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Proposed 1-Storey Warehouse

3113 Carp Road, Ottawa, On

Technical Note Site Servicing and Site grading, Erosion and Sediment control



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Review	Issue	Date
01	For permit	2025-12-29

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1 Introduction

The existing site, as illustrated in Figure 1 of Section 1.1, where the new Carp Road warehouse will be constructed, is currently undeveloped and contains no buildings. The project involves the construction of a new warehouse. The site, including the areas designated for parking facilities, covers a total surface area of 3.05 ha (see Plan A100).

All works on this site are subject to the requirements of the City of Ottawa's Stormwater Management By-law. To comply with these requirements, Group XX has mandated Hasen-engineering, inc. And Fritz Gerald to prepare the civil permit drawings necessary to ensure proper management of stormwater runoff.

This technical memorandum accompanies the plans submitted as part of the civil permit application. It outlines the key requirements of the City of Ottawa and Ontario's Environmental Protection Act. It also summarizes the calculations related to the allowable release rate, the required detention volume, stormwater quality treatment, as well as the proposed stormwater management strategy.

1.1 Project Location

The warehouse is located on Carp Road, between the West Ottawa Christian Community and Bit-Ta-Luk Farms Inc., in the city of Kanata, Ottawa.



Figure 1: Project Warehouse Location

1.2 Site Green and Impervious Areas

The project site has an area of 3.05 ha. The area of landscaped/grass-covered surfaces is 8,800 m² (see Plan A100). The average imperviousness of the site is 73%. The figure 2 below illustrates the distribution of green and impervious areas across the site.



Figure 2: Distribution of Green and Impervious Areas on the Study Site

2 Methodology

The methodology adopted for the development of stormwater management plans is structured around the following key components:

- Applicable project-specific standards and regulatory requirements
- Data acquisition and data analysis
- Regulatory frameworks and design criteria
- Hydraulic modeling of the drainage system using PCSWMM software to estimate pre- and post-construction runoff volumes and peak flow rates

- Definition and modeling of stormwater management measures required to meet performance objectives
- Technical analysis and recommendation

3 Standards and Regulations – Municipal and Provincial

- Sewer design guidelines the city of Ottawa (second edition, October 2012)
- Storm sewer management planning and design manual, ministry of the environment, Ontario, March 2003
- Drainage Management manual, Ministry of Transportation Ontario (MTO), 1995
- Drinking water Facility Standards city of Ottawa, May 29, 2020

4 Available Data

- Received plans (architectural, mechanical, structural)
- Topographic survey
- Digital Terrain Model (DTM)
- Hydrogeological assessment and terrain analysis, October 6, 2025 (Paterson Group)
- Phase-I- Environmental site assessment, June 3, 2022 (Paterson group)

5 Assumptions / Design Criteria

- Water quality control: 80 % of TSS removal
- Water quality control: post-development flows must be less than or equal to pre-development flows for return periods of 2, 5, 10, 25, 50, and 100 years.
- 100-year spill elevation will be 300 mm lower than the warehouse opening and ramp
- The maximum permissible ponding depth for the 100-year + 20% event is 350 mm
- No spill is allowed onto any permanent structures for 100-year +20% event
- No Surface ponding on parking areas for 2-Year storm event according to technical Bulletin PIEDTB
- The minimum diameter of orifice is 83mm
- The minimum flow rate from a vortex is 6 l/s
- Roof drains are connected downstream of Inlet Control Devices (ICD) not to foundation drain system
- There not underground storage for the warehouse
- Minimum diameter for minor sewer 300 mm
- Maximum flow depth on parking lot 300 mm

5.1 Design rainfall

Table 1: Design rainfall

Rainfall	Description	Reference
Quantity control/Major system design	100-year return period	city of Ottawa, October 2012
Quality control	25 mm	MOE Stormwater Management planning and Design Manual pg. 4-57
Erosion control	2- year return	city of Ottawa, October 2012
Menor system	10 -year return period	city of Ottawa, October 2012

5.2 PCSWMM Software Modeling Parameters

For the purposes of the hydraulic calculations, hydrologic and hydraulic simulations were carried out to estimate the runoff volumes and flow rates generated on the study site. The parameters presented in Table 2 are used for the hydraulic simulation with the SWMM model. These parameters are recommended by the city of Ottawa, October 2012.

Table 2: PCSWMM Modeling Parameters

Parameter	Value	Reference
Routing Model	Dynamic Wave	City of Ottawa, October 2012
Inertial Term	Dampen	City of Ottawa, October 2012
Normal Flow Criterion	Froude and slope (both)	City of Ottawa, October 2012
Infiltration Model	Horton	City of Ottawa, October 2012
Maximum Infiltration Rate	76.2 mm	City of Ottawa, October 2012(5.4.5.5)
Minimum Infiltration Rate	13.2 mm	City of Ottawa, October 2012(5.4.5.5)
Decay Constant	4 h ⁻¹	City of Ottawa, October 2012
Drying Time	7 days	City of Ottawa, October 2012

Basin Roughness – Impervious N	0.016	City of Ottawa, October 2012
Basin Roughness – Pervious N	0.26	City of Ottawa, October 2012
Impervious Surface Storage	1.57 mm	City of Ottawa, October 2012(5.4.5.4)
Pervious Surface Storage	4.67 mm	City of Ottawa, October 2012(5.4.5.4)
Zero-Impervious	25%	City of Ottawa, October 2012
Pressurized Conduit Equations	Hazen-Williams	City of Ottawa, October 2012
Roughness – New sewer	0.013	City of Ottawa, October 2012(6.1.2.1)
Clean Stone Porosity	20% void	City of Ottawa, October 2012
Outfall Conditions	Full pipe	City of Ottawa, October 2012
Runoff Coefficient	Paved and roof: 0.9	City of Ottawa, October 2012

5.3 Pre-Development Site Conditions

According to the topographic survey and the digital terrain model, site drainage prior to development flows toward the existing ditch located to the northeast. Part of the site is currently used for agricultural purposes. The existing runoff coefficient is estimated at 5%. The figure below illustrates the current sub-catchment of the study site.

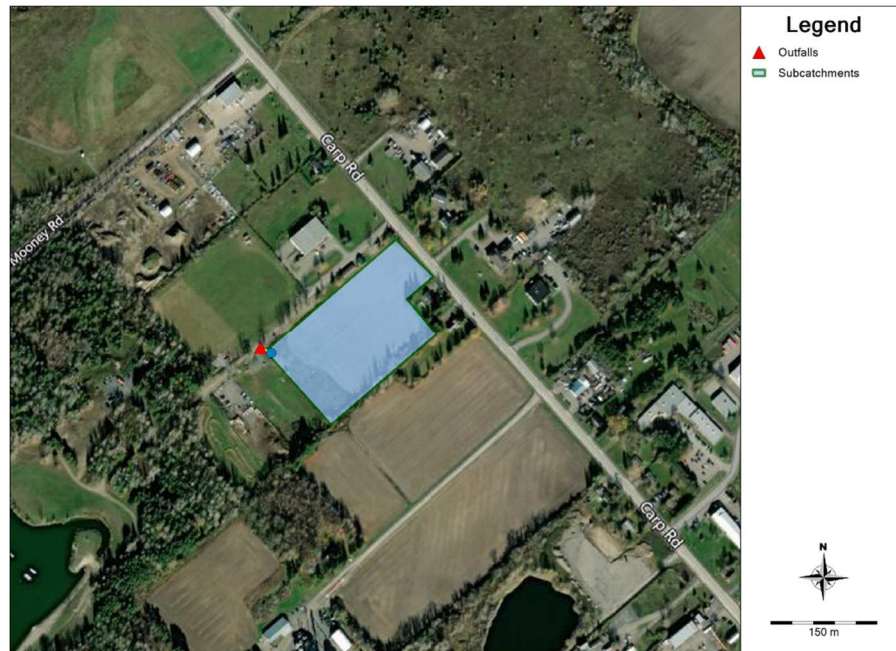


Figure 3: pre-development Sud-catchment

5.4 Pre-Development Flow Results for Return Periods

Table 3:pre-development flow 2 year@100year

Return period	Flow (l/s)
2-year	36.14
5--year	50.46
10-year	62.21
25 -year	75.80
50-year	87.75
100-year	99.82

5.4.1 Projected Hydraulic Conditions of the Study Site Post-Development

This section presents the characteristics of the proposed stormwater sub-catchment and the overall hydraulic performance of the site in relation to compliance with the City of Ottawa design guidelines. It also identifies the interventions required to achieve compliance with the City of Ottawa's regulatory requirements, including quantity control, water quality treatment, and erosion control. Additionally, it describes roof storage and the characteristics of roof drains.

5.4.2 Characterization of Stormwater Sub-catchment

As shown in Figure 4 below, the site has been divided into 31 stormwater sub-basins, whose characteristics are presented in the drainage sub-basin table on the civil plans accompanying this technical memorandum.

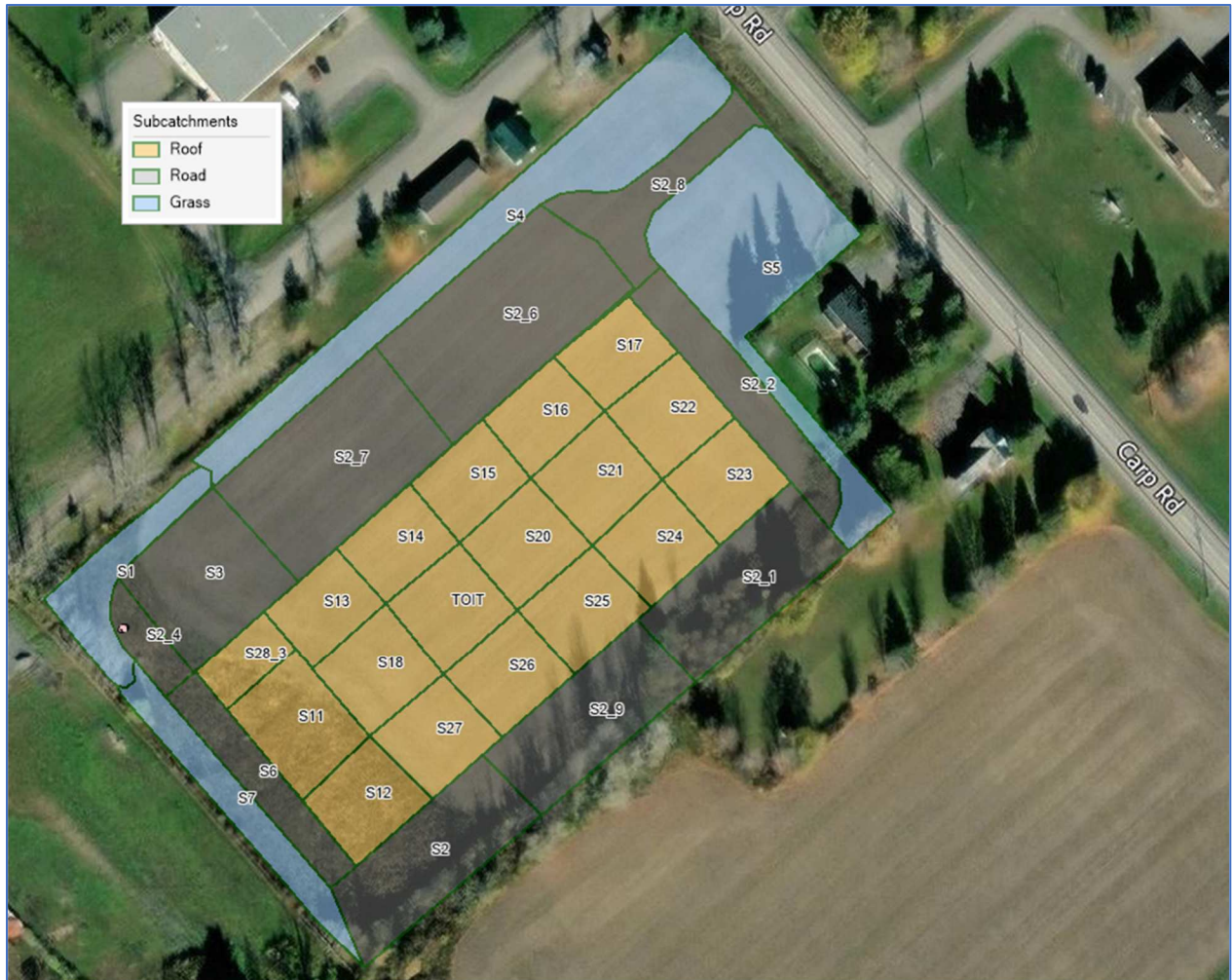


Figure 4: Stormwater Sub-catchments of the Study Site

6 Stormwater Management (BMPs)

Efforts to reduce stormwater runoff primarily focus on the following drainage strategies:

- Conveyance of runoff from impervious areas to catch basins or sumps
- Surface retention in parking areas (peak flow control)
- Pond retention equivalent (peak flow control)
- Roof storage (controlled flow roof drains)
- Water quality control to remove 80% of suspended solids (hydrodynamic separator or equivalent)

This section also allows for the determination of runoff volumes and flow rates under the projected conditions of the study site. Analysis of the results helps to determine the necessity of implementing

stormwater management systems to comply with By-law. A hydraulic analysis of runoff on the proposed site was carried out. A summary of the results is presented in the following sections and in Appendix B.

6.1 Water quantity control

Post-development flows must be less than or equal to pre-development flows for return periods of 2, 5, 10, 25, 50, and 100 years.

Table 4: pre-development flow vs post-development flow

Return period	Predevelopment Flow (l/s)	Post-development flow (l/s)
2-year	36.14	25.00
5--year	50.46	45.34
10-year	62.21	59.55
25 -year	75.80	69.15
50-year	87.75	82.95
100-year	99.82	92.00

6.2 100-year spill elevation will be 300 mm lower than the warehouse opening and ramp

Catch basin CB-1, CB-2 and CB-3 are in front of the warehouse access ramp. The water depth above it, for a 100-year return period storm event, remains below the 300 mm limit specified by the City of Ottawa regulations, as illustrated in curves below.

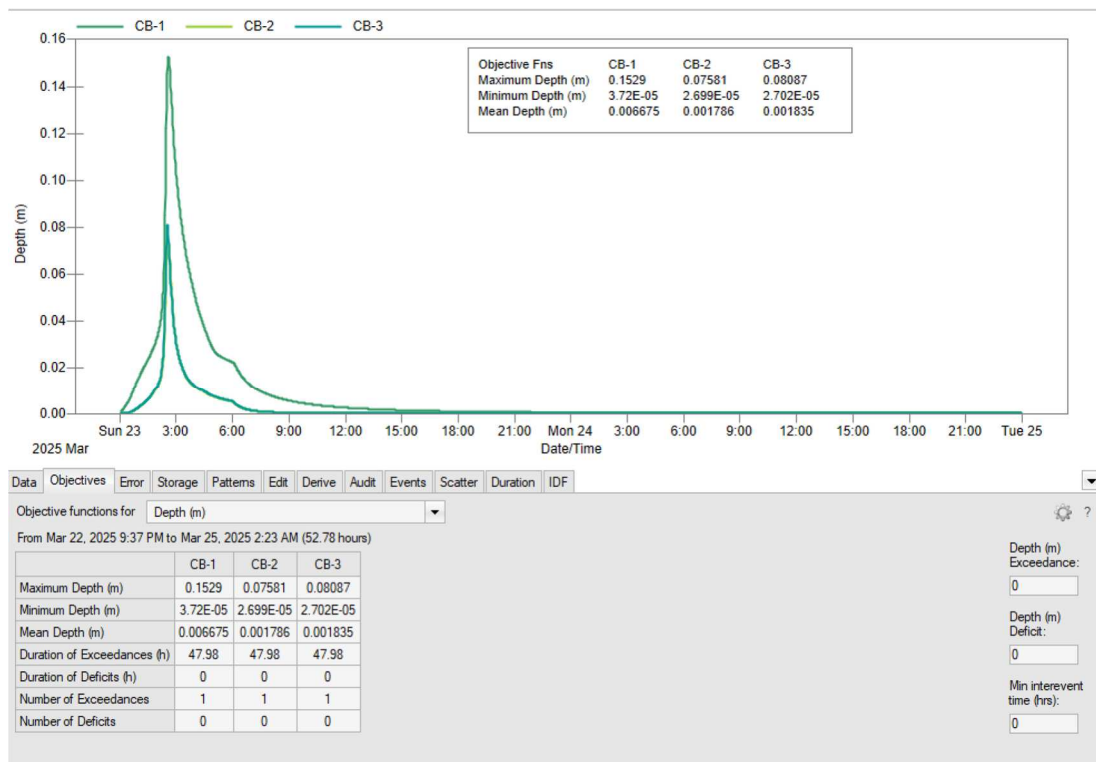


Figure 5: curve of water depth of CB-1, CB-2 and CB-3

6.3 The maximum permissible ponding depth for the 100-year + 20% event is 350 mm

As illustrated in the following curve, the water level observed in the retention basin remains below 350 mm, in accordance with the requirements of the City of Ottawa's regulations.

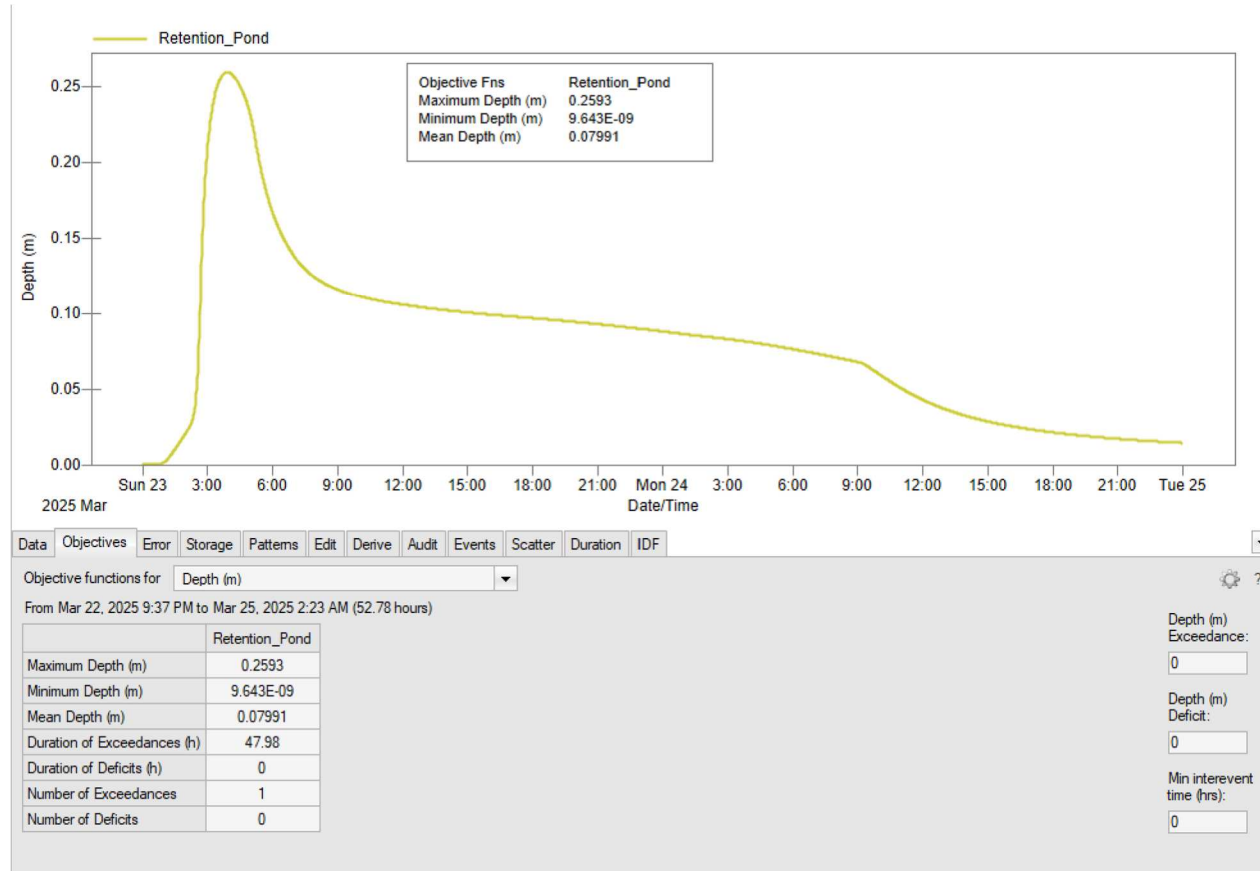


Figure 5: Water level in the retention basin for a 100-year storm +20%

7 Retention Volume from the PCSWMM Model

This section presents the results of the hydraulic analysis regarding the estimated retention volume on the parking areas and in the underground basin, respectively.

7.1 Parking Surface Retention

For the purposes of the hydraulic calculation, a 1% slope was assumed for parking areas expected to receive rainwater retention. The retention volume was calculated based on one-third of the total parking area. Figure 6 provides a summary of the volume calculation for the parking surface. A detailed table of the retention volume on the parking surface is also included in the civil plan of the minor storm sewer network. The total water volume retained on the parking surface is 24 m³.

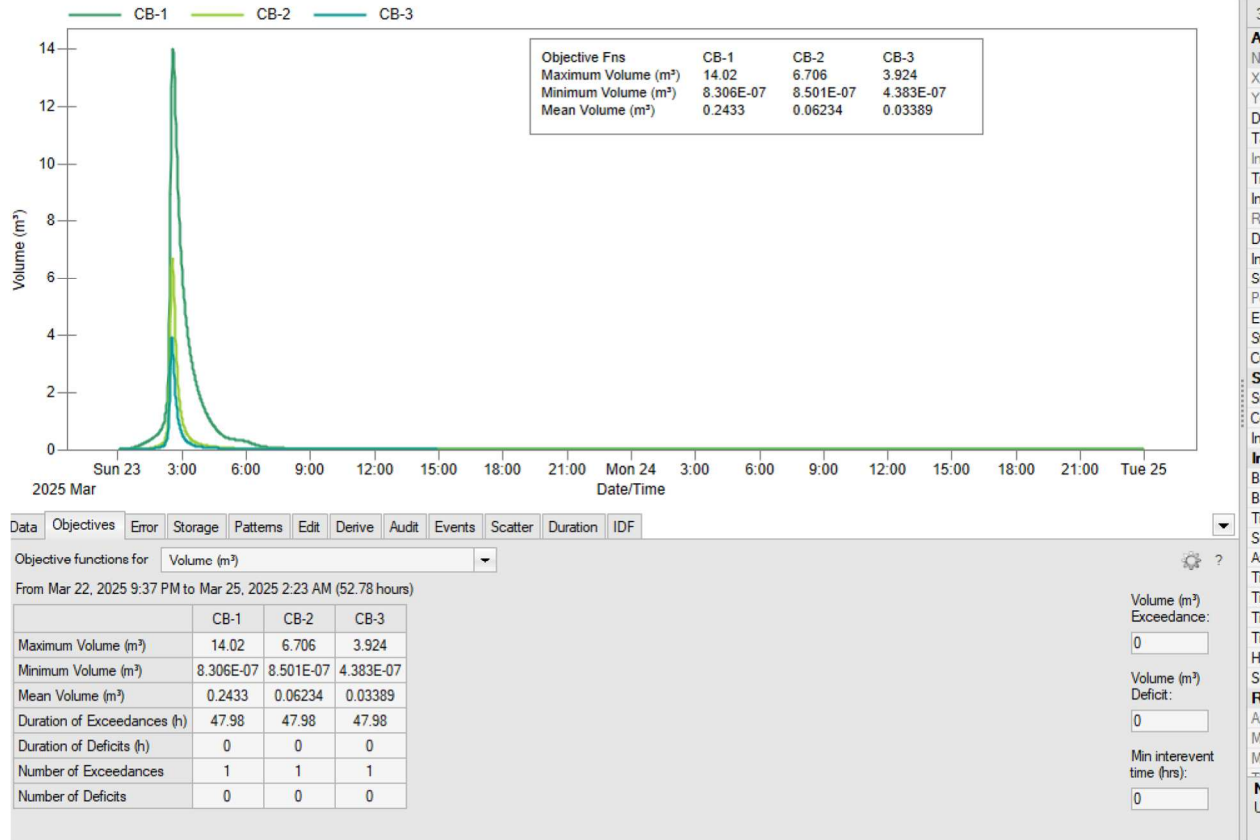


Figure 6: Volume above the catch basins

7.2 Retention pond

The dry retention basin, located at the outlet of the parking lot and roof drainage network, stores and attenuates runoff from 2-year to 100-year storm events before releasing it to the downstream ditch. It also meets the pre-development requirements set by the City of Ottawa. The basin has a total area of 508 m² and a depth of 0.7 m. The table 5 below summarizes the basin's water volumes and depths for storm events ranging from the 2-year to the 100-year return period.

Table 5: volume of retention pond 2 year to 100 year

Return Period (years)	Volume (m3)	Water Depth (m)
2	139	0.130
5	191.50	0.76
10	224	0.203
25	245	0.220
50	274	0.244
100	293	0.259

7.3 Roof retention

Flat roof areas designated for rainwater retention have a slope of 1%. The roof surface has been subdivided into seven drainage sub-basins. The residence time of the retained water on the roof, considering controlled flow drains of the “Murphco” type or equivalent, is provided in Appendix D.

The flat roof areas used for calculating residence times were determined based on the “typical” slopes required for roof retention. A table 6 summarizing the roof retention results is included in the minor storm sewer plan accompanying this technical note.

Table 6: roof retention volume

ZONE	HAUT. MAX (mm)	VOL. RÉT. (m3)
DT-1	140.208	33.783
DT-2	140.208	26.423
DT-3	149.352	39.441
DT-4	140.208	26.200
DT-5	140.208	22.974
DT-6	140.208	27.153
D-7	146.304	26.393
DT-8	99.822	1.893
DT-9	146.558	27.266
DT-10	140.462	26.820
Dt-11	145.796	19.802
DT-12	140.208	27.672
DT-13	140.208	25.548
DT-14	140.208	22.422
DT-15	140.208	26.494
DT-16	140.208	25.894
TOTAL		406.176

7.4 Dry swale

A dry swale is installed on the northeast side of the warehouse, specifically at the vehicle entrance. Runoff water from the parking area on the same side will be conveyed to the dry swale. This water will then be stored in the downstream retention basin. Furthermore, the dry swale provides a total suspended solids (TSS) removal efficiency up to 80%. The dry swale has a depth of 500 mm and a base width of 1000 mm. The figure 7 below shows the proposed dry swale, while the table 7 above presents the water depth and retention volume of the swale.

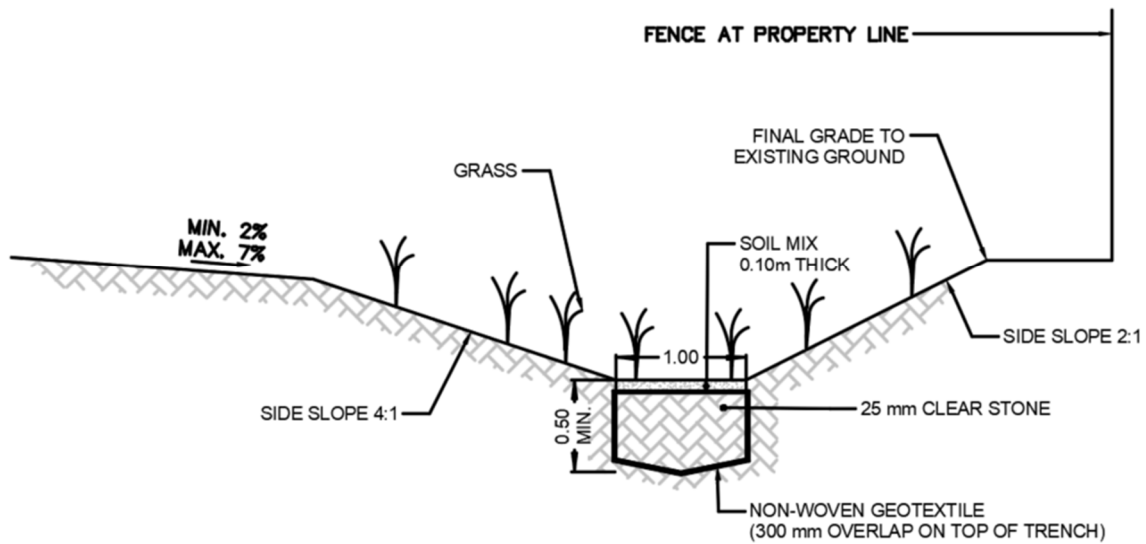


Figure 7: dry swale proposal

Table 7: Dry swale retention 2 year to 100 year

Return Period (years)	Volume (m3)	Water Depth (m)
2	17.80	0.142
5	40.45	0.237
10	66.75	0.315
25	93.42	0.377
50	136	0.460
100	176	0.524

7.5 Summary of the project retention volume

Table 8 presents a **summary of the project's retention volume**. The **total retention volume** of the project is **899 m³**.

Table 8: Summary of the project retention volume

	Volume(m ³)
Parking surface retention	24
Retention basin	293
Roof surface retention volume	406
Dry swale volume	176
Total volume	899

7.6 Water quality control

The City of Ottawa requires a minimum removal rate of 80% of suspended solids (TSS) for this project. A 25 mm design storm, as specified on page 4-57 of the MOE Stormwater Management Planning and Design Manual, was used to determine the water quality flow. This flow was used to size the equipment required for the treatment of TSS and hydrocarbons.

The water quality flow is shown in Figure 8. A hydrodynamic separator (OGS) will be installed upstream of the retention basin to capture 80% of TSS and oil before reaching the downstream retention basin. The calculations and design of the OGS are provided in Appendix B. The **flow rate to be treated is 8.738 L/s**. The **figure below shows the flow rate curve to be treated**. See appendix B for more detail of the OGS sizing.

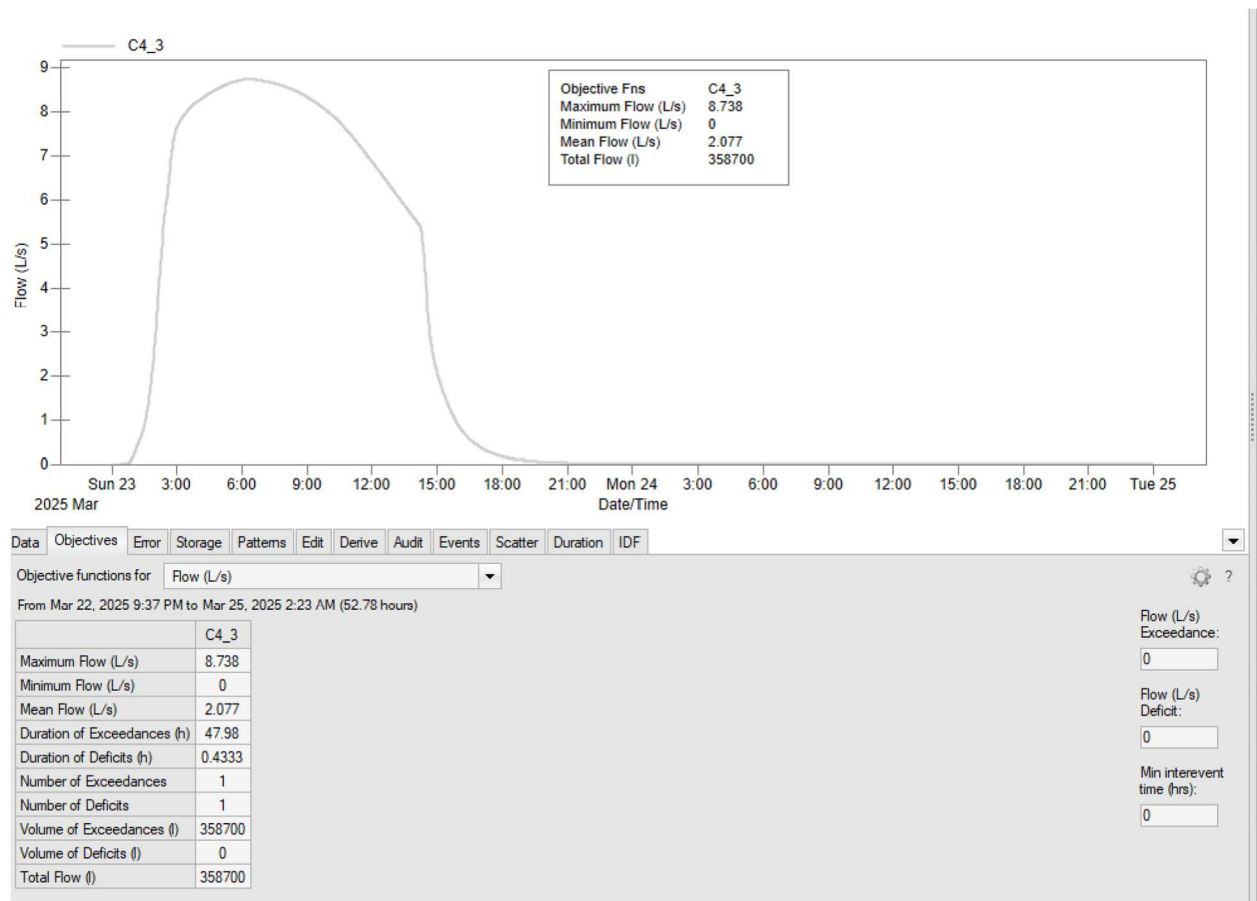


Figure 8: flow rate to be treated

7.6.1 Regulation Manhole

Upstream of the retention basin, a regulation manhole is installed. This manhole is fitted with a wall designed to accommodate orifices for controlling water from quality storm events, thereby ensuring

compliance with pre-development flow conditions. The table 9 below summarizes the return periods, quality storm volumes, and orifice diameters.

Table 9: orifice for 5-year, 25 year and 25 mm, weir for 100 years

Rain	Orifice (mm)	Weir (mm)
5 yr	90	-
25 yr	90	-
100 yr	-	Length: 1200 Height: 200mm
25 mm	100	-

8 Proposed Drainage Network

The layout of the stormwater drainage network for the warehouse is illustrated on the Site Servicing Plan C-001 accompanying this technical memorandum. The network was modeled using the PCSWMM software, considering the parameters presented in Table 2. The project's drainage network is connected to a 450 mm culvert, which conveys runoff from the development area as well as roof drainage from the warehouse to the ditch. Figure 9 shows the drainage network layout.

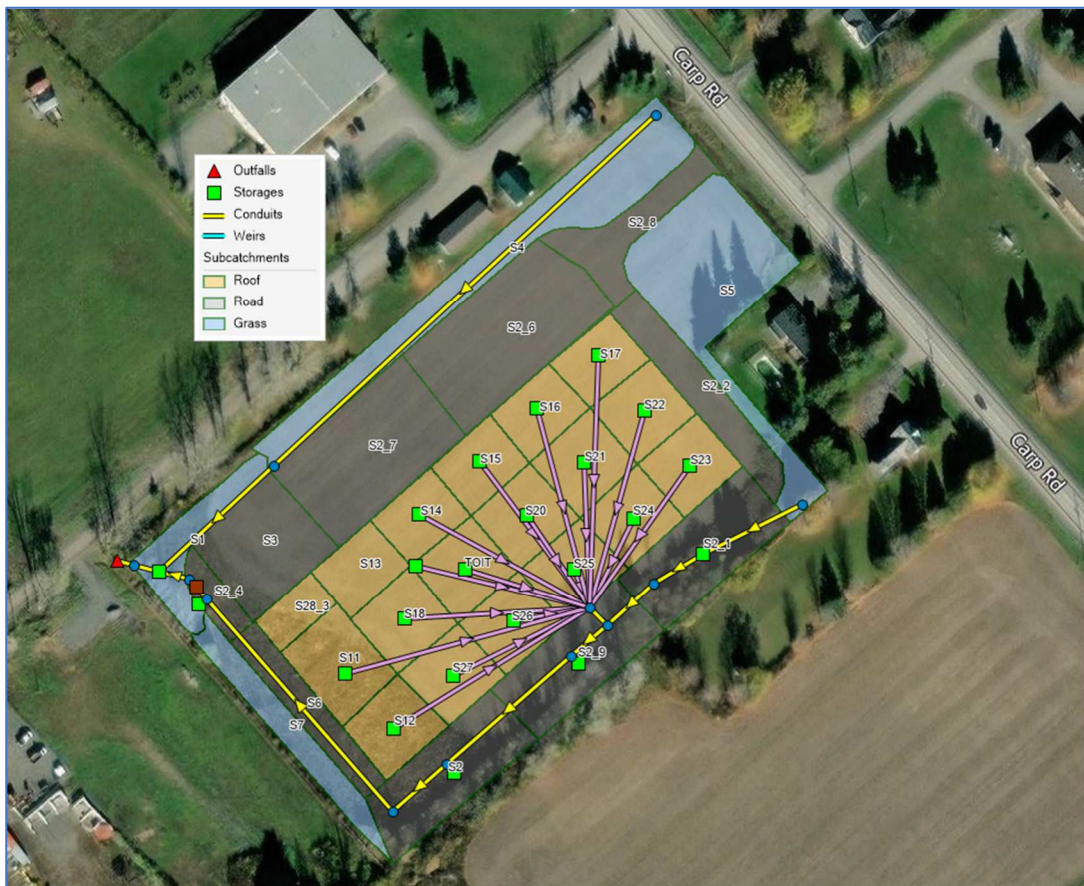


Figure 9:Runoff conveyance network to the municipal drainage system

9 Sanitary Service

There is no sanitary sewer located within Carp Road nearby this current project. The sanitary outflows that will be produced by the current site are treated by a septic system, and release via leaching bed.

The proposed development will be serviced via a treatment system and leaching bed, to be buried at the rear (north) of the property beside the main entrance facing Carp Road.

The total anticipated wet sanitary flow was estimated to be 5,400 l/day refer to plan PH5068-1 "Sewage system layout plan".

Refer to Appendix E for the sanitary sewer design sheet. On October 21, 2025, the city of Ottawa has provided the permit 25-380 to build the sewage system.

10 Water Supply and fire protection

10.1.1 Domestic Water Supply

An existing new drilled well located at 3698 mm of the Fire pump room of the building will provide the domestic water supply. A "Hydrogeological Assessment and Terrain Analysis" prepared for this current

project has demonstrated that the preferred water supply intercepted by this new well contains a water supply that is potable and contains only elevated concentrations of hardness.

For details related to pumps and pipes that provide domestic water supply, see Mechanical Engineering.

10.1.2 Water Supply for Firefighting

The closest fire station km which is Ottawa Fire Station 64 is located at 4.1km at 475 Donald B. Munro Dr, Kinburn, On. The nearest approved water supply, Hydrant 342020HP001 is within 1.0 km at 273 Russ Bradley Road, Ottawa, ON.

Appendix D presents the calculation of the required fire water supply in accordance with the Ontario Building Code (OBC) Section 3.2.5.7 and related tables. The determined minimum water supply, flow rate, and storage requirements for fire protection are as follow:

- Minimum required water supply: 162,000 L
- Flow rate: 2,700 L/min for 60 minutes
- Effective Storage: 2 tanks of 135,000 L each for a total of 270,000 L

The two water storage tanks will supply adequate water by connecting to a safety blue dry hydrant in accordance with City of Ottawa Standard Drawing W53. The dry hydrant is positioned near the remote fire protection hydrants, as illustrated on the civil plans.

Appendix A: Network Profiles



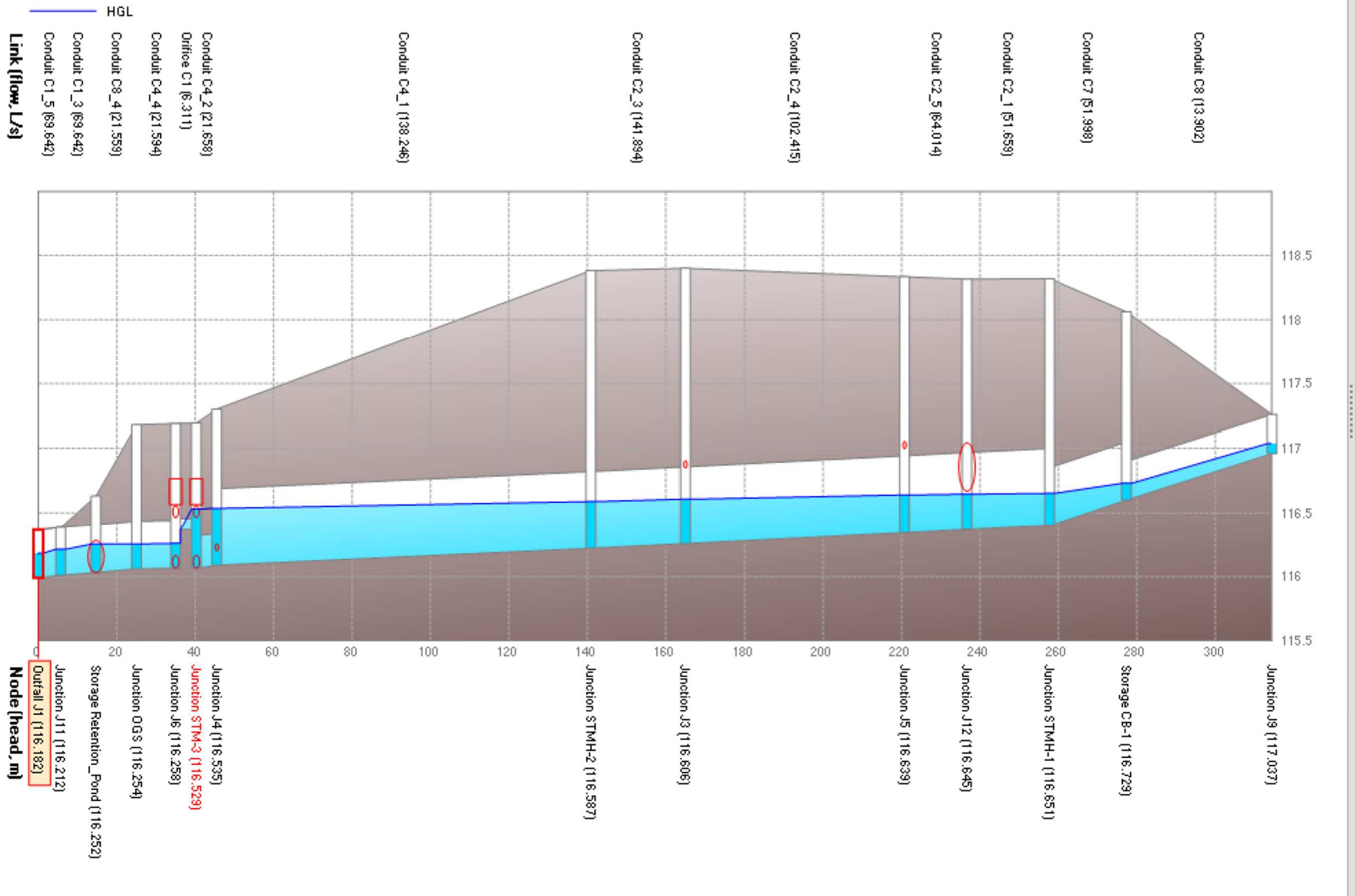


Figure 10: network profile 1/25 year

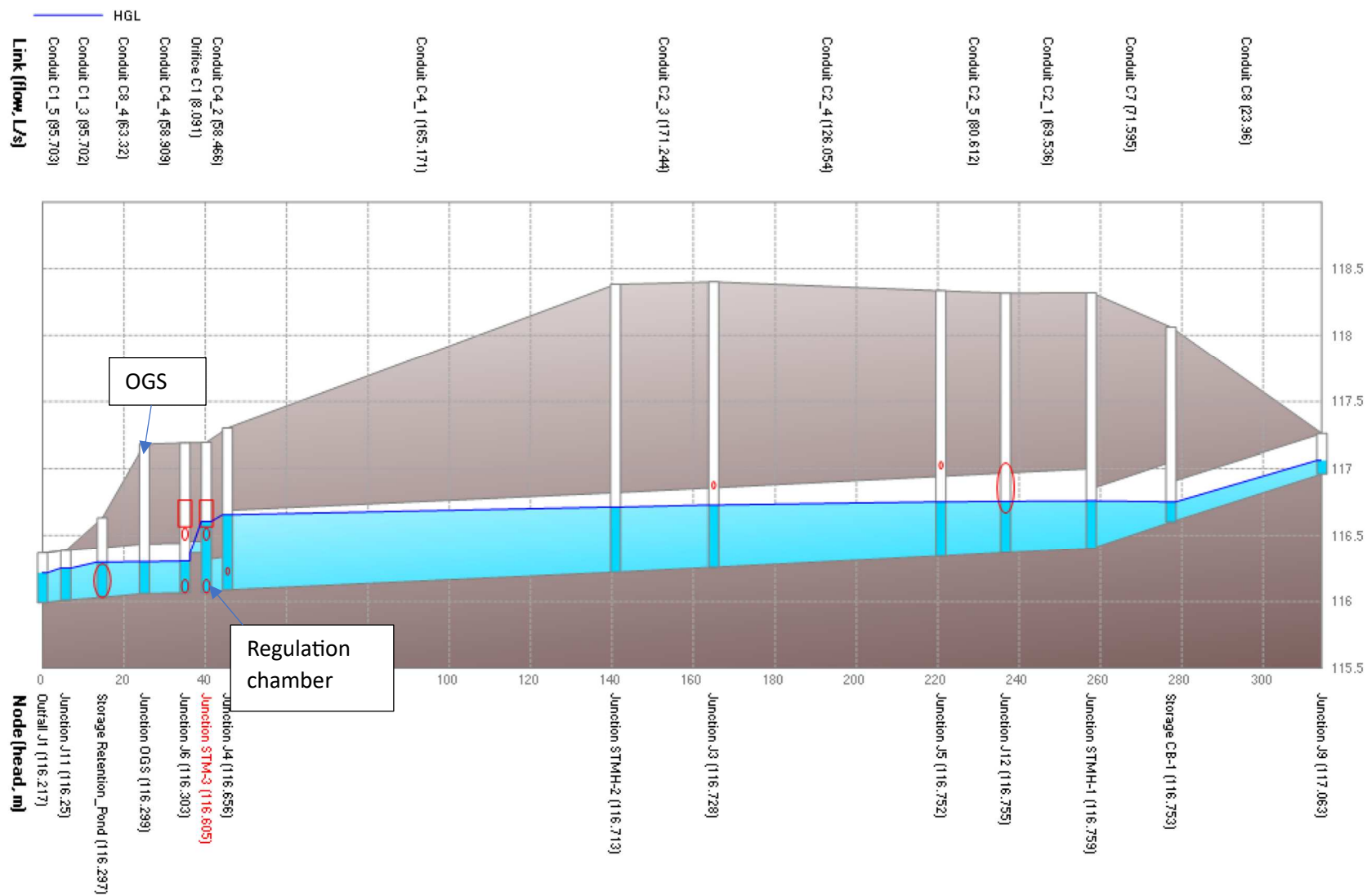
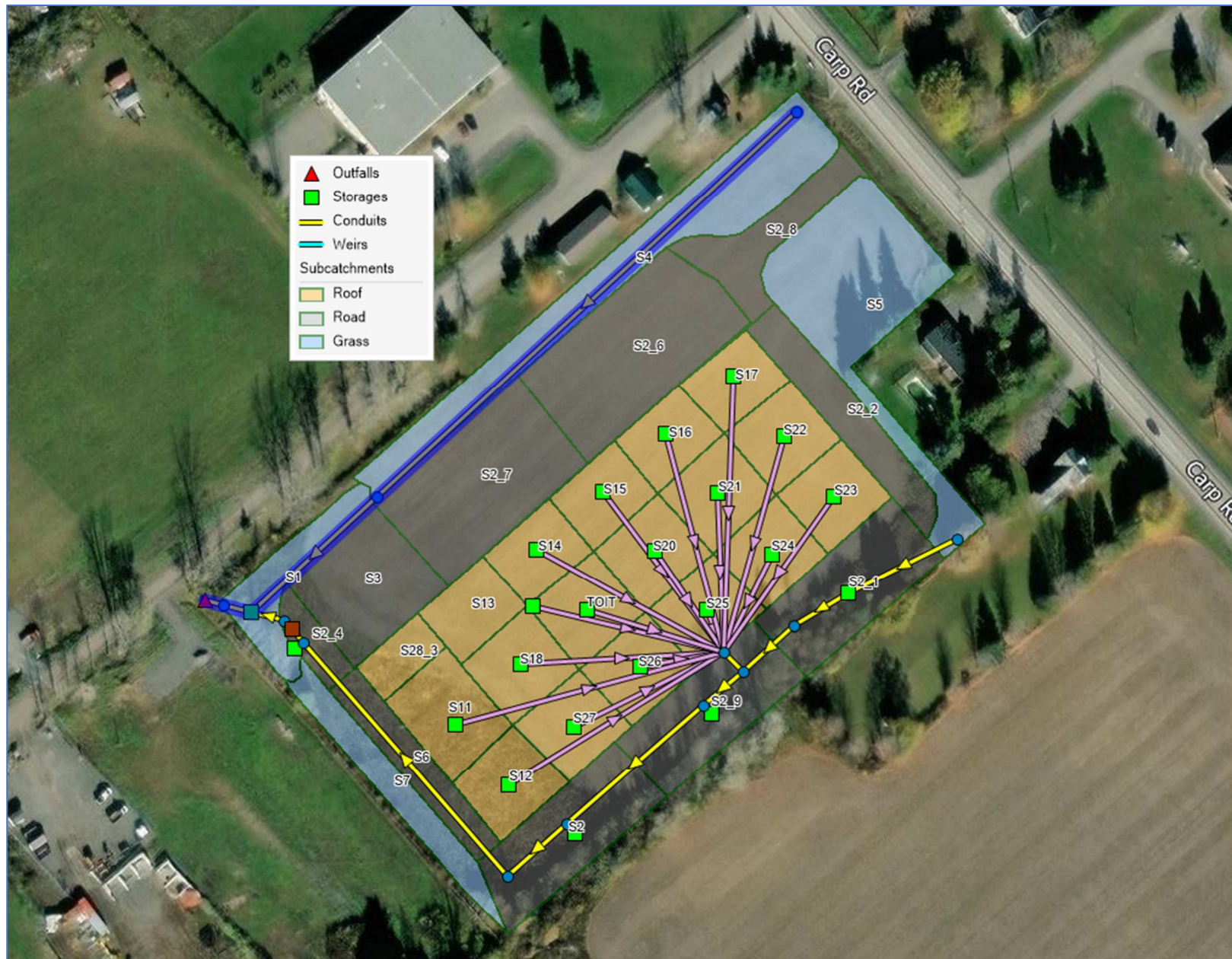


Figure 11:network profile 1/100 year



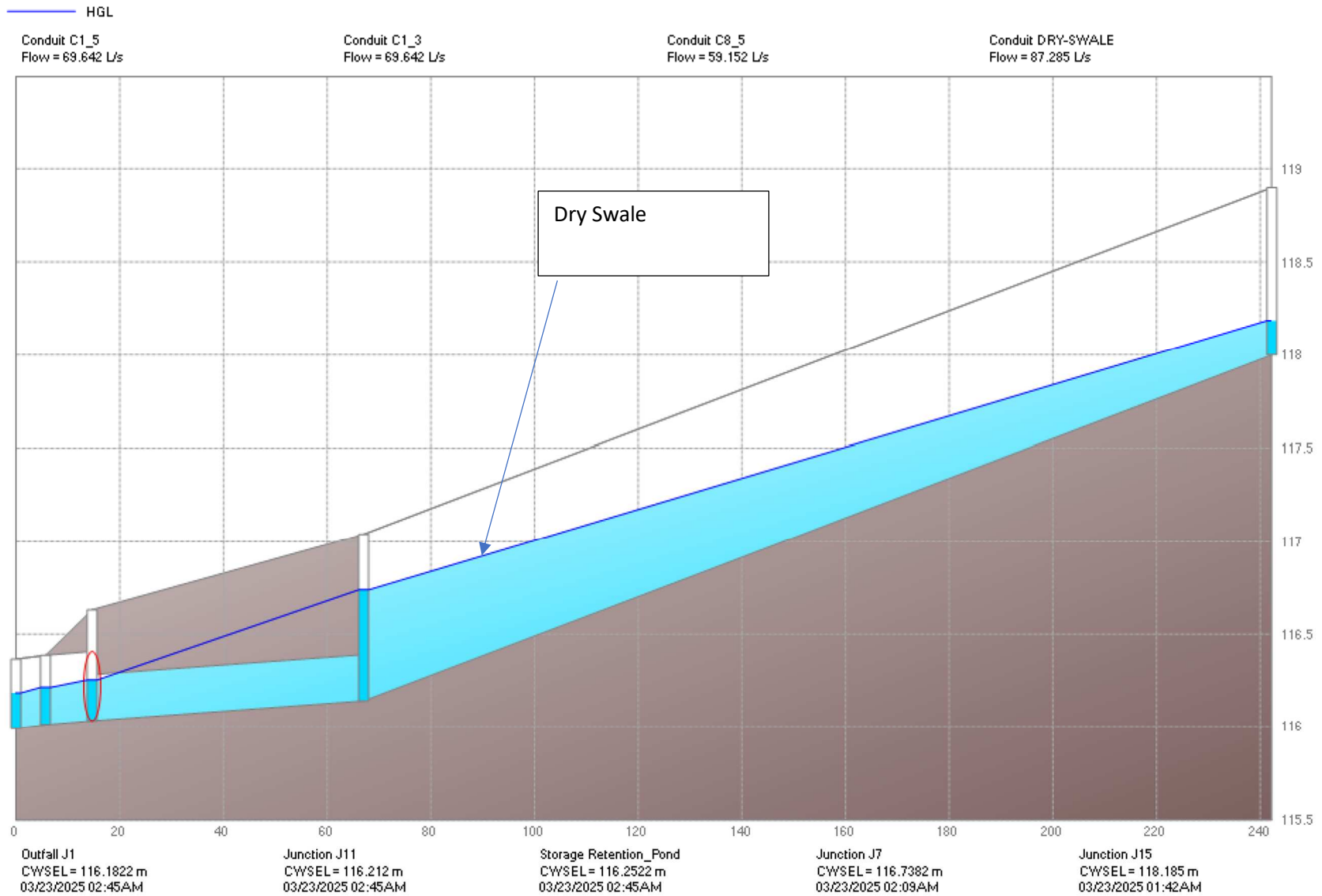


Figure 12:network profile 1/25 year

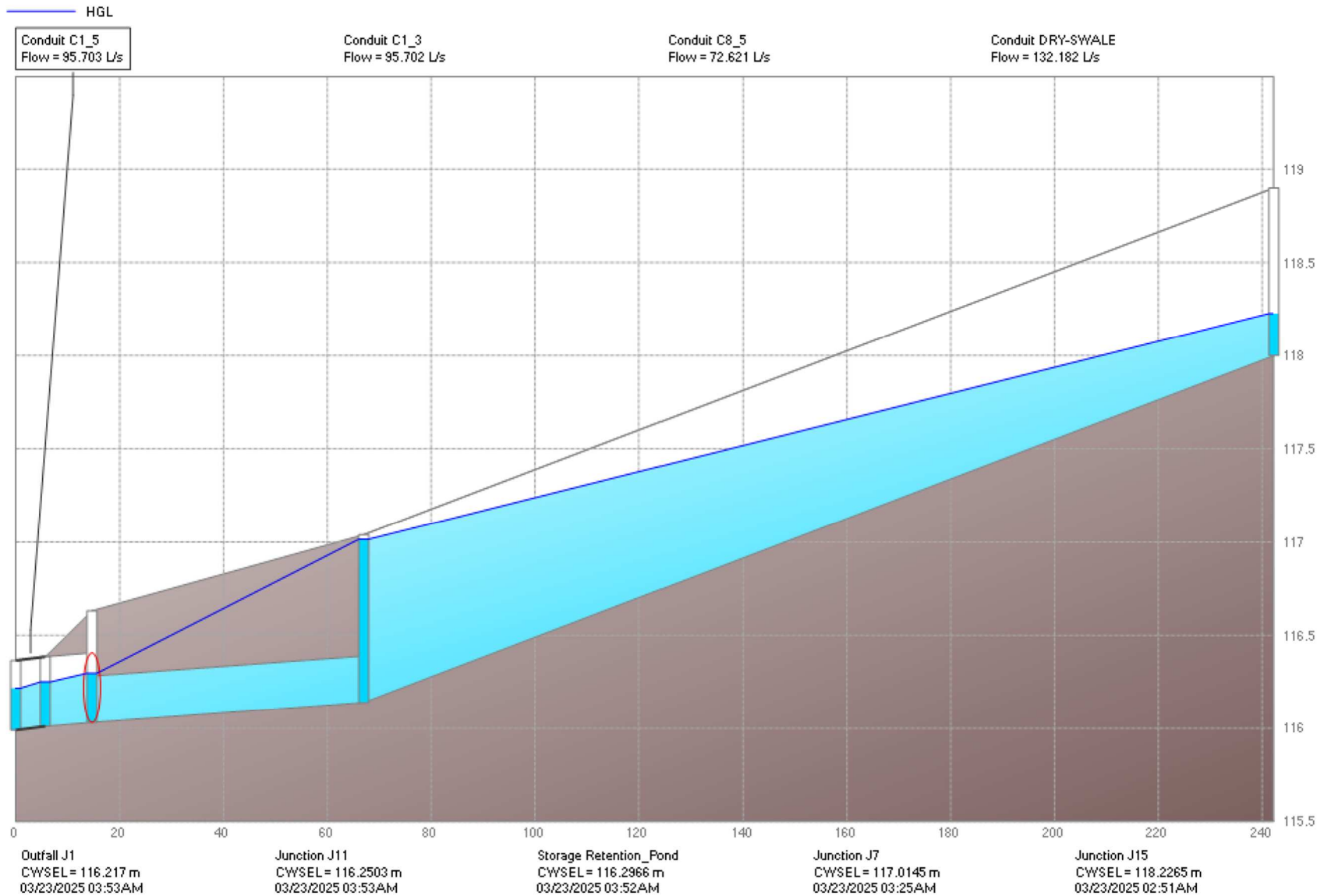


Figure 13:network profile 1/100year

Appendix B- OGS-Sizing

Hydro First Defense® - HC



Rev. 9.4

Project Name: **CAP-WOOD** Report Date: **2025-04-06** Paste
 Street: **N/A** City: **Ottawa**
 Province: **Ontario** Country: **Canada**
 Designer: **Jean Geral Mesidor ,ing** email:

Treatment Parameters:

Structure ID: **OGS-1**
 TSS Goal: **80 % Removal**
 TSS Particle Size: **Fine**
 Area: **1.25 ha**
 Percent Impervious: **71%**
 Rational C value: **0.73** Calc. Cn
 Rainfall Station: **Ottawa, ONT** MAP
 Peak Storm Flow: **94 L/s**

RESULTS SUMMARY

Model	TSS	Volume
FD-3HC	80.5%	95.8%
FD-4HC	84.9%	99.4%
FD-5HC	88.9%	99.8%
FD-6HC	91.1%	100.0%
FD-8HC	94.5%	99.9%

Net Annual Removal Model: FD-3HC

Intensity ⁽¹⁾	Fraction of Rainfall ⁽¹⁾	FD-3HC Removal Efficiency ⁽²⁾	Weighted Net Annual Efficiency
(mm/hr)	(%)	(%)	(%)
0.50	0.1%	96.5%	0.1%
1.00	14.1%	90.4%	12.8%
1.50	14.2%	87.1%	12.4%
2.00	14.1%	84.8%	12.0%
2.50	4.2%	83.1%	3.5%
3.00	1.5%	81.7%	1.2%
3.50	8.5%	80.5%	6.9%
4.00	5.4%	79.5%	4.3%
4.50	1.2%	78.6%	0.9%
5.00	5.5%	77.9%	4.3%
6.00	4.3%	76.6%	3.3%
7.00	4.5%	75.5%	3.4%
8.00	3.1%	74.5%	2.3%
9.00	2.3%	73.7%	1.7%
10.00	2.6%	73.0%	1.9%
20.00	9.2%	68.5%	6.3%
30.00	2.6%	65.9%	1.7%
40.00	1.2%	64.2%	0.7%
50.00	0.5%	62.9%	0.3%
100.00	0.7%	58.9%	0.4%
150.00	0.1%	56.8%	0.0%
200.00	0.0%	55.3%	0.0%

Model Specification:

Model: **FD-3HC**
 Diameter: **900 mm**
 No Bypass Flow: **8.00 L/s**
 Peak Flow Capacity: **425.00 L/s**
 Sediment Storage: **0.31 m³**
 Oil Storage: **473.00 L**

Installation Configuration:

Placement: **Online**
 Outlet Pipe Size: **450 mm** OK
 Inlet Pipe 1 Size: **450 mm** OK
 Inlet Pipe 2 Size: **mm** OK
 Inlet Pipe 3 Size: **mm** OK

Rim Level: **116.060 m** Calc Invs.
 Outlet Pipe Invert: **m**
 Invert Pipe 1: **m** OK!
 Invert Pipe 2: **m**
 Invert Pipe 3: **m**

Total Net Annual Removal Efficiency: 80.5%

Total Annual Runoff Volume Treated: 95.8%

1. Rainfall Data: 1960:2007, HLY03, Ottawa, ONT, 6105976 & 6105978.

2. Based on third party verified data and approximating the removal of a PSD similar to the STC Fine distribution

3. Rainfall adjusted to 5 min peak intensity based on hourly average.

Designer Notes:

Hydro
International



1	Vortex Chamber Diameter	900 mm
2	Inlet Pipe Diameter	450 mm
3	Oil Storage Capacity	473.00 L
4	Min. Provided Sediment Storage Capacity	0.31 m ³
5	Outlet Pipe Diameter	450 mm
6	Height(Final Grade to Outlet Invert)	116060 mm
7	Sump Depth(Outlet Invert to Sump)	#REF! mm
	Total Depth	#REF! mm

[illegible]

Verification Statement



Hydro International First Defense® HC Oil Grit Separator Registration number: (V-2018-10-01) Date of issue: 2018-October-15 (rev 2019-02-01)

Technology type	Oil Grit Separator		
Application	Technology to remove oil, sediment, trash and debris from stormwater and snowmelt runoff as well as other pollutants that attach to sediment particles, such as nutrients and metals		
Company	Hydro International		
Address	94 Hutchins Drive, Portland, Maine USA 04102	Phone	+1-207-756 6200
Website	https://www.hydro-int.com		
E-mail	dscott@hydro-int.com		

Verified Performance Claims

The Hydro International First Defense® High Capacity (HC) Oil Grit Separator (OGS) was tested by Good Harbour Laboratories Inc. (GHL), Mississauga, Ontario, Canada in 2018. The performance test results were verified by Toronto and Region Conservation Authority (TRCA), Vaughan, Ontario, Canada following the requirements of ISO 14034:2016 and the VerifiGlobal Performance Verification Protocol. The following performance claims were verified:

Capture test¹:

With a false floor set to 50% of the manufacturer's recommended maximum sediment storage depth and an influent test sediment concentration of 200 mg/L, the First Defense® HC OGS device removes 67, 60, 55, 50, 45, 45, and 41 percent of influent sediment by mass at surface loading rates of 40, 80, 200, 400, 600, 1000, and 1400 L/min/m², respectively.

Scour test¹:

With 10.2 cm (4 inches) of test sediment pre-loaded onto a false floor reaching 50% of the manufacturer's recommended maximum sediment storage depth, the First Defense® HC OGS device generates adjusted effluent² concentrations of 0, 0, 11, 2, and 0 mg/L at 5-minute duration surface loading rates of 200, 800, 1400, 2000, and 2600 L/min/m², respectively.

¹ The claims can be applied to other units smaller or larger than the tested unit as long as the untested units meet the scaling rule specified in the Procedure for Laboratory of Testing of Oil Grit Separators (Version 3.0, June 2014)

² The effluent suspended sediment concentration is adjusted based on the background concentration and the smallest 5% of particles captured during the 40 L/min/m² sediment capture test (see Table 2)

Technology Application

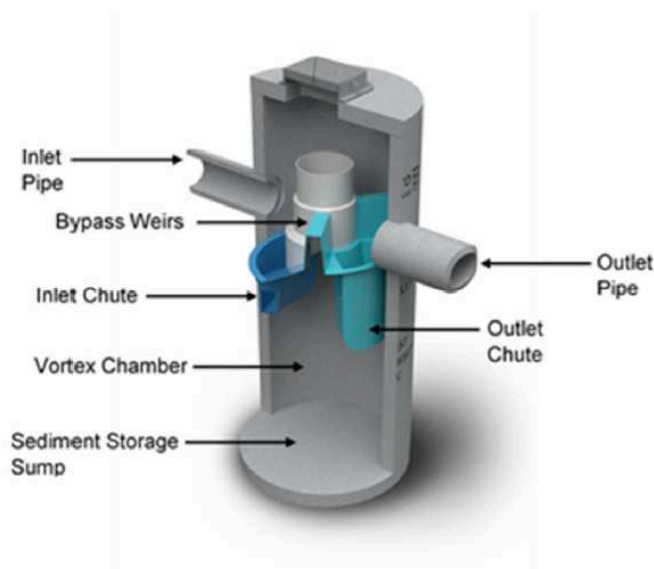
The First Defense® HC (FDHC) Oil Grit Separator can be used as a stand-alone stormwater treatment technology, depending on water quality objectives, or as a pretreatment component in a treatment train when higher TSS removals are required and polishing or volume reduction best management practices (BMPs), such as infiltration or bio-infiltration, are installed downstream. FDHC applications include: stormwater treatment at the point of entry into the drainage line; sites constrained by space, topography or drainage profiles with limited slope and depth of cover; retrofit installations where stormwater treatment is placed on or tied into an existing storm drain line; pretreatment for filters, infiltration, other sedimentation BMPs and storage.

Technology Description

The Hydro International First Defense® HC (FDHC) is an Oil Grit Separator designed to remove oil, sediment, trash and debris from stormwater and snowmelt runoff as well as other pollutants that attach to sediment particles, such as nutrients and metals. The patented flow modifying internal components are designed to be inserted into standard precast concrete manholes where they collect and treat runoff as part of the drainage system (Figure 1).

Flow entering the manhole via an inlet pipe or inlet grate is diverted into a vortex chamber beneath a separation module that includes both inlet/outlet chutes and bypass weirs. The internal bypass weirs divert flows greater than the maximum design treatment flow rate over the separation module and away from the vortex chamber where oil, sediment, debris and attached pollutants are accumulating. This function prevents high velocities from re-suspending previously captured pollutants during large storm events. The FDHC can be designed and sized to function effectively in either online or offline configurations.

Figure 1: Hydro International First Defense® HC Oil Grit Separator



The test unit was 1.2 m (4 foot) in diameter with a 1.51 m (59 5/8 inches) sump depth measured from the outlet invert to the floor of the unit. The effective treatment area (also known as the effective sedimentation area) is 1.2 m² (12.6 ft²). The maximum sediment storage depth is 0.457 m (18 inches).

Description of Test Procedure

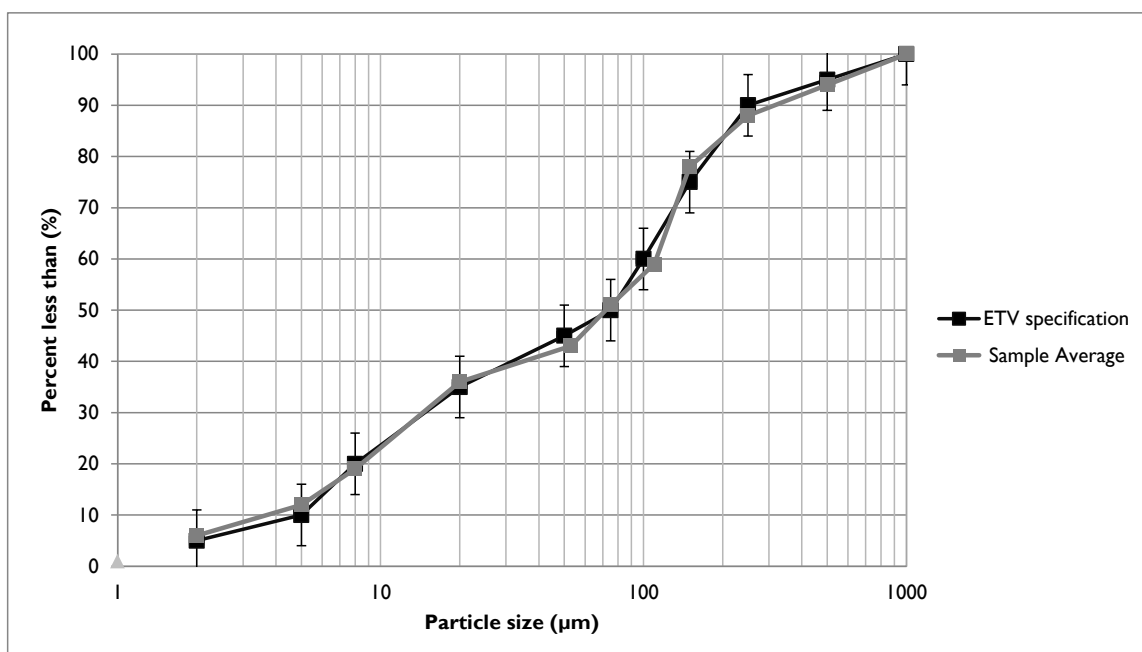
The test data and results for this verification were obtained from independent testing conducted on a 1.2 m (48 inch) diameter Hydro International First Defense® HC OGS device, in accordance with the *Procedure for Laboratory Testing of Oil-Grit Separators (Version 3.0, June 2014)*. The laboratory test procedure was originally prepared by the Toronto and Region Conservation Authority (TRCA) in association with a 31 member advisory committee from various stakeholder groups.

Verification Results

Toronto and Region Conservation Authority verified the performance test data and other information pertaining to the First Defense® HC Oil Grit Separator. A Verification Plan was prepared to guide the verification process based on the requirements of ISO 14034:2016 and the VerifiGlobal Performance Verification Protocol.

The test sediment consisted of ground silica (1 – 1000 micron) with a specific gravity of 2.65, uniformly mixed to meet the particle size distribution specified in the testing procedure. The *Procedure for Laboratory Testing of Oil Grit Separators* requires that the three sample average of the test sediment particle size distribution (PSD) meet the specified PSD percent less than values within a boundary threshold of 6%, and a median particle size no greater than 75 µm. Comparison of the individual sample and average test sediment PSD to the specified PSD shown in Figure 2 indicates that the test sediment used for the capture and scour tests met this condition. The median particle size was 73 µm. Samples from test sediment batches used for each run met the specified PSD within the required tolerance thresholds.

Figure 2 - The three sample average particle size distribution (PSD) of the test sediment used for the capture and scour test compared to the specified PSD



The capacity of the device to retain sediment was determined at seven surface loading rates using the modified mass balance method. This method involved measuring the mass and particle size distribution of the injected and retained sediment for each test run. Performance was evaluated with a false floor simulating the technology filled to 50% of the manufacturer's recommended maximum sediment storage depth. The test was carried out with clean water that maintained a sediment concentration below 20 mg/L. Based on these conditions, removal efficiencies for individual particle size classes and for the test sediment as a whole were determined for each of the tested surface loading rates (Table 1).

In some instances, the removal efficiencies were above 100% for certain particle size fractions. These discrepancies are not unique to any one test laboratory and are attributed to errors relating to the blending of sediment, collection of representative samples for laboratory submission, and laboratory analysis of PSD. Due to these errors, caution should be exercised in applying the removal efficiencies by particle size fraction for the purposes of sizing the tested device (see Bulletin # CETV 2016-11-0001). The results for “all particle sizes by mass balance” (see Table 1) are based on measurements of the total injected and retained sediment mass, and are therefore not subject to blending, sampling or PSD analysis errors.

Table 1 - Removal efficiencies (%) of the First Defence HC at specified surface loading rates

Particle size fraction (µm)	Surface loading rate (L/min/m ²)						
	40	80	200	400	600	1000	1400
>500	100*	100*	100*	81	72	86	80
250 - 500	100*	97	99	100*	100*	59	88
150 - 250	100*	91	95	93	47	100*	84
105 - 150	96	89	94	89	90	70	75
75 - 105	100*	90	95	77	-20**	100	51
53 - 75	74	100*	97	62	100*	46	37
20 - 53	60	33	10	5	4	0	0
8 - 20	29	16	8	3	3	1	1
5 - 8	8	5	8	4	4	4	3
<5	5	3	0	0	0	3	3
All particle sizes By mass balance	66.5	59.9	55.4	50.2	44.9	45.2	40.5

* Removal efficiencies were calculated to be above 100%. Calculated values ranged between 101 and 184% (average 115%). See text and Bulletin # CETV 2016-11-0001 for more information.

** An outlier in the retained sediment sample sieve data resulted in negative removal for this size fraction. The outlier at the 75 µm particle size is shown in Figure 3.

Figure 3 - Particle size distribution of sediment retained in the First Defence HC in relation to the injected test sediment average

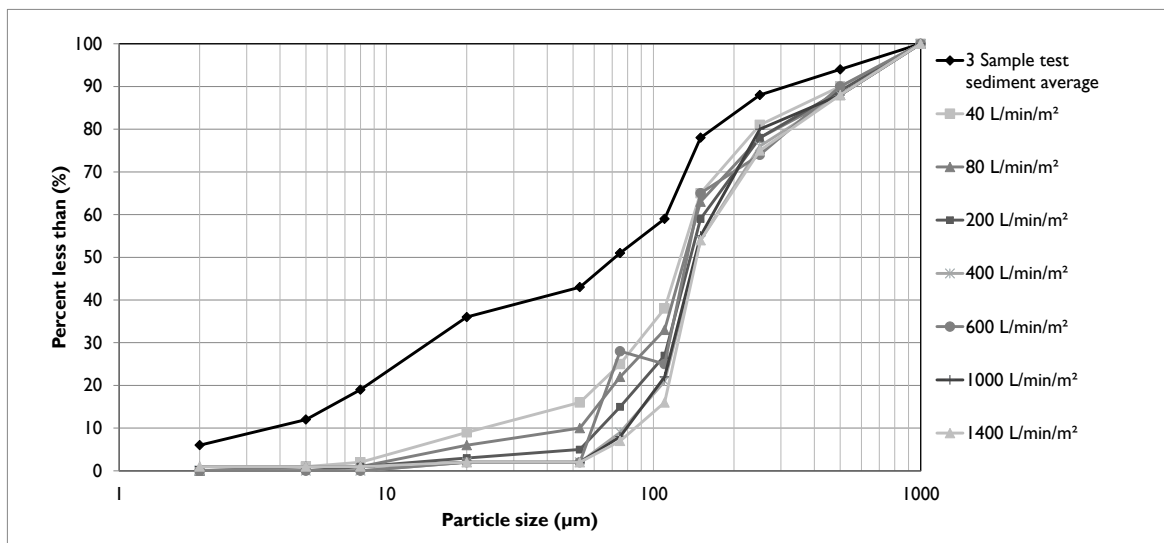


Figure 3 compares the particle size distribution (PSD) of the three sample average of the test sediment to the PSD of the sediment retained by the FDHC device at each of the tested surface loading rates. As expected, the capture efficiency for fine particles was generally found to decrease as surface loading rates increased, particularly in the 40 to 400 L/min/m² range.

Table 2 shows the results of the sediment scour and re-suspension test for the First Defense® HC unit. The scour test involved preloading 10.2 cm (4 inches) of fresh test sediment into the sedimentation sump of the device. The sediment was placed on a false floor to mimic a device filled to 50% of the maximum recommended sediment storage depth. Clean water was run through the device at five surface loading rates over a 30 minute period. Each flow rate was maintained for 5 minutes with a one minute transition time between flow rates. Effluent samples were collected at one minute sampling intervals and analyzed for Suspended Sediment Concentration (SSC) and PSD by recognized methods. The effluent samples were subsequently adjusted based on the background concentration of the influent water. The smallest 5% of particles captured during the 40 L/min/m² sediment capture test (13.5 µm in this case) was used to further adjust the effluent sediment concentrations, as per the method described in Bulletin # CETV 2016-09-0001. Results showed average adjusted effluent sediment concentrations below 11 mg/L at all surface loading rates. Effluent concentrations would be expected to decrease at higher flow rates since bypass over the insert bypass weirs was observed to begin at 1,032 L/min/m².

Table 2 - Scour test adjusted effluent sediment concentration at each surface loading rate

Run	Surface loading rate (L/min/m ²)	Run time (min)	Background sample concentration (mg/L)	Average adjusted effluent suspended sediment concentration (mg/L)*
1	200	1:00 – 6:00	0.8	0
2	800	7:00 – 12:00	1.0	0
3	1400	13:00 – 18:00	1.1	10.6
4	2000	19:00 – 24:00	2.8	2.4
5	2600	25:00 – 30:00	6.6	0

*The effluent suspended sediment concentration is adjusted based on the background concentration and the smallest 5% of particles captured during the 40 L/min/m² sediment capture test, as per the method described in Bulletin # CETV 2016-09-0001.

Variances from the Procedure

Minor variances from the *Procedure for Laboratory Testing of Oil-Grit Separators* used as the basis of testing for this verification were as follows:

1. The *Procedure* states that the tested device “must be a full scale commercially available device with the same configuration and components as would be typical for an actual installation.” The unit tested for this verification had the same internal components as would be typical for a commercial installation, but the internal components were placed inside a structure constructed of composite materials, rather than a manhole made of concrete, the latter of which is typical for most installations. The dimensions of the structure were the same as would have been the case had the manhole been concrete. The use of alternate materials for the structure was not believed to significantly affect system performance.
2. As part of the capture test, evaluation of the 40 and 80 L/min/m² surface loading rate was split into 3 and 2 parts, respectively. The test was conducted in parts because of the long duration (i.e. over 10 hours) needed to feed the required minimum 11.3 kg of test sediment into the unit. At the end of the first and second parts of the test, the flow rates were gradually decreased to prevent capture of particles that would have been washed out under normal circumstances. The requirement to split the test into parts was not anticipated in the *Procedure for Laboratory Testing of Oil-Grit Separators*, but has been a common feature of testing at the 40 L/min/m² surface loading rate. Conducting the test in two parts for the 80 L/min/m² surface loading rate is less common. The testing did not assess the significance of the breaks, however, the test laboratory and verifier do not believe that the breaks significantly affected the test results.

Hydro International First Defense® HC Oil Grit Separator Verification Statement

3. During the sediment scour test, the flow rate coefficient of variation (COV) at the 200 L/min/m² surface loading rate of 0.045 slightly exceeded the target COV of 0.04. The average flow rate during the test remained within $\pm 10\%$ of the target flow rate.

Quality assurance

Performance testing and verification of the First Defense® HC Oil Grit Separator were performed in accordance with the requirements of ISO 14034:2016 and the VerifiGlobal Performance Verification Protocol. The verifier, Toronto and Region Conservation Authority, has confirmed that quality assurance requirements were addressed throughout the performance testing process and in the generation of performance test results. This includes reviewing all data sheets and data downloads, as well as overall management of the test system, quality control and data integrity.

Verification Summary

In summary, the First Defense® HC Oil Grit Separator is designed to remove oil, sediment, trash and debris from stormwater and snowmelt runoff as well as other pollutants that attach to sediment particles, such as nutrients and metals. Verification of performance claims for the Hydro International First Defense® HC Oil Grit Separator was conducted by Toronto and Region Conservation Authority based on independent third-party performance test results provided by Good Harbour Laboratories, as well as additional information provided by Hydro International. Table 3 summarizes the verification results in relation to the technology performance parameters that were identified to determine the efficacy of the First Defense® HC Oil Grit Separator.

Table 3 - Summary of Verification Results Against Performance Parameters

Performance Parameter	Verified Performance
Sediment Removal Rate	The sediment removal rate of the FDHC is dependent upon flow rate, particle density and particle size. Removal efficiency decreased with increasing surface loading rate from 67% at 40 L/min/m ² to 41% at 1400 L/min/m ² . The weighted average removal efficiency achieved by the unit will vary depending on the rainfall distribution of the jurisdiction in which it is installed, and site characteristics.
Sediment Scour	When pre-loaded with sediment with a particle size distribution matching that of the feed sediment used in the sediment capture test, the FDHC generated effluent suspended solids concentrations of less than 11 mg/L at surface loading rates ranging from 200 to 2600 L/min/m ² .
Bypass flow rate	The flow rate at which bypass occurs will vary based on model size. For the 1.2 m (4 foot) diameter test unit, the flow rate at which bypass occurred over the insert bypass weirs was 1238 L/min (327 gpm).
Head loss	The loss of hydraulic head across the FDHC was determined by measuring the water elevation difference between the inlet and outlet sides of the insert. Head loss may vary based on model size. For the tested unit the head loss ranged from 2 mm (0.08 inches) at 93.5 L/min (12.3 gpm) to 100 mm (3.94 inches) at 1238 L/min (327 gpm) when bypass was observed to occur. At 327 gpm, when bypass occurred, the depth of the water was 177 mm upstream and 77 mm downstream for a difference of 100 mm (3.94 inches). The highest water elevation difference was 111mm (4.37 inches) at a flow rate of 1635 L/min (431.8 gpm), after which head loss declined up to the maximum measured flow rate of 3036 L/min (801.9 gpm).

What is ISO 14034?

The purpose of environmental technology verification is to provide a credible and impartial account of the performance of environmental technologies. Environmental technology verification is based on a number of principles to ensure that verifications are performed and reported accurately, clearly, unambiguously and objectively. The International Organization for Standardization (ISO) standard for environmental technology verification (ETV) is ISO 14034, which was published in November 2016.

Benefits of ETV

ETV contributes to protection and conservation of the environment by promoting and facilitating market uptake of innovative environmental technologies, especially those that perform better than relevant alternatives. ETV is particularly applicable to those environmental technologies whose innovative features or performance cannot be fully assessed using existing standards. Through the provision of objective evidence, ETV provides an independent and impartial confirmation of the performance of an environmental technology based on reliable test data. ETV aims to strengthen the credibility of new, innovative technologies by supporting informed decision-making among interested parties.

For more information on the First Defense® HC Oil Grit Separator, contact:	For more information on VerifiGlobal, contact:
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Signed for Hydro International: <i>Original signed by:</i> David Scott David Scott Technical Product Manager, Americas Stormwater	Signed for VerifiGlobal: <i>Original signed by:</i> Thomas Bruun Thomas Bruun, Managing Director <i>Original signed by:</i> John Neate John Neate, Managing Director

NOTICE: Verifications are based on an evaluation of technology performance under specific, predetermined operational conditions and parameters and the appropriate quality assurance procedures. VerifiGlobal and the Verification Expert, Toronto and Region Conservation Authority, make no expressed or implied warranties as to the performance of the technology and do not certify that a technology will always operate as verified. The end user is solely responsible for complying with any and all applicable regulatory requirements. Mention of commercial product names does not imply endorsement.

VerifiGlobal and the Verification Expert, Toronto and Region Conservation Authority, provide the verification services solely on the basis of the information supplied by the applicant or vendor and assume no liability thereafter. The responsibility for the information supplied remains solely with the applicant or vendor and the liability for the purchase, installation, and operation (whether consequential or otherwise) is not transferred to any other party as a result of the verification.

Appendix C- Roof drain



MURPHCO SELECTION TOOL - REPORT GENERATED 2025-11-06

PROJECT DATA

PROJECT NAME: PROJET 1
 LOCALITY: OTTAWA CDA RCS ONT
 CONCEPTOR: Jean Geral Mesidor
 COMMENTS:
 UNITS: METRIC
 MAXIMUM FLOW RATE ALLO 6 L/S
 RETURN PERIOD: 25 YEARS

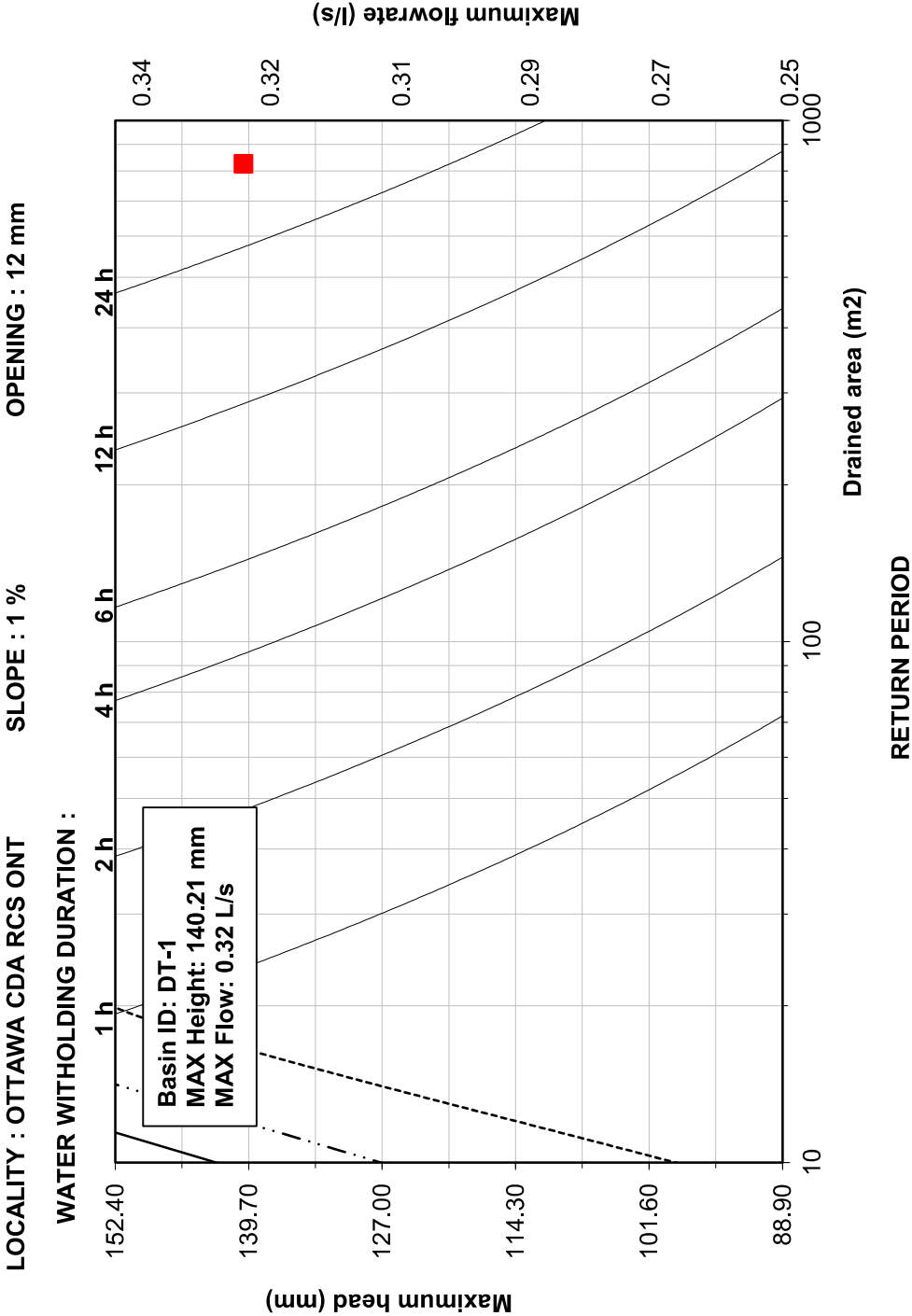
BASINS DATA

ZONE	AREA (m ²)	ADD AREA (m ²)	MAX DIST TO DRAIN (m)	SLOPE (%)	OPENING (mm)	MAX FLOWRATE (L/s)
DT-1	826	0	15	1	(Auto)	(Auto)
DT-2	647	0	15	1	(Auto)	(Auto)
DT-3	1027	0	17	1	91	(Auto)
DT-4	641	0	15	1	(Auto)	(Auto)
DT-5	562	0	15	1	(Auto)	(Auto)
DT-6	665	0	15	1	(Auto)	(Auto)
D-7	646	0	16	1	(Auto)	(Auto)
DT-8	57	0	10	1	(Auto)	(Auto)
DT-9	666	0	16	1	(Auto)	(Auto)
DT-10	655	0	15	1	(Auto)	(Auto)
Dt-11	554	0	17	1	60	(Auto)
DT-12	676	0	15	1	(Auto)	(Auto)
DT-13	624	0	15	1	(Auto)	(Auto)
DT-14	548	0	15	1	(Auto)	(Auto)
DT-15	648	0	15	1	(Auto)	(Auto)
DT-16	633	0	15	1	(Auto)	(Auto)
TOTAL	10075	0				

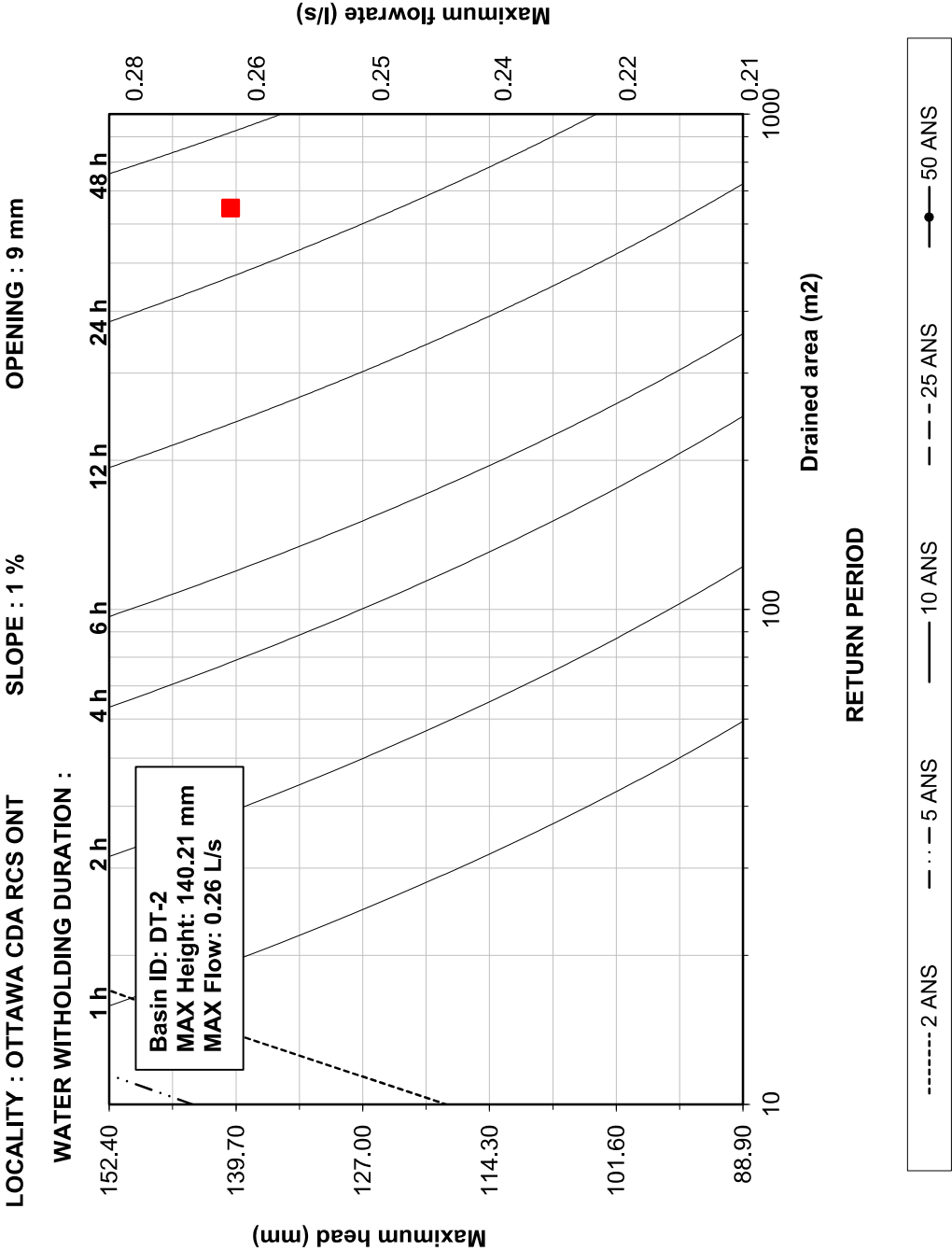
SELECTION RESULT

ZONE	OPENING (mm)	MAX FLOWRATE (L/s)	MAX HEIGHT (mm)	RET. VOL. (L)	RET. TIME (h)	RAIN DURATION
DT-1	12	0.32239137	140.208	33782.5887	35.48	60 min
DT-2	9	0.26497921	140.208	26422.881	33.62	60 min
DT-3	91	1.32931238	149.352	39440.8303	11.88	60 min
DT-4	8.5	0.25488477	140.208	26199.6554	34.58	60 min
DT-5	7	0.22207782	140.208	22974.2968	34.73	60 min
DT-6	9.5	0.27381185	140.208	27152.7838	33.42	60 min
D-7	8.5	0.26056289	146.304	26392.522	34.05	60 min
DT-8	6	0.16592746	99.822	1893.1971	3.82	60 min
DT-9	8	0.25046845	146.558	27265.7783	36.63	60 min
DT-10	8	0.24479032	140.462	26819.7056	36.87	60 min
Dt-11	60	1.20439361	145.796	19801.8961	6.25	60 min
DT-12	8.5	0.25551567	140.208	27672.2177	36.52	60 min
DT-13	7.5	0.23406497	140.208	25548.2242	36.73	60 min
DT-14	6.5	0.21009066	140.208	22421.6648	35.83	60 min
DT-15	8.5	0.25488477	140.208	26494.1603	34.97	60 min
DT-16	8	0.24479032	140.208	25894.0593	35.6	60 min
TOTAL		5.99294651		406176.461		

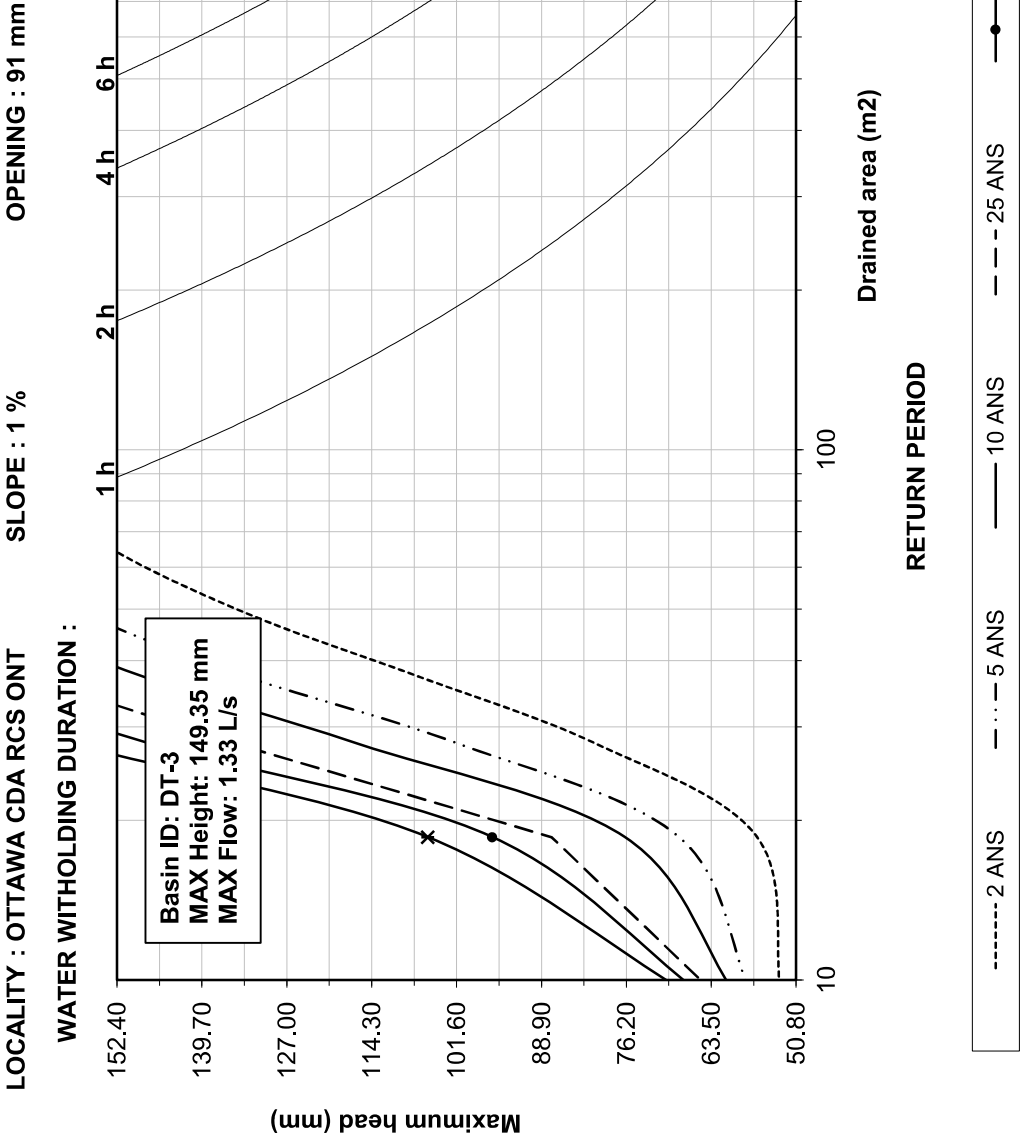
Maximum head vs drained area for different return periods



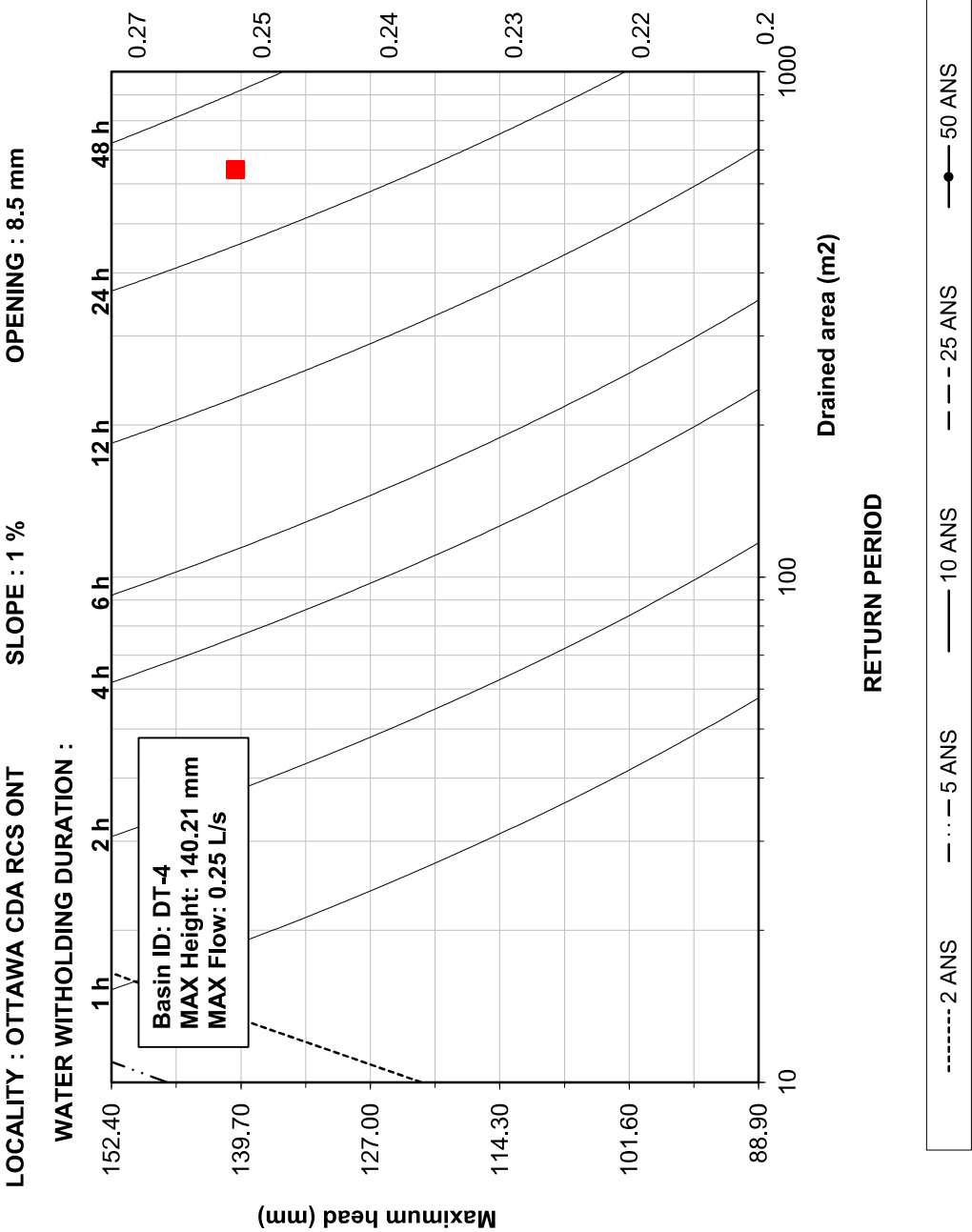
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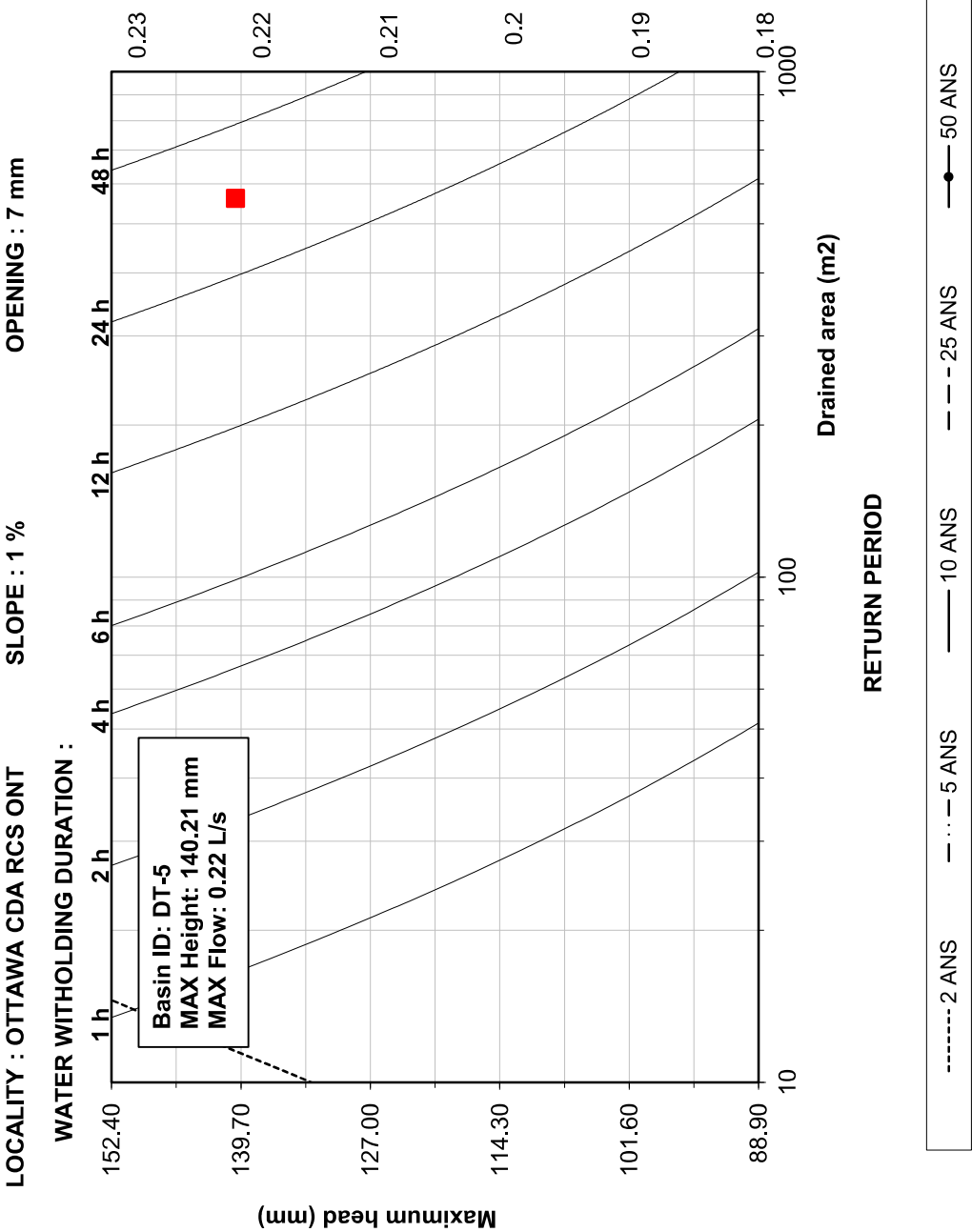
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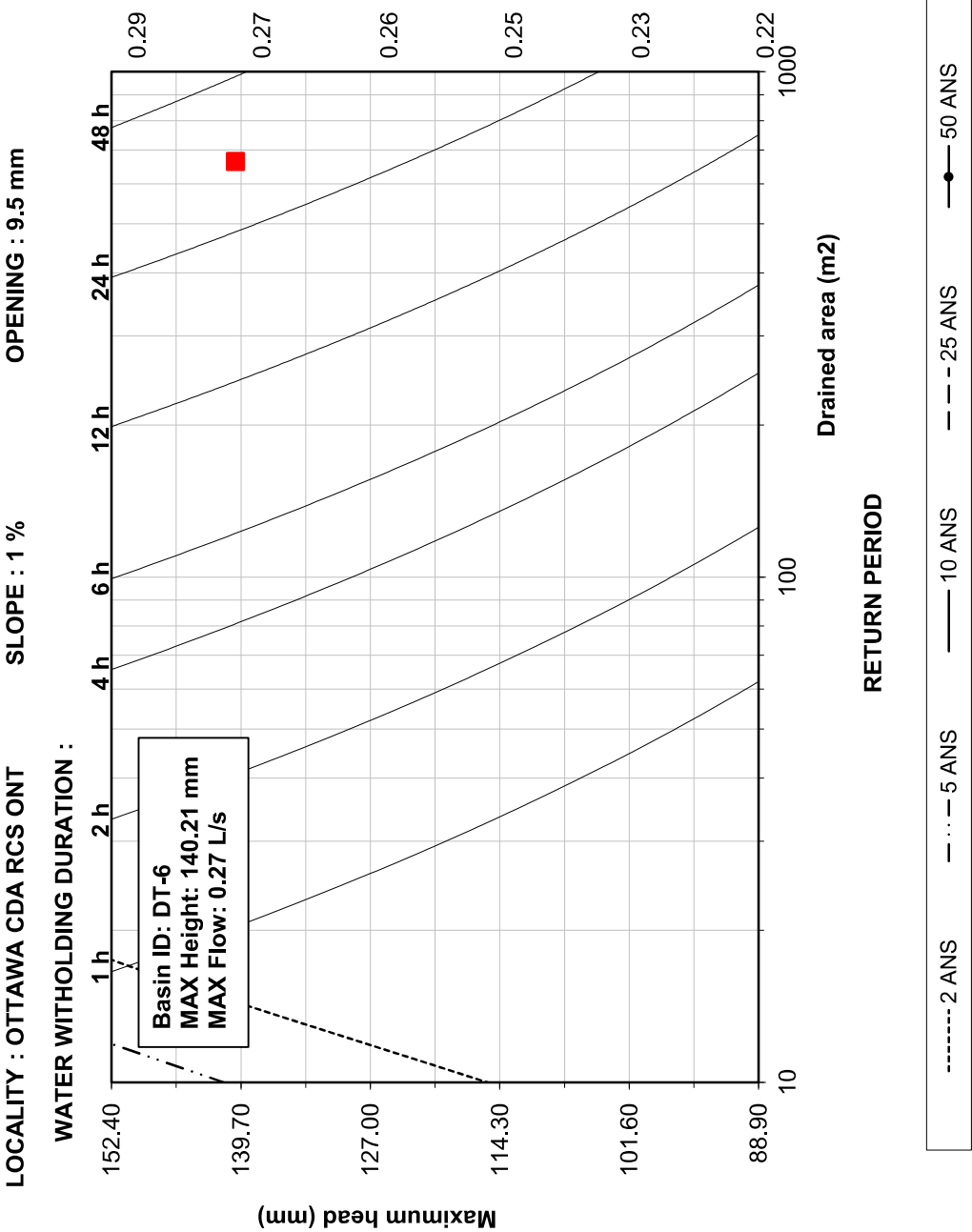
Maximum head vs drained area for different return periods



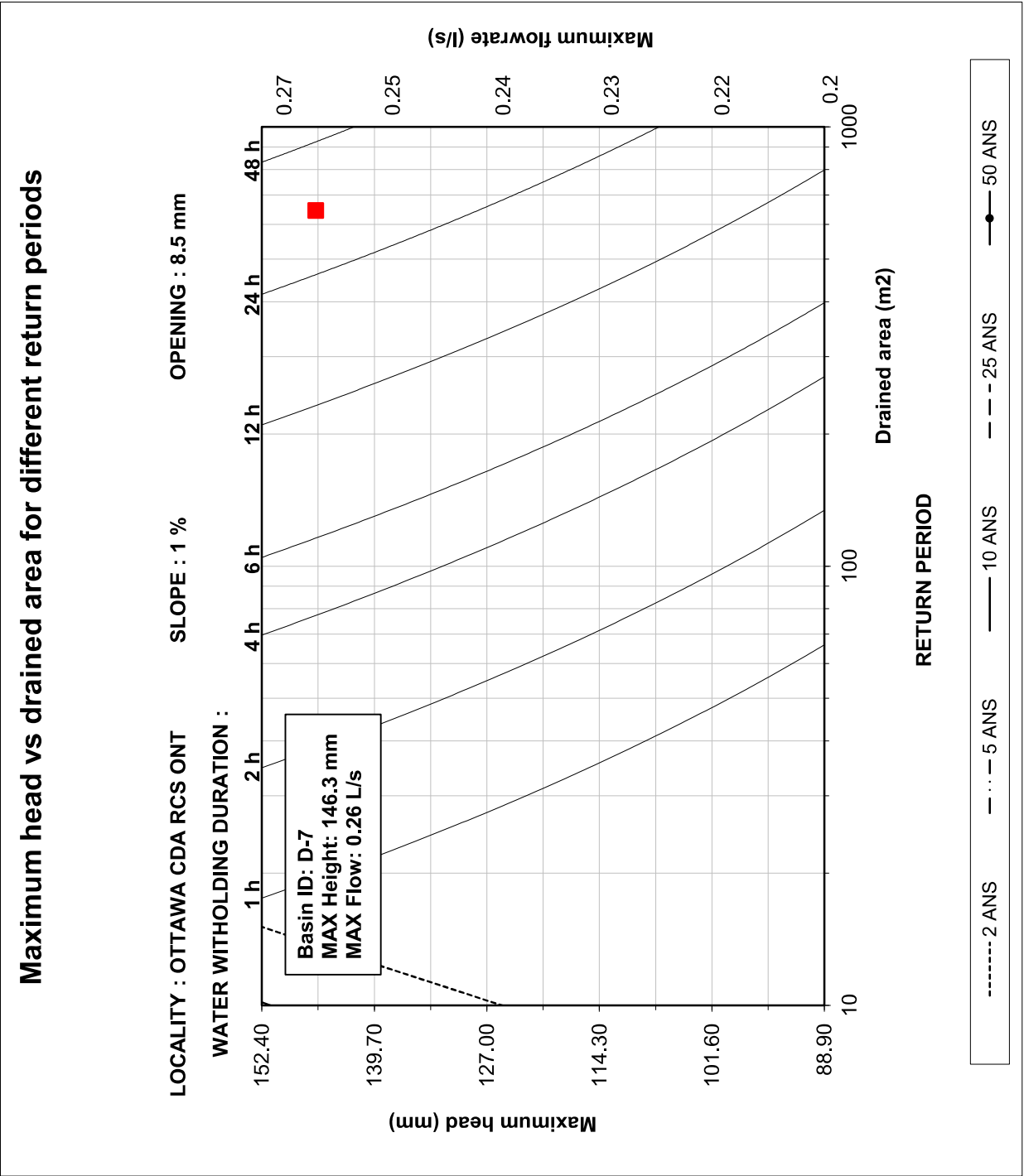
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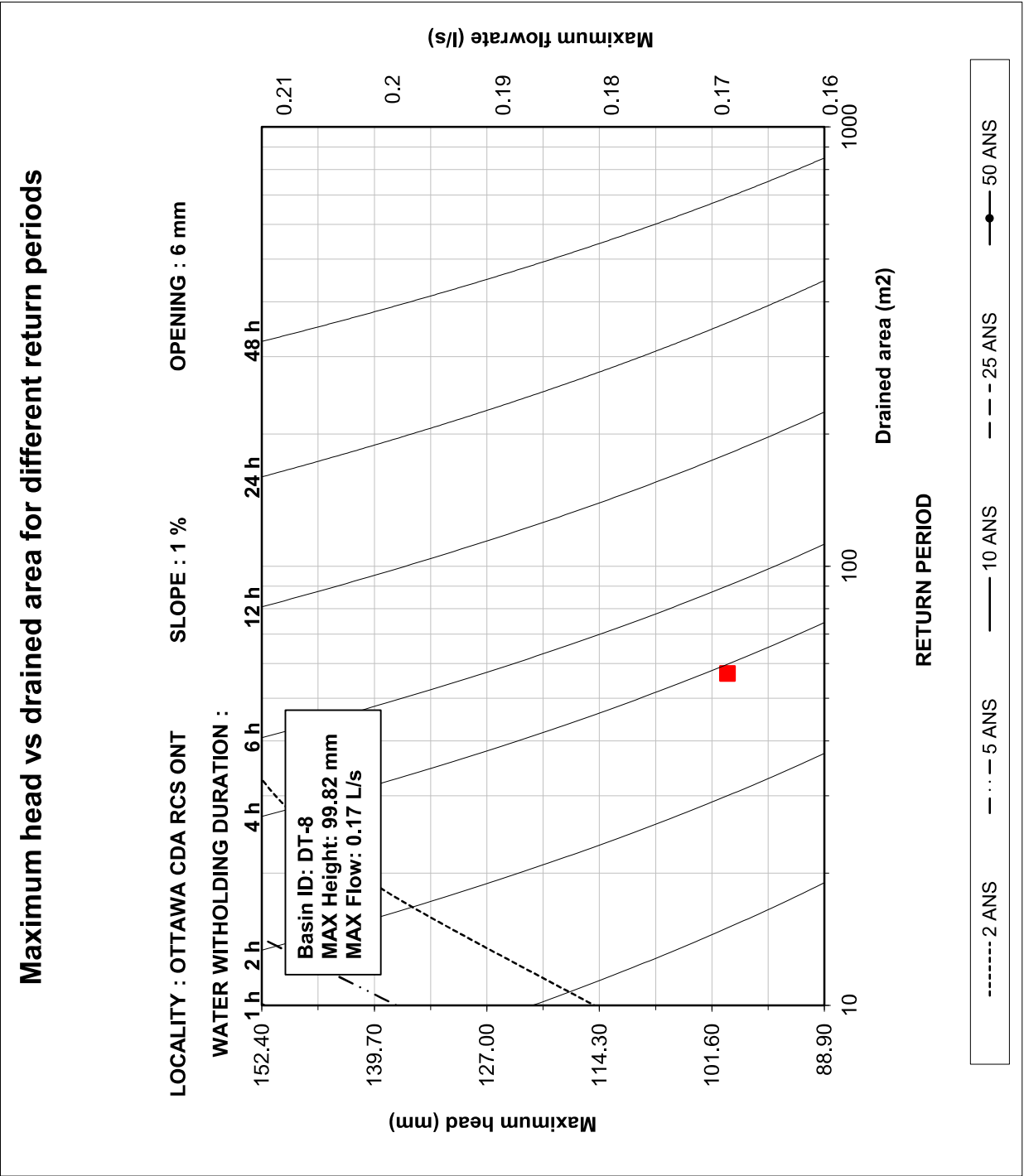
Maximum head vs drained area for different return periods



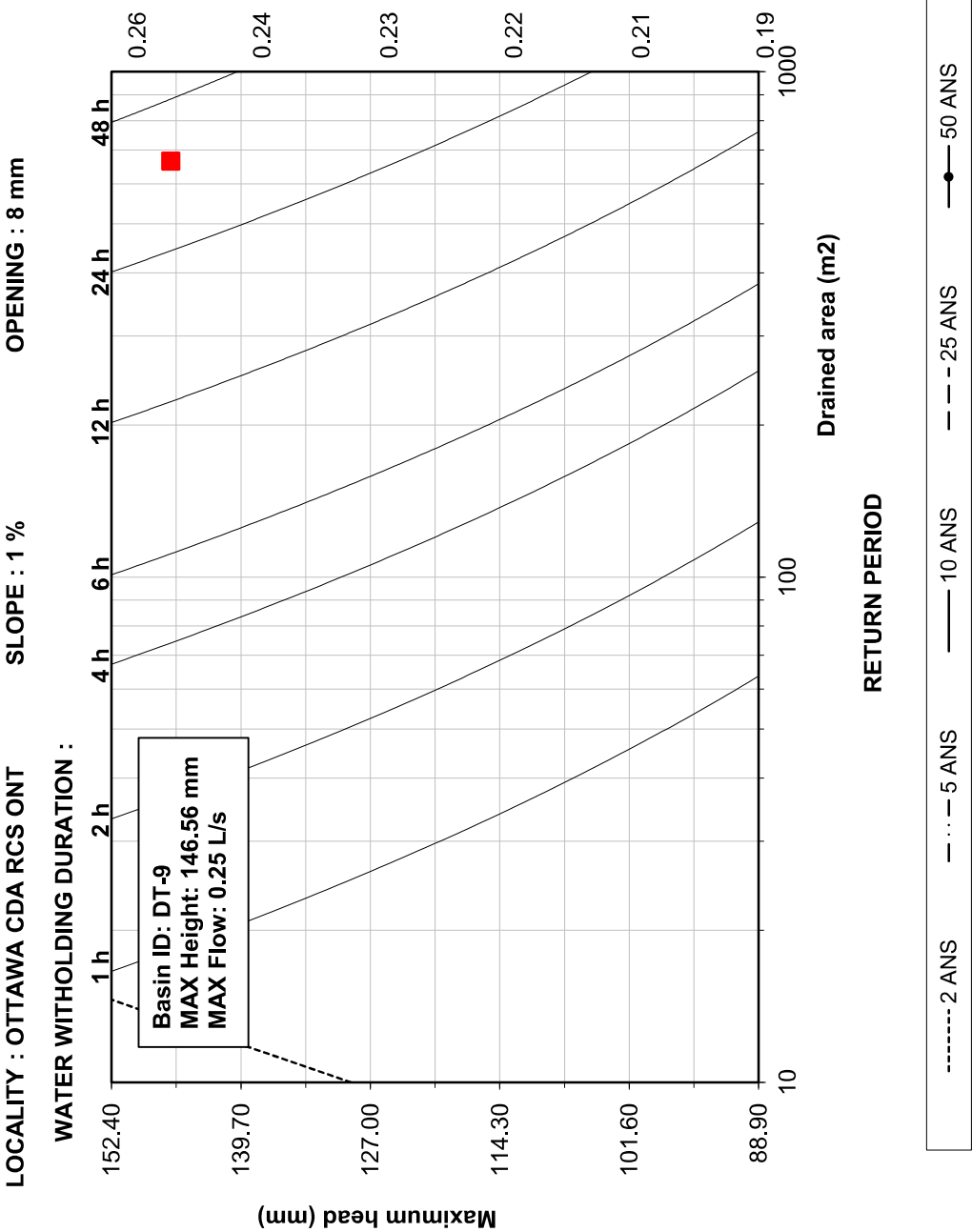
Maximum head vs drained area for different return periods



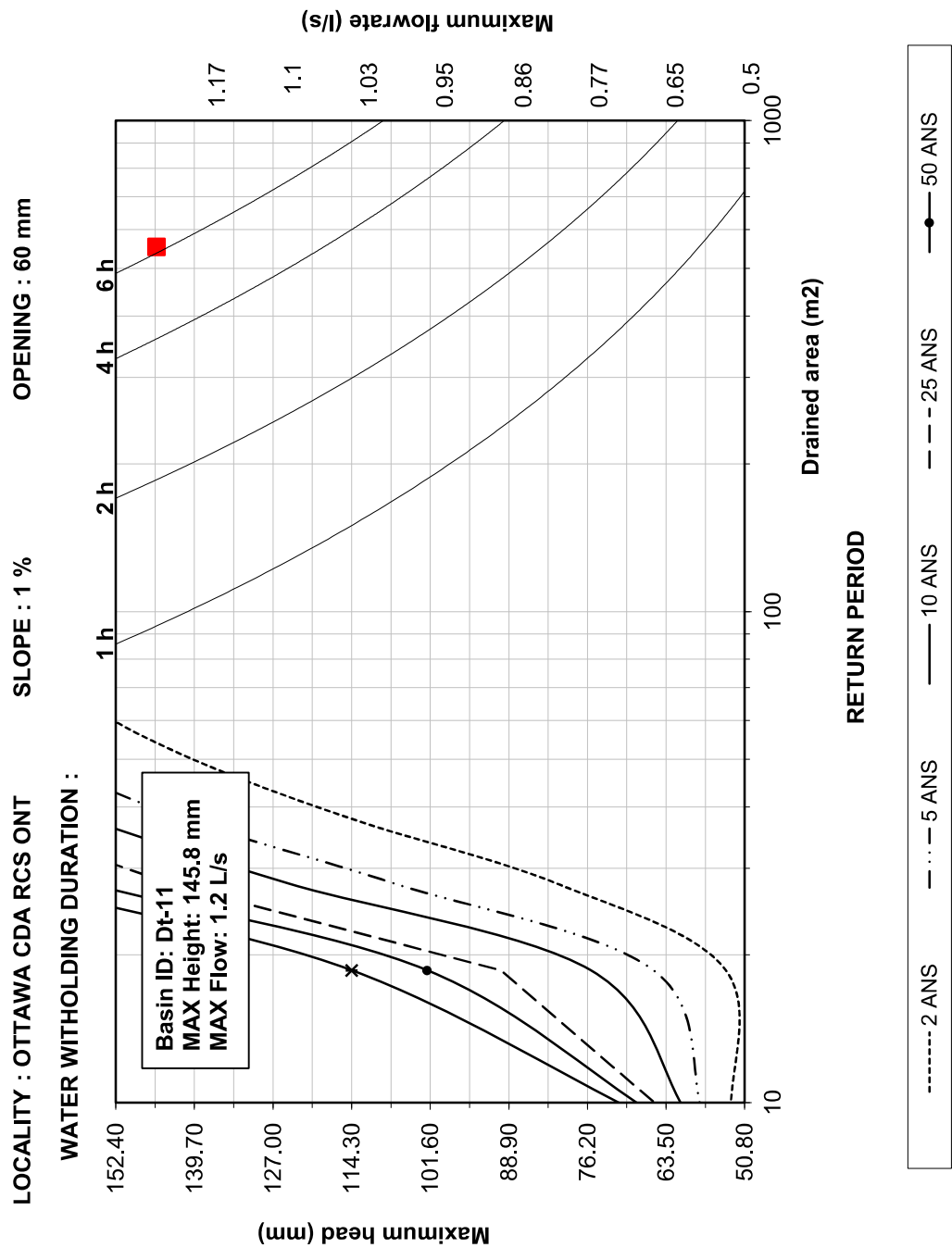
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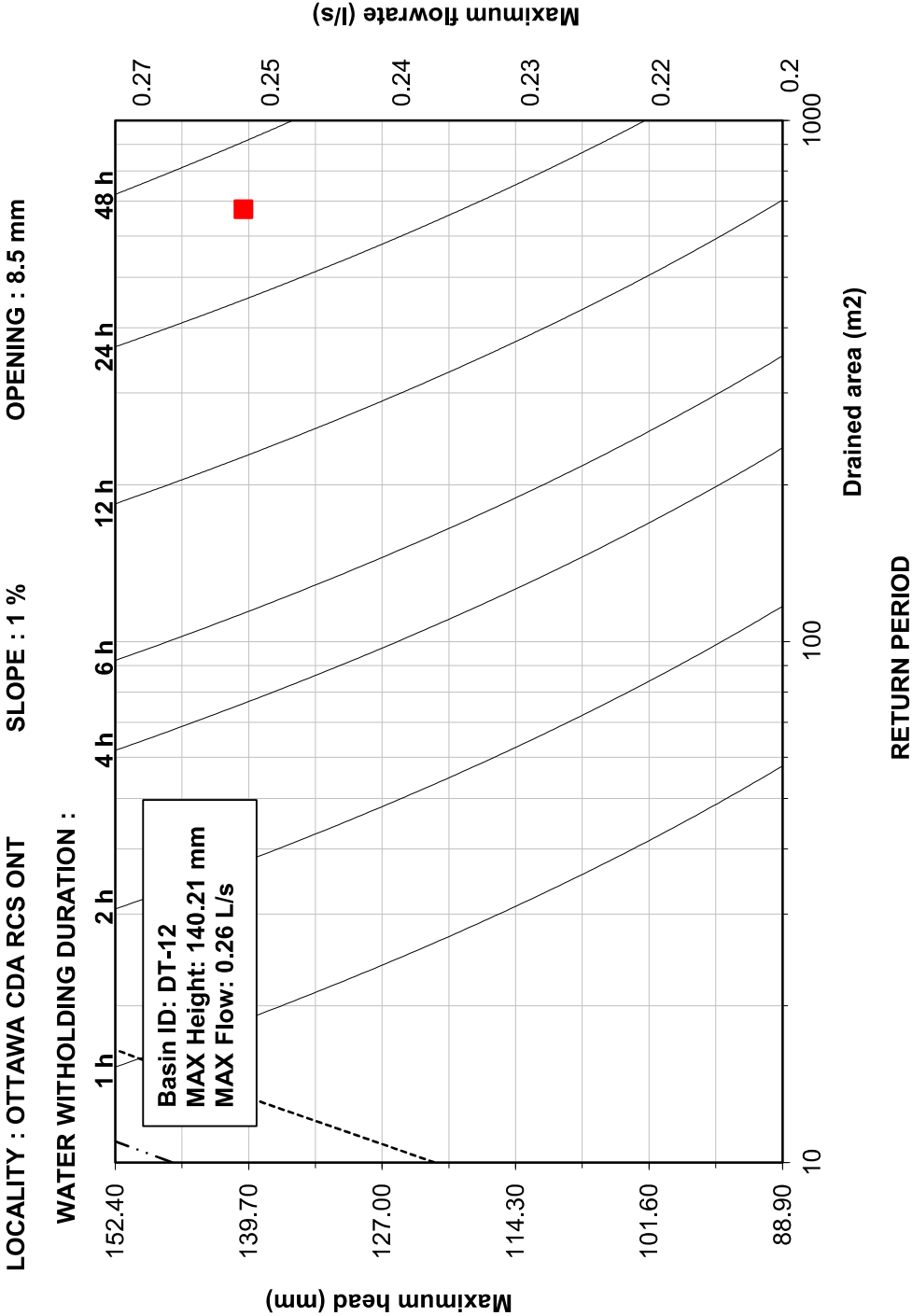
Maximum head vs drained area for different return periods



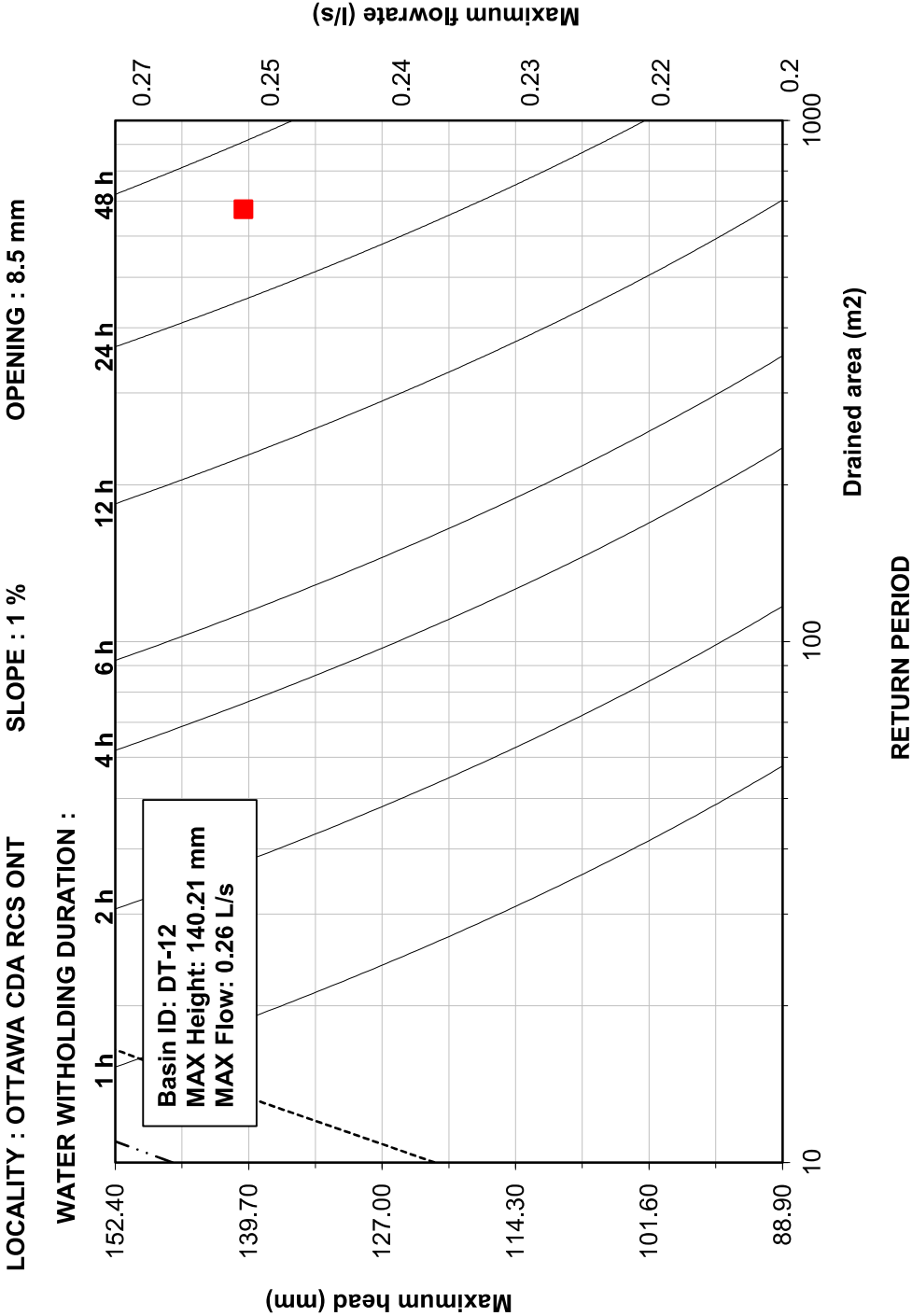
Maximum head vs drained area for different return periods



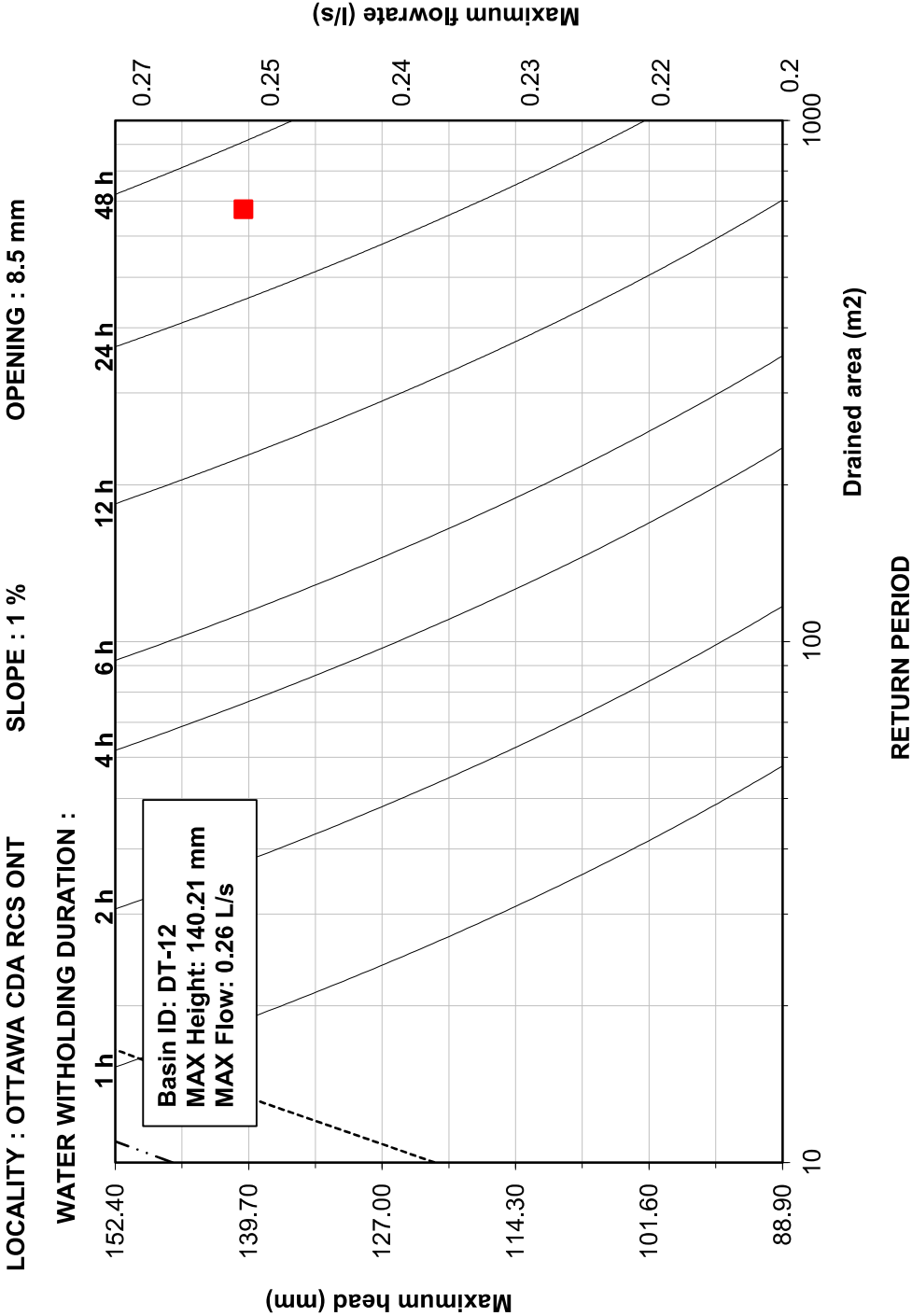
Maximum head vs drained area for different return periods



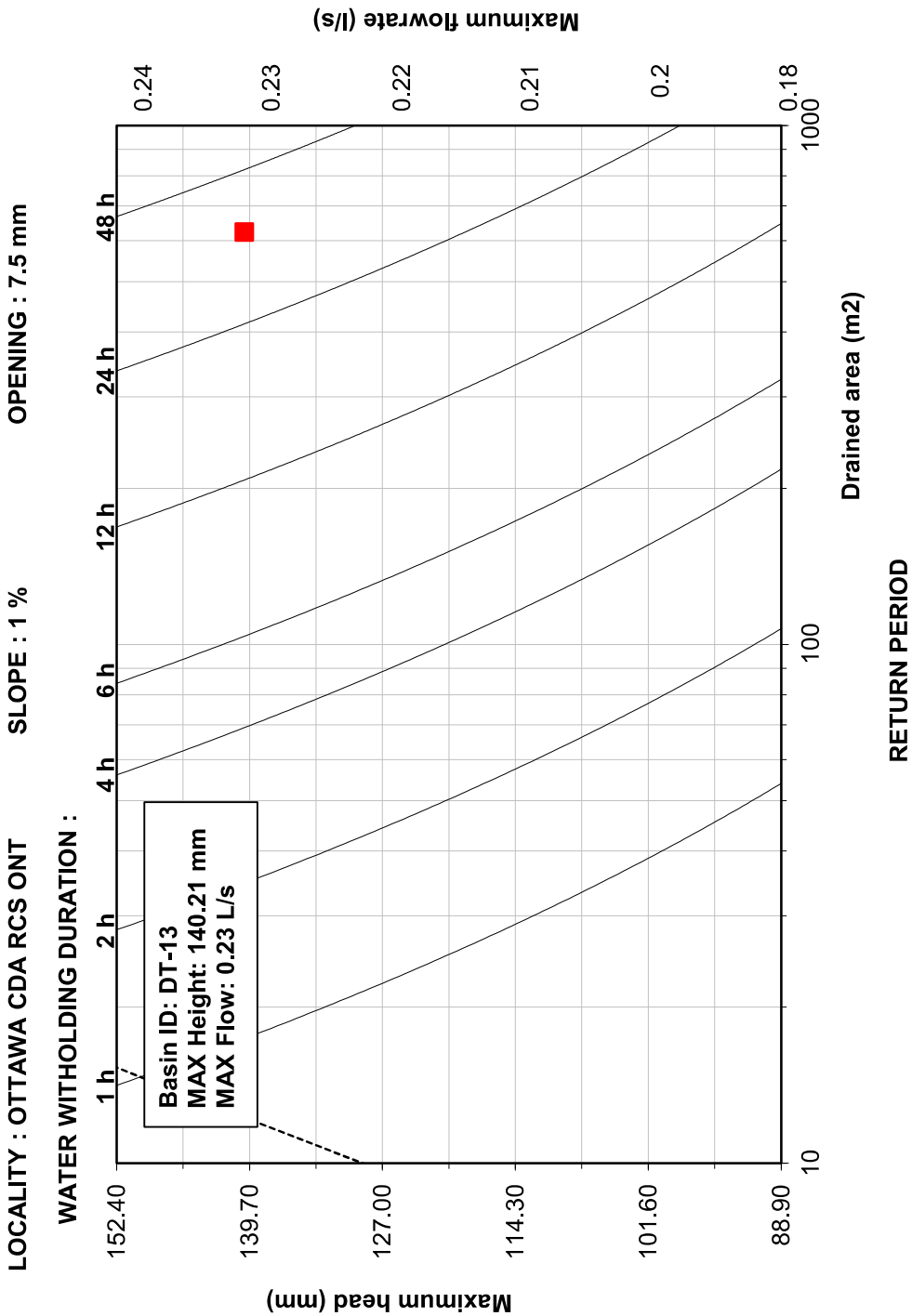
Maximum head vs drained area for different return periods



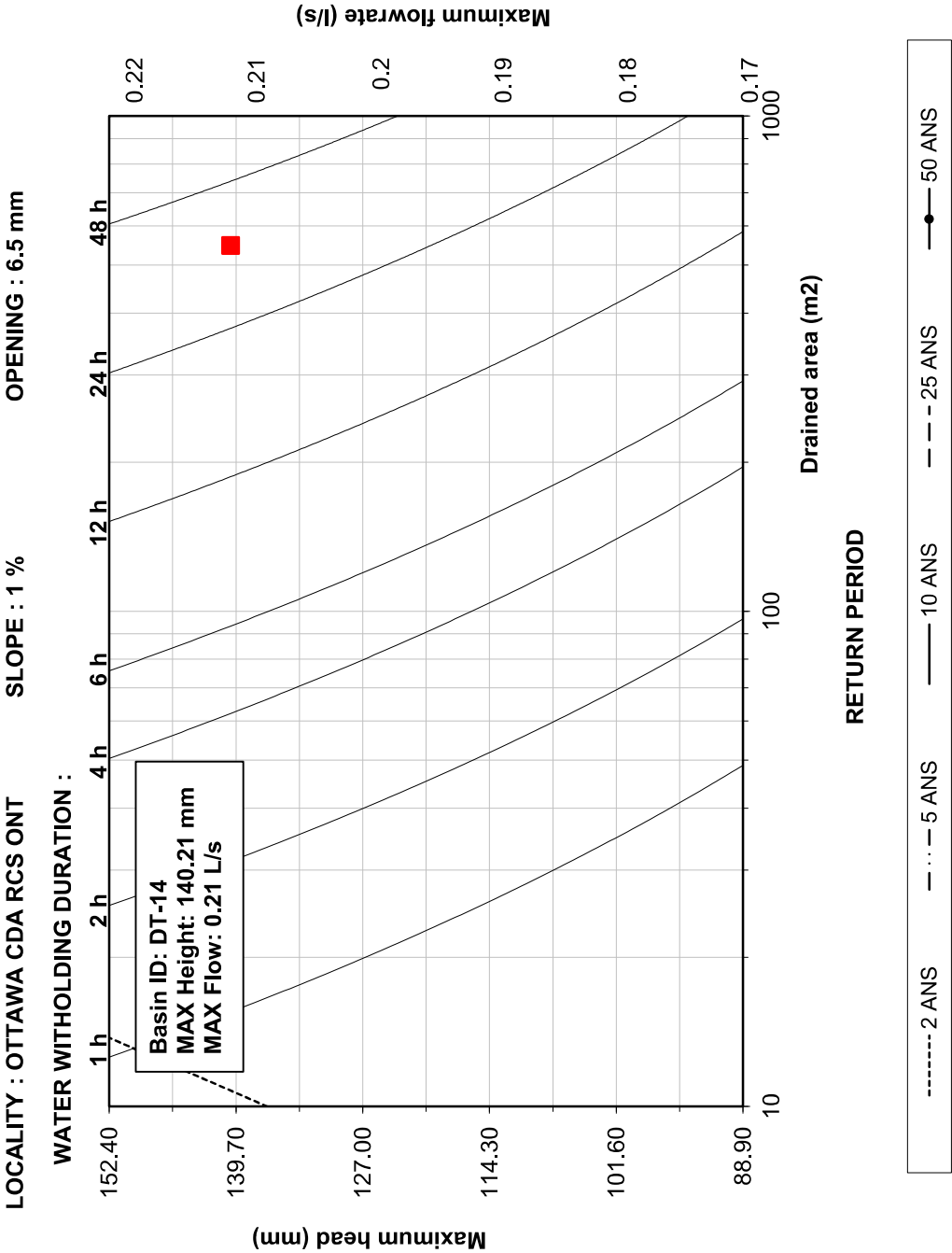
Maximum head vs drained area for different return periods



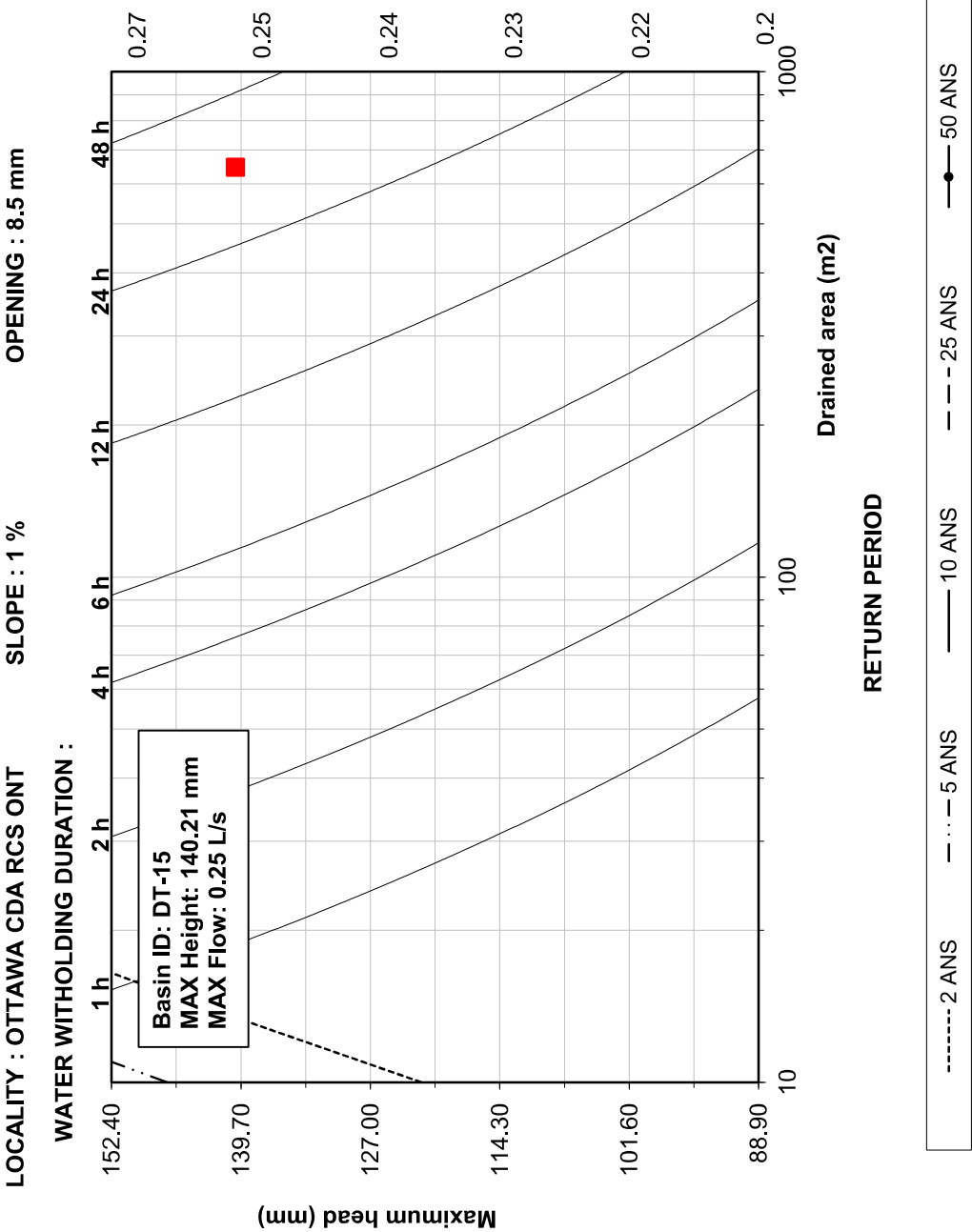
Maximum head vs drained area for different return periods



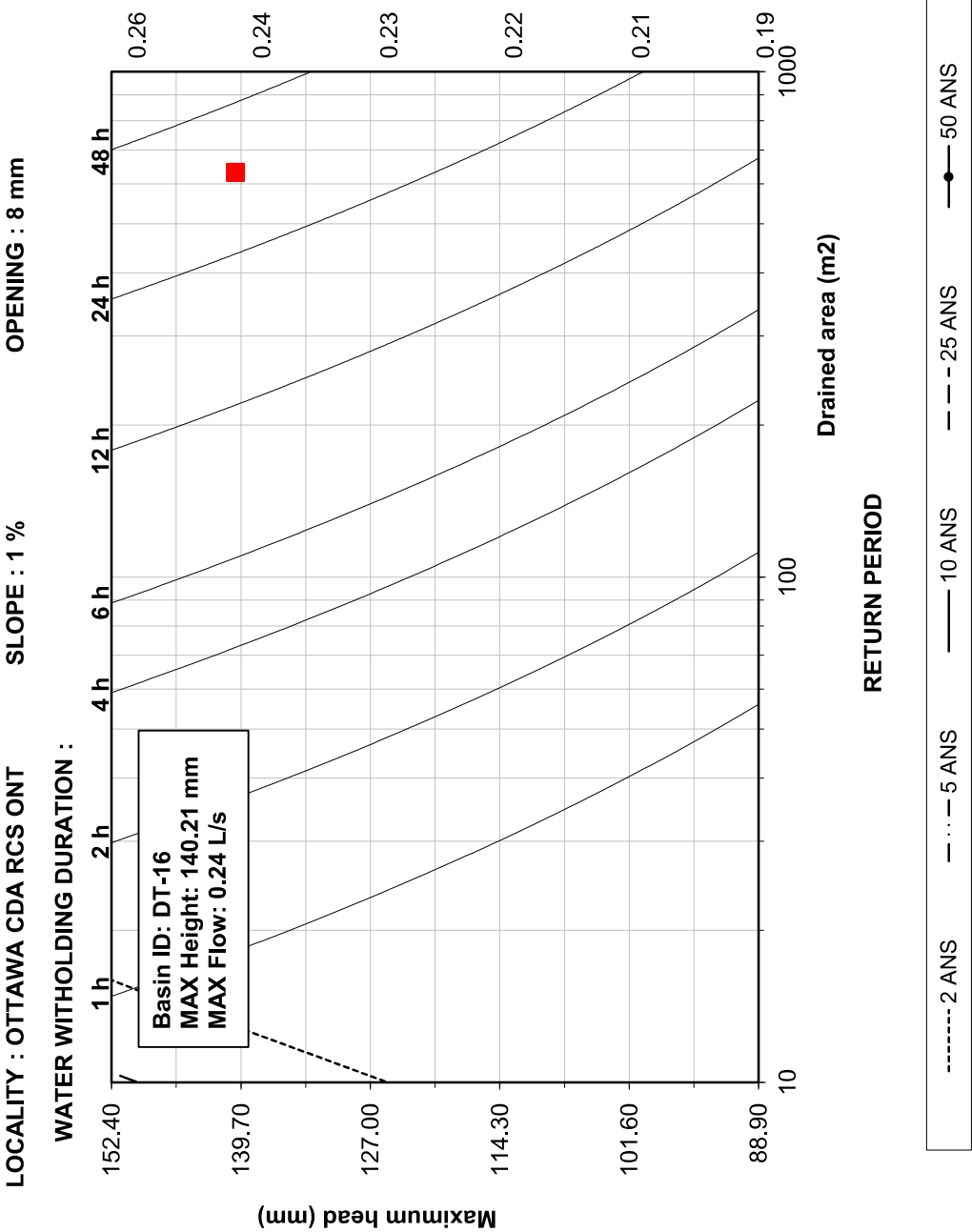
Maximum head vs drained area for different return periods



Maximum head vs drained area for different return periods



Maximum head vs drained area for different return periods





SWMM data for basins : DT-3

Opening : 91 mm

Height (mm)	Flow (L/s)	Height (mm)	Flow (L/s)	Height (mm)	Flow (L/s)	Height (mm)	Flow (L/s)
1	0.00124	39	0.32694	77	0.76670	115	1.10623
2	0.00351	40	0.33903	78	0.77733	116	1.11344
3	0.00646	41	0.35115	79	0.78788	117	1.12060
4	0.00998	42	0.36328	80	0.79838	118	1.12771
5	0.01399	43	0.37541	81	0.80881	119	1.13477
6	0.01845	44	0.38755	82	0.81920	120	1.14177
7	0.02332	45	0.39968	83	0.82953	121	1.14873
8	0.02857	46	0.41179	84	0.83981	122	1.15564
9	0.03420	47	0.42389	85	0.85004	123	1.16251
10	0.04017	48	0.43595	86	0.86023	124	1.16933
11	0.04648	49	0.44798	87	0.87037	125	1.17611
12	0.05312	50	0.45997	88	0.88046	126	1.18284
13	0.06008	51	0.47191	89	0.89051	127	1.18953
14	0.06734	52	0.48379	90	0.90052	128	1.19618
15	0.07490	53	0.49563	91	0.91048	129	1.20279
16	0.08276	54	0.50742	92	0.92009	130	1.20936
17	0.09090	55	0.51917	93	0.92941	131	1.21590
18	0.09933	56	0.53088	94	0.93853	132	1.22239
19	0.10804	57	0.54256	95	0.94749	133	1.22885
20	0.11702	58	0.55419	96	0.95631	134	1.23527
21	0.12627	59	0.56579	97	0.96500	135	1.24165
22	0.13578	60	0.57735	98	0.97356	136	1.24800
23	0.14556	61	0.58888	99	0.98202	137	1.25432
24	0.15561	62	0.60036	100	0.99038	138	1.26060
25	0.16591	63	0.61180	101	0.99864	139	1.26684
26	0.17646	64	0.62319	102	1.00681	140	1.27306
27	0.18726	65	0.63454	103	1.01489	141	1.27924
28	0.19825	66	0.64585	104	1.02289	142	1.28539
29	0.20941	67	0.65710	105	1.03081	143	1.29151
30	0.22072	68	0.66831	106	1.03865	144	1.29760
31	0.23216	69	0.67947	107	1.04642	145	1.30366
32	0.24372	70	0.69057	108	1.05412	146	1.30969
33	0.25539	71	0.70162	109	1.06175	147	1.31569
34	0.26715	72	0.71262	110	1.06932	148	1.32166
35	0.27899	73	0.72355	111	1.07682	149	1.32760
36	0.29090	74	0.73443	112	1.08426	150	1.33351
37	0.30287	75	0.74525	113	1.09164	151	1.33940
38	0.31489	76	0.75601	114	1.09897	152	1.34526

Laboratory tests certifying the height-flow
curve





SWMM data for basins : Dt-11

Opening : 60 mm

Height (mm)	Flow (L/s)	Height (mm)	Flow (L/s)	Height (mm)	Flow (L/s)	Height (mm)	Flow (L/s)
1	0.00131	39	0.34676	77	0.77326	115	1.03514
2	0.00372	40	0.35958	78	0.78140	116	1.04109
3	0.00685	41	0.37243	79	0.78945	117	1.04701
4	0.01059	42	0.38530	80	0.79740	118	1.05289
5	0.01484	43	0.39817	81	0.80526	119	1.05874
6	0.01957	44	0.41104	82	0.81304	120	1.06456
7	0.02473	45	0.42390	83	0.82073	121	1.07034
8	0.03031	46	0.43675	84	0.82835	122	1.07609
9	0.03627	47	0.44958	85	0.83588	123	1.08181
10	0.04261	48	0.46237	86	0.84334	124	1.08750
11	0.04930	49	0.47513	87	0.85073	125	1.09316
12	0.05634	50	0.48784	88	0.85806	126	1.09878
13	0.06372	51	0.50051	89	0.86531	127	1.10438
14	0.07142	52	0.51311	90	0.87249	128	1.10995
15	0.07944	53	0.52567	91	0.87962	129	1.11549
16	0.08778	54	0.53817	92	0.88668	130	1.12100
17	0.09641	55	0.55063	93	0.89368	131	1.12649
18	0.10535	56	0.56306	94	0.90062	132	1.13195
19	0.11458	57	0.57544	95	0.90751	133	1.13738
20	0.12411	58	0.58778	96	0.91434	134	1.14278
21	0.13392	59	0.60008	97	0.92112	135	1.14816
22	0.14401	60	0.61235	98	0.92784	136	1.15351
23	0.15439	61	0.62390	99	0.93451	137	1.15884
24	0.16504	62	0.63489	100	0.94113	138	1.16414
25	0.17596	63	0.64549	101	0.94770	139	1.16942
26	0.18716	64	0.65580	102	0.95423	140	1.17467
27	0.19860	65	0.66585	103	0.96071	141	1.17990
28	0.21026	66	0.67568	104	0.96714	142	1.18511
29	0.22210	67	0.68531	105	0.97353	143	1.19029
30	0.23410	68	0.69475	106	0.97987	144	1.19545
31	0.24623	69	0.70402	107	0.98617	145	1.20059
32	0.25850	70	0.71313	108	0.99243	146	1.20570
33	0.27087	71	0.72210	109	0.99865	147	1.21079
34	0.28334	72	0.73093	110	1.00483	148	1.21586
35	0.29590	73	0.73963	111	1.01096	149	1.22091
36	0.30853	74	0.74821	112	1.01706	150	1.22594
37	0.32122	75	0.75667	113	1.02313	151	1.23095
38	0.33397	76	0.76502	114	1.02915	152	1.23594

Laboratory tests certifying the height-flow
curve





SWMM data for basins : DT-1

Opening : 12 mm

Height (mm)	Flow (L/s)	Height (mm)	Flow (L/s)	Height (mm)	Flow (L/s)	Height (mm)	Flow (L/s)
1	0.00148	39	0.15955	77	0.23445	115	0.29060
2	0.00421	40	0.16197	78	0.23610	116	0.29193
3	0.00776	41	0.16435	79	0.23773	117	0.29326
4	0.01198	42	0.16670	80	0.23936	118	0.29458
5	0.01679	43	0.16901	81	0.24098	119	0.29589
6	0.02214	44	0.17130	82	0.24258	120	0.29720
7	0.02798	45	0.17355	83	0.24418	121	0.29850
8	0.03429	46	0.17577	84	0.24576	122	0.29980
9	0.04104	47	0.17797	85	0.24733	123	0.30109
10	0.04821	48	0.18014	86	0.24890	124	0.30238
11	0.05578	49	0.18228	87	0.25045	125	0.30366
12	0.06375	50	0.18440	88	0.25199	126	0.30493
13	0.07047	51	0.18650	89	0.25353	127	0.30620
14	0.07621	52	0.18857	90	0.25506	128	0.30746
15	0.08142	53	0.19062	91	0.25657	129	0.30872
16	0.08624	54	0.19264	92	0.25808	130	0.30998
17	0.09077	55	0.19465	93	0.25958	131	0.31123
18	0.09505	56	0.19663	94	0.26107	132	0.31247
19	0.09914	57	0.19860	95	0.26255	133	0.31371
20	0.10304	58	0.20054	96	0.26402	134	0.31494
21	0.10680	59	0.20247	97	0.26549	135	0.31617
22	0.11042	60	0.20438	98	0.26695	136	0.31740
23	0.11391	61	0.20627	99	0.26840	137	0.31862
24	0.11730	62	0.20814	100	0.26984	138	0.31983
25	0.12059	63	0.21000	101	0.27127	139	0.32104
26	0.12379	64	0.21184	102	0.27270	140	0.32225
27	0.12691	65	0.21366	103	0.27412	141	0.32345
28	0.12995	66	0.21547	104	0.27553	142	0.32464
29	0.13292	67	0.21727	105	0.27693	143	0.32584
30	0.13582	68	0.21904	106	0.27833	144	0.32703
31	0.13866	69	0.22081	107	0.27972	145	0.32821
32	0.14144	70	0.22256	108	0.28110	146	0.32939
33	0.14417	71	0.22430	109	0.28248	147	0.33056
34	0.14685	72	0.22602	110	0.28385	148	0.33174
35	0.14947	73	0.22773	111	0.28521	149	0.33290
36	0.15206	74	0.22943	112	0.28657	150	0.33407
37	0.15459	75	0.23111	113	0.28792	151	0.33522
38	0.15709	76	0.23279	114	0.28926	152	0.33638

Laboratory tests certifying the height-flow
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SWMM data for basins : DT-6

Opening : 10 mm

Height (mm)	Flow (L/s)	Height (mm)	Flow (L/s)	Height (mm)	Flow (L/s)	Height (mm)	Flow (L/s)
1	0.00160	39	0.13763	77	0.20010	115	0.24724
2	0.00454	40	0.13963	78	0.20148	116	0.24836
3	0.00836	41	0.14161	79	0.20286	117	0.24948
4	0.01291	42	0.14356	80	0.20422	118	0.25059
5	0.01810	43	0.14548	81	0.20558	119	0.25169
6	0.02387	44	0.14738	82	0.20692	120	0.25279
7	0.03017	45	0.14925	83	0.20826	121	0.25389
8	0.03697	46	0.15110	84	0.20959	122	0.25498
9	0.04425	47	0.15292	85	0.21091	123	0.25606
10	0.05137	48	0.15473	86	0.21222	124	0.25715
11	0.05699	49	0.15651	87	0.21352	125	0.25822
12	0.06193	50	0.15828	88	0.21482	126	0.25929
13	0.06642	51	0.16002	89	0.21610	127	0.26036
14	0.07059	52	0.16175	90	0.21738	128	0.26143
15	0.07450	53	0.16346	91	0.21866	129	0.26248
16	0.07820	54	0.16515	92	0.21992	130	0.26354
17	0.08172	55	0.16682	93	0.22118	131	0.26459
18	0.08509	56	0.16847	94	0.22243	132	0.26564
19	0.08832	57	0.17011	95	0.22368	133	0.26668
20	0.09144	58	0.17174	96	0.22491	134	0.26772
21	0.09444	59	0.17335	97	0.22614	135	0.26875
22	0.09736	60	0.17494	98	0.22737	136	0.26978
23	0.10018	61	0.17652	99	0.22858	137	0.27081
24	0.10293	62	0.17809	100	0.22979	138	0.27183
25	0.10560	63	0.17964	101	0.23100	139	0.27285
26	0.10821	64	0.18118	102	0.23220	140	0.27387
27	0.11076	65	0.18270	103	0.23339	141	0.27488
28	0.11324	66	0.18422	104	0.23457	142	0.27588
29	0.11567	67	0.18572	105	0.23575	143	0.27689
30	0.11805	68	0.18720	106	0.23693	144	0.27789
31	0.12039	69	0.18868	107	0.23810	145	0.27888
32	0.12268	70	0.19015	108	0.23926	146	0.27988
33	0.12492	71	0.19160	109	0.24042	147	0.28087
34	0.12713	72	0.19304	110	0.24157	148	0.28185
35	0.12930	73	0.19448	111	0.24271	149	0.28284
36	0.13143	74	0.19590	112	0.24385	150	0.28381
37	0.13353	75	0.19731	113	0.24499	151	0.28479
38	0.13559	76	0.19871	114	0.24612	152	0.28576

Laboratory tests certifying the height-flow
curve





SWMM data for basins : DT-2

Opening : 9 mm

Height (mm)	Flow (L/s)	Height (mm)	Flow (L/s)	Height (mm)	Flow (L/s)	Height (mm)	Flow (L/s)
1	0.00163	39	0.13339	77	0.19355	115	0.23900
2	0.00463	40	0.13532	78	0.19489	116	0.24008
3	0.00854	41	0.13722	79	0.19621	117	0.24116
4	0.01319	42	0.13910	80	0.19752	118	0.24223
5	0.01849	43	0.14095	81	0.19883	119	0.24329
6	0.02437	44	0.14277	82	0.20012	120	0.24435
7	0.03081	45	0.14457	83	0.20141	121	0.24541
8	0.03775	46	0.14635	84	0.20269	122	0.24646
9	0.04518	47	0.14811	85	0.20397	123	0.24751
10	0.05133	48	0.14985	86	0.20523	124	0.24855
11	0.05646	49	0.15157	87	0.20649	125	0.24959
12	0.06106	50	0.15326	88	0.20774	126	0.25063
13	0.06529	51	0.15494	89	0.20898	127	0.25166
14	0.06923	52	0.15660	90	0.21021	128	0.25268
15	0.07293	53	0.15825	91	0.21144	129	0.25370
16	0.07645	54	0.15988	92	0.21266	130	0.25472
17	0.07980	55	0.16149	93	0.21387	131	0.25573
18	0.08301	56	0.16308	94	0.21508	132	0.25674
19	0.08610	57	0.16466	95	0.21628	133	0.25775
20	0.08907	58	0.16622	96	0.21747	134	0.25875
21	0.09195	59	0.16777	97	0.21866	135	0.25975
22	0.09474	60	0.16931	98	0.21984	136	0.26074
23	0.09744	61	0.17083	99	0.22101	137	0.26173
24	0.10008	62	0.17234	100	0.22218	138	0.26272
25	0.10264	63	0.17383	101	0.22334	139	0.26370
26	0.10514	64	0.17532	102	0.22449	140	0.26468
27	0.10758	65	0.17679	103	0.22564	141	0.26565
28	0.10996	66	0.17824	104	0.22679	142	0.26663
29	0.11230	67	0.17969	105	0.22792	143	0.26760
30	0.11458	68	0.18112	106	0.22906	144	0.26856
31	0.11683	69	0.18255	107	0.23018	145	0.26952
32	0.11902	70	0.18396	108	0.23130	146	0.27048
33	0.12118	71	0.18536	109	0.23242	147	0.27143
34	0.12330	72	0.18675	110	0.23353	148	0.27239
35	0.12539	73	0.18813	111	0.23463	149	0.27333
36	0.12743	74	0.18950	112	0.23573	150	0.27428
37	0.12945	75	0.19086	113	0.23683	151	0.27522
38	0.13144	76	0.19221	114	0.23792	152	0.27616

Laboratory tests certifying the height-flow
curve





SWMM data for basins : DT-4, D-7, DT-12, DT-15

Opening : 9 mm

Height (mm)	Flow (L/s)	Height (mm)	Flow (L/s)	Height (mm)	Flow (L/s)	Height (mm)	Flow (L/s)
1	0.00167	39	0.12883	77	0.18656	115	0.23022
2	0.00473	40	0.13068	78	0.18784	116	0.23126
3	0.00872	41	0.13250	79	0.18911	117	0.23229
4	0.01346	42	0.13430	80	0.19037	118	0.23332
5	0.01887	43	0.13607	81	0.19162	119	0.23435
6	0.02488	44	0.13782	82	0.19287	120	0.23537
7	0.03144	45	0.13955	83	0.19411	121	0.23638
8	0.03853	46	0.14125	84	0.19534	122	0.23739
9	0.04549	47	0.14294	85	0.19656	123	0.23840
10	0.05090	48	0.14461	86	0.19777	124	0.23940
11	0.05563	49	0.14625	87	0.19898	125	0.24040
12	0.05992	50	0.14788	88	0.20018	126	0.24139
13	0.06389	51	0.14949	89	0.20137	127	0.24238
14	0.06761	52	0.15109	90	0.20256	128	0.24337
15	0.07111	53	0.15267	91	0.20374	129	0.24435
16	0.07444	54	0.15423	92	0.20491	130	0.24533
17	0.07763	55	0.15577	93	0.20608	131	0.24630
18	0.08068	56	0.15730	94	0.20723	132	0.24727
19	0.08362	57	0.15882	95	0.20839	133	0.24824
20	0.08645	58	0.16032	96	0.20953	134	0.24920
21	0.08919	59	0.16181	97	0.21067	135	0.25016
22	0.09185	60	0.16328	98	0.21181	136	0.25112
23	0.09443	61	0.16474	99	0.21293	137	0.25207
24	0.09695	62	0.16619	100	0.21405	138	0.25302
25	0.09939	63	0.16762	101	0.21517	139	0.25396
26	0.10178	64	0.16905	102	0.21628	140	0.25490
27	0.10412	65	0.17046	103	0.21738	141	0.25584
28	0.10640	66	0.17186	104	0.21848	142	0.25677
29	0.10863	67	0.17325	105	0.21958	143	0.25770
30	0.11082	68	0.17462	106	0.22066	144	0.25863
31	0.11296	69	0.17599	107	0.22175	145	0.25956
32	0.11507	70	0.17734	108	0.22282	146	0.26048
33	0.11713	71	0.17869	109	0.22390	147	0.26139
34	0.11916	72	0.18002	110	0.22496	148	0.26231
35	0.12116	73	0.18135	111	0.22603	149	0.26322
36	0.12312	74	0.18267	112	0.22708	150	0.26413
37	0.12505	75	0.18397	113	0.22813	151	0.26503
38	0.12696	76	0.18527	114	0.22918	152	0.26594

Laboratory tests certifying the height-flow
curve





SWMM data for basins : DT-9, DT-10, DT-16

Opening : 8 mm

Height (mm)	Flow (L/s)	Height (mm)	Flow (L/s)	Height (mm)	Flow (L/s)	Height (mm)	Flow (L/s)
1	0.00170	39	0.12394	77	0.17912	115	0.22091
2	0.00483	40	0.12570	78	0.18034	116	0.22190
3	0.00889	41	0.12744	79	0.18156	117	0.22289
4	0.01373	42	0.12916	80	0.18277	118	0.22387
5	0.01925	43	0.13085	81	0.18396	119	0.22485
6	0.02538	44	0.13252	82	0.18516	120	0.22583
7	0.03208	45	0.13417	83	0.18634	121	0.22680
8	0.03931	46	0.13580	84	0.18752	122	0.22777
9	0.04524	47	0.13741	85	0.18869	123	0.22873
10	0.05015	48	0.13900	86	0.18985	124	0.22969
11	0.05452	49	0.14058	87	0.19100	125	0.23065
12	0.05852	50	0.14214	88	0.19215	126	0.23160
13	0.06224	51	0.14368	89	0.19329	127	0.23255
14	0.06573	52	0.14520	90	0.19443	128	0.23349
15	0.06904	53	0.14671	91	0.19556	129	0.23443
16	0.07219	54	0.14820	92	0.19668	130	0.23537
17	0.07520	55	0.14968	93	0.19779	131	0.23630
18	0.07809	56	0.15114	94	0.19890	132	0.23723
19	0.08087	57	0.15259	95	0.20001	133	0.23816
20	0.08356	58	0.15402	96	0.20110	134	0.23908
21	0.08617	59	0.15545	97	0.20219	135	0.24000
22	0.08870	60	0.15685	98	0.20328	136	0.24091
23	0.09115	61	0.15825	99	0.20436	137	0.24182
24	0.09354	62	0.15964	100	0.20543	138	0.24273
25	0.09587	63	0.16101	101	0.20650	139	0.24363
26	0.09814	64	0.16237	102	0.20756	140	0.24453
27	0.10037	65	0.16372	103	0.20862	141	0.24543
28	0.10254	66	0.16506	104	0.20967	142	0.24633
29	0.10467	67	0.16638	105	0.21072	143	0.24722
30	0.10675	68	0.16770	106	0.21176	144	0.24811
31	0.10880	69	0.16901	107	0.21279	145	0.24899
32	0.11080	70	0.17030	108	0.21382	146	0.24987
33	0.11277	71	0.17159	109	0.21485	147	0.25075
34	0.11471	72	0.17287	110	0.21587	148	0.25163
35	0.11661	73	0.17414	111	0.21689	149	0.25250
36	0.11849	74	0.17539	112	0.21790	150	0.25337
37	0.12033	75	0.17664	113	0.21891	151	0.25424
38	0.12215	76	0.17789	114	0.21991	152	0.25510

Laboratory tests certifying the height-flow
curve





SWMM data for basins : DT-13

Opening : 8 mm

Height (mm)	Flow (L/s)	Height (mm)	Flow (L/s)	Height (mm)	Flow (L/s)	Height (mm)	Flow (L/s)
1	0.00173	39	0.11871	77	0.17123	115	0.21106
2	0.00492	40	0.12039	78	0.17240	116	0.21200
3	0.00907	41	0.12204	79	0.17356	117	0.21295
4	0.01400	42	0.12367	80	0.17471	118	0.21388
5	0.01963	43	0.12528	81	0.17585	119	0.21482
6	0.02588	44	0.12687	82	0.17699	120	0.21575
7	0.03271	45	0.12844	83	0.17811	121	0.21667
8	0.03944	46	0.12999	84	0.17924	122	0.21760
9	0.04461	47	0.13153	85	0.18035	123	0.21852
10	0.04908	48	0.13304	86	0.18146	124	0.21943
11	0.05312	49	0.13454	87	0.18256	125	0.22034
12	0.05685	50	0.13602	88	0.18365	126	0.22125
13	0.06032	51	0.13749	89	0.18474	127	0.22215
14	0.06360	52	0.13894	90	0.18582	128	0.22305
15	0.06671	53	0.14037	91	0.18690	129	0.22395
16	0.06967	54	0.14179	92	0.18796	130	0.22484
17	0.07251	55	0.14320	93	0.18903	131	0.22573
18	0.07524	56	0.14459	94	0.19008	132	0.22662
19	0.07787	57	0.14597	95	0.19113	133	0.22750
20	0.08041	58	0.14734	96	0.19218	134	0.22838
21	0.08287	59	0.14869	97	0.19322	135	0.22925
22	0.08527	60	0.15003	98	0.19425	136	0.23012
23	0.08759	61	0.15136	99	0.19528	137	0.23099
24	0.08986	62	0.15268	100	0.19630	138	0.23186
25	0.09206	63	0.15399	101	0.19732	139	0.23272
26	0.09422	64	0.15528	102	0.19833	140	0.23358
27	0.09633	65	0.15657	103	0.19934	141	0.23444
28	0.09839	66	0.15784	104	0.20034	142	0.23529
29	0.10041	67	0.15910	105	0.20134	143	0.23614
30	0.10239	68	0.16036	106	0.20233	144	0.23698
31	0.10433	69	0.16160	107	0.20332	145	0.23783
32	0.10623	70	0.16284	108	0.20430	146	0.23867
33	0.10810	71	0.16406	109	0.20528	147	0.23951
34	0.10994	72	0.16528	110	0.20626	148	0.24034
35	0.11175	73	0.16649	111	0.20722	149	0.24117
36	0.11353	74	0.16769	112	0.20819	150	0.24200
37	0.11528	75	0.16888	113	0.20915	151	0.24283
38	0.11701	76	0.17006	114	0.21010	152	0.24365

Laboratory tests certifying the height-flow
curve





SWMM data for basins : DT-5

Opening : 7 mm

Height (mm)	Flow (L/s)	Height (mm)	Flow (L/s)	Height (mm)	Flow (L/s)	Height (mm)	Flow (L/s)
1	0.00177	39	0.11315	77	0.16290	115	0.20067
2	0.00502	40	0.11474	78	0.16401	116	0.20157
3	0.00924	41	0.11631	79	0.16511	117	0.20246
4	0.01428	42	0.11785	80	0.16620	118	0.20335
5	0.02001	43	0.11937	81	0.16728	119	0.20424
6	0.02639	44	0.12088	82	0.16836	120	0.20512
7	0.03335	45	0.12236	83	0.16943	121	0.20600
8	0.03901	46	0.12383	84	0.17049	122	0.20688
9	0.04363	47	0.12528	85	0.17155	123	0.20775
10	0.04772	48	0.12672	86	0.17260	124	0.20861
11	0.05145	49	0.12814	87	0.17364	125	0.20948
12	0.05491	50	0.12954	88	0.17468	126	0.21034
13	0.05815	51	0.13093	89	0.17571	127	0.21120
14	0.06121	52	0.13230	90	0.17674	128	0.21205
15	0.06412	53	0.13366	91	0.17775	129	0.21290
16	0.06690	54	0.13500	92	0.17877	130	0.21375
17	0.06956	55	0.13634	93	0.17978	131	0.21459
18	0.07212	56	0.13766	94	0.18078	132	0.21543
19	0.07460	57	0.13896	95	0.18177	133	0.21627
20	0.07699	58	0.14026	96	0.18277	134	0.21710
21	0.07931	59	0.14154	97	0.18375	135	0.21793
22	0.08156	60	0.14281	98	0.18473	136	0.21876
23	0.08375	61	0.14407	99	0.18571	137	0.21958
24	0.08589	62	0.14532	100	0.18668	138	0.22040
25	0.08797	63	0.14656	101	0.18764	139	0.22122
26	0.09001	64	0.14778	102	0.18860	140	0.22204
27	0.09200	65	0.14900	103	0.18956	141	0.22285
28	0.09394	66	0.15021	104	0.19051	142	0.22366
29	0.09585	67	0.15141	105	0.19146	143	0.22447
30	0.09772	68	0.15260	106	0.19240	144	0.22527
31	0.09955	69	0.15378	107	0.19333	145	0.22607
32	0.10135	70	0.15495	108	0.19427	146	0.22687
33	0.10312	71	0.15611	109	0.19519	147	0.22766
34	0.10486	72	0.15726	110	0.19612	148	0.22845
35	0.10657	73	0.15841	111	0.19704	149	0.22924
36	0.10825	74	0.15954	112	0.19795	150	0.23003
37	0.10991	75	0.16067	113	0.19886	151	0.23081
38	0.11155	76	0.16179	114	0.19977	152	0.23160

Laboratory tests certifying the height-flow
curve





SWMM data for basins : DT-14

Opening : 7 mm

Height (mm)	Flow (L/s)	Height (mm)	Flow (L/s)	Height (mm)	Flow (L/s)	Height (mm)	Flow (L/s)
1	0.00180	39	0.10726	77	0.15413	115	0.18975
2	0.00511	40	0.10876	78	0.15517	116	0.19060
3	0.00942	41	0.11023	79	0.15621	117	0.19144
4	0.01455	42	0.11168	80	0.15724	118	0.19228
5	0.02039	43	0.11312	81	0.15826	119	0.19312
6	0.02689	44	0.11453	82	0.15927	120	0.19395
7	0.03332	45	0.11593	83	0.16028	121	0.19478
8	0.03817	46	0.11732	84	0.16129	122	0.19561
9	0.04233	47	0.11868	85	0.16228	123	0.19643
10	0.04608	48	0.12003	86	0.16327	124	0.19725
11	0.04951	49	0.12137	87	0.16426	125	0.19806
12	0.05271	50	0.12269	88	0.16523	126	0.19887
13	0.05571	51	0.12400	89	0.16621	127	0.19968
14	0.05856	52	0.12529	90	0.16717	128	0.20049
15	0.06127	53	0.12657	91	0.16814	129	0.20129
16	0.06386	54	0.12784	92	0.16909	130	0.20209
17	0.06635	55	0.12909	93	0.17004	131	0.20288
18	0.06875	56	0.13033	94	0.17099	132	0.20368
19	0.07106	57	0.13157	95	0.17193	133	0.20447
20	0.07330	58	0.13278	96	0.17286	134	0.20525
21	0.07547	59	0.13399	97	0.17379	135	0.20604
22	0.07758	60	0.13519	98	0.17472	136	0.20682
23	0.07964	61	0.13638	99	0.17564	137	0.20760
24	0.08164	62	0.13755	100	0.17655	138	0.20837
25	0.08360	63	0.13872	101	0.17746	139	0.20914
26	0.08551	64	0.13988	102	0.17837	140	0.20991
27	0.08737	65	0.14103	103	0.17927	141	0.21068
28	0.08920	66	0.14216	104	0.18017	142	0.21144
29	0.09099	67	0.14329	105	0.18106	143	0.21220
30	0.09275	68	0.14441	106	0.18195	144	0.21296
31	0.09447	69	0.14553	107	0.18283	145	0.21372
32	0.09616	70	0.14663	108	0.18371	146	0.21447
33	0.09783	71	0.14772	109	0.18458	147	0.21522
34	0.09946	72	0.14881	110	0.18546	148	0.21597
35	0.10107	73	0.14989	111	0.18632	149	0.21671
36	0.10265	74	0.15096	112	0.18719	150	0.21745
37	0.10421	75	0.15203	113	0.18804	151	0.21819
38	0.10575	76	0.15308	114	0.18890	152	0.21893

Laboratory tests certifying the height-flow
curve





SWMM data for basins : DT-8

Opening : 6 mm

Height (mm)	Flow (L/s)	Height (mm)	Flow (L/s)	Height (mm)	Flow (L/s)	Height (mm)	Flow (L/s)
1	0.00184	39	0.10104	77	0.14492	115	0.17830
2	0.00521	40	0.10243	78	0.14589	116	0.17909
3	0.00960	41	0.10381	79	0.14686	117	0.17989
4	0.01482	42	0.10517	80	0.14783	118	0.18067
5	0.02077	43	0.10651	81	0.14878	119	0.18146
6	0.02739	44	0.10784	82	0.14974	120	0.18224
7	0.03270	45	0.10915	83	0.15068	121	0.18301
8	0.03698	46	0.11044	84	0.15162	122	0.18379
9	0.04074	47	0.11172	85	0.15255	123	0.18456
10	0.04415	48	0.11298	86	0.15348	124	0.18533
11	0.04730	49	0.11423	87	0.15440	125	0.18609
12	0.05025	50	0.11547	88	0.15532	126	0.18685
13	0.05302	51	0.11669	89	0.15623	127	0.18761
14	0.05565	52	0.11790	90	0.15714	128	0.18837
15	0.05816	53	0.11910	91	0.15804	129	0.18912
16	0.06056	54	0.12029	92	0.15893	130	0.18987
17	0.06287	55	0.12146	93	0.15983	131	0.19061
18	0.06510	56	0.12263	94	0.16071	132	0.19136
19	0.06725	57	0.12378	95	0.16159	133	0.19210
20	0.06934	58	0.12492	96	0.16247	134	0.19284
21	0.07136	59	0.12605	97	0.16334	135	0.19357
22	0.07333	60	0.12717	98	0.16421	136	0.19430
23	0.07524	61	0.12829	99	0.16507	137	0.19503
24	0.07711	62	0.12939	100	0.16593	138	0.19576
25	0.07893	63	0.13048	101	0.16678	139	0.19648
26	0.08071	64	0.13156	102	0.16763	140	0.19720
27	0.08245	65	0.13264	103	0.16847	141	0.19792
28	0.08416	66	0.13371	104	0.16931	142	0.19864
29	0.08583	67	0.13476	105	0.17015	143	0.19935
30	0.08747	68	0.13581	106	0.17098	144	0.20006
31	0.08908	69	0.13685	107	0.17181	145	0.20077
32	0.09066	70	0.13789	108	0.17264	146	0.20148
33	0.09222	71	0.13891	109	0.17346	147	0.20218
34	0.09375	72	0.13993	110	0.17427	148	0.20288
35	0.09525	73	0.14094	111	0.17509	149	0.20358
36	0.09673	74	0.14195	112	0.17589	150	0.20428
37	0.09819	75	0.14294	113	0.17670	151	0.20497
38	0.09962	76	0.14393	114	0.17750	152	0.20566

Laboratory tests certifying the height-flow
curve



Appendix D- Water supply for firefighting

OBC Fire Protection Calculations

Water supply for firefighting

Project	Proposed 1-storey warehouse
Client	MEGHA HOLDINS Inc.
Address	3113 Carp Road, Ottawa, On
Methode	Ontario Building Code
Designed by	Fritz Gérald St Fleur, P. Eng
Date/Revision	2025-12-29 Rev. 01

INPUT DATA

- Warehouse area: 10,567 m² (6 compartments)
- Largest typical compartment Area: 1,842.8 m²
- Height: 9.62 m
- Building Group: F-3 (Low hazard industrial)
- Sprinkler system: Entire building
- Construction type: Non-combustible
- OBC Coefficient (K): 12 (As per OBC Table 1)
- Spatial Coefficient (S_{Tot}): 1.0
- Reduction Option: (1) Compartmentalization applied
(2) Sprinkler system 50%
- Closest Fire Station: Ottawa Fire Station 64 within 4.1 km (475 Donald B. Munro Dr, Kinburn, On) < 5 km
- Closest approved water supply: Hydrant 342020HP001 within 1.0 km (273 Russ Bradley Road, Ottawa, ON) < 2.5 km
- Exposure distance: 44.19 Noth, 16.15 East, 18.28 West, 24.68 South

CALCULATION (OBC FORMULA)

$Q = K \times V \times S_{Tot}$ (Required water supply in liters)

- Volume: 8,863.87 m³
- OBC Coefficient (K): 12 (As per OBC Table 1)
- Spatial Coefficient (S_{Tot}): 1.0
 $= 1.0 + S_{side\ N} + S_{side\ E} + S_{side\ W} + S_{side\ S}$
 $= 1.0 + 0 + 0 + 0 + 0$
 $= 1.0$

$Q = 106,366\text{ L (}106.37\text{ m}^3\text{)}$

Duration: 60 minutes

Flow = 1772,77 L/min

MINIMUM WATER SUPPLY FLOW RATE

As per OBC A-3.2.5.7 Table 2

$Q < 108,000 \text{ L}$

Flow = 2,700 L/min

Less than 9,000 L/min; therefore, FUS formula is not applicable.

$Q = 2,700 \times 60$

$Q = 162,000 \text{ L}$

STORAGE VOLUME

Storage Volume = 162,000 L

Tank capacity: 135,000 L (See model)

Number of tanks required: 2 units

Effective Storage volume: 270,000 L

For commercial lines insurance, the Fire Department must be able to deliver a flow rate of not less than 1900 LPM (400 IGPM) within 5 minutes of arriving at the test site with the first major piece of apparatus (wheel stop).

Figure 1. Superior Tanker Shuttle – Commercial Flow Rate

To be recognized for fire insurance grading purposes, the protected property must be located within;

- Commercial Lines (PFPC) – 5 km of a fire station AND 2.5 km of an approved water supply point
- Personal Lines (DPG) – 8 km of a fire station AND 5 km of an approved supply point

Figure 2. Superior Tanker Shuttle – Distances

REFERENCES

- Ontario Building Code (OBC) 3.2.5.7
- Memo accompanying Rural Fire Demand Tech Bulletin IWSTB-2024-05

TABLE 1
WATER SUPPLY COEFFICIENT -- K

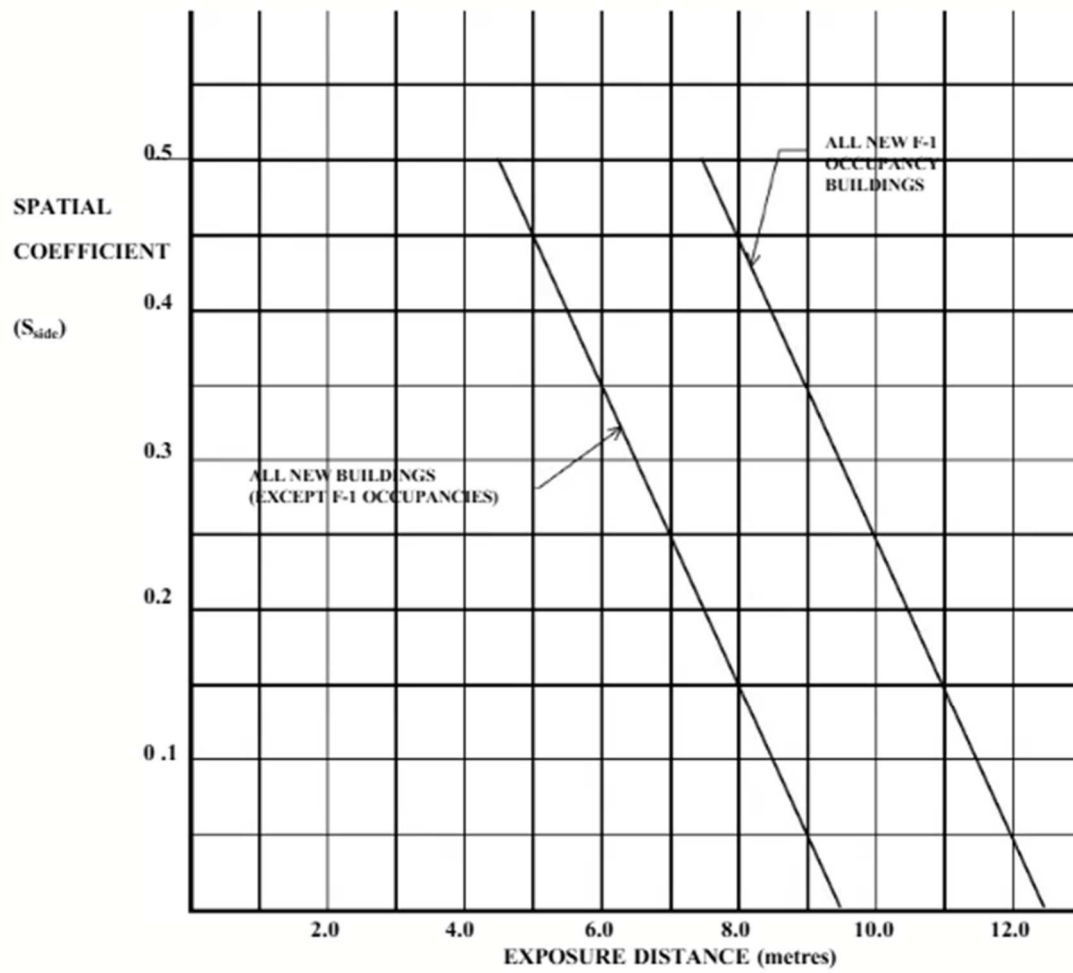
TYPE OF CONSTRUCTION	Classification by Group or Division in Accordance with Table 3.1.2.1 of the Ontario Building Code				
	A-2 B-1 B-2 B-3 C D	A-4 F-3	A-1 A-3	E F-2	F-1
Building is of noncombustible construction with fire separations and fire-resistance ratings provided in accordance with Subsection 3.2.2. of the OBC, including loadbearing walls, columns and arches.	10	12	14	17	23
Building is of noncombustible construction or of heavy timber construction conforming to Article 3.1.4.6. of the OBC. Floor assemblies are fire separations but with no fire-resistance rating. Roof assemblies, mezzanines, loadbearing walls, columns and arches do not have a fire-resistance rating.	16	19	22	27	37
Building is of combustible construction with fire separations and fire-resistance ratings provided in accordance with Subsection 3.2.2. of the OBC, including loadbearing walls, columns and arches. Noncombustible construction may be used in lieu of fire-resistance rating where permitted in Subsection 3.2.2. of the OBC.	18	22	25	31	41
Building is of combustible construction. Floor assemblies are fire separations but with no fire-resistance rating. Roof assemblies, mezzanines, loadbearing walls, columns and arches do not have a fire-resistance rating.	23	28	32	39	53
Column 1	2	3	4	5	6

TABLE 2
MINIMUM WATER SUPPLY FLOW RATES

Building Code, Part 3 Buildings	Required Minimum Water Supply Flow Rate (L/min.)
One-storey building with building area not exceeding 600m ² (excluding F-1 occupancies)	1800
All other buildings	2700 (If $Q \leq 108,000L^{(1)}$) 3600 (If $Q > 108,000L$ and $\leq 135,000L^{(1)}$) 4500 (If $Q > 135,000L$ and $\leq 162,000L^{(1)}$) 5400 (If $Q > 162,000L$ and $\leq 190,000L^{(1)}$) 6300 (If $Q > 190,000L$ and $\leq 270,000L^{(1)}$) 9000 (If $Q > 270,000L^{(1)}$)

FIGURE 1

SPATIAL COEFFICIENT VS EXPOSURE DISTANCE



Buoyancy Calculation Request Form

Project Name: _____

Contact: Ramesh Sarna

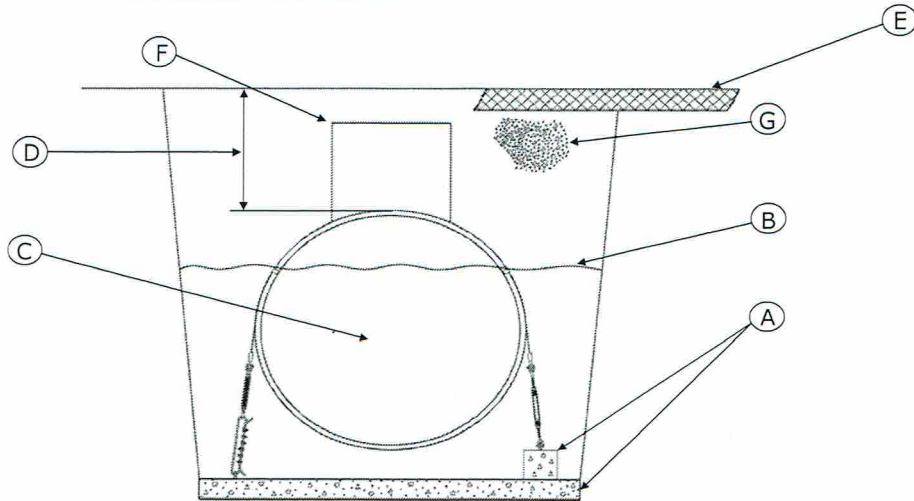
Contact: _____

Phone: _____

Phone: _____

Fax/E-mail: _____

Fax/E-mail: _____



Check Here For Canadian Tanks: ☐

(A) Anchoring: ☐ No Secondary Anchorage, OR:

If deadmen are used: ☐ Xerxes supplied, OR ☐ Supplied by others

For **deadmen supplied by others**: Thickness: _____ in x Width: _____ in x Length: _____ ft

If a bottom anchor slab is used: Thickness: 62'-0" in x Width: 11'-0" ft x Length: 12' Hk (62 x 11 x 12)

(B) Water Table (note: **you must select one of these 3 options**):

☒ Level with Middle of Tank, OR ☐ Level with Top of Tank, OR ☐ At Finished Grade Level

(C) Tank Description:

Nominal Tank Diameter: 10 ft Nominal Capacity: 35000 gallons (135000 litres)

☒ Single-Wall Tank, OR ☐ Double-Wall Tank, OR ☐ Double-Wall Tank (wet interstitial space)

For Multicompartment Tanks, capacity: _____ gals x _____ gals x _____ gals

(D) Total Depth to Top of Tank (**includes soil & top slab**): 2' 0" in

(E) Top Slab (if any): ☐ Concrete, OR ☐ Asphalt Thickness: _____ in (N/A)

(F) Containment Sumps/Risers/Extensions (indicate quantity and diameter):

_____-22" Dia ____-24" Dia ____-30" Dia ____-36" Dia ____-42" Dia ____-48" Dia

(G) Tank Backfill Material: Granular (20 kN/m³)

Additional Comments:

Please refer to the attached sketch

z10-036-01-135.pdf

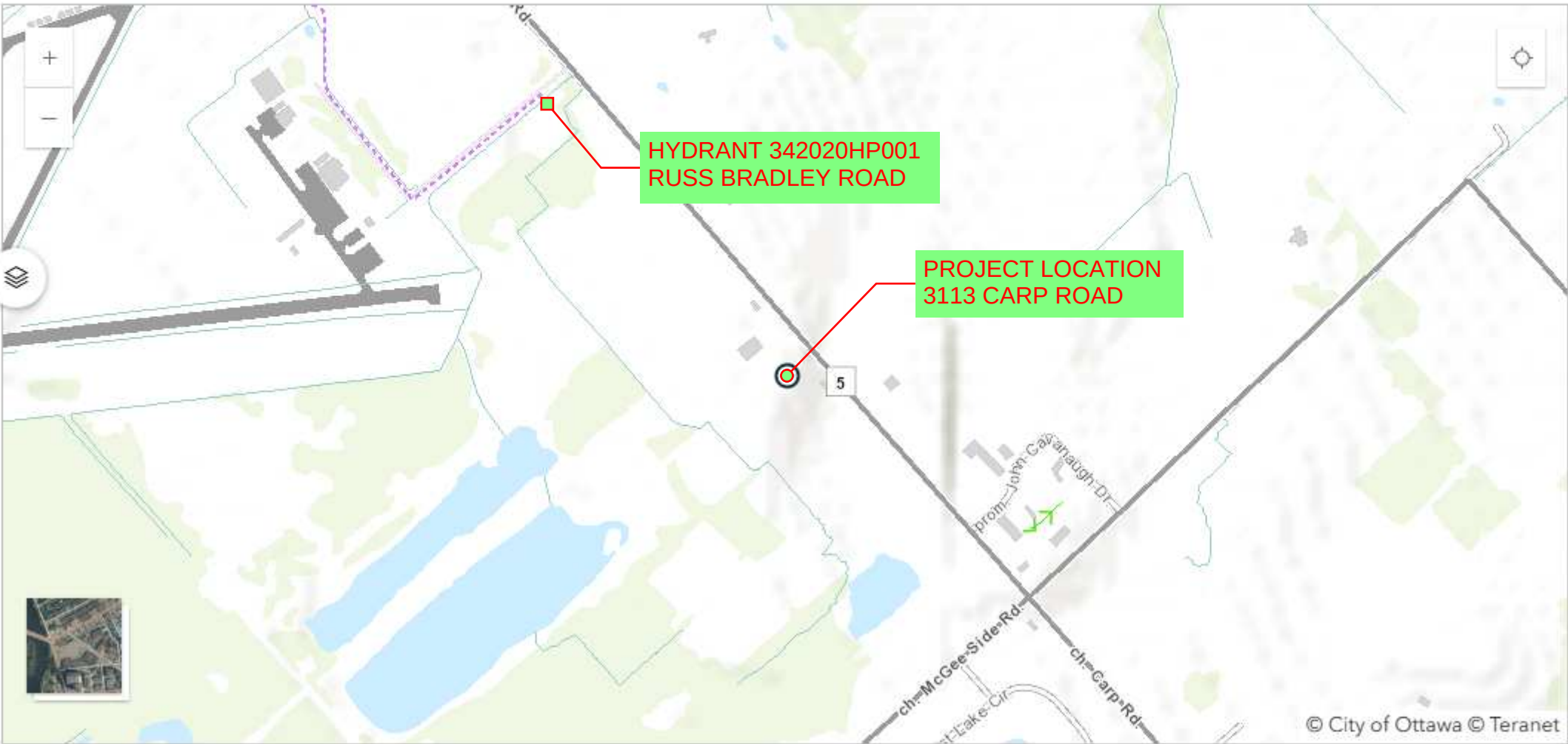


COMPOSITES INC.

71005W

DATE 10-1-74 FOR NO. 10

Selected location: 3113 Carp Rd



Sanitary Manholes (0)	Sanitary Pipes (0)	Storm Inlets (0)	Storm Outlets (0)	Storm Manholes (0)	Storm Pipes (0)
Storm Pipes (2)	Combined Manholes (0)	Combined Pipes (0)	Combined Pipes (0)	Hydrants (0)	Water Mains (2)

Misc. Water Infrastructure (0)

	ID	Install Year	Internal Diameter	Material
---	WAT57777	2020	305mm	Poly Vinyl Chloride
---	WAT55595	2020	305mm	Poly Vinyl Chloride

Appendix E- Sanitary Service

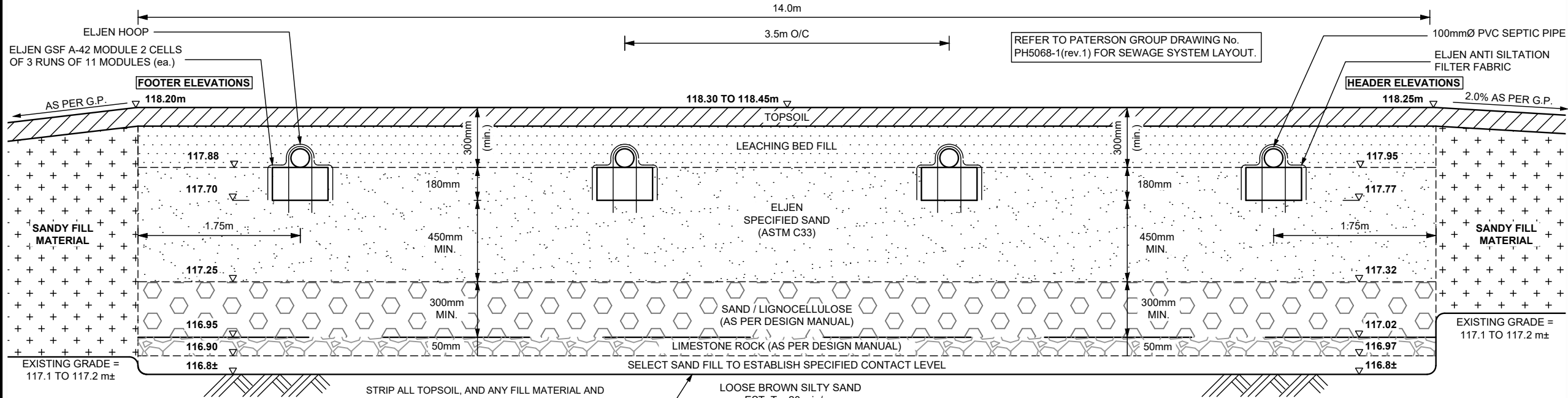
1. TANKAGE AREA SHALL BE PROTECTED FROM PUBLIC ACCESS. IF PUBLIC ACCESS CANNOT BE PREVENTED WITHIN THIS AREA, IT IS RECOMMENDED THAT TANK LIDS BE REINFORCED, LOCKABLE AND WATERTIGHT.
2. CONTROL PANEL SHALL BE INSTALLED WITHIN A LOCKABLE, TAMPER PROOF BOX.
3. PROPOSED SEWAGE SYSTEM SHALL BE GRASS COVERED ONLY.
4. PROPOSED LEACHING BED AREA SHALL BE PROTECTED FROM VEHICULAR TRAFFIC WITH BOLLAARDS OR CONCRETE CURBING.
5. TREES WITHIN 5m OF DISTRIBUTION PIPES TO BE REMOVED/RELOCATED OR, A ROOT BARRIER SHALL BE INSTALLED VERTICALLY ALONG THE EXCAVATION OF THE PROPOSED SEWAGE SYSTEM FROM THE BASE OF THE SYSTEM EXTENDING TO THE FINISHED GRADE.
6. SNOW STORAGE SHALL NOT BE LOCATED OVER PROPOSED SEWAGE SYSTEM.
7. IT IS RECOMMENDED THAT THE LEACHING BED AREA BE SODDED AS SOON AS POSSIBLE.
8. SURFICIAL DRAINAGE SHALL BE DIRECTED AWAY FROM THE PROPOSED SEWAGE SYSTEM.



COVER MATERIAL TO CONSIST OF LEACHING BED FILL FOLLOWED BY APPROX. 100mm OF SANDY TOPSOIL. LEACHING BED TO BE VEGETATED AS SOON AS POSSIBLE.

SEWAGE SYSTEM DESIGN, SPECIFICATION, DETAILS AND NOTES HAVE BEEN COMPLETED IN ACCORDANCE WITH ELJEN DENITRIFICATION SUPPLEMENTAL DESIGN AND INSTALLATION MANUAL.

FINAL GRADING SHALL BE SUITABLY SHAPED TO DIRECT SURFACE WATER AWAY FROM THE PROPOSED SEWAGE SYSTEM.



NOTES:

1) ESTIMATE OF DAILY SEWAGE FLOW (Q)

THE PROPOSED SEWAGE SYSTEM HAS BEEN DESIGNED TO SUPPORT A COMMERCIAL TYPE USAGE CONSISTING OF OFFICE, STORE AND WAREHOUSE SPACE. THE DAILY DESIGN SEWAGE FLOW RATE IS CALCULATED IN ACCORDANCE WITH O.B.C. TABLE 8.2.1.3.B.

OFFICE SPACE:

- 2 EMPLOYEES @ 75/DAY/EMPLOYEE x 12 UNITS = 150 L/DAY x 12 UNITS
- ESTIMATE SEWAGE FLOW = 1,800 L/DAY

WAREHOUSE SPACE:

- 2 LOADING BAY x 150 L/DAY / LOADING BAY x 12 UNITS = 300 L/DAY x 12 UNITS
- ESTIMATE SEWAGE FLOW = 3,600 L/DAY

ESTIMATED SANITARY SEWAGE FLOW = 5,400 L/DAY
TOTAL DESIGN DAILY SANITARY SEWAGE FLOW = 6,000 L/DAY

2) SOIL CONDITIONS

SOILS INFORMATION GATHERED BY PATERSON GROUP INC. ON JUNE 23, 2022. REFER TO PATERSON GROUP REPORT PG6308-1 FOR FULL SOILS BREAKDOWN.

BH 1-22, ELEV. 117.21m		BH 3-22, ELEV. 116.78m	
0-0.28	TOPSOIL	0-0.28	TOPSOIL
0.28-0.69	LOOSE BROWN SILTY SAND	0.28-0.69	LOOSE REDDISH BROWN SILTY SAND
0.69-1.45	STIFF BROWN SILTY CLAY	0.69-2.59	STIFF BROWN SILTY CLAY
1.45-3.6	LOOSE TO COMPACT BROWN SISA TO SASI INTERMITTENT LAYERS OF SILTY CLAY	2.59-4.50	INTERBEDDED LAYERS OF LOOSE BROWN SISA TO SASI AND STIFF BROWN SICL

- G.W.L. @ 1.67m DEPTH (115.54m)

- G.W.L. @ 1.22m DEPTH (115.56m)

3) PRETREATMENT TANK

- TANK SHALL BE CONNECTED TO BUILDING BY A 150mm Ø PVC PIPE SLEEVED THROUGH A 200mmØ PVC SDR 28 PIPE AND OVERLAIN WITH 50mm T x 600mm W RIGID INSULATION BOARDS (UNDER ROADWAY) AND SHALL BE INSTALLED AT 2.0% (min.) SLOPE TO THE PRETREATMENT TANK.
- TANK SHALL INSTALLED LEVEL ON 150mm LAYER OF O.P.S.S. GRANULAR 'A' COMPACTED TO 98% S.P.M.D.D.
- MINIMUM WORKING CAPACITY OF PRETREATMENT TANK = (3 x Q) = 3 x 6,000 L/DAY = 18,000 L (min.)
- IT IS RECOMMENDED THAT A NEW 18,000L (min.) TWO-COMPARTMENT SEPTIC TANK BE INSTALLED.
- AN OBC APPROVED EFFLUENT FILTER (I.E. POLYLOK PL-525 EFFLUENT FILTER, OR EQUIVALENT) SHALL BE INSTALLED ON THE OUTLET PIPE IN THE PRETREATMENT TANK.
- THE ACCESS LIDS TO THE TANK OPENINGS SHALL BE EXTENDED TO THE GROUND SURFACE. INSTALL RISERS AND COVERS TO SUIT.
- ACCESS LIDS SHALL INCLUDE SAFETY DEVICES AS PER CSA B66-21.

4) LEACHING BED SIZING CRITERIA

- NO. OF MODULES REQUIRED = Q/95 = 6,000/95 = 63.1 MODULES
- USE 2 CELLS OF 3 RUNS OF 11 (66) ELJEN GSF A-42 MODULES EACH
- SAND AREA REQUIRED = QT/400 = 6,000(20)/400 = 300m² (min.)
- SAND AREA PROVIDED = 16.92m x 21.0m = 355.3m²

5) BALANCING TANK

- INSTALL A 6,000L (min.) BALANCING TANK IN SERIES AND DOWNSTREAM FROM THE NEW SEPTIC TANK.
- TANK SHALL INSTALLED LEVEL ON 150mm LAYER OF O.P.S.S. GRANULAR 'A' COMPACTED TO 98% S.P.M.D.D.
- A TIME OPERATED ALTERNATING DUPLEX PUMPING SYSTEM (I.E. MYERS ME3F, OR SIMILAR) AND A HIGH WATER ALARM SHALL BE INSTALLED IN THE BALANCING TANK.

- THE TIME OPERATED DUPLEX PUMPING SYSTEM SHALL OPERATE EVERY HOUR (I.E. 250 L/DSE + VOLUME TO CHARGE THE SYSTEM) AND SHALL ALTERNATE BETWEEN EACH CELL.
- A 3mmØ DRAIN HOLE SHALL BE INSTALLED IN THE UNDERSIDE OF THE FORCEMAIN IN THE BALANCING TANK NEAR THE WALL CONNECTION.
- RISERS WITH A COVER SHALL BE INSTALLED OVER THE BALANCING TANK TO PROVIDE ACCESS FROM THE GROUND SURFACE.
- DISCHARGE PIPING FOR PUMP SHALL BE CONFIGURED SUCH THAT THE PUMP IS EASILY SERVICED FROM THE GROUND SURFACE.

6) DISTRIBUTION BOX / FORCEMAIN

- A 38mmØ (NOMINAL) PVC SCH 40 FORCEMAIN (2) SHALL BE USED TO CARRY THE EFFLUENT FROM THE BALANCING TANK TO EACH 3m L x 100mm Ø PVC SEWER PIPE.
- 100mm SEWER PIPE SHALL DRAIN BY GRAVITY TO A 3 OUTLET DISTRIBUTION BOX.
- THE FORCE MAIN SHALL BE INSTALLED TO GRAVITY DRAIN TO THE BALANCING TANK
- THE FORCE MAIN SHALL BE OVERLAIN WITH 50mm T x 600mm W RIGID INSULATION.
- THE FORCEMAIN SHALL BE BEDDED ON A 150 mm THICK LAYER OF COMPACTED SAND OR GRANULAR 'A'.
- THE DISTRIBUTION BOX SHALL BE EQUIPPED WITH AN INLET BAFFLE AND OUTLET PIPES (3).
- BOX SHALL INSTALLED LEVEL ON 150mm LAYER OF O.P.S.S. GRANULAR 'A' COMPACTED TO 98% S.P.M.D.D.
- EACH PIPING RUN SHALL BE FED BY A 3 OUTLET DISTRIBUTION BOX.
- THE DISTRIBUTION BOX SHALL BE CONNECTED TO THE DISTRIBUTION PIPING RUNS USING 100mmØ SOLID PVC SEWER PIPE @ 2% (min.) SLOPE.

7) LEACHING BED CONSTRUCTION GUIDELINES

- REMOVE ALL EXISTING TOPSOIL, AND ANY FILL WITHIN LIMITS OF THE SAND AREA AND SUBEXCAVATE TO AT LEAST ELEVATION 116.90m, WHICHEVER IS GREATER. RE-ESTABLISH THE SPECIFIED CONTACT LEVEL USING SELECT SAND FILL, WHERE REQUIRED.
- THE SUBGRADE SURFACE SHALL BE SCARIFIED, UNDER DRY CONDITIONS.
- PLACE A 50mm MIN. THICK LAYER OF LIMESTONE ROCK OVER THE SUITABLY PREPARED SUBGRADE.
- LIMESTONE ROCK SHALL NO SMALLER THAN 25mm IN DIAMETER UP TO 50mm IN DIAMETER. THE ROCK SHALL CONTAIN GREATER THAN 15% LIMESTONE AS PER ELJEN DENITRIFICATION SUPPLEMENTAL DESIGN AND INSTALLATION MANUAL.
- PLACE A 300mm THICK LAYER OF SAND / LIGNOCELLULOSE OVER THE LIMESTONE ROCK LAYER.
- SAND / LIGNOCELLULOSE SHALL CONSIST OF WOOD CHIPS OR SAW DUST FROM HARD WOOD TREES THAT HAVE NOT BEEN FURTHER PROCESSED BY CHEMICALS. THE 300mm SAND AND LIGNOCELLULOSE LAYER SHALL BE 50/50 EQUAL MIXTURE OF ASTM C33 SAND AND WOOD CHIPS FROM HARD WOOD TREES. THE MIXTURE MUST NOT EXCEED 60/40 IN FAVOR OF THE MORE WOOD TO SAND.
- PLACE A 450mm MIN. THICK LAYER OF ELJEN SPECIFIED SAND FILL OVER THE LEACHING BED FILL.
- THE ELJEN SPECIFIED SAND FILL SHALL CONSIST OF WASHED SAND MEETING THE REQUIREMENTS OF ASTM C33 "STANDARD SPECIFICATION FOR CONCRETE AGGREGATES" WITH LESS THAN THAN 5% PASSING 0.075mm SIEVE. ELJEN SPECIFIED SAND FILL SHALL BE PRE-APPROVED BY THE CONSULTANT.
- THE MODULES SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.
- THE MODULES SHALL BE INSTALLED AT APPROXIMATELY A 0.5% SLOPE, END TO END AND WITH THE WHITE DEMARCATION LINE FACING UP.
- THE MODULAR BASE LEVEL (ELEV. 117.70 AT THE FOOTER TO 117.77m AT THE HEADER) SHALL BE ESTABLISHED WITH ELJEN SPECIFIED SAND FILL, HAVING A MINIMUM THICKNESS OF 450mm.
- THE ELJEN MODULES SHALL BE FED BY GRAVITY BY A 100mmØ PVC SEWER PIPE @ 2% (min.) SLOPE FROM THE DISTRIBUTION BOX
- THE DISTRIBUTION PIPE SHALL CONSIST OF A 100mmØ PERFORATED PVC PIPE CENTRED OVER THE MODULES. THE PIPE SHALL BE SECURED TO THE TOP OF THE MODULES USING AN ELJEN HOOP (MINIMUM 1 HOOP PER MODULE).
- THE INVERT LEVEL OF THE DISTRIBUTION PIPE SHALL BE SET ON THE MODULES AT ELEVATION 117.88m AT THE FOOTER TO 117.95m AT THE HEADER. THE END OF THE PIPE RUNS SHALL BE CONNECTED TO A 100mmØ SOLID PVC FOOTER PIPE
- INSTALL ELJEN SYSTEM SAMPLING DEVICE AS PER MANUFACTURER'S RECOMMENDATIONS.
- THE ELJEN ANTI-SILTATION FILTER FABRIC SHALL BE SPREAD LENGTHWISE OVER THE PERFORATED SEPTIC PIPE AND DOWN THE SIDES OF THE MODULES. ENSURE ENDS OF MODULES ARE ALSO COVERED WITH FABRIC.

- THE MODULES SHALL BE BACKFILLED, WITH ELJEN SPECIFIED SAND FILL TO AT LEAST THE TOP OF THE ELJEN MODULES, FOLLOWED BY 200mm (min.) OF LEACHING BED FILL, FOLLOWED BY 100mm OF SANDY TOPSOIL, WITHIN THE LIMITS OF THE SAND AREA. THE BED AREA SHOULD BE VEGETATED AS SOON AS POSSIBLE.
- LEACHING BED SAND FILL SHALL BE UNIFORM SAND WITH GRADING LIMITS SIMILAR TO 100% PASSING 13.2mm SIEVE, LESS THAN 5% PASSING 0.075mm SIEVE, AND HAVING A PERCOLATION TIME OF 6 TO 8 min/cm. LEACHING BED FILL SHALL BE PRE-APPROVED BY THE CONSULTANT.
- THE SIDES OF THE BED SHOULD BE SLOPED AT 3H:1V OR SHALLOWER.
- VENT SYSTEM SHALL BE INSTALLED ON THE FOOTER PIPE. CONNECT A 100mmØ PVC VENT PIPE TO FOOTER PIPE, EXTENDING TO GROUND SURFACE. VENT PIPE TO BE INSTALLED IN 150mmØ LANDSCAPE VALVE COVER.

8) MINIMUM CLEARANCE DISTANCE FROM DISTRIBUTION PIPE

- 5.7m FROM ANY PROPERTY LINE
- 7.7m FROM ANY STRUCTURE: 5.0m FROM ANY BASEMENTLESS STRUCTURE
- 17.7m FROM ANY DRILLED WELL
- 5.0m FROM ANY TREE (UNLESS OTHERWISE APPROVED)

9) MINIMUM CLEARANCE DISTANCE FROM TANK(S)

- 1.5m FROM ANY STRUCTURE
- 15.0m FROM ANY DRILLED OR DUG WELL
- 3.0m FROM ANY PROPERTY LINE

10) GENERAL

- SNOW STORAGE SHALL NOT BE LOCATED OVER PROPOSED SEWAGE SYSTEM.**
- THE SEWAGE SYSTEM HAS NOT BEEN DESIGNED TO SUPPORT TRAFFIC LOADING.
- THE BACKFILLING OF THE SEWAGE SYSTEM SHOULD MINIMIZE THE RISK OF OVER COMPACTION WITH THE USE RUBBER TRACKED EQUIPMENT AND BY AVOIDING THE CREATION OF ANY CONSTRUCTION ROUTES OR PATHWAYS OVER THE SYSTEM.
- ANY NEW IRRIGATION / SPRINKLER SYSTEM SHOULD NOT BE USED IN PROXIMITY OF THE PROPOSED SEWAGE SYSTEM.
- ENSURE WALKWAYS AND/OR SHURBBERY ARE NOT PLACED WITHIN PROXIMITY OF THE TANKAGE.
- THE BACKWASH WATERS FROM ANY WATER TREATMENT UNIT, SUCH AS WATER SOFTENER, SHOULD NOT DISCHARGE INTO THE SEWAGE SYSTEM.
- THE SEWAGE SYSTEM HAS NOT BEEN DESIGNED FOR THE USE OF A GARBAGE DISPOSAL.
- SEWAGE SYSTEM INSTALLER SHALL BE QUALIFIED AND REGISTERED UNDER PART 8 OF THE ONTARIO BUILDING CODE AND SHALL BE AN AUTHORIZED EULEN TREATMENT SYSTEM INSTALLER.
- ALL WORK SHALL BE CARRIED OUT IN ACCORDANCE WITH THE LATEST BY-LAWS, CODES AND REGULATIONS.
- CONTRACTOR SHALL REVIEW DRAWINGS IN DETAIL AND SHALL INFORM THE CONSULTANT OF ANY ERRORS AND/OR OMISSIONS ON DESIGN DRAWINGS IMMEDIATELY.
- CONTRACTOR SHALL BE RESPONSIBLE TO LOCATE AND PROTECT ALL EXISTING UNDERGROUND SERVICES.
- CONTRACTOR SHALL VISIT THE SITE AND REVIEW ALL DOCUMENTATION TO BECOME FAMILIAR WITH THE SITE AND SUBSURFACE SOIL CONDITIONS TO DETERMINE SUITABLE METHODS OF CONSTRUCTION.
- THE MANUFACTURER PROVIDES A LIMITED WARRANTY OF THE SYSTEM COMPONENTS. THE OWNER OF THE SYSTEM MUST SIGN A MAINTENANCE AGREEMENT WITH THE MANUFACTURER'S REPRESENTATIVE. THE HOMEOWNER IS RESPONSIBLE FOR THE ANNUAL FEES ASSOCIATED WITH THE MAINTENANCE.
- THE FIRM OF PATERSON GROUP INC. HAS PROVIDED DESIGN SERVICES ONLY FOR THE SUBJECT SEWAGE SYSTEM. THE DESIGN HAS BEEN CARRIED OUT IN ACCORDANCE WITH THE MANUFACTURER'S GUIDELINES AND OUR INTERPRETATION OF PART 8 OF THE ONTARIO BUILDING CODE.
- INSPECTIONS BY THE CONSULTANT DURING THE INSTALLATION OF THE SYSTEM IS A REQUIREMENT OF SOME REGULATING AUTHORITIES AND IS STRONGLY RECOMMENDED BY THIS FIRM.
- THE PROPERTY LINE / SEPARATION DISTANCES SHOULD BE CONFIRMED PRIOR TO CONSTRUCTION.
- CONSTRUCTION INSPECTIONS DURING THE INSTALLATION OF THE SEWAGE SYSTEM MAY BE REQUIRED BY THE REGULATING AUTHORITY AND ARE STRONGLY RECOMMENDED BY THIS FIRM. IF THIS FIRM IS TO COMPLETE ANY CONSTRUCTION INSPECTION(S), ADDITIONAL FEES MAY BE APPLIED. CONFIRMATION OF PAYMENT WILL BE REQUIRED PRIOR TO THE INSPECTION.**
- THE TEST HOLE INFORMATION PROVIDED, IS INTENDED TO BE USED FOR DESIGN PURPOSES ONLY, AND SHOULD NOT BE RELIED UPON FOR CONSTRUCTION PURPOSES. IF DISCREPANCIES ARE FOUND DURING THE CONSTRUCTION PROCESS, IT IS THE CLIENT'S RESPONSIBILITY TO CONTACT THIS FIRM TO MAKE ANY NECESSARY COMMENTS OR REVISIONS. ADDITIONAL REVISIONS ARE NOT CONSIDERED PART OF THE DESIGN WORKS AND WILL BE CONSIDERED AS AN ADDITIONAL COST.**



Professional Engineers
Ontario

Licensed Engineering Technologist

Name: H. G. VAN DE GLIND

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Limitations: Inspecting, designing, and assessing residential and commercial sewage systems, grading designs and soil analysis, and overseeing installation and compliance.

Association of Professional Engineers of Ontario

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Consultant:



**PATERSON
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Client:

MEGHA HOLDINGS INC.

Project:

**PROPOSED WAREHOUSE
BUILDING**

**3113 CARP ROAD
OTTAWA (CARP), ONTARIO**

Drawing:

**SEWAGE SYSTEM
DETAILS AND NOTES
ELJEN DN450**

Scale:

N.T.S.

Drawn by:

HV

Date:

10/2025

Checked by:

MK

Drawing No.:

PH5068-2(rev.2)

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