



319 Huntmar Drive

Preliminary
**Site Servicing and Stormwater
Management Report**

Project Location:

319 Huntmar Drive, Ottawa, ON

Prepared for:

Ironclad Developments
101-57158 Symington Road 20E, Springfield, MB

Prepared by:

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Drawing

Removals Plan	
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Key Plan	
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MTE Drawing No. C2.5	Appended
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MTE Drawing No. C2.6	Appended

1.0 INTRODUCTION

MTE Consultants Inc. was retained by Ironclad Developments to complete a Site Servicing and Stormwater Management Report for a new residential development to be constructed at 319 Huntmar Drive (herein referred to as 'the Site') in the City of Ottawa in support of the Site Plan Control application.

The property is bounded to the north and west by Feedmill Creek, to the east by Huntmar Drive, and to the south by Trans-Canada Highway 417. For the purposes of this report, north refers to project north. Refer to Figure 1.0 for the exact location of the Site.

The proposed development for the Site is the construction of six mid-rise residential buildings complete with at-grade parking, underground parking, exterior amenity areas, a driveway connection to Huntmar Drive, and a connection to the existing bridge between the Site and Tanger Outlets. There are a total of 472 units proposed for this development. The construction of this development is planned to occur in phases; however, a detailed phasing plan is currently unavailable.

The purpose of this study is to support the Site Plan Control application. This will be accomplished by reviewing the opportunities and constraints for the subject property with respect to servicing, grading, and stormwater management; reviewing the requirements of the reviewing agencies; describing the development concept; and demonstrating the serviceability of the property.



SITE



Engineers, Scientists, Surveyors

PROJECT
319 HUNTMAR DRIVE

TITLE
SITE LOCATION PLAN

Drawn	MJR	Scale	N.T.S.
Checked	DXN	Project No.	65860_001
Date	2026-03-19	Rev No.	0

Figure
1.0

2.0 CRITERIA

2.1 Existing Topography

The Site encompasses an area of 3.23ha and currently comprises of undeveloped green space with a few foundation ruins and signs. In the existing condition, surface runoff from the Site generally drains to Feedmill Creek. There is an existing high point near the center of the Site at an elevation of approximately 101.25masl where surface runoff flows away from in a radial pattern. Runoff from areas west and north of this high point flow directly into Feedmill Creek from the Site, whereas the area east of this high point drains to an existing ditch between the Site and Huntmar Drive. It is noted that drainage from the Ministry of Transportation of Ontario (MTO) lands located to the south side of the Site also flows into this existing ditch. This ditch drains north and ultimately outlets to Feedmill Creek. The Site is 99.6% pervious in the existing condition.

2.2 Existing Servicing

2.2.1 Water

There is an existing 200mm diameter watermain along the road located on the south side of Tanger Outlets. There is an existing 200mm diameter watermain that connects to the 200mm diameter watermain within this road and extends into the northern limits of the Site, under the existing bridge between the Site and Tanger Outlets. This 200mm diameter watermain is capped at the northern limits of the Site. Based on the background information reviewed to date, it is anticipated that this 200mm diameter watermain is a private watermain.

Additionally, there is an existing 600mm diameter watermain along the eastern limits of the Site. There is an existing 200mm diameter watermain that connects to the 600mm diameter municipal watermain inside an existing underground chamber. The 200mm diameter watermain then extends into the Site near the southwest corner where it is capped. It is our understanding that the existing 600mm diameter watermain and the connected 200mm diameter watermain are municipal watermains on a private site, with an easement in favour of the City.

The closest fire hydrant to the Site is located north of the existing bridge between the Site and Tanger Outlets. It is anticipated that this is a private fire hydrant. There are no existing fire hydrants along Huntmar Drive adjacent to the Site.

2.2.2 Sanitary

There is an existing 300mm diameter sanitary sewer located under the existing bridge between the Site and Tanger Outlets which drains toward the north. This sanitary sewer then connects to a 300mm diameter sanitary sewer within the road located on the south side of Tanger Outlets which drains to the east. There is an existing manhole located at the northern limit of the Site and which is approximately 5.8m deep to the outlet invert. Based on the background information reviewed to date, it is anticipated that these 300mm diameter sanitary sewers are privately owned.

2.2.3 Storm

Based on the available record drawings and the latest topographical survey completed by Stantec, dated January 23, 2026, it is our understanding that there are no existing storm sewers adjacent to the Site; however, the City's Pre-Consultation Meeting Feedback, dated December 11, 2025, states that a network of 300mm to 825mm private storm sewers were installed on-site. To verify this information, the presence of on-site storm sewers is anticipated to

be confirmed in the field in April 2026. As noted in Section 2.1, surface runoff from the Site generally drains to Feedmill Creek in the existing condition.

2.3 Existing Soils Information

A geotechnical investigation was completed for the Site by Paterson Group, dated October 15, 2025. A complete copy of this report has been submitted separately for the City's records. Fifteen boreholes were advanced in March 2020 to determine the underlying soil conditions of the Site. It is noted that previous investigations were also completed by Paterson Group in October 2012, December 2010, and October 2006 which consisted of a total of two boreholes and one test pit. The investigation, dated October 15, 2025, revealed the Site is generally comprised of a thin topsoil layer and/or fill material underlain by a silty clay deposit. The fill layer was generally observed to consist of a brown silty clay with varying amounts of sand, gravel and crush stone. The fill layer was observed to be underlain by a deposit of hard to very stiff brown silty clay. The silty clay deposit was further underlain by a deposit of stiff to firm grey silt clay. Due to the presence of a silty clay layer, the Site is subject to a permissible grade restriction. This is further discussed in Section 3.1 below.

Standpipe piezometers were installed in all borehole locations to permit monitoring of the groundwater levels on Site. Groundwater measurements were taken in March 2020, November 2012 and October 2006, and were observed between depths of 0.76mbgs to 2.09mbgs.

For additional information, refer to the separately submitted geotechnical investigation.

2.4 Reviewing Agencies

Grading, servicing, and stormwater management designs, as well as this Site Servicing and Stormwater Management Report will be required for submission to the City of Ottawa in support of the Site Plan Control application. The City will also be responsible for the review and approval of site plans, lighting, and landscape design and ultimately issuing building permits.

As the Site falls within the Mississippi Valley Conservation Authority (MVCA) regulation limit, the site engineering design will also be submitted to the MVCA for their review and approval. Furthermore, the Site is located in proximity to Trans-Canada Highway 417 which is a provincial highway. As such, the MTO will be circulated on the Site Plan Control application and will need to provide approval for the development.

3.0 METHODOLOGY

The grading and servicing strategies for the proposed development have been developed based on the topographic survey, plan and profile information, and the Site Plan prepared by McCallumSather dated March 25, 2026.

3.1 Proposed Grading

The proposed development will include six mid-rise residential buildings complete with at-grade parking, underground parking, exterior amenity areas, a driveway connection to Huntmar Drive, and a connection to the existing bridge between the Site and Tanger Outlets. The proposed grading strategy will respect the existing grades along the southern property line for the west half of the Site. Re-grading within the 14.0m MTO setback and within the MVCA regulation limit will be required to accommodate the proposed development, as well as a portion of the Huntmar Drive boulevard. Additional topographical survey of the impacted areas within the 14.0m MTO setback and the MVCA regulation limit will be completed to support additional grading design

details beyond the property limits. These grading details will be included in the next submission. The existing gravel access lane connecting to Huntmar Drive located north of the Site will be re-built and extended further west as a part of this development. Generally, the proposed pathway will be constructed to match the existing grades.

As noted in Section 2.3, the Site is subject to a permissible grade restriction due to the presence of silty clay soils. As noted in the geotechnical investigation by Paterson Group, dated October 15, 2025, the proposed structures may be supported by conventional shallow footings bearing on an undisturbed stiff silty clay bearing surface. The disturbance of subgrade soils may result in having to sub-excavate the disturbed material and the placement of additional suitable fill material. Thus, the finished floors of the buildings have been determined considering the elevation of the existing clay soils such that the existing clay soils remain undisturbed.

3.2 Proposed Servicing

As noted in Section 1.0, the construction of this development is planned to occur in phases. Once a detailed phasing plan is available, the proposed servicing design will be reviewed to ensure all phases are serviced appropriately.

3.2.1 Water

In order to service the development, a connection to the existing 200mm diameter watermain located at the southeast limits of the Site is proposed. New 200mm diameter watermain will be extended into the Site to service all buildings. A chamber with a shut off valve and backflow prevention has been proposed at the connection point to the existing 200mm diameter watermain to mitigate the risk of water contamination. Details regarding the chamber and the configuration within will be provided in the next submission.

The required water service size for each building is to be reviewed and confirmed by the mechanical engineer but is anticipated to be 150mm diameter. The water services for each building are proposed to connect to the above-mentioned 200mm diameter watermain and will enter the mechanical room of each building.

3.2.2 Water Demand

Water demands were calculated for the proposed development by referencing the City's Water Distribution Design Guidelines, dated December 8, 2025. These calculations are included in Appendix A. The maximum domestic water demand was determined to be approximately 6.9L/s.

The proposed development was analyzed using both OBC and FUS fire flow requirements. The governing fire flow requirement was determined to be 150L/s and 217L/s based on the OBC and FUS fire flow requirements, respectively.

Many municipalities in Ontario use both the OBC and the FUS fire flow requirements for assessing firefighting water supply requirements. It is our understanding that the FUS fire flow requirements are the governing criteria within the City of Ottawa. As a result, the minimum allowable pressure permitted under firefighting conditions is 150.0kPa per FUS 2020.

The proposed buildings will each have an automatic sprinkler system. Section A-3.2.5.7.2 of the OBC relates to water supply for firefighting in sprinklered buildings. For sprinklered buildings, water supply additional to that required by the sprinkler systems should be provided for firefighting using fire hoses in accordance with the hose stream demands and water supply durations for different hazard classifications as specified in National Fire Protection Association's (NFPA) NFPA 13, "Standard for the Installation of Sprinkler Systems". The site-specific system

demand for the proposed sprinkler system is not known at this time; however, is expected that the sprinkler demand will be less than the FUS water demand of 217L/s.

For firefighting purposes, two private on-site hydrants will be required. If required, a fire flow analysis will be completed to ensure that adequate flow and pressure will be available at the proposed private on-site hydrants. It is noted that a boundary condition request is currently in progress with the City of Ottawa in parallel with this Site Plan Control application.

3.2.3 Sanitary

A sanitary flow design sheet has been prepared by referencing the City's Sewer Design Guideline, dated December 2025, to determine the flows anticipated to be generated by the proposed development. With the proposed development having 472 units and a site area of 3.23ha, the anticipated peak sanitary flow from the Site is approximately 9.1L/s (including infiltration). Refer to Appendix B for sanitary flow calculations.

As per the Design Brief for Tanger Outlet Centres prepared by IBI Group, dated May 2013, it is understood that a total sanitary peak flow of 2.6L/s (including infiltration) was allocated for the Site. Based on our review of the sanitary sewer design sheet included in Appendix G of IBI Group's Design Brief, it is observed that the existing 300mm diameter sanitary sewer mentioned in Section 2.2.2 (from MH100A to MH17A in IBI Group's sanitary sewer design sheet) has an available capacity of 42.5L/s which is equivalent to 94.2% availability. Additionally, the downstream sanitary sewer that was designed as part of the Tanger Outlet Centres development (from MH301A to MH EX in IBI Group's sanitary sewer design sheet) has an available capacity of 27.9L/s which is equivalent to 61.7% availability. These availabilities were based on the previously allocated total sanitary peak flow rate of 2.6L/s from the Site. Considering the new total peak sanitary flow rate of 9.1L/s from the Site, the availability of the sanitary sewer between MH100A and MH17A is anticipated to be 36.0L/s (79.8%), and the availability of the sanitary sewer between MH301A and MH EX is anticipated to be 21.4L/s (47.4%). As such, it is concluded that there is adequate capacity in the existing sanitary sewers to accommodate the anticipated peak sanitary flow rate of 9.1L/s. The sanitary sewer design sheet from IBI Group's Design Brief, along with the corresponding drainage area plan, have been included in Appendix B for reference. It is proposed that the Site will be serviced by the existing 300mm diameter sanitary sewer mentioned in Section 2.2.2. This existing 300mm diameter sanitary sewer is understood to be privately owned and thus, an agreement with the owner of this sewer and associated easement will be required to service the Site.

To accommodate the proposed development design, the existing sanitary manhole located near the northern limit of the Site will need to be relocated further north. A new 200mm diameter sanitary sewer will connect to this relocated manhole with an external drop structure and extend into the Site to service all buildings.

3.2.4 Storm

A private storm sewer system will be installed on-site to collect runoff from the common drive aisles and at-grade parking areas. Runoff from the building rooftops will be conveyed to the surface via downspouts which will ultimately enter the proposed private storm sewer system as well. This storm sewer system, which will include catchbasins, manholes, catchbasin-manholes, and side inlet catchbasins, will convey runoff towards the proposed oil-grit separator located within the northern landscape area between the Site and Feedmill Creek. This storm sewer will outlet directly into Feedmill Creek complete with a headwall and erosion protection measures.

4.0 STORMWATER MANAGEMENT DESIGN

4.1 Stormwater Management Criteria

The stormwater management design criteria for the Site, as provided by the City of Ottawa via Pre-Consultation Meeting Feedback, dated December 11, 2025, are as follows:

- i) Attenuation of the post-development peak flows for the 2-, 5-, 10-, 25-, 50- and 100-year storm event to the pre-development (existing) peak flows.
- ii) Implementation of Enhanced (80% TSS removal) water quality controls.
- iii) Infiltration of 50-70mm/year of runoff with a 25% increase for post-development.
- iv) Implementation of Erosion and Sediment Control measures.

4.2 Water Quantity Control

In order to successfully complete the preliminary stormwater management design for the Site, the following specific tasks were undertaken:

- i) Calculate the allowable runoff rates using MIDUSS NET.
- ii) Determine the percent impervious of the site and catchment parameters for inclusion in MIDUSS modeling.
- iii) Calculate post-development runoff hydrographs using MIDUSS NET.
- iv) Revise the site design to attain the required storage for runoff control.




The following table summarizes the catchments used in modeling of the Site. The pre-development condition was modelled as one catchment area. The post-development condition was separated into two catchment areas: the controlled area and the uncontrolled area. Figure 2.0 illustrates the limits of the pre-development catchment area. Figure 3.0 illustrates the limits of the post-development catchment areas.


Table 4.1 – Catchment Parameters

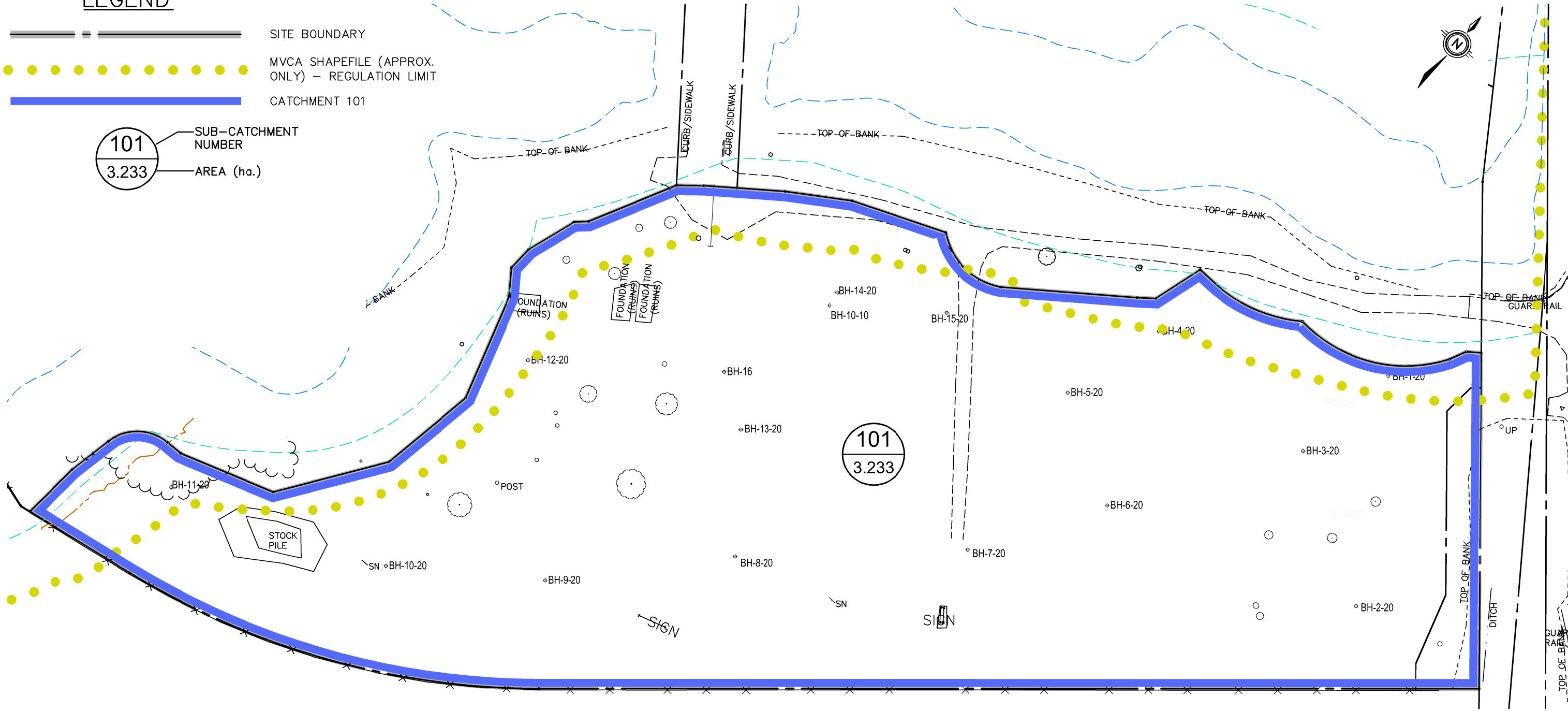
#	Catchment	Area (m)	% Impervious	Pervious CN	Impervious CN	Slope (%)	Flow Length (m)
Pre-Development Catchment Area							
101	Site	3.233	0.4	75	98	2.5	40.0
Post-Development Catchment Area							
201	Controlled Area	2.661	88.2	75	98	1.5	15.0
202	Uncontrolled Area	0.572	24.4	75	98	20.0	5.0

As discussed in Section 2.3, a geotechnical investigation for the Site was completed by Paterson Group, dated October 15, 2025. The investigation revealed the Site is generally comprised of a thin topsoil layer and/or fill material underlain by a silty clay deposit. Therefore, a pervious CN value of 75 for grassed areas is appropriate.

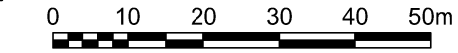
LEGEND


-  SITE BOUNDARY
-  MVCA SHAPEFILE (APPROX. ONLY) - REGULATION LIMIT
-  CATCHMENT 101

 SUB-CATCHMENT NUMBER
 3.233 AREA (ha.)







HWY 417 (QUEENSWAY)




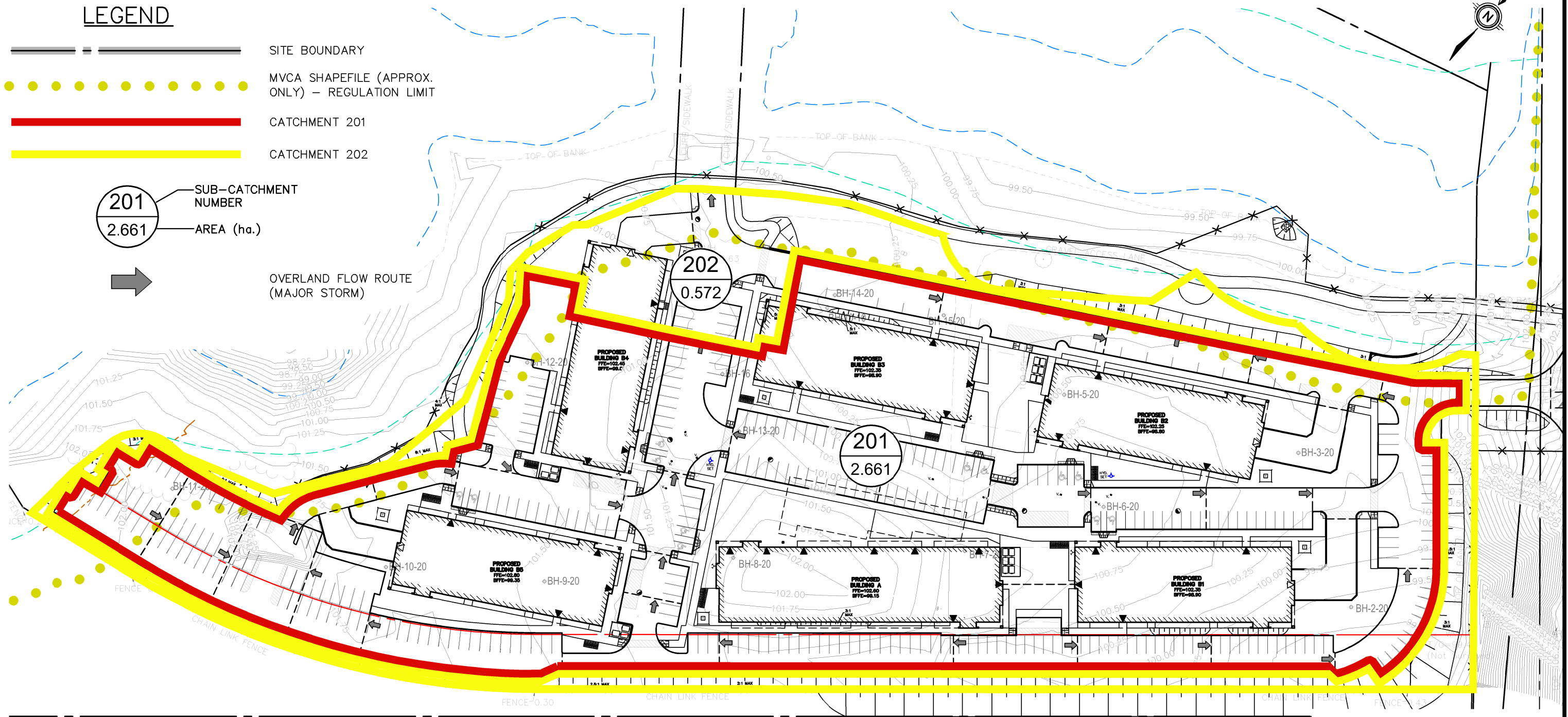
 Engineers, Scientists, Surveyors			
PROJECT 319 HUNTMAR DRIVE			
TITLE PRE-DEVELOPMENT CATCHMENT AREA			
Drawn	MJR	Scale	1:1000
Checked	DXN	Project No.	65860_001
Date	2026-03-19	Rev No.	0
			2.0

LEGEND

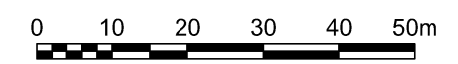
-  SITE BOUNDARY
-  MVCA SHAPEFILE (APPROX. ONLY) - REGULATION LIMIT
-  CATCHMENT 201
-  CATCHMENT 202

201 - SUB-CATCHMENT NUMBER
2.661 - AREA (ha.)

 OVERLAND FLOW ROUTE (MAJOR STORM)



HWY 417 (QUEENSWAY)



PROJECT			319 HUNTMAR DRIVE
TITLE			
PROJECT			POST-DEVELOPMENT CATCHMENT AREAS
TITLE			
Drawn	MJR	Scale	3.0
Checked	DXN	Project No.	
Date	2026-03-19	Rev No.	
		0	

In order to achieve the stormwater management requirements for the Site, runoff generated from the controlled area will be conveyed to catchbasin-manhole CBMH13, located within the drive aisle north of Building B2 wherein the flow will be controlled with the installation of a 100mm diameter on-line orifice plate on the outlet pipe and a 27.0m wide weir along the curb of this drive aisle. Storage volume for the orifice and the weir will be provided within the at-grade parking areas, underground storm sewers, and an underground storage tank. The maximum depth of ponding permitted by grading within the at-grade parking areas is 0.30m.

The flow equations for the orifice and the weir are included in Appendix C, along with the IDF parameters used for all storm events. Refer to Appendix D for the MIDUSS NET output.

The following table illustrates the stage-storage-discharge relationship for the storm system.

Table 4.2 – Stage-Storage-Discharge Information

Elevation (m)	Head (m)	Orifice/Weir Flow (m ³ /s)	Volume (m ³)	Remarks
99.05	0.00	0.0000	0.0	100mm diameter orifice invert
101.55	2.50	0.0342	522.3	Top of grate
101.60	2.55	0.0346	523.4	Top of grate
101.65	2.60	0.0349	531.0	Top of grate
101.70	2.65	0.0353	554.5	Top of grate
101.75	2.70	0.0356	608.3	Top of grate
101.80	2.75	0.0359	707.6	Top of grate
101.85	2.80	0.0363	861.3	27.0m wide weir
101.90	2.85	0.4998	1,060.5	Contour

With the addition of the 100mm diameter orifice plate and the 27.0m wide weir, the post-development runoff from the controlled portion of the Site for the 5- and 100-year storm events is controlled to 0.036m³/s and 0.306m³/s, respectively. The following table summarizes the flows generated by the whole Site.

Table 4.3 – Summary of Flows

Modelling Condition	Pre-Development (m ³ /s)	Post-Development (m ³ /s)
2-Year Storm Event	0.036	0.047
5-Year Storm Event	0.091	0.076
10-Year Storm Event	0.139	0.099
25-Year Storm Event	0.217	0.140
50-Year Storm Event	0.284	0.231
100-Year Storm Event	0.362	0.344

As summarized by Table 4.3 above, the post-development flow rates have been attenuated to the pre-development flow rates for all storm events with the exception of the 2-year storm. In the 2-year storm event, the post-development flow rate slightly exceeds the pre-development flow rate due to the runoff of the uncontrolled area. The amount of uncontrolled area has been reduced as much as possible given the constraints of the Site. This uncontrolled area is limited to the landscape areas between the property line and the extents of the proposed hardscape features, and a small area connecting to the existing bridge between the Site and Tanger Outlets. As the elevations at the existing bridge between the Site and Tanger Outlets are much lower than the remainder of the Site, this area is unable to be controlled.

As the proposed on-site storm sewers are already shallow, oversized pipes for additional storage would not be possible without concrete insulation. Considering the grading and servicing challenges of the Site, including the 14.0m MTO setback, surface storage within the at-grade parking areas cannot be increased. Furthermore, allocating additional space for a larger underground storage tank would pose challenges for both the deep servicing and utility servicing. Thus, the post-development flow rates have been attenuated given the Site's constraints.

The maximum depth for the 5-year storm event is 101.783m. This represents 23.3cm of ponding depth within the parking area. For the 100-year storm event, the maximum ponding elevation is 101.879m. This represents 30.0cm of ponding depth within the parking area with 2.9cm flowing over the weir.

As per Section 8.3.12 of the City's Sewer Design Guideline, dated December 2025, it is understood that the proposed drainage system shall be stress tested using design storms calculated based on a 20% increase of the City's IDF curves rainfall values. Due to the limited information available regarding this 20% increase, the IDF parameters of the 100-year storm have been modified to produce a 20% increase in the maximum intensity of the storm. Refer to Appendix C for further information on the IDF parameters used for this stress test. The results of this stress test have been included in Appendix D with the other post-development MIDSS NET output results. For this 100-year + 20% storm event, the maximum ponding elevation is 101.899m which represents 30.0cm of ponding depth within the parking area with 4.9cm flowing over the weir.

4.3 Water Quality Control

A Stormceptor EFO8 will be installed on the storm sewer system to provide water quality control for the Site. The chosen unit is expected to provide Enhanced water quality control. Refer to Appendix E for the sizing output from the Stormceptor Expert program. The Stormceptor will require regular annual maintenance to ensure it is operating properly. The owner may be required to enter into a maintenance agreement with a suitable contractor to complete this work. In addition, all the storm structures will have a 600mm sump.

4.4 Infiltration Target

As noted by the City in the Pre-Consultation Meeting Feedback, dated December 11, 2025, an infiltration target equal to 50-70mm/year of runoff must be achieved, with an increase of 25% for the post-development conditions. As per the geotechnical investigation prepared for the Site by Paterson Group, dated October 15, 2025, it is understood that implementation of infiltration-type LIDs are not considered suitable for the Site due to the poor hydraulic properties of the in-situ silty clay soils. Furthermore, based on the email correspondence with Oleksandr (Alex) Polyak from the City on February 23, 2026, it is understood that the infiltration galleries within the Tanger Outlets site were sized to accommodate the Site. Considering the information provided

by Paterson Group and the City, it is acknowledged that the implementation of infiltration facilities are not suitable for the Site and thus have not been proposed as part of the development.

4.5 Erosion and Sediment Control

Precautions will need to be taken during construction to limit erosion and sedimentation. Typically, the following measures are recommended during construction for erosion and sedimentation control:

- i) Erosion and sedimentation facilities are to be installed prior to any area grading operations.
- ii) All erosion control measures are to be inspected and monitored by the contractor and repairs are to be completed as required.
- iii) All materials and equipment used for the purpose of site preparation and project completion should be operated and stored in a manner that prevents any deleterious substance from leaving the Site.
- iv) To minimize the amount of mud being tracked onto the roadway, a mud mat should be installed at the primary construction entrance.

5.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the foregoing analysis, it is concluded that:

- i) The proposed grading design will respect the existing grades along the southern property line for the west half of the Site. Re-grading within the 14.0m MTO setback and within the MVCA regulation limit will be required to accommodate the proposed development, as well as a portion of the Huntmar Drive boulevard.
- ii) The existing service stubs for water and sanitary services will be utilized, and a storm sewer outlet to Feedmill Creek will be required to service the Site.
- iii) The anticipated maximum day domestic water demand is approximately 6.9L/s and the maximum fire flow demand is 150L/s and 217L/s based on OBC and FUS calculations, respectively. If required, a fire flow analysis will be completed to ensure that the minimum residual pressure of 150kPa can be achieved at the proposed private on-site hydrants, as per FUS requirements.
- iv) The proposed sanitary peak flow rate is anticipated to be approximately 9.1L/s.
- v) The proposed stormwater management design provides adequate attenuation of the 2- to 100-year storm events, considering the Site constraints.
- vi) Stormwater quality control can be provided with the installation of a Stormceptor Model EFO8.
- vii) No infiltration measures are proposed on-site due to the poor hydraulic properties of the in-situ silty clay soils.

All of which is respectfully submitted,

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https://mte85.sharepoint.com/sites/65860_001/Shared Documents/03- Reports/SSSWM/rpt_2026-04-01_SSSWM.docx



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Appendix A

Water Demand Calculations



**319 Huntmar Road
PRELIMINARY WATER DEMANDS**

Ottawa, Ontario
 Project #: 65860_001
 Date: March 26, 2026
 Date Printed: 3/26/2026
 Designed By: DXN
 Checked By: LEI

Development Information ¹								Fire Flow ^{1,2}												Domestic Flow ^{3,4}								
								Ontario Building Code					Fire Underwriters Survey							City of Ottawa Guidelines	Average Day	Max Day	Maximum Hour	Minimum Hour	Max Day + Fire Flow			
Node ID / Area ID / Building #	F.F.E. (m.a.s.l.)	Description	# of Units	Population # of people	Bldg Area (1 st Floor) m ²	Total Bldg Area m ²	Building Volume m ³	K	V	S _{tot}	Q	F	F	C	A	F	(2) Occupancy Reduction	(3) Sprinkler Protection	(4) Building Exposure							F	F	Fire Flow (Max OBC/FUS) L/s
A	102.60	Apartment	87	157	1,409	8,349	32,315	18	32,315	1.00	581,670	9,000	150	1.50	8,349	30,000	-15%	-50%	0%	13,000	217	217	0.508	0.508	1.269	2.791	0.203	224
B1	102.35	Apartment	77	139	1,085	6,515	23,951	18	23,951	1.00	431,118	9,000	150	1.50	6,515	27,000	-15%	-50%	0%	11,000	183	183	0.449	0.449	1.123	2.470	0.180	190
B2	102.25	Apartment	77	139	1,085	6,515	23,951	18	23,951	1.00	431,118	9,000	150	1.50	6,515	27,000	-15%	-50%	0%	11,000	183	183	0.449	0.449	1.123	2.470	0.180	190
B3	102.35	Apartment	77	139	1,085	6,515	23,951	18	23,951	1.00	431,118	9,000	150	1.50	6,515	27,000	-15%	-50%	0%	11,000	183	183	0.449	0.449	1.123	2.470	0.180	190
B4	102.45	Apartment	77	139	1,085	6,515	23,951	18	23,951	1.00	431,118	9,000	150	1.50	6,515	27,000	-15%	-50%	0%	11,000	183	183	0.449	0.449	1.123	2.470	0.180	190
B5	102.80	Apartment	77	139	1,085	6,515	23,951	18	23,951	1.00	431,118	9,000	150	1.50	6,515	27,000	-15%	-50%	0%	11,000	183	183	0.449	0.449	1.123	2.470	0.180	190
TOTALS FOR SITE			472	850	6833	40925	152070	Max Fire Flow = 150					Max Fire Flow = 217							217	2.75	2.75	6.88	15.14	1.10	224		

Sum of Maximum Day Flows + Largest OBC Fire Flow (L/s) = 157
Sum of Maximum Day Flows + Largest FUS Fire Flow (L/s) = 224






Assumptions:

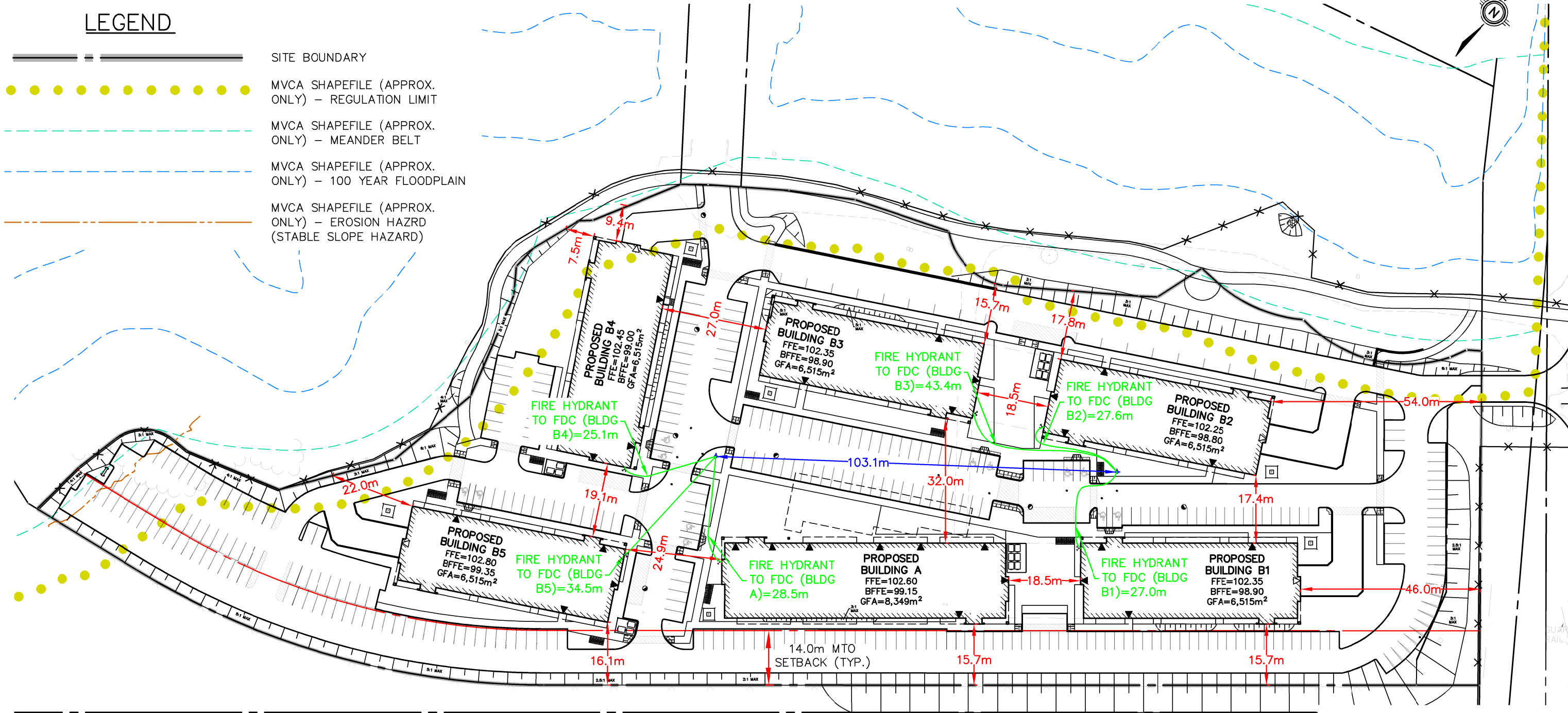
- All building areas, volumes, and construction coefficients are based on the Site Plan (dated March 25, 2026) and information provided by McCallum Sather. A population density value of 1.8 (average for apartments) was used as noted in Table 4.1 of the Water Distribution Design Guidelines by the City of Ottawa (dated December 8, 2025).
- All buildings are classified as major occupancy group C (Residential Occupancy).
- Average Daily Demands for each building are based on the information provided in Table 4.2 of the Water Distribution Design Guidelines by the City of Ottawa (dated December 8, 2025).
 Residential = 280 L/cap/day
- Maximum day and maximum hour peaking factors are based on the information provided in Table 4.2 of the Water Distribution Design Guidelines by the City of Ottawa (dated December 8, 2025). The minimum hour peaking factor is based on Table 3-1 of the Design Guidelines for Drinking-Water Systems by the MOE (dated 2008).
 Average Day = 1
 Maximum Day = 2.5 x average day
 Maximum Hour = 2.2 x maximum day
 Minimum Hour = 0.4

Building Exposure Calculations:

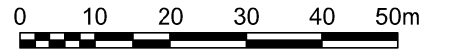
As noted on Page 32 of the Fire Underwriters Survey (2020), all proposed buildings are fully protected with automatic sprinkler systems. Thus, no exposure adjustment charge should be applied. For subject buildings adjacent to the Feedmill Creek, Huntmar Drive, or the Trans-Canada Highway 417, an exposure adjustment charge is not applicable as there are no exposed risks within the creek or the roads. Refer to the appended figure for building exposure dimensions.

LEGEND

-  SITE BOUNDARY
-  MVCA SHAPEFILE (APPROX. ONLY) - REGULATION LIMIT
-  MVCA SHAPEFILE (APPROX. ONLY) - MEANDER BELT
-  MVCA SHAPEFILE (APPROX. ONLY) - 100 YEAR FLOODPLAIN
-  MVCA SHAPEFILE (APPROX. ONLY) - EROSION HAZRD (STABLE SLOPE HAZARD)



HWY 417 (QUEENSWAY)



PROJECT		
319 HUNTMAR DRIVE		
TITLE		
WATER DEMAND CALCULATION SUPPORT		
Drawn	MJR	Scale 1:1000
Checked	DXN	Project No. 65860_001
Date	2026-03-27	Rev No. 0
		WAT

Appendix B

Sanitary Demand Calculations

319 Huntmar Drive
CITY OF WATERLOO

Project Number: 65860_001
Date: March 18, 2026
Design By: DXN
Checked By: LEI
File: Q:\65860_001\SAN\65860_001_Sanitary Sewer Design Sheet.xls

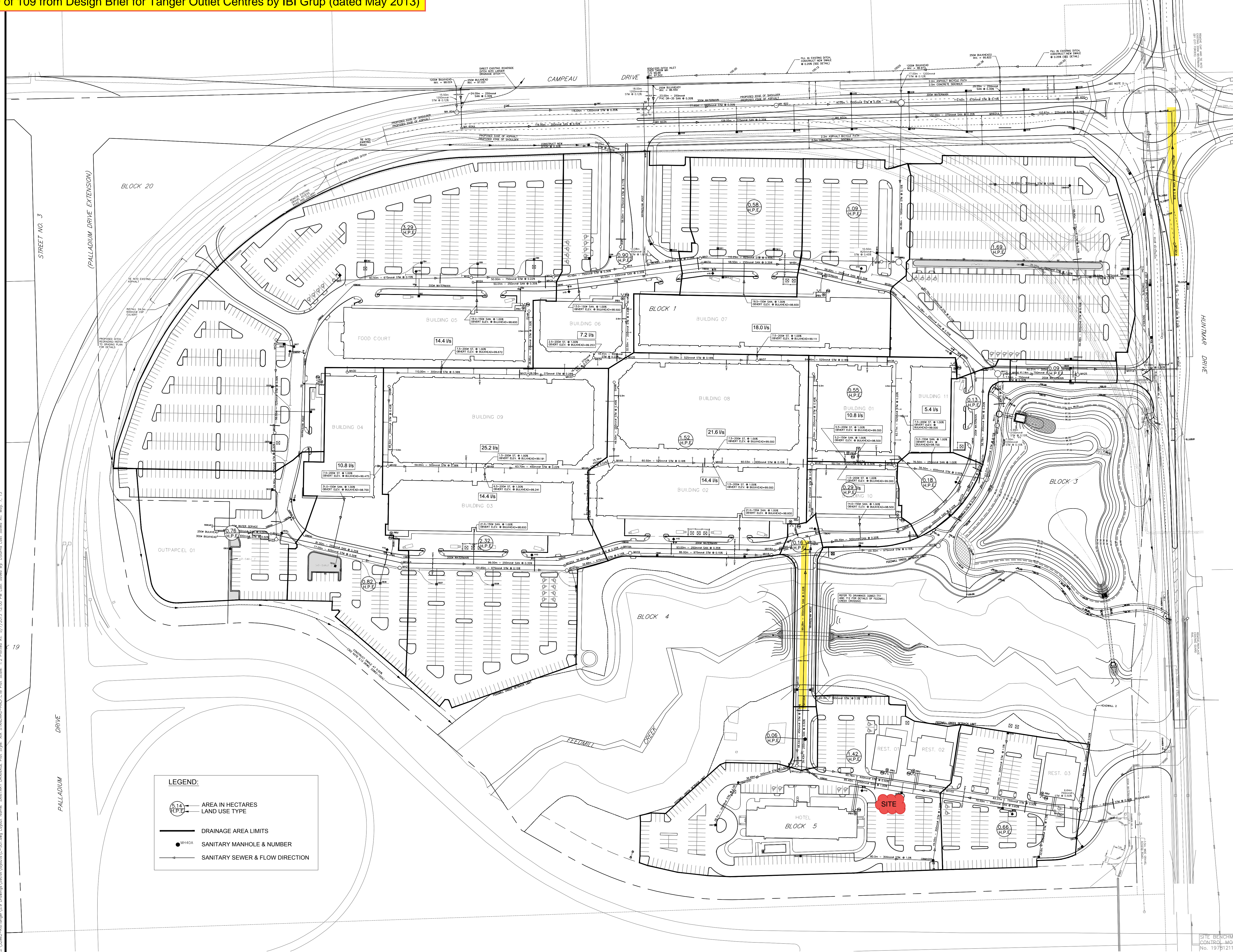
SANITARY SEWER DESIGN SHEET
ENGINEERING AND PUBLIC WORKS

Drainage Area Plan No:

Design Parameters			
Average Daily Flow		Mannings "n"	0.013
Residential	0.00324 L/s/c (280 L/c/d)	Min. Velocity	0.6 m/sec
Commercial	28000 L/ha/d	Max. Velocity	3.0 m/sec
Light Industrial	35000 L/ha/d	Residential Harmon Peaking Factor (F) $F = 1 + 14/(4 + (P/1000)^{0.5})$ K	
Institutional	28000 L/ha/d	where P = population and K = correction factor = 0.8	
		Residential Areas Infiltration	0.33 L/s/ha



LOCATION				RESIDENTIAL AREAS AND POPULATION					SCHOOL, INSTITUTIONAL	COMMERCIAL	INDUSTRIAL		INFILTRATION	DESIGN								
STREET	AREA NO.	MANHOLE LOCATION		AREA	No. UNITS @ 1.80 PPU	POPUL.	CUMUL POPUL.	PEAK FACTOR "F"	PEAK RES. FLOW	HECTARES AND FLOW OF EACH ZONING			TOTALS- C-I FLOW	AREA	CUMUL AREA	INFIL FLOW	TOTAL VOLUME FLOW	LENGTH	SLOPE	PIPE SIZE	CAPACITY	FULL FLOW VELOCITY
		FROM MH	TO MH							AREA	CUMUL AREA	PEAK FLOW										
		ha	(Avg. Apt)	1000s	1000s	L/sec	ha	ha	L/sec	ha	ha	L/sec	L/sec	ha	ha	L/sec	L/sec	m	%	mm	L/sec.	m/s
Site (Last SAN Run)		MH6A	MH7A	3.23	472.00	0.850	0.850	3.275619	9.0189				0.0000	0.31	0.31	0.1016	9.1205	29.4	1.00	200	32.7818	1.044



06			
05			
04			
03			
02	13.05.07	RE-ISSUED FOR SITE PLAN APPROVAL	J.I.M.
01	13.01.31	ISSUED FOR SITE PLAN APPLICATION	J.I.M.
No.	Date	Issued/Revision	By

PROJECT ARCHITECT
TURNER FLEISCHER
 TURNER FLEISCHER ARCHITECTS INC.
 67 Leasmill Road Toronto ON Canada M3B 2T8
 Telephone (416) 435-2222 Facsimile (416) 435-6777
 turnerfleischer.com

DESIGN ARCHITECT
CREATE
 Architecture Planning & Design LLC
 The Chrysler Building
 405 Lexington Avenue, Tower Suite 70
 New York, NY 10174
 Phone: (212) 297-0880
 www.createworldwide.com

SITE/CIVIL
IBI GROUP
 Architects, Engineers, Planners
 5th Floor, 230 Richmond Street West
 Toronto, ON
 M5V 1W6, Canada
 Tel: (416) 596-1930
 Fax: (416) 596-0644
 333 Preston Street
 Tower 1, Suite 400
 Ottawa, Ontario
 Canada K1S 5N4
 Tel: (613) 225-1311
 FAX: (613) 225-9868

ELECTRICAL
h HAMMERSCHLAG + JOFFE I
 N.C.
 69 Leasmill Road Toronto,
 Ontario Canada M3B 2T8
 T: (416) 444-9263
 F: (416) 444-1463
 E: dhw@hamjof.com

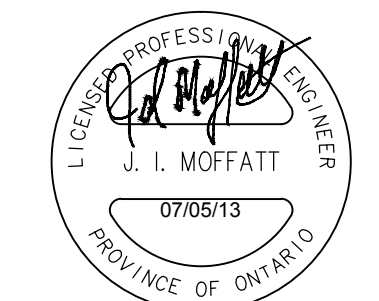
PLANNER
FOTENN PLANNING & URBAN DESIGN
 223 McLeod Street | Ottawa, ON | K2P 0Z8
 T: 613.730.5709 ext.234 | F: 613.730.1136

DEVELOPER
RIO CAN
 RioCan Real Estate Investment Trust
 2300 Yonge Street
 Suite 500
 Toronto, Ontario
 M4P 1E4
 (416) 646 8330

DEVELOPER
TangerOutlets
 Tanger Outlets
 3200 Northline Avenue, Suite 360
 Greensboro, North Carolina
 27408

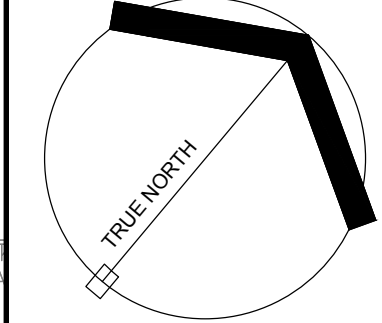
PROJECT
TANGER OUTLET CENTRES

KANATA ONTARIO
 DWG. TITLE
SANITARY DRAINAGE AREA PLAN



PROJECT NO. 32862 DATE JANUARY 2013
 DRAWN BY M.M. SCALE 1:1000
 CHECKED BY J.I.M. FILE NAME: -

PLOT SCALE: 1:1
 DRAWING NUMBER: C-501



J:\32862-RioCan\32862-RioCan\Drawings\32862-RioCan\Layout\Sanitary Drainage Area Plan.dwg
 Plot Scale: 1:2 Printed At: 5/7/2013 12:00 PM Last Saved By: DSaurin Last Saved At: May 7, 13



SANITARY SEWER DESIGN SHEET

PROJECT: TANGER OUTLET CENTRES
 LOCATION: CITY OF OTTAWA
 CLIENT: RIO-CAN MANAGEMENT INC

LOCATION				RESIDENTIAL								ICI AREAS						INFILTRATION ALLOWANCE			TOTAL FLOW	PROPOSED SEWER DESIGN										
STREET	AREA ID	FROM MH	TO MH	UNIT TYPES				AREA (Ha)	POPULATION		PEAK FACTOR	PEAK FLOW (L/s)	AREA (Ha)						PEAK FLOW (L/s)	AREA (Ha)		FLOW (L/s)	TOTAL FLOW (L/s)	CAPACITY (L/s)	LENGTH (m)	DIA (mm)	SLOPE (%)	VELOCITY (full) (m/s)	AVAILABLE CAPACITY			
				SF	SD	TH	APT		IND	CUM			INSTITUTIONAL	HIGH PROFILE EMPLOY	PRESTIGE BUSINESS PK	IND	CUM	IND		CUM	IND								CUM	L/s	(%)	L/s
Tanger Site		2A	3A					0.0		4.00	0.00			3.29	3.29					2.86	3.29	3.29	0.92	3.78	36.70	50.01	250	0.35	0.724	32.93	89.71	
		3A	7A					0.0		4.00	0.00			0.90	4.19				3.64	0.90	4.19	1.17	4.81	36.70	90.00	250	0.35	0.724	31.89	86.89		
		7A	8A					0.0		4.00	0.00			0.58	4.77				4.14	0.58	4.77	1.34	5.48	36.70	58.50	250	0.35	0.724	31.23	85.08		
		8A	9A					0.0		4.00	0.00			1.09	5.86				5.09	1.09	5.86	1.64	6.73	36.70	58.90	250	0.35	0.724	29.98	81.67		
		9A	12A					0.0		4.00	0.00			1.69	7.55				6.55	1.69	7.55	2.11	8.67	36.70	74.08	250	0.35	0.724	28.03	76.38		
Tanger Site		BLKHD	22A					0.0		4.00	0.00			0.76	0.76				0.66	0.76	0.76	0.21	0.87	43.87	32.00	250	0.50	0.866	43.00	98.01		
		22A	21A					0.0		4.00	0.00			0.82	1.58				1.37	0.82	1.58	0.44	1.81	36.70	81.50	250	0.35	0.724	34.89	95.06		
		21A	20A					0.0		4.00	0.00			2.32	3.90				3.39	2.32	3.90	1.09	4.48	36.70	99.00	250	0.35	0.724	32.23	87.80		
		20A	19A					0.0		4.00	0.00			0.00	3.90				3.39	0.00	3.90	1.09	4.48	36.70	36.36	250	0.35	0.724	32.23	87.80		
		19A	18A					0.0		4.00	0.00			1.52	5.42				4.70	1.52	5.42	1.52	6.22	36.70	93.00	250	0.35	0.724	30.48	83.05		
		18A	17A					0.0		4.00	0.00			0.00	5.42				4.70	0.00	5.42	1.52	6.22	36.70	19.36	250	0.35	0.724	30.48	83.05		
Hotel Site		103A	102A					0.0		4.00	0.00			0.66	0.66				0.57	0.66	0.66	0.18	0.76	48.06	70.50	250	0.60	0.948	47.30	98.42		
		102A	101A					0.0		4.00	0.00			1.42	2.08				1.81	1.42	2.08	0.58	2.39	62.04	85.40	250	1.00	1.224	59.65	96.15		
		101A	100A					0.0		4.00	0.00			0.06	2.14				1.86	0.06	2.14	0.60	2.46	43.87	39.43	250	0.50	0.866	41.41	94.40		
Feedmill Creek Crossing		100A	17A					0.0		4.00	0.00			0.16	2.30				2.00	0.16	2.30	0.64	2.64	45.12	99.28	300	0.20	0.618	42.48	94.15		
Tanger Site		17A	16A					0.0		4.00	0.00			0.29	8.01				6.95	0.29	8.01	2.24	9.20	45.12	68.30	300	0.20	0.618	35.92	79.62		
		16A	15A					0.0		4.00	0.00			0.18	8.19				7.11	0.18	8.19	2.29	9.40	45.12	32.00	300	0.20	0.618	35.71	79.16		
		15A	14A					0.0		4.00	0.00			0.00	8.19				7.11	0.00	8.19	2.29	9.40	45.12	27.12	300	0.20	0.618	35.71	79.16		
Tanger Site		13A	14A					0.0		4.00	0.00			0.55	0.55				0.48	0.55	0.55	0.15	0.63	62.04	76.50	250	1.00	1.224	61.41	98.98		
Tanger Site		14A	12A					0.0		4.00	0.00			0.13	8.87				7.70	0.13	8.87	0.04	7.74	45.12	58.78	300	0.20	0.618	37.38	82.85		
Tanger Site/Huntmar		12A	11A					0.0		4.00	0.00			0.09	16.51				14.33	0.09	16.51	0.03	14.36	45.12	92.51	300	0.20	0.618	30.76	68.18		
		11A	302A					0.0		4.00	0.00			0.00	16.51				14.33	0.00	16.51	0.06	14.39	45.12	25.03	300	0.20	0.618	30.72	68.10		
		302A	301A					0.0		4.00	0.00			0.29	16.80				14.58	0.29	16.80	2.26	16.84	45.12	76.13	300	0.20	0.618	28.28	62.67		
		301A	EX.					0.0		4.00	0.00			0.37	17.17				14.90	0.37	17.17	2.36	17.26	45.12	80.50	300	0.20	0.618	27.85	61.73		
External (West)			604A					0.0		4.00	0.00								52.66	52.66	32.00	14.74	46.74	63.80		300	0.40	0.874	17.06	26.74		
External (North)			604A					0.0		4.00	0.00								4.76	4.76	2.89	4.76	1.33	4.23	36.70	24.00	250	0.35	0.724	32.48	88.49	
Campeau Drive		604A	603A					0.0		4.00	0.00			0.44	57.86				0.44	57.86	35.16	0.44	57.86	16.20	51.36	63.80	116.95	300	0.40	0.874	12.44	19.50
External (North)			603A					0.0		4.00	0.00			5.14	5.14				5.14	5.14	3.12	5.14	1.44	4.56	36.70	23.00	250	0.35	0.724	32.14	87.57	
Campeau Drive		603A	602A					0.0		4.00	0.00			0.50	63.50				0.50	63.50	38.59	0.50	63.50	17.78	56.37	108.21	109.05	375	0.35	0.949	51.85	47.91
Campeau Drive		602A	601A					0.0		4.00	0.00			0.50	64.00				0.50	64.00	38.89	0.50	64.00	17.92	56.81	108.21	102.00	375	0.35	0.949	51.40	47.50
External (North)			601A					0.0		4.00	0.00			5.00	5.00				5.00	5.00	3.04	5.00	1.40	4.44	36.70	29.00	250	0.35	0.724	32.26	87.91	
Campeau Drive		601A	600A					0.0		4.00	0.00			0.39	69.39				0.39	69.39	42.16	0.39	77.45	21.69	63.85	108.21	103.87	375	0.35	0.949	44.36	41.00

MTE NOTE 1
 - Available capacity (42.48L/s) appears to have been determined by subtracting the total flow (2.64L/s) from the sewer capacity (45.12L/s)
 - Available capacity in percentage appears to have been determined by dividing the available capacity (42.48L/s) by the sewer capacity (45.12L/s)

MTE NOTE 2
 - Considering the new total peak sanitary flow rate of 9.1L/s
 - Available capacity = 45.12L/s - 9.1L/s = 36.02L/s
 - Available capacity (%) = 36.02L/s / 45.12L/s = 79.8%

MTE NOTE 3
 - Available capacity (27.85L/s) appears to have been determined by subtracting the total flow (17.26L/s) from the sewer capacity (45.12L/s)
 - Available capacity in percentage appears to have been determined by dividing the available capacity (27.85L/s) by the sewer capacity (45.12L/s)

MTE NOTE 4
 - Considering the new total peak sanitary flow rate of 9.1L/s, the total flow for this line is changed from 17.26L/s to 23.72L/s (ie. subtracting 2.64L/s and adding 9.1L/s to 17.26L/s)
 - Available capacity = 45.12L/s - 23.72L/s = 21.40L/s
 - Available capacity (%) = 21.40L/s / 45.12L/s = 47.4%

MTE NOTE 1 & 2

MTE NOTE 3 & 4

Design Parameters:		Notes:		Designed: J.J.M.		No. 1.		Revision: 1st Submission for Site Plan Application		Date: 30/01/2013	
Residential		ICI Areas		2. Demand (per capita): 350 L/day		2.		2nd Submission for Site Plan Application			
SF	3.4 p/p/u			3. Infiltration allowance: 0.28 L/s/Ha		Checked: P.K.					
TH/SD	2.7 p/p/u	INST	50,000 L/Ha/day	4. Residential Peaking Factor:		Dwg. Reference: 32862 C-501/C-501A					
APT	2.3 p/p/u	EMP	50,000 L/Ha/day	Harmon Formula = 1+(14/(4+P^0.5))		File Reference: 32862.5.7.1		Date: 25/01/2013		Sheet No: 1 of 1	
Other	60 p/p/Ha	BUSS	35,000 L/Ha/day	where P = population in thousands							

Appendix C

Stormwater Management Calculations

CALCULATIONS

Orifice Equation (MIDUSS NET)

$$Q = C_c \sqrt{2g(H-2/3D)} D^2$$

where,

- C_c coefficient of contraction
- H head relative to the invert of the orifice
- D orifice diameter
- g gravitational acceleration

Weir Equation (MIDUSS NET)

$$Q_{cr} = B \sqrt{g} y_{cr}^{3/2} \quad \text{where } y_{cr} = 2/3 (H-Z)$$

where,

- B weir breadth
- g gravitational acceleration
- H head relative to the invert of the weir
- Z weir sill elevation

IDF Parameters

Modelling Condition	a	b	c
2-Year Storm Event	732.951	6.199	0.810
5-Year Storm Event	998.071	6.053	0.814
10-Year Storm Event	1174.184	6.014	0.816
25-Year Storm Event	1402.884	6.018	0.819
50-Year Storm Event	1569.580	6.014	0.820
100-Year Storm Event	1735.688	6.014	0.820
100-Year + 20% Storm Event*	2082.820	5.890	0.824

*To increase the maximum intensity of the 100-year storm by 20%, the 'a' value was multiplied by 1.2, and the 'b' and 'c' values were adjusted as required to produce a 20% increase.



Appendix D

MIDUSS Outputs

Pre-Development



```

1 " MIDUSS Output ----->"
2 " MIDUSS version Version 2.25 rev. 473"
3 " MIDUSS created Sunday, February 7, 2010"
4 " 10 Units used: ie METRIC"
5 " Job folder: Q:\65860_001\SWM"
6 " Output filename: 2 Year Pre.out"
7 " Licensee name: A"
8 " Company "
9 " Date & Time last used: 3/16/2026 at 8:33:08 AM"
10 " 31 TIME PARAMETERS"
11 " 5.000 Time Step"
12 " 180.000 Max. Storm length"
13 " 1500.000 Max. Hydrograph"
14 " 32 STORM Chicago storm"
15 " 1 Chicago storm"
16 " 732.951 Coefficient A"
17 " 6.199 Constant B"
18 " 0.810 Exponent C"
19 " 0.400 Fraction R"
20 " 180.000 Duration"
21 " 1.000 Time step multiplier"
22 " Maximum intensity 103.571 mm/hr"
23 " Total depth 31.880 mm"
24 " 6 002hyd Hydrograph extension used in this file"
25 " 33 CATCHMENT 101"
26 " 1 Triangular SCS"
27 " 1 Equal length"
28 " 1 SCS method"
29 " 101 Site"
30 " 0.400 % Impervious"
31 " 3.233 Total Area"
32 " 40.000 Flow length"
33 " 2.500 Overland Slope"
34 " 3.220 Pervious Area"
35 " 40.000 Pervious length"
36 " 2.500 Pervious slope"
37 " 0.013 Impervious Area"
38 " 40.000 Impervious length"
39 " 2.500 Impervious slope"
40 " 0.250 Pervious Manning 'n'"
41 " 75.000 Pervious SCS Curve No."
42 " 0.159 Pervious Runoff coefficient"
43 " 0.100 Pervious Ia/S coefficient"
44 " 8.467 Pervious Initial abstraction"
45 " 0.015 Impervious Manning 'n'"
46 " 98.000 Impervious SCS Curve No."
47 " 0.830 Impervious Runoff coefficient"
48 " 0.100 Impervious Ia/S coefficient"
49 " 0.518 Impervious Initial abstraction"
50 " 0.036 0.000 0.000 0.000 c.m/sec"
51 " Catchment 101 Pervious Impervious Total Area "
52 " Surface Area 3.220 0.013 3.233 hectare"
53 " Time of concentration 31.878 2.519 31.275 minutes"
54 " Time to Centroid 141.434 91.680 140.412 minutes"
55 " Rainfall depth 31.880 31.880 31.880 mm"
56 " Rainfall volume 1026.55 4.12 1030.67 c.m"
57 " Rainfall losses 26.812 5.423 26.726 mm"
58 " Runoff depth 5.068 26.457 5.153 mm"
59 " Runoff volume 163.18 3.42 166.61 c.m"
60 " Runoff coefficient 0.159 0.830 0.162 "
61 " Maximum flow 0.036 0.003 0.036 c.m/sec"
62 " 40 HYDROGRAPH Add Runoff "
63 " 4 Add Runoff "
64 " 0.036 0.036 0.000 0.000"
65 " 40 HYDROGRAPH Copy to Outflow"
66 " 8 Copy to Outflow"
67 " 0.036 0.036 0.036 0.000"
68 " 38 START/RE-START TOTALS 101"
69 " 3 Runoff Totals on EXIT"

```

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70 " Total Catchment area 3.233 hectare"
71 " Total Impervious area 0.013 hectare"
72 " Total % impervious 0.400"
73 " 19 EXIT"
74 "

```

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1 " MIDUSS Output ----->"
2 " MIDUSS version Version 2.25 rev. 473"
3 " MIDUSS created Sunday, February 7, 2010"
4 " 10 Units used: ie METRIC"
5 " Job folder: Q:\65860_001\SWM"
6 " Output filename: 5 Year Pre.out"
7 " Licensee name: A"
8 " Company "
9 " Date & Time last used: 3/16/2026 at 8:35:15 AM"
10 " 31 TIME PARAMETERS"
11 " 5.000 Time Step"
12 " 180.000 Max. Storm length"
13 " 1500.000 Max. Hydrograph"
14 " 32 STORM Chicago storm"
15 " 1 Chicago storm"
16 " 998.071 Coefficient A"
17 " 6.053 Constant B"
18 " 0.814 Exponent C"
19 " 0.400 Fraction R"
20 " 180.000 Duration"
21 " 1.000 Time step multiplier"
22 " Maximum intensity 141.178 mm/hr"
23 " Total depth 42.540 mm"
24 " 6 005hyd Hydrograph extension used in this file"
25 " 33 CATCHMENT 101"
26 " 1 Triangular SCS"
27 " 1 Equal length"
28 " 1 SCS method"
29 " 101 Site"
30 " 0.400 % Impervious"
31 " 3.233 Total Area"
32 " 40.000 Flow length"
33 " 2.500 Overland Slope"
34 " 3.220 Pervious Area"
35 " 40.000 Pervious length"
36 " 2.500 Pervious slope"
37 " 0.013 Impervious Area"
38 " 40.000 Impervious length"
39 " 2.500 Impervious slope"
40 " 0.250 Pervious Manning 'n'"
41 " 75.000 Pervious SCS Curve No."
42 " 0.229 Pervious Runoff coefficient"
43 " 0.100 Pervious Ia/S coefficient"
44 " 8.467 Pervious Initial abstraction"
45 " 0.015 Impervious Manning 'n'"
46 " 98.000 Impervious SCS Curve No."
47 " 0.866 Impervious Runoff coefficient"
48 " 0.100 Impervious Ia/S coefficient"
49 " 0.518 Impervious Initial abstraction"
50 " 0.091 0.000 0.000 0.000 c.m/sec"
51 " Catchment 101 Pervious Impervious Total Area "
52 " Surface Area 3.220 0.013 3.233 hectare"
53 " Time of concentration 22.466 2.197 22.163 minutes"
54 " Time to Centroid 129.195 90.172 128.612 minutes"
55 " Rainfall depth 42.540 42.540 42.540 mm"
56 " Rainfall volume 1369.82 5.50 1375.32 c.m"
57 " Rainfall losses 32.780 5.684 32.672 mm"
58 " Runoff depth 9.760 36.856 9.868 mm"
59 " Runoff volume 314.27 4.77 319.04 c.m"
60 " Runoff coefficient 0.229 0.866 0.232 "
61 " Maximum flow 0.090 0.004 0.091 c.m/sec"
62 " 40 HYDROGRAPH Add Runoff "
63 " 4 Add Runoff "
64 " 0.091 0.091 0.000 0.000"
65 " 40 HYDROGRAPH Copy to Outflow"
66 " 8 Copy to Outflow"
67 " 0.091 0.091 0.091 0.000"
68 " 38 START/RE-START TOTALS 101"
69 " 3 Runoff Totals on EXIT"

```

```

70 " Total Catchment area 3.233 hectare"
71 " Total Impervious area 0.013 hectare"
72 " Total % impervious 0.400"
73 " 19 EXIT"
74 "

```

```

1 " MIDUSS Output ----->"
2 " MIDUSS version Version 2.25 rev. 473"
3 " MIDUSS created Sunday, February 7, 2010"
4 " 10 Units used: ie METRIC"
5 " Job folder: Q:\65860_001\SWM"
6 " Output filename: 10 Year Pre.out"
7 " Licensee name: A"
8 " Company "
9 " Date & Time last used: 3/16/2026 at 8:35:56 AM"
10 " 31 TIME PARAMETERS"
11 " 5.000 Time Step"
12 " 180.000 Max. Storm length"
13 " 1500.000 Max. Hydrograph"
14 " 32 STORM Chicago storm"
15 " 1 Chicago storm"
16 " 1174.184 Coefficient A"
17 " 6.014 Constant B"
18 " 0.816 Exponent C"
19 " 0.400 Fraction R"
20 " 180.000 Duration"
21 " 1.000 Time step multiplier"
22 " Maximum intensity 165.771 mm/hr"
23 " Total depth 49.535 mm"
24 " 6 010hyd Hydrograph extension used in this file"
25 " 33 CATCHMENT 101"
26 " 1 Triangular SCS"
27 " 1 Equal length"
28 " 1 SCS method"
29 " 101 Site"
30 " 0.400 % Impervious"
31 " 3.233 Total Area"
32 " 40.000 Flow length"
33 " 2.500 Overland Slope"
34 " 3.220 Pervious Area"
35 " 40.000 Pervious length"
36 " 2.500 Pervious slope"
37 " 0.013 Impervious Area"
38 " 40.000 Impervious length"
39 " 2.500 Impervious slope"
40 " 0.250 Pervious Manning 'n'"
41 " 75.000 Pervious SCS Curve No."
42 " 0.270 Pervious Runoff coefficient"
43 " 0.100 Pervious Ia/S coefficient"
44 " 8.467 Pervious Initial abstraction"
45 " 0.015 Impervious Manning 'n'"
46 " 98.000 Impervious SCS Curve No."
47 " 0.883 Impervious Runoff coefficient"
48 " 0.100 Impervious Ia/S coefficient"
49 " 0.518 Impervious Initial abstraction"
50 " 0.139 0.000 0.000 0.000 c.m/sec"
51 " Catchment 101 Pervious Impervious Total Area "
52 " Surface Area 3.220 0.013 3.233 hectare"
53 " Time of concentration 19.266 2.050 19.043 minutes"
54 " Time to Centroid 124.334 89.488 123.882 minutes"
55 " Rainfall depth 49.535 49.535 49.535 mm"
56 " Rainfall volume 1595.05 6.41 1601.45 c.m"
57 " Rainfall losses 36.154 5.808 36.033 mm"
58 " Runoff depth 13.380 43.727 13.502 mm"
59 " Runoff volume 430.85 5.65 436.51 c.m"
60 " Runoff coefficient 0.270 0.883 0.273 "
61 " Maximum flow 0.139 0.004 0.139 c.m/sec"
62 " 40 HYDROGRAPH Add Runoff "
63 " 4 Add Runoff "
64 " 0.139 0.139 0.000 0.000"
65 " 40 HYDROGRAPH Copy to Outflow"
66 " 8 Copy to Outflow"
67 " 0.139 0.139 0.139 0.000"
68 " 38 START/RE-START TOTALS 101"
69 " 3 Runoff Totals on EXIT"

```

```

70 " Total Catchment area 3.233 hectare"
71 " Total Impervious area 0.013 hectare"
72 " Total % impervious 0.400"
73 " 19 EXIT"
74 "

```

```

1 " MIDUSS Output ----->"
2 " MIDUSS version Version 2.25 rev. 473"
3 " MIDUSS created Sunday, February 7, 2010"
4 " 10 Units used: ie METRIC"
5 " Job folder: Q:\65860_001\SWM"
6 " Output filename: 25 Year Pre.out"
7 " Licensee name: A"
8 " Company "
9 " Date & Time last used: 3/16/2026 at 8:36:36 AM"
10 " 31 TIME PARAMETERS"
11 " 5.000 Time Step"
12 " 180.000 Max. Storm length"
13 " 1500.000 Max. Hydrograph"
14 " 32 STORM Chicago storm"
15 " 1 Chicago storm"
16 " 1402.884 Coefficient A"
17 " 6.018 Constant B"
18 " 0.819 Exponent C"
19 " 0.400 Fraction R"
20 " 180.000 Duration"
21 " 1.000 Time step multiplier"
22 " Maximum intensity 196.580 mm/hr"
23 " Total depth 58.261 mm"
24 " 6 025hyd Hydrograph extension used in this file"
25 " 33 CATCHMENT 101"
26 " 1 Triangular SCS"
27 " 1 Equal length"
28 " 1 SCS method"
29 " 101 Site"
30 " 0.400 % Impervious"
31 " 3.233 Total Area"
32 " 40.000 Flow length"
33 " 2.500 Overland Slope"
34 " 3.220 Pervious Area"
35 " 40.000 Pervious length"
36 " 2.500 Pervious slope"
37 " 0.013 Impervious Area"
38 " 40.000 Impervious length"
39 " 2.500 Impervious slope"
40 " 0.250 Pervious Manning 'n'"
41 " 75.000 Pervious SCS Curve No."
42 " 0.316 Pervious Runoff coefficient"
43 " 0.100 Pervious Ia/S coefficient"
44 " 8.467 Pervious Initial abstraction"
45 " 0.015 Impervious Manning 'n'"
46 " 98.000 Impervious SCS Curve No."
47 " 0.898 Impervious Runoff coefficient"
48 " 0.100 Impervious Ia/S coefficient"
49 " 0.518 Impervious Initial abstraction"
50 " 0.217 0.000 0.000 0.000 c.m/sec"
51 " Catchment 101 Pervious Impervious Total Area "
52 " Surface Area 3.220 0.013 3.233 hectare"
53 " Time of concentration 16.592 1.907 16.427 minutes"
54 " Time to Centroid 119.922 88.786 119.570 minutes"
55 " Rainfall depth 58.261 58.261 58.261 mm"
56 " Rainfall volume 1876.04 7.53 1883.58 c.m"
57 " Rainfall losses 39.857 5.960 39.722 mm"
58 " Runoff depth 18.404 52.301 18.539 mm"
59 " Runoff volume 592.61 6.76 599.37 c.m"
60 " Runoff coefficient 0.316 0.898 0.318 "
61 " Maximum flow 0.216 0.005 0.217 c.m/sec"
62 " 40 HYDROGRAPH Add Runoff "
63 " 4 Add Runoff "
64 " 0.217 0.217 0.000 0.000"
65 " 40 HYDROGRAPH Copy to Outflow"
66 " 8 Copy to Outflow"
67 " 0.217 0.217 0.217 0.000"
68 " 38 START/RE-START TOTALS 101"
69 " 3 Runoff Totals on EXIT"

```

```

70 " Total Catchment area 3.233 hectare"
71 " Total Impervious area 0.013 hectare"
72 " Total % impervious 0.400"
73 " 19 EXIT"
74 "

```

```

1 " MIDUSS Output ----->"
2 " MIDUSS version Version 2.25 rev. 473"
3 " MIDUSS created Sunday, February 7, 2010"
4 " 10 Units used: ie METRIC"
5 " Job folder: Q:\65860_001\SWM"
6 " Output filename: 50 Year Pre.out"
7 " Licensee name: A"
8 " Company "
9 " Date & Time last used: 3/16/2026 at 8:37:18 AM"
10 " 31 TIME PARAMETERS"
11 " 5.000 Time Step"
12 " 180.000 Max. Storm length"
13 " 1500.000 Max. Hydrograph"
14 " 32 STORM Chicago storm"
15 " 1 Chicago storm"
16 " 1569.580 Coefficient A"
17 " 6.014 Constant B"
18 " 0.820 Exponent C"
19 " 0.400 Fraction R"
20 " 180.000 Duration"
21 " 1.000 Time step multiplier"
22 " Maximum intensity 219.477 mm/hr"
23 " Total depth 64.845 mm"
24 " 6 050hyd Hydrograph extension used in this file"
25 " 33 CATCHMENT 101"
26 " 1 Triangular SCS"
27 " 1 Equal length"
28 " 1 SCS method"
29 " 101 Site"
30 " 0.400 % Impervious"
31 " 3.233 Total Area"
32 " 40.000 Flow length"
33 " 2.500 Overland Slope"
34 " 3.220 Pervious Area"
35 " 40.000 Pervious length"
36 " 2.500 Pervious slope"
37 " 0.013 Impervious Area"
38 " 40.000 Impervious length"
39 " 2.500 Impervious slope"
40 " 0.250 Pervious Manning 'n'"
41 " 75.000 Pervious SCS Curve No."
42 " 0.347 Pervious Runoff coefficient"
43 " 0.100 Pervious Ia/S coefficient"
44 " 8.467 Pervious Initial abstraction"
45 " 0.015 Impervious Manning 'n'"
46 " 98.000 Impervious SCS Curve No."
47 " 0.906 Impervious Runoff coefficient"
48 " 0.100 Impervious Ia/S coefficient"
49 " 0.518 Impervious Initial abstraction"
50 " 0.284 0.000 0.000 0.000 c.m/sec"
51 " Catchment 101 Pervious Impervious Total Area "
52 " Surface Area 3.220 0.013 3.233 hectare"
53 " Time of concentration 15.143 1.821 15.005 minutes"
54 " Time to Centroid 117.433 88.374 117.132 minutes"
55 " Rainfall depth 64.845 64.845 64.845 mm"
56 " Rainfall volume 2088.06 8.39 2096.44 c.m"
57 " Rainfall losses 42.338 6.082 42.193 mm"
58 " Runoff depth 22.508 58.763 22.653 mm"
59 " Runoff volume 724.76 7.60 732.36 c.m"
60 " Runoff coefficient 0.347 0.906 0.349 "
61 " Maximum flow 0.283 0.006 0.284 c.m/sec"
62 " 40 HYDROGRAPH Add Runoff "
63 " 4 Add Runoff "
64 " 0.284 0.284 0.000 0.000"
65 " 40 HYDROGRAPH Copy to Outflow"
66 " 8 Copy to Outflow"
67 " 0.284 0.284 0.284 0.000"
68 " 38 START/RE-START TOTALS 101"
69 " 3 Runoff Totals on EXIT"

```

```

70 " Total Catchment area 3.233 hectare"
71 " Total Impervious area 0.013 hectare"
72 " Total % impervious 0.400"
73 " 19 EXIT"
74 "

```

```

1 " MIDUSS Output ----->"
2 " MIDUSS version Version 2.25 rev. 473"
3 " MIDUSS created Sunday, February 7, 2010"
4 " 10 Units used: ie METRIC"
5 " Job folder: Q:\65860_001\SWM"
6 " Output filename: 100 Year Pre.out"
7 " Licensee name: A"
8 " Company "
9 " Date & Time last used: 3/16/2026 at 8:37:56 AM"
10 " 31 TIME PARAMETERS"
11 " 5.000 Time Step"
12 " 180.000 Max. Storm length"
13 " 1500.000 Max. Hydrograph"
14 " 32 STORM Chicago storm"
15 " 1 Chicago storm"
16 " 1735.688 Coefficient A"
17 " 6.014 Constant B"
18 " 0.820 Exponent C"
19 " 0.400 Fraction R"
20 " 180.000 Duration"
21 " 1.000 Time step multiplier"
22 " Maximum intensity 242.704 mm/hr"
23 " Total depth 71.708 mm"
24 " 6 100hyd Hydrograph extension used in this file"
25 " 33 CATCHMENT 101"
26 " 1 Triangular SCS"
27 " 1 Equal length"
28 " 1 SCS method"
29 " 101 Site"
30 " 0.400 % Impervious"
31 " 3.233 Total Area"
32 " 40.000 Flow length"
33 " 2.500 Overland Slope"
34 " 3.220 Pervious Area"
35 " 40.000 Pervious length"
36 " 2.500 Pervious slope"
37 " 0.013 Impervious Area"
38 " 40.000 Impervious length"
39 " 2.500 Impervious slope"
40 " 0.250 Pervious Manning 'n'"
41 " 75.000 Pervious SCS Curve No."
42 " 0.377 Pervious Runoff coefficient"
43 " 0.100 Pervious Ia/S coefficient"
44 " 8.467 Pervious Initial abstraction"
45 " 0.015 Impervious Manning 'n'"
46 " 98.000 Impervious SCS Curve No."
47 " 0.913 Impervious Runoff coefficient"
48 " 0.100 Impervious Ia/S coefficient"
49 " 0.518 Impervious Initial abstraction"
50 " 0.362 0.000 0.000 0.000 c.m/sec"
51 " Catchment 101 Pervious Impervious Total Area "
52 " Surface Area 3.220 0.013 3.233 hectare"
53 " Time of concentration 13.966 1.746 13.849 minutes"
54 " Time to Centroid 115.362 88.031 115.098 minutes"
55 " Rainfall depth 71.708 71.708 71.708 mm"
56 " Rainfall volume 2309.04 9.27 2318.31 c.m"
57 " Rainfall losses 44.708 6.258 44.554 mm"
58 " Runoff depth 27.000 65.450 27.154 mm"
59 " Runoff volume 869.42 8.46 877.88 c.m"
60 " Runoff coefficient 0.377 0.913 0.379 "
61 " Maximum flow 0.360 0.007 0.362 c.m/sec"
62 " 40 HYDROGRAPH Add Runoff "
63 " 4 Add Runoff "
64 " 0.362 0.362 0.000 0.000"
65 " 40 HYDROGRAPH Copy to Outflow"
66 " 8 Copy to Outflow"
67 " 0.362 0.362 0.362 0.000"
68 " 38 START/RE-START TOTALS 101"
69 " 3 Runoff Totals on EXIT"

```

```

70 " Total Catchment area 3.233 hectare"
71 " Total Impervious area 0.013 hectare"
72 " Total % impervious 0.400"
73 " 19 EXIT"
74 "

```

Post-Development

```

1 " MIDUSS Output ----->"
2 " MIDUSS version Version 2.25 rev. 473"
3 " MIDUSS created Sunday, February 7, 2010"
4 " 10 Units used: ie METRIC"
5 " Job folder: Q:\65860_001\SWM\2026-03-16"
6 " Output filename: 2 Year Post E.out"
7 " Licensee name: A"
8 " Company "
9 " Date & Time last used: 3/17/2026 at 12:52:52 PM"
10 " 31 TIME PARAMETERS"
11 " 5.000 Time Step"
12 " 180.000 Max. Storm length"
13 " 1500.000 Max. Hydrograph"
14 " 32 STORM Chicago storm"
15 " 1 Chicago storm"
16 " 732.951 Coefficient A"
17 " 6.199 Constant B"
18 " 0.810 Exponent C"
19 " 0.400 Fraction R"
20 " 180.000 Duration"
21 " 1.000 Time step multiplier"
22 " Maximum intensity 103.571 mm/hr"
23 " Total depth 31.880 mm"
24 " 6 002hyd Hydrograph extension used in this file"
25 " 33 CATCHMENT 201"
26 " 1 Triangular SCS"
27 " 1 Equal length"
28 " 1 SCS method"
29 " 201 Controlled Area"
30 " 88.200 % Impervious"
31 " 2.661 Total Area"
32 " 15.000 Flow length"
33 " 1.500 Overland Slope"
34 " 0.314 Pervious Area"
35 " 15.000 Pervious length"
36 " 1.500 Pervious slope"
37 " 2.347 Impervious Area"
38 " 15.000 Impervious length"
39 " 1.500 Impervious slope"
40 " 0.250 Pervious Manning 'n'"
41 " 75.000 Pervious SCS Curve No."
42 " 0.159 Pervious Runoff coefficient"
43 " 0.100 Pervious Ia/S coefficient"
44 " 8.467 Pervious Initial abstraction"
45 " 0.015 Impervious Manning 'n'"
46 " 98.000 Impervious SCS Curve No."
47 " 0.831 Impervious Runoff coefficient"
48 " 0.100 Impervious Ia/S coefficient"
49 " 0.518 Impervious Initial abstraction"
50 " 0.499 0.000 0.000 0.000 c.m/sec"
51 " Catchment 201 Pervious Impervious Total Area "
52 " Surface Area 0.314 2.347 2.661 hectare"
53 " Time of concentration 20.628 1.630 2.104 minutes"
54 " Time to Centroid 128.029 90.214 91.157 minutes"
55 " Rainfall depth 31.880 31.880 31.880 mm"
56 " Rainfall volume 100.10 748.22 848.32 c.m"
57 " Rainfall losses 26.812 5.373 7.903 mm"
58 " Runoff depth 5.067 26.507 23.977 mm"
59 " Runoff volume 15.91 622.11 638.02 c.m"
60 " Runoff coefficient 0.159 0.831 0.752 "
61 " Maximum flow 0.005 0.499 0.499 c.m/sec"
62 " 40 HYDROGRAPH Add Runoff "
63 " 4 Add Runoff "
64 " 0.499 0.000 0.000"
65 " 54 POND DESIGN"
66 " 0.499 Current peak flow c.m/sec"
67 " 0.249 Target outflow c.m/sec"
68 " 638.0 Hydrograph volume c.m"
69 " 9. Number of stages"

```

```

70 " 99.045 Minimum water level metre"
71 " 101.900 Maximum water level metre"
72 " 99.045 Starting water level metre"
73 " 0 Keep Design Data: 1 = True; 0 = False"
74 " Level Discharge Volume"
75 " 99.045 0.000 0.000"
76 " 101.550 0.03422 522.260"
77 " 101.600 0.03457 523.440"
78 " 101.650 0.03492 530.990"
79 " 101.700 0.03526 554.500"
80 " 101.750 0.03560 608.340"
81 " 101.800 0.03594 707.570"
82 " 101.850 0.03627 861.310"
83 " 101.900 0.4998 1060.460"
84 " 1. WEIRS"
85 " Crest Weir Crest Left Right"
86 " elevation coefficient breadth sideslope sideslope"
87 " 101.850 0.900 27.000 0.000 0.000"
88 " 1. ORIFICES"
89 " Orifice Orifice Orifice Number of"
90 " invert coefficient diameter orifices"
91 " 99.045 0.630 0.1000 1.000"
92 " Peak outflow 0.031 c.m/sec"
93 " Maximum level 101.290 metre"
94 " Maximum storage 467.974 c.m"
95 " Centroidal lag 5.666 hours"
96 " 0.499 0.499 0.031 0.000 c.m/sec"
97 " 40 HYDROGRAPH Combine 1"
98 " 6 Combine "
99 " 1 Node #"
100 " Total Site"
101 " Maximum flow 0.031 c.m/sec"
102 " Hydrograph volume 635.525 c.m"
103 " 0.499 0.499 0.031 0.031"
104 " 40 HYDROGRAPH Start - New Tributary"
105 " 2 Start - New Tributary"
106 " 0.499 0.000 0.031 0.031"
107 " 33 CATCHMENT 202"
108 " 1 Triangular SCS"
109 " 1 Equal length"
110 " 1 SCS method"
111 " 202 Uncontrolled Area"
112 " 24.400 % Impervious"
113 " 0.572 Total Area"
114 " 5.000 Flow length"
115 " 20.000 Overland Slope"
116 " 0.432 Pervious Area"
117 " 5.000 Pervious length"
118 " 20.000 Pervious slope"
119 " 0.140 Impervious Area"
120 " 5.000 Impervious length"
121 " 20.000 Impervious slope"
122 " 0.250 Pervious Manning 'n'"
123 " 75.000 Pervious SCS Curve No."
124 " 0.158 Pervious Runoff coefficient"
125 " 0.100 Pervious Ia/S coefficient"
126 " 8.467 Pervious Initial abstraction"
127 " 0.015 Impervious Manning 'n'"
128 " 98.000 Impervious SCS Curve No."
129 " 0.748 Impervious Runoff coefficient"
130 " 0.100 Impervious Ia/S coefficient"
131 " 0.518 Impervious Initial abstraction"
132 " 0.036 0.000 0.031 0.031 c.m/sec"
133 " Catchment 202 Pervious Impervious Total Area "
134 " Surface Area 0.432 0.140 0.572 hectare"
135 " Time of concentration 4.906 0.388 2.175 minutes"
136 " Time to Centroid 109.293 88.965 97.008 minutes"
137 " Rainfall depth 31.880 31.880 31.880 mm"
138 " Rainfall volume 137.86 44.49 182.35 c.m"

```

139	"	Rainfall losses	26.839	8.025	22.248	mm"
140	"	Runoff depth	5.041	23.855	9.632	mm"
141	"	Runoff volume	21.80	33.29	55.09	c.m"
142	"	Runoff coefficient	0.158	0.748	0.302	"
143	"	Maximum flow	0.011	0.031	0.036	c.m/sec"
144	" 40	HYDROGRAPH Add Runoff "				
145	"	4 Add Runoff "				
146	"	0.036 0.036	0.031	0.031"		
147	" 40	HYDROGRAPH Copy to Outflow"				
148	"	8 Copy to Outflow"				
149	"	0.036 0.036	0.036	0.031"		
150	" 40	HYDROGRAPH Combine 1"				
151	"	6 Combine "				
152	"	1 Node #"				
153	"	Total Site"				
154	"	Maximum flow	0.047	c.m/sec"		
155	"	Hydrograph volume	690.617	c.m"		
156	"	0.036 0.036	0.036	0.047"		
157	" 40	HYDROGRAPH Confluence 1"				
158	"	7 Confluence "				
159	"	1 Node #"				
160	"	Total Site"				
161	"	Maximum flow	0.047	c.m/sec"		
162	"	Hydrograph volume	690.617	c.m"		
163	"	0.036 0.047	0.036	0.000"		
164	" 38	START/RE-START TOTALS 1"				
165	"	3 Runoff Totals on EXIT"				
166	"	Total Catchment area	3.233	hectare"		
167	"	Total Impervious area	2.487	hectare"		
168	"	Total % impervious	76.912"			
169	" 19	EXIT"				
170						

```

1 " MIDUSS Output ----->"
2 " MIDUSS version Version 2.25 rev. 473"
3 " MIDUSS created Sunday, February 7, 2010"
4 " 10 Units used: ie METRIC"
5 " Job folder: Q:\65860_001\SWM\2026-03-16"
6 " Output filename: 5 Year Post E.out"
7 " Licensee name: A"
8 " Company "
9 " Date & Time last used: 3/17/2026 at 12:53:39 PM"
10 " 31 TIME PARAMETERS"
11 " 5.000 Time Step"
12 " 180.000 Max. Storm length"
13 " 1500.000 Max. Hydrograph"
14 " 32 STORM Chicago storm"
15 " 1 Chicago storm"
16 " 998.071 Coefficient A"
17 " 6.053 Constant B"
18 " 0.814 Exponent C"
19 " 0.400 Fraction R"
20 " 180.000 Duration"
21 " 1.000 Time step multiplier"
22 " Maximum intensity 141.178 mm/hr"
23 " Total depth 42.540 mm"
24 " 6 005hyd Hydrograph extension used in this file"
25 " 33 CATCHMENT 201"
26 " 1 Triangular SCS"
27 " 1 Equal length"
28 " 1 SCS method"
29 " 201 Controlled Area"
30 " 88.200 % Impervious"
31 " 2.661 Total Area"
32 " 15.000 Flow length"
33 " 1.500 Overland Slope"
34 " 0.314 Pervious Area"
35 " 15.000 Pervious length"
36 " 1.500 Pervious slope"
37 " 2.347 Impervious Area"
38 " 15.000 Impervious length"
39 " 1.500 Impervious slope"
40 " 0.250 Pervious Manning 'n'"
41 " 75.000 Pervious SCS Curve No."
42 " 0.230 Pervious Runoff coefficient"
43 " 0.100 Pervious Ia/S coefficient"
44 " 8.467 Pervious Initial abstraction"
45 " 0.015 Impervious Manning 'n'"
46 " 98.000 Impervious SCS Curve No."
47 " 0.865 Impervious Runoff coefficient"
48 " 0.100 Impervious Ia/S coefficient"
49 " 0.518 Impervious Initial abstraction"
50 " 0.721 0.000 0.000 0.000 c.m/sec"
51 " Catchment 201 Pervious Impervious Total Area "
52 " Surface Area 0.314 2.347 2.661 hectare"
53 " Time of concentration 14.538 1.422 1.872 minutes"
54 " Time to Centroid 118.992 88.963 89.993 minutes"
55 " Rainfall depth 42.540 42.540 42.540 mm"
56 " Rainfall volume 133.58 998.42 1131.99 c.m"
57 " Rainfall losses 32.771 5.759 8.947 mm"
58 " Runoff depth 9.769 36.781 33.593 mm"
59 " Runoff volume 30.68 863.24 893.92 c.m"
60 " Runoff coefficient 0.230 0.865 0.790 "
61 " Maximum flow 0.011 0.719 0.721 c.m/sec"
62 " 40 HYDROGRAPH Add Runoff "
63 " 4 Add Runoff "
64 " 0.721 0.000 0.000"
65 " 54 POND DESIGN"
66 " 0.721 Current peak flow c.m/sec"
67 " 0.249 Target outflow c.m/sec"
68 " 893.9 Hydrograph volume c.m"
69 " 9. Number of stages"
70 " 99.045 Minimum water level metre"
71 " 101.900 Maximum water level metre"
72 " 99.045 Starting water level metre"
73 " 0 Keep Design Data: 1 = True; 0 = False"
74 " Level Discharge Volume"
75 " 99.045 0.000 0.000"
76 " 101.550 0.03422 522.260"
77 " 101.600 0.03457 523.440"
78 " 101.650 0.03492 530.990"
79 " 101.700 0.03526 554.500"
80 " 101.750 0.03560 608.340"
81 " 101.800 0.03594 707.570"
82 " 101.850 0.03627 861.310"
83 " 101.900 0.4998 1060.460"
84 " 1. WEIRS"
85 " Crest Weir Crest Left Right"
86 " elevation coefficient breadth sideslope sideslope"
87 " 101.850 0.900 27.000 0.000 0.000"
88 " 1. ORIFICES"
89 " Orifice Orifice Orifice Number of"
90 " invert coefficient diameter orifices"
91 " 99.045 0.630 0.1000 1.000"
92 " Peak outflow 0.036 c.m/sec"
93 " Maximum level 101.783 metre"
94 " Maximum storage 674.215 c.m"
95 " Centroidal lag 5.897 hours"
96 " 0.721 0.721 0.036 0.000 c.m/sec"
97 " 40 HYDROGRAPH Combine 1"
98 " 6 Combine "
99 " 1 Node #"
100 " Total Site"
101 " Maximum flow 0.036 c.m/sec"
102 " Hydrograph volume 890.242 c.m"
103 " 0.721 0.721 0.036 0.036"
104 " 40 HYDROGRAPH Start - New Tributary"
105 " 2 Start - New Tributary"
106 " 0.721 0.000 0.036 0.036"
107 " 33 CATCHMENT 202"
108 " 1 Triangular SCS"
109 " 1 Equal length"
110 " 1 SCS method"
111 " 202 Uncontrolled Area"
112 " 24.400 % Impervious"
113 " 0.572 Total Area"
114 " 5.000 Flow length"
115 " 20.000 Overland Slope"
116 " 0.432 Pervious Area"
117 " 5.000 Pervious length"
118 " 20.000 Pervious slope"
119 " 0.140 Impervious Area"
120 " 5.000 Impervious length"
121 " 20.000 Impervious slope"
122 " 0.250 Pervious Manning 'n'"
123 " 75.000 Pervious SCS Curve No."
124 " 0.225 Pervious Runoff coefficient"
125 " 0.100 Pervious Ia/S coefficient"
126 " 8.467 Pervious Initial abstraction"
127 " 0.015 Impervious Manning 'n'"
128 " 98.000 Impervious SCS Curve No."
129 " 0.772 Impervious Runoff coefficient"
130 " 0.100 Impervious Ia/S coefficient"
131 " 0.518 Impervious Initial abstraction"
132 " 0.059 0.000 0.036 0.036 c.m/sec"
133 " Catchment 202 Pervious Impervious Total Area "
134 " Surface Area 0.432 0.140 0.572 hectare"
135 " Time of concentration 3.457 0.338 1.817 minutes"
136 " Time to Centroid 104.999 87.691 95.896 minutes"
137 " Rainfall depth 42.540 42.540 42.540 mm"
138 " Rainfall volume 183.96 59.37 243.33 c.m"

```

139	"	Rainfall losses	32.985	9.693	27.302	mm"
140	"	Runoff depth	9.555	32.847	15.238	mm"
141	"	Runoff volume	41.32	45.84	87.16	c.m"
142	"	Runoff coefficient	0.225	0.772	0.358	"
143	"	Maximum flow	0.026	0.044	0.059	c.m/sec"
144	" 40	HYDROGRAPH Add Runoff "				
145	"	4 Add Runoff "				
146	"	0.059 0.059	0.036	0.036"		
147	" 40	HYDROGRAPH Copy to Outflow"				
148	"	8 Copy to Outflow"				
149	"	0.059 0.059	0.059	0.036"		
150	" 40	HYDROGRAPH Combine 1"				
151	"	6 Combine "				
152	"	1 Node #"				
153	"	Total Site"				
154	"	Maximum flow	0.076	c.m/sec"		
155	"	Hydrograph volume	977.407	c.m"		
156	"	0.059 0.059	0.059	0.076"		
157	" 40	HYDROGRAPH Confluence 1"				
158	"	7 Confluence "				
159	"	1 Node #"				
160	"	Total Site"				
161	"	Maximum flow	0.076	c.m/sec"		
162	"	Hydrograph volume	977.407	c.m"		
163	"	0.059 0.076	0.059	0.000"		
164	" 38	START/RE-START TOTALS 1"				
165	"	3 Runoff Totals on EXIT"				
166	"	Total Catchment area	3.233	hectare"		
167	"	Total Impervious area	2.487	hectare"		
168	"	Total % impervious	76.912"			
169	" 19	EXIT"				
170						

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1 " MIDUSS Output ----->"
2 " MIDUSS version Version 2.25 rev. 473"
3 " MIDUSS created Sunday, February 7, 2010"
4 " 10 Units used: ie METRIC"
5 " Job folder: Q:\65860_001\SWM\2026-03-16"
6 " Output filename: 10 Year Post E.out"
7 " Licensee name: A"
8 " Company "
9 " Date & Time last used: 3/17/2026 at 12:54:26 PM"
10 " 31 TIME PARAMETERS"
11 " 5.000 Time Step"
12 " 180.000 Max. Storm length"
13 " 1500.000 Max. Hydrograph"
14 " 32 STORM Chicago storm"
15 " 1 Chicago storm"
16 " 1174.184 Coefficient A"
17 " 6.014 Constant B"
18 " 0.816 Exponent C"
19 " 0.400 Fraction R"
20 " 180.000 Duration"
21 " 1.000 Time step multiplier"
22 " Maximum intensity 165.771 mm/hr"
23 " Total depth 49.535 mm"
24 " 6 010hyd Hydrograph extension used in this file"
25 " 33 CATCHMENT 201"
26 " 1 Triangular SCS"
27 " 1 Equal length"
28 " 1 SCS method"
29 " 201 Controlled Area"
30 " 88.200 % Impervious"
31 " 2.661 Total Area"
32 " 15.000 Flow length"
33 " 1.500 Overland Slope"
34 " 0.314 Pervious Area"
35 " 15.000 Pervious length"
36 " 1.500 Pervious slope"
37 " 2.347 Impervious Area"
38 " 15.000 Impervious length"
39 " 1.500 Impervious slope"
40 " 0.250 Pervious Manning 'n'"
41 " 75.000 Pervious SCS Curve No."
42 " 0.270 Pervious Runoff coefficient"
43 " 0.100 Pervious Ia/S coefficient"
44 " 8.467 Pervious Initial abstraction"
45 " 0.015 Impervious Manning 'n'"
46 " 98.000 Impervious SCS Curve No."
47 " 0.878 Impervious Runoff coefficient"
48 " 0.100 Impervious Ia/S coefficient"
49 " 0.518 Impervious Initial abstraction"
50 " 0.867 0.000 0.000 0.000 c.m/sec"
51 " Catchment 201 Pervious Impervious Total Area "
52 " Surface Area 0.314 2.347 2.661 hectare"
53 " Time of concentration 12.467 1.327 1.767 minutes"
54 " Time to Centroid 115.375 88.388 89.455 minutes"
55 " Rainfall depth 49.535 49.535 49.535 mm"
56 " Rainfall volume 155.54 1162.58 1318.11 c.m"
57 " Rainfall losses 36.150 6.047 9.599 mm"
58 " Runoff depth 13.385 43.487 39.935 mm"
59 " Runoff volume 42.03 1020.65 1062.68 c.m"
60 " Runoff coefficient 0.270 0.878 0.806 "
61 " Maximum flow 0.017 0.863 0.867 c.m/sec"
62 " 40 HYDROGRAPH Add Runoff "
63 " 4 Add Runoff "
64 " 0.867 0.000 0.000"
65 " 54 POND DESIGN"
66 " 0.867 Current peak flow c.m/sec"
67 " 0.249 Target outflow c.m/sec"
68 " 1062.7 Hydrograph volume c.m"
69 " 9. Number of stages"

```

```

70 " 99.045 Minimum water level metre"
71 " 101.900 Maximum water level metre"
72 " 99.045 Starting water level metre"
73 " 0 Keep Design Data: 1 = True; 0 = False"
74 " Level Discharge Volume"
75 " 99.045 0.000 0.000"
76 " 101.550 0.03422 522.260"
77 " 101.600 0.03457 523.440"
78 " 101.650 0.03492 530.990"
79 " 101.700 0.03526 554.500"
80 " 101.750 0.03560 608.340"
81 " 101.800 0.03594 707.570"
82 " 101.850 0.03627 861.310"
83 " 101.900 0.4998 1060.460"
84 " 1. WEIRS"
85 " Crest Weir Crest Left Right"
86 " elevation coefficient breadth sideslope sideslope"
87 " 101.850 0.900 27.000 0.000 0.000"
88 " 1. ORIFICES"
89 " Orifice Orifice Orifice Number of"
90 " invert coefficient diameter orifices"
91 " 99.045 0.630 0.1000 1.000"
92 " Peak outflow 0.036 c.m/sec"
93 " Maximum level 101.838 metre"
94 " Maximum storage 825.161 c.m"
95 " Centroidal lag 6.277 hours"
96 " 0.867 0.867 0.036 0.000 c.m/sec"
97 " 40 HYDROGRAPH Combine 1"
98 " 6 Combine "
99 " 1 Node #"
100 " Total Site"
101 " Maximum flow 0.036 c.m/sec"
102 " Hydrograph volume 1057.730 c.m"
103 " 0.867 0.867 0.036 0.036"
104 " 40 HYDROGRAPH Start - New Tributary"
105 " 2 Start - New Tributary"
106 " 0.867 0.000 0.036 0.036"
107 " 33 CATCHMENT 202"
108 " 1 Triangular SCS"
109 " 1 Equal length"
110 " 1 SCS method"
111 " 202 Uncontrolled Area"
112 " 24.400 % Impervious"
113 " 0.572 Total Area"
114 " 5.000 Flow length"
115 " 20.000 Overland Slope"
116 " 0.432 Pervious Area"
117 " 5.000 Pervious length"
118 " 20.000 Pervious slope"
119 " 0.140 Impervious Area"
120 " 5.000 Impervious length"
121 " 20.000 Impervious slope"
122 " 0.250 Pervious Manning 'n'"
123 " 75.000 Pervious SCS Curve No."
124 " 0.265 Pervious Runoff coefficient"
125 " 0.100 Pervious Ia/S coefficient"
126 " 8.467 Pervious Initial abstraction"
127 " 0.015 Impervious Manning 'n'"
128 " 98.000 Impervious SCS Curve No."
129 " 0.783 Impervious Runoff coefficient"
130 " 0.100 Impervious Ia/S coefficient"
131 " 0.518 Impervious Initial abstraction"
132 " 0.079 0.000 0.036 0.036 c.m/sec"
133 " Catchment 202 Pervious Impervious Total Area "
134 " Surface Area 0.432 0.140 0.572 hectare"
135 " Time of concentration 2.965 0.316 1.671 minutes"
136 " Time to Centroid 102.995 87.068 95.219 minutes"
137 " Rainfall depth 49.535 49.535 49.535 mm"
138 " Rainfall volume 214.20 69.13 283.34 c.m"

```

139	"	Rainfall losses	36.406	10.729	30.141	mm"
140	"	Runoff depth	13.129	38.806	19.394	mm"
141	"	Runoff volume	56.77	54.16	110.93	c.m"
142	"	Runoff coefficient	0.265	0.783	0.392	"
143	"	Maximum flow	0.038	0.052	0.079	c.m/sec"
144	" 40	HYDROGRAPH Add Runoff "				
145	"	4 Add Runoff "				
146	"	0.079 0.079	0.036	0.036"		
147	" 40	HYDROGRAPH Copy to Outflow"				
148	"	8 Copy to Outflow"				
149	"	0.079 0.079	0.079	0.036"		
150	" 40	HYDROGRAPH Combine 1"				
151	"	6 Combine "				
152	"	1 Node #"				
153	"	Total Site"				
154	"	Maximum flow	0.099	c.m/sec"		
155	"	Hydrograph volume	1168.663	c.m"		
156	"	0.079 0.079	0.079	0.099"		
157	" 40	HYDROGRAPH Confluence 1"				
158	"	7 Confluence "				
159	"	1 Node #"				
160	"	Total Site"				
161	"	Maximum flow	0.099	c.m/sec"		
162	"	Hydrograph volume	1168.663	c.m"		
163	"	0.079 0.099	0.079	0.000"		
164	" 38	START/RE-START TOTALS 1"				
165	"	3 Runoff Totals on EXIT"				
166	"	Total Catchment area	3.233	hectare"		
167	"	Total Impervious area	2.487	hectare"		
168	"	Total % impervious	76.912"			
169	" 19	EXIT"				
170						

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1 " MIDUSS Output ----->"
2 " MIDUSS version Version 2.25 rev. 473"
3 " MIDUSS created Sunday, February 7, 2010"
4 " 10 Units used: ie METRIC"
5 " Job folder: Q:\65860_001\SWM\2026-03-16"
6 " Output filename: 25 Year Post E.out"
7 " Licensee name: A"
8 " Company: "
9 " Date & Time last used: 3/17/2026 at 12:55:07 PM"
10 " 31 TIME PARAMETERS"
11 " 5.000 Time Step"
12 " 180.000 Max. Storm length"
13 " 1500.000 Max. Hydrograph"
14 " 32 STORM Chicago storm"
15 " 1 Chicago storm"
16 " 1402.884 Coefficient A"
17 " 6.018 Constant B"
18 " 0.819 Exponent C"
19 " 0.400 Fraction R"
20 " 180.000 Duration"
21 " 1.000 Time step multiplier"
22 " Maximum intensity 196.580 mm/hr"
23 " Total depth 58.261 mm"
24 " 6 025hyd Hydrograph extension used in this file"
25 " 33 CATCHMENT 201"
26 " 1 Triangular SCS"
27 " 1 Equal length"
28 " 1 SCS method"
29 " 201 Controlled Area"
30 " 88.200 % Impervious"
31 " 2.661 Total Area"
32 " 15.000 Flow length"
33 " 1.500 Overland Slope"
34 " 0.314 Pervious Area"
35 " 15.000 Pervious length"
36 " 1.500 Pervious slope"
37 " 2.347 Impervious Area"
38 " 15.000 Impervious length"
39 " 1.500 Impervious slope"
40 " 0.250 Pervious Manning 'n'"
41 " 75.000 Pervious SCS Curve No."
42 " 0.315 Pervious Runoff coefficient"
43 " 0.100 Pervious Ia/S coefficient"
44 " 8.467 Pervious Initial abstraction"
45 " 0.015 Impervious Manning 'n'"
46 " 98.000 Impervious SCS Curve No."
47 " 0.890 Impervious Runoff coefficient"
48 " 0.100 Impervious Ia/S coefficient"
49 " 0.518 Impervious Initial abstraction"
50 " 1.050 0.000 0.000 0.000 c.m/sec"
51 " Catchment 201 Pervious Impervious Total Area "
52 " Surface Area 0.314 2.347 2.661 hectare"
53 " Time of concentration 10.737 1.234 1.664 minutes"
54 " Time to Centroid 112.046 87.777 88.875 minutes"
55 " Rainfall depth 58.261 58.261 58.261 mm"
56 " Rainfall volume 182.94 1367.39 1550.32 c.m"
57 " Rainfall losses 39.896 6.424 10.374 mm"
58 " Runoff depth 18.364 51.837 47.887 mm"
59 " Runoff volume 57.66 1216.61 1274.27 c.m"
60 " Runoff coefficient 0.315 0.890 0.822 "
61 " Maximum flow 0.027 1.043 1.050 c.m/sec"
62 " 40 HYDROGRAPH Add Runoff "
63 " 4 Add Runoff "
64 " 1.050 1.050 0.000 0.000"
65 " 54 POND DESIGN"
66 " 1.050 Current peak flow c.m/sec"
67 " 0.249 Target outflow c.m/sec"
68 " 1274.3 Hydrograph volume c.m"
69 " 9. Number of stages"

```

```

70 " 99.045 Minimum water level metre"
71 " 101.900 Maximum water level metre"
72 " 99.045 Starting water level metre"
73 " 0 Keep Design Data: 1 = True; 0 = False"
74 " Level Discharge Volume"
75 " 99.045 0.000 0.000"
76 " 101.550 0.03422 522.260"
77 " 101.600 0.03457 523.440"
78 " 101.650 0.03492 530.990"
79 " 101.700 0.03526 554.500"
80 " 101.750 0.03560 608.340"
81 " 101.800 0.03594 707.570"
82 " 101.850 0.03627 861.310"
83 " 101.900 0.4998 1060.460"
84 " 1. WEIRS"
85 " Crest Weir Crest Left Right"
86 " elevation coefficient breadth sideslope sideslope"
87 " 101.850 0.900 27.000 0.000 0.000"
88 " 1. ORIFICES"
89 " Orifice Orifice Orifice Number of"
90 " invert coefficient diameter orifices"
91 " 99.045 0.630 0.1000 1.000"
92 " Peak outflow 0.123 c.m/sec"
93 " Maximum level 101.859 metre"
94 " Maximum storage 898.444 c.m"
95 " Centroidal lag 5.817 hours"
96 " 1.050 1.050 0.123 0.000 c.m/sec"
97 " 40 HYDROGRAPH Combine 1"
98 " 6 Combine "
99 " 1 Node #"
100 " Total Site"
101 " Maximum flow 0.123 c.m/sec"
102 " Hydrograph volume 1268.105 c.m"
103 " 1.050 1.050 0.123 0.123"
104 " 40 HYDROGRAPH Start - New Tributary"
105 " 2 Start - New Tributary"
106 " 1.050 0.000 0.123 0.123"
107 " 33 CATCHMENT 202"
108 " 1 Triangular SCS"
109 " 1 Equal length"
110 " 1 SCS method"
111 " 202 Uncontrolled Area"
112 " 24.400 % Impervious"
113 " 0.572 Total Area"
114 " 5.000 Flow length"
115 " 20.000 Overland Slope"
116 " 0.432 Pervious Area"
117 " 5.000 Pervious length"
118 " 20.000 Pervious slope"
119 " 0.140 Impervious Area"
120 " 5.000 Impervious length"
121 " 20.000 Impervious slope"
122 " 0.250 Pervious Manning 'n'"
123 " 75.000 Pervious SCS Curve No."
124 " 0.312 Pervious Runoff coefficient"
125 " 0.100 Pervious Ia/S coefficient"
126 " 8.467 Pervious Initial abstraction"
127 " 0.015 Impervious Manning 'n'"
128 " 98.000 Impervious SCS Curve No."
129 " 0.794 Impervious Runoff coefficient"
130 " 0.100 Impervious Ia/S coefficient"
131 " 0.518 Impervious Initial abstraction"
132 " 0.106 0.000 0.123 0.123 c.m/sec"
133 " Catchment 202 Pervious Impervious Total Area "
134 " Surface Area 0.432 0.140 0.572 hectare"
135 " Time of concentration 2.553 0.293 1.534 minutes"
136 " Time to Centroid 101.079 86.427 94.470 minutes"
137 " Rainfall depth 58.261 58.261 58.261 mm"
138 " Rainfall volume 251.94 81.31 333.25 c.m"

```

139	"	Rainfall losses	40.101	12.026	33.250	mm"
140	"	Runoff depth	18.160	46.235	25.010	mm"
141	"	Runoff volume	78.53	64.53	143.06	c.m"
142	"	Runoff coefficient	0.312	0.794	0.429	"
143	"	Maximum flow	0.054	0.063	0.106	c.m/sec"
144	" 40	HYDROGRAPH Add Runoff "				
145	"	4 Add Runoff "				
146	"	0.106 0.106	0.123	0.123"		
147	" 40	HYDROGRAPH Copy to Outflow"				
148	"	8 Copy to Outflow"				
149	"	0.106 0.106	0.106	0.123"		
150	" 40	HYDROGRAPH Combine 1"				
151	"	6 Combine "				
152	"	1 Node #"				
153	"	Total Site"				
154	"	Maximum flow	0.140	c.m/sec"		
155	"	Hydrograph volume	1411.165	c.m"		
156	"	0.106 0.106	0.106	0.140"		
157	" 40	HYDROGRAPH Confluence 1"				
158	"	7 Confluence "				
159	"	1 Node #"				
160	"	Total Site"				
161	"	Maximum flow	0.140	c.m/sec"		
162	"	Hydrograph volume	1411.165	c.m"		
163	"	0.106 0.140	0.106	0.000"		
164	" 38	START/RE-START TOTALS 1"				
165	"	3 Runoff Totals on EXIT"				
166	"	Total Catchment area	3.233	hectare"		
167	"	Total Impervious area	2.487	hectare"		
168	"	Total % impervious	76.912"			
169	" 19	EXIT"				
170						

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1 " MIDUSS Output ----->"
2 " MIDUSS version Version 2.25 rev. 473"
3 " MIDUSS created Sunday, February 7, 2010"
4 " 10 Units used: ie METRIC"
5 " Job folder: Q:\65860_001\SWM\2026-03-16"
6 " Output filename: 50 Year Post E.out"
7 " Licensee name: A"
8 " Company "
9 " Date & Time last used: 3/17/2026 at 12:55:56 PM"
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11 " 5.000 Time Step"
12 " 180.000 Max. Storm length"
13 " 1500.000 Max. Hydrograph"
14 " 32 STORM Chicago storm"
15 " 1 Chicago storm"
16 " 1569.580 Coefficient A"
17 " 6.014 Constant B"
18 " 0.820 Exponent C"
19 " 0.400 Fraction R"
20 " 180.000 Duration"
21 " 1.000 Time step multiplier"
22 " Maximum intensity 219.477 mm/hr"
23 " Total depth 64.845 mm"
24 " 6 050hyd Hydrograph extension used in this file"
25 " 33 CATCHMENT 201"
26 " 1 Triangular SCS"
27 " 1 Equal length"
28 " 1 SCS method"
29 " 201 Controlled Area"
30 " 88.200 % Impervious"
31 " 2.661 Total Area"
32 " 15.000 Flow length"
33 " 1.500 Overland Slope"
34 " 0.314 Pervious Area"
35 " 15.000 Pervious length"
36 " 1.500 Pervious slope"
37 " 2.347 Impervious Area"
38 " 15.000 Impervious length"
39 " 1.500 Impervious slope"
40 " 0.250 Pervious Manning 'n'"
41 " 75.000 Pervious SCS Curve No."
42 " 0.345 Pervious Runoff coefficient"
43 " 0.100 Pervious Ia/S coefficient"
44 " 8.467 Pervious Initial abstraction"
45 " 0.015 Impervious Manning 'n'"
46 " 98.000 Impervious SCS Curve No."
47 " 0.896 Impervious Runoff coefficient"
48 " 0.100 Impervious Ia/S coefficient"
49 " 0.518 Impervious Initial abstraction"
50 " 1.187 0.000 0.000 0.000 c.m/sec"
51 " Catchment 201 Pervious Impervious Total Area "
52 " Surface Area 0.314 2.347 2.661 hectare"
53 " Time of concentration 9.799 1.178 1.601 minutes"
54 " Time to Centroid 110.213 87.419 88.537 minutes"
55 " Rainfall depth 64.845 64.845 64.845 mm"
56 " Rainfall volume 203.61 1521.92 1725.53 c.m"
57 " Rainfall losses 42.445 6.751 10.963 mm"
58 " Runoff depth 22.401 58.094 53.882 mm"
59 " Runoff volume 70.34 1363.47 1433.81 c.m"
60 " Runoff coefficient 0.345 0.896 0.831 "
61 " Maximum flow 0.035 1.177 1.187 c.m/sec"
62 " 40 HYDROGRAPH Add Runoff "
63 " 4 Add Runoff "
64 " 1.187 1.187 0.000 0.000"
65 " 54 POND DESIGN"
66 " 1.187 Current peak flow c.m/sec"
67 " 0.249 Target outflow c.m/sec"
68 " 1433.8 Hydrograph volume c.m"
69 " 9. Number of stages"

```

```

70 " 99.045 Minimum water level metre"
71 " 101.900 Maximum water level metre"
72 " 99.045 Starting water level metre"
73 " 0 Keep Design Data: 1 = True; 0 = False"
74 " Level Discharge Volume"
75 " 99.045 0.000 0.000"
76 " 101.550 0.03422 522.260"
77 " 101.600 0.03457 523.440"
78 " 101.650 0.03492 530.990"
79 " 101.700 0.03526 554.500"
80 " 101.750 0.03560 608.340"
81 " 101.800 0.03594 707.570"
82 " 101.850 0.03627 861.310"
83 " 101.900 0.4998 1060.460"
84 " 1. WEIRS"
85 " Crest Weir Crest Left Right"
86 " elevation coefficient breadth sideslope sideslope"
87 " 101.850 0.900 27.000 0.000 0.000"
88 " 1. ORIFICES"
89 " Orifice Orifice Orifice Number of"
90 " invert coefficient diameter orifices"
91 " 99.045 0.630 0.1000 1.000"
92 " Peak outflow 0.208 c.m/sec"
93 " Maximum level 101.869 metre"
94 " Maximum storage 935.681 c.m"
95 " Centroidal lag 5.385 hours"
96 " 1.187 1.187 0.208 0.000 c.m/sec"
97 " 40 HYDROGRAPH Combine 1"
98 " 6 Combine "
99 " 1 Node #"
100 " Total Site"
101 " Maximum flow 0.208 c.m/sec"
102 " Hydrograph volume 1425.469 c.m"
103 " 1.187 1.187 0.208 0.208"
104 " 40 HYDROGRAPH Start - New Tributary"
105 " 2 Start - New Tributary"
106 " 1.187 0.000 0.208 0.208"
107 " 33 CATCHMENT 202"
108 " 1 Triangular SCS"
109 " 1 Equal length"
110 " 1 SCS method"
111 " 202 Uncontrolled Area"
112 " 24.400 % Impervious"
113 " 0.572 Total Area"
114 " 5.000 Flow length"
115 " 20.000 Overland Slope"
116 " 0.432 Pervious Area"
117 " 5.000 Pervious length"
118 " 20.000 Pervious slope"
119 " 0.140 Impervious Area"
120 " 5.000 Impervious length"
121 " 20.000 Impervious slope"
122 " 0.250 Pervious Manning 'n'"
123 " 75.000 Pervious SCS Curve No."
124 " 0.343 Pervious Runoff coefficient"
125 " 0.100 Pervious Ia/S coefficient"
126 " 8.467 Pervious Initial abstraction"
127 " 0.015 Impervious Manning 'n'"
128 " 98.000 Impervious SCS Curve No."
129 " 0.799 Impervious Runoff coefficient"
130 " 0.100 Impervious Ia/S coefficient"
131 " 0.518 Impervious Initial abstraction"
132 " 0.129 0.000 0.208 0.208 c.m/sec"
133 " Catchment 202 Pervious Impervious Total Area "
134 " Surface Area 0.432 0.140 0.572 hectare"
135 " Time of concentration 2.330 0.280 1.450 minutes"
136 " Time to Centroid 99.984 86.053 93.998 minutes"
137 " Rainfall depth 64.845 64.845 64.845 mm"
138 " Rainfall volume 280.41 90.50 370.91 c.m"

```

139	"	Rainfall losses	42.636	13.008	35.407	mm"
140	"	Runoff depth	22.210	51.837	29.439	mm"
141	"	Runoff volume	96.04	72.35	168.39	c.m"
142	"	Runoff coefficient	0.343	0.799	0.454	"
143	"	Maximum flow	0.066	0.071	0.129	c.m/sec"
144	" 40	HYDROGRAPH Add Runoff "				
145	"	4 Add Runoff "				
146	"	0.129 0.129	0.208	0.208"		
147	" 40	HYDROGRAPH Copy to Outflow"				
148	"	8 Copy to Outflow"				
149	"	0.129 0.129	0.129	0.208"		
150	" 40	HYDROGRAPH Combine 1"				
151	"	6 Combine "				
152	"	1 Node #"				
153	"	Total Site"				
154	"	Maximum flow	0.231	c.m/sec"		
155	"	Hydrograph volume	1593.858	c.m"		
156	"	0.129 0.129	0.129	0.231"		
157	" 40	HYDROGRAPH Confluence 1"				
158	"	7 Confluence "				
159	"	1 Node #"				
160	"	Total Site"				
161	"	Maximum flow	0.231	c.m/sec"		
162	"	Hydrograph volume	1593.858	c.m"		
163	"	0.129 0.231	0.129	0.000"		
164	" 38	START/RE-START TOTALS 1"				
165	"	3 Runoff Totals on EXIT"				
166	"	Total Catchment area	3.233	hectare"		
167	"	Total Impervious area	2.487	hectare"		
168	"	Total % impervious	76.912"			
169	" 19	EXIT"				
170						

1	"	MIDUSS Output ----->"	70	"	99.045	Minimum water level	metre"			
2	"	MIDUSS version	71	"	101.900	Maximum water level	metre"			
3	"	MIDUSS created	72	"	99.045	Starting water level	metre"			
4	"	10 Units used:	73	"	0	Keep Design Data: 1 = True; 0 = False"				
5	"	Job folder:	74	"		Level Discharge	Volume"			
6	"	Output filename:	75	"	99.045	0.000	0.000"			
7	"	Licensee name:	76	"	101.550	0.03422	522.260"			
8	"	Company:	77	"	101.600	0.03457	523.440"			
9	"	Date & Time last used:	78	"	101.650	0.03492	530.990"			
10	"	3/17/2026 at 12:56:37 PM"	79	"	101.700	0.03526	554.500"			
11	"	5.000 Time Step"	80	"	101.750	0.03560	608.340"			
12	"	180.000 Max. Storm length"	81	"	101.800	0.03594	707.570"			
13	"	1500.000 Max. Hydrograph"	82	"	101.850	0.03627	861.310"			
14	"	32 STORM Chicago storm"	83	"	101.900	0.4998	1060.460"			
15	"	1 Chicago storm"	84	"	1.	WEIRS"				
16	"	1735.688 Coefficient A"	85	"		Crest	Weir	Crest	Left	Right"
17	"	6.014 Constant B"	86	"		elevation	coefficie	breadth	sideslope	sideslope"
18	"	0.820 Exponent C"	87	"		101.850	0.900	27.000	0.000	0.000"
19	"	0.400 Fraction R"	88	"	1.	ORIFICES"				
20	"	180.000 Duration"	89	"		Orifice	Orifice	Orifice	Number of	
21	"	1.000 Time step multiplier"	90	"		invert	coefficie	diameter	orifices"	
22	"	Maximum intensity	91	"		99.045	0.630	0.1000	1.000"	
23	"	Total depth	92	"						
24	"	6 100Hyd Hydrograph extension used in this file"	93	"		Peak outflow		0.306	c.m/sec"	
25	"	33 CATCHMENT 201"	94	"		Maximum level		101.879	metre"	
26	"	1 Triangular SCS"	95	"		Maximum storage		977.205	c.m"	
27	"	1 Equal length"	96	"		Centroidal lag		4.999	hours"	
28	"	1 SCS method"	97	"	40	1.327	1.327	0.306	0.000	c.m/sec"
29	"	201 Controlled Area"	98	"		6	Combine	1"		
30	"	88.200 % Impervious"	99	"		1	Node #"			
31	"	2.661 Total Area"	100	"			Total Site"			
32	"	15.000 Flow length"	101	"			Maximum flow		0.306	c.m/sec"
33	"	1.500 Overland Slope"	102	"			Hydrograph volume		1596.001	c.m"
34	"	0.314 Pervious Area"	103	"			1.327	1.327	0.306	0.306"
35	"	15.000 Pervious length"	104	"	40		HYDROGRAPH Start - New Tributary"			
36	"	1.500 Pervious slope"	105	"		2	Start - New Tributary"			
37	"	2.347 Impervious Area"	106	"			1.327	0.000	0.306	0.306"
38	"	15.000 Impervious length"	107	"	33		CATCHMENT 202"			
39	"	1.500 Impervious slope"	108	"		1	Triangular SCS"			
40	"	0.250 Pervious Manning 'n'"	109	"		1	Equal length"			
41	"	75.000 Pervious SCS Curve No."	110	"		1	SCS method"			
42	"	0.376 Pervious Runoff coefficient"	111	"		202	Uncontrolled Area"			
43	"	0.100 Pervious Ia/S coefficient"	112	"		24.400	% Impervious"			
44	"	8.467 Pervious Initial abstraction"	113	"		0.572	Total Area"			
45	"	0.015 Impervious Manning 'n'"	114	"		5.000	Flow length"			
46	"	98.000 Impervious SCS Curve No."	115	"		20.000	Overland Slope"			
47	"	0.901 Impervious Runoff coefficient"	116	"		0.432	Pervious Area"			
48	"	0.100 Impervious Ia/S coefficient"	117	"		5.000	Pervious length"			
49	"	0.518 Impervious Initial abstraction"	118	"		20.000	Pervious slope"			
50	"	1.327 0.000 0.000 0.000 c.m/sec"	119	"		0.140	Impervious Area"			
51	"	Catchment 201 Pervious Impervious Total Area "	120	"		5.000	Impervious length"			
52	"	Surface Area	121	"		20.000	Impervious slope"			
53	"	Time of concentration	122	"		0.250	Pervious Manning 'n'"			
54	"	Time to Centroid	123	"		75.000	Pervious SCS Curve No."			
55	"	Rainfall depth	124	"		0.372	Pervious Runoff coefficient"			
56	"	Rainfall volume	125	"		0.100	Pervious Ia/S coefficient"			
57	"	Rainfall losses	126	"		8.467	Pervious Initial abstraction"			
58	"	Runoff depth	127	"		0.015	Impervious Manning 'n'"			
59	"	Runoff volume	128	"		98.000	Impervious SCS Curve No."			
60	"	Runoff coefficient	129	"		0.805	Impervious Runoff coefficient"			
61	"	Maximum flow	130	"		0.100	Impervious Ia/S coefficient"			
62	"	40 HYDROGRAPH Add Runoff "	131	"		0.518	Impervious Initial abstraction"			
63	"	4 Add Runoff "	132	"			0.153	0.000	0.306	0.306 c.m/sec"
64	"	1.327 1.327 0.000 0.000"	133	"			Catchment 202	Pervious	Impervious	Total Area "
65	"	54 POND DESIGN"	134	"			Surface Area	0.432	0.140	0.572 hectare"
66	"	1.327 Current peak flow c.m/sec"	135	"			Time of concentration	2.149	0.269	1.376 minutes"
67	"	0.249 Target outflow c.m/sec"	136	"			Time to Centroid	99.066	85.747	93.591 minutes"
68	"	1601.2 Hydrograph volume c.m"	137	"			Rainfall depth	71.708	71.708	71.708 mm"
69	"	9. Number of stages"	138	"			Rainfall volume	310.09	100.08	410.17 c.m"

139	"	Rainfall losses	45.028	14.014	37.460	mm"
140	"	Runoff depth	26.680	57.693	34.247	mm"
141	"	Runoff volume	115.37	80.52	195.89	c.m"
142	"	Runoff coefficient	0.372	0.805	0.478	"
143	"	Maximum flow	0.078	0.079	0.153	c.m/sec"
144	" 40	HYDROGRAPH Add Runoff "				
145	"	4 Add Runoff "				
146	"	0.153 0.153	0.306	0.306"		
147	" 40	HYDROGRAPH Copy to Outflow"				
148	"	8 Copy to Outflow"				
149	"	0.153 0.153	0.153	0.306"		
150	" 40	HYDROGRAPH Combine 1"				
151	"	6 Combine "				
152	"	1 Node #"				
153	"	Total Site"				
154	"	Maximum flow	0.344	c.m/sec"		
155	"	Hydrograph volume	1791.895	c.m"		
156	"	0.153 0.153	0.153	0.344"		
157	" 40	HYDROGRAPH Confluence 1"				
158	"	7 Confluence "				
159	"	1 Node #"				
160	"	Total Site"				
161	"	Maximum flow	0.344	c.m/sec"		
162	"	Hydrograph volume	1791.895	c.m"		
163	"	0.153 0.344	0.153	0.000"		
164	" 38	START/RE-START TOTALS 1"				
165	"	3 Runoff Totals on EXIT"				
166	"	Total Catchment area	3.233	hectare"		
167	"	Total Impervious area	2.487	hectare"		
168	"	Total % impervious	76.912"			
169	" 19	EXIT"				
170						

```

1 " MIDUSS Output ----->"
2 " MIDUSS version Version 2.25 rev. 473"
3 " MIDUSS created Sunday, February 7, 2010"
4 " 10 Units used: ie METRIC"
5 " Job folder: Q:\65860_001\SWM\2026-03-16"
6 " Output filename: 100 Year Post E + 20%.out"
7 " Licensee name: A"
8 " Company "
9 " Date & Time last used: 3/17/2026 at 12:48:38 PM"
10 " 31 TIME PARAMETERS"
11 " 5.000 Time Step"
12 " 180.000 Max. Storm length"
13 " 1500.000 Max. Hydrograph"
14 " 32 STORM Chicago storm"
15 " 1 Chicago storm"
16 " 2082.820 Coefficient A"
17 " 5.890 Constant B"
18 " 0.824 Exponent C"
19 " 0.400 Fraction R"
20 " 180.000 Duration"
21 " 1.000 Time step multiplier"
22 " Maximum intensity 291.166 mm/hr"
23 " Total depth 84.315 mm"
24 " 8 10020hyd Hydrograph extension used in this file"
25 " 33 CATCHMENT 201"
26 " 1 Triangular SCS"
27 " 1 Equal length"
28 " 1 SCS method"
29 " 201 Controlled Area"
30 " 88.200 % Impervious"
31 " 2.661 Total Area"
32 " 15.000 Flow length"
33 " 1.500 Overland Slope"
34 " 0.314 Pervious Area"
35 " 15.000 Pervious length"
36 " 1.500 Pervious slope"
37 " 2.347 Impervious Area"
38 " 15.000 Impervious length"
39 " 1.500 Impervious slope"
40 " 0.250 Pervious Manning 'n'"
41 " 75.000 Pervious SCS Curve No."
42 " 0.423 Pervious Runoff coefficient"
43 " 0.100 Pervious Ia/S coefficient"
44 " 8.467 Pervious Initial abstraction"
45 " 0.015 Impervious Manning 'n'"
46 " 98.000 Impervious SCS Curve No."
47 " 0.907 Impervious Runoff coefficient"
48 " 0.100 Impervious Ia/S coefficient"
49 " 0.518 Impervious Initial abstraction"
50 " 1.608 0.000 0.000 0.000 c.m/sec"
51 " Catchment 201 Pervious Impervious Total Area "
52 " Surface Area 0.314 2.347 2.661 hectare"
53 " Time of concentration 7.922 1.048 1.452 minutes"
54 " Time to Centroid 106.134 86.520 87.672 minutes"
55 " Rainfall depth 84.315 84.315 84.315 mm"
56 " Rainfall volume 264.75 1978.88 2243.63 c.m"
57 " Rainfall losses 48.637 7.837 12.651 mm"
58 " Runoff depth 35.678 76.478 71.664 mm"
59 " Runoff volume 112.03 1794.95 1906.98 c.m"
60 " Runoff coefficient 0.423 0.907 0.850 "
61 " Maximum flow 0.069 1.591 1.608 c.m/sec"
62 " 40 HYDROGRAPH Add Runoff "
63 " 4 Add Runoff "
64 " 1.608 1.608 0.000 0.000"
65 " 54 POND DESIGN"
66 " 1.608 Current peak flow c.m/sec"
67 " 0.249 Target outflow c.m/sec"
68 " 1907.0 Hydrograph volume c.m"
69 " 9. Number of stages"

```

```

70 " 99.045 Minimum water level metre"
71 " 101.900 Maximum water level metre"
72 " 99.045 Starting water level metre"
73 " 0 Keep Design Data: 1 = True; 0 = False"
74 " Level Discharge Volume"
75 " 99.045 0.000 0.000"
76 " 101.550 0.03422 522.260"
77 " 101.600 0.03457 523.440"
78 " 101.650 0.03492 530.990"
79 " 101.700 0.03526 554.500"
80 " 101.750 0.03560 608.340"
81 " 101.800 0.03594 707.570"
82 " 101.850 0.03627 861.310"
83 " 101.900 0.4998 1060.460"
84 " 1. WEIRS"
85 " Crest Weir Crest Left Right"
86 " elevation coefficient breadth sideslope sideslope"
87 " 101.850 0.900 27.000 0.000 0.000"
88 " 1. ORIFICES"
89 " Orifice Orifice Orifice Number of"
90 " invert coefficient diameter orifices"
91 " 99.045 0.630 0.1000 1.000"
92 " Peak outflow 0.493 c.m/sec"
93 " Maximum level 101.899 metre"
94 " Maximum storage 1057.712 c.m"
95 " Centroidal lag 4.453 hours"
96 " 1.608 1.608 0.493 0.000 c.m/sec"
97 " 40 HYDROGRAPH Combine 1"
98 " 6 Combine "
99 " 1 Node #"
100 " Total Site"
101 " Maximum flow 0.493 c.m/sec"
102 " Hydrograph volume 1909.670 c.m"
103 " 1.608 1.608 0.493 0.493"
104 " 40 HYDROGRAPH Start - New Tributary"
105 " 2 Start - New Tributary"
106 " 1.608 0.000 0.493 0.493"
107 " 33 CATCHMENT 202"
108 " 1 Triangular SCS"
109 " 1 Equal length"
110 " 1 SCS method"
111 " 202 Uncontrolled Area"
112 " 24.400 % Impervious"
113 " 0.572 Total Area"
114 " 5.000 Flow length"
115 " 20.000 Overland Slope"
116 " 0.432 Pervious Area"
117 " 5.000 Pervious length"
118 " 20.000 Pervious slope"
119 " 0.140 Impervious Area"
120 " 5.000 Impervious length"
121 " 20.000 Impervious slope"
122 " 0.250 Pervious Manning 'n'"
123 " 75.000 Pervious SCS Curve No."
124 " 0.419 Pervious Runoff coefficient"
125 " 0.100 Pervious Ia/S coefficient"
126 " 8.467 Pervious Initial abstraction"
127 " 0.015 Impervious Manning 'n'"
128 " 98.000 Impervious SCS Curve No."
129 " 0.812 Impervious Runoff coefficient"
130 " 0.100 Impervious Ia/S coefficient"
131 " 0.518 Impervious Initial abstraction"
132 " 0.205 0.000 0.493 0.493 c.m/sec"
133 " Catchment 202 Pervious Impervious Total Area "
134 " Surface Area 0.432 0.140 0.572 hectare"
135 " Time of concentration 1.884 0.249 1.255 minutes"
136 " Time to Centroid 97.481 85.150 92.734 minutes"
137 " Rainfall depth 84.315 84.315 84.315 mm"
138 " Rainfall volume 364.61 117.68 482.28 c.m"

```

139	"	Rainfall losses	49.029	15.873	40.939	mm"
140	"	Runoff depth	35.287	68.442	43.376	mm"
141	"	Runoff volume	152.59	95.52	248.11	c.m"
142	"	Runoff coefficient	0.419	0.812	0.514	"
143	"	Maximum flow	0.109	0.096	0.205	c.m/sec"
144	" 40	HYDROGRAPH Add Runoff "				
145	"	4 Add Runoff "				
146	"	0.205 0.205	0.493	0.493"		
147	" 40	HYDROGRAPH Copy to Outflow"				
148	"	8 Copy to Outflow"				
149	"	0.205 0.205	0.205	0.493"		
150	" 40	HYDROGRAPH Combine 1"				
151	"	6 Combine "				
152	"	1 Node #"				
153	"	Total Site"				
154	"	Maximum flow	0.570	c.m/sec"		
155	"	Hydrograph volume	2157.784	c.m"		
156	"	0.205 0.205	0.205	0.570"		
157	" 40	HYDROGRAPH Confluence 1"				
158	"	7 Confluence "				
159	"	1 Node #"				
160	"	Total Site"				
161	"	Maximum flow	0.570	c.m/sec"		
162	"	Hydrograph volume	2157.784	c.m"		
163	"	0.205 0.570	0.205	0.000"		
164	" 38	START/RE-START TOTALS 1"				
165	"	3 Runoff Totals on EXIT"				
166	"	Total Catchment area	3.233	hectare"		
167	"	Total Impervious area	2.487	hectare"		
168	"	Total % impervious	76.912"			
169	" 19	EXIT"				
170						

Appendix E

OGS Sizing Report

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

03/20/2026

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

Project Name:	Huntmar
Project Number:	70345
Designer Name:	Dain Na
Designer Company:	MTE Consultants Inc.
Designer Email:	dna@mte85.com
Designer Phone:	519-743-6500
EOR Name:	
EOR Company:	
EOR Email:	
EOR Phone:	

Site Name:

Drainage Area (ha): 2.661

% Imperviousness: 88.20

Runoff Coefficient 'c': 0.82

Particle Size Distribution: Fine

Target TSS Removal (%): 80.0

Required Water Quality Runoff Volume Capture (%):	90.00
Estimated Water Quality Flow Rate (L/s):	71.22
Oil / Fuel Spill Risk Site?	Yes
Upstream Flow Control?	No
Peak Conveyance (maximum) Flow Rate (L/s):	
Influent TSS Concentration (mg/L):	
Estimated Average Annual Sediment Volume (L/yr):	2129

Net Annual Sediment (TSS) Load Reduction Sizing Summary	
Stormceptor Model	TSS Removal Provided (%)
EFO4	56
EFO5	65
EFO6	72
EFO8	82
EFO10	87
EFO12	91

Recommended Stormceptor EFO Model: EFO8
Estimated Net Annual Sediment (TSS) Load Reduction (%): 82
Water Quality Runoff Volume Capture (%): > 90



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.

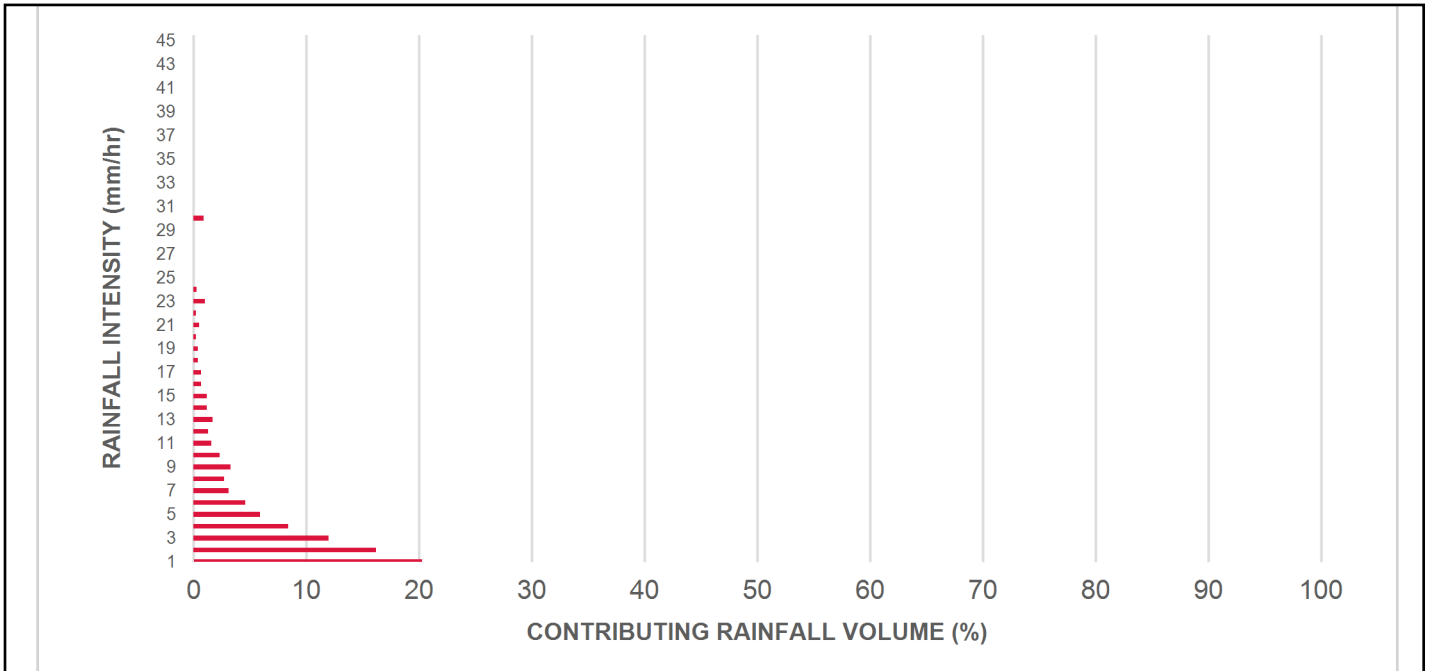
Particle Size (µm)	Percent Less Than	Particle Size Fraction (µm)	Percent
1000	100	500-1000	5
500	95	250-500	5
250	90	150-250	15
150	75	100-150	15
100	60	75-100	10
75	50	50-75	5
50	45	20-50	10
20	35	8-20	15
8	20	5-8	10
5	10	2-5	5
2	5	<2	5

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	3.07	184.0	39.0	100	8.6	8.6
1.00	20.3	29.0	6.13	368.0	78.0	100	20.3	29.0
2.00	16.2	45.2	12.27	736.0	157.0	89	14.5	43.5
3.00	12.0	57.2	18.40	1104.0	235.0	82	9.8	53.3
4.00	8.4	65.6	24.54	1472.0	313.0	78	6.6	59.9
5.00	5.9	71.6	30.67	1840.0	392.0	74	4.4	64.3
6.00	4.6	76.2	36.80	2208.0	470.0	71	3.3	67.6
7.00	3.1	79.3	42.94	2576.0	548.0	67	2.1	69.6
8.00	2.7	82.0	49.07	2944.0	626.0	64	1.8	71.4
9.00	3.3	85.3	55.21	3312.0	705.0	64	2.1	73.5
10.00	2.3	87.6	61.34	3680.0	783.0	63	1.5	75.0
11.00	1.6	89.2	67.47	4048.0	861.0	63	1.0	75.9
12.00	1.3	90.5	73.61	4417.0	940.0	62	0.8	76.8
13.00	1.7	92.2	79.74	4785.0	1018.0	61	1.1	77.8
14.00	1.2	93.5	85.88	5153.0	1096.0	59	0.7	78.5
15.00	1.2	94.6	92.01	5521.0	1175.0	58	0.7	79.2
16.00	0.7	95.3	98.15	5889.0	1253.0	56	0.4	79.6
17.00	0.7	96.1	104.28	6257.0	1331.0	54	0.4	80.0
18.00	0.4	96.5	110.41	6625.0	1410.0	52	0.2	80.2
19.00	0.4	96.9	116.55	6993.0	1488.0	49	0.2	80.4
20.00	0.2	97.1	122.68	7361.0	1566.0	47	0.1	80.5
21.00	0.5	97.5	128.82	7729.0	1644.0	45	0.2	80.7
22.00	0.2	97.8	134.95	8097.0	1723.0	43	0.1	80.8
23.00	1.0	98.8	141.08	8465.0	1801.0	41	0.4	81.2
24.00	0.3	99.1	147.22	8833.0	1879.0	39	0.1	81.3
25.00	0.0	99.1	153.35	9201.0	1958.0	38	0.0	81.3
30.00	0.9	100.0	184.02	11041.0	2349.0	31	0.3	81.6
35.00	0.0	100.0	214.69	12882.0	2741.0	27	0.0	81.6
40.00	0.0	100.0	245.36	14722.0	3132.0	24	0.0	81.6
45.00	0.0	100.0	276.03	16562.0	3524.0	21	0.0	81.6
Estimated Net Annual Sediment (TSS) Load Reduction =								82 %

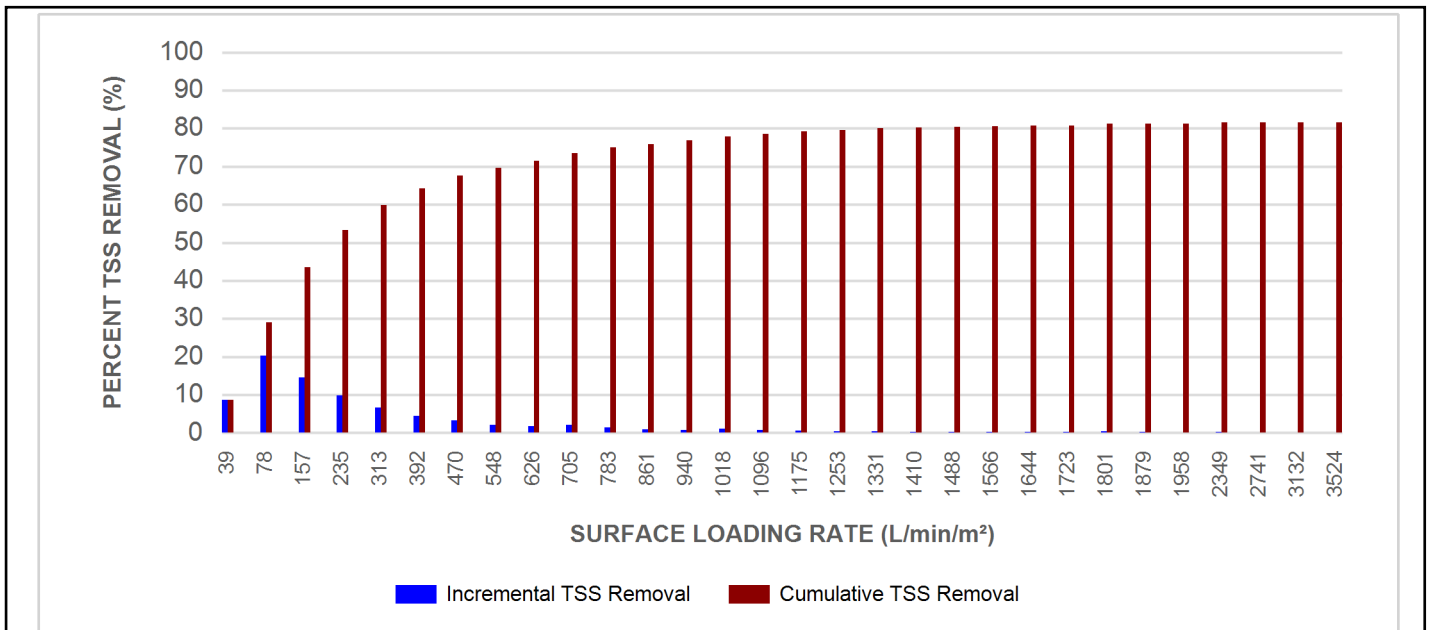
Climate Station ID: 6105978 Years of Rainfall Data: 20



RAINFALL DATA FROM OTTAWA CDA RCS RAINFALL STATION



INCREMENTAL AND CUMULATIVE TSS REMOVAL FOR THE RECOMMENDED STORMCEPTOR® MODEL



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
EF5 / EFO5	1.5	5	90	762	30	762	30	710	25
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

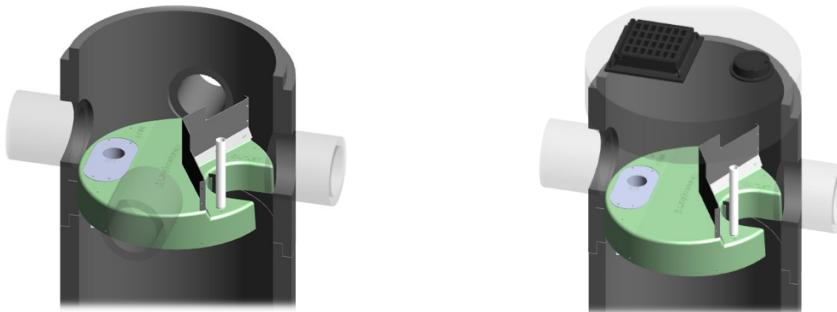
► Stormceptor® EF and EFO feature an internal bypass and superior scour prevention technology that have been demonstrated in third-party testing according to the scour testing provisions of the Canadian ETV Procedure for Laboratory Testing of Oil-Grit Separators, and the exceptional scour test performance 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.

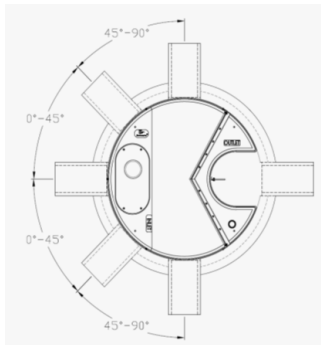
DESIGN FLEXIBILITY

► 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.





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)	(ft³)	(kg)	(lb)
EF4 / EFO4	1.2	4	1.52	5.0	265	70	203	8	1190	42	1904	5250
EF5 / EFO5	1.5	5	1.62	5.3	420	111	305	10	2124	75	2612	5758
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/ft³)

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>

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
	5 ft (1524 mm) Diameter OGS Units:	1.95 m ³ sediment / 420 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/m² to 1400 L/min/m², 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/m² and 1400 L/min/m² 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/m² shall be assumed to be identical to the sediment removal efficiency at 40 L/min/m². No extrapolation shall be allowed that results in a sediment removal efficiency that is greater than that demonstrated at 40 L/min/m².

3.2.4 Sediment removal efficiency for surface loading rates greater than the highest tested surface loading rate of 1400 L/min/m² shall assume zero sediment removal for the portion of flow that exceeds 1400 L/min/m², and shall be calculated using a simple proportioning formula, with 1400 L/min/m² 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/m².

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/m².

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/m² to 2600 L/min/m²) 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.

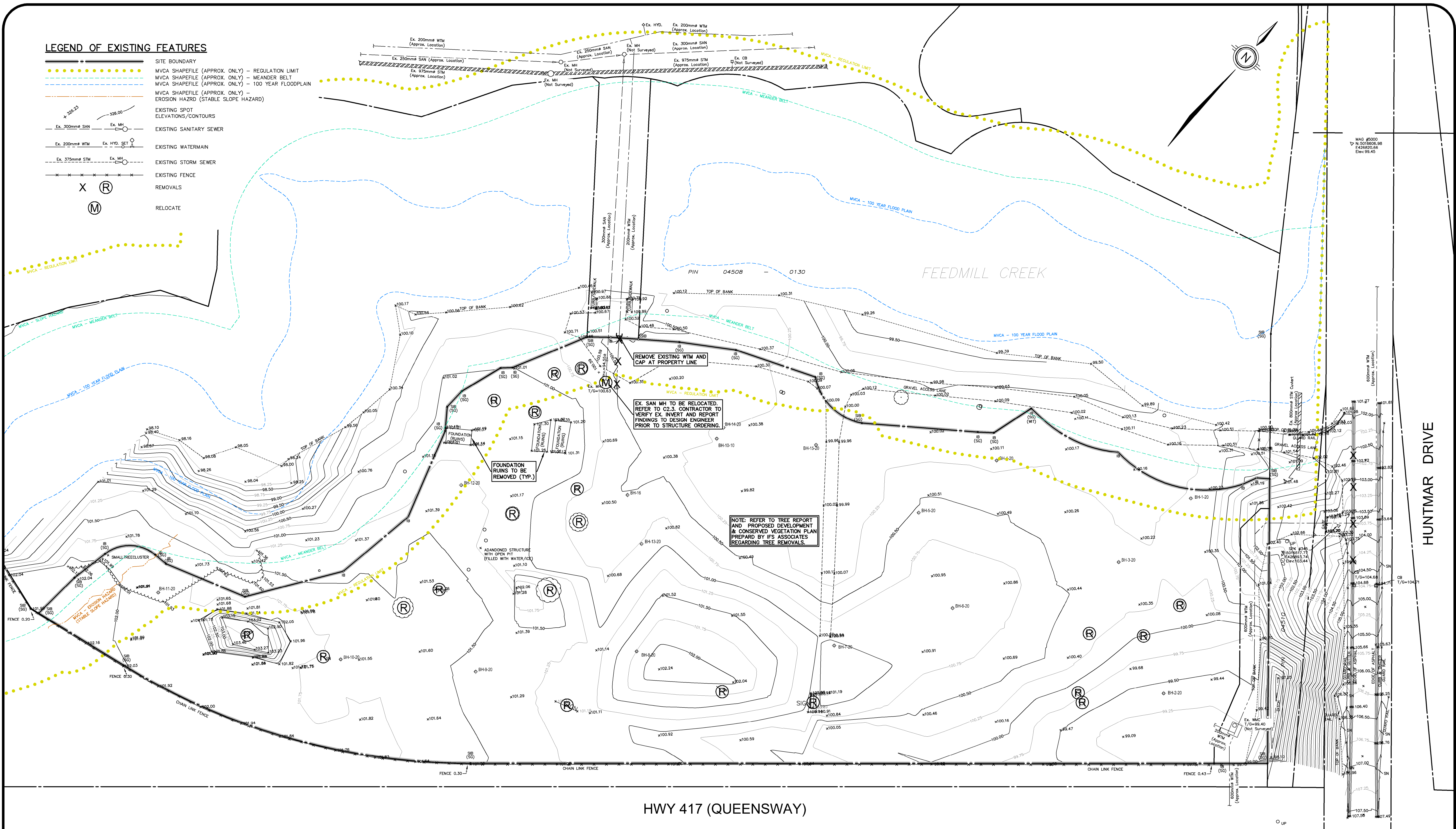
Appendix F

Engineering Drawings

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LEGEND OF EXISTING FEATURES

- SITE BOUNDARY
- MVCA SHAPEFILE (APPROX. ONLY) - REGULATION LIMIT
- MVCA SHAPEFILE (APPROX. ONLY) - MEANDER BELT
- MVCA SHAPEFILE (APPROX. ONLY) - 100 YEAR FLOODPLAIN
- MVCA SHAPEFILE (APPROX. ONLY) - EROSION HAZRD (STABLE SLOPE HAZARD)
- EXISTING SPOT ELEVATIONS/CONTOURS
- EXISTING SANITARY SEWER
- EXISTING WATERMAIN
- EXISTING STORM SEWER
- EXISTING FENCE
- REMOVALS
- RELOCATE



MAG #6000
N 5016006.98
E 42620.66
Elev. 95.45

HUNTMAR DRIVE

HWY 417 (QUEENSWAY)

NOTE:

- PROPERTY LINE IS APPROXIMATE ONLY AND SHOULD NOT BE USED FOR DETERMINING SETBACKS OR LAYOUT.
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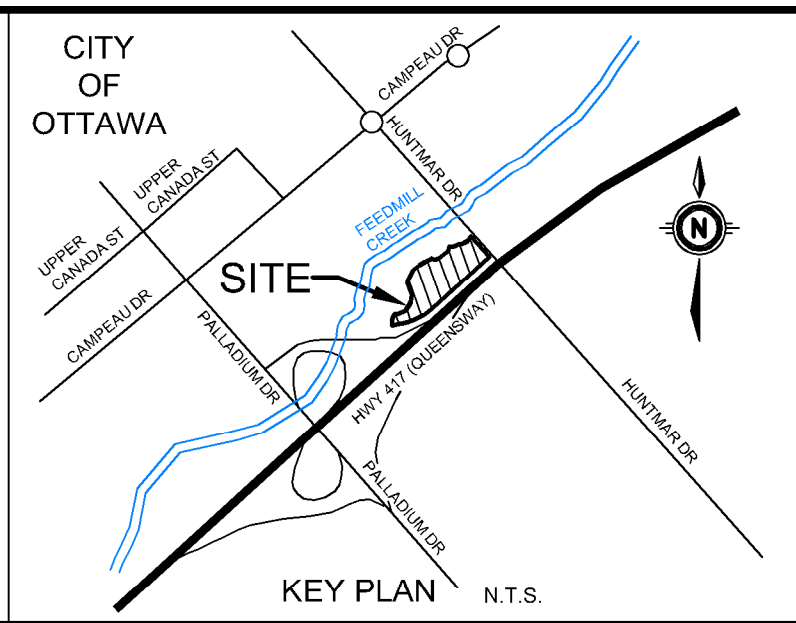
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2.			
1.	ISSUED FOR SITE PLAN CONTROL	AXS	2026-04-01
No.	REVISION	BY	YYYY-MM-DD



GEODETIC BM	ELEV. =	m
REFER TO SURVEY COMPLETED BY STANTEC, DATED JANUARY 23, 2026		
SITE BENCHMARK	ELEV. =	m
SEE ABOVE		

CLIENT
IRONCLAD DEVELOPMENTS

101-57158 SYMINGTON RD 20E
SPRINGFIELD, MB

319 HUNTMAR DRIVE
STITTSVILLE, ON

REMOVALS PLAN

Design By	DXN/LEI	Project Manager	A. SAWATSKY
Checked By	DAC	Project No.	65860_001
Date (yyyy-mm-dd)	2026-02-12	Drawing No.	C1.1
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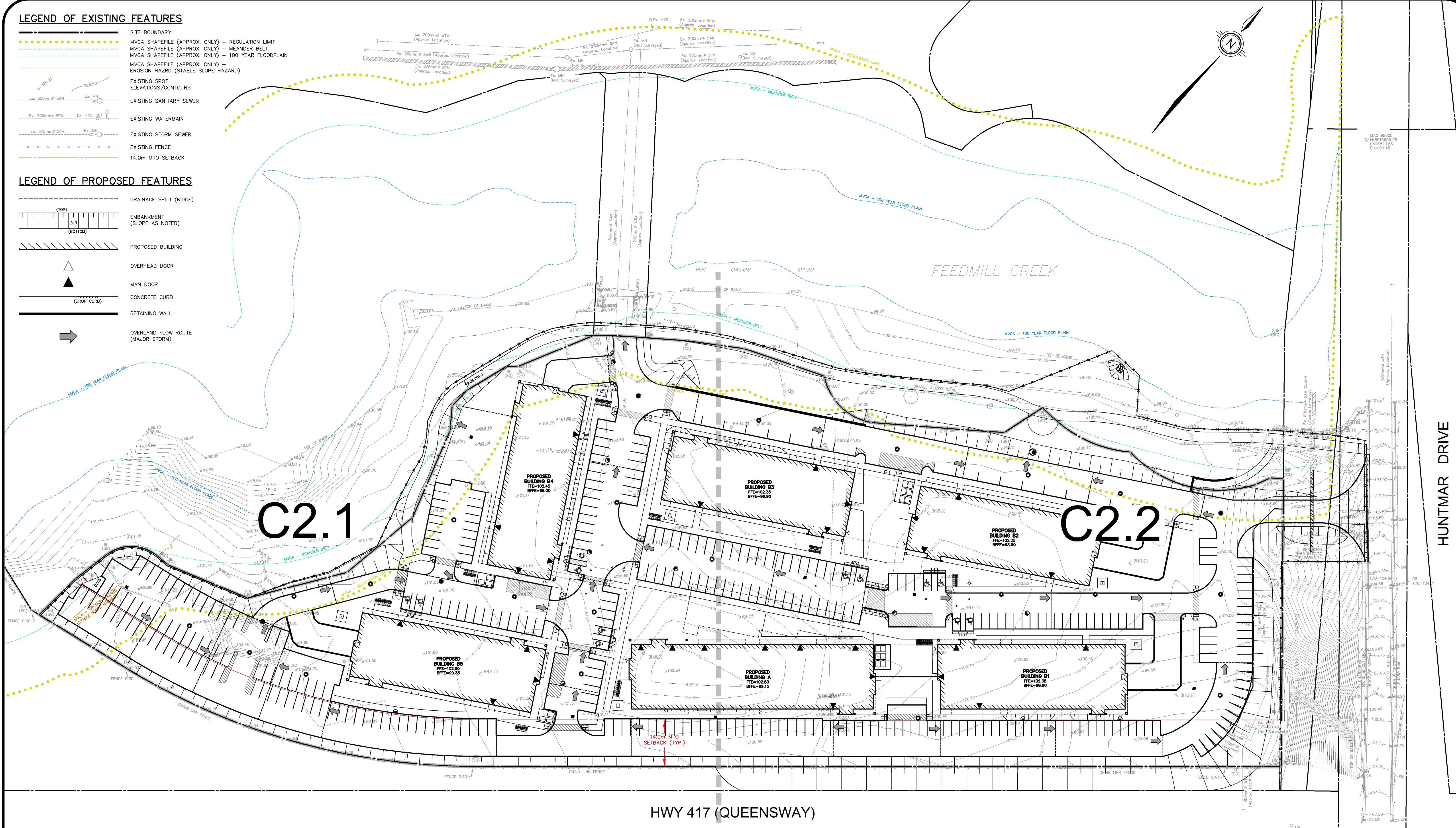
April 1, 2026 4:22:02 PM - Plotted By: Gemma Cabral-Guadalupe

LEGEND OF EXISTING FEATURES

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- MVCA SHAPEFILE (APPROX. ONLY) - 100 YEAR FLOODPLAIN
- MVCA SHAPEFILE (APPROX. ONLY) - EROSION HAZRD (STABLE SLOPE HAZARD)
- EXISTING SPOT ELEVATIONS/CONTOURS
- EXISTING SANITARY SEWER
- EXISTING WATERMAIN
- EXISTING STORM SEWER
- EXISTING FENCE
- 14.0m MTO SETBACK

LEGEND OF PROPOSED FEATURES

- DRAINAGE SPLIT (RIDGE)
- EMBANKMENT (SLOPE AS NOTED)
- PROPOSED BUILDING
- OVERHEAD DOOR
- MAN DOOR
- CONCRETE CURB
- RETAINING WALL
- OVERLAND FLOW ROUTE (MAJOR STORM)



HUNTMAR DRIVE

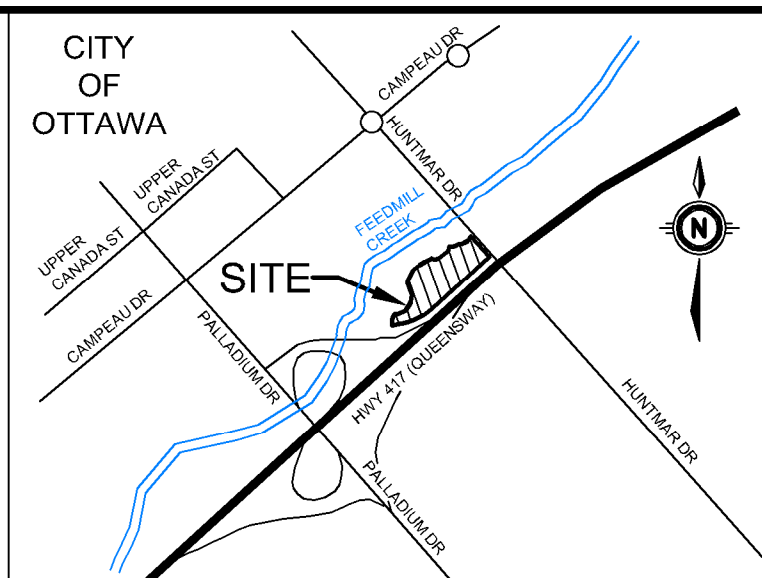
C2.1

C2.2

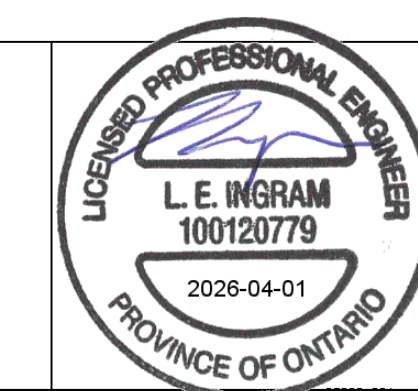
HWY 417 (QUEENSWAY)

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2.	1. ISSUED FOR SITE PLAN CONTROL	AXS	2026-04-01
No.	REVISION	BY	YYYY-MM-DD



GEODETC BM	ELEV. =	m	CLIENT
REFER TO SURVEY COMPLETED BY STANTEC, DATED JANUARY 23, 2026			IRONCLAD DEVELOPMENTS
SITE BENCHMARK	ELEV. =	m	101-57158 SYMINGTON RD 20E SPRINGFIELD, MB
SEE ABOVE			319 HUNTMAR DRIVE STITTSVILLE, ON

KEY PLAN

MTE
 Engineers, Scientists, Surveyors.

Design By	DXN/LEI	Project Manager	A. SAWATSKY
Drawn By	DAC	Project No.	65860_001
Checked By	DXN/LEI	Drawing No.	C2.0
Date (yyyy-mm-dd)	2026-02-12		Sheet 2 of 8
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LEGEND OF EXISTING FEATURES

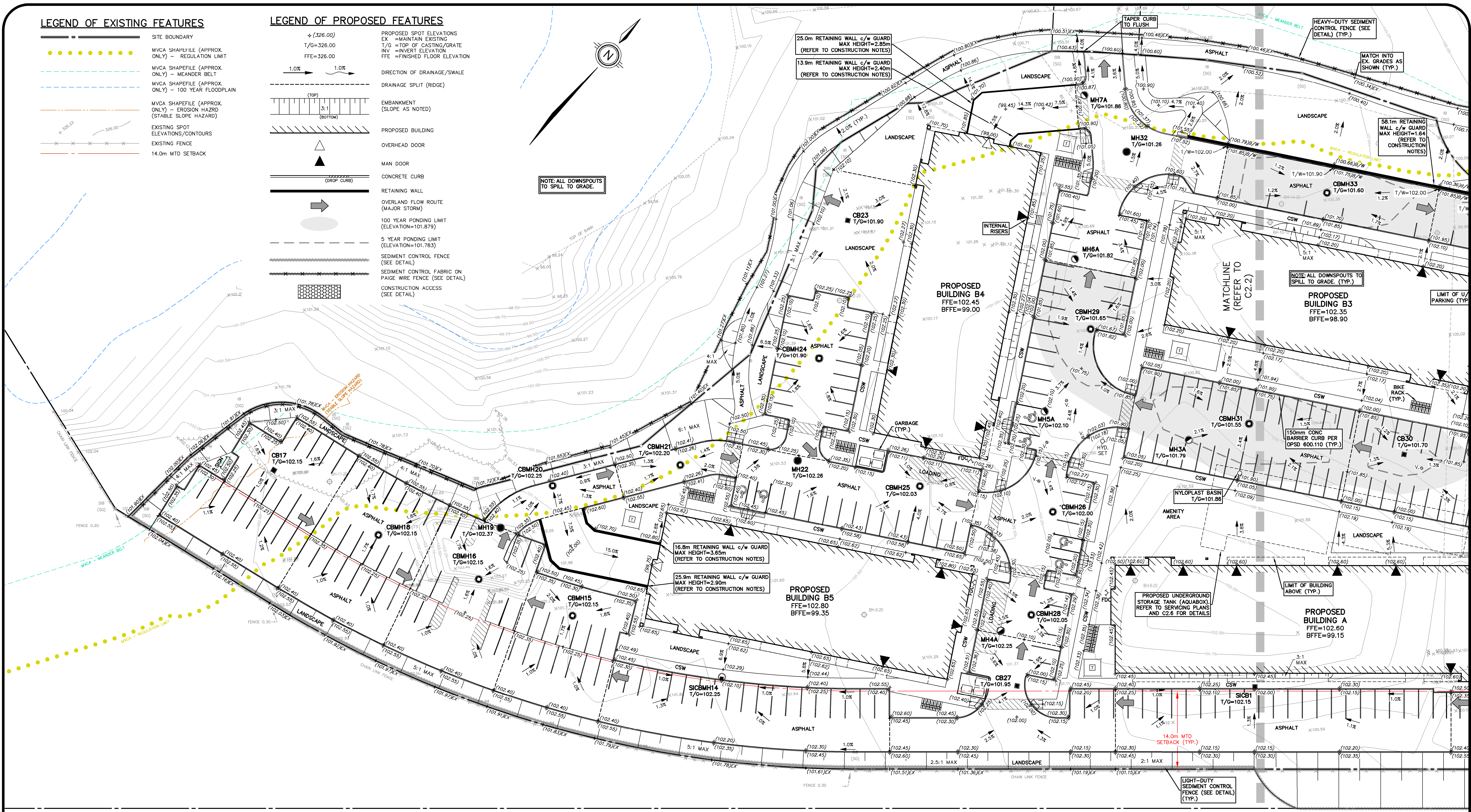
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- MVCA SHAPEFILE (APPROX. ONLY) - MEANDER BELT
- MVCA SHAPEFILE (APPROX. ONLY) - EROSION HAZARD (STABLE SLOPE HAZARD)
- EXISTING SPOT ELEVATIONS/CONTOURS
- EXISTING FENCE
- 14.0m MTO SETBACK

LEGEND OF PROPOSED FEATURES

- (+326.00) T/G=326.00 FFE=326.00
- DIRECTION OF DRAINAGE/SWALE
- DRAINAGE SPLIT (RIDGE)
- EMBANKMENT (SLOPE AS NOTED)
- PROPOSED BUILDING
- OVERHEAD DOOR
- MAN DOOR
- CONCRETE CURB
- RETAINING WALL
- OVERLAND FLOW ROUTE (MAJOR STORM)
- 100 YEAR PONDING LIMIT (ELEVATION=101.879)
- 5 YEAR PONDING LIMIT (ELEVATION=101.783)
- SEDIMENT CONTROL FENCE (SEE DETAIL)
- SEDIMENT CONTROL FABRIC ON PAIGE WIRE FENCE (SEE DETAIL)
- CONSTRUCTION ACCESS (SEE DETAIL)

NOTE: ALL DOWNSPOUTS TO SPILL TO GRADE.

NOTE: ALL DOWNSPOUTS TO SPILL TO GRADE (TYP.)



HWY 417 (QUEENSWAY)

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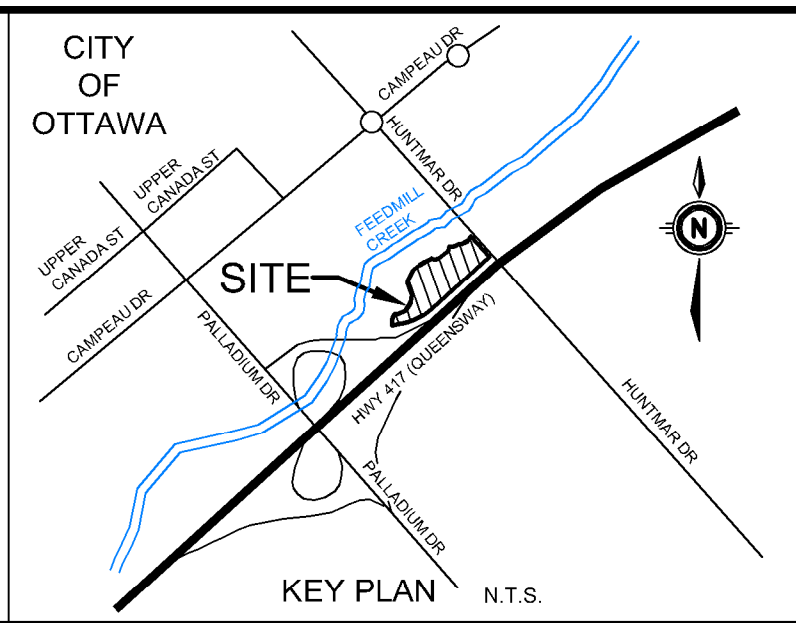
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No.	REVISION	BY	YYYY-MM-DD



GEODETC BM	ELEV. =	m
REFER TO SURVEY COMPLETED BY STANTEC, DATED JANUARY 23, 2026		
SITE BENCHMARK	ELEV. =	m
SEE ABOVE		

CLIENT
IRONCLAD DEVELOPMENTS
101-57158 SYMINGTON RD 20E
SPRINGFIELD, MB

319 HUNTMAR DRIVE
STITTSVILLE, ON

PRELIMINARY SITE GRADING AND E&SC PLAN 1

Design By: DXN/LEI
Checked By: DAC
Date: 2026-02-12

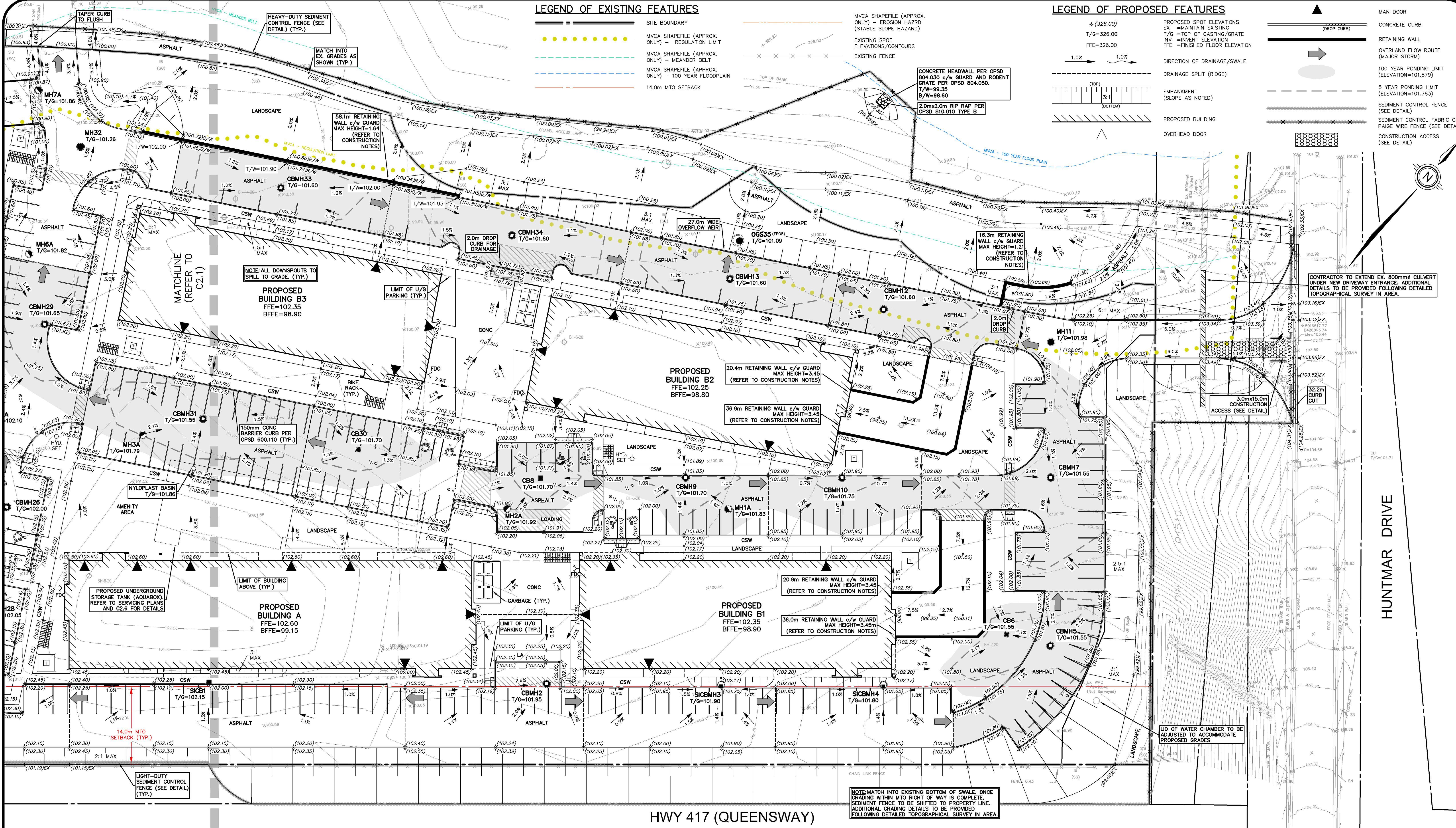
Project Manager: A. SAWATSKY
Project No.: 65860_001
Drawing No.: C2.1

Scale: 1:300
Sheet 3 of 8

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MTE File Path: P:\165860_01\165860_001-C2



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- 14.0m MTO SETBACK
- MVCA SHAPEFILE (APPROX. ONLY) - EROSION HAZARD (STABLE SLOPE HAZARD)
- EXISTING SPOT ELEVATIONS/CONTOURS
- EXISTING FENCE

LEGEND OF PROPOSED FEATURES

- PROPOSED SPOT ELEVATIONS
 - EX = MAINTAIN EXISTING
 - T/G = TOP OF CASTING/GRATE
 - INV = INVERT ELEVATION
 - FFE = FINISHED FLOOR ELEVATION
- MAN DOOR
- CONCRETE CURB
- RETAINING WALL
- OVERLAND FLOW ROUTE (MAJOR STORM)
- 100 YEAR PONDING LIMIT (ELEVATION=101.879)
- 5 YEAR PONDING LIMIT (ELEVATION=101.783)
- SEDIMENT CONTROL FENCE (SEE DETAIL)
- SEDIMENT CONTROL FABRIC ON PAIGE WIRE FENCE (SEE DETAIL)
- CONSTRUCTION ACCESS (SEE DETAIL)
- DIRECTION OF DRAINAGE/SWALE
- DRAINAGE SPLIT (RIDGE)
- EMBANKMENT (SLOPE AS NOTED)
- PROPOSED BUILDING
- OVERHEAD DOOR

- NOTE:**
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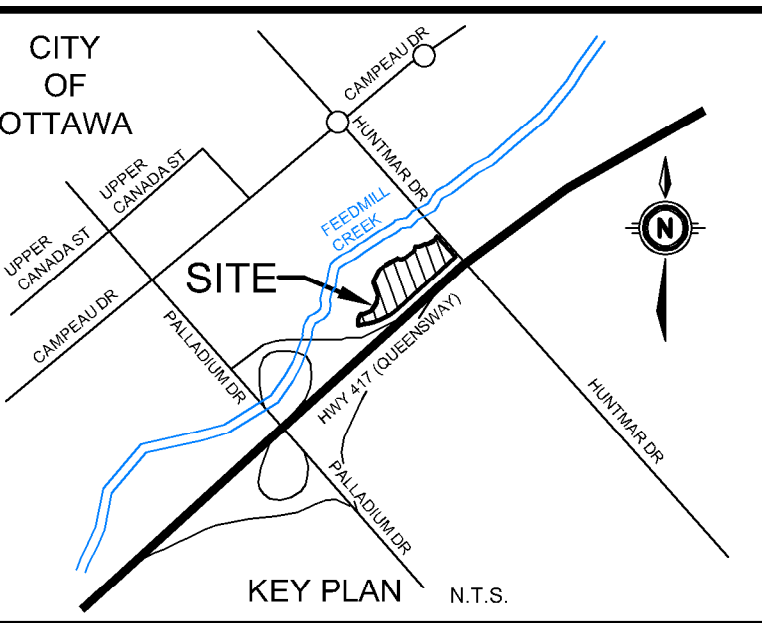
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No.	REVISION	AXS	DATE
1.	ISSUED FOR SITE PLAN CONTROL	BY	2026-04-01
			2026-04-01

LICENSED PROFESSIONAL ENGINEER

L. E. INGRAM
100120779

2026-04-01

PROVINCE OF ONTARIO

GEODEIC BM	ELEV. =	m
REFER TO SURVEY COMPLETED BY STANTEC, DATED JANUARY 23, 2026		
SITE BENCHMARK	ELEV. =	m
SEE ABOVE		

CLIENT

IRONCLAD DEVELOPMENTS

101-57158 SYMINGTON RD 20E
SPRINGFIELD, MB

319 HUNTMAR DRIVE
STITTSVILLE, ON

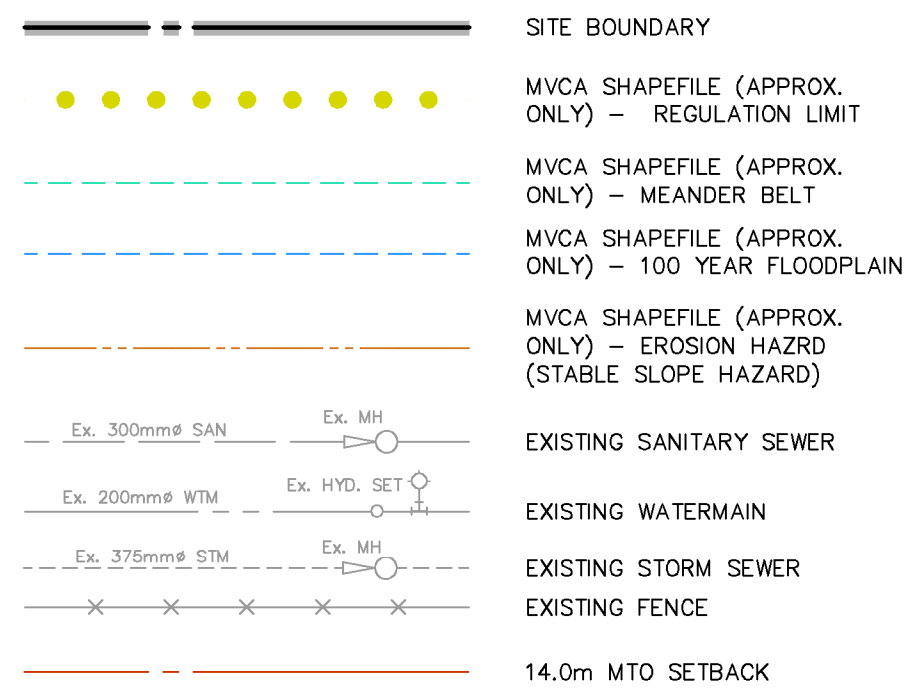
PRELIMINARY SITE GRADING AND E&SC PLAN 2

Design By: DXN/LEI
Checked By: DAC
Date: 2026-02-12

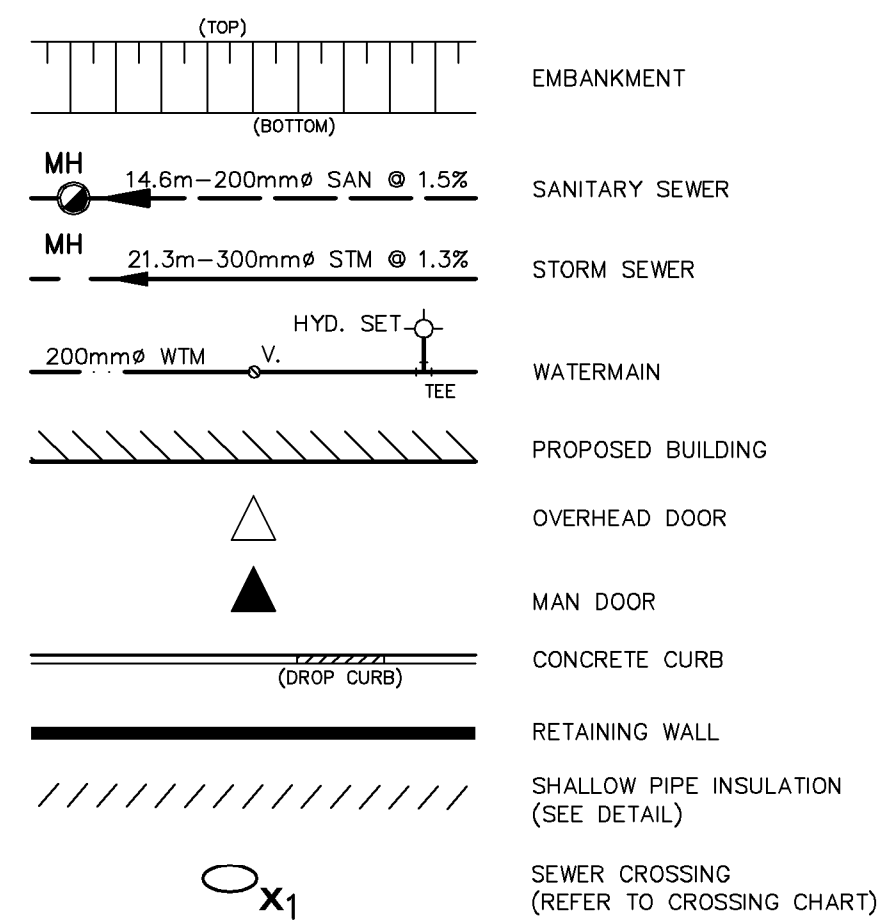
Project Manager: A. SAWATSKY
Project No.: 65860_001
Drawing No.:
1:300

C2.2
Sheet 4 of 8

LEGEND OF EXISTING FEATURES



LEGEND OF PROPOSED FEATURES

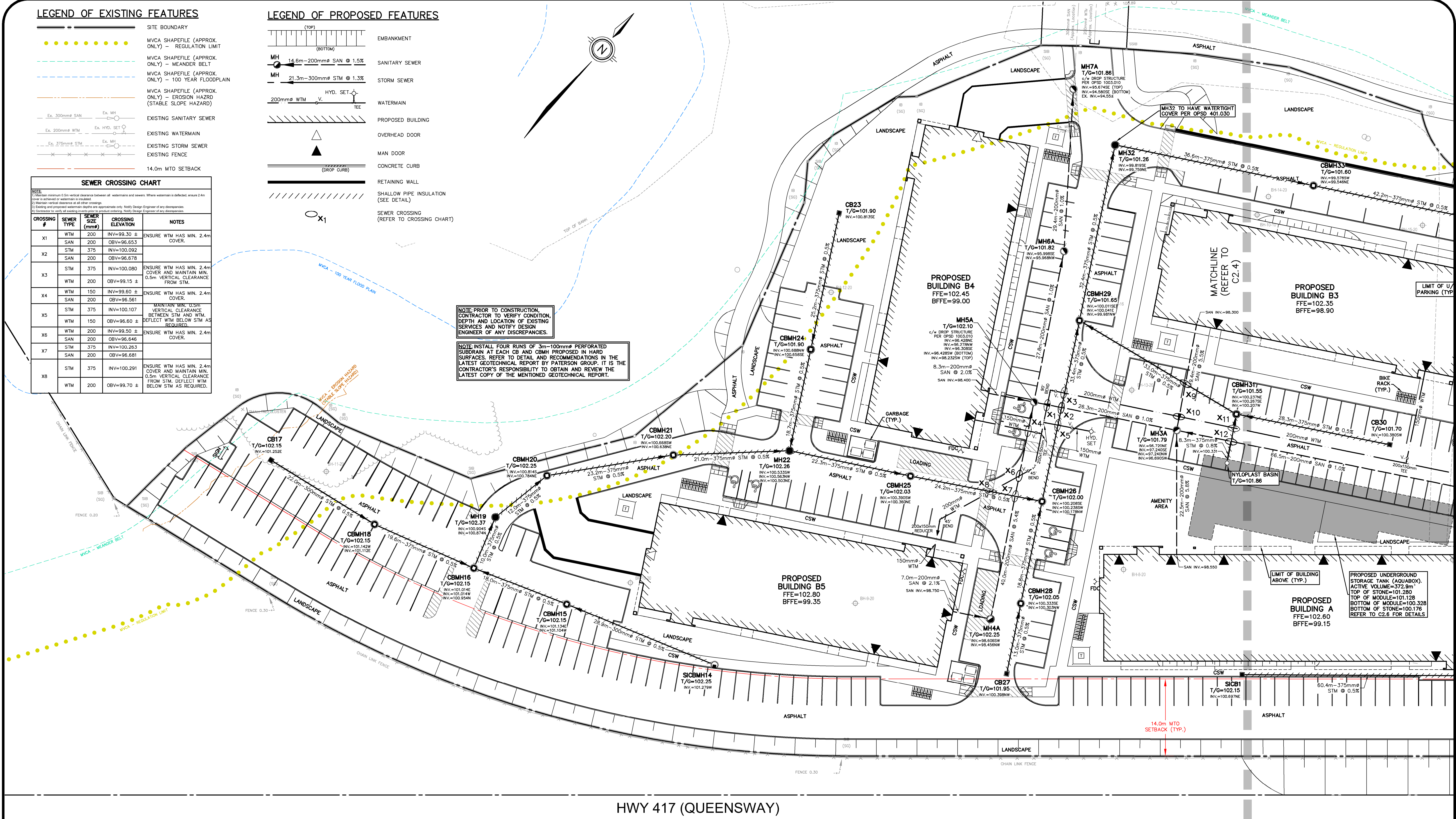


SEWER CROSSING CHART

CROSSING #	SEWER TYPE	SEWER SIZE (mm)	CROSSING ELEVATION	NOTES
X1	WTM	200	INV=99.30 ±	ENSURE WTM HAS MIN. 2.4m COVER.
X2	SAN	200	OBV=96.653	
	STM	375	INV=100.092	
	SAN	200	OBV=96.678	
X3	STM	375	INV=100.080	ENSURE WTM HAS MIN. 2.4m COVER AND MAINTAIN MIN. 0.5m VERTICAL CLEARANCE FROM STM.
X4	WTM	200	OBV=99.15 ±	
	SAN	200	OBV=96.561	
X5	STM	375	INV=100.107	MAINTAIN MIN. 0.5m VERTICAL CLEARANCE BETWEEN STM AND WTM. DEFLECT WTM BELOW STM AS REQUIRED.
X6	WTM	200	INV=99.50 ±	ENSURE WTM HAS MIN. 2.4m COVER.
	SAN	200	OBV=96.646	
X7	STM	375	INV=100.283	
	SAN	200	OBV=96.681	
X8	STM	375	INV=100.291	ENSURE WTM HAS MIN. 2.4m COVER AND MAINTAIN MIN. 0.5m VERTICAL CLEARANCE FROM STM. DEFLECT WTM BELOW STM AS REQUIRED.
	WTM	200	OBV=99.70 ±	

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HWY 417 (QUEENSWAY)

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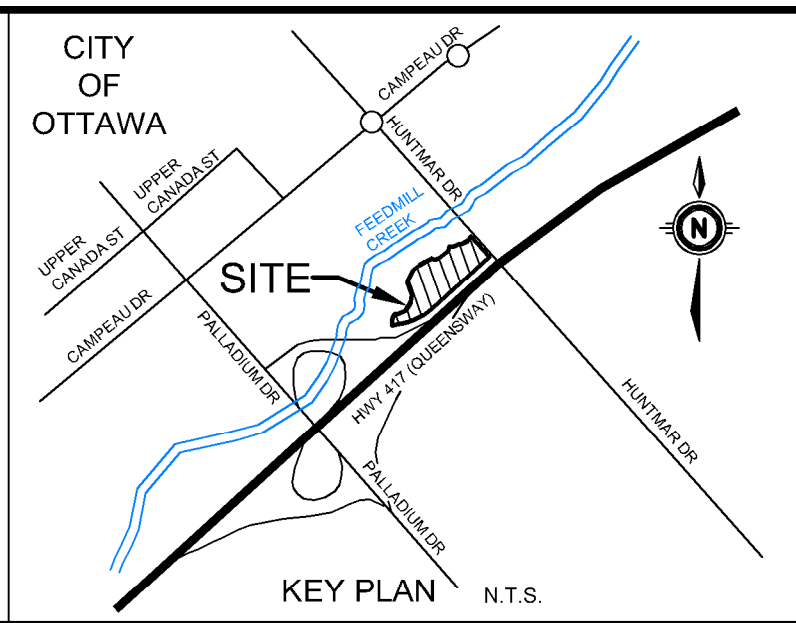
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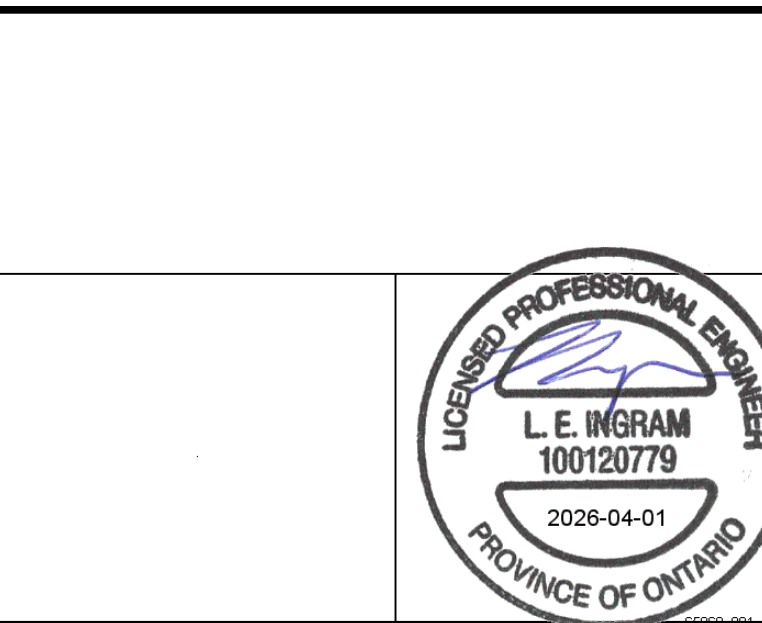
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No.	REVISION	DATE	BY
1.	ISSUED FOR SITE PLAN CONTROL	2026-04-01	AXS
2.	REVISION	2026-04-01	YYY



GEODETIC BM	ELEV. =	m
REFER TO SURVEY COMPLETED BY STANTEC, DATED JANUARY 23, 2026		
SITE BENCHMARK	ELEV. =	m
SEE ABOVE		

CLIENT

IRONCLAD DEVELOPMENTS

101-57158 SYMINGTON RD 20E
SPRINGFIELD, MB

319 HUNTMAR DRIVE
STITTSVILLE, ON

DRAWING

PRELIMINARY SITE SERVICING PLAN 1

Design By: DXN/LEI
Checked By: DAC
Date: 2026-02-12

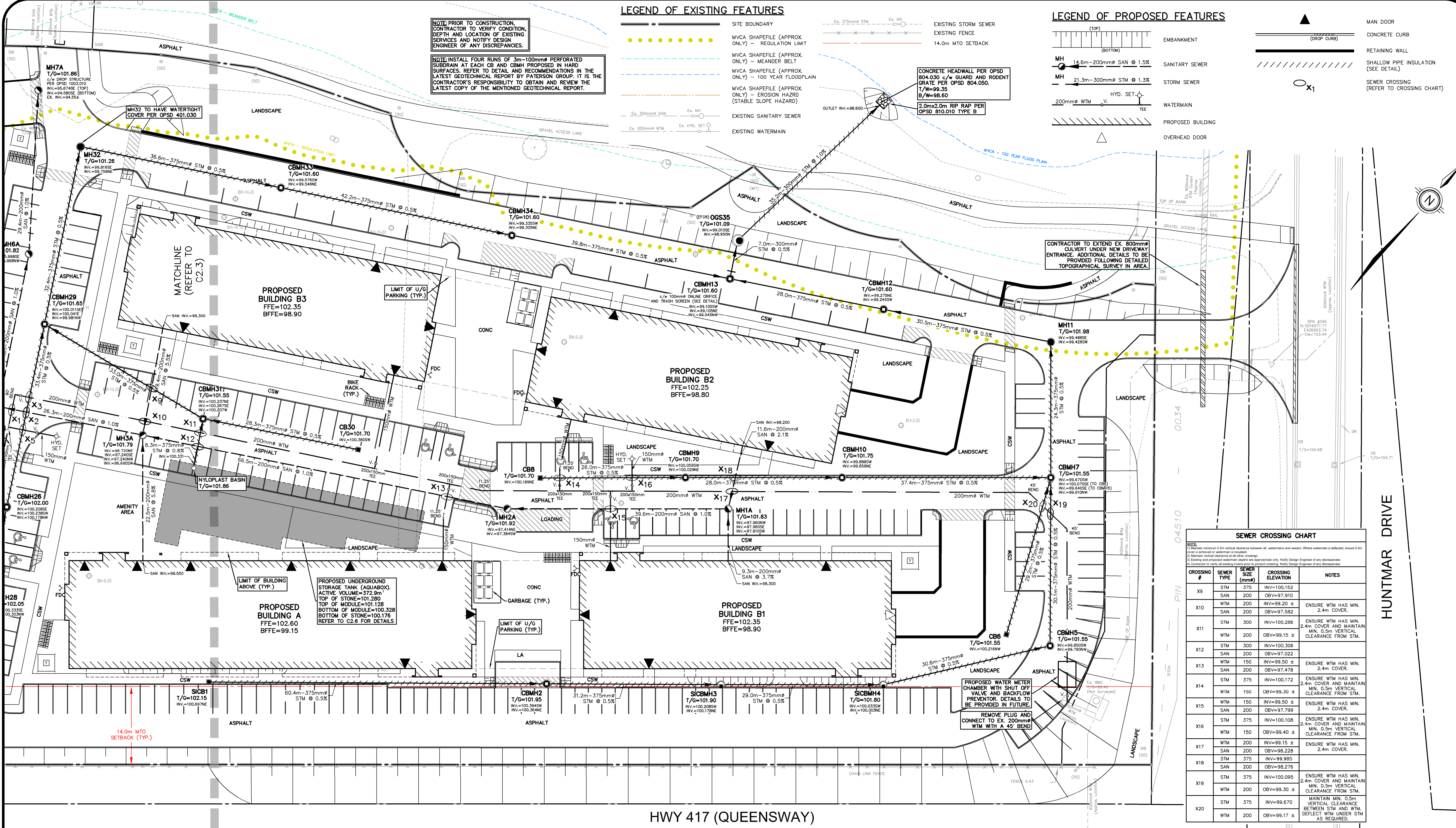
Project Manager: A. SAWATSKY
Project No.: 65860_001
Drawing No.:
1:300

C2.3
Sheet 5 of 8

MTE File Path: P:\165860_01\165860_001-C2

April 1, 2026 - 4:17:05 PM - Plotted By: Gemma Cabral-Guerra

MTE File Path: P:\165860_01\165860_001-C2



LEGEND OF EXISTING FEATURES

- SITE BOUNDARY
- MVCA SHAPEFILE (APPROX. ONLY) - REGULATION LIMIT
- MVCA SHAPEFILE (APPROX. ONLY) - MEANDER BELT
- MVCA SHAPEFILE (APPROX. ONLY) - 100 YEAR FLOODPLAIN
- MVCA SHAPEFILE (APPROX. ONLY) - EROSION HAZARD (STABLE SLOPE HAZARD)
- EXISTING SANITARY SEWER
- EXISTING WATERMAIN
- EXISTING STORM SEWER
- EXISTING FENCE
- 14.0m MTO SETBACK
- Ex. 375mm ϕ STM
- Ex. MH
- Ex. 300mm ϕ SAN
- Ex. MH
- Ex. 200mm ϕ WTM
- Ex. HYD. SET

LEGEND OF PROPOSED FEATURES

- EMBANKMENT
- SANITARY SEWER
- STORM SEWER
- WATERMAIN
- PROPOSED BUILDING
- OVERHEAD DOOR
- MAN DOOR
- CONCRETE CURB
- RETAINING WALL
- SHALLOW PIPE INSULATION (SEE DETAIL)
- SEWER CROSSING (REFER TO CROSSING TABLE)

NOTE: PRIOR TO CONSTRUCTION, CONTRACTOR TO VERIFY CONDITION, DEPTH AND LOCATION OF EXISTING SERVICES AND NOTIFY DESIGN ENGINEER OF ANY DISCREPANCIES.

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CONCRETE HEADWALL PER OPSD 804.030 c/w GUARD AND RODENT GRATE PER OPSD 804.050. T/W=99.35 B/W=98.60. 2.0m x 2.0m RIP RAP PER OPSD 810.010 TYPE B

CONTRACTOR TO EXTEND EX. 800mm ϕ CULVERT UNDER NEW DRIVEWAY ENTRANCE. ADDITIONAL DETAILS TO BE PROVIDED FOLLOWING DETAILED TOPOGRAPHICAL SURVEY IN AREA.

SEWER CROSSING CHART

CROSSING #	SEWER TYPE	SEWER SIZE (mm)	CROSSING ELEVATION	NOTES
X9	STM	375	INV=100.152	
X10	SAN	200	OBV=97.910	ENSURE WTM HAS MIN. 2.4m COVER.
	WTM	200	INV=99.20 \pm	
X11	STM	300	INV=100.286	ENSURE WTM HAS MIN. 2.4m COVER AND MAINTAIN MIN. 0.5m VERTICAL CLEARANCE FROM STM.
	WTM	200	OBV=99.15 \pm	
X12	SAN	200	OBV=97.022	ENSURE WTM HAS MIN. 2.4m COVER.
	SAN	200	OBV=97.478	
X14	STM	375	INV=100.172	ENSURE WTM HAS MIN. 2.4m COVER AND MAINTAIN MIN. 0.5m VERTICAL CLEARANCE FROM STM.
	WTM	150	OBV=99.30 \pm	
X15	WTM	150	INV=99.50 \pm	ENSURE WTM HAS MIN. 2.4m COVER.
	SAN	200	OBV=97.799	
X16	STM	375	INV=100.108	ENSURE WTM HAS MIN. 2.4m COVER AND MAINTAIN MIN. 0.5m VERTICAL CLEARANCE FROM STM.
	WTM	150	OBV=99.40 \pm	
X17	WTM	200	INV=99.15 \pm	ENSURE WTM HAS MIN. 2.4m COVER.
	SAN	200	OBV=98.228	
X18	STM	375	INV=99.985	
	SAN	200	OBV=98.276	
X19	STM	375	INV=100.095	ENSURE WTM HAS MIN. 2.4m COVER AND MAINTAIN MIN. 0.5m VERTICAL CLEARANCE FROM STM.
	WTM	200	OBV=99.30 \pm	
X20	STM	375	INV=99.670	MAINTAIN MIN. 0.5m VERTICAL CLEARANCE BETWEEN STM AND WTM. DEFLECT WTM UNDER STM AS REQUIRED.
	WTM	200	OBV=99.17 \pm	

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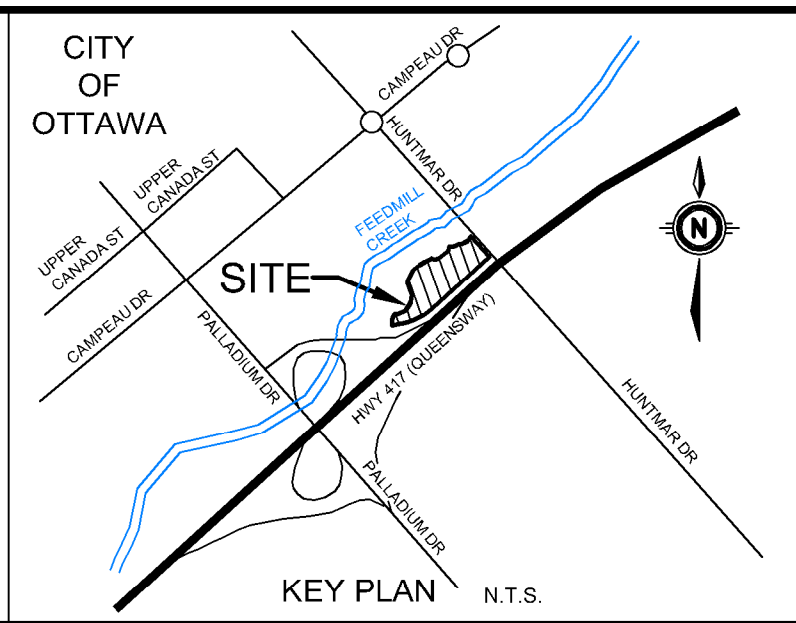
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2.			
1.	ISSUED FOR SITE PLAN CONTROL	AXS	2026-04-01
No.	REVISION	BY	YVY1-AMM-D0



GEODETC BM ELEV. = m
REFER TO SURVEY COMPLETED BY STANTEC, DATED JANUARY 23, 2026

SITE BENCHMARK ELEV. = m
SEE ABOVE

CLIENT
IRONCLAD DEVELOPMENTS
101-51758 SYMINGTON RD 20E SPRINGFIELD, MB

319 HUNTMAR DRIVE
STITTSVILLE, ON

DRAWING
PRELIMINARY SITE SERVICING PLAN 2

Design By: DXN/LEI Project Manager: A. SAWATSKY

Checked By: DAC Project No: 65860_001

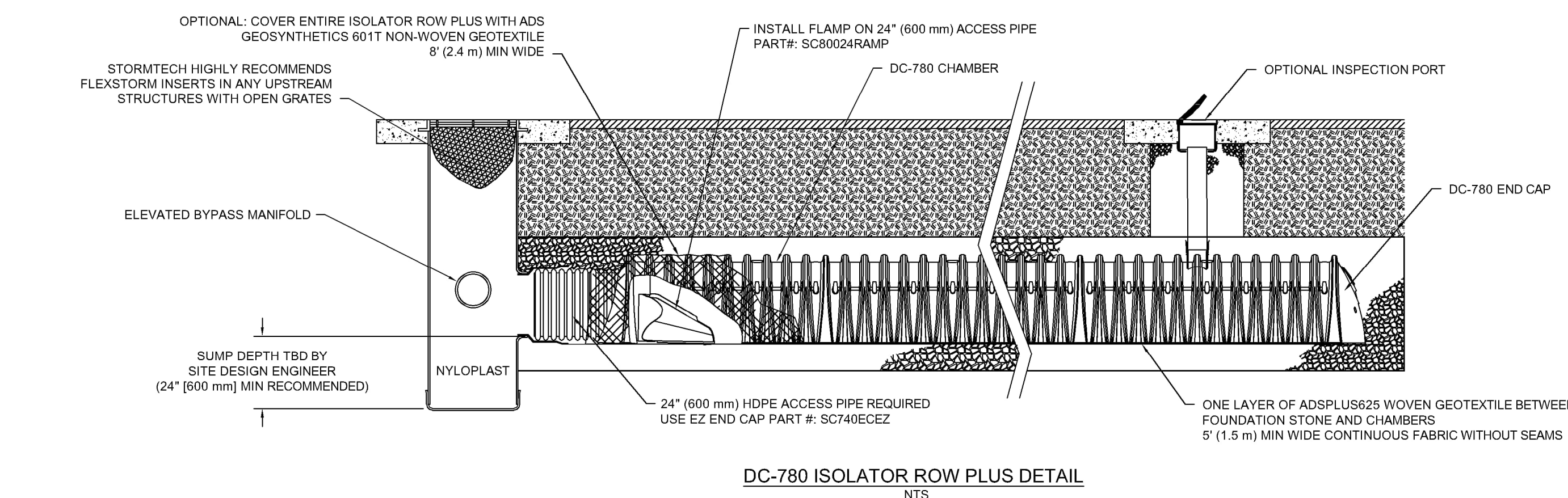
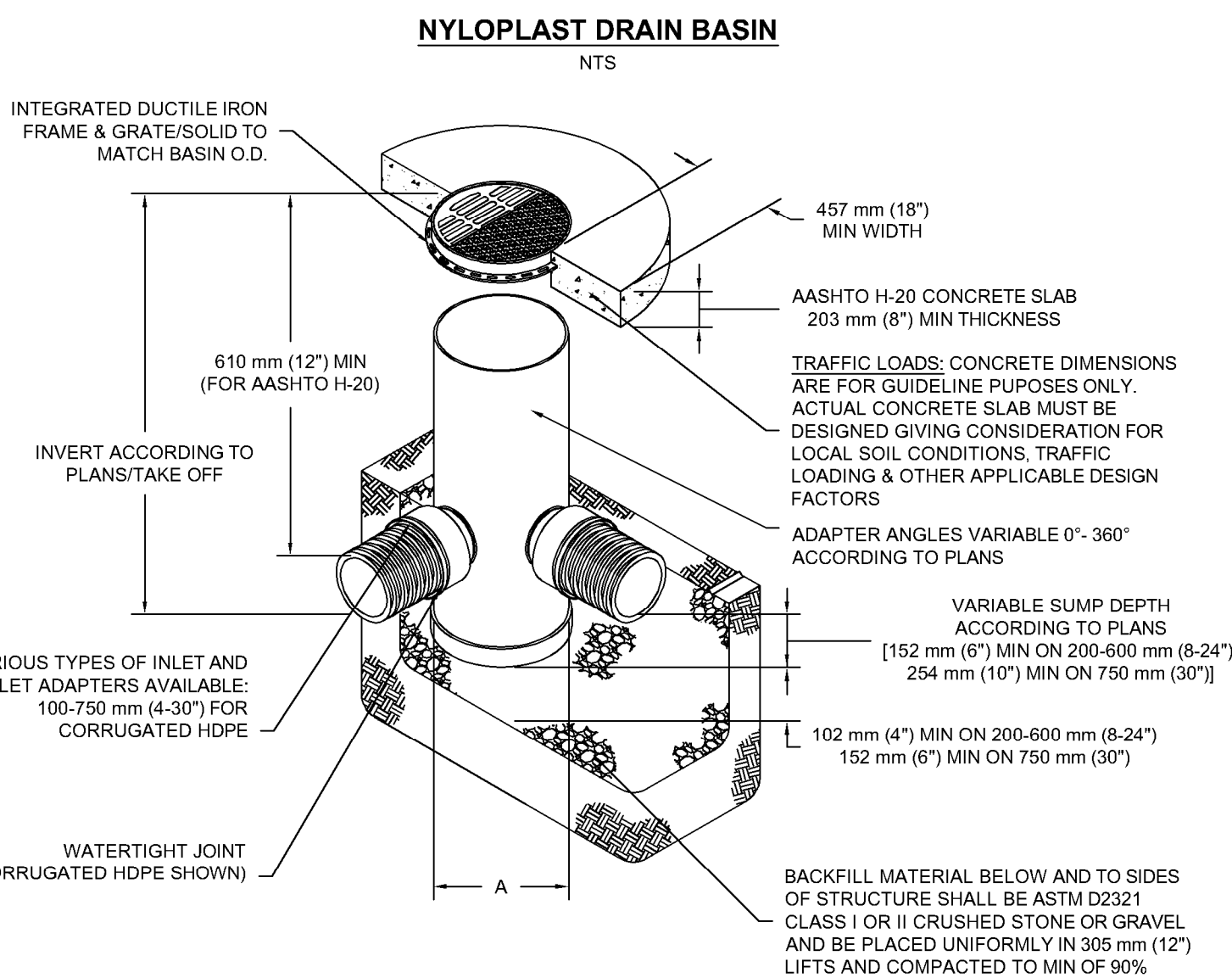
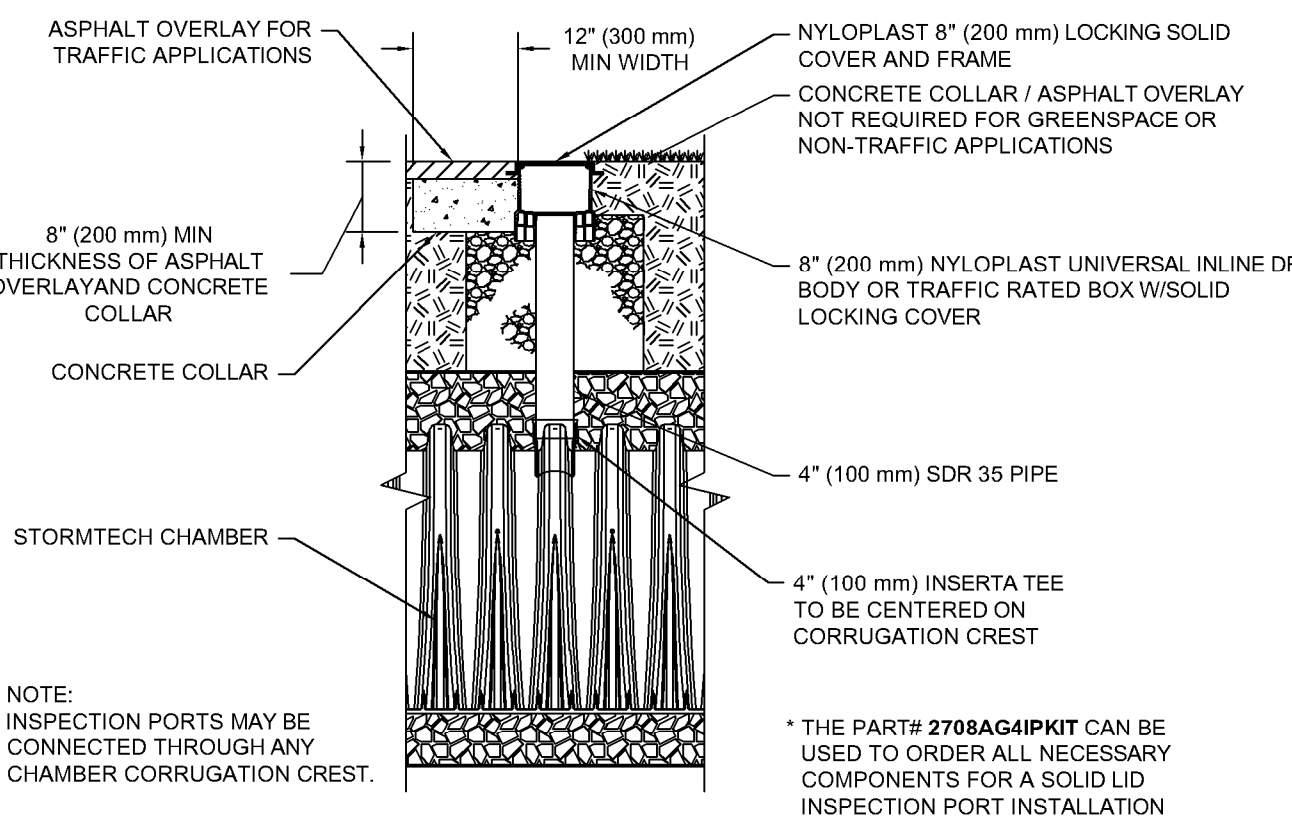
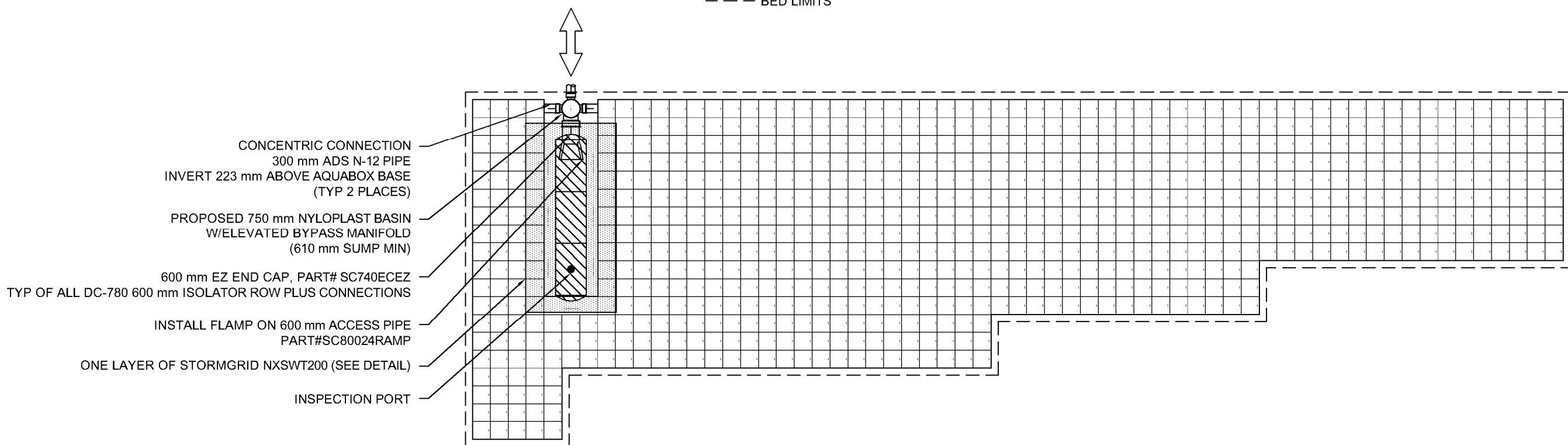
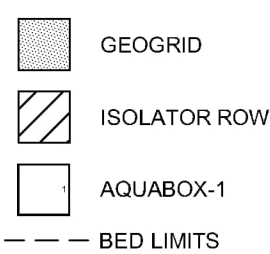
Date: 2026-02-12 Drawing No: **C2.4**

1:300 Sheet 6 of 8

PROPOSED LAYOUT			
752	AQUABOX-1 (1 LAYER)	0	MODULE INSPECTION PORTS
752	AQUABOX FULL MODULE	1	CHAMBER INSPECTION PORTS
0	AQUABOX CUBE MODULE		
3	STORMTECH DC-780 CHAMBERS		
2	STORMTECH DC-780 END CAPS		
152	STONE ABOVE (mm)		
152	STONE BELOW (mm)		
40	% STONE VOID		
372.9	INSTALLED SYSTEM VOLUME (m³) (PERIMETER STONE INCLUDED)		
103.109	ABOVE ELEVATION 100.XXX.XXX - XXX.XXX		
480.7	EXCAVATION AREA (m²)		
122.5	EXCAVATION PERIMETER (m)		
425.2	MODULE AREA (m²)		
136.6	MODULE PERIMETER (m)		
PROPOSED ELEVATIONS			
103.109	MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED)		
101.738	MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC)		
101.585	MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC)		
101.585	MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT)		
101.585	MINIMUM ALLOWABLE GRADE (TOP OF RIGID PAVEMENT)		
101.280	TOP OF STONE		
101.128	TOP OF MODULE		
101.090	TOP OF DC-780 CHAMBER		
100.551	300 mm CONCENTRIC CONNECTION		
100.331	600 mm ISOLATOR ROW CONNECTION		
100.328	BOTTOM OF MODULE		
100.176	BOTTOM OF STONE		

NOTES

- STRUCTURES SHOWN ON THIS DESIGN ARE NOT INTENDED FOR MANWAY ACCESS. INSPECTION AND MAINTENANCE OF THE SYSTEM VIA THESE STRUCTURES IS RECOMMENDED TO BE COMPLETED WITH REMOTE CONTROLLED EQUIPMENT, OR ADHERE TO GUIDANCE BY PROFESSIONAL MAINTENANCE COMPANY.
- THE SITE DESIGN ENGINEER MUST CONSIDER THE EFFECTS OF POSSIBLE SATURATED SOILS ON NEARBY SYSTEMS, INCLUDING BUT NOT LIMITED TO, RETAINING WALLS, SLOPE CONSTRUCTION/STABILITY, OR BUILDINGS/STRUCTURES. NO FOUNDATION LOADS SHALL BE TRANSMITTED TO THE CHAMBERS.
- NOT FOR CONSTRUCTION:** THIS LAYOUT IS FOR DIMENSIONAL PURPOSES ONLY TO PROVE CONCEPT & THE REQUIRED STORAGE VOLUME CAN BE ACHIEVED ON SITE.



INSPECTION & MAINTENANCE

STEP 1) INSPECT ISOLATOR ROW PLUS FOR SEDIMENT

A. REMOVE COVER FROM STRUCTURE AT UPSTREAM END OF MAINTENANCE ROW

B. USING A FLASHLIGHT, INSPECT DOWN THE ISOLATOR ROW PLUS THROUGH OUTLET PIPE

i) MIRRORS ON POLES OR CAMERAS MAY BE USED TO AVOID A CONFINED SPACE ENTRY

ii) FOLLOW OSHA REGULATIONS FOR CONFINED SPACE ENTRY IF ENTERING MANHOLE

C. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.

STEP 2) CLEAN OUT ISOLATOR ROW PLUS USING THE JETVAC PROCESS

A. A FIXED CULVERT CLEANING NOZZLE WITH REAR FACING SPREAD OF 45° (1.1 m) OR MORE IS PREFERRED

B. APPLY MULTIPLE PASSES OF JETVAC UNTIL BACKFLUSH WATER IS CLEAN

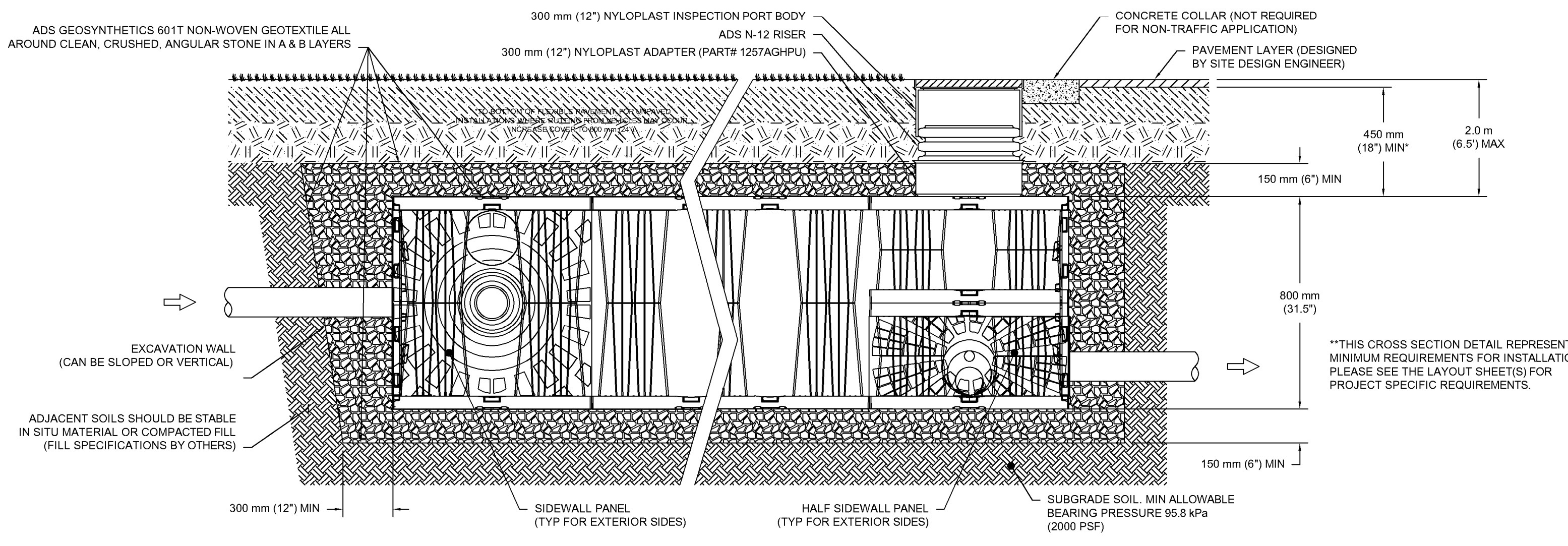
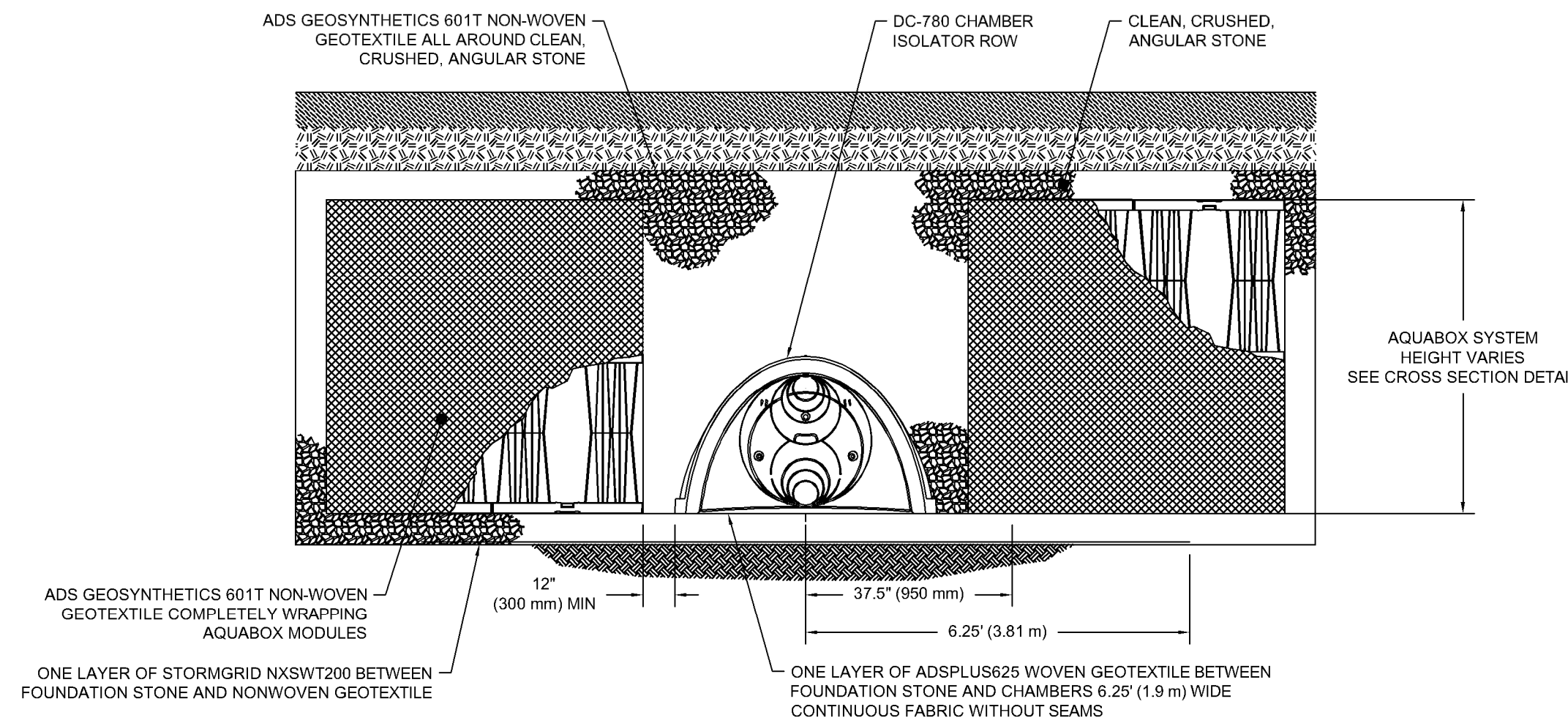
C. VACUUM STRUCTURE SUMP AS REQUIRED

STEP 3) REPLACE ALL COVERS, GRATES, FILTERS, AND LIDS; RECORD OBSERVATIONS AND ACTIONS.

STEP 4) INSPECT AND CLEAN BASINS AND MANHOLES UPSTREAM OF THE AQUABOX SYSTEM.

NOTES

- INSPECT EVERY 6 MONTHS DURING THE FIRST YEAR OF OPERATION. ADJUST THE INSPECTION INTERVAL BASED ON PREVIOUS OBSERVATIONS OF SEDIMENT ACCUMULATION AND HIGH WATER ELEVATIONS.
- CONDUCT JETTING AND VACTORING ANNUALLY OR WHEN INSPECTION SHOWS THAT MAINTENANCE IS NECESSARY.



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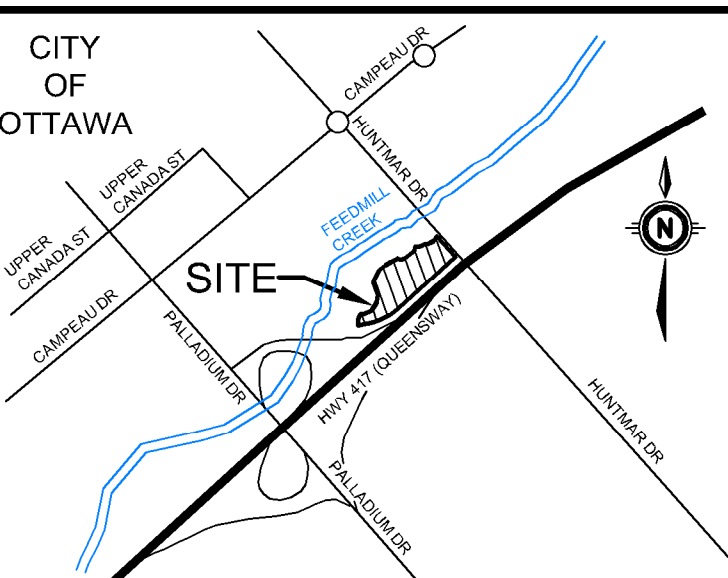
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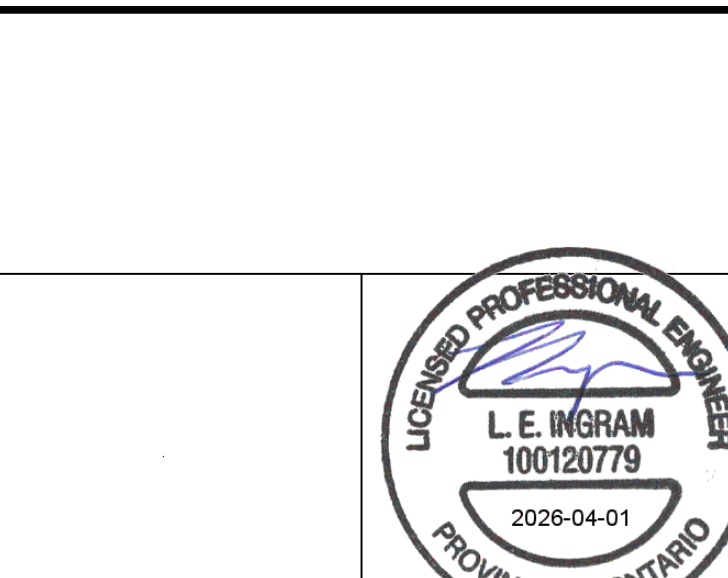
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No.	REVISION	DATE	BY
1.	ISSUED FOR SITE PLAN CONTROL	2026-04-01	AXS
2.			



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REFER TO SURVEY COMPLETED BY STANTEC, DATED JANUARY 23, 2026		
SITE BENCHMARK	ELEV. =	m
SEE ABOVE		

CLIENT
IRONCLAD DEVELOPMENTS
101-57158 SYMINGTON RD 20E
SPRINGFIELD, MB

319 HUNTMAR DRIVE
STITTSVILLE, ON

DRAWING
DETAILS AND NOTES PLAN 2

Design By: DXN/LEI
Checked By: DAC
Date: 2026-02-12

Project Manager: A. SAWATSKY
Project No: 65860_001
Drawing No: C2.6

N.T.S. Sheet 8 of 8