Stormwater Management Report and Servicing Brief

Orleans Residential & Medical Facility
3996 Innes Rd, Orleans,
Ottawa, Ontario

Prepared for:

Lou Frangian

Attention: Lou Frangian

LRL File No.: 230737

Rev. July 19, 2024
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5430 Canotek Road | Ottawa, ON, K1J 9G2 | info@lrl.ca | www.lrl.ca | (613) 842-3434

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1 INTRODUCTION AND SITE DESCRIPTION

LRL Associates Ltd. was retained by Lou Frangian to complete a Stormwater Management Analysis and Servicing Brief for the development of a proposed five (5) storeys commercial/residential building with an underground car parking on the subject property located at 3996 Innes Rd, Orleans, Ottawa, Ontario.

The subject property consists of a lot that is legally described as parts of Lot 1, concession 3 (Ottawa Front) in the township of Gloucester. The subject lots are zoned AM11 (Arterial Mainstreet).

Figure 1: Aerial View of Proposed Development

The subject property is trapezoidal shaped and measures approximately 36 m in frontage along Innes Road and 41 m in depth. The total site area is approximately **0.15 ha**.

The proposed development will be constructed in a single phase, which includes a 5-storey apartment building consisting of a total of twenty (20) units with one (1) level of underground parking. Approximately 17 outdoor surface parking spaces are also proposed at the ground level. Refer to ***Site Plan*** included in ***Appendix F*** for more details.

This report has been prepared in consideration of the terms and conditions noted above and with the civil drawings prepared for the new development. Should there be any changes in the design features, which may relate to the stormwater and servicing considerations, LRL Associates Ltd. should be advised to review the report recommendations.

2 EXISTING SITE AND DRAINAGE DESCRIPTION

The subject site measures ***0.15 ha*** and currently consists of a residential dwelling covering 0.05 ha of the site, which will be demolished. Elevations of existing site ranges between 90.88 m at the northwest corner to 89.40 m at the southeast corner of the subject property.

Sewer and watermain mapping, along with as-built information collected from the City of Ottawa indicate the following existing infrastructure located within the adjacent right-of-ways:

Innes Road:

- 610mm diameter DI water main
- 250mm diameter PVC sanitary sewer
- 600mm diameter concrete storm sewer
- 1200 mm diameter concrete storm sewer

3 SCOPE OF WORK

As per applicable guidelines, the scope of work includes the following:

Stormwater management

- Calculate the allowable stormwater release rate.
- Calculate the anticipated post-development stormwater release rates.
- Demonstrate how the target quantity and quality control objectives will be achieved.

Water services

- Calculate the expected water supply demand at average and peak conditions.
- Calculate the required fire flow as per the Fire Underwriters Survey (FUS) method.
- Confirm the adequacy of water supply and pressure during peak flow and fire flow conditions.
- Describe the proposed water distribution network and connection to the existing system.

Sanitary services

- Describe the existing sanitary sewers available to receive wastewater from the proposed building.
- Calculate peak design flow rates from the proposed development.
- Describe the proposed sanitary sewer system.

4 REGULATORY APPROVALS

An MECP Environmental Compliance Approval is not expected to be required for installation of the proposed storm and sanitary sewers within the site. A Permit to Take Water is not anticipated to be required for pumping requirements for sewer installation. The Rideau Valley Conservation Authority will need to be consulted in order to obtain municipal approval for site development. No other approval requirements from other regulatory agencies are anticipated.

5 WATER SUPPLY AND FIRE PROTECTION

5.1 Existing Water Supply Services and Fire Hydrant Coverage

The subject property lies within the City of Ottawa 1E water distribution network pressure zone. There is an existing 610 mm watermain within Innes Road. There are currently two (2) existing fire hydrants within close proximity of the subject property.

5.2 Water Supply Servicing Design

Considering the presence of automatic sprinkler system inside the building and a recommended size to service the sprinkler system, the subject property is proposed to be serviced via a 150 mm diameter service laterals connected to the existing 610 mm diameter watermain located within Innes Rd. Refer to *Site Servicing Plan C401* in ***Appendix E*** for servicing layout and connection points.

Table 1 below summarizes the City of Ottawa Design Guidelines design parameters employed in the preparation of the water demand estimate.

Table 1: City of Ottawa Design Guidelines Design Parameters

Design Parameter	Value
Residential Bachelor / 1 Bedroom Apartment	1.4 P/unit
Residential 2 Bedroom Apartment	2.1 P/unit
Residential 3 Bedroom Apartment	3.1 P/unit
Townhouse	2.7 P/unit
Other Commercial Average Daily Demand	2.8 L/m^2/d
Average Daily Demand	280 L/d/per
Minimum Depth of Cover	2.4 m from top of watermain to finished grade
Desired operating pressure range during Maximum Day Flow	345 kPa (50 psi) and 552 kPa (80 psi)
Minimum allowable pressure during Peak Hour Flow	275 kPa (40 psi)
Minimum allowable pressure during Fire Flow Conditions	140 kPa (20 psi)

The interior layout and architectural floor plans have been reviewed, and it was determined that the building will house 6 one-bedroom units and 14 two-bedroom units. Based on the City of Ottawa Design guidelines for population projection, this translates to approximately 37.8

residents. ***Table 2*** summarizes the proposed development estimated population as interpreted using Table 4.1 of the City of Ottawa Design Guidelines.

Table 2: Residential Population Estimate

Proposed Unit type	Persons Per Unit	Number of Units	Population
1 Bedroom Apartment	1.4	6	8.4
2 Bedroom Apartment	2.1	14	29.4
		Total Residential Population	**37.8**

The required water supply requirements for the residential units in proposed building have been calculated using the following formula:

$$\boldsymbol{Q = (q \times P \times M)}$$

where,
q = average water consumption (L/capita/day)
P = design population (capita)
M = peak factor

The following factors were used in calculations as per Table 3-3 in the MOE Guidelines.

- Maximum Daily Demand Residential Factor = 8.7
- Peak Hour Demand Residential Factor = 13.1

Using the above-mentioned factors and design parameters listed in ***Table 1***, anticipated total demands, including commercial demands, were calculated as follows:

- Average day demand is **0.13** L/s.
- Maximum daily demand is **1.08** L/s, and
- Maximum hour demand is **1.63** L/s.

Refer to ***Appendix B*** for water demand calculations.

The City of Ottawa was contacted to obtain boundary conditions associated with the estimated water demand, ***Table 3*** below summarizes boundary conditions for the proposed development.

Table 3: Summary of Anticipated Demands and Boundary Conditions

Demand Scenario	Anticipated Demand (L/s)	Connection @ Innes Rd* (m H2O / kPa)
Average Daily Demand	0.13	130.3/56.5
Max Day + Fire Flow (per FUS)	**1.08+ 133.3**	**128.6/54.1**
Peak Hour	**1.63**	**127.0/51.8**
*Assumed ground elevation at Innes Rd = 90.54 m		

As indicated in ***Table 3***, pressures in all scenarios meet the required pressure range stated in Table 1 as per City of Ottawa Design Guidelines. Refer to ***Appendix A*** for Boundary Conditions correspondence.

The estimated fire flow for the proposed buildings was calculated in accordance with *ISTB-2018-02*. The following parameters were adopted from the Architectural site plan, see ***Appendix F***:

- Type of construction
- Total floor area (excluding basement)
- Sprinkler protection

The estimated fire flow demand was calculated to be **8,000 L/min**, see ***Appendix B*** for details.

There are two (2) existing fire hydrants near the proposed buildings that are available to provide the required fire flow. ***Table 4*** below summarizes the aggregate fire flow of the contributing fire hydrants in close proximity to the proposed development based on Table 18.5.4.3 of *ISTB-2018-02*.

Table 4: Fire Protection Summary

Building	Fire Flow Demand (L/min)	Fire Hydrants(s) within 75m	Available Combined Fire Flow (L/min)
Proposed 5-storey building	8,000	2	(2 x 5678) = 11,356

The total available fire flow from contributing hydrants is equal to **11,356 L/min** which is sufficient to provide required fire flow for the proposed development. A certified fire protection system

specialist will need to be employed to design the building's fire suppression system and confirm the actual fire flow demand.

The proposed water supply design conforms to all relevant City Guidelines and Policies.

6 SANITARY SERVICE

6.1 Existing Sanitary Sewer Services

There is an existing 250 mm diameter sanitary sewer within Innes Road.

6.2 Sanitary Sewer Servicing Design

The proposed development will be serviced via a 200 mm dia. sanitary service to be connected to the existing 250 mm diameter sanitary sewer within Innes Road. Refer to the *Servicing Plan C401* (***Appendix F*****),** for the proposed sanitary servicing layout.

The parameters used to calculate the anticipated sanitary flows are:

- Residential average population per unit of 1.4 person for single units and 2.1 persons for two-bedroom units
- Residential daily demand of 280 L/p/day, a residential peaking factor of 3.8
- Commercial demand of 28000 L/ha/day, a commercial peaking factor of 1.5
- Total infiltration rate of 0.33 L/s/ha.

Based on these parameters and the total site area of 0.152 ha (including 0.036 ha commercial area), the total anticipated wet wastewater flow was estimated **0.53 L/s**. Refer to ***Appendix C*** for the sanitary sewer design sheet.

7 STORMWATER MANAGEMENT

7.1 Existing Stormwater Infrastructure

Stormwater runoff from the subject property is tributary to the City of Ottawa sewer systems. As such, approvals for the proposed development within this area are under the approval authority of the City of Ottawa.

In pre-development conditions, drainage from the subject site is depicted by existing catchment areas ECA-01 (0.043 ha) and ECA-02 (0.108 ha).

- ECA-01 drains uncontrolled overland towards ECA-02.
- ECA-02 drains uncontrolled overland towards south which will eventually outlet to the existing ditch inlet catch basin located near the southeast corner of the site.

Refer to the *Pre-development Watershed Plan C701* included in ***Appendix E*** for pre-development drainage characteristics. There are currently an existing 600 mm dia. concrete (located easterly) and 1200 mm dia. concrete (located westerly) storm sewers within the Innes Rd ROW.

7.2 Design Criteria

The stormwater management criteria for this development are based on the pre-consultation with City of Ottawa officials, the City of Ottawa Sewer Design Guidelines (2012) as well as the Ministry of the Environment's Stormwater Management Planning and Design Manual, 2003.

7.2.1 Water Quality

The subject property lies within the Ottawa River East sub-watershed and is therefore subject to review by the Rideau Valley Conservation Authority (RVCA). It was determined that an enhanced level of treatment (80% TSS Removal) is required for stormwater runoff from the proposed development.

7.2.2 Water Quantity

Based on the City requirements, the following stormwater management quantity control requirements were identified for the subject site:

- Meet an allowable release rate based on a Rational Method runoff coefficient of 0.5 or lower based on existing condition, employing the City of Ottawa IDF parameters for a 5-year storm.

- Attenuate all storms up to and including the City of Ottawa 100-year storm event on site.

Utilizing the above parameters, the total allowable storm release rate was calculated to be **17.45 L/s**. Refer to ***Appendix D*** for calculations.

7.3 Method of Analysis

The Modified Rational Method has been used to calculate the runoff rate from the site and to quantify the detention storage required for quantity control. Refer to the design sheets included in ***Appendix D*** for storage calculations.

7.4 Proposed Stormwater Quantity Controls

The proposed stormwater management quantity control for this development will be accomplished using controlled catchment areas with an Inlet Control Device (ICD) to be installed at the downstream manhole (MH03). Storage required, as a result of quantity control measure, will be accomplished through a combination of parking lot surface storage and underground storage in oversized storm sewers/catch basin/manhole. Briefly, in post-development condition, the site will have six (6) catchments as outlined below.

- *Catchment CA-01* (0.007 ha) consisting of an outdoor amenity area will be captured by a catchbasin (CB01).
- *Catchment CA-02* (0.105 ha) consisting of roof and parking lot will be captured by a catchbasin manhole (CBMH02). The roof drains remain uncontrolled and flow from downspout will be directed towards the parking lot, eventually captured by CBMH02.
- *Catchment CA-03* (0.012 ha) consisting of ramp area will flow uncontrolled to the trench drain located at the bottom of the ramp. The captured flow will be connected to sump

pump through the building's mechanical system and discharged on surface towards the parking lot, eventually captured by CBMH02.

- *Catchment CA-04* (0.005 ha) consisting of grass and landscaping area in the west end of site, will flow uncontrolled off the site as it did in pre-development condition.
- *Catchment CA-05* (0.013 ha) consisting of grass and landscaping area in the south end of site, will flow uncontrolled off the site as it did in pre-development condition.
- *Catchment CA-06* (0.009 ha) consisting of grass and landscaping area in the north end of site, will flow uncontrolled off the site towards Innes Rd right-of-way.

The subject site is proposed to be serviced via CB and CBMH in the landscape and parking lot area that collect and direct runoff to MH03, where it is controlled to an allowable release rate established in Section 7.2.2 above by using an ICD Hydrovex 100 VHV-1 (or approved equivalent). A proposed 250 mm diameter free-flowing storm sewer pipe will discharge controlled flows to the proposed Oil/Grit Separator (OGS) which will eventually outlet to the existing 1200 mm diameter storm sewer within Innes Rd. The proposed servicing layout and connection points are shown on drawing C401 in ***Appendix E,*** and detailed calculations can be found in ***Appendix D***. ***Table 5*** below summarizes post-development drainage areas, calculations can be found in ***Appendix D.***

Table 5: Drainage Areas and Runoff Coefficient

Catchment	Area (ha)	Weighted Runoff Coefficient (C)	100 Year Weighted Runoff Coefficient (25% increase)
CA-01 (Controlled)	0.007	0.42	0.53
CA -02 (Controlled)	0.105	0.87	1.00
CA -03 (Controlled)	0.012	0.90	1.00
CA -04 (Uncontrolled)	0.005	0.20	0.25
CA -05 (Uncontrolled)	0.013	0.36	0.45
CA -06 (Uncontrolled)	0.009	0.36	0.44

Table 6 below summarizes the release rates and storage volumes required to meet the allowable release rate of **17.45 L/s** for 100-year flow rates.

Table 6: Stormwater Release Rate & Storage Volume Summary (100 Year)

Catchment	Area (ha)	100-year Release Rate (L/s)	100-Year Required Storage (m^3)	Available Surface Storage (m^3)
CA-01 to CA-03 (Controlled)	0.124	11.87	35.93	36.38
CA-04 to CA-06 (Uncontrolled)	0.027	5.57	N/A	N/A
Total	**0.152**	**17.45**	**35.93**	**36.38**

To attenuate flows to the allowable release rate of **17.45 L/s**, it is calculated that a total of **35.93 m^3** of storage will be required for the 100-year storm event. The required storage is proposed to be met via surface ponding in the paved parking lot. The 100-year maximum ponding extent can be found on *Stormwater Management Plan C601* in ***Appendix E***.
The required storage for 2-year storm will be accommodated underground in oversized storm sewers and catchbasin/manhole structures. As such, no surface ponding occurs during 2-year storm event. Detail calculations can be found in ***Appendix D.***

To meet stormwater quality control objective, a **Stormceptor EF04** Oil/Grit Separator is proposed which will provide an enhanced level of treatment (i.e.,80% TSS removal). Refer to *Servicing Plan C401* for location of OGS and **Appendix D** for sizing report and specifications.

8 EROSION AND SEDIMENT CONTROL

During construction, erosion and sediment controls will be provided primarily via a sediment control fence to be erected along the perimeter of the site where runoff has the potential of leaving the site. Inlet sediment control devices are also to be provided in any catch basin and/or manholes in and around the site that may be impacted by the site construction. Construction and maintenance requirements for erosion and sediment controls are to comply with Ontario Provincial Standard Specification OPSS.MUNI 805. Refer to drawing C101 for erosion and sediment control details.

9 CONCLUSION

This Stormwater Management and Servicing Report for the development proposed at 3996 Innes Road presents the rationale and details for the servicing requirements for the subject property.

In accordance with the report objectives, the servicing requirements for the development are summarized below:

Water Service

- The maximum required fire flow was calculated at **8,000 L/min**, using the FUS method.
- There are two existing fire hydrants available to service the proposed development. They will provide a combined fire flow of **11,356 L/min** to the site.
- The proposed development will be serviced with a 150 mm dia. water service connection to be connected to the existing 600 mm dia. watermain within Innes Rd.
- Boundary conditions received from the City of Ottawa indicate that sufficient pressure is available to service the proposed site.

Sanitary Service

- The total anticipated wastewater design flow from the proposed development is **0.53 L/s.**
- The proposed development will discharge to the existing 250 mm dia. sanitary sewer within Innes Road via a proposed 200 mm diameter sanitary service lateral.

Stormwater Management

- An OGS is proposed to meet the required water quality control objective of 80% TSS removal.
- The stormwater release rates from the proposed development will meet calculated allowable release rate of **17.45 L/s.**
- Stormwater quantity control objectives will be met using an inlet control device and on-site storm water storage in the parking lot and underground storage in oversized storm sewers.

10 REPORT CONDITIONS AND LIMITATIONS

The report conclusions are applicable only to this specific project described in the preceding pages. Any changes, modifications or additions will require a subsequent review by LRL Associates Ltd. to ensure the compatibility with the recommendations contained in this document.

If you have any questions or comments, please contact the undersigned.

Prepared by:
LRL Associates Ltd.

Maxime Longtin
Civil Engineering Technologist

Mohan Basnet, P.Eng.
Civil Engineer

APPENDIX A

Pre-consultation / Correspondence

Mohan Basnet

From: Fadel, Rafic <rafic.fadel@ottawa.ca>
Sent: January 3, 2024 3:31 PM
To: Maxime Longtin
Cc: Mohan Basnet; Boughton, Michael; Polyak, Alex
Subject: RE: 3996 Innes Rd (City File# D07-12-21-0209)
Attachments: RE: 3996 Innes Rd (City File# D07-12-21-0209)

Good afternoon,

Please find below the results for the water boundary conditions.

Results

Connection 1 – Innes Road

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	130.3	56.5
Peak Hour	127.0	51.8
Max Day plus Fire Flow #1	128.6	54.1
[1] Ground Elevation =	90.54	m

Notes

1. Service connection to 610 mm backbone watermain was consulted with Drinking Water Services.

Disclaimer

The boundary condition information is based on current operation of the city water distribution system. The computer model simulation is based on the best information available at the time. The operation of the water distribution system can change on a regular basis, resulting in a variation in boundary conditions. The physical properties of watermains deteriorate over time, as such must be assumed in the absence of actual field test data. The variation in physical watermain properties can therefore alter the results of the computer model simulation. Fire Flow analysis is a reflection of available flow in the watermain; there may be additional restrictions that occur between the watermain and the hydrant that the model cannot take into account.

Please note that **Drinking Water Services** will need to be circulated when the application is submitted.

Thank you,

Rafic Fadel
Engineering Intern
Planning, Real Estate and Economic Development Department
Development Review - East Branch
City of Ottawa | Ville d'Ottawa
110 Laurier Avenue West Ottawa, ON | 110, avenue. Laurier Ouest. Ottawa (Ontario) K1P 1J1

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APPENDIX B

Water Supply Calculations

Water Supply Calculations

LRL File No.	230737
Project:	3996 Innes Rd, Orleans, ON
Prepared by	M Basnet
Date	December 22, 2023

Residential Demand based on the City of Ottawa Design Guidelines-Water Distribution, 2010

Unit Type	Persons Per Unit	Number of Units	Population
1 Bedroom Apartment	1.4	6	8.4
2 Bedroom Apartment	2.1	14	29.4
	Total	**20**	**37.8**

Average Water Consumption Rate	280	L/c/d		
Average Day Demand	**10,584**	**L/d**	**0.12**	**L/s**
Maximum Day Factor	8.7		(MOE Table 3-3)	
Maximum Daily Demand	**91,768**	**L/d**	**1.06**	**L/s**
Peak Hour Factor	13.1		(MOE Table 3-3)	
Maximum Hour Demand	**138,233**	**L/d**	**1.60**	**L/s**

Institutional / Commercial / Industrial Demand			
Property Type	**Demand (L/ha/d)**	**Area (ha)**	**Demand (L/d)**
Commercial	28000	0.036	1008.0

Average Day Demand	**1,008**	**L/d**	**0.012**	**L/s**
Maximum Day Factor	1.5		(Design Guidelines-Water Distribution Table 4.2)	
Maximum Daily Demand	**1,512**	**L/d**	**0.018**	**L/s**
Peak Hour Factor	1.8		(Design Guidelines-Water Distribution Table 4.2)	
Maximum Hour Demand	**2,722**	**L/d**	**0.032**	**L/s**

TOTAL DEMAND				
Average Day Demand	**11,592**	**L/d**	**0.13**	**L/s**
Maximum Daily Demand	**93,280**	**L/d**	**1.08**	**L/s**
Maximum Hour Demand	**140,955**	**L/d**	**1.63**	**L/s**

Water Service Pipe Sizing

Q = VA

Where: V = velocity
A = area of pipe
Q = flow rate

Assuming a maximum velocity of 1.8m/s, the diameter of pipe is calculated as:

Minimum pipe diameter (d) =	$(4Q/\pi V)^{1/2}$	
=	0.034	m
=	34	mm
Proposed pipe diameter (d) =	**150**	mm
(considering sprinkler system)		

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Fire Flow Calculations

LRL File No.	230737
Location	3996 Innes Rd, Orleans, ON
Method	Fire Underwriters Survey (FUS)
Prepared by	M Basnet
Date	December 22, 2023

Step	Task	Term	Options	Multiplier	Choose:	Value	Unit	Fire Flow
Structural Framing Material								
1	Choose frame used for building	Coefficient C related to the type of construction	Wood Frame	1.5	Non-combustible construction	**0.8**		
			Ordinary Construction	1.0				
			Non-combustible construction	0.8				
			Fire resistive construction <2 hrs	0.7				
			Fire resistive construction >2 hrs	0.6				
Floor Space Area (A)								
2	Total area					**2,413**	m^2	
3	Obtain fire flow before reductions	Required fire flow *(rounded to nearest 1,000 L/min)*	Fire Flow = 220 x C x $A^{0.5}$				L/min	**9,000**
Reductions or surcharge due to factors affecting burning								
4	Choose combustibility of contents	Occupancy hazard reduction or surcharge	Non-combustible	-25%	Limited combustible	**-15%**	L/min	**7,650**
			Limited combustible	-15%				
			Combustible	0%				
			Free burning	15%				
			Rapid burning	25%				
5	Choose reduction for sprinklers	Sprinkler reduction	Full automatic sprinklers	-30%	True	**-30%**	L/min	**4,590**
			Water supply is standard for both the system and fire department hose lines	-10%	True	**-10%**		
			Fully supervised system	-10%	False	**0%**		
6	Choose separation	Exposure distance between units	North side	>30m	0%		L/min	**8,033**
			West side	10.1 to 20m	15%			
			East side	10.1 to 20m	15%			
			South side	10.1 to 20m	15%	**45%**		
Net required fire flow								
7	Obtain fire flow, duration, and volume				Minimum required fire flow rate (rounded to nearest 1000)		L/min	**8,000**
					Minimum required fire flow rate		L/s	**133.3**
					Required duration of fire flow		hr	**2**

APPENDIX C

Sanitary Calculations

LRL File No. 230737
Project: Orleans Residential & Medical Facility
Location: 3996 Innes Rd
Date: July 19, 2024

Sanitary Design Parameters

Average Daily Flow = 280 L/p/day
Commercial & Institutional Flow = 28000 L/ha/day
Light Industrial Flow = 35000 L/ha/day
Heavy Industrial Flow = 55000 L/ha/day
Maximum Residential Peak Factor = 4.0
Commercial & Institutional Peak Factor = 1.5
Industrial Peak Factor = as per Appendix 4-B
Extraneous Flow = 0.33L/s/gross ha

Pipe Design Parameters

Maximum Velocity = 3.00 m/s
Minimum Velocity = 0.60 m/s
Manning's n = 0.013

LOCATION			RESIDENTIAL AREA AND POPULATION						COMMERCIAL		INDUSTRIAL			INSTITUTIONAL		C+I+I	INFILTRATION			TOTAL FLOW (l/s)	PIPE						
STREET	FROM MH	TO MH	AREA (Ha)	POP.	CUMMULATIVE AREA (Ha)	CUMMULATIVE POP.	PEAK FACT.	PEAK FLOW (l/s)	AREA (Ha)	ACCU. AREA (Ha)	AREA (Ha)	ACCU. AREA (Ha)	PEAK FACT.	AREA (Ha)	ACCU. AREA (Ha)	PEAK FLOW (l/s)	TOTAL AREA (Ha)	ACCU. AREA (Ha)	INFILT. FLOW (l/s)		LENGTH (m)	DIA. (mm)	SLOPE (%)	MATERIAL	CAP. (FULL) (l/s)	VEL. (FULL) (m/s)	RATIO Q /QFULL
	BLDG/STUB	SAN MH01	0.116	37.8	0.12	37.8	3.8	0.47	0.036	0.036						0.02	0.152	0.152	0.05	0.53	1.0	200	2.00%	PVC	46.38	1.48	0.01
Innes Road	SAN MH01	*CR-03*																		0.53	12.0	200	2.00%	PVC	46.38	1.48	0.01
Innes Road	*CR-03*	*EX. SAN*																		0.53	5.9	200	5.42%	PVC	76.36	2.43	0.01

NOTES: Existing inverts and slopes are estimated. They are to be confirmed on-site.

Designed: MB/ML	PROJECT: Orleans Residential & Medical Facility	
Checked: MB	LOCATION: 3996 Innes Rd	
Dwg. Reference: C.401	File Ref.: 230737	Date: 2024-07-19 / Sheet No. 1 of 1

APPENDIX D

Stormwater Management Calculations
Hydrovex ICD
Stormceptor OGS

LRL Associates Ltd.
Storm Watershed Summary

LRL File No.	230737
Project:	Orleans Residential & Medical Facility
Location:	3996 Innes Rd, Ottawa
Date:	July 12, 2024
Designed:	Maxime Longtin
Drawing Reference:	C701/C702

Pre-Development Catchments

CATCHMENT	C = 0.2	C = 0.80	C = 0.90	Total Area (m^2)	Total Area (ha)	Combined C
ECA-01	212	0	221	433.0	0.043	0.56
ECA-02	878	0	206	1084.0	0.108	0.33
TOTAL	**1090.0**	**0.0**	**427.0**	**1517.0**	**0.152**	**0.40**

Post-Development Catchments

CATCHMENT	C = 0.20	C = 0.80	C = 0.90	Total Area (m^2)	Total Area (ha)	Combined C
CA-01 (Controlled)	47	0	22	69.0	0.007	0.42
CA-02 (Controlled)	50	0	1001	1051.0	0.105	0.87
CA-03 (Controlled)	0	0	121	121.0	0.012	0.90
CA-04 (Uncontrolled)	50	0	0	50.0	0.005	0.20
CA-05 (Uncontrolled)	104	0	30	134.0	0.013	0.36
CA-06 (Uncontrolled)	70	0	20	90.0	0.009	0.36
TOTAL	**321.0**	**0.0**	**1194.0**	**1515.0**	**0.152**	**0.75**

LRL File No. 230737
Project: Orleans Residential & Medical Facility
Location: 3996 Innes Rd
Date: July 11, 2024
Designed: M. Basnet
Drawing Ref.: C.601

Stormwater Management Design Sheet

STM-100 Year

Runoff Equation

Q = 2.78CIA (L/s)
C = Runoff coefficient
I = Rainfall intensity (mm/hr) = $A / (Td + C)^B$
A = Area (ha)
T_d = Time of duration (min)

Pre-development Stormwater Management

$I_{100} = 1735.688 / (Td + 6.014)^{0.820}$ **A = 1735.688** **B = 0.820** **C = 6.014**

C =	0.40	
I =	178.6	mm/hr
Tc =	10	min
Total Area =	0.152	ha
100 Year Release Rate=	**29.90**	L/s
Allowable Release Rate=	**17.45**	L/s (5 Year Pre-development Flow)

Post-development Stormwater Management

					$\sum R_{2\&5}$	$\sum R_{100}$
	Total Site Area =	**0.152**	ha	**∑R=**	**0.75**	**0.94**
Controlled	CA-01 (Controlled)	0.007	ha	R=	0.42	0.53
	CA-02 (Controlled)	0.105	ha	R=	0.87	1.00
	CA-03 (Controlled)	0.012	ha	R=	0.90	1.00
	Total Controlled =	**0.124**	**ha**	**∑R=**	**0.85**	**1.00**
Uncontrolled	CA-04 (Uncontrolled)	0.005	ha	R=	0.20	0.25
	CA-05 (Uncontrolled)	0.013	ha	R=	0.36	0.45
	CA-06 (Uncontrolled)	0.009	ha	R=	0.36	0.44
	Total Uncontrolled =	**0.027**	**ha**	**∑R=**	**0.33**	**0.41**

Post-development Stormwater Management

100 Year Storm Event:

$I_{100} = 1735.688 / (Td + 6.014)^{0.820}$ **A = 1735.688** **B = 0.820** **C = 6.014**

		Storage Required				
Time (min)	**Intensity (mm/hr)**	**Controlled Runoff (L/s)**	**Storage Volume (m^3)**	**Controlled Release Rate (L/s)**	**Uncontrolled Runoff (L/s)**	**Total Release Rate (L/s)**
10	178.6	61.60	29.84	11.87	5.57	17.45
15	142.9	49.30	33.68	11.87	4.46	16.33
20	120.0	41.38	35.41	11.87	3.74	15.62
25	103.8	35.83	35.93	11.87	3.24	15.11
30	91.9	31.69	35.68	11.87	2.87	14.74
35	82.6	28.49	34.89	11.87	2.58	14.45
40	75.1	25.92	33.72	11.87	2.34	14.22
45	69.1	23.82	32.26	11.87	2.15	14.03
50	64.0	22.06	30.57	11.87	2.00	13.87
60	55.9	19.28	26.67	11.87	1.74	13.62
70	49.8	17.18	22.27	11.87	1.55	13.43
80	45.0	15.52	17.51	11.87	1.40	13.28
90	41.1	14.18	12.47	11.87	1.28	13.16
100	37.9	13.08	7.21	11.87	1.18	13.06
110	35.2	12.14	1.79	11.87	1.10	12.97
120	32.9	11.35	0.00	11.87	1.03	12.90

Total Storage Required = 35.93 m^3
Available Surface Storage = 36.38 m^3 (See DWG C601)

LRL File No. 230737
Project: Orleans Residential & Medical Facility
Location: 3996 Innes Rd
Date: July 11, 2024
Designed: M. Basnet
Drawing Ref.: C.601

Stormwater Management Design Sheet

STM-5 Year

Runoff Equation

Q = 2.78CIA (L/s)
C = Runoff coefficient
I = Rainfall intensity (mm/hr) = A / (Td + C)^{B}
A = Area (ha)
T_d = Time of duration (min)

Pre-development Stormwater Management

I_5 = 998.071 / (Td + 6.053)$^{0.814}$ **A =** 998.071 **B =** 0.814 **C =** 6.053

C =	0.40	
I =	104.2	mm/hr
Tc =	10	min
Total Area =	0.152	ha
5 Year Release Rate=	**17.45**	**L/s**

(Allowable Release Rate)

Post-development Stormwater Management

					$\sum R_{2\&5}$
	Total Site Area =	**0.152**	ha	**∑R=**	**0.75**
Controlled	CA-01 (Controlled)	0.007	ha	R=	0.42
	CA-02 (Controlled)	0.105	ha	R=	0.87
	CA-03 (Controlled)	0.012	ha	R=	0.90
	Total Controlled =	**0.124**	**ha**	**∑R=**	**0.85**
Uncontrolled	CA-04 (Uncontrolled)	0.005	ha	R=	0.20
	CA-05 (Uncontrolled)	0.013	ha	R=	0.36
	CA-06 (Uncontrolled)	0.009	ha	R=	0.36
	Total Uncontrolled =	**0.027**	**ha**	**∑R=**	**0.33**

Post-development Stormwater Management

5 Year Storm Event:

I_5 = 998.071 / (Td + 6.053)$^{0.814}$ **A =** 998.071 **B =** 0.814 **C =** 6.053

		Storage Required				
Time (min)	Intensity (mm/hr)	Controlled Runoff (L/s)	Storage Volume (m^3)	Controlled Release Rate (L/s)	Uncontrolled Runoff (L/s)	Total Release Rate (L/s)
10	104.2	30.38	11.11	11.87	2.60	14.48
15	83.6	24.37	11.24	11.87	2.09	13.96
20	70.3	20.49	10.34	11.87	1.75	13.63
25	60.9	17.76	8.83	11.87	1.52	13.39
30	53.9	15.73	6.93	11.87	1.35	13.22
35	48.5	14.15	4.78	11.87	1.21	13.09
40	44.2	12.89	2.43	11.87	1.10	12.98
45	40.6	11.85	0.00	11.87	1.01	12.89
50	37.7	10.98	0.00	11.87	0.94	12.81
60	32.9	9.61	0.00	11.87	0.82	12.70
70	29.4	8.57	0.00	11.87	0.73	12.61
80	26.6	7.75	0.00	11.87	0.66	12.54
90	24.3	7.08	0.00	11.87	0.61	12.48
100	22.4	6.53	0.00	11.87	0.56	12.43
110	20.8	6.07	0.00	11.87	0.52	12.39
120	19.5	5.68	0.00	11.87	0.49	12.36

Total Storage Required = 11.24 m^3

LRL File No.	230737
Project:	Orleans Residential & Medical Facility
Location:	3996 Innes Rd
Date:	July 11, 2024
Designed:	M Basnet
Drawing Ref.:	C.601

Stormwater Management Design Sheet

STM-2 Year

Runoff Equation

Q = 2.78CIA (L/s)
C = Runoff coefficient
I = Rainfall intensity (mm/hr) = $A / (Td + C)^B$
A = Area (ha)
T_d = Time of duration (min)

Pre-development Stormwater Management

I_2 = 732.951 / (Td + 6.199)$^{0.810}$ **A = 732.951** **B = 0.810** **C = 6.199**

C =	0.40	
I =	76.8	mm/hr
Tc =	10	min
Total Area =	0.152	ha
2 Year Release Rate=	**12.86**	L/s

Post-development Stormwater Management

					$\sum R_{2\&5}$
	Total Site Area =	**0.152**	ha	**ΣR=**	**0.75**
Controlled	CA-01 (Controlled)	0.007	ha	R=	0.42
	CA-02 (Controlled)	0.105	ha	R=	0.87
	CA-03 (Controlled)	0.012	ha	R=	0.90
	Total Controlled =	**0.124**	**ha**	**ΣR=**	**0.85**
Uncontrolled	CA-04 (Uncontrolled)	0.005	ha	R=	0.20
	CA-05 (Uncontrolled)	0.013	ha	R=	0.36
	CA-06 (Uncontrolled)	0.009	ha	R=	0.36
	Total Uncontrolled =	**0.027**	**ha**	**ΣR=**	**0.33**

Post-development Stormwater Management

2 Year Storm Event:

I_2 = 732.951 / (Td + 6.199)$^{0.810}$ **A = 732.951** **B = 0.810** **C = 6.199**

		Storage Required				
Time (min)	**Intensity (mm/hr)**	**Controlled Runoff (L/s)**	**Storage Volume (m^3)**	***Controlled Release Rate (L/s)**	**Uncontrolled Runoff (L/s)**	**Total Release Rate (L/s)**
10	76.8	22.40	9.88	5.94	1.92	7.85
15	61.8	18.01	10.87	5.94	1.54	7.48
20	52.0	15.17	11.08	5.94	1.30	7.24
25	45.2	13.17	10.85	5.94	1.13	7.06
30	40.0	11.68	10.33	5.94	1.00	6.94
35	36.1	10.52	9.62	5.94	0.90	6.84
40	32.9	9.58	8.75	5.94	0.82	6.76
45	30.2	8.82	7.78	5.94	0.75	6.69
50	28.0	8.18	6.72	5.94	0.70	6.64
60	24.6	7.16	4.41	5.94	0.61	6.55
70	21.9	6.39	1.90	5.94	0.55	6.48
90	18.1	5.29	0.00	5.94	0.45	6.39
110	15.6	4.54	0.00	5.94	0.39	6.33
130	13.7	3.99	0.00	5.94	0.34	6.28
150	12.3	3.57	0.00	5.94	0.31	6.24
170	11.1	3.24	0.00	5.94	0.28	6.21

* Controlled release rate reduced to 50% for underground storage calculations

Total Storage Required = 11.08 m^3
Available Underground Storage = 11.53 m^3

Underground Storage

Oversized Pipe	**dia (m)**	**A(m^2)**	**L(m)**	**V(m^3)**
STM Sewer (CB01-CBMH02)	0.525	0.216	17.8	3.85
STM Sewer (CBMH02-MH03)	0.525	0.216	14.3	3.10
			Total	**6.95**
CBMH	**dia (m)**	**A(m^2)**	**H(m)**	**V(m^3)**
MH03	1.2	1.131	1.82	2.06
CBMH02	1.2	1.131	1.72	1.95
CB01	0.6*0.6	0.360	1.60	0.58
			Total	**4.58**

LRL Associates Ltd.

Storm Design Sheet

LRL File No.	230737
Project:	Orleans Residential & Medical Facility
Location:	3996 Innes Rd, Ottawa
Date:	July 12, 2024
Designed:	M. Basnet
Drawing Reference:	C.401

Storm Design Parameters

Rational Method Q = 2.78CIA

Q = Peak flow in litres per second (L/s)
A = Drainage area in hectares (ha)
C = Runoff coefficient
I = Rainfall intensity (mm/hr)

Runoff Coefficient (C)

Grass	0.20
Gravel	0.80
Asphalt / rooftop	0.90

Ottawa Macdonald-Cartier International Airport IDF curve equation (5 year event, intensity in mm/hr)

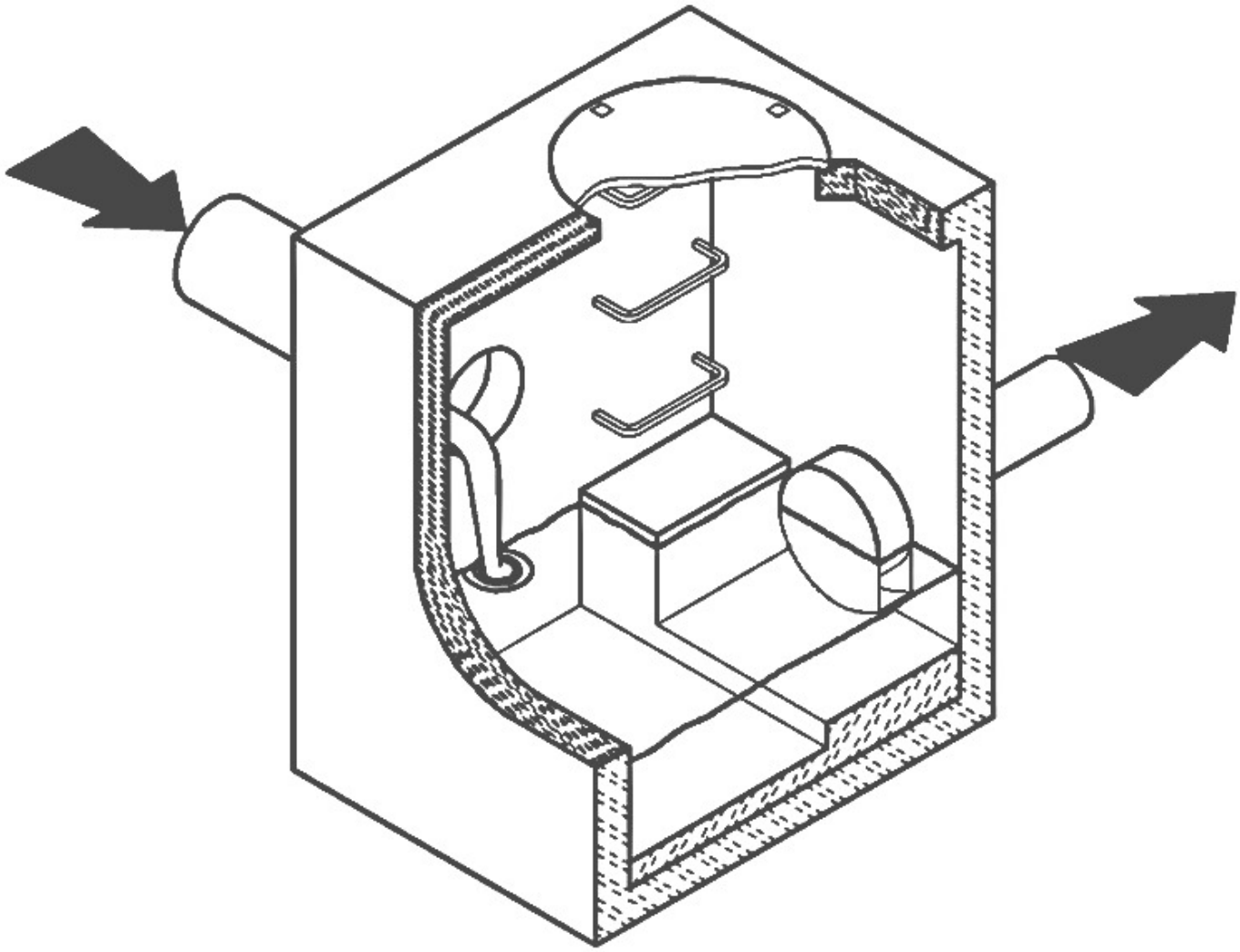
$$I_5 = 998.071 / (Td + 6.053)^{0.814}$$

Min. velocity = 0.80 m/s
Manning's "n" = 0.013

LOCATION			AREA (ha)			FLOW						STORM SEWER							
WATERSHED / STREET	From MH	To MH	C = 0.20	C = 0.80	C = 0.90	Indiv. 2.78AC	Accum. 2.78AC	Time of Conc. (min.)	Rainfall Intensity (mm/hr)	Peak Flow Q (L/s)	Controlled Flow Q (L/s)	Pipe Diameter (mm)	Type	Slope (%)	Length (m)	Capacity Full (L/s)	Velocity Full (m/s)	Time of Flow (min.)	Ratio (Q/Q_{FULL})
CA-01	CB01	CBMH02	0.005	0.000	0.002	0.008	0.01	10.00	104.2	0.85		525	PVC	0.50%	17.8	304.1	1.40	0.21	0.00
CA-02 & CA-03	CBMH02	MH03	0.005	0.000	0.112	0.284	0.29	10.21	103.1	30.06		525	PVC	0.50%	14.3	304.1	1.40	0.17	0.10
	MH03	OGS					0.29	10.38	102.2	29.81	11.87	250	PVC	1.00%	1.9	59.5	1.21	0.03	0.20
	OGS	Ex. STM					0.29	10.41	102.1	29.77	11.87	250	PVC	1.00%	19.0	59.5	1.21	0.26	0.20

CSO/STORMWATER MANAGEMENT

HYDROVEX® VHV / SVHV
Vertical Vortex Flow Regulator



JOHN MEUNIER

APPLICATIONS

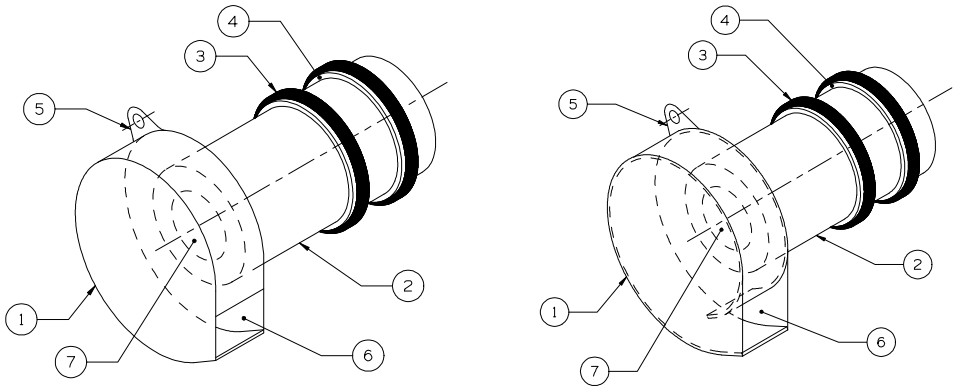
One of the major problems of urban wet weather flow management is the runoff generated after a heavy rainfall. During a storm, uncontrolled flows may overload the drainage system and cause flooding. Due to increased velocities, sewer pipe wear is increased dramatically and results in network deterioration. In a combined sewer system, the wastewater treatment plant may also experience significant increases in flows during storms, thereby losing its treatment efficiency.

A simple means of controlling excessive water runoff is by controlling excessive flows at their origin (manholes). **John Meunier Inc.** manufactures the **HYDROVEX® VHV / SVHV** line of vortex flow regulators to control stormwater flows in sewer networks, as well as manholes.

The vortex flow regulator design is based on the fluid mechanics principle of the forced vortex. This grants flow regulation without any moving parts, thus reducing maintenance. The operation of the regulator, depending on the upstream head and discharge, switches between orifice flow (gravity flow) and vortex flow. Although the concept is quite simple, over 12 years of research have been carried out in order to get a high performance.

The **HYDROVEX® VHV / SVHV** Vertical Vortex Flow Regulators **(refer to Figure 1)** are manufactured entirely of stainless steel, and consist of a hollow body (**1**) (in which flow control takes place) and an outlet orifice (**7**). Two rubber "O" rings (**3**) seal and retain the unit inside the outlet pipe. Two stainless steel retaining rings (**4**) are welded on the outlet sleeve to ensure that there is no shifting of the "O" rings during installation and use.

1. BODY
2. SLEEVE
3. O-RING
4. RETAINING RINGS (SQUARE BAR)
5. ANCHOR PLATE
6. INLET
7. OUTLET ORIFICE



VHV *SVHV*

FIGURE 1: HYDROVEX® VHV-SVHV VERTICAL VORTREX FLOW REGULATORS

ADVANTAGES

- The **HYDROVEX® VHV / SVHV** line of flow regulators are manufactured entirely of stainless steel, making them durable and corrosion resistant.
- Having no moving parts, they require minimal maintenance.
- The geometry of the **HYDROVEX® VHV / SVHV** flow regulators allows a control equal to an orifice plate, having a cross section area 4 to 6 times smaller. This decreases the chance of blockage of the regulator, due to sediments and debris found in stormwater flows. **Figure 2** illustrates the comparison between a regulator model 100 SVHV-2 and an equivalent orifice plate. One can see that for the same height of water, the regulator controls a flow approximately four times smaller than an equivalent orifice plate.
- Installation of the **HYDROVEX® VHV / SVHV** flow regulators is quick and straightforward and is performed after all civil works are completed.
- Installation requires no special tools or equipment and may be carried out by any contractor.
- Installation may be carried out in existing structures.

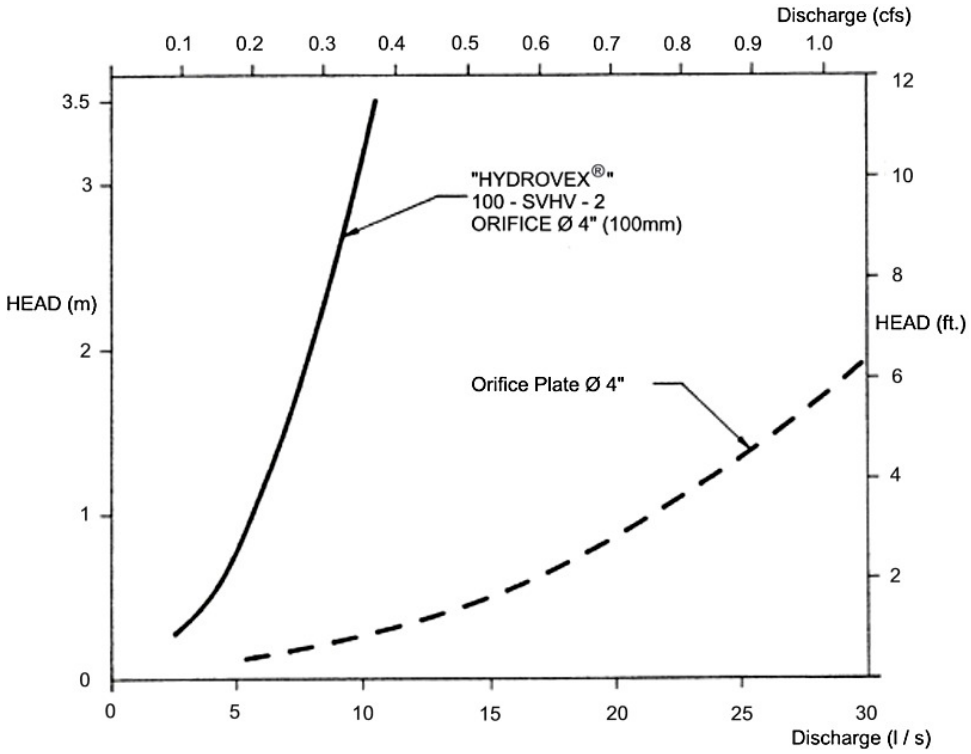


FIGURE 2: DISCHARGE CURVE SHOWING A HYDROVEX® FLOW REGULATOR VS AN ORIFICE PLATE

SELECTION

Selection of a **VHV or SVHV** regulator can be easily made using the selection charts found at the back of this brochure (see **Figure 3**). These charts are a graphical representation of the maximum upstream water pressure (head) and the maximum discharge at the manhole outlet. The maximum design head is the difference between the maximum upstream water level and the invert of the outlet pipe. All selections should be verified by John Meunier Inc. personnel prior to fabrication.

Example:

✓ Maximum design head	2m (6.56 ft.)
✓ Maximum discharge	6 L/s (0.2 cfs)
✓ Using **Figure 3** - VHV	model required is a **75 VHV-1**

INSTALLATION REQUIREMENTS

All **HYDROVEX® VHV / SVHV** flow regulators can be installed in circular or square manholes. **Figure 4** gives the various minimum dimensions required for a given regulator. ***It is imperative to respect the minimum clearances shown to ensure easy installation and proper functioning of the regulator.***

SPECIFICATIONS

In order to specify a **HYDROVEX®** regulator, the following parameters must be defined:

- The model number (ex: 75-VHV-1)
- The diameter and type of outlet pipe (ex: 6" diam. SDR 35)
- The desired discharge (ex: 6 l/s or 0.21 CFS)
- The upstream head (ex: 2 m or 6.56 ft.) *
- The manhole diameter (ex: 36" diam.)
- The minimum clearance "H" (ex: 10 inches)
- The material type (ex: 304 s/s, 11 Ga. standard)

* ***Upstream head is defined as the difference in elevation between the maximum upstream water level and the invert of the outlet pipe where the HYDROVEX® flow regulator is to be installed.***

PLEASE NOTE THAT WHEN REQUESTING A PROPOSAL, WE SIMPLY REQUIRE THAT YOU PROVIDE US WITH THE FOLLOWING:

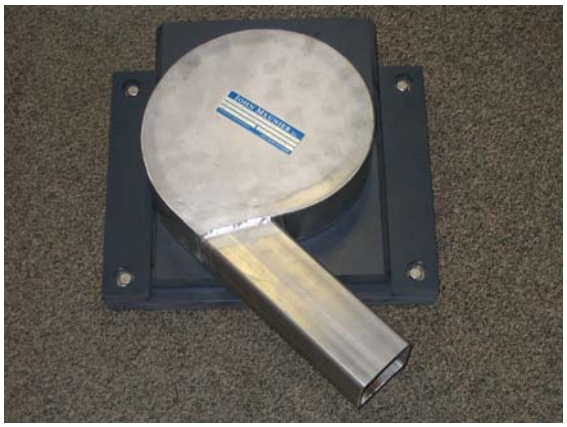
- ***project design flow rate***
- ***pressure head***
- ***chamber's outlet pipe diameter and type***

Typical VHV model in factory

OPTIONS

FV – SVHV (mounted on sliding plate)

VHV-1-O (standard model with odour control inlet)



FV – VHV-O (mounted on sliding plate with odour control inlet)

VHV with Gooseneck assembly in existing chamber without minimum release at the bottom

VHV with air vent for minimal slopes

HYDROVEX®

VHV Vertical Vortex Flow Regulator

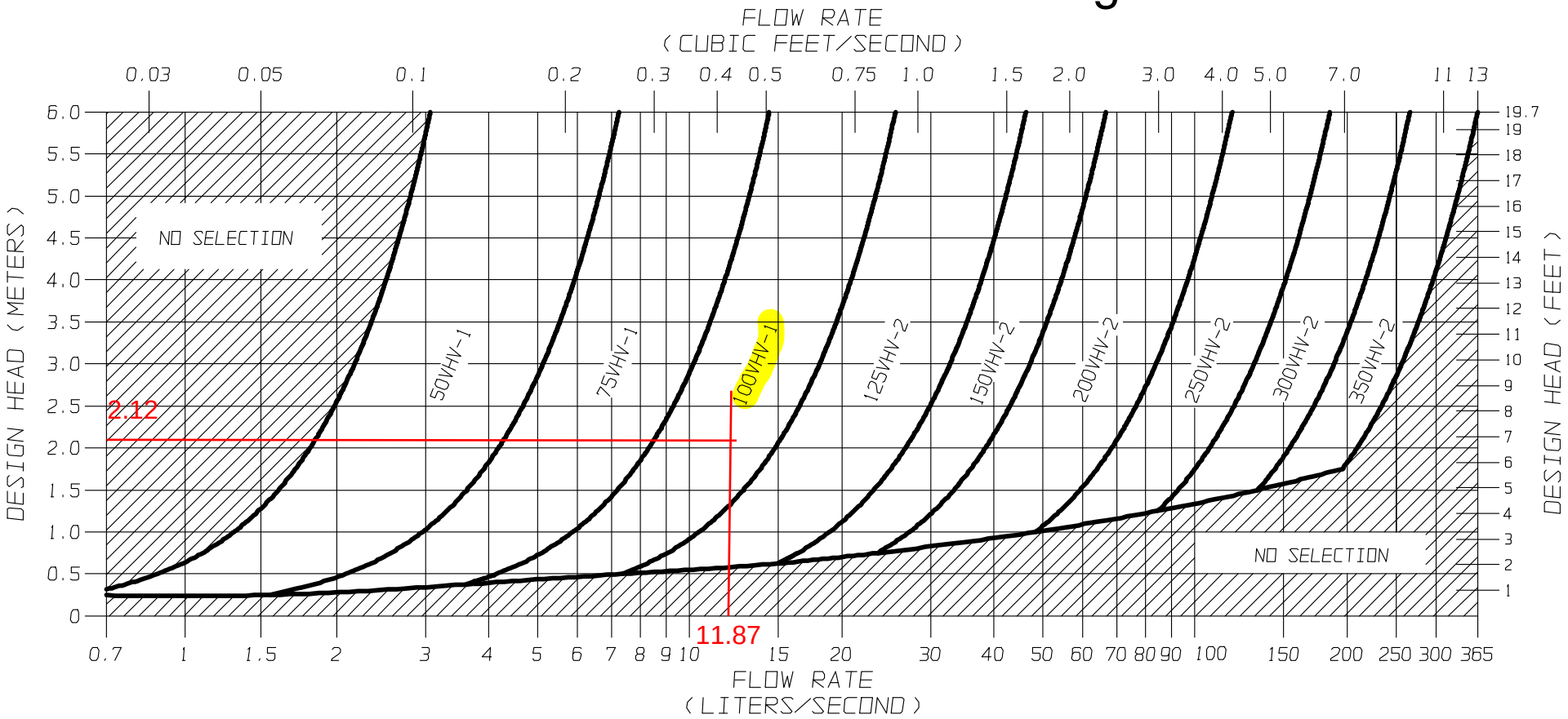


FIGURE 3 - VHV

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HYDROVEX®

SVHV Vertical Vortex Flow Regulator

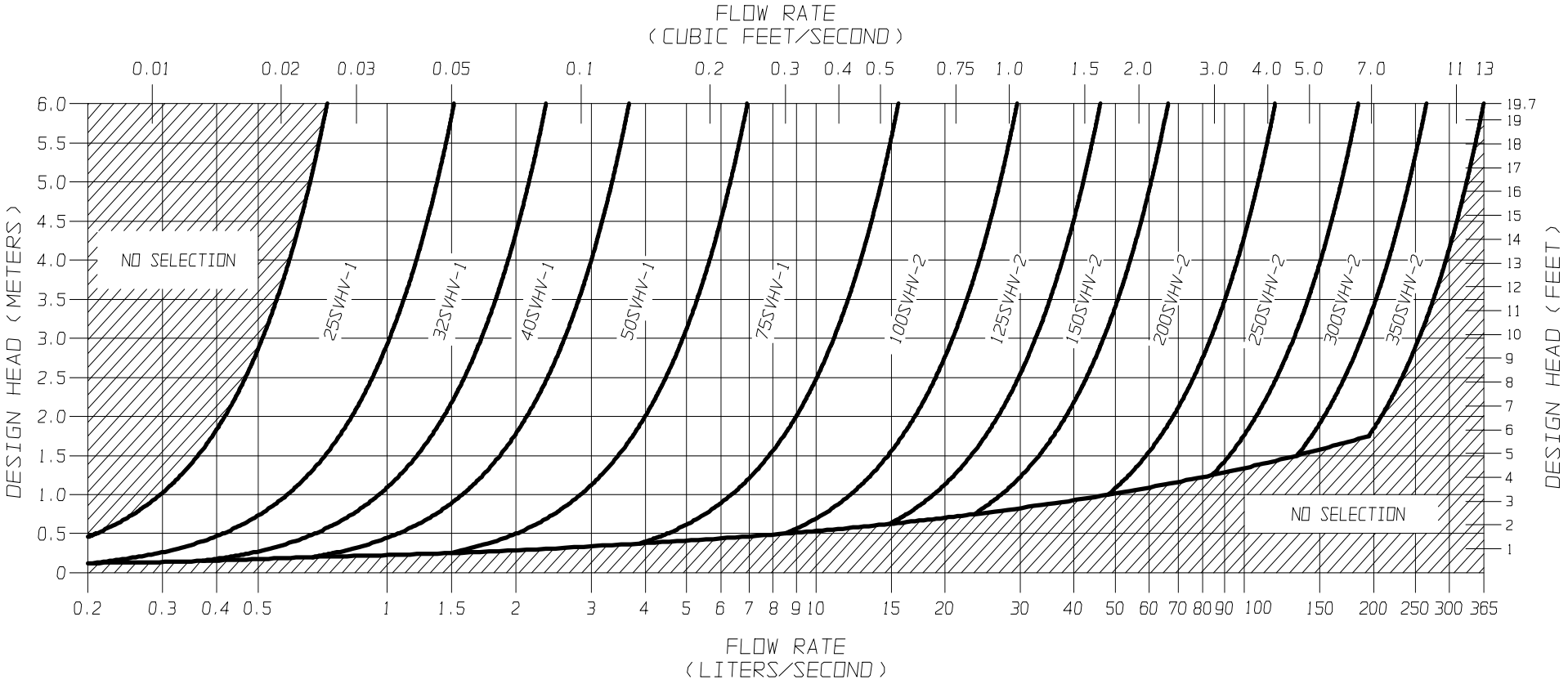
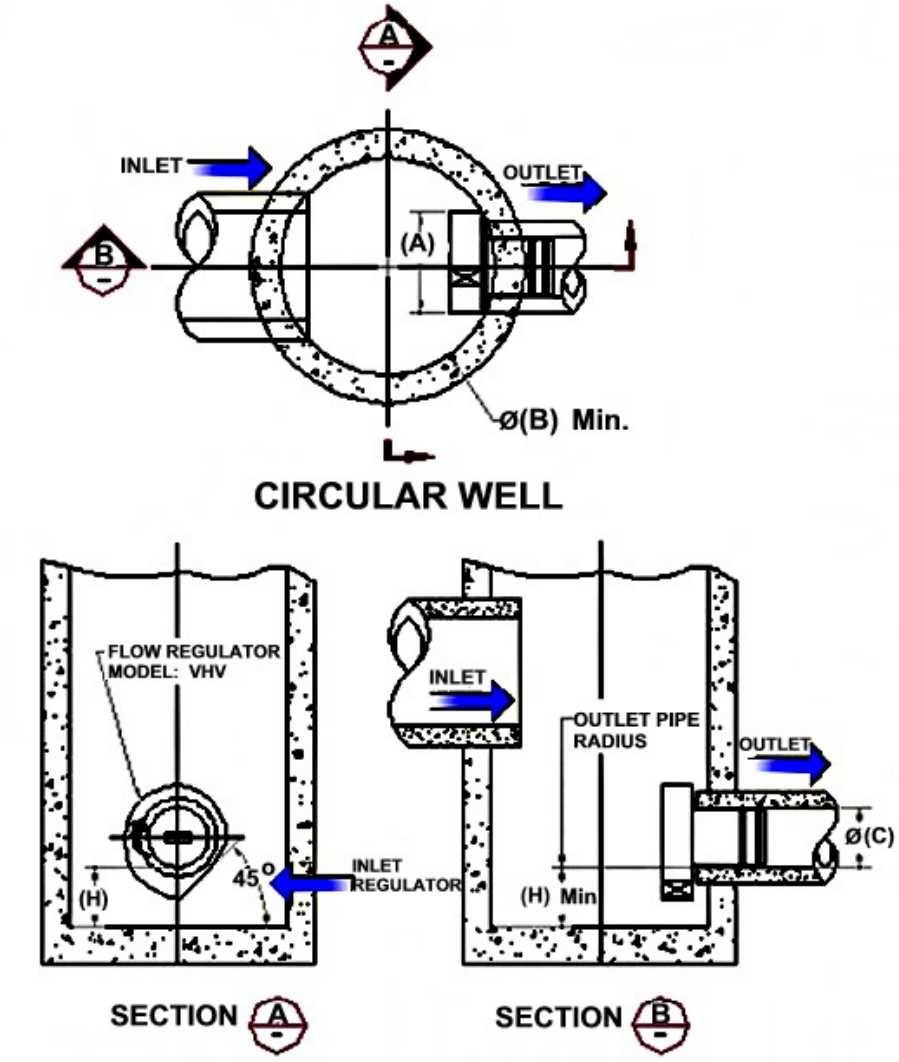


FIGURE 3 - SVHV

JOHN MEUNIER

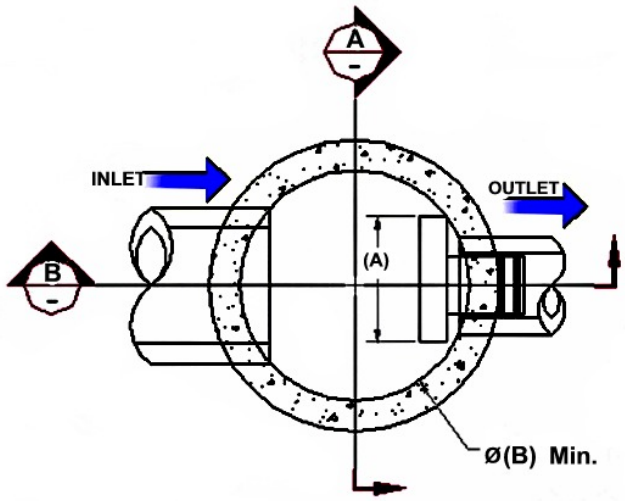
FLOW REGULATOR TYPICAL INSTALLATION IN CIRCULAR MANHOLE
FIGURE 4 (MODEL VHV)

Model Number	Regulator Diameter		Minimum Manhole Diameter		Minimum Outlet Pipe Diameter		Minimum Clearance	
	A (mm)	**A** (in.)	**B** (mm)	**B** (in.)	**C** (mm)	**C** (in.)	**H** (mm)	**H** (in.)
50VHV-1	150	6	600	24	150	6	150	6
75VHV-1	250	10	600	24	150	6	150	6
100VHV-1	325	13	900	36	150	6	200	8
125VHV-2	275	11	900	36	150	6	200	8
150VHV-2	350	14	900	36	150	6	225	9
200VHV-2	450	18	1200	48	200	8	300	12
250VHV-2	575	23	1200	48	250	10	350	14
300VHV-2	675	27	1600	64	250	10	400	16
350VHV-2	800	32	1800	72	300	12	500	20

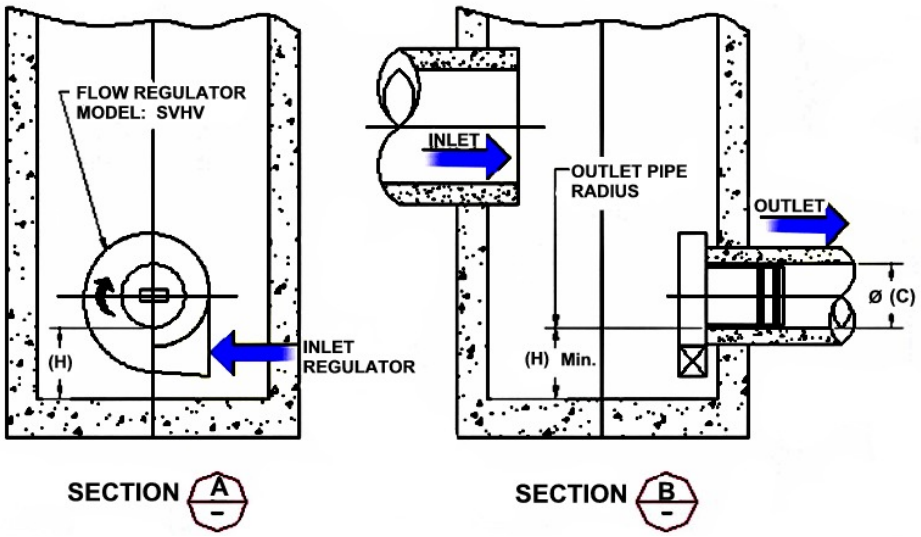


FLOW REGULATOR TYPICAL INSTALLATION IN CIRCULAR MANHOLE
FIGURE 4 (MODEL SVHV)

Model Number	Regulator Diameter		Minimum Manhole Diameter		Minimum Outlet Pipe Diameter		Minimum Clearance	
	A (mm)	**A** (in.)	**B** (mm)	**B** (in.)	**C** (mm)	**C** (in.)	**H** (mm)	**H** (in.)
25 SVHV-1	125	5	600	24	150	6	150	6
32 SVHV-1	150	6	600	24	150	6	150	6
40 SVHV-1	200	8	600	24	150	6	150	6
50 SVHV-1	250	10	600	24	150	6	150	6
75 SVHV-1	375	15	900	36	150	6	275	11
100 SVHV-2	275	11	900	36	150	6	250	10
125 SVHV-2	350	14	900	36	150	6	300	12
150 SVHV-2	425	17	1200	48	150	6	350	14
200 SVHV-2	575	23	1600	64	200	8	450	18
250 SVHV-2	700	28	1800	72	250	10	550	22
300 SVHV-2	850	34	2400	96	250	10	650	26
350 SVHV-2	1000	40	2400	96	250	10	700	28



CIRCULAR WELL

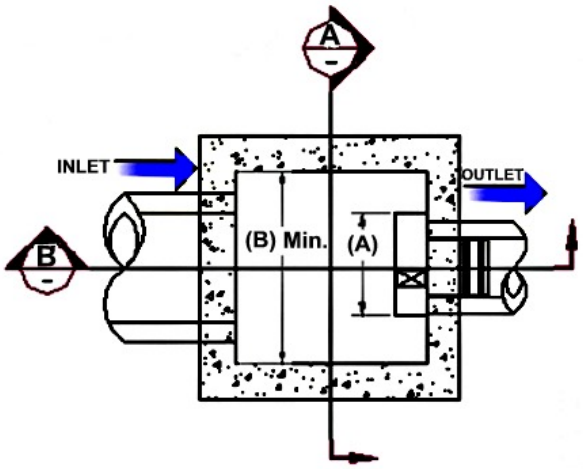


SECTION A **SECTION B**

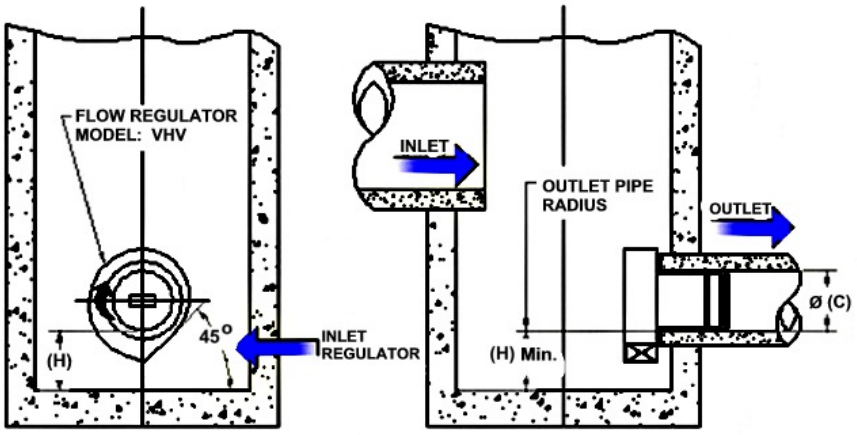
FLOW REGULATOR TYPICAL INSTALLATION IN SQUARE MANHOLE
FIGURE 4 (MODEL VHV)

Model Number	Regulator Diameter		Minimum Chamber Width		Minimum Outlet Pipe Diameter		Minimum Clearance	
	A (mm)	**A** (in.)	**B** (mm)	**B** (in.)	**C** (mm)	**C** (in.)	**H** (mm)	**H** (in.)
50VHV-1	150	6	600	24	150	6	150	6
75VHV-1	250	10	600	24	150	6	150	6
100VHV-1	325	13	600	24	150	6	200	8
125VHV-2	275	11	600	24	150	6	200	8
150VHV-2	350	14	600	24	150	6	225	9
200VHV-2	450	18	900	36	200	8	300	12
250VHV-2	575	23	900	36	250	10	350	14
300VHV-2	675	27	1200	48	250	10	400	16
350VHV-2	800	32	1200	48	300	12	500	20

NOTE: ***In the case of a square manhole, the outlet flow pipe must be centered on the wall to ensure enough clearance for the unit.***



SQUARE / RECTANGULAR WELL

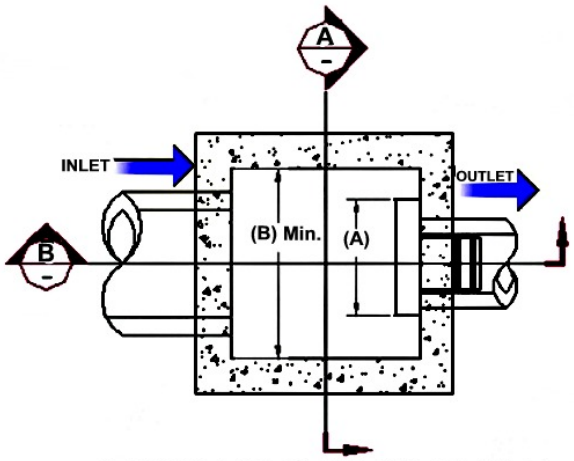


SECTION A **SECTION B**

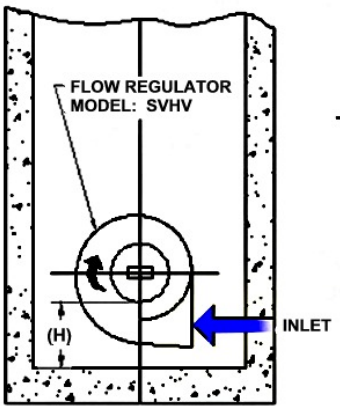
FLOW REGULATOR TYPICAL INSTALLATION IN SQUARE MANHOLE
FIGURE 4 (MODEL SVHV)

Model Number	Regulator Diameter		Minimum Chamber Width		Minimum Outlet Pipe Diameter		Minimum Clearance	
	A (mm)	**A** (in.)	**B** (mm)	**B** (in.)	**C** (mm)	**C** (in.)	**H** (mm)	**H** (in.)
25 SVHV-1	125	5	600	24	150	6	150	6
32 SVHV-1	150	6	600	24	150	6	150	6
40 SVHV-1	200	8	600	24	150	6	150	6
50 SVHV-1	250	10	600	24	150	6	150	6
75 SVHV-1	375	15	600	24	150	6	275	11
100 SVHV-2	275	11	600	24	150	6	250	10
125 SVHV-2	350	14	600	24	150	6	300	12
150 SVHV-2	425	17	600	24	150	6	350	14
200 SVHV-2	575	23	900	36	200	8	450	18
250 SVHV-2	700	28	900	36	250	10	550	22
300 SVHV-2	850	34	1200	48	250	10	650	26
350 SVHV-2	1000	40	1200	48	250	10	700	28

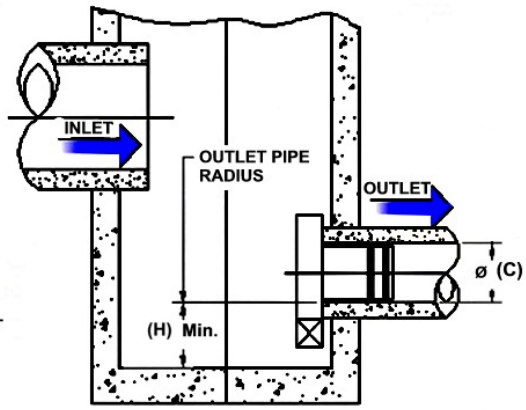
NOTE: ***In the case of a square manhole, the outlet flow pipe must be centered on the wall to ensure enough clearance for the unit.***



SQUARE / RECTANGULAR WELL



SECTION A



SECTION B

INSTALLATION

The installation of a **HYDROVEX®** regulator may be undertaken once the manhole and piping is in place. Installation consists of simply fitting the regulator into the outlet pipe of the manhole. **John Meunier Inc.** recommends the use of a lubricant on the outlet pipe, in order to facilitate the insertion and orientation of the flow controller.

MAINTENANCE

HYDROVEX® regulators are manufactured in such a way as to be maintenance free; however, a periodic inspection (every 3-6 months) is suggested in order to ensure that neither the inlet nor the outlet has become blocked with debris. The manhole should undergo periodically, particularly after major storms, inspection and cleaning as established by the municipality

GUARANTY

The **HYDROVEX®** line of **VHV / SVHV** regulators are guaranteed against both design and manufacturing defects for a period of 5 years. Should a unit be defective, **John Meunier Inc.** is solely responsible for either modification or replacement of the unit.

John Meunier Inc.
ISO 9001 : 2008

Head Office
4105 Sartelon
Saint-Laurent (Quebec) Canada H4S 2B3
Tel.: 514-334-7230 www.johnmeunier.com
Fax: 514-334-5070 cso@johnmeunier.com

Ontario Office
2000 Argentia Road, Plaza 4, Unit 430
Mississauga (Ontario) Canada L5N 1W1
Tel.: 905-286-4846 www.johnmeunier.com
Fax: 905-286-0488 ontario@johnmeunier.com

USA Office
2209 Menlo Avenue
Glenside, PA USA 19038
Tel.: 412- 417-6614 www.johnmeunier.com
Fax: 215-885-4741 asteele@johnmeunier.com

Revised: 2011-05-03

Stormceptor®

Rinker MATERIALS® A QUIKRETE® COMPANY

Stormceptor® EF Sizing Report

Imbrium® Systems
ESTIMATED NET ANNUAL SEDIMENT (TSS) LOAD REDUCTION

02/07/2024

Province:	Ontario
City:	Ottawa
Nearest Rainfall Station:	OTTAWA CDA RCS
Climate Station Id:	6105978
Years of Rainfall Data:	20

Site Name:	3996 Innes Rd, Ottawa

Drainage Area (ha):	0.13
Runoff Coefficient 'c':	0.85

Particle Size Distribution:	Fine
Target TSS Removal (%):	80.0

Required Water Quality Runoff Volume Capture (%):	90.00
Estimated Water Quality Flow Rate (L/s):	3.57
Oil / Fuel Spill Risk Site?	Yes
Upstream Flow Control?	Yes
Upstream Orifice Control Flow Rate to Stormceptor (L/s):	12.61
Peak Conveyance (maximum) Flow Rate (L/s):	
Influent TSS Concentration (mg/L):	200
Estimated Average Annual Sediment Load (kg/yr):	151
Estimated Average Annual Sediment Volume (L/yr):	123

Project Name:	3996 Innes Rd, Ottawa
Project Number:	230737
Designer Name:	Jessica Steffler
Designer Company:	Forterra Pipe & Precast
Designer Email:	jessica.steffler@RinkerPipe.com
Designer Phone:	519-239-6958
EOR Name:	Mohan Basnet
EOR Company:	LRL Engineeering
EOR Email:	mbasnet@lrl.ca
EOR Phone:	613-229-6819

Net Annual Sediment (TSS) Load Reduction Sizing Summary

Stormceptor Model	TSS Removal Provided (%)
EFO4	97
EFO6	99
EFO8	100
EFO10	100
EFO12	100

Recommended Stormceptor EFO Model: EFO4

Estimated Net Annual Sediment (TSS) Load Reduction (%): 97

Water Quality Runoff Volume Capture (%): > 90

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THIRD-PARTY TESTING AND VERIFICATION

►**Stormceptor® EF and Stormceptor® EFO** are the latest evolutions in the Stormceptor® oil-grit separator (OGS) technology series, and are designed to remove a wide variety of pollutants from stormwater and snowmelt runoff. These technologies have been third-party tested in accordance with the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators** and performance has been third-party verified in accordance with the **ISO 14034 Environmental Technology Verification (ETV)** protocol.

PERFORMANCE

►**Stormceptor® EF and EFO** remove stormwater pollutants through gravity separation and floatation, and feature a patent-pending design that generates positive removal of total suspended solids (TSS) throughout each storm event, including high-intensity storms. Captured pollutants include sediment, free oils, and sediment-bound pollutants such as nutrients, heavy metals, and petroleum hydrocarbons. Stormceptor is sized to remove a high level of TSS from the frequent rainfall events that contribute the vast majority of annual runoff volume and pollutant load. The technology incorporates an internal bypass to convey excessive stormwater flows from high-intensity storms through the device without resuspension and washout (scour) of previously captured pollutants. Proper routine maintenance ensures high pollutant removal performance and protection of downstream waterways.

PARTICLE SIZE DISTRIBUTION (PSD)

►The **Canadian ETV PSD** shown in the table below was used, or in part, for this sizing. This is the identical PSD that is referenced in the Canadian ETV ***Procedure for Laboratory Testing of Oil-Grit Separators*** for both sediment removal testing and scour testing. The Canadian ETV PSD contains a wide range of particle sizes in the sand and silt fractions, and is considered reasonably representative of the particle size fractions found in typical urban stormwater runoff.

Particle Size (µm)	Percent Less Than	Particle Size Fraction (µm)	Percent
1000	100	500-1000	5
500	95	250-500	5
250	90	150-250	15
150	75	100-150	15
100	60	75-100	10
75	50	50-75	5
50	45	20-50	10
20	35	8-20	15
8	20	5-8	10
5	10	2-5	5
2	5	<2	5

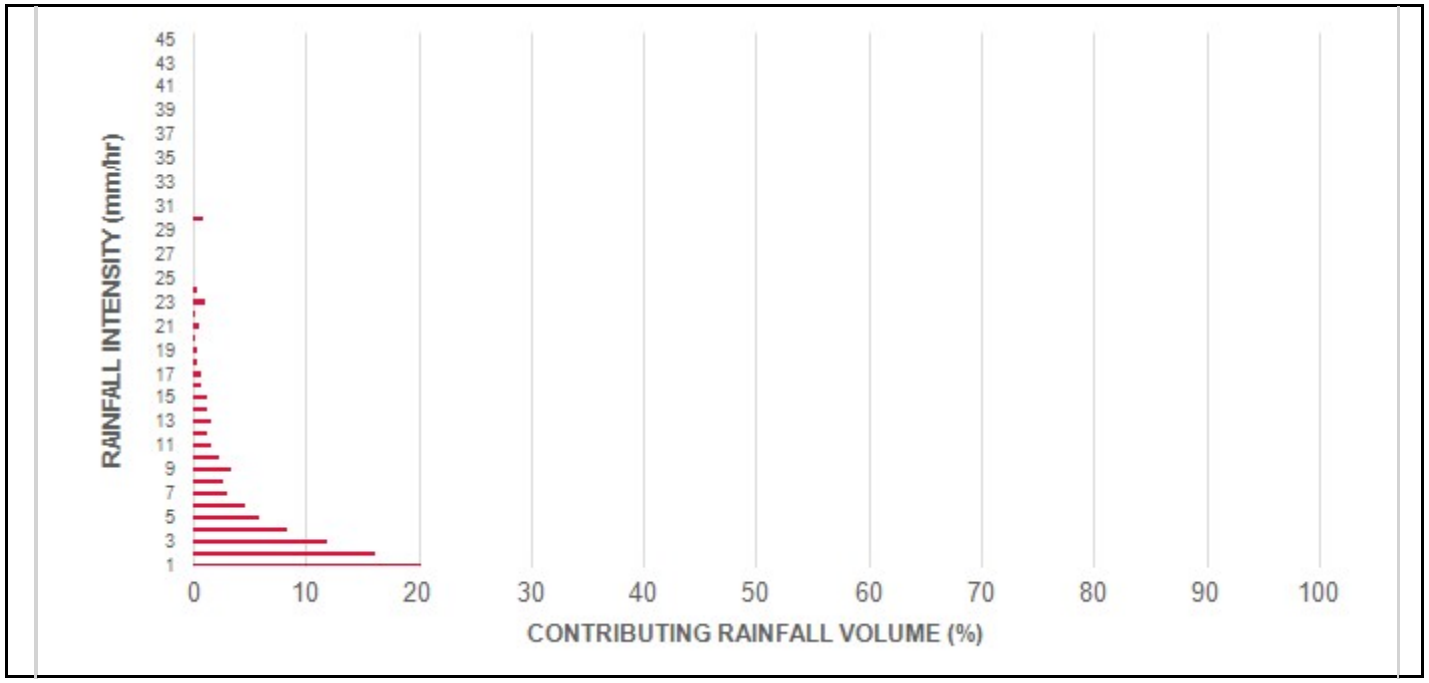
Stormceptor® EF Sizing Report

Upstream Flow Controlled Results

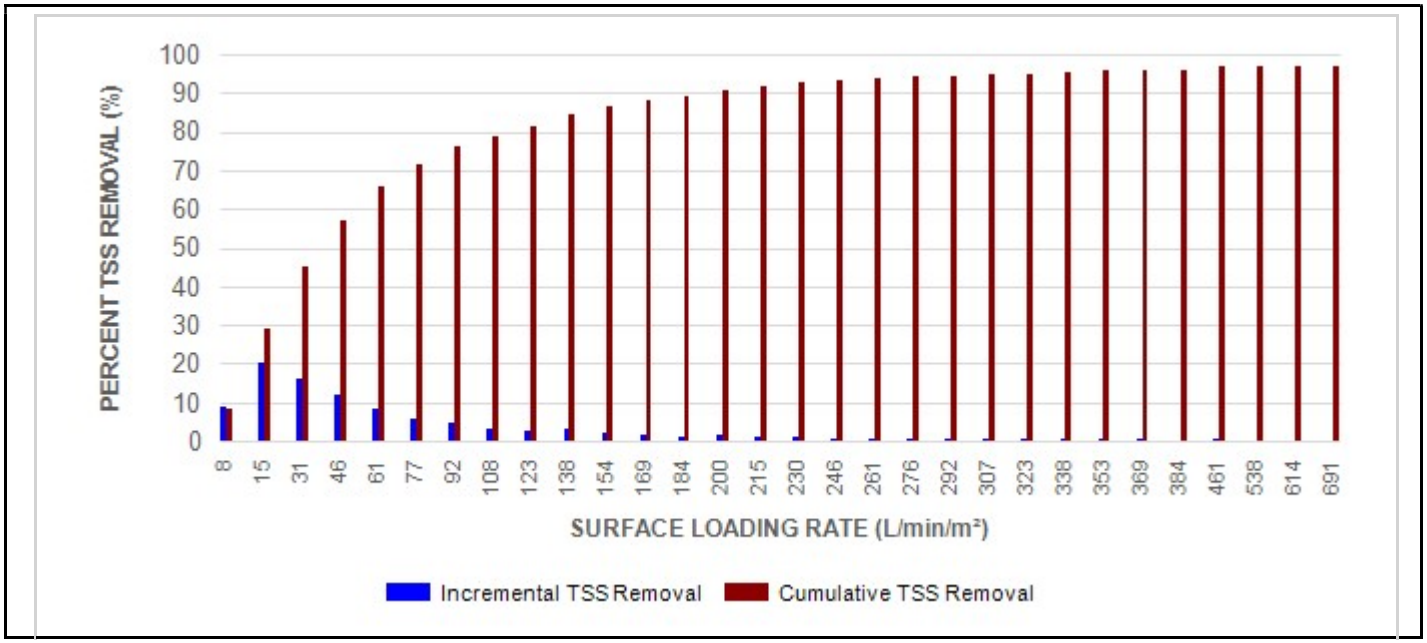
Rainfall Intensity (mm / hr)	Percent Rainfall Volume (%)	Cumulative Rainfall Volume (%)	Flow Rate (L/s)	Flow Rate (L/min)	Surface Loading Rate (L/min/m²)	Removal Efficiency (%)	Incremental Removal (%)	Cumulative Removal (%)
0.50	8.6	8.6	0.15	9.0	8.0	100	8.6	8.6
1.00	20.3	29.0	0.31	18.0	15.0	100	20.3	29.0
2.00	16.2	45.2	0.61	37.0	31.0	100	16.2	45.2
3.00	12.0	57.2	0.92	55.0	46.0	100	12.0	57.2
4.00	8.4	65.6	1.23	74.0	61.0	100	8.4	65.6
5.00	5.9	71.6	1.54	92.0	77.0	100	5.9	71.6
6.00	4.6	76.2	1.84	111.0	92.0	97	4.5	76.1
7.00	3.1	79.3	2.15	129.0	108.0	96	2.9	79.0
8.00	2.7	82.0	2.46	147.0	123.0	93	2.6	81.6
9.00	3.3	85.3	2.76	166.0	138.0	92	3.1	84.6
10.00	2.3	87.6	3.07	184.0	154.0	89	2.1	86.7
11.00	1.6	89.2	3.38	203.0	169.0	88	1.4	88.1
12.00	1.3	90.5	3.69	221.0	184.0	86	1.1	89.2
13.00	1.7	92.2	3.99	240.0	200.0	83	1.4	90.6
14.00	1.2	93.5	4.30	258.0	215.0	83	1.0	91.6
15.00	1.2	94.6	4.61	276.0	230.0	82	0.9	92.6
16.00	0.7	95.3	4.92	295.0	246.0	81	0.6	93.2
17.00	0.7	96.1	5.22	313.0	261.0	80	0.6	93.7
18.00	0.4	96.5	5.53	332.0	276.0	80	0.3	94.1
19.00	0.4	96.9	5.84	350.0	292.0	79	0.3	94.4
20.00	0.2	97.1	6.14	369.0	307.0	78	0.2	94.6
21.00	0.5	97.5	6.45	387.0	323.0	78	0.4	94.9
22.00	0.2	97.8	6.76	405.0	338.0	77	0.2	95.1
23.00	1.0	98.8	7.07	424.0	353.0	76	0.8	95.9
24.00	0.3	99.1	7.37	442.0	369.0	76	0.2	96.1
25.00	0.9	100.0	7.68	461.0	384.0	75	0.7	96.8
30.00	0.9	100.9	9.22	553.0	461.0	71	0.7	97.4
35.00	-0.9	100.0	10.75	645.0	538.0	68	N/A	96.8
40.00	0.0	100.0	12.29	737.0	614.0	65	0.0	96.8
45.00	0.0	100.0	13.00	780.0	650.0	64	0.0	96.8
Estimated Net Annual Sediment (TSS) Load Reduction =								**97 %**

Climate Station ID: 6105978 *Years of Rainfall Data*: 20

RAINFALL DATA FROM OTTAWA CDA RCS RAINFALL STATION



INCREMENTAL AND CUMULATIVE TSS REMOVAL
FOR THE RECOMMENDED STORMCEPTOR® MODEL



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Maximum Pipe Diameter / Peak Conveyance

Stormceptor EF / EFO	Model Diameter		Min Angle Inlet / Outlet Pipes	Max Inlet Pipe Diameter		Max Outlet Pipe Diameter		Peak Conveyance Flow Rate	
	(m)	(ft)		(mm)	(in)	(mm)	(in)	(L/s)	(cfs)
EF4 / EFO4	1.2	4	90	609	24	609	24	425	15
EF6 / EFO6	1.8	6	90	914	36	914	36	990	35
EF8 / EFO8	2.4	8	90	1219	48	1219	48	1700	60
EF10 / EFO10	3.0	10	90	1828	72	1828	72	2830	100
EF12 / EFO12	3.6	12	90	1828	72	1828	72	2830	100

SCOUR PREVENTION AND ONLINE CONFIGURATION

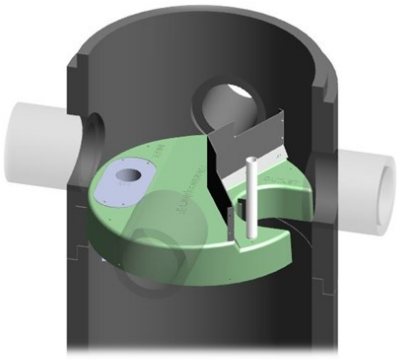
►**Stormceptor® EF and EFO** feature an internal bypass and superior scour prevention technology that have been demonstrated in third-party testing according to the scour testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**, and the exceptional scour test performance has been third-party verified in accordance with the ISO 14034 ETV protocol. As a result, Stormceptor EF and EFO are approved for online installation, eliminating the need for costly additional bypass structures, piping, and installation expense.

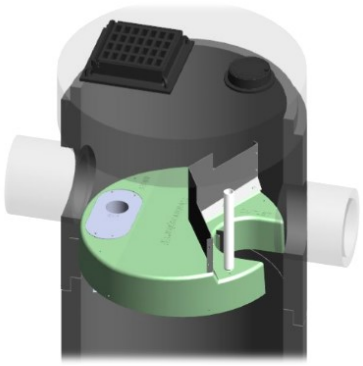
DESIGN FLEXIBILITY

►**Stormceptor® EF** and **EFO** offers design flexibility in one simplified platform, accepting stormwater flow from a single inlet pipe or multiple inlet pipes, and/or surface runoff through an inlet grate. The device can also serve as a junction structure, accommodate a 90-degree inlet-to-outlet bend angle, and can be modified to ensure performance in submerged conditions.

OIL CAPTURE AND RETENTION

►While Stormceptor® EF will capture and retain oil from dry weather spills and low intensity runoff, **Stormceptor® EFO** has demonstrated superior oil capture and greater than 99% oil retention in third-party testing according to the light liquid re-entrainment testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**. Stormceptor EFO is recommended for sites where oil capture and retention is a requirement.





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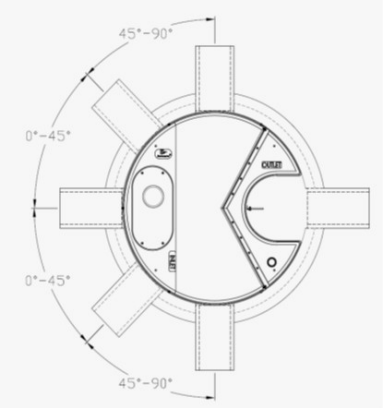
Stormceptor® EF Sizing Report



INLET-TO-OUTLET DROP

Elevation differential between inlet and outlet pipe inverts is dictated by the angle at which the inlet pipe(s) enters the unit.
0° - 45° : The inlet pipe is 1-inch (25mm) higher than the outlet pipe.
45° - 90° : The inlet pipe is 2-inches (50mm) higher than the outlet pipe.

HEAD LOSS

The head loss through Stormceptor EF is similar to that of a 60-degree bend structure. The applicable K value for calculating minor losses through the unit is 1.1. For submerged conditions the applicable K value is 3.0.

Pollutant Capacity

Stormceptor EF / EFO	Model Diameter		Depth (Outlet Pipe Invert to Sump Floor)		Oil Volume		Recommended Sediment Maintenance Depth *		Maximum Sediment Volume *		Maximum Sediment Mass **	
	(m)	(ft)	(m)	(ft)	(L)	(Gal)	(mm)	(in)	(L)	(ft^3)	(kg)	(lb)
EF4 / EFO4	1.2	4	1.52	5.0	265	70	203	8	1190	42	1904	5250
EF6 / EFO6	1.8	6	1.93	6.3	610	160	305	12	3470	123	5552	15375
EF8 / EFO8	2.4	8	2.59	8.5	1070	280	610	24	8780	310	14048	38750
EF10 / EFO10	3.0	10	3.25	10.7	1670	440	610	24	17790	628	28464	78500
EF12 / EFO12	3.6	12	3.89	12.8	2475	655	610	24	31220	1103	49952	137875

*Increased sump depth may be added to increase sediment storage capacity
** Average density of wet packed sediment in sump = 1.6 kg/L (100 lb/ft^3)

Feature	Benefit	Feature Appeals To
Patent-pending enhanced flow treatment and scour prevention technology	Superior, verified third-party performance	Regulator, Specifying & Design Engineer
Third-party verified light liquid capture and retention for EFO version	Proven performance for fuel/oil hotspot locations	Regulator, Specifying & Design Engineer, Site Owner
Functions as bend, junction or inlet structure	Design flexibility	Specifying & Design Engineer
Minimal drop between inlet and outlet	Site installation ease	Contractor
Large diameter outlet riser for inspection and maintenance	Easy maintenance access from grade	Maintenance Contractor & Site Owner

STANDARD STORMCEPTOR EF/EFO DRAWINGS

For standard details, please visit http://www.imbriumsystems.com/stormwater-treatment-solutions/stormceptor-ef

STANDARD STORMCEPTOR EF/EFO SPECIFICATION

For specifications, please visit http://www.imbriumsystems.com/stormwater-treatment-solutions/stormceptor-ef

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STANDARD PERFORMANCE SPECIFICATION FOR "OIL GRIT SEPARATOR" (OGS) STORMWATER QUALITY TREATMENT DEVICE

PART 1 – GENERAL

1.1 WORK INCLUDED

This section specifies requirements for selecting, sizing, and designing an underground Oil Grit Separator (OGS) device for stormwater quality treatment, with third-party testing results and a Statement of Verification in accordance with ISO 14034 Environmental Management – Environmental Technology Verification (ETV).

1.2 REFERENCE STANDARDS & PROCEDURES

ISO 14034:2016 Environmental management – Environmental technology verification (ETV)

Canadian Environmental Technology Verification (ETV) Program's **Procedure for Laboratory Testing of Oil-Grit Separators**

1.3 SUBMITTALS

1.3.1 All submittals, including sizing reports & shop drawings, shall be submitted upon request with each order to the contractor then forwarded to the Engineer of Record for review and acceptance. Shop drawings shall detail all OGS components, elevations, and sequence of construction.

1.3.2 Alternative devices shall have features identical to or greater than the specified device, including: treatment chamber diameter, treatment chamber wet volume, sediment storage volume, and oil storage volume.

1.3.3 Unless directed otherwise by the Engineer of Record, OGS stormwater quality treatment product substitutions or alternatives submitted within ten days prior to project bid shall not be accepted. All alternatives or substitutions submitted shall be signed and sealed by a local registered Professional Engineer, based on the exact same criteria detailed in Section 3, in entirety, subject to review and approval by the Engineer of Record.

PART 2 – PRODUCTS

2.1 OGS POLLUTANT STORAGE

The OGS device shall include a sump for sediment storage, and a protected volume for the capture and storage of petroleum hydrocarbons and buoyant gross pollutants. The minimum sediment & petroleum hydrocarbon storage capacity shall be as follows:

2.1.1	4 ft (1219 mm) Diameter OGS Units:	1.19 m^3 sediment / 265 L oil
	6 ft (1829 mm) Diameter OGS Units:	3.48 m^3 sediment / 609 L oil
	8 ft (2438 mm) Diameter OGS Units:	8.78 m^3 sediment / 1,071 L oil
	10 ft (3048 mm) Diameter OGS Units:	17.78 m^3 sediment / 1,673 L oil
	12 ft (3657 mm) Diameter OGS Units:	31.23 m^3 sediment / 2,476 L oil

PART 3 – PERFORMANCE & DESIGN

3.1 GENERAL

The OGS stormwater quality treatment device shall be verified in accordance with ISO 14034:2016 Environmental management – Environmental technology verification (ETV). The OGS stormwater quality treatment device shall remove oil, sediment and gross pollutants from stormwater runoff during frequent wet weather events, and retain these pollutants during less frequent high flow wet weather events below the insert within the OGS for later removal during maintenance. The Manufacturer shall have at least ten (10) years of local experience, history and success in engineering design, manufacturing and production and supply of OGS stormwater quality treatment device systems, acceptable to the Engineer of Record.

3.2 SIZING METHODOLOGY

The OGS device shall be engineered, designed and sized to provide stormwater quality treatment based on treating a minimum of 90 percent of the average annual runoff volume and a minimum removal of an annual average 60% of the sediment (TSS) load based on the Particle Size Distribution (PSD) specified in the sizing report for the specified device. Sizing of the OGS shall be determined by use of a minimum ten (10) years of local historical rainfall data provided by Environment Canada. Sizing shall also be determined by use of the sediment removal performance data derived from the ISO 14034 ETV third-party verified laboratory testing data from testing conducted in accordance with the Canadian ETV protocol Procedure for Laboratory Testing of Oil-Grit Separators, as follows:

3.2.1 Sediment removal efficiency for a given surface loading rate and its associated flow rate shall be based on sediment removal efficiency demonstrated at the seven (7) tested surface loading rates specified in the protocol, ranging 40 L/min/m^2 to 1400 L/min/m^2, and as stated in the ISO 14034 ETV Verification Statement for the OGS device.

3.2.2 Sediment removal efficiency for surface loading rates between 40 L/min/m^2 and 1400 L/min/m^2 shall be based on linear interpolation of data between consecutive tested surface loading rates.

3.2.3 Sediment removal efficiency for surface loading rates less than the lowest tested surface loading rate of 40 L/min/m^2 shall be assumed to be identical to the sediment removal efficiency at 40 L/min/m^2. No extrapolation shall be allowed that results in a sediment removal efficiency that is greater than that demonstrated at 40 L/min/m^2.

3.2.4 Sediment removal efficiency for surface loading rates greater than the highest tested surface loading rate of 1400 L/min/m^2 shall assume zero sediment removal for the portion of flow that exceeds 1400 L/min/m^2, and shall be calculated using a simple proportioning formula, with 1400 L/min/m^2 in the numerator and the higher surface loading rate in the denominator, and multiplying the resulting fraction times the sediment removal efficiency at 1400 L/min/m^2.

The OGS device shall also have sufficient annual sediment storage capacity as specified and calculated in Section 2.1.

3.3 CANADIAN ETV or ISO 14034 ETV VERIFICATION OF SCOUR TESTING

The OGS device shall have Canadian ETV or ISO 14034 ETV Verification of third-party scour testing conducted in

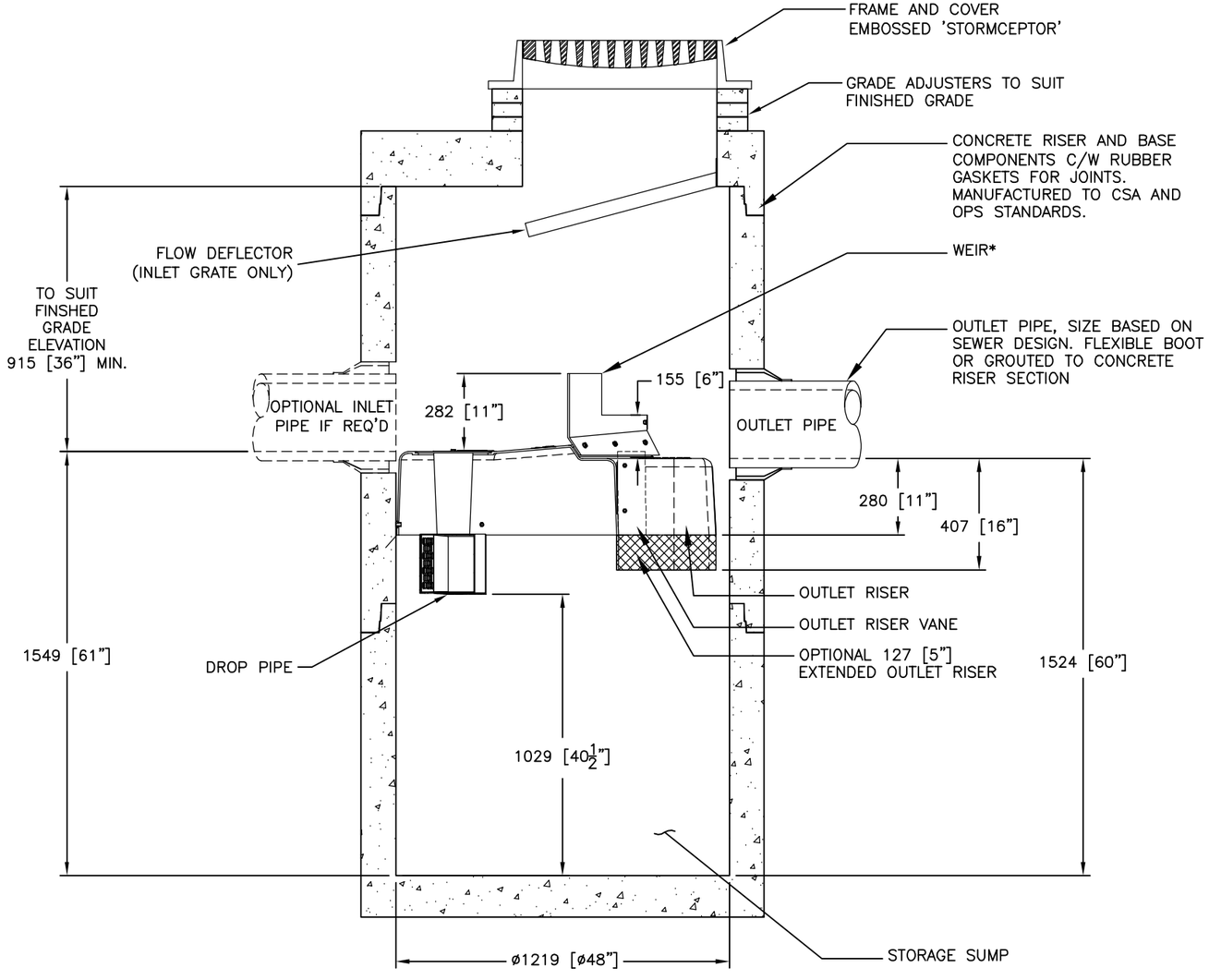
accordance with the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators.**

3.3.1 To be acceptable for on-line installation, the OGS device must demonstrate an average scour test effluent concentration less than 10 mg/L at each surface loading rate tested, up to and including 2600 L/min/m^2.

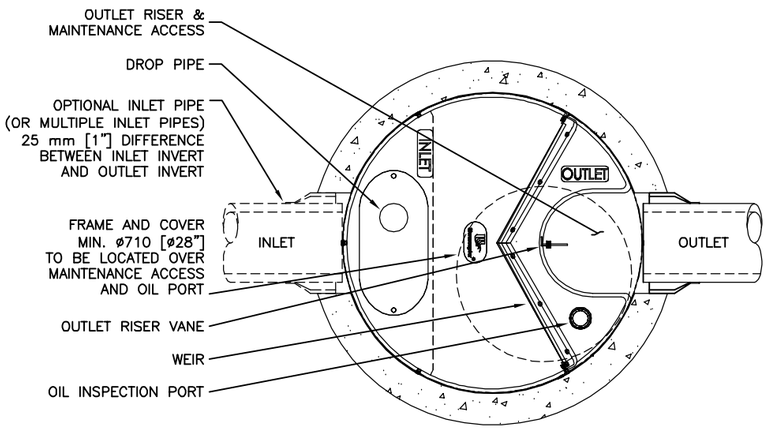
3.4 LIGHT LIQUID RE-ENTRAINMENT SIMULATION TESTING

The OGS device shall have Canadian ETV or ISO 14034 ETV Verification of completed third-party Light Liquid Re-entrainment Simulation Testing in accordance with the Canadian ETV **Program's Procedure for Laboratory Testing of Oil-Grit Separators,** with results reported within the Canadian ETV or ISO 14034 ETV verification. This re-entrainment testing is conducted with the device pre-loaded with low density polyethylene (LDPE) plastic beads as a surrogate for light liquids such as oil and fuel. Testing is conducted on the same OGS unit tested for sediment removal to assess whether light liquids captured after a spill are effectively retained at high flow rates.

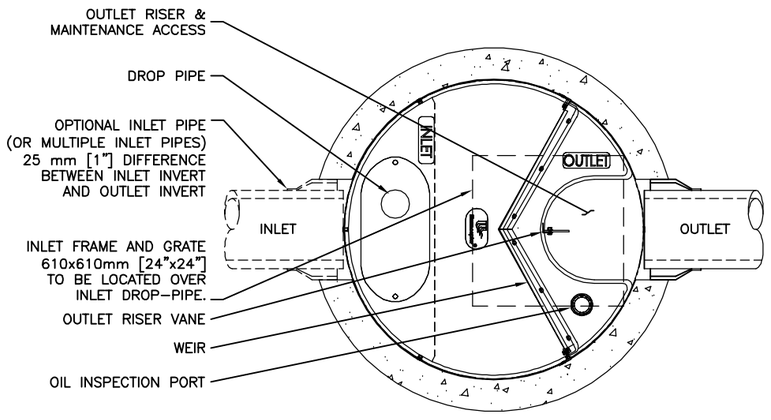
3.4.1 For an OGS device to be an acceptable stormwater treatment device on a site where vehicular traffic occurs and the potential for an oil or fuel spill exists, the OGS device must have reported verified performance results of greater than 99% cumulative retention of LDPE plastic beads for the five specified surface loading rates (ranging 200 L/min/m^2 to 2600 L/min/m^2) in accordance with the Light Liquid Re-entrainment Simulation Testing within the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators.** However, an OGS device shall not be allowed if the Light Liquid Re-entrainment Simulation Testing was performed with screening components within the OGS device that are effective at retaining the LDPE plastic beads, but would not be expected to retain light liquids such as oil and fuel.



SECTION VIEW



PLAN VIEW (STANDARD)



PLAN VIEW (INLET TOP)

FOR SITE SPECIFIC DRAWINGS PLEASE CONTACT YOUR LOCAL STORMCEPTOR REPRESENTATIVE. SITE SPECIFIC DRAWINGS ARE BASED ON THE BEST AVAILABLE INFORMATION AT THE TIME. SOME FIELD REVISIONS TO THE SYSTEM LOCATION OR CONNECTION PIPING MAY BE NECESSARY BASED ON AVAILABLE SPACE OR SITE CONFIGURATION REVISIONS. ELEVATIONS SHOULD BE MAINTAINED EXCEPT WHERE NOTED ON BYPASS STRUCTURE (IF REQUIRED).

GENERAL NOTES:

* MAXIMUM SURFACE LOADING RATE (SLR) INTO LOWER CHAMBER THROUGH DROP PIPE IS 1135 L/min/m^2 (27.9 gpm/ft^2) FOR STORMCEPTOR EF4 AND 535 L/min/m^2 (13.1 gpm/ft^2) FOR STORMCEPTOR EFO4 (OIL CAPTURE CONFIGURATION). WEIR HEIGHT IS 150 mm (6 INCH) FOR EF04.

1. ALL DIMENSIONS INDICATED ARE IN MILLIMETERS (INCHES) UNLESS OTHERWISE SPECIFIED.
2. STORMCEPTOR STRUCTURE INLET AND OUTLET PIPE SIZE AND ORIENTATION SHOWN FOR INFORMATIONAL PURPOSES ONLY.
3. UNLESS OTHERWISE NOTED, BYPASS INFRASTRUCTURE, SUCH AS ALL UPSTREAM DIVERSION STRUCTURES, CONNECTING STRUCTURES, OR PIPE CONDUITS CONNECTING TO COMPLETE THE STORMCEPTOR SYSTEM SHALL BE PROVIDED AND ADDRESSED SEPARATELY.
4. DRAWING FOR INFORMATION PURPOSES ONLY. REFER TO ENGINEER'S SITE/UTILITY PLAN FOR STRUCTURE ORIENTATION.
5. NO PRODUCT SUBSTITUTIONS SHALL BE ACCEPTED UNLESS SUBMITTED 10 DAYS PRIOR TO PROJECT BID DATE, OR AS DIRECTED BY THE ENGINEER OF RECORD.

INSTALLATION NOTES

A. ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
B. CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE STRUCTURE (LIFTING CLUTCHES PROVIDED)
C. CONTRACTOR WILL INSTALL AND LEVEL THE STRUCTURE, SEALING THE JOINTS, LINE ENTRY AND EXIT POINTS (NON-SHRINK GROUT WITH APPROVED WATERSTOP OR FLEXIBLE BOOT)
D. CONTRACTOR TO TAKE APPROPRIATE MEASURES TO PROTECT THE DEVICE FROM CONSTRUCTION-RELATED EROSION RUNOFF.
E. DEVICE ACTIVATION, BY CONTRACTOR, SHALL OCCUR ONLY AFTER SITE HAS BEEN STABILIZED AND THE STORMCEPTOR UNIT IS CLEAN AND FREE OF DEBRIS.

STANDARD DETAIL
NOT FOR CONSTRUCTION

SITE SPECIFIC DATA REQUIREMENTS

STORMCEPTOR MODEL	EFO4				
STRUCTURE ID					*
HYDROCARBON STORAGE REQ'D (L)					*
WATER QUALITY FLOW RATE (L/s)					*
PEAK FLOW RATE (L/s)					*
RETURN PERIOD OF PEAK FLOW (yrs)					*
DRAINAGE AREA (HA)					*
DRAINAGE AREA IMPERVIOUSNESS (%)					*
PIPE DATA:	I.E.	MAT'L	DIA	SLOPE %	HGL
INLET #1	*	*	*	*	*
INLET #2	*	*	*	*	*
OUTLET	*	*	*	*	*

* PER ENGINEER OF RECORD

MARK	DATE	REVISION DESCRIPTION	BY
####	####	####	####
####	####	####	####
1	6/8/18	UPDATES	JSK
0	5/26/17	INITIAL RELEASE	JSK

Stormceptor® EF

SCALE = NTS

imbrium®
407 FAIRVIEW DRIVE, WHITBY, ON, L1N 9A9
TF 800-565-4501 CA 416-800-9000 INTL +1-416-800-9000

DATE: 10/13/2017

DESIGNED:	DRAWN:
JSK	JSK
CHECKED:	APPROVED:
BSF	SP
PROJECT No.:	SEQUENCE No.:
EFO4	*

SHEET: 1 OF 1

STANDARD SPECIFICATION FOR "OIL GRIT SEPARATOR" (OGS) STORMWATER QUALITY TREAMENT DEVICE WITH THIRD-PARTY VERIFIED LIGHT LIQUID RE-ENTRAINMENT SIMULATION PERFORMANCE TESTING RESULTS

PART 1 – GENERAL

1.1 WORK INCLUDED

This section specifies requirements for selecting, sizing, designing, maintaining, and constructing an underground Oil Grit Separator (OGS) device for stormwater quality treatment, **specifically an OGS device that has been third-party tested for oil and fuel retention capability using a protocol for light liquid re-entrainment simulation testing, with t testing results and a Statement of Verification in accordance with all the provisions of ISO 14034 Environmental Management – Environmental Technology Verification (ETV)**. Work includes supply and installation of concrete bases, precast sections, and the appropriate precast section with OGS internal components correctly installed within the system, watertight sealed to the precast concrete prior to arrival to the project site.

1.2 REFERENCE STANDARDS

1.2.1 For Canadian projects only, the following reference standards apply:

CAN/CSA-A257.4-14: Joints for Circular Concrete Sewer and Culvert Pipe, Manhole Sections, and Fittings Using Rubber Gaskets
CAN/CSA-A257.4-14: Precast Reinforced Circular Concrete Manhole Sections, Catch Basins, and Fittings
CAN/CSA-S6-00: Canadian Highway Bridge Design Code

1.2.2 For ALL projects, the following reference standards apply:

ASTM D-4097: Contact Molded Glass Fiber Reinforced Chemical Resistant Tanks
ASTM C 478: Specification for Precast Reinforced Concrete Manhole Sections
ASTM C 443: Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets
ASTM C 891: Standard Practice for Installation of Underground Precast Concrete Utility Structures
ASTM D2563: Standard Practice for Classification of Visual Defects in Reinforced Plastics

1.3 SHOP DRAWINGS

1.3.1 Shop drawings shall be submitted upon request with each order to the contractor then forwarded to the Engineer of Record for review and acceptance. Shop drawings shall detail the precast concrete components and OGS internal components prior to shipment, including the sequence for installation.

1.3.2 Unless directed otherwise by the Engineer of Record, OGS stormwater quality treatment product substitutions or alternatives submitted within ten days prior to project bid shall not be accepted. All alternatives or substitutions submitted shall be based on the exact same criteria detailed in Section 3, in entirety, subject to review and approval by the Engineer of Record. Any and all changes to project cost estimates, bonding amounts, plan check fees for revision of approved documents, or design impacts due to regulatory requirements as a result of a product substitution shall be coordinated by the Contractor with the Engineer of Record.

1.4 HANDLING AND STORAGE

Prevent damage to materials during storage and handling.

1.4.1 OGS internal components supplied by the Manufacturer for attachment to the precast concrete vessel shall be pre-fabricated, bolted to the precast and watertight sealed to the precast vessel surface prior to site delivery to ensure Manufacturer's internal assembly process and quality control processes are fully adhered to, and to prevent materials damage on site.

1.4.2 Follow all instructions including the sequence for installation in the shop drawings during installation.

PART 2 – PRODUCTS

2.1 GENERAL

2.1.1 The OGS vessel shall be cylindrical and constructed from precast concrete riser and slab components.

2.1.2 The precast concrete OGS internal components shall include a fiberglass insert bolted and watertight sealed inside the precast concrete vessel, prior to site delivery. Primary internal components that are to be anchored and watertight sealed to the precast concrete vessel shall be done so only by the Manufacturer prior to arrival at the job site to ensure product quality.

2.1.3 The OGS shall be allowed to be specified and have the ability to function as a 240-degree bend structure in the stormwater drainage system, or as a junction structure.

2.1.4 The OGS to be specified shall have the capability to accept influent flow from an inlet grate and an inlet pipe.

2.2 PRECAST CONCRETE SECTIONS

All precast concrete components shall be designed and manufactured to meet highway loading conditions per State/Provincial or local requirements.

2.3 GASKETS

Only profile neoprene or nitrile rubber gaskets that are oil resistant shall be accepted. For Canadian projects only, gaskets shall be in accordance to CSA A257.4-14. Mastic sealants, butyl tape/rope or Conseal CS-101 alone are not acceptable gasket materials.

2.4 JOINTS

The concrete joints shall be watertight and meet the design criteria according to ASTM C-990. For projects where joints require gaskets, the concrete joints shall be watertight and oil resistant and meet the design criteria according to ASTM C-443. Mastic sealants or butyl tape/rope alone are not an acceptable alternative.

2.5 FRAMES AND COVERS

Frames and covers shall be manufactured in accordance with State/Provincial or local requirements for inspection and maintenance access purposes. A minimum of one cover, at least 22-inch (560 mm) in diameter, shall be clearly embossed with the OGS manufacturer's product name to properly identify this asset's purpose is for stormwater quality treatment.

2.6 PRECAST CONCRETE

All precast concrete components shall conform to the appropriate CSA or ASTM specifications.

2.7 FIBERGLASS

The fiberglass portion of the OGS device shall be constructed in accordance with ASTM D2563, and in accordance with the PS15-69 manufacturing standard, and shall only be installed, bolted and watertight sealed to the precast concrete by the Manufacturer prior to arrival at the project site to ensure product quality.

2.8 OGS POLLUTANT STORAGE

The OGS device shall include a sump for sediment storage, and a fiberglass insert for the capture and storage of petroleum hydrocarbons and buoyant gross pollutants. The total sediment storage capacity shall be a minimum 40 ft^3 (1.1 m^3). The total petroleum hydrocarbon storage capacity shall be a minimum 50 gallons (189 liters). The access opening to the sump of the OGS device for periodic inspection and maintenance purposes shall be a minimum 16 inches (406 mm) in diameter.

2.9 LADDERS

Ladder rungs shall be provided upon request or to comply with State/Provincial or local requirements.

2.10 INSPECTION

All precast concrete sections shall be level and inspected to ensure dimensions, appearance, integrity of internal components, and quality of the product meets State/Provincial or local specifications and associated standards.

PART 3 – PERFORMANCE & DESIGN

3.1 GENERAL

The OGS stormwater quality treatment device shall be verified in accordance with ISO 14034:2016 Environmental management – Environmental technology verification (ETV). The OGS stormwater quality treatment device shall remove oil, sediment and gross pollutants from stormwater runoff during frequent wet weather events, and retain these pollutants during less frequent high flow wet weather events below the insert within the OGS for later removal during maintenance. The Manufacturer shall have at least ten (10) years of local experience, history and success in engineering design, manufacturing and production and supply of OGS stormwater quality treatment device systems, acceptable to the Engineer of Record.

3.2 HYDROLOGY AND RUNOFF VOLUME

The OGS device shall be engineered, designed and sized to treat a minimum of 90 percent of the average annual runoff volume, unless otherwise stated by the Engineer of Record, using historical rainfall data. Rainfall data sets should be comprised of a minimum 15-years of rainfall data or a longer continuous period if available for a given location, but in all cases a minimum 5-year period of rainfall data.

3.3 ANNUAL (TSS) SEDIMIMENT LOAD AND STORAGE CAPACITY

The OGS device shall be capable of removing and have sufficient storage capacity for the calculated annual total suspended solids (TSS) mass load and volume without scouring previously captured pollutants prior to maintenance being required. The annual (TSS) sediment load and volume transported from the drainage area should be calculated and compared to the OGS device's available storage capacity by the specifying Engineer to ensure adequate capacity between maintenance cycles. Sediment loadings shall be determined by land use and defined as a minimum of 450 kg (992 lb) of sediment (TSS) per impervious hectare of drainage area per year, or greater based on land use, as noted in Table 1 below.

Annual sediment volume calculations shall be performed using the projected average annual treated runoff volume, a typical sediment bulk density of 1602 kg/m^3 (100 lbs/ft^3) and an assumed Event Mean

Concentration (EMC) of 125 mg/L TSS in the runoff, or as otherwise determined by the Engineer of Record.

Example calculation for a 1.3-hectares parking lot site:

- 1.28 meters of rainfall depth, per year
- 1.3 hectares of 100% impervious drainage area
- EMC of 125 mg/L TSS in runoff
- Treatment of 90% of the average annual runoff volume
- Target average annual TSS removal rate of 60% by OGS

Annual Runoff Volume:

- 1.28 m rain depth x 1.3 ha x 10,000 m^2/ha= 16,640 m^3 of runoff volume
- 16,640 m^3 x 1000 L/m^3 = 16,640,000 L of runoff volume
- 16,640,000 L x 0.90 = 14,976,000 L to be treated by OGS unit

Annual Sediment Mass and Sediment Volume Load Calculation:

- 14,976,000 L x 125 mg/L x kg/1,000,000 mg = 1,872 kg annual sediment mass
- 1,872 kg x m^3/1602 kg = 1.17 m^3 annual sediment volume
- 1.17 m^3 x 60% TSS removal rate by OGS = 0.70 m^3 minimum expected annual storage requirement in OGS

As a guideline, the U.S. EPA has determined typical annual sediment loads per drainage area for various sites by land use (see Table 1). Certain States, Provinces and local jurisdictions have also established such guidelines.

Table 1 – Annual Mass Sediment Loading by Land Use

	Commercial	Parking Lot	Residential			Highways	Industrial	Shopping Center
			High	Med.	Low			
(lbs/acre/yr)	1,000	400	420	250	10	880	500	440
(kg/hectare/yr)	1,124	450	472	281	11	989	562	494

Source: U.S. EPA Stormwater Best Management Practice Design Guide Volume 1, Appendix D, Table D-1, Burton and Pitt 2002

3.4 SIZING METHODOLOGY

The OGS device shall be engineered, designed and sized to provide stormwater quality treatment based on treating a minimum of 90 percent of the average annual runoff volume and a minimum removal of an annual average 60% of the sediment (TSS) load based on the Particle Size Distribution (PSD) specified in Table 2, Section 3.5, and based on third-party performance testing conducted in accordance with the Canadian Environmental Technology Verification (ETV) Program's **Procedure for Laboratory Testing of Oil-Grit Separators**. Sizing shall be determined using historical rainfall data (as specified in Section 3.2) and a sediment removal performance curve derived from the actual third-party verified laboratory testing data. The OGS device shall also have sufficient annual sediment storage capacity as specified and calculated in Section 3.3.

3.4.1 The Peclet Number is not an approved method or model for calculating TSS removal, sizing, or scaling OGS devices.

3.4.2 If an alternate OGS device is proposed, supporting documentation shall be submitted that demonstrates:

- Canadian ETV or ISO 14034 ETV Verification Statement which verifies third-party performance testing conducted in accordance with the **Procedure for Laboratory Testing of Oil-Grit Separators,** including the Light Liquid Re-entrainment Simulation Testing.
- Equal or better sediment (TSS) removal of the PSD specified in Table 2 at equivalent surface loading rates, as compared to the OGS device specified herein.
- Equal or better Light Liquid Re-entrainment Simulation Test results (using low-density polyethylene beads as a surrogate for light liquids such as oil and fuel) at equivalent

surface loading rates, as compared to the OGS device specified herein. However, an alternative OGS device shall not be allowed as a substitute if the Light Liquid Re-entrainment Simulation Test was performed with screening components within the OGS device that are effective at retaining the low-density polyethylene beads, but would not be expected to retain light liquids such as oil and fuel.

- Equal or greater sediment storage capacity, as compared to the OGS device specified herein.
- Supporting documentation shall be signed and sealed by a local registered Professional Engineer. All costs associated with preparing and certifying this documentation shall be born solely by the Contractor.

3.5 PARTICLE SIZE DISTRIBUTION (PSD) FOR SIZING

The OGS device shall be sized to achieve the Engineer-specified average annual percent sediment (TSS) removal based solely on the test sediment used in the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators.** This test sediment is comprised of inorganic ground silica with a specific gravity of 2.65, uniformly mixed, and containing a broad range of particle sizes as specified in Table 2. No alternative PSDs or deviations from Table 2 shall be accepted.

Table 2
Canadian ETV Program Procedure for Laboratory Testing of Oil-Grit Separators
Particle Size Distribution (PSD) of Test Sediment

Particle Diameter (Microns)	% by Mass of All Particles	Specific Gravity
1000	5%	2.65
500	5%	2.65
250	15%	2.65
150	15%	2.65
100	10%	2.65
75	5%	2.65
50	10%	2.65
20	15%	2.65
8	10%	2.65
5	5%	2.65
2	5%	2.65

3.6 CANADIAN ETV or ISO 14034 ETV VERIFICATION OF SCOUR TESTING

The OGS device shall have Canadian ETV or ISO 14034 ETV Verification of completed third-party scour testing conducted and have in accordance with the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators**. This scour testing is conducted with the device pre-loaded with test sediment comprised of the particle size distribution (PSD) illustrated in Table 2.

3.6.1 To be acceptable for on-line installation, the OGS device must demonstrate an average scour test effluent concentration less than 10 mg/L at each surface loading rate tested, up to and including 2600 L/min/m^2.

Data generated from laboratory scour testing performed with an OGS device pre-loaded with a coarser PSD than in Table 2 (i.e. the coarser PSD has no particles in the 1-micron to 50-micron size range, or the D_{50} of the test sediment exceeds 75 microns) shall not be acceptable for the determination of the device's suitability for on-line installation.

3.7 DESIGN ACCOUNTING FOR BYPASS

3.7.1 The OGS device shall be specified to achieve the TSS removal performance and water quality objectives without washout of previously captured pollutants. The OGS device shall also have sufficient hydraulic conveyance capacity to convey the peak storm event, in accordance

with hydraulic conditions per the Engineer of Record. To ensure this is achieved, there are two design options with associated requirements:

3.7.1.1 The OGS device shall be placed **off-line** with an upstream diversion structure (typically in an upstream manhole) that only allows the water quality volume to be diverted to the OGS device, and excessive flows diverted downstream around the OGS device to prevent high flow washout of pollutants previously captured. This design typically incorporates a triangular layout including an upstream bypass manhole with an appropriately engineered weir wall, the OGS device, and a downstream junction manhole, which is connected to both the OGS device and bypass structure. In this case with an external bypass required, the OGS device manufacturer must provide calculations and designs for all structures, piping and any other required material applicable to the proper functioning of the system, stamped by a Professional Engineer.

3.7.1.2 Alternatively, OGS devices in compliance with Section 3.6 shall be acceptable for an **on-line** design configuration, thereby eliminating the requirement for an upstream bypass manhole and downstream junction manhole.

3.7.2 The OGS device shall also have sufficient hydraulic conveyance capacity to convey the peak storm event, in accordance with hydraulic conditions per the Engineer of Record. If an alternate OGS device is proposed, supporting documentation shall be submitted that demonstrates equal or better hydraulic conveyance capacity as compared to the OGS device specified herein. This documentation shall be signed and sealed by a local registered Professional Engineer. All costs associated with preparing and certifying this documentation shall be born solely by the Contractor.

3.8 LIGHT LIQUID RE-ENTRAINMENT SIMULATION TESTING

The OGS device shall have Canadian ETV or ISO 14034 ETV Verification of completed third-party Light Liquid Re-entrainment Simulation Testing in accordance with the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators**, with results reported within the Canadian ETV or ISO 14034 ETV verification. This re-entrainment testing is conducted with the device pre-loaded with low density polyethylene (LDPE) plastic beads as a surrogate for light liquids such as oil and fuel. Testing is conducted on the same OGS unit tested for sediment removal to assess whether light liquids captured after a spill are effectively retained at high flow rates.

3.8.1 For an OGS device to be an acceptable stormwater treatment device on a site where vehicular traffic occurs and the potential for an oil or fuel spill exists, the OGS device must have reported verified performance results of greater than 99% cumulative retention of LDPE plastic beads for the five specified surface loading rates (ranging 200 L/min/m^2 to 2600 L/min/m^2) in accordance with the Light Liquid Re-entrainment Simulation Testing within the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators**. However, an OGS device shall not be allowed if the Light Liquid Re-entrainment Simulation Testing was performed with screening components within the OGS device that are effective at retaining the LDPE plastic beads, but would not be expected to retain light liquids such as oil and fuel.

3.9 PETROLEUM HYDROCARBONS AND FLOATABLES STORAGE CAPACITY

Petroleum hydrocarbons and floatables storage capacity in the OGS device shall be a minimum 50 gallons (189 Liters), or more as specified.

3.9.1 The OGS device shall have gasketed precast concrete joints that are watertight, and oil resistant and meet the design criteria according to ASTM C-443 to provide safe oil and other hydrocarbon materials storage and ground water protection. Mastic sealants or butyl tape/rope alone are not an acceptable alternative.

3.10 SURFACE LOADING RATE SCALING OF DIFFERENT MODEL SIZES

The reference device for scaling shall be an OGS device that has been third-party tested in accordance with the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators**. Other model sizes of the tested device shall only be scaled such that the claimed TSS removal efficiency of the scaled device shall be no greater than the TSS removal efficiency of the tested device at identical **surface loading rates** (flow rate divided by settling surface area). The depth of other model sizes of the tested device shall be scaled in accordance with the depth scaling provisions within Section 6.0 of the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators**.

3.10.1 The Peclet Number and volumetric scaling are not approved methods for scaling OGS devices.

PART 4 – INSPECTION & MAINTENANCE

The OGS manufacturer shall provide an Owner's Manual upon request.

4.1 A Quality Assurance Plan that provides inspection and maintenance for a minimum of 5 years shall be included with the OGS stormwater quality device, and written into the Environmental Compliance Approval (ECA) or the appropriate State/Provincial or local approval document.

4.2 OGS device inspection shall include determination of sediment depth and presence of petroleum hydrocarbons and floatables below the insert. Inspection shall be easily conducted from finished grade through a Frame and Cover of at least 22 inch (560 mm) in diameter.

4.3 Inspection and pollutant removal from below the OGS's insert shall be conducted as a periodic maintenance practice using a standard maintenance truck and vacuum apparatus, and shall be easily conducted from finished grade through a Frame and Cover of at least 22-inches (560 mm) in diameter, and through an access opening to the OGS device's sump with a minimum 16-inches diameter (406 mm).

4.4 No confined space for sediment removal or inspection of internal components shall be required for normal operation, annual inspection or maintenance activity.

PART 5 – EXECUTION

5.1 PRECAST CONCRETE INSTALLATION

The installation of the precast concrete OGS stormwater quality treatment device shall conform to ASTM C 891, ASTM C 478, ASTM C 443, CAN/CSA-A257.4-14, CAN/CSA-A257.4-14, CAN/CSA-S6-00 and all highway, State/Provincial, or local specifications for the construction of manholes. Selected sections of a general specification that are applicable are summarized below. The Contractor shall furnish all labor, equipment and materials necessary to offload, assemble as needed the OGS internal components as specified in the Shop Drawings.

5.2 EXCAVATION

5.2.1 Excavation for the installation of the OGS stormwater quality treatment device shall conform to highway, State/Provincial or local specifications. Topsoil that is removed during the excavation for the OGS stormwater quality treatment device shall be stockpiled in designated areas and not be mixed with subsoil or other materials. Topsoil stockpiles and the general site preparation for the installation of the OGS stormwater quality device shall conform to highway, State/Provincial or local specifications.

5.2.2 The OGS device shall not be installed on frozen ground. Excavation shall extend a minimum of 12 inch (300 mm) from the precast concrete surfaces plus an allowance for shoring and bracing where required. If the bottom of the excavation provides an unsuitable foundation additional excavation may be required.

5.2.3 In areas with a high water table, continuous dewatering shall be provided to ensure that the excavation is stable and free of water.

5.3 BACKFILLING

Backfill material shall conform to highway, State/Provincial or local specifications. Backfill material shall be placed in uniform layers not exceeding 12 inches (300 mm) in depth and compacted to highway, State/Provincial or local specifications.

5.4 OGS WATER QUALITY DEVICE CONSTRUCTION SEQUENCE

5.4.1 The precast concrete OGS stormwater quality treatment device is installed and leveled in sections in the following sequence:

- aggregate base
- base slab, or base
- riser section(s) (if required)
- riser section w/ pre-installed fiberglass insert
- upper riser section(s)
- internal OGS device components
- connect inlet and outlet pipes
- riser section, top slab and/or transition (if required)
- frame and access cover

5.4.2 The precast concrete base shall be placed level at the specified grade. The entire base shall be in contact with the underlying compacted granular material. Subsequent sections, complete with oil resistant, watertight joint seals, shall be installed in accordance with the precast concrete manufacturer's recommendations.

5.4.3 Adjustment of the OGS stormwater quality treatment device can be performed by lifting the upper sections free of the excavated area, re-leveling the base, and re-installing the sections. Damaged sections and gaskets shall be repaired or replaced as necessary. Once the OGS stormwater quality treatment device has been constructed, any lift holes must be plugged with mortar.

5.5 DROP PIPE AND OIL INSPECTION PIPE

Once the upper precast concrete riser has been attached to the lower precast concrete riser section, the OGS device Drop Pipe and Oil Inspection Pipe must be attached, and watertight sealed to the fiberglass insert using Sikaflex 1a. Installation instructions and required materials shall be provided by the OGS manufacturer.

5.6 INLET AND OUTLET PIPES

Inlet and outlet pipes shall be securely set using grout or approved pipe seals (flexible boot connections, where applicable) so that the structure is watertight. Non-secure inlets and outlets will result in improper performance.

5.7 FRAME AND COVER OR FRAME AND GRATE INSTALLATION

Precast concrete adjustment units shall be installed to set the frame and cover/grate at the required elevation. The adjustment units shall be laid in a full bed of mortar with successive units being joined using sealant recommended by the manufacturer. Frames for the cover/grate should be set in a full bed of mortar at the elevation specified.

5.7.1 A minimum of one cover, at least 22-inch (560 mm) in diameter, shall be clearly embossed with the OGS device brand or product name to properly identify this asset's purpose is for stormwater quality treatment.

APPENDIX E

Civil Engineering Drawings

ORLEANS RESIDENTIAL & MEDICAL FACILITY
3996 INNES RD, OTTAWA

REVISION 03

KEY PLAN (N.T.S.)

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5430 Canotek Road | Ottawa, ON, K1J 9G2
www.lrl.ca | (613) 842-3434

ORLEANS RESIDENTIAL & MEDICAL FACILITY
3996 INNES RD, OTTAWA
REV.03 - ISSUED FOR APPROVAL - JULY 19th 2024
LRL PROJECT no: 230737

LICENSED PROFESSIONAL ENGINEER
M. BASNET
100501996
2024/7/19
PROVINCE OF ONTARIO

NOT AUTHENTIC UNLESS SIGNED AND DATED

GENERAL NOTES

1. ALL WORKS MATERIALS SHALL CONFIRM TO THE LAST REVISION OF THE STANDARDS AND SPECIFICATIONS FOR THE CITY OF OTTAWA, ONTARIO PROVINCIAL STANDARD DRAWINGS (OPSD) AND SPECIFICATIONS (OPSS), WHERE APPLICABLE. LOCAL UTILITY STANDARDS AND MINISTRY OF TRANSPORTATION STANDARDS WILL APPLY WHERE REQUIRED.
2. THE CONTRACTORS SHALL CONFIRM THE LOCATION OF ALL EXISTING UTILITIES WITHIN THE SITE AND ADJACENT WORK AREAS. THE CONTRACTORS SHALL BE RESPONSIBLE FOR PROTECTING ALL EXISTING UTILITIES TO THE SATISFACTION OF THE AUTHORITY HAVING JURISDICTION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE REPAIR OR REPLACEMENT OF ANY SERVICES OR UTILITIES DISTURBED DURING CONSTRUCTION , TO THE SATISFACTION OF THE AUTHORITY HAVING JURISDICTION.
3. ALL DIMENSIONS SHALL BE CHECKED AND VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO THE START OF CONSTRUCTION, ANY DISCREPANCIES SHALL BE REPORTED IMMEDIATELY TO THE ENGINEER. LOST TIME DUE TO FAILURE OF THE CONTRACTORS TO CONFIRM UTILITY LOCATIONS AND NOTIFY ENGINEER OF POSSIBLE CONFLICTS PRIOR TO CONSTRUCTION WILL BE AT CONTRACTORS EXPENSE.
4. ANY AREA BEYOND THE LIMIT OF THE SITE DISTURBED DURING CONSTRUCTION SHALL BE RESTORED TO ORIGINAL CONDITION OR BETTER TO THE SATISFACTION OF THE AUTHORITY HAVING JURISDICTION AT THE CONTRACTOR'S EXPENSE.
   RELOCATING OF EXISTING SERVICES AND/OR UTILITIES SHALL BE AS SHOWN ON THE DRAWINGS OR DETECTED BY THE ENGINEER AT THE EXPENSE OF DEVELOPERS.
5. ALL WORK SHALL BE COMPLETED IN ACCORDANCE WITH THE 'OCCUPATIONAL HEALTH AND SAFETY ACT AND REGULATIONS FOR CONSTRUCTION PROJECTS'. THE GENERAL CONTRACTORS SHALL BE DEEMED TO BE THE 'CONTRACTOR' AS DEFINED IN THE ACT.
6. ALL THE CONSTRUCTION SIGNAGE MUST CONFIRM TO THE MINISTRY OF TRANSPORTATION OF ONTARIO MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES PER LATEST AMENDMENT.
7. THE CONTRACTOR IS ADVISED THAT WORKS BY OTHERS MAY BE ONGOING DURING THE PERIOD OF THE CONTRACT. THE CONTRACTOR SHALL COORDINATE CONSTRUCTION ACTIVITIES TO PREVENT CONFLICTS.
8. ALL DIMENSIONS ARE IN METRES UNLESS SPECIFIED OTHERWISE.
9. THERE WILL BE NO SUBSTITUTION OF MATERIALS UNLESS PRIOR WRITTEN APPROVAL IS RECEIVED FROM THE ENGINEER.
10. ALL CONSTRUCTION SHALL BE CARRIED OUT IN ACCORDANCE WITH THE RECOMMENDATIONS MADE IN THE GEOTECHNICAL REPORT.
11. FOR DETAILS RELATING TO STORMWATER MANAGEMENT AND ROOF DRAINAGE REFER TO THE SITE SERVICING AND STORMWATER MANAGEMENT REPORT.
12. ALL SEWERS CONSTRUCTED WITH GRADES LESS THAN 1.0% SHALL BE INSTALLED USING LASER ALIGNMENT AND CHECKED WITH LEVEL INSTRUMENT PRIOR TO BACKFILLING.
13. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING ALL PERMITS REQUIRED AND TO BEAR THE COST OF THE SAME.
14. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ADDITIONAL BEDDING, OR ADDITIONAL STRENGTH PIPE IF THE MAXIMUM TRENCH WIDTH AS SPECIFIED BY OPSD IS EXCEEDED.
15. ALL PIPE/CULVERT SECTION SIZES REFER TO INSIDE DIMENSIONS.
16. SHOULD DEEPLY BURIED ARCHAEOLOGICAL REMAINS BE FOUND ON THE PROPERTY DURING CONSTRUCTION ACTIVITIES, THE HERITAGE OPERATIONS UNIT OF THE ONTARIO MINISTRY OF CULTURE MUST BE NOTIFIED IMMEDIATELY.
17. ALL NECESSARY CLEARING AND GRUBBING SHALL BE COMPLETED BY THE CONTRACTOR. REVIEW WITH CONTRACT ADMINISTRATOR AND THE CITY OF OTTAWA PRIOR TO ANY TREE CUTTING/REMOVAL.
18. DRAWINGS SHALL BE READ ON CONJUNCTION WITH ARCHITECTURAL SITE PLAN.
19. THE CONTRACTOR SHALL PROVIDE THE PROJECT ENGINEER ON SET OF AS CONSTRUCTED SITE SERVICING AND GRADING DRAWINGS.
20. BENCHMARKS: IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY THAT THE SITE BENCHMARK(S) HAS NOT BEEN ALTERED OR DISTURBED AND THAT ITS RELATIVE ELEVATION AND DESCRIPTION AGREES WITH THE INFORMATION DEPICTED ON THIS PLAN.

EROSION AND SEDIMENT CONTROL NOTES

GENERAL

THE CONTRACTOR SHALL IMPLEMENT BEST MANAGEMENT PRACTICES, TO PROVIDE FOR PROTECTION OF THE AREA DRAINAGE SYSTEM AND THE RECEIVING WATERCOURSE, DURING CONSTRUCTION ACTIVITIES. THE CONTRACTOR ACKNOWLEDGES THAT FAILURE TO IMPLEMENT APPROPRIATE EROSION AND SEDIMENT CONTROL MEASURES MAY BE SUBJECT TO PENALTIES IMPOSED BY ANY APPLICABLE REGULATORY AGENCY.

THE CONTRACTOR ACKNOWLEDGES THAT SURFACE EROSION AND SEDIMENT RUNOFF RESULTING FROM THEIR CONSTRUCTION OPERATIONS HAS POTENTIAL TO CAUSE A DETRIMENTAL IMPACT TO ANY DOWNSTREAM WATERCOURSE OR SEWER, AND THAT ALL CONSTRUCTION OPERATIONS THAT MAY IMPACT UPON WATER QUALITY SHALL BE CARRIED OUT IN MANNER THAT STRICTLY MEETS THE REQUIREMENT OF ALL APPLICABLE LEGISLATION AND REGULATIONS.

AS SUCH, THE CONTRACTOR SHALL BE RESPONSIBLE FOR CARRYING OUT THEIR OPERATIONS, AND SUPPLYING AND INSTALLING ANY APPROPRIATE CONTROL MEASURES, SO AS TO PREVENT SEDIMENT LADEN RUNOFF ENTERING ANY SEWER OR WATERCOURSE WITHIN OR DOWNSTREAM OF THE WORKING AREA.

THE CONTRACTOR ACKNOWLEDGES THAT NO ONE MEASURE IS LIKELY TO BE 100% EFFECTIVELY FOR EROSION PROTECTION AND CONTROLLING SEDIMENT RUNOFF AND DISCHARGES FROM THE SITE. THEREFORE, WHERE NECESSARY THE CONTRACTOR SHALL IMPLEMENT ADDITIONAL MEASURES ARRANGED IN SUCH MANNER AS TO MITIGATE SEDIMENT RELEASE FROM THE CONSTRUCTION OPERATIONS AND ACHIEVE SPECIFIC MAXIMUM PERMITTED CRITERIA WHERE APPLICABLE. SUGGESTED ON-SITE MEASURES MAY INCLUDE, BUT SHALL NOT BE LIMITED TO, THE FOLLOWING METHODS: SEDIMENT PONDS, FILTER BAGS, PUMP FILTERS, SETTLING TANKS, SILT FENCE, STRAW BALES, FILTER CLOTHS, CATCH BASIN FILTERS, CHECK DAMS AND/OR OTHER RECOGNIZED TECHNOLOGIES AND METHOD AVAILABLE AT THE TIME OF CONSTRUCTION. SPECIFIC MEASURES SHALL BE INSTALLED IN ACCORDANCE WITH REQUIREMENTS OF OPSS 577 WHERE APPROPRIATE, OR IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.

WHERE, IN THE OPINION OF THE CONTRACT ADMINISTRATOR OR REGULATORY AGENCY, THE INSTALLED CONTROL MEASURES FAIL TO PERFORM ADEQUATELY, THE CONTRACTOR SHALL SUPPLY AND INSTALL ADDITIONAL OR ALTERNATIVE MEASURES AS DIRECTED BY THE CONTRACT ADMINISTRATOR OR REGULATORY AGENCY, AS SUCH, THE CONTRACTOR SHALL HAVE ADDITIONAL CONTROL MATERIALS ON SITE AT ALL TIME WHICH ARE EASILY ACCESSIBLE AND MAY BE IMPLEMENTED BY HIM AT THE MOMENT'S NOTICE.

PRIOR TO COMMENCING WORK, THE CONTRACTOR SHALL SUBMIT TO THE CONTRACT ADMINISTRATOR SIX COPIES OF A DETAILED EROSION AND SEDIMENT CONTROL PLAN (ESCP). THE ESCP WILL CONSIST OF WRITTEN DESCRIPTION AND DETAILED DRAWINGS INDICATING THE ON-SITE ACTIVITIES AND MEASURES TO BE USED TO CONTROL EROSION AND SEDIMENT MOVEMENT FOR EACH STEP OF THE WORK.

CONTRACTOR'S RESPONSIBILITIES

THE CONTRACTOR SHALL ENSURE THAT ALL WORKERS, INCLUDING SUB-CONTRACTOR, IN THE WORKING ARE ARE AWARE OF THE IMPORTANCE OF THE EROSION AND SEDIMENT CONTROL MEASURES AND INFORMED OF THE CONSEQUENCES OF THE FAILURE TO COMPLY WITH THE REQUIREMENTS OF ALL REGULATORY AGENCIES.

THE CONTRACTOR SHALL PERIODICALLY, AND WHEN REQUESTED BY THE CONTRACT ADMINISTRATOR, CLEAN OUT ACCUMULATED SEDIMENT DEPOSITS AS REQUIRED AT THE SEDIMENT CONTROL DEVICES, INCLUDING THOSE DEPOSITS THAT MAY ORIGINATE FROM OUTSIDE THE CONSTRUCTION AREA. ACCUMULATED SEDIMENT SHALL BE REMOVED IN SUCH A MANNER THAT PREVENTS THE DEPOSITION OF THIS MATERIAL INTO THE SEWER WATERCOURSE AND AVOIDS DAMAGE TO CONTROL MEASURES. THE SEDIMENT SHALL BE REMOVED FROM THE SITE AT THE CONTRACTOR'S EXPENSE AND MANAGED IN COMPLIANCE WITH REQUIREMENTS FRO EXCESS EARTH MATERIAL, AS SPECIFIED ELSEWHERE IN THE CONTRACT.

THE CONTRACTOR SHALL IMMEDIATELY REPORT TO THE CONTRACT ADMINISTRATOR ANY ACCIDENTAL DISCHARGES OF SEDIMENT MATERIAL INTO EITHER THE WATERCOURSE OR THE STORM SEWER SYSTEM. FAILURE TO REPORT WILL BE CONSTITUTE A BRACH OF THIS SPECIFICATION AND THE CONTRACTOR MAY ALSO BE SUBJECT TO THE PENALTIES IMPOSED BY THE APPLICABLE REGULATORY AGENCY. APPROPRIATE RESPONSE MEASURES, INCLUDING ANY REPAIRS TO EXISTING CONTROL MEASURES OR THE IMPLEMENTATION OF ADDITIONAL CONTROL MEASURES, SHALL BE CARRIED OUT BY THE CONTRACTOR WITHOUT DELAY.

THE SEDIMENT CONTROL MEASURES SHALL ONLY BE REMOVED WHEN, IN THE OPINION OF THE CONTRACT ADMINISTRATOR, THE MEASURE OR MEASURES, IS NO LONGER REQUIRED. NO CONTROL MEASURE MAY BE PERMANENTLY REMOVED WITHOUT PRIOR AUTHORIZATION FROM THE CONTRACT ADMINISTRATOR. ALL SEDIMENT AND EROSION CONTROL MEASURES SHALL BE REMOVED IN A MANNER THAT AVOIDS THE ENTRY OF ANY EQUIPMENT, OTHER THAN HAND-HELD EQUIPMENT, INTO ANY WATERCOURSE, AND PREVENTS THE RELEASE OF ANY SEDIMENT OR DEBRIS INTO ANY SEWER OR WATERCOURSE WITHIN OR DOWNSTREAM OF THE WORKING AREA. ALL ACCUMULATED SEDIMENT SHALL BE REMOVED FROM THE WORKING AREA AT THE CONTRACTOR'S EXPENSE AND MANAGED IN COMPLIANCE WITH THE REQUIREMENTS FOR EXCESS EARTH MATERIAL

WHERE, IN THE OPINION OF EITHER THE CONTRACT ADMINISTRATOR OR A REGULATORY AGENCY, ANY OF THE TERMS SPECIFIED HEREIN HAVE NOT BEEN COMPLIED WITH OR PERFORMED IN A SUITABLE MANNER, OR TAT ALL, THE CONTRACTOR ADMINISTRATOR OR A REGULATORY AGENCY HAS THE RIGHT TO IMMEDIATELY WITHDRAW ITS PERMISSION TO CONTINUE THE WORK BUT MAY RENEW ITS PERMISSION UPON BEING SATISFIED THAT THE DEFAULTS OR DEFICIENCIES IN THE PERFORMANCE OF THIS SPECIFICATION BY THE CONTRACTOR HAVE BEEN REMEDIED.

SPILL CONTROL NOTES

1. ALL CONSTRUCTION EQUIPMENT SHALL BE RE-FUELED, MAINTAINED, AND STORED NO LESS THAN 30 METRES FROM WATERCOURSE, STEAMS, CREEKS, WOODLOTS, AND ANY ENVIRONMENTALLY SENSITIVE AREAS, OR AS OTHERWISE SPECIFIED.
2. THE CONTRACTOR MUST IMPLEMENT ALL NECESSARY MEASURES IN ORDER TO PREVENT LEAKS, DISCHARGES OR SPILLS OF POLLUTANTS, DELETERIOUS MATERIALS, OR OTHER SUCH MATERIALS OR SUBSTANCES WHICH WOULD OR COULD CAUSE AN ADVERSE IMPACT TO THE NATURAL ENVIRONMENT.
3. IN THE EVENT OF A LEAK, DISCHARGE OR SPILL OF POLLUTANT, DELETERIOUS MATERIAL OR OTHER SUCH MATERIAL OR SUBSTANCE WHICH WOULD OR COULD CAUSE AN ADVERSE IMPACT TO THE NATURAL ENVIRONMENT, THE CONTRACTOR SHALL:
   - 3.1. IMMEDIATELY NOTIFY APPROPRIATE FEDERAL, PROVINCIAL, AND LOCAL GOVERNMENT MINISTRIES, DEPARTMENTS, AGENCIES, AND AUTHORITIES OF THE INCIDENT IN ACCORDANCE WITH ALL CURRENT LAWS, LEGISLATION, ACTS, BY-LAWS, PERMITS, APPROVALS, ETC.
   - 3.2. TAKE IMMEDIATE MEASURES TO CONTAIN THE MATERIAL OR SUBSTANCE, AND TO TAKE SUCH MEASURES TO MITIGATE AGAINST ADVERSE IMPACTS TO THE NATURAL ENVIRONMENT.
   - 3.3. RESTORE THE AFFECTED AREA TO THE ORIGINAL CONDITION OR BETTER TO THE SATISFACTION OF THE AUTHORITIES HAVING JURISDICTION.

MUD MAT NOTES

1. THE GRANULAR MATERIAL WILL REQUIRE PERIODIC REPLACEMENT AS IT BECOMES CONTAMINATED BY VEHICLE TRAFFIC.
2. SEDIMENT SHALL BE CLEANED FROM PUBLIC ROADS AT THE END OF EACH DAY.
3. SEDIMENT SHALL BE REMOVED FROM PUBLIC ROADS BY SHOVELING OR SWEEPING AND DISPOSED OR PROPERLY IN A CONTROLLED SEDIMENT DISPOSAL AREA.

SITE GRADING NOTES

1. PRIOR TO THE COMMENCEMENT OF THE SITE GRADING WORKS, ALL SILTATION CONTROL DEVICES SHALL BE INSTALLED AND OPERATIONAL PER EROSION CONTROL PLAN.
2. ALL GRANULAR AND PAVEMENT FOR ROADS/PARKING AREAS SHALL BE CONSTRUCTED IN ACCORDANCE WITH GEOTECHNICAL ENGINEER'S RECOMMENDATIONS.
3. ALL TOPSOIL AND ORGANIC MATERIAL SHALL BE STRIPPED WITHIN THE ROAD AND PARKING AREAS ALLOWANCE PRIOR TO THE COMMENCEMENT OF CONSTRUCTION.
4. CONCRETE CURB SHALL BE IN ACCORDANCE WITH THE CITY OF OTTAWA STD. SC1.1 PROVISION SHALL BE MADE OR CURB DEPRESSIONS AS INDICATED ON ARCHITECTURAL SITE PLAN. CONCRETE SIDEWALK SHALL BE IN ACCORDANCE WITH CITY OF OTTAWA STD SC1.4. ALL CURBS, CONCRETE ISLANDS, AND SIDEWALKS SHOWN O THIS DRAWING ARE TO BR PRICED IN SITE WORKS PORTION OF THE CONTRACT.
5. PAVEMENT REINSTATEMENT FOR SERVICE AND UTILITY CUTS SHALL BE IN ACCORDANCE WITH THE CITY OF OTTAWA STD. R10 AND OPSD 509.010 AND OPSS 310.
6. GRANULAR 'A' SHALL BE PLACED TO A MINIMUM THICKNESS OF 30MM AROUND ALL STRUCTURES WITHIN THE PAVEMENT AREA.
7. SUB-EXCAVATE SOFT AREAS AND FILL WITH GRANULAR 'B' COMPACTED IN MAXIMUM 30MM LIFTS.
8. ALL WORK ON THE MUNICIPAL RIGHT OF WAY AND EASEMENTS TO BE INSPECTED BY THE MUNICIPALITY PRIOR BACKFILLING.
9. CONTRACTOR TO OBTAIN A ROAD OCCUPANCY PERMIT 48 HOURS PRIOR TO COMMENCING ANY WORK WITHIN THE MUNICIPAL ROAD ALLOWANCE, IF REQUIRED BY THE MUNICIPALITY.
10. ALL PAVEMENT MARKING FEATURES AND SITE SIGNAGE SHALL BE PLACED PER ARCHITECTURAL SITE PLAN. LINE PAINTING AND DIRECTIONAL SYMBOLS SHALL BE APPLIED WITH A MINIMUM OF TWO COATS OF ORGANIC SOLVENT PAINT.
11. REFER TO ARCHITECTURAL SITE PLAN FOR DIMENSIONS AND SITE DETAILS.
12. STEP JOINTS ARE TO BE USED WHERE PROPOSED ASPHALT MEETS EXISTING ASPHALT. ALL JOINTS MUST BE SEALED.
13. SIDEWALKS TO BE 13MM & BEVELED AT 2:1 OR 6MM WITH NO BEVEL REQUIRED BELOW THE FINISHED FLOOR SLAB ELEVATION AT ENTRANCES REQUIRED TO BE BARRIER-FREE, UNLESS OTHERWISE NOTED. ALL IN ACCORDANCE WITH OBC 3.8.1.3 & OTTAWA ACCESSIBILITY DESIGN STANDARDS.
14. WHERE APPLICABLE THE CONTRACTOR IS TO SUBMIT SHOP DRAWINGS TO THE ENGINEER FOR APPROVAL PRIOR TO CONSTRUCTION. SHOP DRAWINGS MUST BE SITE SPECIFIC, SIGNED AND SEALED BY A LICENSED STRUCTURAL ENGINEER. THE CONTRACTOR WILL ALSO BE REQUIRED TO SUPPLY AND GEOTECHNICAL CERTIFICATION OF THE AS-CONSTRUCTED RETAINING WALL TO THE ENGINEER PRIOR TO FINAL ACCEPTANCE.

ROADWORK SPECIFICATIONS

15. ROADWORK TO BE COMPLETED IN ACCORDANCE WITH GEOTECHNICAL REPORT, PREPARED BY LRL ASSOCIATES. DATED NOVEMBER 2020.
16. AL TOPSOIL AND ORGANIC MATERIAL SHALL BE STRIPPED WITHIN THE ROAD ALLOWANCE PRIOR TO THE COMMENCEMENT OF CONSTRUCTION AND STOCK PILLED ON SITE AS DIRECTED BY NATIONAL MUNICIPALITY.
17. THE SUBGRADE SHALL BE CROWNED AND SLOPED AT LEAST 2% AND PROOF ROLLED WITH HEAVY ROLLERS.
18. SUB-EXCAVATE SOFT AREAS AND FILL WITH GRANULAR 'A', TYPE II COMPACTED IN MAXIMUM 300MM LIFTS.
19. ALL GRANULAR FOR ROADS SHALL BE COMPACTED TO MINIMUM OF 100% STANDARD PROCTOR DENSITY MAXIMUM DRY DENSITY (SPMDD).
20. CONCRETE RAMP C/W TACTILE WALKING SURFACE INDICATORS COMPONENT AS PER OPSD 310.039. TACTILE WALKING SURFACE INDICATORS TO BE INSTALLED AT ALL RAMPS. MATERIAL TO BE POLYMER COMPOSITE, COLOR GREY.

SANITARY, FOUNDATION DRAIN, STORM SEWER AND WATERMAIN NOTES

GENERAL

1. LASER ALIGNMENT CONTROL TO BE UTILIZED ON ALL SEWER INSTALLATIONS.
2. CLAY SEALS TO BE INSTALLED AS PER CITY STANDARD DRAWING S8. THE SEALS SHOULD BE AT LEAST 1.5M LONG (IN THE TRENCH DIRECTION) AND SHOULD EXTEND FROM TRENCH WALL TO TRENCH WALL. THE SEALS SHOULD EXTEND FROM THE FROST LINE AND FULLY PENETRATE THE BEDDING, SUB-BEDDING, AND COVER MATERIAL. THE BARRIERS SHOULD CONSIST OF RELATIVELY DRY AND COMPATIBLE BROWN SILTY CLAY PLACED IN MAXIMUM 225MM LIFTS AND COMPACTED TO A MINIMUM OF 95% SPMDD. THE CLAY SEALS SHOULD BE PLACED AT THE SITE BOUNDARIES AND AT 60M INTERVALS IN THE SERVICE TRENCHES.
3. SERVICES TO BUILDING TO BE TERMINATED 1.0M FROM THE OUTSIDE FACE OF BUILDING UNLESS OTHERWISE NOTED.
4. ALL MAINTENANCE STRUCTURE AND CATCH BASIN EXCAVATIONS TO BE BACKFILLED WITH GRANULAR MATERIAL COMPACTED TO 98% STANDARD PROCTOR DENSITY. A MINIMUM OF 300MM AROUND STRUCTURES.
5. "MODULOC" OR APPROVED PRE-CAST MAINTENANCE STRUCTURE AND CATCH BASIN ADJUSTERS TO BE USED IN LIEU OF BRICKING. PARGE ADJUSTING UNITS ON THE OUTSIDE ONLY.
6. SAFETY PLATFORMS SHALL BE PER OPSD 404.02.
7. DROP STRUCTURES SHALL BE IN ACCORDANCE WITH OPSD 1003.01, IF APPLICABLE.
8. THE CONTRACTOR IS TO PROVIDE CCTV CAMERA INSPECTIONS OF ALL SEWERS, INCLUDING PICTORIAL REPORT, ONE (1) CD COPY AND TWO (2) VIDEO RECORDING IN A FORMAT ACCEPTABLE TO ENGINEER. ALL SEWER ARE TO BE FLUSHED PRIOR TO CAMERA INSPECTION. ASPHALT WEAR COURSE SHALL NOT BE PLACED UNTIL THE VIDEO INSPECTION OF SEWERS AND NECESSARY REPAIRS HAVE BEEN COMPLETED TO THE SATISFACTION OF THE ENGINEER.
9. CONTRACTOR SHALL PERFORM LEAKAGE TESTING, IN THE PRESENCE OF THE CONSULTANT, FOR SANITARY SEWERS IN ACCORDANCE WITH OPSS 407. CONTRACTOR SHALL PERFORM VIDEO INSPECTION OF ALL SEWERS. A COPY OF THE VIDEO AND INSPECTION REPORT SHALL BE SUBMITTED TO THE CONSULTANT FOR REVIEW AND APPROVAL PRIOR TO PLACEMENT OF WEAR COURSE ASPHALT.

SANITARY

10. ALL SANITARY SEWER INSTALLATION SHALL CONFORM TO THE LATEST REVISIONS OF THE CITY OF OTTAWA AND THE ONTARIO PROVINCIAL STANDARD DRAWINGS (OPSD). AND SPECIFICATIONS (OPSS).
11. ALL SANITARY GRAVITY SEWER SHALL BE PVC SDR 35, IPEX 'RING-TITE' (OR APPROVED EQUIVALENT) PER CSA STANDARD B182.2 OR LATEST AMENDMENT, UNLESS SPECIFIED OTHERWISE.
12. EXISTING MAINTENANCE STRUCTURES TO BE RE-BENCHED WHERE A NEW CONNECTION IS MADE.
13. SANITARY GRAVITY SEWER TRENCH AND BEDDING SHALL BE PER CITY OF OTTAWA STD. S6 AND S7 CLASS 'B' BEDDING, UNLESS SPECIFIED OTHERWISE.
14. SANITARY MAINTENANCE STRUCTURE FRAME AND COVERS SHALL BE PER CITY OF OTTAWA STD. S24 AND S25.
15. SANITARY MAINTENANCE STRUCTURES SHALL BE BENCHED PER OPSD 701.021.
16. 100MM THICK HIGH-DENSITY GRADE 'A' POLYSTYRENE INSULATION TO BE INSTALLED IN ACCORDANCE WITH CITY STD W22 WHERE INDICATED ON DRAWING SSP-1.

STORM

17. ALL REINFORCED CONCRETE STORM SEWER PIPE SHALL BE IN ACCORDANCE WITH CSA A257.2, OR LATEST AMENDMENT. ALL NON-REINFORCED CONCRETE STORM SEWER PIPE SHALL BE IN ACCORDANCE WITH CSA A257.1, OR LATEST AMENDMENT. PIPE SHALL BE JOINED WITH STD. RUBBER GASKETS AS PER CSA A257.3, OR LATEST AMENDMENT.
18. ALL STORM SEWER TRENCH AND BEDDING SHALL BE IN ACCORDANCE WITH THE CITY OF OTTAWA STD. S6 AND S7 CLASS 'B' UNLESS OTHERWISE SPECIFIED. BEDDING AND COVER MATERIAL SHALL BE SPECIFIED BY PROJECT GEOTECHNICAL ENGINEER.
19. ALL PVC STORM SEWERS ARE TO BE SDR 35 APPROVED PER C.S.A. B182.2 OR LATEST AMENDMENT, UNLESS OTHERWISE SPECIFIED.
20. CATCH BASIN SHALL BE IN ACCORDANCE WITH OPSD 705.010.
21. CATCH BASIN LEADS SHALL BE IN 200MM DIA. AT 1% SLOPE (MIN) UNLESS SPECIFIED OTHERWISE.
22. ALL CATCH BASINS SHALL HAVE 600MM SUMPS, UNLESS SPECIFIED OTHERWISE.
23. ALL CATCH BASIN LEAD INVERTS TO BE 1.5M BELOW FINISHED GRADE UNLESS SPECIFIED OTHERWISE.
24. THE STORM SEWER CLASSES HAVE BEEN DESIGNED BASED ON BEDDING CONDITIONS SPECIFIED ABOVE. WHERE THE SPECIFIED TRENCH WIDTH IS EXCEEDED , THE CONTRACTOR IS REQUIRED TO PROVIDE AND SHALL BE RESPONSIBLE FOR EXTRA TEMPORARY AND/OR PERMANENT REPAIRS MADE NECESSARY BY THE WIDENED TRENCH.
25. ALL ROAD AND PARKING LOT CATCH BASINS TO BE INSTALLED WITH ORTHOGONALLY PLACED SUBDRAINS IN ACCORDANCE WITH DETAIL. PERFORATED SUBDRAIN FOR ROAD AND PARKING LOT CATCH BASIN SHALL BE INSTALLED PER CITY STD R1 UNLESS OTHERWISE NOTED.
26. PERFORATED SUBDRAIN FOR REAR YARD AND LANDSCAPING APPLICATIONS SHALL BE INSTALLED PER CITY STD S29, S30 AND S31, WHERE APPLICABLE.
27. RIP-RAP TREATMENT SEWER AND CULVERT OUTLETS PER OPSD 810.010.
28. ALL STORM SEWER/ CULVERTS TO BE INSTALLED WITH FROST TREATMENT PER OPSD 803.031 WHERE APPLICABLE.
29. ALL STORM MANHOLES WITH PIPE LESS THAN 900MM IN DIAMETER SHALL BE CONSTRUCTED WITH A 300MM SUMP AS PER SDG, CLAUSE 6.2.6.

WATERMAIN

30. ALL WATERMAIN INSTALLATION SHALL CONFORM TO THE LATEST REVISIONS OF THE CITY OF OTTAWA AND THE ONTARIO PROVINCIAL STANDARD DRAWINGS (OPSD) AND SPECIFICATIONS (OPSS).
31. ALL PVC WATERMAINS SHALL BE AWWA C-900 CLASS 150, SDR 18 OR APPROVED EQUIVALENT.
32. ALL WATER SERVICES LESS THAN OR EQUAL TO 50MM IN DIAMETER TO BE TYPE 'K' COPPER.
33. WATERMAIN TRENCH AND BEDDING SHALL BE IN ACCORDANCE WITH CITY OF OTTAWA STANDARD W17. UNLESS SPECIFIED OTHERWISE. BEDDING AND COVER MATERIAL SHALL BE SPECIFIED BY THE PROJECT GEOTECHNICAL ENGINEER.
34. ALL PVC WATERMAINS, SHALL BE INSTALLED WITH A 10 GAUGE STRANDED COPPER TWU OR RWU TRACER WIRE IN ACCORDANCE WITH CITY OF OTTAWA STD. W.36.
35. CATHODIC PROTECTION IS REQUIRED ON ALL METALLIC FITTINGS PER CITY OF OTTAWA STD.25.5 AND W25.6.
36. VALVE BOXES SHALL BE INSTALLED PER CITY OF OTTAWA STD W24.
37. WATERMAIN IN FILL AREAS TO BE INSTALLED WITH RESTRAINED JOINTS PER CITY OF OTTAWA STD.25.5 AND W25.6.
38. THRUST BLOCKING OF WATERMAINS TO BE INSTALLED PER CITY OF OTTAWA STD. W25.3 AND W25.4.
39. THE CONTRACTOR SHALL PROVIDE ALL TEMPORARY CAPS, PLUGS, BLOW-OFFS, AND NOZZLES REQUIRED FOR TESTING AND DISINFECTION OF THE WATERMAIN.
40. WATERMAIN CROSSING OVER AND BELOW SEWERS SHALL BE IN ACCORDANCE WITH THE CITY OF OTTAWA STD. W25,2 AND W25, RESPECTIVELY.
41. WATER SERVICES ARE TO BE INSULATED PER CITY STD. W23 WHERE SEPARATION BETWEEN SERVICES AND MAINTENANCE HOLES ARE LESS THAN 2.4M.
42. THE MINIMUM VERTICAL CLEARANCE BETWEEN WATERMAIN AND SEWER/UTILITY IS 0.5M PER MOE GUIDELINES. FOR CROSSING UNDER SEWERS, ADEQUATE STRUCTURAL SUPPORT FOR THE SEWER IS REQUIRED TO PREVENT EXCESSIVE DEFLECTION OF JOINTS AND SETTLING. THE LENGTH OF WATER PIPE SHALL BE CENTERED AT THE POINT OF CROSSING TO ENSURE THAT THE JOINTS WILL BE EQUIDISTANT AND AS FAR AS POSSIBLE FROM THE SEWER.
43. ALL WATERMAINS SHALL HAVE A MINIMUM COVER OR 2.4M, OTHERWISE THERMAL INSULATION IS REQUIRED AS PER STD DWG W22.
44. GENERAL WATER PLANT TO UTILITY CLEARANCE AS PER STD DWG R20.
45. FIRE HYDRANT INSTALLATION AS PER STD DWG W19, ALL BOTTOM OF HYDRANT FLANGE ELEVATIONS TO BE INSTALLED 0.10M ABOVE PROPOSED FINISHED GRADE AT HYDRANT; FIRE HYDRANT LOCATION AS PER STD DWG W18.
46. BUILDING SERVICE TO BE CAPPED 1.0M OFF THE FACE OF THE BUILDING UNLESS OTHERWISE NOTED AND MUST BE RESTRAINED A MINIMUM OF 12M BACK FROM STUB.
47. ALL WATERMAINS SHALL BE HYDROSTATICALLY TESTED IN ACCORDANCE WITH THE CITY OF OTTAWA AND ONTARIO GUIDELINES UNLESS OTHERWISE DIRECTED. PROVISIONS FOR FLUSHING WATER LINE PRIOR TO TESTING, ETC. MUST BE PROVIDED.
48. ALL WATERMAINS SHALL BE BACTERIOLOGICALLY TESTED IN ACCORDANCE WITH THE CITY OF OTTAWA AND ONTARIO GUIDELINES. ALL CHLORINATED WATER TO BE DISCHARGED AND PRETREATED TO ACCEPTABLE LEVELS PRIOR TO DISCHARGE. ALL DISCHARGED WATER MUST BE CONTROLLED AND TREATED SO AS NOT TO ADVERSELY EFFECT ENVIRONMENT. IT IS RESPONSIBILITY OF THE CONTRACTOR TO ENSURE THAT ALL MUNICIPAL AND/OR PROVINCIAL REQUIREMENTS ARE FOLLOWED.
49. ALL WATERMAIN STUBS SHALL BE TERMINATED WITH A PLUG AND 50MM BLOW OFF UNLESS OTHERWISE NOTED.

GENERAL NOTES:

EXISTING SERVICES AND UTILITIES SHOWN ON THESE DRAWINGS ARE TAKEN FROM THE BEST AVAILABLE RECORDS, BUT MAY NOT BE COMPLETE OR TO DATE. CONTRACTOR SHALL VERIFY IN FIELD FOR LOCATION AND ELEVATION OF PIPES AND CHECK WITH THE UTILITY COMPANIES BEFORE DIGGING OR PERFORMING WORK.

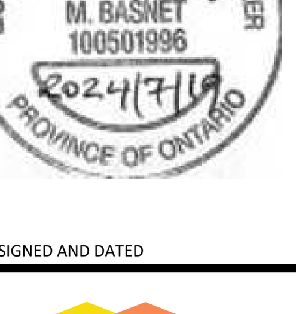
CONTRACTOR IS ADVISED TO COLLECT INFORMATION ON SOIL CONDITIONS BEFORE START OF CONSTRUCTION.

THE ENGINEER WAIVES ANY AND ALL RESPONSIBILITY AND LIABILITY FOR PROBLEMS WHICH ARISE FROM FAILURE TO FOLLOW THESE PLANS, SPECIFICATIONS AND THE DESIGN INTENT THEY CONVEY, OR FOR PROBLEMS WHICH ARISE FROM OTHERS' FAILURE TO OBTAIN AND/OR FOLLOW THE ENGINEER'S GUIDANCE WITH RESPECT TO ANY ERRORS, OMISSIONS, INCONSISTENCIES AMBIGUITIES OR CONFLICTS WHICH ARE ALLEGED.

CONTRACTOR TO VERIFY ALL DIMENSIONS AND NOTIFY THE ENGINEER OF ANY DISCREPANCIES BEFORE WORK COMMENCES. DO NOT SCALE DRAWINGS.

SUBJECT FOR APPROVAL

No.	REVISIONS	BY	DATE
03	RE-ISSUED FOR APPROVAL	M.L.	19 JUL 2024
02	RE-ISSUED FOR APPROVAL	M.L.	29 MAY 2024
01	ISSUED FOR APPROVAL	M.L.	08 FEB 2024



NOT AUTHENTIC UNLESS SIGNED AND DATED

LRL
ENGINEERING | INGÉNIERIE
5430 Canotek Road | Ottawa, ON, K1J 9G2
www.lrl.ca | (613) 842-3434

CLIENT
LOU FRANGIAN

DESIGNED BY:	DRAWN BY:	APPROVED BY:
M.L.	M.L.	M.B.

PROJECT
ORLEANS RESIDENTIAL & MEDICAL FACILITY
3996 INNES RD, OTTAWA, ON.

DRAWING TITLE
GENERAL NOTES

PROJECT NO.
230737

DATE
NOVEMBER 2023

C001

D07-12-21-0209

#18675

LEGEND:

- EXISTING PROPERTY LINE TO REMAIN
- PROPOSED CURB
- PROPOSED DEPRESSED CURB
- PROPOSED TERRACING (3:1 MIN.)
- PROPOSED SILT FENCE AS PER OPSD 219.110
- PROPOSED GRASS AREA (100mm TOP SOIL & SOD)
- PROPOSED CONCRETE FEATURES/SLAB
- PROPOSED HEAVY DUTY ASPHALT
- PROPOSED LIGHT DUTY ASPHALT
- ×50.00 PROPOSED ELEVATION
- ×50.00HP PROPOSED HIGH POINT ELEVATION
- ×50.00BC PROPOSED BOTTOM OF CURB / ASPHALT ELEVATION
- ×50.00TC PROPOSED TOP OF CURB ELEVATION
- ×50.00BW PROPOSED EXPOSED BOTTOM OF RETAINING WALL
- ×50.00TW PROPOSED TOP OF RETAINING WALL
- ×50.00EX MATCH INTO EXISTING ELEVATION
- ×70.19 EXISTING ELEVATION
- PROPOSED OVERLAND MAJOR FLOW ROUTE
- STM STM PROPOSED STORM SEWER
- SAN SAN PROPOSED SANITARY SEWER
- WTR WTR PROPOSED WATERMAIN
- STM STM EXISTING STORM SEWER
- SAN SAN EXISTING SANITARY SEWER
- WTR WTR EXISTING WATERMAIN
- GAS GAS EXISTING GAS LINE
- EXISTING MANHOLE
- EXISTING CATCHBASIN
- PROPOSED CATCHBASIN-MANHOLE/CATCHBASIN
- PROPOSED MANHOLE
- PROPOSED CURB STOP
- PROPOSED PIPE INSULATION
- PROPOSED 100 YEAR HIGH WATER LEVEL
- PROPOSED 5 YEAR HIGH WATER LEVEL
- STORM WATERSHED EXTENT
- WS-XX CONTROLLED / AREA / RUNOFF — WATERSHED NAME, RUNOFF COEFFICIENT, AREA IN HECTARES

(OTTAWA ROAD No. 30)

ROAD ALLOWANCE BETWEEN CONCESSION 2 AND 3 (OTTAWA

PART 4 PLAN 4R -- 19054
P.I.N. 04404 -- 0414

DEDICATED AS PUBLIC HIGHWAY BY BY-LAW No. 2003-606, INST No. OC291818

PART 1 PLAN 4R -- 24767

PART 1 PLAN 4R -- 22441
P.I.N. 04404 -- 0458

PART 1 PLAN OC339346
P.I.N. 04404 -- 0457

PART 1 PLAN 4R
P.I.N. 04404

PART 4 PLAN 4R -- 22441
P.I.N. 04404 -- 0499

LOT 1 CONCESSION 3 (OTTAWA FRONT) PLAN 4R -- 22441

PROPOSED SILT SACK IN EXISTING CATCH BASIN TO BE FLEXSTORM CATCH-IT INLET SEDIMENT CONTROL FILTER OR APPROVED EQUIVALENT & TO BE INSPECTED/MAINTAINED DURING CONSTRUCTION

PROPOSED 6.0m X 13.0m MUDMAT AS PER DETAIL ON C901

PROPOSED SILT FENCE BARRIER AS PER OPSD 219.130

PROP. STRAW BALE FLOW CHECK DAM AS PER OPSD 219.180 (LATEST EDITION)

LOT 04404
BUILDING #3996
5 STOREY WITH
UNDERGROUND PARKING
BUILDING AREA : 458.02m2
F.F.E. = 91.20
PARKING SLAB ELEV. = 88.30
TOP FW = 91.36
TOP FW (S.E.. COR) = 91.81
U.S.F. = 87.90

No. 2002 Mer-Bleue Road
1 Storey
Stucco Sided Building
(Siding Noted)

MH-ST
T/G=91.08
InvE(City)=±87.5
InvW(City)=±86.8

MH-S
T/G=90.82
InvE(City)=±87.2

1200mmø Storm Sewer
EXISTING STORM - 1200mmØ CONCRETE
EXISTING STORM - 600mmØ CONCRETE
EXISTING SANITARY - 250mmØ PVC
600mmø Watermain
200mmø Gas
Concrete Island
Concrete Curb
Edge of Asphalt
Concrete Sidewalk
Printed Line – (Bike Lane)
Depressed Curb
Asphalt
Grass
Overhang

SUBJECT FOR APPROVAL

USE AND INTERPRETATION OF DRAWINGS

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3.0m 1.5 0 3.0 6.0m
SCALE: 1:150

No.	REVISIONS	BY	DATE
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02	RE-ISSUED FOR APPROVAL	M.L.	29 MAY 2024
01	ISSUED FOR APPROVAL	M.L.	08 FEB 2024

LICENSED PROFESSIONAL ENGINEER
M. BASNET
100501996
2024/7/19
PROVINCE OF ONTARIO

NOT AUTHENTIC UNLESS SIGNED AND DATED

LRL
ENGINEERING | INGÉNIERIE
5430 Canotek Road | Ottawa, ON, K1J 9G2
www.lrl.ca | (613) 842-3434

CLIENT
LOU FRANGIAN

DESIGNED BY:	DRAWN BY:	APPROVED BY:
M.L.	M.L.	M.B.

PROJECT
ORLEANS RESIDENTIAL & MEDICAL FACILITY
3996 INNES RD, OTTAWA, ON.

DRAWING TITLE
EROSION AND SEDIMENT CONTROL PLAN

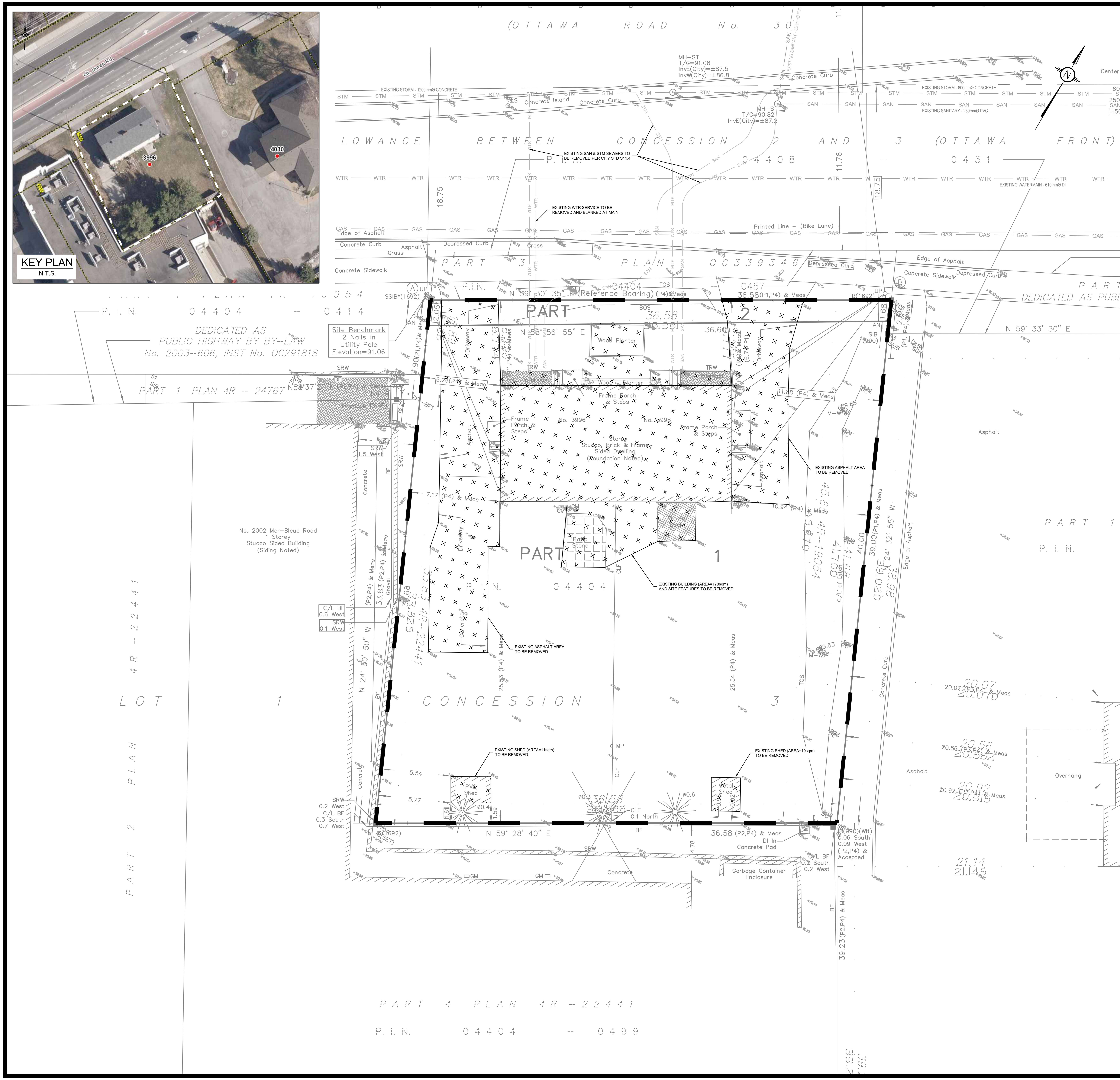
PROJECT NO.
230737

DATE
NOVEMBER 2023

C101

D07-12-21-0209

#18675


KEY PLAN
N.T.S.
3996
4030
(OTTAWA ROAD No. 30)
LOWANCE BETWEEN CONCESSION 2 AND 3 (OTTAWA FRONT)
EXISTING SAN & STM SEWERS TO BE REMOVED PER CITY STD S11.4
EXISTING WTR SERVICE TO BE REMOVED AND BLANKED AT MAIN
Site Benchmark
2 Nails in Utility Pole
Elevation=91.06
DEDICATED AS PUBLIC HIGHWAY BY BY-LAW No. 2003-606, INST No. OC291818
PART 1 PLAN 4R-24767
No. 3996
No. 3998
1 Storey Stucco, Brick & Frame Sided Dwelling (Foundation Noted)
EXISTING ASPHALT AREA TO BE REMOVED
EXISTING BUILDING (AREA=170sqm) AND SITE FEATURES TO BE REMOVED
EXISTING SHED (AREA=11sqm) TO BE REMOVED
EXISTING SHED (AREA=10sqm) TO BE REMOVED
No. 2002 Mer-Bleue Road
1 Storey
Stucco Sided Building
(Siding Noted)
No. 4030
1 Storey
Brick Sided Building
(Foundation Noted)
CONCESSION 3
LOT 1
PART 4 PLAN 4R-22441
P.I.N. 04404-0499
N 59° 28' 40" E
36.58 (P2,P4) & Meas
N 24° 30' 50" W
39.00(P1,P4) & Meas
N 59° 30' 35" E (Reference Bearing) (P4) & Meas
36.58(P1,P4) & Meas
Garbage Container Enclosure
Concrete Pad

LEGEND:

- EXISTING PROPERTY LINE TO REMAIN
- PROPOSED CURB
- PROPOSED DEPRESSED CURB
- PROPOSED TERRACING (3:1 MIN.)
- PROPOSED SILT FENCE AS PER OPSD 219.110
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3.0m 1.5 0 3.0 6.0m

SCALE: 1:150

SUBJECT FOR APPROVAL

No.	REVISIONS	BY	DATE
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LICENSED PROFESSIONAL ENGINEER
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100501996
2024/7/19
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CLIENT
LOU FRANGIAN

DESIGNED BY:	DRAWN BY:	APPROVED BY:
M.L.	M.L.	M.B.

PROJECT
ORLEANS RESIDENTIAL & MEDICAL FACILITY
3996 INNES RD, OTTAWA, ON.

DRAWING TITLE
DEMOLITION PLAN

PROJECT NO.
230737

DATE
NOVEMBER 2023

C102

D07-12-21-0209

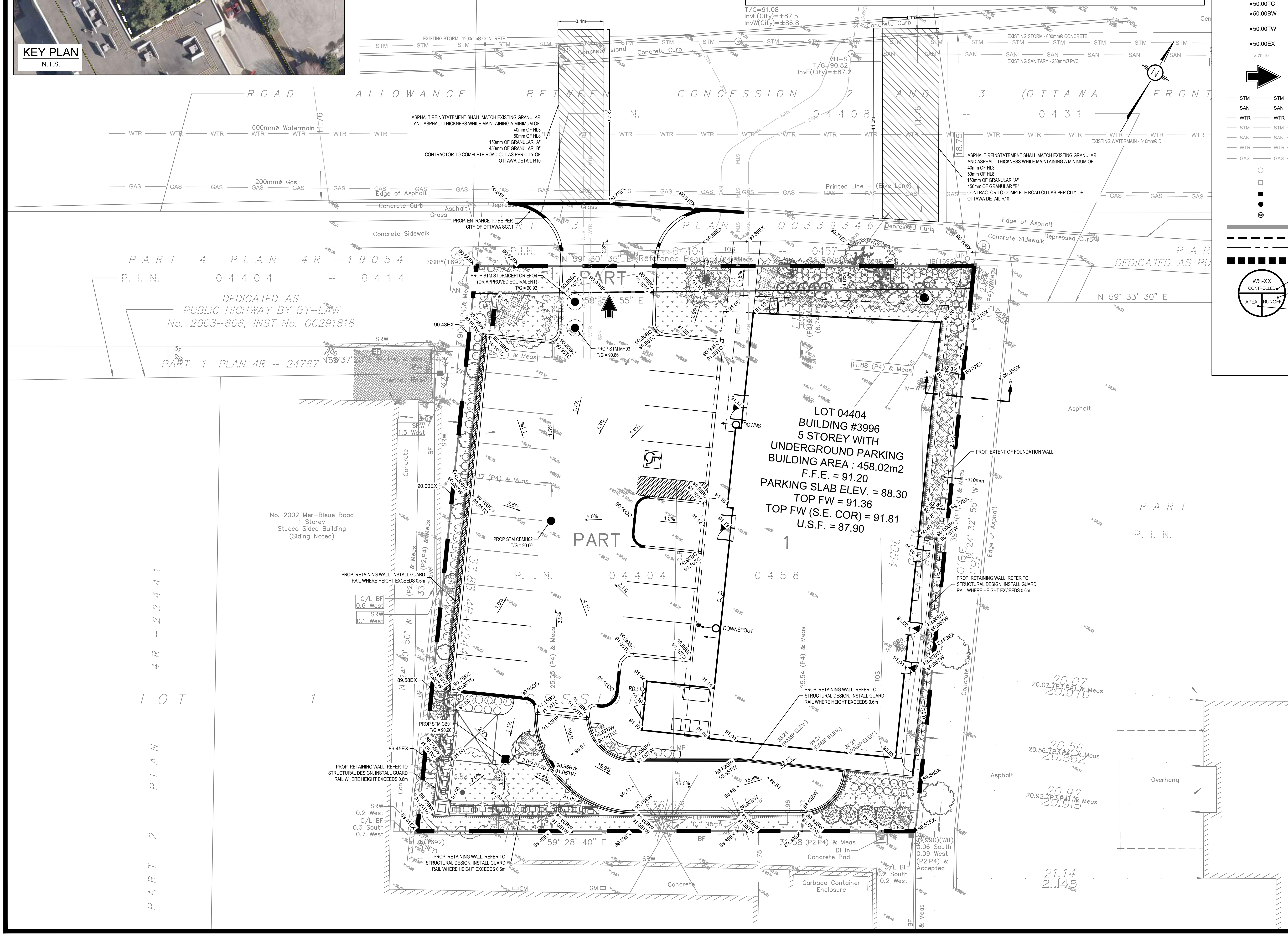
#18675

PAVEMENT STRUCTURE

COURSE	MATERIAL	THICKNESS (mm)	
		AUTOMOBILE PARKING	TRUCK ROUTE (HEAVY TRAFFIC)
SURFACE	HL.3 A/C (PG 58-34)	50	40
BINDER	HL.8 A/C (PG 58-34)	--	50
BASECOURSE	OPSS GRANULAR "A"	150	150
SUBBASE	OPSS GRANULAR "B" TYPE II	300	450

NOTE:
IN PREPARATION FOR PAVEMENT CONSTRUCTION AT THIS SITE, ANY SURFICIAL OR NEAR SURFACE/SUBGRADE LEVEL TOPSOIL AND ANY SOFT, WET OR DELETERIOUS MATERIALS SHOULD BE REMOVED FROM THE PROPOSED PAVED AREAS. THE EXPOSED SUBGRADE SHOULD BE INSPECTED AND APPROVED BY GEOTECHNICAL PERSONNEL AND ANY SOFT AREAS EVIDENT SHOULD BE SUBEXCAVATED AND REPLACED WITH SUITABLE EARTH BORROW APPROVED BY THE GEOTECHNICAL ENGINEER. THE SUBGRADE SHOULD BE SHAPED AND CROWNED TO PROMOTE DRAINAGE OF THE SITE DRAINAGE STRUCTURES. FOLLOWING APPROVAL OF THE PREPARATION OF THE SUBGRADE, THE PAVEMENT GRANULARS MAY BE PLACED.

REFER TO THE GEOTECHNICAL INVESTIGATION PREPARED BY PATERSON DATED NOV 17th, 2021.



LEGEND:

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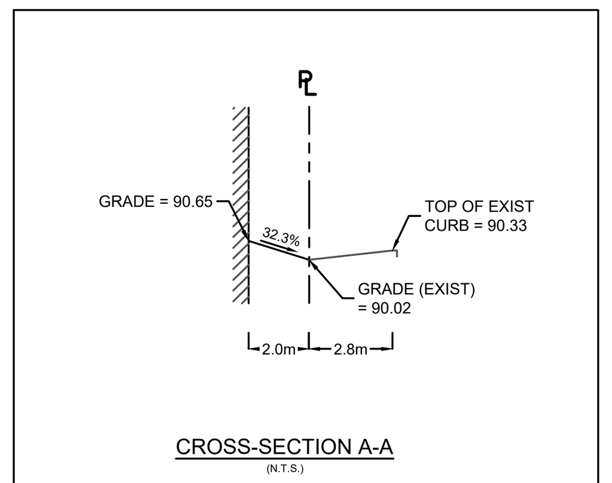

CROSS-SECTION A-A

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LICENSED PROFESSIONAL ENGINEER
M. BASNET
100501996
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CLIENT
LOU FRANGIAN

DESIGNED BY: M.L.
DRAWN BY: M.L.
APPROVED BY: M.B.

PROJECT
ORLEANS RESIDENTIAL & MEDICAL FACILITY
3996 INNES RD, OTTAWA, ON.

DRAWING TITLE
GRADING AND DRAINAGE PLAN

PROJECT NO.
230737

DATE
NOVEMBER 2023

C301

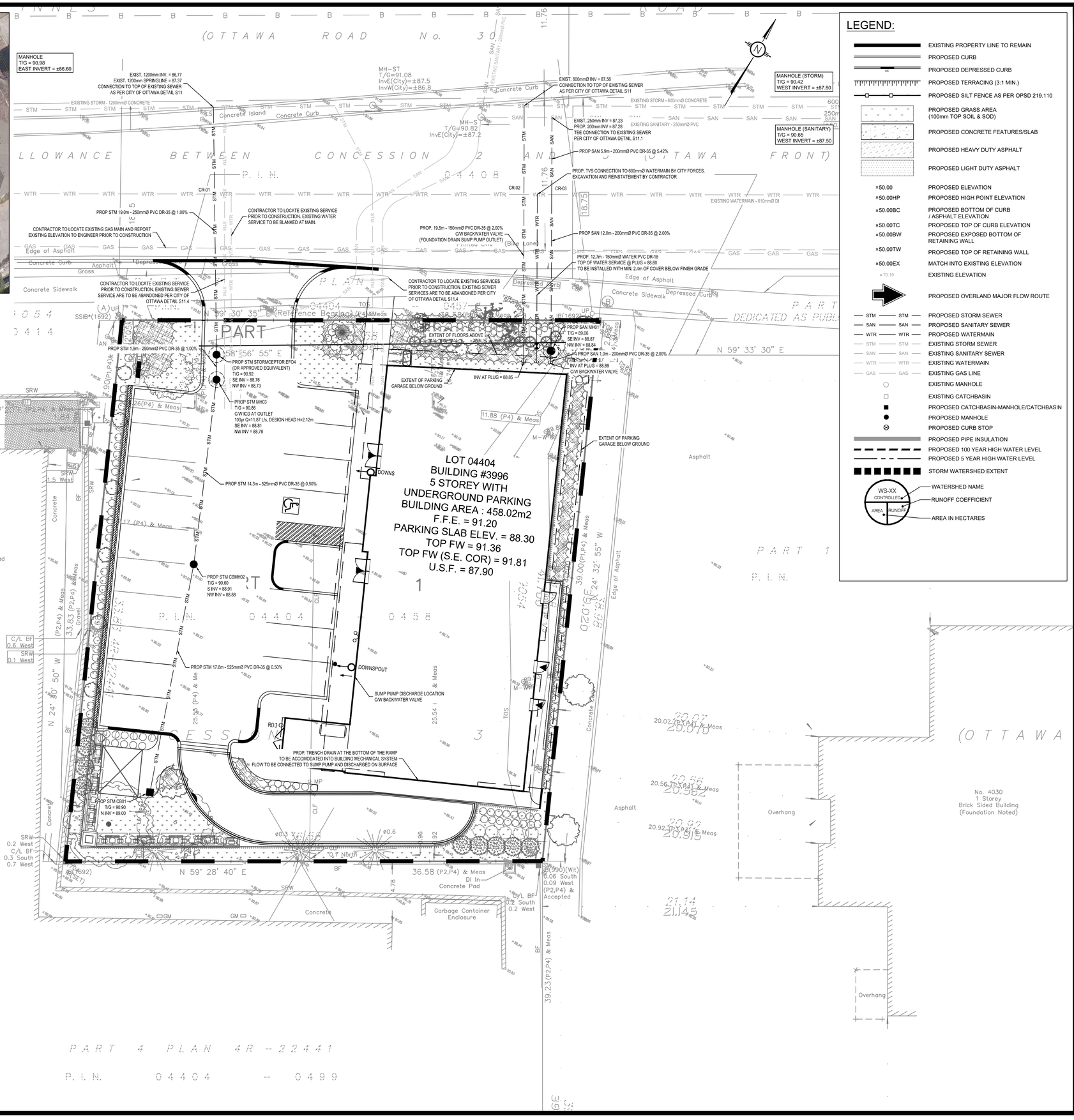
D07-12-21-0209

#18675

Crossing Table

Crossing #	WTR	inv./obv.	STM	inv./obv.	SAN	inv./obv.	Depth Separation (m)
CR-01	±88.1	obv.	88.60	inv.	N/A		0.50
CR-02	±88.1	obv.	88.60	inv.	N/A		0.50
CR-03	±88.1	obv.	N/A		88.60	inv.	0.50

Note : Contractor to confirm existing inv. / obv. elevations at crossings and proposed connections and report any discrepancies to the engineer prior to commencing work



LEGEND:

- EXISTING PROPERTY LINE TO REMAIN
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- STORM WATERSHED EXTENT
- WS-XX — WATERSHED NAME
- CONTROLLED — RUNOFF COEFFICIENT
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3.0m 1.5 0 3.0 6.0m
SCALE: 1:150

SUBJECT FOR APPROVAL

No.	REVISIONS	BY	DATE
03	RE-ISSUED FOR APPROVAL	M.L.	19 JUL 2024
02	RE-ISSUED FOR APPROVAL	M.L.	29 MAY 2024
01	ISSUED FOR APPROVAL	M.L.	08 FEB 2024

LICENSED PROFESSIONAL ENGINEER
M. BASNET
100501996
2024/7/19
PROVINCE OF ONTARIO

NOT AUTHENTIC UNLESS SIGNED AND DATED

LRL
ENGINEERING | INGÉNIERIE
5430 Canotek Road | Ottawa, ON, K1J 9G2
www.lrl.ca | (613) 842-3434

CLIENT
LOU FRANGIAN

DESIGNED BY:	DRAWN BY:	APPROVED BY:
M.L.	M.L.	M.B.

PROJECT
ORLEANS RESIDENTIAL & MEDICAL FACILITY
3996 INNES RD, OTTAWA, ON.

DRAWING TITLE
SERVICING PLAN

PROJECT NO.
230737

DATE
NOVEMBER 2023

C401

D07-12-21-0209

#18675

LEGEND:

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LICENSED PROFESSIONAL ENGINEER M. BASNET 100501996 2024/7/19 PROVINCE OF ONTARIO

NOT AUTHENTIC UNLESS SIGNED AND DATED

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CLIENT
LOU FRANGIAN

DESIGNED BY:	DRAWN BY:	APPROVED BY:
M.L.	M.L.	M.B.

PROJECT
ORLEANS RESIDENTIAL & MEDICAL FACILITY
3996 INNES RD, OTTAWA, ON.

DRAWING TITLE
STORMWATER MANAGEMENT PLAN

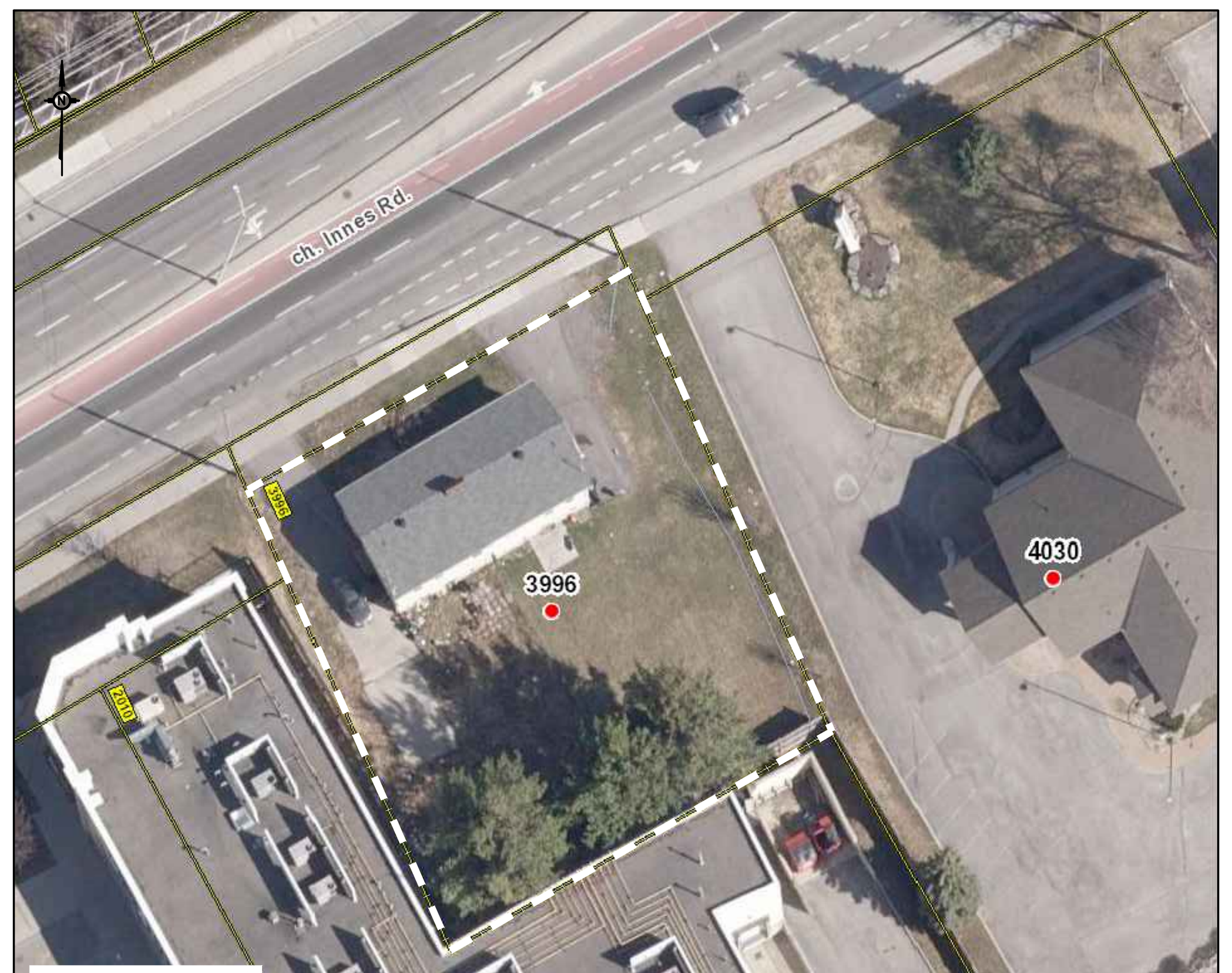
PROJECT NO.
230737

DATE
NOVEMBER 2023

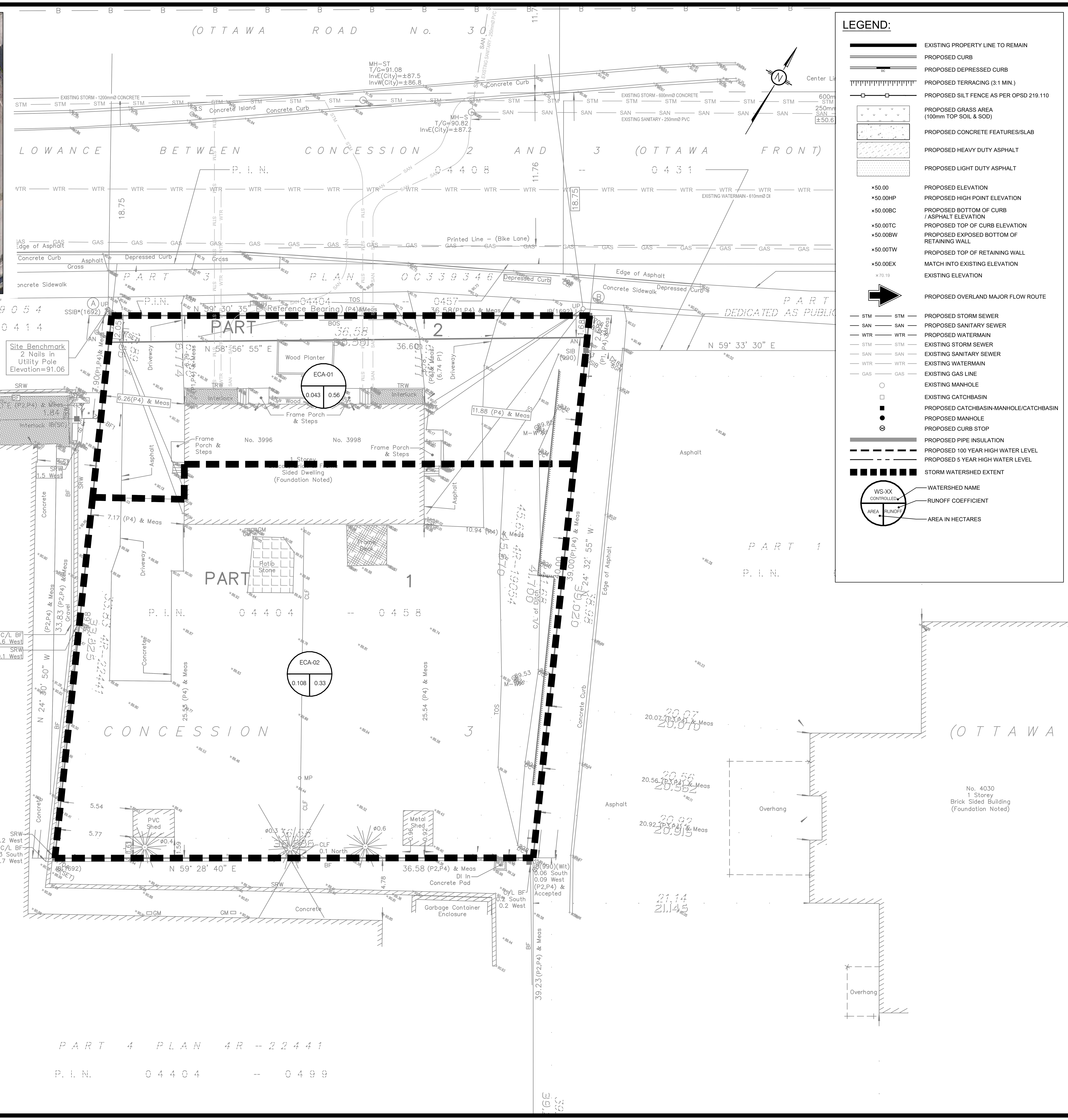
C601

D07-12-21-0209

#18675



KEY PLAN
N.T.S.



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02	RE-ISSUED FOR APPROVAL	M.L.	29 MAY 2024
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LICENSED PROFESSIONAL ENGINEER
M. BASNET
100501996
2024/7/19
PROVINCE OF ONTARIO

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5430 Canotek Road | Ottawa, ON, K1J 9G2
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CLIENT
LOU FRANGIAN

DESIGNED BY:	DRAWN BY:	APPROVED BY:
M.L.	M.L.	M.B.

PROJECT
ORLEANS RESIDENTIAL & MEDICAL FACILITY
3996 INNES RD, OTTAWA, ON.

DRAWING TITLE
PRE-DEVELOPMENT WATERSHED PLAN

PROJECT NO.
230737

DATE
NOVEMBER 2023

C701

D07-12-21-0209

#18675

LEGEND:

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CONTRACTOR TO VERIFY ALL DIMENSIONS AND NOTIFY THE ENGINEER OF ANY DISCREPANCIES BEFORE WORK COMMENCES. DO NOT SCALE DRAWINGS.

3.0m 1.5 0 3.0 6.0m
SCALE: 1:150

SUBJECT FOR APPROVAL

No.	REVISIONS	BY	DATE
03	RE-ISSUED FOR APPROVAL	M.L.	19 JUL 2024
02	RE-ISSUED FOR APPROVAL	M.L.	29 MAY 2024
01	ISSUED FOR APPROVAL	M.L.	08 FEB 2024

LICENSED PROFESSIONAL ENGINEER — M. BASNET 100501996 — 2024/7/19 — PROVINCE OF ONTARIO

NOT AUTHENTIC UNLESS SIGNED AND DATED

LRL
ENGINEERING | INGÉNIERIE
5430 Canotek Road | Ottawa, ON, K1J 9G2
www.lrl.ca | (613) 842-3434

CLIENT
LOU FRANGIAN

DESIGNED BY:	DRAWN BY:	APPROVED BY:
M.L.	M.L.	M.B.

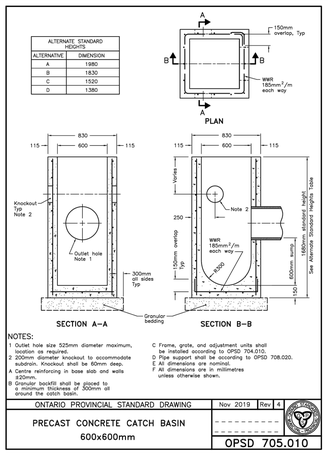
PROJECT
ORLEANS RESIDENTIAL & MEDICAL FACILITY
3996 INNES RD, OTTAWA, ON.

DRAWING TITLE
POST-DEVELOPMENT WATERSHED PLAN

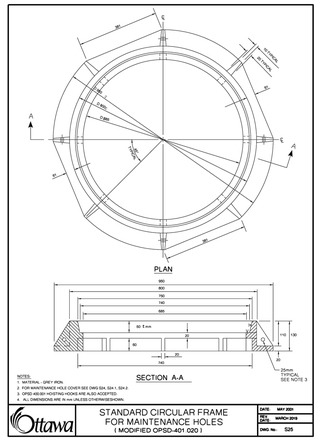
PROJECT NO. 230737
DATE NOVEMBER 2023
C702

D07-12-21-0209

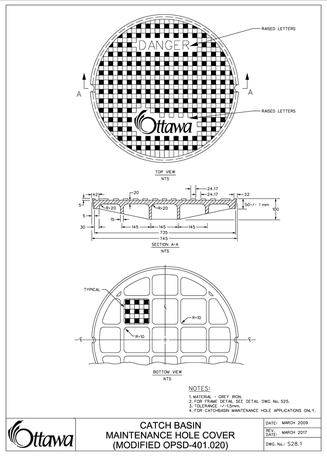
#18675



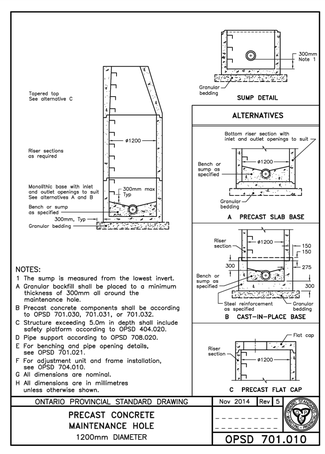
ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2019	Rev 4
PRECAST CONCRETE CATCH BASIN 600x600mm		
	OPSD 705.010	



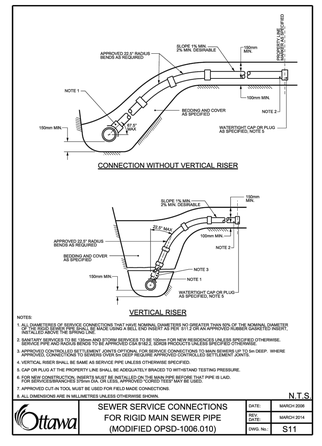
STANDARD CIRCULAR FRAME FOR MAINTENANCE HOLES (MODIFIED OPSD-401.020)	DATE: MAY 2020 REV. DATE: MARCH 2015 DWG. No.: S25



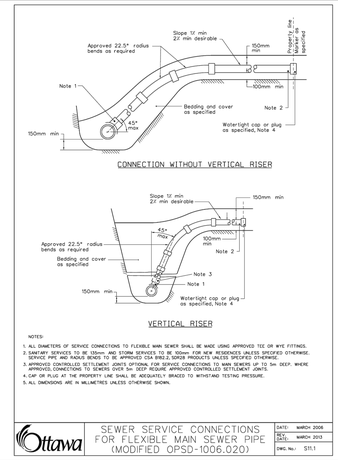
CATCH BASIN MAINTENANCE HOLE COVER (MODIFIED OPSD-401.020)	DATE: MARCH 2009 REV. DATE: MARCH 2017 DWG. No.: S28.1



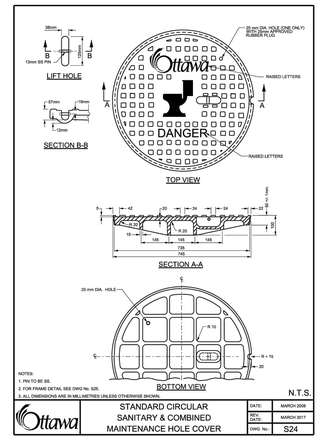
ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2014	Rev 5
PRECAST CONCRETE MAINTENANCE HOLE 1200mm DIAMETER		
	OPSD 701.010	



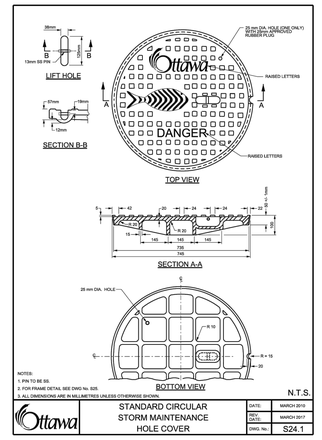
SEWER SERVICE CONNECTIONS FOR RIGID MAIN SEWER PIPE (MODIFIED OPSD-1006.010)	N.T.S. DATE: MARCH 2008 REV. DATE: MARCH 2014 DWG. No.: S11



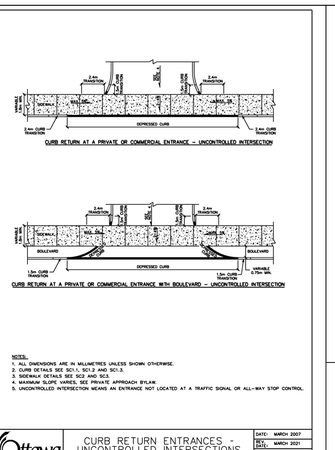
SEWER SERVICE CONNECTIONS FOR FLEXIBLE MAIN SEWER PIPE (MODIFIED OPSD-1006.020)	DATE: MARCH 2008 REV. DATE: MARCH 2013 DWG. No.: S11.1



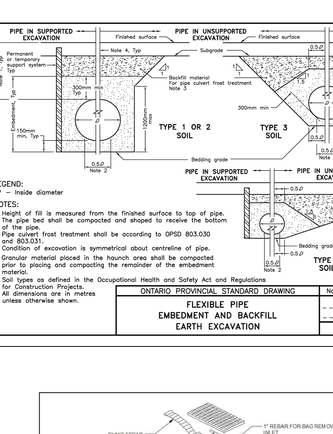
HEAVY–DUTY SILT FENCE BARRIER	Nov 2021	Rev 3
	OPSD 219.130	



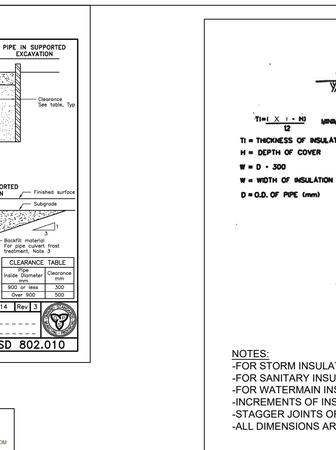
CONCRETE BARRIER CURB	DATE: NOV 2012 REV. DATE: - DWG. No.: -
	OPSD 600.110



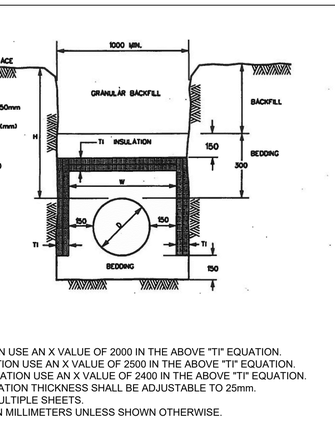
CONCRETE SIDEWALK	DATE: NOV 2019 REV. DATE: - DWG. No.: -
	OPSD 310.010



SANITARY BACKWATER VALVE INSTALLATION TYPE 2	N.T.S. DATE: MARCH 2011 REV. DATE: - DWG. No.: S14.2



HEAVY DUTY "FISH" TYPE ROUND CATCH BASIN COVER (MODIFIED OPSD-400.07)	DATE: MAY 2005 REV. DATE: MARCH 2017 DWG. No.: S19



SEWER SERVICE ABANDONMENT BENEATH PAVEMENT	N.T.S. DATE: MARCH 2011 REV. DATE: - DWG. No.: S11.4

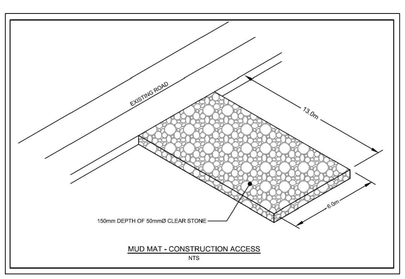
STANDARD CIRCULAR SANITARY & COMBINED MAINTENANCE HOLE COVER	N.T.S. DATE: MARCH 2008 REV. DATE: MARCH 2017 DWG. No.: S24

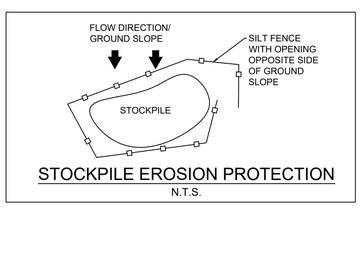
STANDARD CIRCULAR STORM MAINTENANCE HOLE COVER	N.T.S. DATE: MARCH 2010 REV. DATE: MARCH 2017 DWG. No.: S24.1

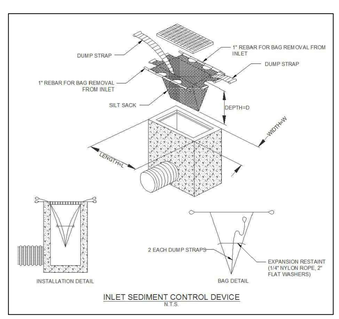
CURB RETURN ENTRANCES - UNCONTROLLED INTERSECTIONS	DATE: MARCH 2007 REV. DATE: MARCH 2021 DWG. No.: SC7.1

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2014	Rev 3
FLEXIBLE PIPE EMBEDMENT AND BACKFILL EARTH EXCAVATION		
	OPSD 802.010	

TYPICAL STORM AND SANITARYSEWER AND WATERMAIN INSULATION DETAIL
(N.T.S.)







USE AND INTERPRETATION OF DRAWINGS

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SUBJECT FOR APPROVAL

No.	REVISIONS	BY	DATE
03	RE-ISSUED FOR APPROVAL	M.L.	19 JUL 2024
02	RE-ISSUED FOR APPROVAL	M.L.	29 MAY 2024
01	ISSUED FOR APPROVAL	M.L.	08 FEB 2024

LICENSED PROFESSIONAL ENGINEER M. BASNET 100501996 2024/7/19 PROVINCE OF ONTARIO

NOT AUTHENTIC UNLESS SIGNED AND DATED

LRL
ENGINEERING | INGÉNIERIE
5430 Canotek Road I Ottawa, ON, K1J 9G2
www.lrl.ca I (613) 842-3434

CLIENT
LOU FRANGIAN

DESIGNED BY:	DRAWN BY:	APPROVED BY:
M.L.	M.L.	M.B.

PROJECT
ORLEANS RESIDENTIAL & MEDICAL FACILITY
3996 INNES RD, OTTAWA, ON.

DRAWING TITLE
CONSTRUCTION DETAIL PLAN

PROJECT NO. 230737
DATE NOVEMBER 2023
C901

D07-12-21-0209

#18675

DRAWINGS/FIGURES

Proposed Site Plan
Legal Survey
As-builts

I REQUIRE THIS PLAN TO BE DEPOSITED UNDER THE LAND TITLES ACT.

DATE:_____

EMAD ALREFAEEI
ONTARIO LAND SURVEYOR

PLAN 4R-
RECEIVED AND DEPOSITED

DATE: _____

REPRESENTATIVE FOR LAND REGISTRAR FOR THE LAND TITLES DIVISION OF OTTAWA-CARLETON NO. 4.

SCHEDULE

PART	LOT	CONCESSION	PIN	AREA (Sq.m.)
1	PART OF 1	3 (Ottawa Front)	ALL OF 04404 - 0458	1448.9
2				67.7

PLAN OF SURVEY OF

PART OF LOT 1
CONCESSION 3 (OTTAWA FRONT)
GEOGRAPHIC TOWNSHIP OF GLOUCESTER
CITY OF OTTAWA

FARLEY, SMITH & DENIS SURVEYING LTD. 2022

Scale 1: 200

0 2.5 5 10 15 20 metres

Metric Note

Distances and coordinates on this plan are in metres and can be converted to feet by dividing by 0.3048.

Distance Note

Distances shown on this plan are ground distances and can be converted to grid distances by multiplying by the combined scale factor of 0.99996.

Bearing Note

Bearings are MTM grid, derived from Can-Net Real Time Network GPS observations on reference points A and B, shown hereon, having a bearing of N 59° 30' 35" E and are referred to the Central Meridian of MTM Zone 9 (76°30' West Longitude) Nad-83 (Original).

For bearing comparisons, a rotation of 0°00'45" clockwise was applied to bearings on P2.

CO-ORDINATES WERE DERIVED FROM CAN-NET REAL TIME NETWORK OBSERVATIONS, MTM ZONE 9, N.A.D. 1983 (ORIGINAL).		
POINT ID	NORTHING	EASTING
Ⓐ	5035467.37	382491.68
Ⓑ	5035485.94	382523.18
01919680184	5040610.16	384736.56
01919834761	5036178.12	372436.11

CO-ORDINATES ARE MTM ZONE 9, N.A.D. 1983 (ORIGINAL), TO URBAN ACCURACY PER SEC. 14 (2) OF O.REG. 216/10, AND CANNOT, IN THEMSELVES, BE USED TO RE-ESTABLISH CORNERS OR BOUNDARIES SHOWN ON THIS PLAN.

Notes & Legend

Denotes

- Survey Monument Planted
- Survey Monument Found
- SIB — Standard Iron Bar
- SSIB — Short Standard Iron Bar
- SSIB* — Short Standard Iron Bar (0.3 Long)
- IB — Iron Bar
- (Wit) — Witness
- Meas — Measured
- (P1) — Plan 4R-19054
- (P2) — Plan 4R-22441
- (P3) — Plan by (1491) dated January 31, 2002
- (P4) — Plan by (1692) dated January 8, 2021 (File No. 614-20)
- OHW — Overhead Wires
- UP — Utility Pole
- AN — Anchor
- Ø — Diameter
- CLF — Chain Link Fence
- BF — Board Fence
- SRW — Stone Retaining Wall
- TRW — Timber Retaining Wall
- C/L — Centreline
- Property Line
- Coniferous Tree - The Symbol shown denotes location and trunk diameter only. Size of its' root system/overhead canopy may be smaller/larger than the symbol size depicted on this plan.

Surveyor's Certificate

I certify that :

1. This survey and plan are correct and in accordance with the Surveys Act, the Surveyors Act and the Land Titles Act and the Regulations made under them.
2. The survey was completed on the 21 day of March, 2022.

Date

Emad Alrefaai
Ontario Land Surveyor

FARLEY, SMITH & DENIS SURVEYING LTD.

ONTARIO LAND SURVEYORS
CANADA LAND SURVEYORS

Unit 275, 30 COLONNADE ROAD, OTTAWA, ONTARIO K2E 7J6
TEL. (613) 727-8226 E-mail: fsdsurveys@bellnet.ca

FILE No. : 116-22

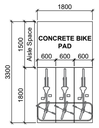
J:\2022\116-22_3996-3998 Innes Rd_rplan\Drafting\116-22_3996(3998) Innes Rd_Ptl1 Con 3_Rplan_D1.dwg

RP;LAN 24/36

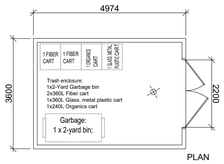
Global Industrial Bicycle Parking Rack or equivalent
Weights & Dimensions

Tube Diameter 1-1/4 IN (3.18 cm)
Width14 IN (35.56 cm)
Length 70 IN (177.8 cm)
Height 14-1/2 IN (36.83 cm)
Weight 14 LBS (6.36 kg)
Product Details

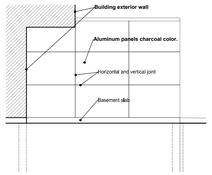
Mounting Location Surface
Description Bicycle Parking Rack, Adjustable, 5-Bike Capacity, Single-Sided Version
Assembly Required Unassembled
Capacity 5 Bikes
BrandGlobal Industrial
Material Powder Coated Steel
Manufacturers Part Number 708150
Color Family Gray



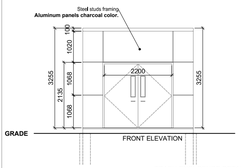
TYPICAL BIKE RACK LAYOUT
SCALE 1:100



PLAN

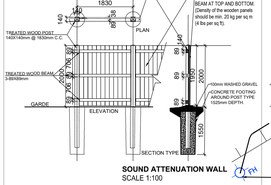


SIDE ELEVATION

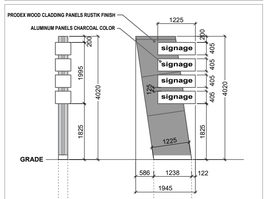


FRONT ELEVATION

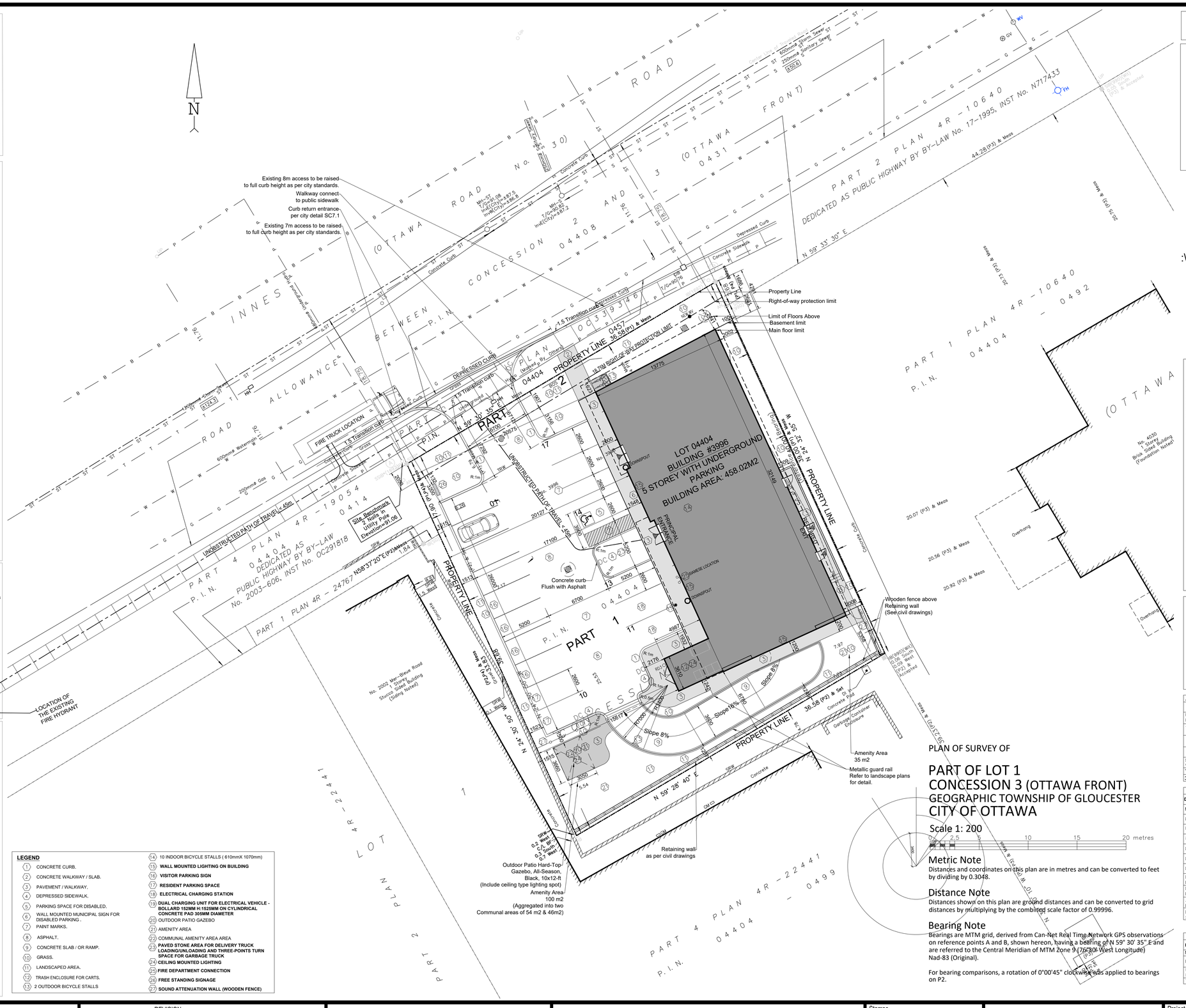
TRASH ENCLOSURE DETAIL
SCALE 1:100



SOUND ATTENUATION WALL
SCALE 1:100



FREE STANDING SIGNAGE
SCALE 1:100



"Boundary information derived from plan of survey prepared by *FARLEY, SMITH & DENIS SURVEYING LTD.* OLS, dated 21st day of December, 2020"

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LEGEND

1. CONCRETE CURB.
2. CONCRETE WALKWAY / SLAB.
3. PAVEMENT / WALKWAY.
4. DEPRESSED SIDEWALK.
5. PARKING SPACE FOR DISABLED.
6. WALL MOUNTED MUNICIPAL SIGN FOR DISABLED PARKING .
7. PAINT MARKS.
8. ASPHALT.
9. CONCRETE SLAB / OR RAMP.
10. GRASS.
11. LANDSCAPED AREA.
12. TRASH ENCLOSURE FOR CARTS.
13. 2 OUTDOOR BICYCLE STALLS
14. 10 INDOOR BICYCLE STALLS (610mmX 1070mm)
15. **WALL MOUNTED LIGHTING ON BUILDING**
16. **VISITOR PARKING SIGN**
17. **RESIDENT PARKING SPACE**
18. **ELECTRICAL CHARGING STATION**
19. **DUAL CHARGING UNIT FOR ELECTRICAL VEHICLE - BOLLARD 152MM H:1525MM ON CYLINDRICAL CONCRETE PAD 305MM DIAMETER**
20. OUTDOOR PATIO GAZEBO
21. AMENITY AREA
22. COMMUNAL AMENITY AREA AREA
23. **PAVED STONE AREA FOR DELIVERY TRUCK LOADING/UNLOADING AND THREE-POINTS TURN SPACE FOR GARBAGE TRUCK**
24. **CEILING MOUNTED LIGHTING**
25. **FIRE DEPARTMENT CONNECTION**
26. **FREE STANDING SIGNAGE**
27. **SOUND ATTENUATION WALL (WOODEN FENCE)**

BUILDING CODE ANALYSIS

- 5 STOREYS MIXED USE BUILDING WITH BASEMENT FACING 1 STREET
- PARTS 3 OF OBC 2017, USE: GROUP "E", "D", "C" & F3
- CLASSIFICATION:
  3.2.2.43. Group C, up to 6 Storeys, Sprinklered
  3.2.2.51. Group D, up to 6 Storeys, Sprinklered
  3.2.2.57. Group E, up to 6 Storeys, Sprinklered
  3.2.2.74. Group F, Division 3, up to 6 Storeys
- NONCOMBUSTIBLE CONSTRUCTION.
- REQUIRED SPRINKLER AND STANDPIPE SYSTEM.
- OCCUPANCY:
  BASEMENT -CAR PARK,
  1ST FLOOR -PHARMACY AND MEDICAL FACILITY.
  UPPER FLOORS-RESIDENTIAL.
- BUILDING AREA : 458.02 m²
- FLOOR AREA INCLUDE EXTERIOR WALLS :
  BASEMENT 568.76 m²; 1ST FLOOR 458.02 m²; TYPICAL FLOORS 514.13 m²; 5TH FLOOR 412.6 m².
- TOTAL FLOOR AREA 2981.77 m² / 32095.5 sq.ft.
- FIRST FLOOR FIRE SEPARATION: 2HR FIRE-RESISTANCE REQUIRED CW VERTICAL STRUCTURAL COMPONENTS.
- SECOND FLOOR FIRE SEPARATION : 2H FIRE -RESISTANCE RATING REQUIRED BETWEEN GROPE"E" AND GROUP "C" CW VERTICAL STRUCTURAL COMPONENTS.
- FIRE SEPARATION RATING FOR TYPICAL FLOORS : 1 HR F.R.R REQUIRED CW VERTICAL STRUCTURAL COMPONENTS.
- 3/4 HR F.RR, 50 STC REQUIRED BETWEEN PUBLIC CORRIDOR AND THE RESIDENTIAL UNITS. 1 HR FIRE-RESISTANCE AND 55 STC REQUIRED REQUIRED BETWEEN ELEVATOR AND THE RESIDENTIAL UNITS.
- FIRE RESISTANCE FOR ROOF: NOT REQUIRED FOR NONCOMBUSTIBLE CONST.
- PLUMBING EQUIPMENTS:
  1 WASHROOM MIN. PER RESIDENTIAL UNIT REQUIRED AND ONE PUBLIC HANDICAP
  2 WASHROOM PROPOSED FOR FIRST FLOOR RETAIL AND MEDICAL FACILITY THAT INCLUDE 1 FOR HANDICAPS.
  2 STANDARD WASHROOM ARE PROPOSED FOR EMPLOYEES ONLY.
- BARRIER FREE PATH OF TRAVEL PROVIDED FOR ALL FLOORS ACCORDING TO SECTION 3.8.

GROSS FLOOR AREA (WITHOUT EXTERIOR WALLS)
BASEMENT : 542.9m², 1ST FLOOR :418.1m² INCLUDE :
COMMERCIAL AREA : (RETAIL/PHARMACY: 169.5m², CLINIC: 153.7m²)
RESIDENTIAL ENTRANCES, LOBBY /STAIR: 94.9m²
RESIDENTIAL FLOORS: 1 828.8 M2

GROSS FLOOR AREA OF RESIDENTIAL SUITES

SUITE 201, 301, 401 74,17M2	SUITE 203, 303, 403 71,1M2	SUITE 205, 305,405 74,9M2	SUITE 501 175,4M2
SUITE 202, 302,402 77,24M2	SUITE 204, 304,404 60,15M2	SUITE 206, 306,406 61,2M2	SUITE 502 173.7M2

AREA (C) OF SCHEDULE A1 ZONING BY-LAW NO.2008-250

PARKING TYPE	RATE	UNIT	PARKING REQUIRED
DWELLING UNITS IN MIXED-USE BUILDING (TABLE 101-R15)	1 Stall /dwelling unit	20 units	20 Stalls
VISITOR PARKING (TABLE 102)	0.2 Stalls / dwelling unit	20 units	4 Stalls
MEDICAL FACILITY (table 101-N51)	4 Stalls / 100m2	153.7 m2	6 Stalls
RETAIL USE (PHARMACY)	3.4 Stalls/ 100m2	169.5 m2	6 Stalls
SHARED PARKING REDUCTION WEEKDAY AFTERNOON (TABLE 104)	-25% of visitor parking -15% of retail store	1 0.8	-2 Stalls
TOTAL OF REQUIRED PARKING STALLS			34 Stalls
35 PARKING STALLS PROVIDED IN THE BASE BUILDING INCLUDE 2 ACCESSIBLE			

ZONING MECHANISMS - AM ZONE

DESCRIPTION	REQUIREMENTS	PROVIDED
MINIMUM LOT AREA	NO MINIMUM	1 524.64m²
MINIMUM LOT WIDTH	NO MINIMUM	36.5 m
FRONT YARD	NO MINIMUM	1.62 m
MINIMUM INTERIOR SIDE YARD	NO MINIMUM	2 m & 15.62 m
MINIMUM REAR YARD	NO MINIMUM	5.36 m
MAXIMUM BUILDING HEIGHT	25M	19m
MAXIMUM FLOOR SPACE INDEX (FSI)	2 or 3.5 IF 85% PARKING BELOW GRADE	1.83
MINIMUM WIDTH OF LANDSCAPED AREA AROUND A PARKING LOT ABUTTING A STREET	3m	3.15m
MINIMUM WIDTH OF LANDSCAPED AREA AROUND A PARKING LOT NOT ABUTTING A STREET	1.5m	1.51m
AMENITY SPACE REQUIREMENTS FOR MIXED USE BUILDING, SEC.137 (5) , MIN. 50% COMMUNAL AMENITY AREA	6 m² per dwelling unit = 120 m²	135 m² Include Communal 100 m²
MINIMUM LANDSCAPED AREA REQUIREMENT SEC.110 (1)	15% of 615 m²	102.5 m² (16.6%)

BYCILCLE PARKING SPACE TABLE

PARKING TYPE	RATE	UNIT	PARKING REQUIRED
MEDICAL FACILITY ()	1 per 1000m2 of GFA	153.7 m2	1 Space
RETAIL STORE (PHARMACY)	1 per 250m of GFA	169.5 m2	1 Space
DWELLING UNITS IN A MIXED-USE BUILDING (TABLE 101-R15)	0.5 / dwelling unit	20 units	10 Space
TOTAL			12 Spaces

PLAN OF SURVEY OF

PART OF LOT 1
CONCESSION 3 (OTTAWA FRONT)
GEOGRAPHIC TOWNSHIP OF GLOUCESTER
CITY OF OTTAWA

Scale 1: 200

0 2.5 5 10 15 20 metres

Metric Note
Distances and coordinates on this plan are in metres and can be converted to feet by dividing by 0.3048.

Distance Note
Distances shown on this plan are ground distances and can be converted to grid distances by multiplying by the combined scale factor of 0.99996.

Bearing Note
Bearings are MTM grid, derived from Can-Net Real Time Network GPS observations on reference points A and B, shown hereon, having a bearing of N 59° 30' 35" E and are referred to the Central Meridian of MTM Zone 9 (76°30' West Longitude) Nad-83 (Original).

For bearing comparisons, a rotation of 0°00'45" clockwise was applied to bearings on P2.

ISSUED FOR			
No	DATE	DESCRIPTION	App.
	2021.11.23	SITE PLAN CONTROL APPLICATION	P.T.
			P.T.

REVISION			
No	DATE	DESCRIPTION	App.
	2022.04.11	CITY COMMENTS 11 MARCH 2022	P.T.
	2022.07.08	CITY COMMENTS 29 APRIL 2022	P.T.
	2022.09.14	COORDINATION WITH NEW CIVIL DRAWINGS	P.T.
	2023.01.09	CITY COMMENTS 22 NOVEMBER 2022	P.T.
	2023.04.24	CITY COMMENTS 14 FEBRUARY 2023	P.T.
	2023.07.13	CITY COMMENTS 17 MAY 2023	P.T.

Consultants:
EAU STRUCTURAL ENVIRONMENTAL SERVICES
DERRICK CLARK PEng.
TEL. (613) 869-0523, DERRICK.R.CLARK@ROGERS.COM

Stamps

PTabet architecte
2232 rue Saint-Louis, Gatineau QC J8T 5L6
t.: 819.568.3994
c.: 613.797.5375
pierretabetarchitecte.com

Project: ORLEANS RESIDENTIAL & MEDICAL FACILITY
3996 INNES RD, OTTAWA ON.

Title: PROPOSED SITE PLAN
Scale: 1:200
Sheet: 1
Date: 2021/11/23
Drawn /: A. Aldu.
Drawing No. A-100
Revision: 5
Verify /: P.Tabet

City File No. D07-12-21-0209

City Plan Number 18675

mmddyy

DWG. FRAME 790mm x 534mm RMOC-0693-WG

NO.	REVISIONS	BY	DATE
.			
.			
2	CONSTRUCTION ISSUE	MDM	03/08/04
3	100 YEAR HGL & SERVICES	PJH	30/08/04
4	RECORD DRAWING	MDM	31/12/06

NOTE:
The location of the utilities is approximate only, the exact location should be determined by consulting the municipal authorities and utility companies concerned.
The contractor shall prove the location of utilities and shall be responsible for adequate protection from damage

LICENSED PROFESSIONAL ENGINEER P. R. MERGEL PROVINCE OF ONTARIO

LICENSED PROFESSIONAL ENGINEER J. R. ALLEN PROVINCE OF ONTARIO

Delcan

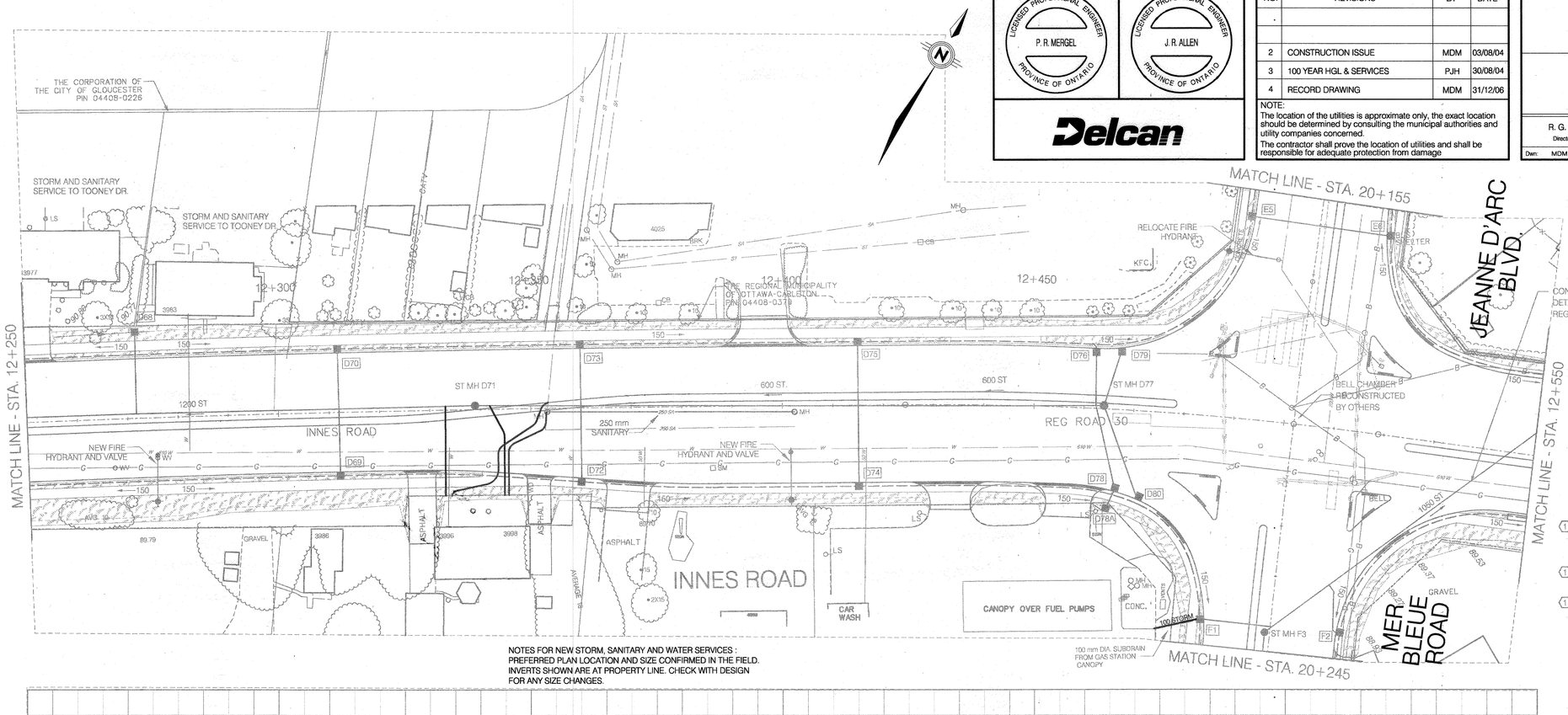
INNES ROAD WIDENING
ORLEANS BLVD
TO
TENTH LINE ROAD

SERVICES
STA. 12+250 TO STA. 12+550

Ottawa

CONTRACT NO.
ISB03-5202
DWG. NO.
R-ISB03-5202-243
SHEET 243 OF
Date: DEC 2006
Scale: HORIZONTAL 0m 5 10 20
0m 2 VERTICAL

R. G. HEWITT, P.ENG. Director Infrastructure Services		W. CLOUTHIER, P.ENG. Manager Construction Services	
Des: MDM	Chkd: DSG	Des: DSG	Chkd: DAH



CONTRACTOR TO PROVIDE TEMPORARY WATERMAIN SUPPORT AND TO PROVIDE A DETAIL SUBMISSION DESIGNED AND STAMPED BY A PROFESSIONAL ENGINEER, REGISTERED IN ONTARIO, FOR REVIEW BY THE CITY.

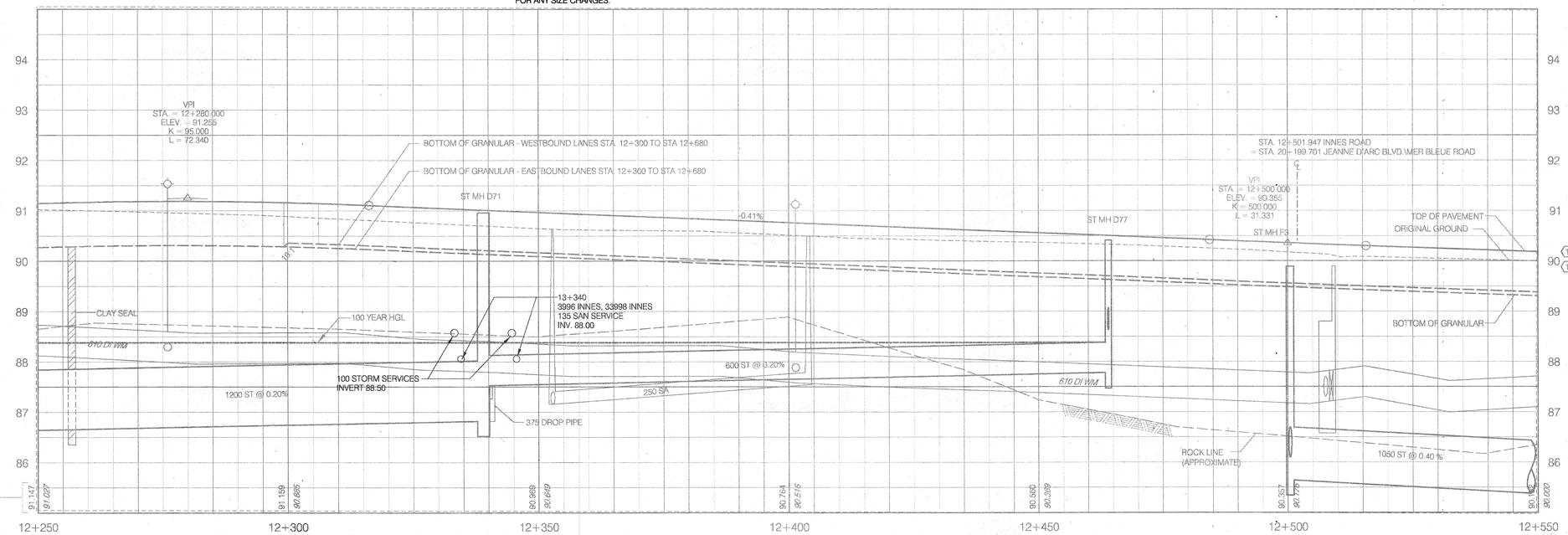
NOTES FOR NEW STORM, SANITARY AND WATER SERVICES :
PREFERRED PLAN LOCATION AND SIZE CONFIRMED IN THE FIELD.
INVERTS SHOWN ARE AT PROPERTY LINE. CHECK WITH DESIGN FOR ANY SIZE CHANGES.

STORM MANHOLES, CATCHBASINS AND DITCH INLET DATA

No.	STATION	OFFSET (m)*	TYPE OF STRUCTURE STD. No.	FRAME & GRATE STD. No.	ELEVATION TOP OF GRATE**	ELEVATION LOW INVERT
D68	12+272.0	17.00 L	S27	S20/S21	90.75	89.75
D69	12+312.0	11.75 R	705.010A	S22/S23	90.86	89.51
D70	12+312.0	11.75 L	705.010A	S22/S23	90.86	89.51
D71	12+344.0	0.3 L	701.013	S24/S25	90.96	86.82
D72	12+360.0	13.85 R	705.010A	S22/S23	90.63	89.28
1 D73	12+360.0	11.75 L	705.010A	S22/S23	90.67	87.32
D74	12+415.0	15.25 R	705.010A	S22/S23	90.37	89.02
D75	12+415.0	11.75 L	705.010A	S22/S23	90.44	89.09
1 D76	12+462.0	11.40 L	705.010A	400.020/S19	90.26	88.81
D77	12+463.7	0.3 L	701.010	S24/S25	90.41	87.78
1 D78	12+467.0	15.78 R	705.010A	400.020/S19	90.14	88.69
D78A	12+465.0	19.50 R	S27	S20/S21	90.10	88.65
D79	12+467.0	11.75 L	705.010A	400.020/S19	90.22	88.77
D80	12+472.0	17.19 R	705.010A	400.020/S19	90.09	88.64

* OFFSETS FOR CURB INLET CATCH BASINS ARE TO THE FACE OF CURB AND ELEVATIONS ARE THE FINISHED ASPHALT SURFACE AT THE GRATE. REFER TO STD. DWG. S22 FOR DETAIL OF LOCAL DEPRESSION OF ASPHALT IN FRONT OF THE GRATE.

** OFFSETS AND ELEVATIONS FOR FLAT GRATE CATCH BASINS ARE AT THE CENTER OF THE GRATE. REFER TO STD. DWG. S2. OFFSETS FOR D.I. (OPSD-705.030 & OPSD-705.040) ARE TO THE CENTER OF THE STRUCTURE, TOP OF GRATE ELEVATIONS ARE TO THE BOTTOM OF THE GRATE SLOPE.



STORM SEWER & CATCHBASIN LEAD DATA

LOCATION No. TO No.	DIA. SIZE (mm)	CLASS OF PIPE	LENGTH (m)	INVERT ELEVATION UPSTREAM	INVERT ELEVATION DOWNSTREAM
MH D71 - MH D65	1200	65-D	120	86.82	86.58
MH D77 - MH D71	600	65-D	125	87.78	87.53
CB D68 - PIPE	200	SDR 35	16	89.75	87.63
CB D69 - PIPE	200	SDR 35	14	89.51	87.71
CB D70 - PIPE	200	SDR 35	11	89.51	87.71
CB D72 - PIPE	200	SDR 35	17	89.28	87.92
CB D73 - PIPE	200	SDR 35	10	89.32	87.92
CB D74 - PIPE	200	SDR 35	19	89.02	88.03
CB D75 - PIPE	200	SDR 35	9	89.09	88.03
1 CB D76 - PIPE	200	SDR 35	6	88.81	88.12
1 CB D78 - PIPE	200	SDR 35	20	88.69	88.12
CB D79 - MH D77	200	SDR 35	7	88.77	88.13
CB D80 - MH D77	200	SDR 35	23	88.64	88.13

NOTES:

1. IN GENERAL, STORM AND SANITARY SERVICES ARE TO BE PROVIDED FROM THE SEWERS TO THE PROPERTY LINE FOR BUILDINGS THAT REMAIN. WATER SERVICES ARE TO BE PROVIDED FROM THE WATERMAIN TO THE PROPERTY LINE FOR SOME BUILDINGS. EXACT LOCATIONS AND ELEVATIONS TO BE DETERMINED DURING CONSTRUCTION.
2. GRAVITY CONNECTIONS FROM BUILDINGS TO STORM SEWER LATERALS AT THE PROPERTY LINE (BY OTHERS) ARE NOT PERMITTED. PROOF OF CHECK VALVE ON PRIVATE PROPERTY REQUIRED PRIOR TO SUMP PUMP CONNECTIONS.
3. SANITARY SEWERS SHALL BE PVC SDR 35. SANITARY MAINTENANCE HOLES PER OPSD 701.010 AND OPSD 1003.010, FRAME PER S24, CLOSED COVER PER S25.
4. PLUG ALL EXPOSED ENDS OF PIPES/CONDUITS, NOT BEING REMOVED, WITH 600 mm MINIMUM LENGTH OF 15 MPa MIN. STRENGTH CONCRETE.
5. LOCATE AND VERIFY LOCATION OF WATER SERVICES NO LONGER NEEDED, EXCAVATE, CLOSE MAIN STOP, CRIMP SHUT THE WATER SERVICE PIPE, BACKFILL AND REINSTATE.
6. LOCATE EXISTING SEWERS AND WATERMAINS FOR CONNECTIONS TO THEM. PROVIDE INVERT ELEVATIONS OF EXISTING SEWERS TO CONTRACT ADMINISTRATOR FOR ANY ADJUSTMENT IN DESIGN PRIOR TO NEW SEWER CONSTRUCTION.
7. RELOCATE EXISTING WATER SERVICE STANDPOSTS TO THE NEW PROPERTY LINE. ADJUST EXISTING WATER SERVICES UNDER OR OVER NEW SEWERS THAT CONFLICT.

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