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**SERVICING AND STORMWATER
MANAGEMENT REPORT**

ORLEANS KIA DEALERSHIP
2045 MER-BLEUE ROAD
ORLEANS, ONTARIO

Prepared For:
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DISTRIBUTION

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1 INTRODUCTION

Kollaard Associates was retained by Lawrence Architects Inc. to complete a Servicing Stormwater Management Report for a proposed building expansion at an automotive dealership in Orleans, Ontario.

This report will address the serviceability of the proposed site, specifically relating to the adequacy of the existing sanitary sewer, storm sewer, and watermains to hydraulically convey the necessary storm runoff, sanitary sewage and water demands that will be placed on the existing system. The report shall also summarize the stormwater management (SWM) design requirements and proposed works that will address stormwater flows arising from the site under post-development conditions and will identify any stormwater servicing concerns and also describe any measures to be taken during construction to minimize erosion and sedimentation.

The proposed development is located at 2045 Mer-Bleue Road in the City of Ottawa. The lot has a total area of 1.29ha and is currently occupied by the existing automotive dealership (Kia site).

The drawings associated with this report orientate Mer-Bleue Road in the north – south direction. The site is located to the east of Mer-Bleue Road. The current site access is an asphalt entrance from Mer-Bleue Road, 350m south of the intersection of Innes Road, Mer-Bleue Road, and Jeanne-d'Arc Boulevard. There is other access at the rear of the property (north-east corner) from a private asphalt driveway coming from Roger-Pharand Street. Both site entrances are to remain.

The site is located between two other automotive dealerships to the north and south (Toyota and Honda) and residential apartment buildings to the east.

There are two additions proposed to the existing Kia dealership, one on the east side of the building and the other on the south side of the building. Both additions will be constructed within the existing asphalt surfaced parking lot.

A limit of development is shown on the civil drawings. The limit of development is 0.40 hectares in area. This limit of development surrounds the new building expansions and the stormwater catchment areas adjacent to the two building expansions.

2 BACKGROUND

The site is part of the Mer-Bleue Automall development, which consists of the development of the three automotive dealerships; Toyota, Kia and Honda. Each automotive dealership is on three separate lots. Each lot contains the dealership building, associated parking for staff, visitors and vehicle displays as well as landscaped areas.



A servicing and stormwater management design was completed by CIMA+ between 2012 and 2013 for all three sites. The Kia site was referenced in the CIMA+ drawings as BLDG K. Construction of the three buildings was completed between 2014 and 2015.

The following 2013 Civil design drawings by CIMA+ were referred to, to understand the existing site works:

- GR1_A000160: Stormwater Management Plan (Rev 8, 07/04/2014)
- SWC2_A000160: Grading Plan (Rev 8, 07/04/2014)
- SWC3_A000160: Municipal Services Plan (Rev 9, 07/04/2014)

The drawings listed above are included in Appendix A of this report.

The maximum allowable release rate from the site was 50L/s/ha or 64 L/s, for all rainfall events up to a 100-year event. This is slightly less than the 5-year pre-development release rate.

The Kia dealership was divided into eleven catchment areas (K-1 to K-11) where stormwater storage was provided on the surface of the parking lot of each catchment. The maximum ponding depth on the surface of the parking lot is 300mm. The release rate of areas K-1 to K-7 is controlled by an inlet control device (ICD) located in a maintenance hole (STM-K1) in catchment K-2. Areas K-8 to K-11 each contain individual ICD's to control the release rate within the separate catchments. The building has a flat roof with roof drains. Stormwater storage is provided on the roof of the building with a controlled release rate that is discharged to a roof leader, connecting to the underground storm pipe network behind the building. There are two uncontrolled areas on the property, where runoff is conveyed without restriction at the very front of the property, as well as at the very back of the property.

There is a private storm sewer located behind each of the automotive dealership buildings, to collect and convey the controlled runoff from the three sites to the 900mm diameter storm pipe on Roger-Pharand Street. Runoff from the Kia site is connected to this private storm sewer at maintenance hole STM-05.

Parallel with the storm sewer is a sanitary sewer, collecting and conveying the sanitary discharge from each building to the 250mm diameter sanitary sewer on Roger-Pharand Street. Sanitary discharge from the Kia site is connected to this private sanitary sewer at maintenance hole SAN-04.

The Kia site contains a 200mm diameter water service at the front of the building that connects to the 405mm diameter watermain on Mer-Bleue Road. The site contains a private fire hydrant, located near front of the building at the side lot line adjacent to the Toyota property.



3 STORMWATER DESIGN

3.1 Introduction and Design Summary

Design of the storm sewer system was completed in conformance with the City of Ottawa Sewer Design Guidelines (December 2025).

3.2 Stormwater Management Design Criteria

Quantity and quality control criteria were provided by the City of Ottawa (CoO) during a pre-consultation meeting on February 19th, 2026. The City meeting number is PC2026-0017. The stormwater management criterion consists of the following:

Quantity Control Criteria

- a) In the absence of area specific stormwater management criteria, the post-development runoff from the subject site, up to and including the 100-year storm event must be controlled to a 5-year pre-development level, with a maximum runoff coefficient of 0.5.
- b) There shall be no surface ponding on private parking areas for the 2-year storm event.

It is understood that If the area specific quantity control stormwater management criteria is less than those calculated in a), then the more restrictive release rate is to be used.

Quality Control Criteria

- a) If it can be demonstrated that there is no increase of hard landscaping on site, then no quality control is required. If this cannot be demonstrated than, an enhanced level of treatment must be provided for runoff from the site, corresponding to 80% total suspended solids removal.

3.3 Stormwater Quantity Control

3.3.1 Methodology

Peak Flow for runoff quantities for the Pre-Development and Post-Development stages of the project were calculated using the rational method. The rational method is a common and straightforward calculation, which assumes that the entire drainage area is subject to uniformly distributed rainfall. The formula is:



$$Q = \frac{CiA}{360}$$

Where

Q is the Peak runoff measured in ***m³/s***

C is the Runoff Coefficient, **Dimensionless**

A is the runoff area in ***hectares***

i is the storm intensity measure in ***mm/hr***

All values for intensity, *i*, for this project were derived from IDF curves provided by the City of Ottawa for data collected at the Ottawa International airport. For this project two return periods were considered, 5 and 100-year events. The formulas for each are:

5-Year Event

$$i = \frac{998.071}{(t_c + 6.053)^{0.814}}$$

100-Year Event

$$i = \frac{1735.688}{(t_c + 6.014)^{0.820}}$$

Where

t_c is time of concentration in ***min***

i is the storm intensity measure in ***mm/hr***

3.3.2 Runoff Coefficients

Runoff coefficients for impervious surfaces (roofs, asphalt, and concrete) were taken as 0.90. Pervious surfaces such as grass have a runoff coefficient of 0.20.

A 25% increase for the post development runoff coefficients were used for 100 year storm events respectively. Refer to Appendix B for pre-development and post-development runoff coefficients.

3.3.3 Pre-development Site Conditions

The site has a total area of about 1.29 hectares. The site limit of development area is 0.40 hectares. As shown on the pre-development drawing, the site catchment areas are delineated as shown in the 2014 design.



The limit of development surrounds the stormwater catchment areas K-4, K-5 and K-9. Majority of these areas contain asphalt surfaces. There are also contributing areas outside of the limit of development that direct runoff to catchments K-5 and K-9.

The Controlled runoff from K-11 is discharged to the pipe network within catchment K-9.

The Controlled runoff from catchments K-8 and K-10 discharge to the pipe network within K-5. Runoff from K-4 is also directed to the pipe network in K-5. The roof leader from the building connects to the pipe network in K-5.

There are no uncontrolled areas within the limit of development.

Drawing 250557-PRE shows the pre-development conditions and pre-development areas.

3.3.4 Pre-Development Time of Concentration

The City of Ottawa Sewer Design Guidelines shows that the time of concentration should be no less than 10 minutes for most urban applications. Therefore a time of concentration of 10 minutes was used for the pre-development conditions.

3.3.5 Pre-development Runoff Coefficient

Pre-development site conditions for K-9, K-5 and K-4 catchments are summarised for the site in the following Table 3.0.

Table 3-0 – Pre-Development Site Conditions

Description	Catchment Area (Ha)	Runoff Coefficient (5yr)	Runoff Coefficient (100yr)	Weighted Average C (5yr)	Weighted Average C (100yr)
K-9	0.211				
Asphalt/Concrete	0.194	0.90	1.00	0.84	0.94
Grass	0.017	0.20	0.25		
K-5	0.155				
Asphalt/Concrete	0.152	0.90	1.00	0.89	0.99
Grass	0.003	0.20	0.25		
K-4	0.035				
Asphalt/Concrete	0.024	0.90	1.00	0.68	0.76
Grass	0.011	0.20	0.25		
Total Limit of Development	0.401				
Asphalt/Concrete	0.370	0.90	1.00	0.85	0.94
Grass	0.031	0.20	0.25		



3.3.6 Pre-development Flow Rate

The storm intensities calculated using the IDF curve equations previously provided yielded 104.19mm/hr for a 5 year storm and 178.56mm/hr for a 100 year storm. Using the Rational Method and the previously calculated runoff coefficients and these storm intensities, the pre-development runoff rate for the 5-year storm and 100- year storms are as follows:

K-9 (pre-development flow)

$$5 \text{ year}_{\text{pre-development}} = 2.78 \times 0.84 \times 104.19 \times 0.211 = 24.3 \text{ L/s}$$

$$100 \text{ year}_{\text{pre-development}} = 2.78 \times 0.94 \times 178.56 \times 0.211 = 98.4 \text{ L/s}$$

K-5 (pre-development flow)

$$5 \text{ year}_{\text{pre-development}} = 2.78 \times 0.89 \times 104.19 \times 0.155 = 39.9 \text{ L/s}$$

$$100 \text{ year}_{\text{pre-development}} = 2.78 \times 0.99 \times 178.56 \times 0.155 = 76.17 \text{ L/s}$$

K-4 (pre-development flow)

$$5 \text{ year}_{\text{pre-development}} = 2.78 \times 0.68 \times 104.19 \times 0.035 = 6.89 \text{ L/s}$$

$$100 \text{ year}_{\text{pre-development}} = 2.78 \times 0.76 \times 178.56 \times 0.035 = 13.2 \text{ L/s}$$

Note, the above calculations reflect unrestricted flows in catchment K-9, K-5 and K-4. Under the existing site conditions and 2014 design it is known that the flows in these catchments are restricted by the use of ICD's in select maintenance holes and catchbasins. Further explanation will be provided in section 3.3.8.

3.3.7 Post-Development Site Conditions

The post-development conditions of the site will involve a building expansion within the original catchment K-9. This is the addition of a vehicle drop off area for customers to drop off vehicles for service. This results in the catchment area being decreased from pre-development conditions.

There is another building expansion proposed within the original catchment K-5. This is a proposed expansion of the vehicle service area at the rear of the existing building. This results in the catchment area being decreased from pre-development conditions.

With the revised site grading, the catchment area K-4 was slightly reduced, while additional area being added to K-5. The runoff coefficients and surface areas of the post-development conditions are summarized in the following table 3.1.



Table 3.1– Summary of Post-Development Site Conditions

Description	Catchment Area (Ha)	Runoff Coefficient (5yr)	Runoff Coefficient (100yr)	Weighted Average C (5yr)	Weighted Average C (100yr)
K-9	0.192				
Asphalt/Concrete	0.172	0.90	1.00	0.83	0.92
Grass	0.020	0.20	0.25		
BLDG K Expansion by K-9	0.019				
Roof/Building	0.019	0.90	1.00	0.90	1.00
K-5	0.123				
Asphalt/Concrete	0.122	0.90	1.00	0.89	0.99
Grass	0.001	0.20	0.25		
BLDG K Expansion by K-5	0.043				
Roof/Building	0.043	0.90	1.00	0.90	1.00
K-4	0.024				
Asphalt/Concrete	0.014	0.90	1.00	0.61	0.69
Grass	0.010	0.20	0.25		
Total Limit of Development	0.401				
Roof/Building	0.062	0.90	1.00	0.85	0.94
Asphalt/Concrete	0.308	0.90	1.00		
Grass	0.031	0.20	0.25		

3.3.8 Allowable Post-Development Release Rate from the Controlled Area

The stormwater management criteria provided for the runoff rate from the site indicates that the storm runoff is to be released in a controlled manner.

Typically the allowable release rate from the controlled areas of the site is equal to the total allowable runoff rate from the site (or 5-year pre-development runoff rate) less the uncontrolled runoff. Since there are no uncontrolled runoff areas within the limit of development the allowable release rate from each catchment is the lesser of the following:

- The post-development flow rates from the site do not exceed the 5-year pre-development runoff rates for storm return periods up to the 100-years storm event.
- The maximum release rate from each catchment and contributing area as shown in the 2014 design.

The allowable controlled area release rate for the site is summarized in the following table.



Table 3.2 – Summary of Allowable Release Rates

Description	Catchment Area (Ha)	5-year Pre-Development Release Rate	Maximum 100-year Controlled Area Release Rate as per 2014 design	Total 100-year Controlled Area Release Rate as per 2014 design
K-9	0.192	24.3 ⁽¹⁾	11.12	14.94
K-11(Contributing Area)	0.073	n/a	3.82	
K-9 Allowable Release Rate (L/s) for 100 year event				14.94
K-5	0.123	39.9 ⁽²⁾	5.58	16.78
K-10 (Contributing Area)	0.073	n/a	3.83	
K-8 (Contributing Area)	0.058	n/a	3.07	
K-4 (Contributing Area)	0.024	6.89	n/a	
BLDG K Original Roof (Contributing Area)	0.086	n/a	4.30	
BLDG K Expansion by K-5	0.043	n/a	n/a	
BLDG K Expansion by K-9	0.019	n/a	n/a	
K-5 Allowable Release Rate (L/s) for 100 year event				16.78

(1) Under pre-development conditions K-9 was 0.211 hectares in area for the flow calculation.

(2) Under pre-development conditions K-5 was 0.155 hectares in area for the flow calculation.

From the 2014 design, the release rate of areas K-1 to K-7 is controlled by an inlet control device (ICD) located in a maintenance hole (STM-K1) in catchment K-2. Stormwater storage is provided in the four parking lot surface of catchments K-2, K-3, K-5, and K-6. The maximum release rate from STM-K1 is 22.33 L/s during a 100-year storm event. Only catchment K-5 is within the current limit of development. To isolate the maximum allowable release rate from K-5, 25% of the release rate from STM-K1 was used. The



maximum release rate from STM-K1 will now be 16.75L/s. The old ICD in STM-K1 is to be removed replaced with a new ICD, as discussed in section 3.3.9.5.

3.3.9 Post Development Restricted Flow and Storage

All surface runoff in K-9 is to be captured in a catchbasin in the side parking lot and directed to an underground storage system (GRAF Ecobloc Inspect Smart Modules). From the underground storage system, the stormwater is conveyed by a storm sewer to a catchbasin maintenance hole (STM-MH2). The contributing area from catchment K-11 is also directed to STM-MH2. STM-MH2 contains an inlet control device (ICD) that will restrict the release rate in order to meet the quantity control criteria. Runoff in excess of the allowable release rate will be temporarily stored below grade in underground storage modules. The temporarily stored water will be released at a controlled rate during and following a rainstorm event. The water released from STM-MH2 will be conveyed by a series of 250mm and 300mm diameter storm pipes to the existing maintenance hole STM-05. From STM-05, the runoff is conveyed by the existing private storm sewer (collecting the runoff from all three auto dealerships) to that municipal storm sewer on Roger-Pharand Street.

All surface runoff in K-5 is to be captured in a catchbasin in the rear parking lot and directed to an underground storage system (GRAF Ecobloc Inspect Smart Modules). From the underground storage system, the stormwater is conveyed by a storm sewer to a catchbasin maintenance hole (STM-MH4). The restricted runoff from contributing areas K-10, K-8 and BLDG K is directed to STM-MH4. The unrestricted runoff from catchments K-4 and the BLDG K expansions is also directed to STM-MH4. STM-MH4 contains an inlet control device (ICD) that will restrict the release rate in order to meet the quantity control criteria. Runoff in excess of the allowable release rate will be temporarily stored below grade in underground storage modules. The temporarily stored water will be released at a controlled rate during and following a rainstorm event. The water released from STM-MH4 will be conveyed by a series of 250mm and 300mm diameter storm pipes to existing maintenance hole STM-05.

From the 2014 design, the release rate of areas K-1 to K-7 is controlled by an inlet control device (ICD) located in a maintenance hole STM-K1 (in catchment K-2). Stormwater storage is provided in the four parking lot surfaces of catchments K-2, K-3, K-5, and K-6. The maximum release rate from STM-K1 is 22.33 L/s during a 100-year storm event. Only catchment K-5 is within the current limit of development. The storm pipe that conveys the runoff from K-5 to the maintenance hole (STM-K1) is proposed to be disconnected in order to confine the current flow restrictions and additional storage requirements within the limit of development. The maximum release rate from STM-K1 will now be 16.75L/s. The old ICD in STM-K1 is to be removed replaced with a new ICD.



Further stormwater servicing details are shown in the site servicing plan 250557-SER, found in appendix E.

3.3.9.1 Underground Storage Modules (K-9)

The underground storage will be provided using GRAF Ecobloc Inspect Smart Plus Modules under the proposed side parking lot. An EcoBloc Module is a subsurface storage unit load-rated for HS-20 Traffic under surfaces such as parking lots.

Product information for the underground modules is provided in Appendix C.

The module parameters are the following:

- The modules are one layer high.
- The underground storage area is to have a total of 125 modules.
- Each Inspect Smart module is 0.8m long, 0.8m wide and 0.33m high. Each Inspect Smart module has a water storage volume of 200L. All Inspect Smart modules need to contain a base plate at the bottom of the module. Any modules facing the sides of the excavation need to contain end plates.
- There is one Vario 800 flex shaft catchbasin structure within the modules to collect runoff from the surface.
- The modules are arranged in a rectangular shape 7 wide by 18 long.
- The Inspect Smart modules have interior bracing that is spaced such that it can be camera inspected. These modules also allow for high pressure jetting for clearing sediment and debris.

The tanks will be placed with a tank invert elevation of 87.80m. The subgrade of the modules is to have an invert elevation of 87.75m.

2-year ponding will result in a water depth of 0.33m in the modules (elevation of 88.13), resulting in the modules being at full capacity.

5-year ponding will result in the modules being completely full, with water ponding at an elevation of 88.10 in the maintenance hole structure.

100-year ponding will result in 0.30m of surface ponding in the parking area. (elevation of 89.70).

Please refer to the storm servicing plan 250557-SER for further module arrangement information.



3.3.9.2 Control Structure (K-9)

The ICD in STM-MH2 will limit the flow rate into the municipal system from the controlled area K-9 during a storm event, detaining any runoff in excess of the design release rate in the proposed underground storage area. The control structure will release water after the storm event has passed until the detained runoff has been completely discharged. The control structure consists of a maintenance hole STM-MH2 containing a Hydrovex 100VHV-1 control device (ICD). This is the original control device in this catchment structure CB-K6. If the ICD is in adequate condition, it can be reused in the STM-MH2. The ICD will limit the 100-year flow to 14.5 L/s at 2.2m of head. The 250mm diameter outlet pipe will consist of PVC SDR 35 pipe.

A Hydrovex 100VHV-1 or approved alternative is to be used. The corresponding flow curve for the inlet control device is shown in Appendix C. The following product parameters should be noted:

- Hydrovex 100VHV-1
- Outlet pipe specification: 250mm diameter
- Discharge: 14.5 L/s
- Upstream Head: 2.2m
- Catchbasin Maintenance Hole Dimensions: 1200 mm diameter
- 600 mm sump

3.3.9.3 Underground Storage Modules (K-5)

The underground storage will be provided using GRAF Ecobloc Inspect Smart Plus Modules under the proposed rear parking lot.

The module parameters are the following:

- The modules are two layers high, for a total height of 0.66m.
- The underground storage area is to have a total of 414 modules, with 207 modules in each layer.
- Each Inspect Smart module is 0.8m long, 0.8m wide and 0.33m high. Each Inspect Smart module has a water storage volume of 200L. All Inspect Smart modules within the first layer need to contain a base plate at the bottom of the module. Any modules facing the sides of the excavation need to contain end plates.
- There is one Vario 800 flex shaft catchbasin structures within the modules to collect runoff from the surface.
- The modules are positioned in an irregular shape for receiving pipe connections, from the other contributing catchments.



The tanks will be placed with a tank invert elevation of 87.50m. The subgrade of the modules is to have an invert elevation of 87.45m.

2-year ponding will result in a water depth of 0.5m in the modules (elevation of 88.00).

5-year ponding will result in the modules being completely full, with water ponding at an elevation of 89.30 in the maintenance hole structures.

100-year ponding will result in 0.25m of surface ponding in the parking area. (elevation of 89.65).

Please refer to the storm servicing plan 250557-SER for further module arrangement information.

3.3.9.4 Control Structure (K-5)

The ICD in STM-MH4 will limit the flow rate into the municipal system from the controlled area K-5 during a storm event, detaining any runoff in excess of the design release rate in the proposed underground storage area. The control structure will release water after the storm event has passed until the detained runoff has been completely discharged. The control structure consists of a maintenance hole STM-MH4 containing a Hydrovex 100VHV-1 control device (ICD). The ICD will limit the 100-year flow to 16.3L/s at 2.35m of head. The 250mm diameter outlet pipe will consist of PVC SDR 35 pipe.

A Hydrovex 100VHV-1 or approved alternative is to be used. The Hydrovex should be ordered to correspond with a pre-set flow curve, as shown in the selection chart in Appendix C. The following parameters should be noted when ordering:

- Hydrovex 100VHV-1
- Outlet pipe specification: 300mm diameter
- Discharge: 16.3 L/s
- Upstream Head: 2.35m
- Catchbasin Maintenance Hole Dimensions: 1200 mm diameter
- 600 mm sump.

3.3.9.5 Control Structure (K-2)

The original ICD in STM-K1 would limit the flow rate into the municipal system from the controlled areas - K-1 to K-7 during the storm event, detaining any runoff in excess of the design release rate within the surface storage of the parking structure, as per the 2014 design. The original control device had a maximum release rate during a 100-year storm event of 22.33L/s at 2.87m of head. The original device was an IPEX orifice cap.



Since the runoff from catchment K-5, is not going to be directed to STM-K1, the maximum controlled release from the ICD in STM-K1 is to be modified to 16.75 L/s.

In keeping with an IPEX product, a Tempest inlet control device is proposed. The ICD should be ordered to correspond with a pre-set flow curve, as shown in the selection chart in Appendix C. The following parameters should be noted when ordering:

- Tempest LMF
- Outlet pipe specification: 250mm diameter
- Discharge: 16.7 L/s
- Upstream Head: 2.87m
- Catchbasin Maintenance Hole Dimensions: 1200 mm diameter
- 600 mm sump

3.3.10 Rooftop Storage

The two proposed building expansions will have flat roof designs. It is not considered that significant stormwater storage will be provided on the roof areas. Roof drainage will be internally plumbed to a roof leader at the back of the building, that discharges to the underground stormwater storage area in catchment K-5.

3.3.11 Summary

The following table presents a summary of the controlled runoff for each catchment and the required storage resulting from the restriction in flow rate.

Table 3-3 – Summary of Runoff Rates and Storage

Catchment Area ID.	Area	5 – year design Storm			100-year design Storm		
		Release Rate (L/s)	Required Storage (m ³)	Available Storage (m ³)	Release Rate (L/s)	Required Storage (m ³)	Available Storage (m ³)
K-9	0.192	12.5	27.5	69.0	14.5	64.0	69.0
K-5	0.123	14.0	66.0	124.0	16.3	124.0	124.0
Total Actual Controlled Area Release Rate							
		26.5			30.8		
Total Allowable Controlled Area Release Rate							
		31.72			31.72		



The above summary table shows that, the total post development runoff rate from the site is less than the total allowable runoff rate from the site for each design storm. As such the stormwater management criteria governing the runoff rate from the site has been met by the proposed design.

The system has been designed to accommodate on-site detention with sufficient capacity to attenuate the 100-year design storm. Excess runoff above the 100 year event within the limit of development will flow overland toward Roger-Pharand Street.

Refer to Appendix B for a detailed summary of the stormwater management calculations.

3.4 Stormwater Quality Control

The preliminary upgrades to the site involve the expansion of the building. The expansion of the roof area, reduces the asphalt surface area. The City of Ottawa feedback during the pre-consultation meeting was that if it could be demonstrated that there is no increase of hard landscaping on site, then no quality control is required.

The comparison of the pre-development and post-development conditions in tables 3.0 and 3.1 demonstrates that the asphalt area will be reduced by 620m² for the building additions. The 310m² of landscaping area within the limit of development will remain by adding soft landscaping to catchments K-4 and K-9 to compensate for the loss of landscaping in K-5 due to the building addition at the back.

Since there is no increase to hard landscaping on the site, quality control will not be required.

3.5 Stormwater System Operation and Maintenance

3.5.1 Catchbasins and Maintenance holes

The catch basins and maintenance holes should be cleaned with a hydrovac excavation truck following completion of construction, final grading of surfaces and establishment of adequate grass cover on the landscaped areas.

Following the initial cleaning the catch basins and maintenance holes should be inspected on a semi-annual basis and following major storm events. Any blockages, trash or debris should be removed. Once the sediment accumulation in the catch basins and maintenance holes has reached a level equal to 0.15 metres below the outlet invert of the structure, the sediment should be removed by hydro excavation.



3.5.2 Inlet Control Devices (ICD's)

The inlet control devices (ICDs) should be inspected on a semi-annual basis and following major storm events. Any blockages, trash or debris should be removed. If surface ponding in the parking areas does not recede in a normal manner, the ICD should be inspected and cleaned.

3.5.3 Underground Storage Modules

Detailed installation, operation and maintenance guidelines from the GRAF underground module supplier should be followed.

The parking areas should be inspected. If there is sediment build-up and debris on the asphalt surfaces, it is recommended that those surfaces be cleaned. There is more effort needed to remove sediment and debris from the underground storage area, than removing the debris before it enters the underground system.

In addition to the manufacturer's recommendations and guidelines, the following maintenance practices should be followed.

Inspection:

- Inspect the Vario flex access chambers.
- Identify and log any sediment and debris accumulation, system backup, or discharge rate changes.
- If there is a sufficient need for cleanout, contact a local hydrovac excavation company for assistance.

Cleaning:

- Using a vacuum pump truck, evacuate debris from the inflow and outflow points.
- Flush the system with clean water, removing debris from the system with a vacuum truck.
- Repeat steps 2 and 3 until no debris is evident.

3.5.4 Connection to the Existing Private Storm System

It is recommended that the existing storm system on the site be CCTV inspected, to determine if there are any blockages, sediment build up or damage in the existing underground storm network. If it is determined that any repairs need to be completed, they can be fixed when the new site works are being installed.



4 SANITARY SEWER DESIGN

The sanitary service lateral from the proposed development will be connected to the existing 200 mm diameter sanitary sewer on-site. The existing sanitary sewer on-site connects to the existing 250 mm diameter sanitary sewer along Roger-Pharand Street.

The anticipated peak sanitary flow will be a total of approximately 0.477 L/s.

4.1 Design Flows

The commercial flows for the automotive dealership were calculated with the use of the Ottawa Sewer Design Guidelines – Appendix 4-A (October 2012) and the Ontario Building Code (O.B.C 2025) Table 8.2.1.3B.

The water demand for the existing building with the proposed additions was calculated as follows:

Commercial – Car Dealership

Office (O.B.C table 8.2.1.3B):

Per employee per 8 hr shift (24 persons) x 75L/day: 1800 L/day

Or

Per each 9.3m² of floor space (188.5m²/9.3m² = 20.26) x 75L 1520 L/day

Service Station/Garage (CoO Appendix-4A):

Per car servicing (one service bay) (9 service bays) x 40L/day: 360 L/day

and

Per catch basins in garage floors (3 trench drains) x 375L/day: 1125 L/day

Showroom and Parts Counter/Advisor Desk (Stores - O.B.C table 8.2.1.3B):

Per 1.0m² of floor area (411.65m²) x 5L/day: 2058 L/day

Or

Per water closet (2 water closets) x 1230 L/day: 2460 L/day

Car wash/wash bays (CoO Appendix-4A):

Per car hand wash (12 cars) x 200L/day: 2400 L/day

Parts Storage (Warehouse - O.B.C table 8.2.1.3B):

Per water closet (0 water closets) x 950 L/day 0 L/day

and

Per loading bay (1 loading bay) x 150 L/day: 150 L/day



Total Average Demand:

8295 L/day

Proposed Building Total

8295 L/day with typical operating hours from 9am – 7pm x (1/36,000 sec/day) = 0.230 L/s

- Average daily demand (ADD) 0.230 L/s
- Commercial Peak (x 1.5) is $0.230 \text{ L/s} \times 1.5 = 0.345 \text{ L/s}$
- Infiltration = $0.33 \text{ L/ha/sec} \times 0.40 \text{ ha}$ (limit of development) = 0.132 L/s
- Total Peak Sanitary Flow = 0.477 L/s

4.2 Sanitary Service

4.2.1 Sanitary Service Requirements

The maximum peak sanitary flow for total commercial use of the building is 0.477 L/sec. The Ontario Building Code specifies minimum pipe size and maximum hydraulic loading for sanitary sewer pipe. OBC 7.4.10.8 (2) states "Horizontal sanitary drainage pipe shall be designed to carry no more than 65% of its full capacity." The capacity of the existing 200 mm diameter PVC sanitary sewer at a 0.7% slope is 26.6 L/sec. Since $0.65 \times 26.6 = 17.3 \text{ L/s}$ is much greater than 0.477 L/sec, the 200 mm diameter sanitary pipe will be sufficient.

4.2.2 Proposed Sanitary Service

A 31m section of the existing 200mm diameter sewer pipe coming from the building, as well as the existing sanitary maintenance hole (SAN-05) are to be removed as they are within the proposed building expansion. A new sanitary maintenance hole (SAN-MH1) and 12.8m of 200mm diameter sanitary pipe are to be installed, connecting into the existing sanitary pipe network. The new section of sanitary pipe and sanitary maintenance hole is to be installed at the location indicated on the Site Servicing drawing 250557– SER.

It is recommended that the existing sanitary pipes that are to be retained on the site be CCTV inspected, to determine if there are any blockages, deformation or damage in the pipes.

5 WATERMAIN DESIGN

The existing 203 mm diameter water service is to be used for the existing building with the proposed additions. The service lateral is connected to the municipal watermain on Mer-Bleue Road.



5.1 Water Demand

The average daily water demand for the existing building with the proposed additions was calculated based on section 4.1 above. The water demand for the proposed site is as follows:

Commercial

8295 L/day with typical operating hours from 9am – 7pm x (1/36,000 sec/day) = 0.230 L/s

- Average daily demand = 0.230 L/s
- Maximum daily demand (factor of 1.5) is $0.230 \text{ L/s} \times 1.5 = 0.345 \text{ L/s}$
- Peak hourly demand (factor of 1.8) = $0.345 \text{ L/s} \times 1.8 = 0.621 \text{ L/s}$

Summary

- Average daily demand (ADD) = 0.230 L/s
- Maximum daily demand (MDD) = 0.345 L/s
- Maximum hour demand (MHD) = 0.621 L/s

The water service is connected to the watermain as indicated on the site servicing drawing 250557-SER.

5.2 Water Required for Fire Protection

It is understood that the proposed building expansions have the following properties, used in the calculations for water flow required for fire protection.

- Unit Type: commercial
- Occupancy: Group F2 (Car dealership service center) and Group D (Car dealership office)
- Total Building Footprint: 1500 m^2
- Number of storeys: 2 storeys
- Area of entire first floor: 1500 m^2
- Area of entire second floor: 362 m^2
- Location of Water Services: 2045 Mer-Bleue Road, Orleans ON
- Type of Construction: non-combustible

As per the Ottawa Water Distribution Guidelines (December 2025), the requirements for levels of fire protection on private property in urban areas are covered in Section A-3.2.5.7 of the Ontario Building Code (O.B.C). If the calculations yield a fire flow of 9,000L/min (or greater) than the Fire Underwriters Method (FUS) is to be used to determine the fire flow.



The fire flow calculations as per the O.B.C method are shown in the appendix. The minimum fire flow requirement was calculated to be 5400 L/min or 90 L/sec.

5.3 Existing Fire Hydrants

The fire hydrants within the vicinity of the proposed building are located as follows:

- Hydrant 1 on the east side of Mer-Bleue Road near the front entrance of the property.
- Hydrant 2 on the west side of Mer-Bleue Road, across the road from the side lot line adjacent to the Honda property.

Both hydrants have blue caps. This is an indication that they are AA class hydrants.

City of Ottawa Technical Bulletin ISTB-2018-02 Appendix I Table 1 provides guidance with respect to maximum flow from to be considered from a given hydrant. From this table, a Class AA hydrant can contribute a maximum flow of 5,700 L/min when located less than 75 metres from the building and 3,800 L/min when located between 75 and 150 metres from the building.

Hydrant 1 is 47m to the principle entrance of the building. Hydrant 2 is 114m to the principle entrance of the building. These hydrants can be expected to provide a total combined contribution of 9500 L/min to the required fire. As previously indicated, the required fire flow is 90 L/sec x 60 sec/min = 5400 L/min. The existing hydrants are considered to be sufficient to meet the required fire flow.

There is a Private Hydrant located near the front of the building, at the side lot line adjacent to the Toyota property. This hydrant does not have a cap colour. The flow capacity of this hydrant is unknown at this time.

5.4 Boundary Conditions

The water demand due to occupancy together with the fire flow requirements were provided to the City of Ottawa in July 2026..

The following are the boundary conditions, HGL, for hydraulic analysis that were provided in DATE for the above indicated peak hourly demand and fire flow demand.

Minimum HGL = 130.3	Pressure 400 Kpa
Maximum HGL = 127.6	Pressure 372 Kpa
MaxDay + FireFlow = 127.6	Pressure 372 Kpa



In accordance with MOE Design Guidelines for Drinking Water Systems, the distribution system shall be sized so that under maximum hourly demand conditions the pressures are not less than 276 kPa (40 psi.)

The pressure loss to the second floor of the proposed building was calculated using Bernoulli's Equation in Combination with the Darcy – Weisbach Equation and the Colebrook Equation. The equations are shown below.

$$H_P + Z_1 - Z_2 + \frac{P_1 - P_2}{S} + \frac{V_1^2 - V_2^2}{2g} = h_f + h_m \quad \text{where:}$$

$$h_m = K_m \frac{V^2}{2g} \quad Re = \frac{VD}{\nu} \quad Q = VA \quad A = \frac{\pi}{4} D^2$$

$$\text{Darcy – Weisbach Equation: } h_f = f \frac{L}{D} \frac{V^2}{2g} \quad \text{where:}$$

$$\text{If laminar flow } (Re < 4000 \text{ and any } \frac{e}{D}), \quad f = \frac{64}{Re}$$

$$\text{If turbulent flow } (4000 \leq Re \leq 10^8 \text{ and } 0 \leq \frac{e}{D} < 0.05), \text{ then}$$

$$\text{Colebrook Equation: } \frac{1}{\sqrt{f}} = -2.0 \log \left(\frac{e/D}{3.7} + \frac{2.51}{Re\sqrt{f}} \right)$$

In general conformance with the MOE Guidelines, and City of Ottawa Technical Bulletin ISD-2010-2, the desired range in pressure should be approximately 350KPa (50psi) to 480KPa (70psi) during normal operating conditions. As per the Ontario Building Code, the residual pressure should not exceed 552KPa (80psi). The system should be designed to maintain a minimum pressure of 140kPa (20 psi) at ground level at all points in the distribution system under maximum day demand plus fire flow conditions.

Table 5.1 Water Flow Analysis

Water Flow Analysis

Pipe Sections			Grade Elevation		Hydraulic Grade line							
Start	Along	End	Start m	End* m	Start** m	End m	Ps kPa	Pe kPa	Q m³/sec	V m/sec	D m	A m²
Calculation of Minimum Available Pressure Starting at Minimum HGL and Maximum Hourly Demand												
Mer-Bleue Road	Entrance	First floor of Bld	89.65	91.08	130.3	130.3	398	384	0.0006	0.020	0.200	0.0314
Mer-Bleue Road	Entrance	Second floor of Bld	89.65	94.74	130.3	130.3	398	349	0.0006	0.020	0.200	0.0314
Calculation of Maximum Pressure Resulting From Maximum HGL and Average Daily Flow Demand												
Mer-Bleue Road	Entrance	First floor of Bld	89.65	91.08	127.6	127.6	372	358	0.0002	0.007	0.200	0.0314
Mer-Bleue Road	Entrance	Second floor of Bld	89.65	94.74	127.6	127.6	372	322	0.0002	0.007	0.200	0.0314
Calculation of Pressure Resulting From Maximum HGL and Fire Flow Demand												
Mer-Bleue Road	Entrance	First floor of Bld	89.65	91.08	127.6	123.2	372	315	0.0903	2.876	0.200	0.0314

Start Elevation Corresponds to Approximate Elevation at surface of Street = 89.65 metres.

*End Elevation Correspond as follows:

90.08- Ground Floor

91.08-4- Fixtures in 1st floor

93.74- Second Floor

94.74- Fixtures in 2nd floor



Based on the results of the analysis as presented in the above table the minimum and maximum HGL provide a water pressure of between 358kPa and 384kPa at the ground floor of the building. The minimum and maximum HGL provide a water pressure of between 322kPa and 349kPa at the second floor of the building. Since these values are above 276KPa, no booster pumps are required. Since these values are below 552KPa, a pressure reducing valve will not be required.

During periods of maximum day and fire flow demand, the resulting residual pressure is 315 KPa, surpassing the minimum requirement of 140 kPa (20 psi.).

From Table 5.1 above, there is sufficient water supply within the existing municipal system to meet the commercial water demand and the fire flow requirements.

5.5 Water Service Requirements

Provided the existing 200mm diameter PVC water service is in adequate condition, it is of adequate size to service the existing building as well as the building expansions.

6 EROSION AND SEDIMENT CONTROL

The owner (and/or contractor) agrees to prepare and implement an erosion and sediment control plan at least equal to the stated minimum requirements and to the satisfaction of the City of Ottawa, appropriate to the site conditions, prior to undertaking any site alterations (filling, grading, removal of vegetation, etc.) and during all phases of site preparation and construction in accordance with the current best management practices for erosion and sediment control. It is considered to be the owners and/or contractors responsibility to ensure that the erosion control measures are implemented and maintained.

In order to limit the amount of sediment carried in stormwater runoff from the site during construction, it is recommended to install a silt fence along the rear edge of asphalt, as shown in Kollaard Associates Inc. Drawing 250557- ESC. The silt fence may be polypropylene, nylon, and polyester or ethylene yarn.

If a standard filter fabric is used, it must be backed by a wire fence supported on posts not over 2.0 m apart. Extra strength filter fabric may be used without a wire fence backing if posts are not over 1.0 m apart. Fabric joints should be lapped at least 150 mm (6") and stapled. The bottom edge of the filter fabric should be anchored in a 300 mm (1 ft) deep trench, to prevent flow under the fence. Sections of fence should be cleaned, if blocked with sediment and replaced if torn.



Sediment traps (filter socks) should be installed across existing storm maintenance holes and catch basin lids. In addition, sediment traps should be installed across the proposed catch basin and manhole lids immediately after the structures are placed. The sediment traps should only be removed once the asphaltic concrete is installed and the site is cleaned.

The proposed landscaping works should be completed as soon as possible. The proposed asphalt surfaced areas should be paved as soon as possible.

The silt fences should only be removed once the site is stabilized and landscaping is completed.

These measures will reduce the amount of sediment carried from the site during storm events that may occur during construction.

7 CONCLUSION

This report addresses the stormwater management requirements as well as the adequacy of the existing municipal storm and sanitary sewer system and watermain to service the proposed development of the two additions to the existing car dealership on Mer-Bleue Road. Based on the analysis provided in this report, the conclusions are as follows:

Within the limit of development, SWM for the proposed expansions will be achieved by restricting the 100-year post development flows to release rates determined from the original stormwater design complete in 2014

Stormwater within the controlled areas K-9 and K-5 of the site will be directed to underground stormwater storage areas within the separate catchments. Catchment areas K-9 and K-5 receive restricted flows from other onsite catchment areas, outside of the limit of development. Both catchment areas K-9 and K-5 will be controlled with the use of inlet control devices. Discharge of the total controlled stormwater from the Kia Automotive dealership will be to the storm sewer on Roger-Pharand Street.

The peak sewage flow rate from the proposed development will be 0.477 L/s. The existing municipal sanitary sewer should have adequate capacity to accommodate the increase in peak flow.

The existing municipal watermain along Mer-Bleue Road will have adequate capacity to service the proposed development for both commercial and fire protection.

During all construction activities, erosion and sedimentation shall be controlled.



We trust that this report provides sufficient information for your present purposes. If you have any questions concerning this report or if we can be of any further assistance to you on this project, please do not hesitate to contact our office.

Sincerely,
Kollaard Associates, Inc.

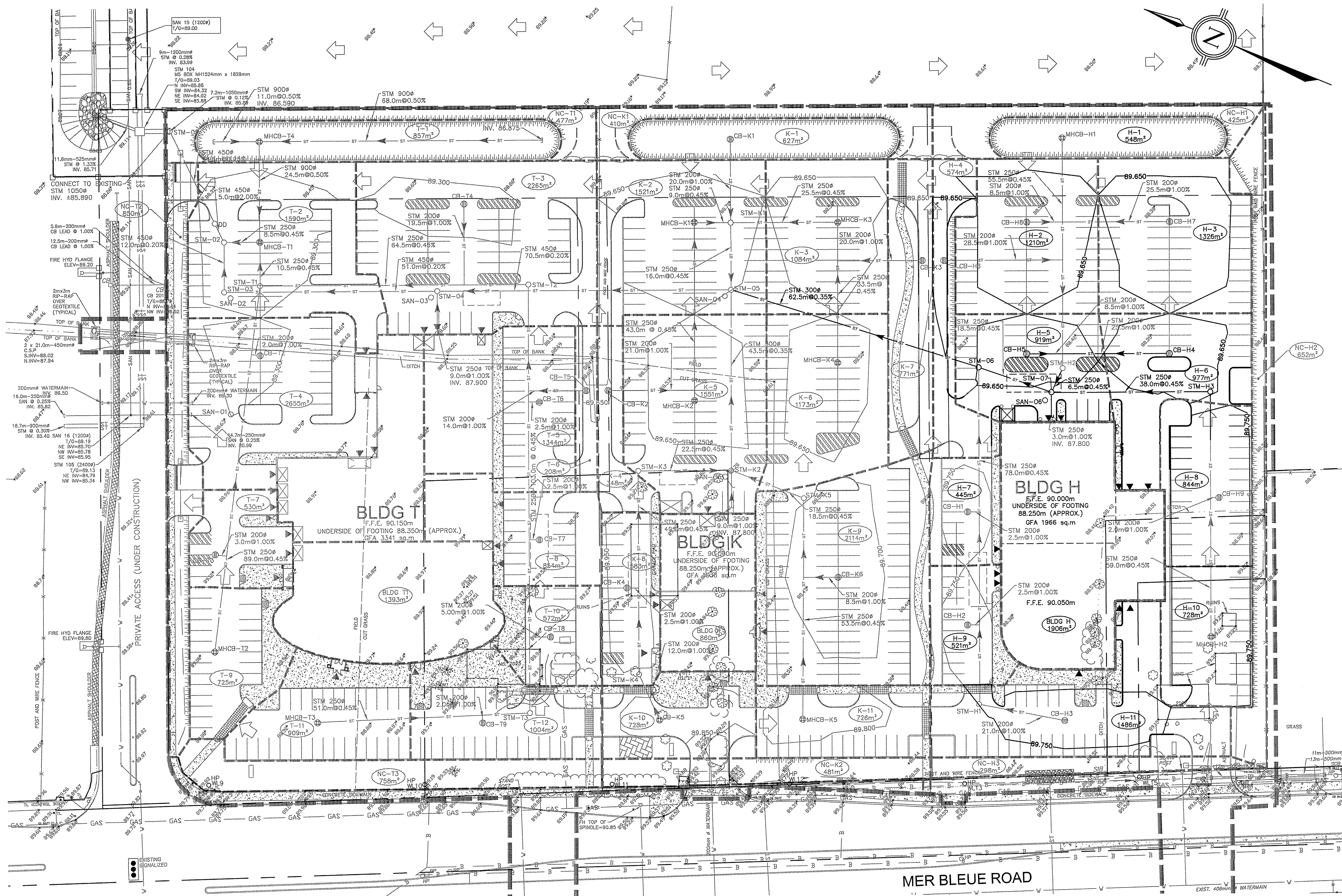


Amanda Van Bruggen, P.Eng.



Appendix A: Original 2014 Design Drawings by CIMA+

- GR1_A000160: Stormwater Management Plan (Rev 8, 07/04/2014)
- SWC2_A000160: Grading Plan (Rev 8, 07/04/2014)
- SWC3_A000160: Municipal Services Plan (Rev 9, 07/04/2014)



RUNOFF COEFFICIENTS - PARCEL K					
AREA	GRASSED AREA (m²)	RUNOFF COEFFICIENT	PAVED AREA (m²)	RUNOFF COEFFICIENT	TOTAL AREA (m²)
K-1	627	0.20	0	0.90	627
K-2	90	0.20	1431	0.90	1521
K-3	0	0.20	1094	0.90	1094
K-4	108	0.20	242	0.90	350
K-5	30	0.20	1521	0.90	1551
K-6	0	0.20	1173	0.90	1173
K-7	288	0.20	483	0.90	771
K-8	0	0.20	583	0.90	583
K-9	171	0.20	1943	0.90	2114
K-10	91	0.20	637	0.90	728
K-11	87	0.20	689	0.90	776
NC-K1	365	0.20	45	0.90	410
NC-K2	404	0.20	77	0.90	481
BLDG K	0	0.20	860	0.90	860
TOTAL	2240	-	9800	-	12040

- ADDITIONAL 25% ADDED TO "C" VALUE FOR 100 YEARS STORM
- MAXIMUM RUNOFF COEFFICIENT EQUAL TO 0.95

DRAINAGE AREA - PARCEL K					
SUB-AREA	TOTAL AREA (m²)	CATCHMENT AREA (m²)	CATCHMENT ELEVATION (m)	MAX. ELEVATION (m)	MAX. ELEVATION (m)
K-1	627	627	88.450	88.850	1.200
K-2	1521	932	88.350	88.850	0.300
K-3	1094	370	88.350	88.850	0.300
K-4	350	122	88.350	88.850	0.015
K-5	1551	543	88.350	88.850	0.300
K-6	1173	411	88.350	88.850	0.130
K-7	771	270	88.350	88.850	0.300
K-8	583	204	88.350	88.850	0.300
K-9	2114	740	88.350	88.850	0.300
K-10	728	235	88.350	88.850	0.300
K-11	776	234	88.350	88.850	0.300
NC-K1	410	0	0.000	0.000	0.000
NC-K2	481	0	0.000	0.000	0.000
BLDG K	860	860	10.050	10.050	0.050
TOTAL	12040	5197	-	-	-

- ADDITIONAL 25% ADDED TO "C" VALUE FOR 100 YEARS STORM
- MAXIMUM RUNOFF COEFFICIENT EQUAL TO 0.95

DRAINAGE AREA - PARCEL H					
SUB-AREA	TOTAL AREA (m²)	CATCHMENT AREA (m²)	CATCHMENT ELEVATION (m)	MAX. ELEVATION (m)	MAX. ELEVATION (m)
H-1	548	548	88.075	88.650	1.115
H-2	1210	424	88.350	88.650	0.300
H-3	1328	464	88.350	88.650	0.300
H-4	574	201	88.650	88.650	0.130
H-5	919	322	88.350	88.650	0.300
H-6	997	349	88.350	88.650	0.300
H-7	445	156	88.450	88.750	0.300
H-8	844	295	88.450	88.750	0.300
H-9	521	182	88.450	88.750	0.300
H-10	728	255	88.450	88.750	0.300
H-11	1486	520	88.450	88.750	0.300
NC-H1	425	0	0.000	0.000	0.000
NC-H2	652	0	0.000	0.000	0.000
NC-H3	298	0	0.000	0.000	0.000
BLDG H	1906	1906	10.050	10.050	0.050
TOTAL	12879	5622	-	-	-

LEGEND:
Ymax = MAXIMUM DEPTH OF WATER THAT MAY BE ACCUMULATED WITHIN THE SUB-AREA.
Vmax = MAXIMUM VOLUME OF WATER (CAPACITY) THAT MAY BE ACCUMULATED WITHIN THE SUB-AREA.
Vmaxstorm = VOLUME OF WATER GENERATED BY THE DESIGN RAINFALL.
Vmax = TOTAL VOLUME OF WATER ACCUMULATED WITHIN THE SUB-AREA IN THE EVENT OF THE DESIGN RAINFALL.

- NOTES:
- TOTAL RAINFALL 439.33mm AT RELEASE RATE EQUAL TO 50 L/s/ha (TOTAL ALLOWABLE RELEASE FLOW 64.385 L/s).
 - SUB AREAS H-1 TO H-4 WILL BE CONTROLLED WITH A SINGLE ICD AT THE OUTLET OF STM-H2 AT A RELEASE RATE EQUAL TO 24.540 L/s/ha (RELEASE FLOW 13.572 L/s). THE TOTAL STORAGE AVAILABLE IN THESE AREAS IS 338.12m³ (173.59m³ POND + 164.53m³ PARKING). THE TOTAL STORAGE REQUIRED IN THESE AREAS IS 338.12m³ (173.59m³ POND + 164.53m³ PARKING). IT IS IMPORTANT TO NOTE THE EXCESS STORM WATER IN THESE AREAS WILL ENTER THE MINOR SYSTEM AND BACKFLOW TO THE POND WHERE IT WILL BE STORED. NO OVERLAND FLOW WILL OCCUR UP TO THE 100 YEARS STORM. THE PIPES HAVE BEEN ADEQUATELY SIZED TO ENSURE THAT THE Vmax IS NOT EXCEEDED UP TO AND INCLUDING THE 100 YEARS STORM.
 - TOTAL STORAGE SUB-AREAS H-7 TO H-11 140.84m³. EACH AREA WILL BE CONTROLLED WITH AN INDIVIDUAL ICD WITH A COMBINED RELEASE FLOW OF 21.163 L/s.
 - NON-CONTROLLED AREAS (NC-H1, NC-H2, NC-H3) RELEASE RATE EQUAL TO 183.679, 123.899, AND 163.679 L/s/ha RESPECTIVELY AT TIME OF CONCENTRATION OF 10 MINUTES. TOTAL RELEASE RATE EQUAL TO 47.109 L/s.
 - ROOF STORAGE (BLDG H) 68.04m³ AT RELEASE RATE EQUAL TO 50 L/s/ha (RELEASE FLOW 9.530 L/s).

RUNOFF COEFFICIENTS - PARCEL H					
AREA	GRASSED AREA (m²)	RUNOFF COEFFICIENT	PAVED AREA (m²)	RUNOFF COEFFICIENT	TOTAL AREA (m²)
H-1	548	0.20	0	0.90	548
H-2	0	0.20	1210	0.90	1210
H-3	24	0.20	1302	0.90	1326
H-4	134	0.20	440	0.90	574
H-5	59	0.20	860	0.90	919
H-6	41	0.20	956	0.90	997
H-7	72	0.20	373	0.90	445
H-8	143	0.20	701	0.90	844
H-9	82	0.20	439	0.90	521
H-10	90	0.20	638	0.90	728
H-11	33	0.20	1353	0.90	1486
NC-H1	390	0.20	45	0.90	435
NC-H2	652	0.20	0	0.90	652
NC-H3	270	0.20	28	0.90	298
BLDG H	0	0.20	1906	0.90	1906
TOTAL	2588	-	10291	-	12879

- ADDITIONAL 25% ADDED TO "C" VALUE FOR 100 YEARS STORM
- MAXIMUM RUNOFF COEFFICIENT EQUAL TO 0.95

DRAINAGE AREA - PARCEL T					
SUB-AREA	TOTAL AREA (m²)	CATCHMENT AREA (m²)	CATCHMENT ELEVATION (m)	MAX. ELEVATION (m)	MAX. ELEVATION (m)
T-1	857	857	88.075	88.300	1.225
T-2	1590	557	88.000	88.300	0.300
T-3	2265	785	88.000	88.300	0.300
T-4	2655	929	88.000	88.300	0.300
T-5	1344	0	88.350	88.350	0.000
T-6	208	0	88.635	88.635	0.000
T-7	530	0	88.380	88.380	0.000
T-8	854	0	88.580	88.580	0.000
T-9	725	0	88.450	88.450	0.000
T-10	572	0	88.600	88.600	0.000
T-11	909	0	88.600	88.600	0.000
T-12	1004	0	88.600	88.600	0.000
NC-T1	477	0	-	0.000	0.000
NC-T2	850	0	-	0.000	0.000
NC-T3	758	0	-	0.000	0.000
BLDG T1	1393	1393	10.050	10.050	0.050
TOTAL	16891	4529	-	-	-

LEGEND:
Ymax = MAXIMUM DEPTH OF WATER THAT MAY BE ACCUMULATED WITHIN THE SUB-AREA.
Vmax = MAXIMUM VOLUME OF WATER (CAPACITY) THAT MAY BE ACCUMULATED WITHIN THE SUB-AREA.
Vmaxstorm = VOLUME OF WATER GENERATED BY THE DESIGN RAINFALL.
Vmax = TOTAL VOLUME OF WATER ACCUMULATED WITHIN THE SUB-AREA IN THE EVENT OF THE DESIGN RAINFALL.

- NOTES:
- TOTAL RAINFALL 439.33mm AT RELEASE RATE EQUAL TO 50 L/s/ha (TOTAL ALLOWABLE RELEASE FLOW 64.385 L/s).
 - SUB AREAS T-1 TO T-12 WILL BE CONTROLLED WITH A SINGLE ICD AT THE OUTLET OF MHC-B-T1 AT A RELEASE RATE EQUAL TO 23.887 L/s/ha (RELEASE FLOW 13.273 L/s). THE TOTAL STORAGE AVAILABLE IN THESE AREAS IS 389.58m³ (188.82m³ POND + 190.76m³ PARKING). THE TOTAL STORAGE REQUIRED IN THESE AREAS IS 389.58m³ (188.82m³ POND + 190.76m³ PARKING). IT IS IMPORTANT TO NOTE THE EXCESS STORM WATER IN THESE AREAS WILL ENTER THE MINOR SYSTEM AND BACKFLOW TO THE POND WHERE IT WILL BE STORED. NO OVERLAND FLOW WILL OCCUR UP TO THE 100 YEARS STORM. THE PIPES HAVE BEEN ADEQUATELY SIZED TO ENSURE THAT THE Vmax IS NOT EXCEEDED UP TO AND INCLUDING THE 100 YEARS STORM.
 - NON-CONTROLLED AREAS (NC-T1, NC-T2, NC-T3) RELEASE RATE EQUAL TO 183.679, 142.238, AND 143.881 L/s/ha RESPECTIVELY AT TIME OF CONCENTRATION OF 10 MINUTES. TOTAL RELEASE RATE EQUAL TO 47.801 L/s.
 - ROOF STORAGE (BLDG T1) 58.48m³ AT RELEASE RATE EQUAL TO 35 L/s/ha (RELEASE FLOW 4.876 L/s).

RUNOFF COEFFICIENTS - PARCEL T					
AREA	GRASSED AREA (m²)	RUNOFF COEFFICIENT	PAVED AREA (m²)	RUNOFF COEFFICIENT	TOTAL AREA (m²)
T-1	857	0.20	0	0.90	857
T-2	203	0.20	1387	0.90	1590
T-3	85	0.20	2180	0.90	2265
T-4	210	0.20	2445	0.90	2655
T-5	0	0.20	1344	0.90	1344
T-6	20	0.20	188	0.90	208
T-7	11	0.20	519	0.90	530
T-8	151	0.20	703	0.90	854
T-9	82	0.20	725	0.90	807
T-10	144	0.20	428	0.90	572
T-11	0	0.20	909	0.90	909
T-12	58	0.20	946	0.90	1004
NC-T1	432	0.20	45	0.90	477
NC-T2	420	0.20	430	0.90	850
NC-T3	721	0.20	37	0.90	758
BLDG T1	0	0.20	1393	0.90	1393
TOTAL	3311	-	13580	-	16891

- ADDITIONAL 25% ADDED TO "C" VALUE FOR 100 YEARS STORM
- MAXIMUM RUNOFF COEFFICIENT EQUAL TO 0.95



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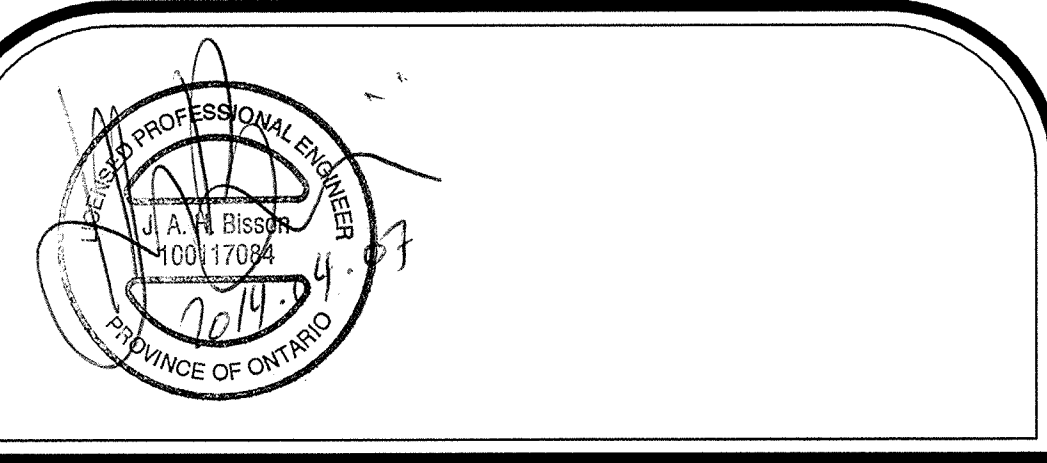
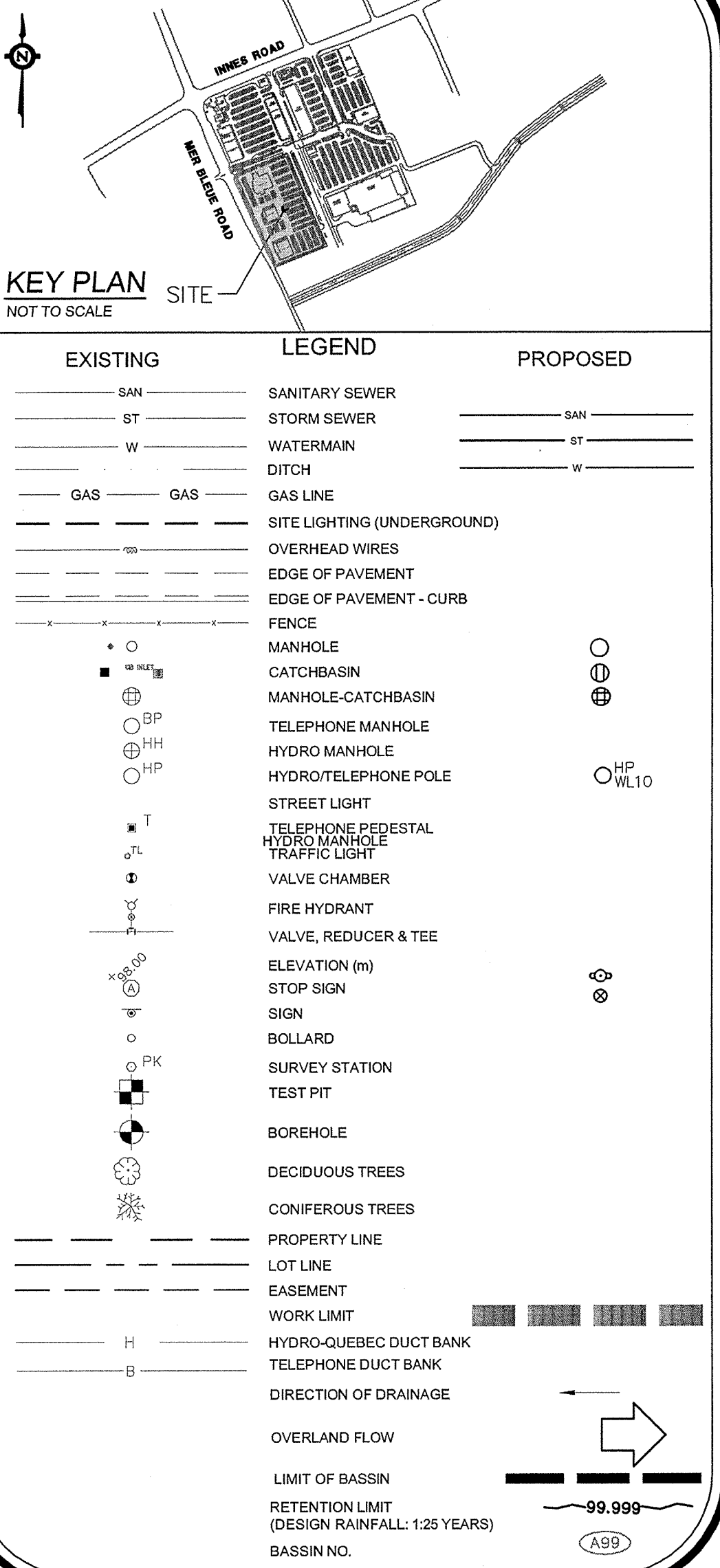
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SITE SURVEY COMPLETED, APRIL 18TH, 2006
MER BLEUE ROAD AS BUILT, 2009
ACCESS ROAD, INTERIM CONSTRUCTION, 2012



No.	REVISION	DATE	BY	CITY
8	RE-ISSUED FOR SITE PLAN APPROVAL - BLDG H	07/04/2014		
7	SITE PLAN APPROVAL AMENDMENT - BLDG H	07/02/2014		
6	ISSUED FOR CONSTRUCTION	13/12/2013		
5	ISSUED FOR MOE APPROVAL	22/11/2013		
4	RE-ISSUED FOR SITE PLAN APPROVAL	20/09/2013		
3	RE-ISSUED FOR SITE PLAN APPROVAL	30/08/2013		
2	RE-ISSUED FOR SITE PLAN APPROVAL	31/05/2012		
1	SITE PLAN APPROVAL	20/12/2012		

REVISIONS
MER BLEUE AUTOMALL
2107, 2025 & 2035 MER BLEUE RD.
BUILDINGS T, K & H - SITEWORKS
OTTAWA, ONTARIO
FOR: MCGAIC REALTY
STORM WATER MANAGEMENT PLAN

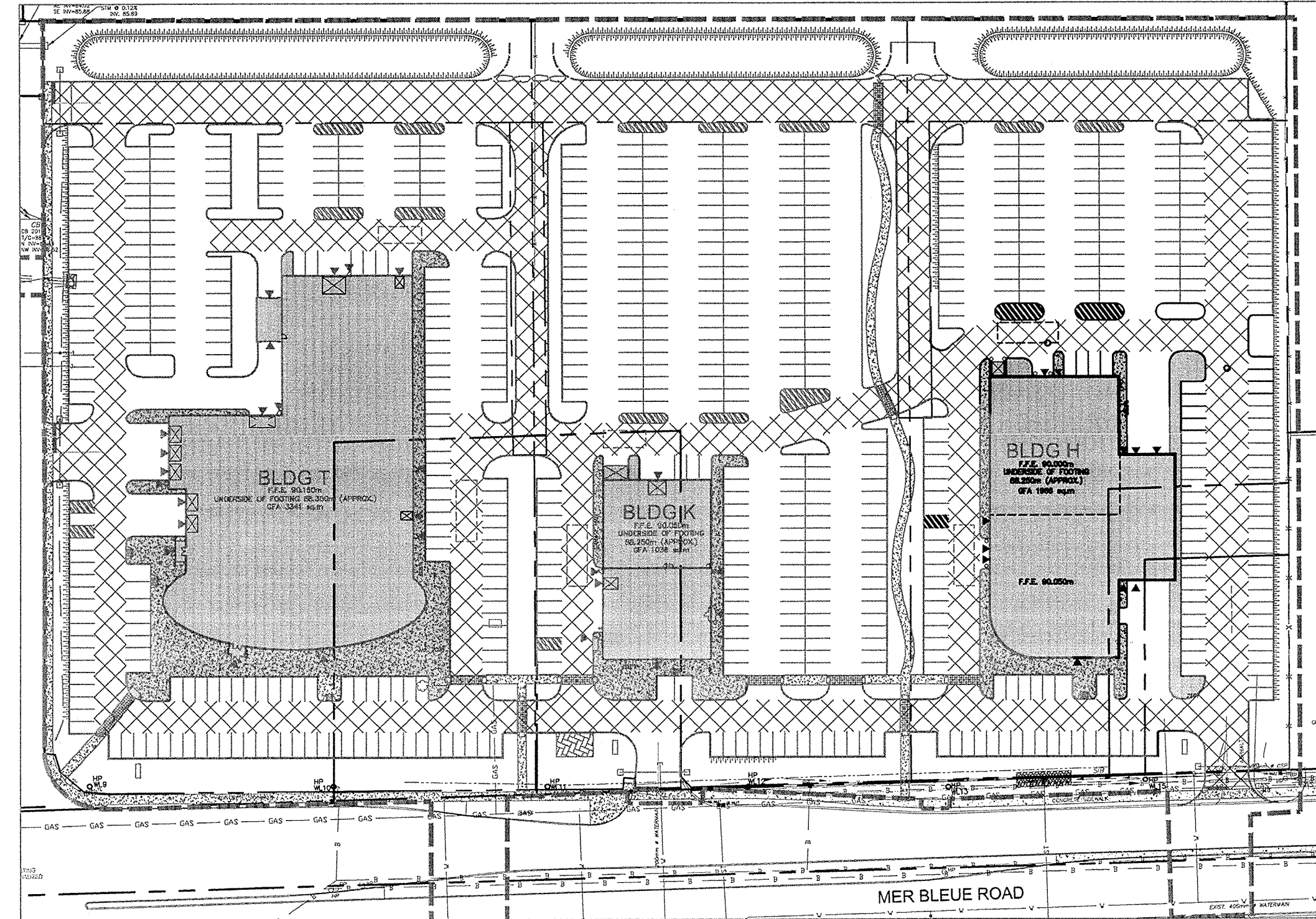
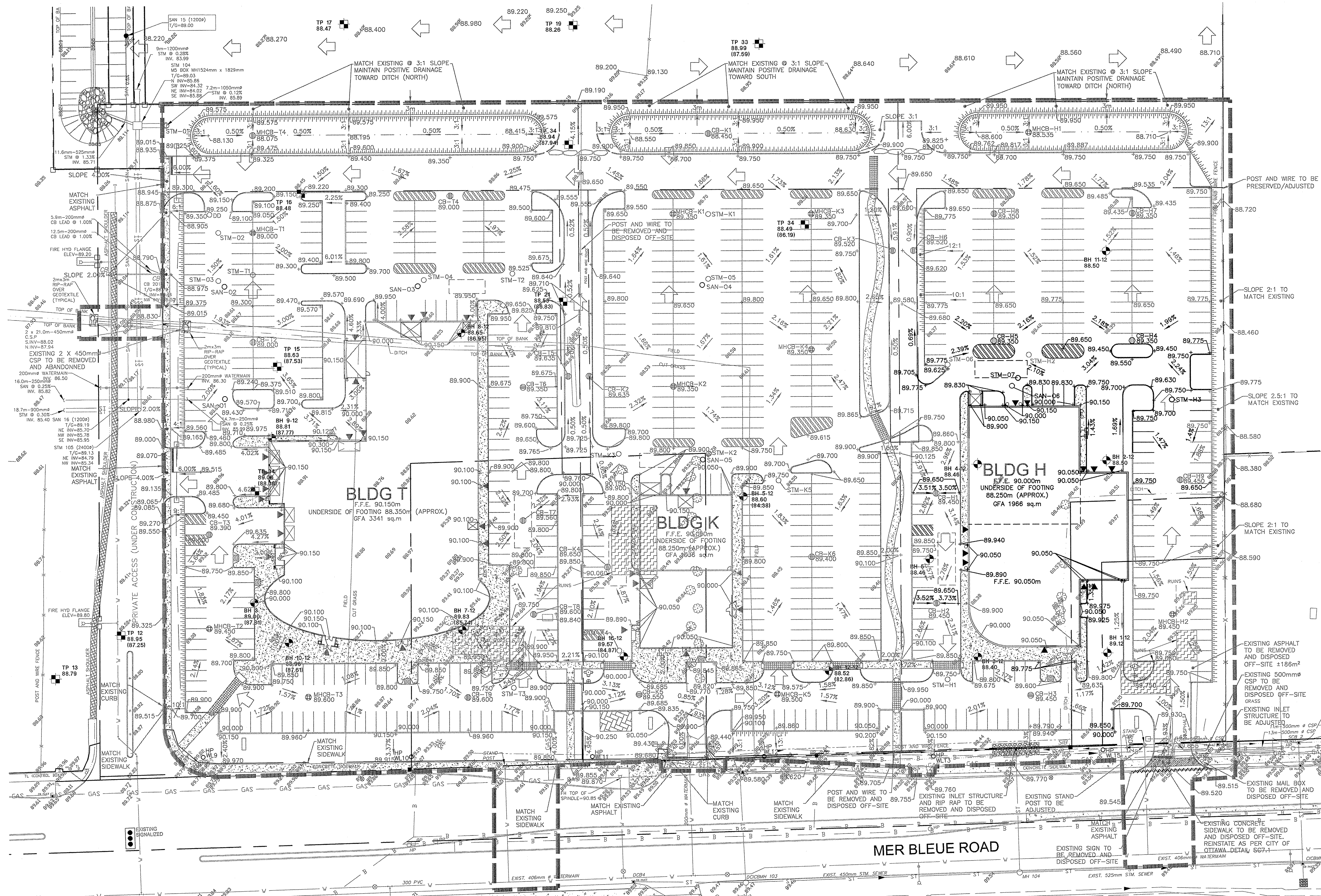
A000160

240, Catherine st., suite 110
Ottawa (Ontario) K2P 2G8
Telephone : (613) 860-2462
Fax : (613) 860-1870
www.cima.ca

DESIGN BY: T. KENNEDY
CHECKED BY: C. J. PAQUETTE
SCALE: 1:500

CHECKED BY: H. BISSON
CHECKED BY: E. DE CÔTÉ
DATE: DEC. 12TH, 2012

PROJECT No.
A000160+A000160B
PLAN No.
GR-1



PROPOSED GRANULAR FOUNDATION AND ASPHALT PAVEMENT

SCALE: 1:1000

LEGEND (SUITE)

- EXISTING (SUITE)
- LIMIT OF BUILDING PAD
 - HEAVY DUTY - FULL PAVEMENT STRUCTURE
 - EXISTING RUNS TO BE REMOVED AND DISPOSED OFF-SITE
 - EXISTING CONCRETE CURB TO BE REMOVED AND DISPOSED OFF-SITE
- PROPOSED
- LIMIT OF BUILDING PAD
 - HEAVY DUTY - FULL PAVEMENT STRUCTURE
 - EXISTING RUNS TO BE REMOVED AND DISPOSED OFF-SITE
 - EXISTING CONCRETE CURB TO BE REMOVED AND DISPOSED OFF-SITE



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KEY PLAN SITE

NOT TO SCALE

LEGEND

EXISTING

- SAN - SANITARY SEWER
- ST - STORM SEWER
- W - WATERMAIN
- GAS - GAS LINE
- SITE LIGHTING (UNDERGROUND)
- OVERHEAD WIRES
- EDGE OF PAVEMENT
- EDGE OF PAVEMENT - CURB
- FENCE
- MANHOLE
- CATCH BASIN
- MANHOLE-CATCH BASIN
- TELEPHONE MANHOLE
- HYDRO MANHOLE
- HYDRO/TELEPHONE POLE
- STREET LIGHT
- TELEPHONE PEDESTAL
- HYDRO/TELEPHONE POLE
- VALVE CHAMBER
- FIRE HYDRANT
- VALVE, REDUCER & TEE
- ELEVATION (m)
- STOP SIGN
- SIGN
- BOLLARD
- SURVEY STATION
- TEST PIT
- BOREHOLE
- DECIDUOUS TREES
- CONIFEROUS TREES
- PROPERTY LINE
- LOT LINE
- EASEMENT
- WORK LIMIT
- HYDRO-QUEBEC DUCT BANK
- TELEPHONE DUCT BANK
- SAW CUT
- OVERLAND FLOW
- DIRECTION OF DRAINAGE
- SWM SUB-AREAS
- ID SUB-AREAS
- AREA m²

PROPOSED

- MANHOLE
- CATCH BASIN
- MANHOLE-CATCH BASIN
- TELEPHONE MANHOLE
- HYDRO MANHOLE
- HYDRO/TELEPHONE POLE
- STREET LIGHT
- TELEPHONE PEDESTAL
- HYDRO/TELEPHONE POLE
- VALVE CHAMBER
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- SAW CUT
- OVERLAND FLOW
- DIRECTION OF DRAINAGE
- SWM SUB-AREAS
- ID SUB-AREAS
- AREA m²

REVISIONS

NO.	REVISION	DATE	BY	CITY
8	RE-ISSUED FOR SITE PLAN APPROVAL - BLDG H	07/04/2014		
7	SITE PLAN APPROVAL AMENDMENT - BLDG H	07/02/2014		
6	ISSUED FOR CONSTRUCTION	11/21/2013		
5	ISSUED FOR MOE APPROVAL	22/11/2013		
4	RE-ISSUED FOR SITE PLAN APPROVAL	20/09/2013		
3	RE-ISSUED FOR SITE PLAN APPROVAL	30/08/2013		
2	RE-ISSUED FOR SITE PLAN APPROVAL	31/05/2012		
1	SITE PLAN APPROVAL	20/12/2012		

REVISIONS

MER BLEUE AUTOMAT
2107, 2025 & 2035 MER BLEUE RD.
BUILDINGS T, K & H - SITEWORKS
OTTAWA, ONTARIO
FOR: MCGAIC REALTY

GRADING PLAN

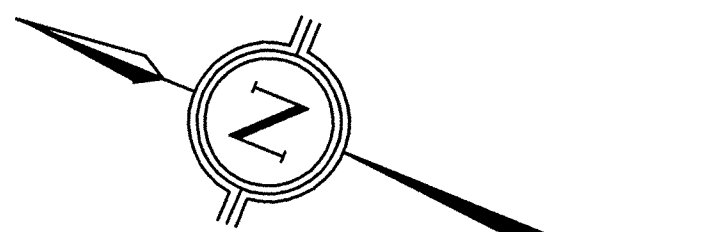
CIMA

400160

240, Catherine St., suite 110
Ottawa (Ontario) K2P 2G8
Telephone : (613) 860-2462
Fax : (613) 860-1870
www.cima.ca

DESIGN BY: T. KENNEDY
CHECKED BY: H. BISSON
DRAFTED BY: C. J. PAQUETTE
CHECKED BY: E. DE COTRET
SCALE: 1:500
DATE: DEC. 12TH, 2012

PROJECT No.
A000160+A000160B
PLAN No.
SW-C2

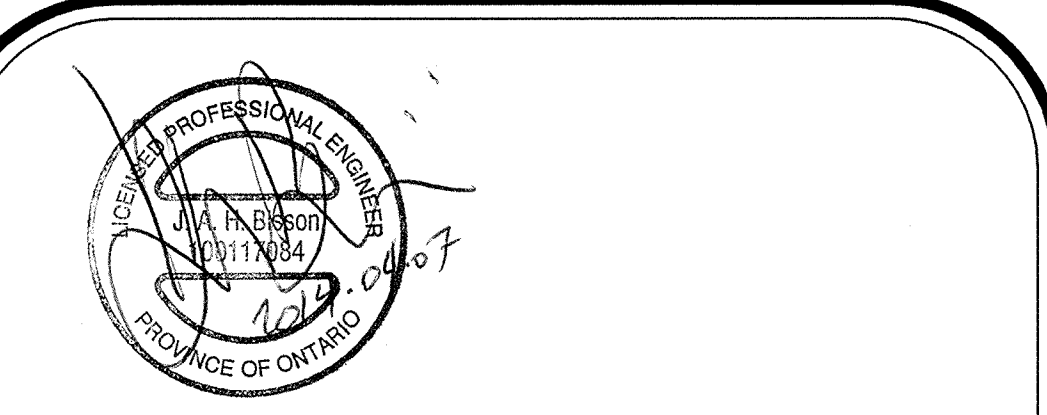
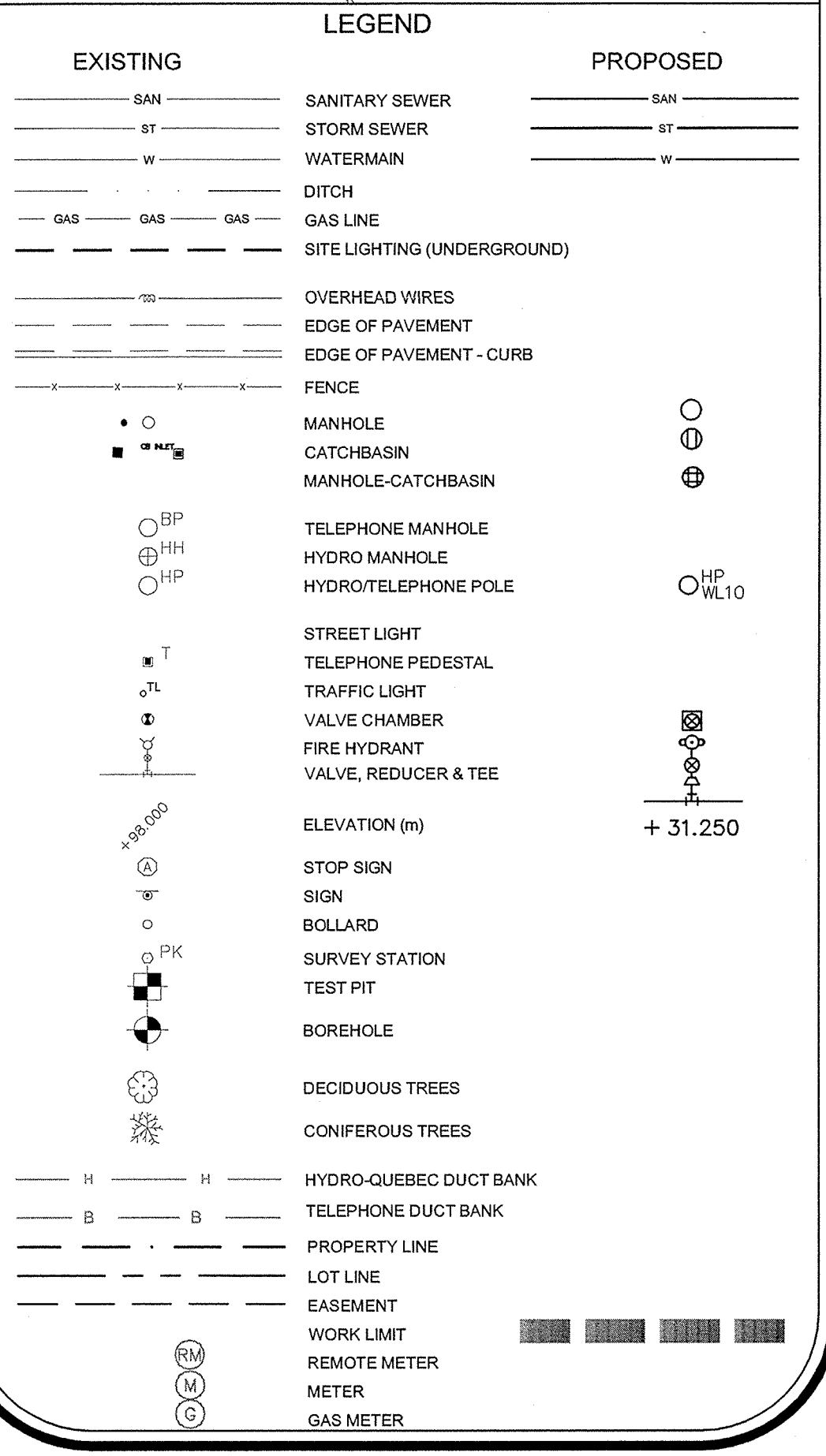


TD → TRENCH DRAIN
MH → MANHOLE
MH/CB → MANHOLE-CATCHBASIN
CB → CATCHBASIN
* → CHECK VALVE

NOTES:

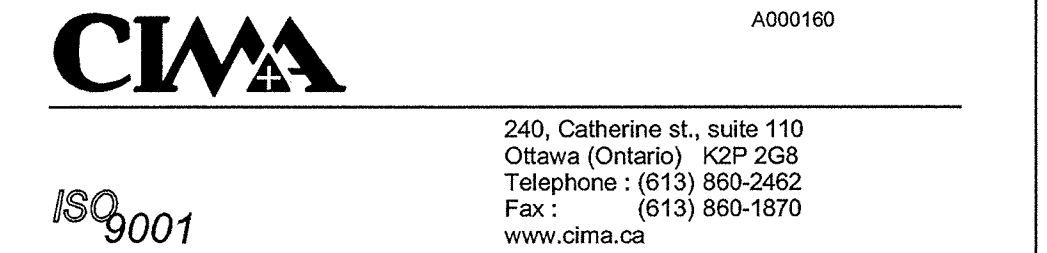
1. ICD TYPE "VORTEX" SHALL BE TYPE HYDROVEX FROM JOHN MEUNIER OR APPROVED EQUIVALENT.
2. ICD TYPE "ORIFICE GAP" SHALL BE BY IPEX OR APPROVED EQUIVALENT.
3. THE MAXIMUM RELEASE FLOW FOR THE ENTIRE PROJECT IS BASED ON A RELEASE RATE OF 50 L/s/ha FOR THE PARKING AREAS AND 30 L/s/ha FOR THE BUILDINGS H AND K, AND 35 L/s/ha FOR BUILDING L.
4. THE REQUIRED RETENTION MUST CORRESPOND TO A RAINFALL EVENT OF 100 YEAR, FOR THE METEOROLOGICAL STATION OF OTTAWA (MACDONALD-CARTIER AIRPORT)

- NOTES:**
1. ICD TYPE "VORTEX" SHALL BE TYPE HYDROVEX FROM JOHN MEUNIER OR APPROVED EQUIVALENT.
 2. ICD TYPE "ORIFICE GAP" SHALL BE BY IPEX OR APPROVED EQUIVALENT.
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 4. THE REQUIRED RETENTION MUST CORRESPOND TO A RAINFALL EVENT OF 100 YEAR, FOR THE METEOROLOGICAL STATION OF OTTAWA (MACDONALD-CARTIER AIRPORT)



9	RE-ISSUED FOR SITE PLAN APPROVAL - BLDG H	07/04/2014		
8	ISSUED FOR REVISION NOTICE #2	20/02/2014		
7	SITE PLAN APPROVAL AMENDMENT - BLDG H	07/02/2014		
6	ISSUED FOR CONSTRUCTION	19/12/2013		
5	RE-ISSUED FOR MOE APPROVAL	22/11/2013		
4	RE-ISSUED FOR SITE PLAN APPROVAL	20/09/2013		
3	RE-ISSUED FOR SITE PLAN APPROVAL	30/08/2013		
2	RE-ISSUED FOR SITE PLAN APPROVAL	31/05/2012		
1	SITE PLAN APPROVAL	20/12/2012		
No.		DATE	BY	CITY

REVISIONS
MER BLEUE AUTOMALL 2107, 2025 & 2035 MER BLEUE RD. BUILDINGS T, K & H - SITEWORKS OTTAWA, ONTARIO FOR: MCGAIC REALTY
MUNICIPAL SERVICES PLAN



ISO 9001

DESIGN BY : T.KENNEDY	CHECKED BY : H.BISSON	PROJECT No. A000160+A000160B
DRAFTED BY : C. Jr. PAQUETTE	CHECKED BY : E. DE COTRET	
SCALE: 1:500	DATE : DEC. 12TH, 2012	PLAN No. SW-C3

0 5 10 20 30 40

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Appendix B: Stormwater Calculations

- Post-Development Required Storage vs. Release Rate (K-9)
- Outlet Control Structure and Stormwater Storage volume provided (K-9)
- Storage vs. Discharge Graph (K-9)
- Stage vs. Storage Graph (K-9)
- Post-Development Required Storage vs. Release Rate (K-5)
- Outlet Control Structure and Stormwater Storage volume provided (K-5)
- Storage vs. Discharge Graph (K-5)
- Stage vs. Storage Graph (K-5)

Client: Lawrence Architects Inc.
Job No.: 250557
Location: 2045 Mer-Bleue Road, Orleans ON
Date: August 10, 2026

				Post Dev run-off Coefficient "C" K-9			
				5 Year Event	100 Year Event		
Area (ha)	Surface		Area (ha)	"C"	C _{avg}	"C" x 1.25	C _{100 avg}
Total	Roof		0.0000	0.90	0.83	1.00	0.92
	Asphalt/Concrete		0.1720	0.90		1.00	
0.192	Grass		0.0200	0.20		0.25	

Criteria 2: Maximum release rate from the catchments in the 2013 site SWM design by CIMA+

Allowable Release Rate	Qmax from K-11 = 3.82 L/s	and	Qmax from K-9 = 11.12 L/s
	Q= 14.94		

Therefore the allowable release rate from K-9 = 14.94

Runoff Coefficient, C = Drainage Area (ha) = Return Period (yrs) =				0.83 0.192 2		Duration Interval (min) = Release Rate Start (L/s) = Release Rate Interval (L/s) =				5 0 4			
Release Rate -->				0	4	8	12	16	20	24	28	32	36
Duration (min)	Rainfall Intensity (mm/hr)	Peak Flow from Catchment K11 (L/sec)	Peak Flow (L/sec)	Storage Required (m³)									
0	167.2	3.82	77.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	103.6	3.82	49.7	14.9	13.7	12.5	11.3	10.1	8.9	7.7	6.5	5.3	4.1
10	76.8	3.82	37.8	22.7	20.3	17.9	15.5	13.1	10.7	8.3	5.9	3.5	1.1
15	61.8	3.82	31.2	28.1	24.5	20.9	17.3	13.7	10.1	6.5	2.9	-0.7	-4.3
20	52.0	3.82	26.9	32.2	27.4	22.6	17.8	13.0	8.2	3.4	-1.4	-6.2	-11.0
25	45.2	3.82	23.8	35.7	29.7	23.7	17.7	11.7	5.7	-0.3	-6.3	-12.3	-18.3
30	40.0	3.82	21.6	38.8	31.6	24.4	17.2	10.0	2.8	-4.4	-11.6	-18.8	-26.0
35	36.1	3.82	19.8	41.6	33.2	24.8	16.4	8.0	-0.4	-8.8	-17.2	-25.6	-34.0
40	32.9	3.82	18.4	44.1	34.5	24.9	15.3	5.7	-3.9	-13.5	-23.1	-32.7	-42.3
45	30.2	3.82	17.2	46.5	35.7	24.9	14.1	3.3	-7.5	-18.3	-29.1	-39.9	-50.7
50	28.0	3.82	16.2	48.7	36.7	24.7	12.7	0.7	-11.3	-23.3	-35.3	-47.3	-59.3
55	26.2	3.82	15.4	50.9	37.7	24.5	11.3	-1.9	-15.1	-28.3	-41.5	-54.7	-67.9
60	24.6	3.82	14.7	52.9	38.5	24.1	9.7	-4.7	-19.1	-33.5	-47.9	-62.3	-76.7
65	23.2	3.82	14.1	54.9	39.3	23.7	8.1	-7.5	-23.1	-38.7	-54.3	-69.9	-85.5
70	21.9	3.69	13.4	56.3	39.5	22.7	5.9	-10.9	-27.7	-44.5	-61.3	-78.1	-94.9
75	20.8	3.50	12.7	57.2	39.2	21.2	3.2	-14.8	-32.8	-50.8	-68.8	-86.8	-104.8
80	19.8	3.34	12.1	58.2	39.0	19.8	0.6	-18.6	-37.8	-57.0	-76.2	-95.4	-114.6
85	18.9	3.19	11.6	59.1	38.7	18.3	-2.1	-22.5	-42.9	-63.3	-83.7	-104.1	-124.5
90	18.1	3.05	11.1	59.9	38.3	16.7	-4.9	-26.5	-48.1	-69.7	-91.3	-112.9	-134.5
95	17.4	2.93	10.6	60.7	37.9	15.1	-7.7	-30.5	-53.3	-76.1	-98.9	-121.7	-144.5
Maximum Storage Rate =				60.7	39.5	24.9	17.8	13.7	10.7	8.3	6.5	5.3	4.1

Runoff Coefficient, C = Drainage Area (ha) = Return Period (yrs) =				0.83 0.192 5		Duration Interval (min) = Release Rate Start (L/s) = Release Rate Interval (L/s) =				5 0 4			
Release Rate -->				0	4	8	12	16	20	24	28	32	36
Duration (min)	Rainfall Intensity (mm/hr)	Peak Flow from Catchment K11 (L/sec)	Peak Flow (L/sec)	Storage Required (m³)									
0	230.5	3.82	105.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	141.2	3.82	66.4	19.9	18.7	17.5	16.3	15.1	13.9	12.7	11.5	10.3	9.1
10	104.2	3.82	50.0	30.0	27.6	25.2	22.8	20.4	18.0	15.6	13.2	10.8	8.4
15	83.6	3.82	40.8	36.8	33.2	29.6	26.0	22.4	18.8	15.2	11.6	8.0	4.4
20	70.3	3.82	34.9	41.9	37.1	32.3	27.5	22.7	17.9	13.1	8.3	3.5	-1.3
25	60.9	3.82	30.8	46.2	40.2	34.2	28.2	22.2	16.2	10.2	4.2	-1.8	-7.8
30	53.9	3.82	27.7	49.9	42.7	35.5	28.3	21.1	13.9	6.7	-0.5	-7.7	-14.9
35	48.5	3.82	25.3	53.2	44.8	36.4	28.0	19.6	11.2	2.8	-5.6	-14.0	-22.4
40	44.2	3.82	23.4	56.1	46.5	36.9	27.3	17.7	8.1	-1.5	-11.1	-20.7	-30.3
45	40.6	3.82	21.8	58.9	48.1	37.3	26.5	15.7	4.9	-5.9	-16.7	-27.5	-38.3
50	37.7	3.82	20.5	61.5	49.5	37.5	25.5	13.5	1.5	-10.5	-22.5	-34.5	-46.5
55	35.1	3.82	19.4	64.0	50.8	37.6	24.4	11.2	-2.0	-15.2	-28.4	-41.6	-54.8
60	32.9	3.82	18.4	66.3	51.9	37.5	23.1	8.7	-5.7	-20.1	-34.5	-48.9	-63.3
65	31.0	3.82	17.6	68.5	52.9	37.3	21.7	6.1	-9.5	-25.1	-40.7	-56.3	-71.9
70	29.4	3.82	16.8	70.7	53.9	37.1	20.3	3.5	-13.3	-30.1	-46.9	-63.7	-80.5
75	27.9	3.82	16.2	72.8	54.8	36.8	18.8	0.8	-17.2	-35.2	-53.2	-71.2	-89.2
80	26.6	3.82	15.6	74.8	55.6	36.4	17.2	-2.0	-21.2	-40.4	-59.6	-78.8	-98.0
85	25.4	3.82	15.1	76.8	56.4	36.0	15.6	-4.8	-25.2	-45.6	-66.0	-86.4	-106.8
90	24.3	3.82	14.6	78.7	57.1	35.5	13.9	-7.7	-29.3	-50.9	-72.5	-94.1	-115.7
95	23.3	3.82	14.1	80.6	57.8	35.0	12.2	-10.6	-33.4	-56.2	-79.0	-101.8	-124.6
Maximum Storage Rate =				80.6	57.8	37.6	28.3	22.7	18.8	15.6	13.2	10.8	9.1

Runoff Coefficient, C =				0.92	Duration Interval (min) =				5				
Drainage Area (ha) =				0.192	Release Rate Start (L/s) =				0				
Return Period (yrs) =				100	Release Rate Interval (L/s) =				4				
Release Rate -->				0	4	8	12	16	20	24	28	32	36
Duration (min)	Rainfall Intensity (mm/hr)	Peak Flow from Catchment K11 (L/sec)	Peak Flow (L/sec)	Storage Required (m³)									
0	398.6	3.82	199.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	242.7	3.82	123.0	36.9	35.7	34.5	33.3	32.1	30.9	29.7	28.5	27.3	26.1
10	178.6	3.82	91.5	54.9	52.5	50.1	47.7	45.3	42.9	40.5	38.1	35.7	33.3
15	142.9	3.82	74.0	66.6	63.0	59.4	55.8	52.2	48.6	45.0	41.4	37.8	34.2
20	120.0	3.82	62.7	75.3	70.5	65.7	60.9	56.1	51.3	46.5	41.7	36.9	32.1
25	103.8	3.82	54.8	82.2	76.2	70.2	64.2	58.2	52.2	46.2	40.2	34.2	28.2
30	91.9	3.82	48.9	88.1	80.9	73.7	66.5	59.3	52.1	44.9	37.7	30.5	23.3
35	82.6	3.82	44.4	93.2	84.8	76.4	68.0	59.6	51.2	42.8	34.4	26.0	17.6
40	75.1	3.82	40.7	97.7	88.1	78.5	68.9	59.3	49.7	40.1	30.5	20.9	11.3
45	69.1	3.82	37.7	101.9	91.1	80.3	69.5	58.7	47.9	37.1	26.3	15.5	4.7
50	64.0	3.82	35.2	105.7	93.7	81.7	69.7	57.7	45.7	33.7	21.7	9.7	-2.3
55	59.6	3.82	33.1	109.2	96.0	82.8	69.6	56.4	43.2	30.0	16.8	3.6	-9.6
60	55.9	3.82	31.3	112.6	98.2	83.8	69.4	55.0	40.6	26.2	11.8	-2.6	-17.0
65	52.6	3.82	29.7	115.7	100.1	84.5	68.9	53.3	37.7	22.1	6.5	-9.1	-24.7
70	49.8	3.82	28.3	118.7	101.9	85.1	68.3	51.5	34.7	17.9	1.1	-15.7	-32.5
75	47.3	3.82	27.0	121.6	103.6	85.6	67.6	49.6	31.6	13.6	-4.4	-22.4	-40.4
80	45.0	3.82	25.9	124.4	105.2	86.0	66.8	47.6	28.4	9.2	-10.0	-29.2	-48.4
85	43.0	3.82	24.9	127.1	106.7	86.3	65.9	45.5	25.1	4.7	-15.7	-36.1	-56.5
90	41.1	3.82	24.0	129.6	108.0	86.4	64.8	43.2	21.6	0.0	-21.6	-43.2	-64.8
95	39.4	3.82	23.2	132.2	109.4	86.6	63.8	41.0	18.2	-4.6	-27.4	-50.2	-73.0
100	37.9	3.82	22.4	134.6	110.6	86.6	62.6	38.6	14.6	-9.4	-33.4	-57.4	-81.4
Maximum Storage Rate =				134.6	110.6	86.6	69.7	59.6	52.2	46.5	41.7	37.8	34.2

APPENDIX A: STORMWATER MANAGEMENT MODEL
OUTLET CONTROL STRUCTURE DESIGN SHEET K-9

Client: Lawrence Architects Inc.
Job No.: 250557
Location: 2045 Mer-Bleue Road, Orleans ON
Date: August 10, 2026

GRAF Storage Modules						Vario 800 Flex Shaft			Concrete Storm Manhole		Hydrovex 100VHV-1		
number of modules in layer 1 (EcoBlock Inspect Smart)	125	7	x	18		number of catchbasin openings	1		Top of Grate Elevation	89.7	Pipe invert	87.50	
storage volume per module (m^3)	0.2					storage volume per module (m^3)	0.2		Outlet Invert Elevation	87.5			
Height of modules (m)	0.33					Height of modules (m)	0.33		manhole diameter (m)	1.2			
Module invert	87.8					Module invert	87.8						
Top of module	88.13					Top of module	89.4						
						riser diameter (m)	0.6						

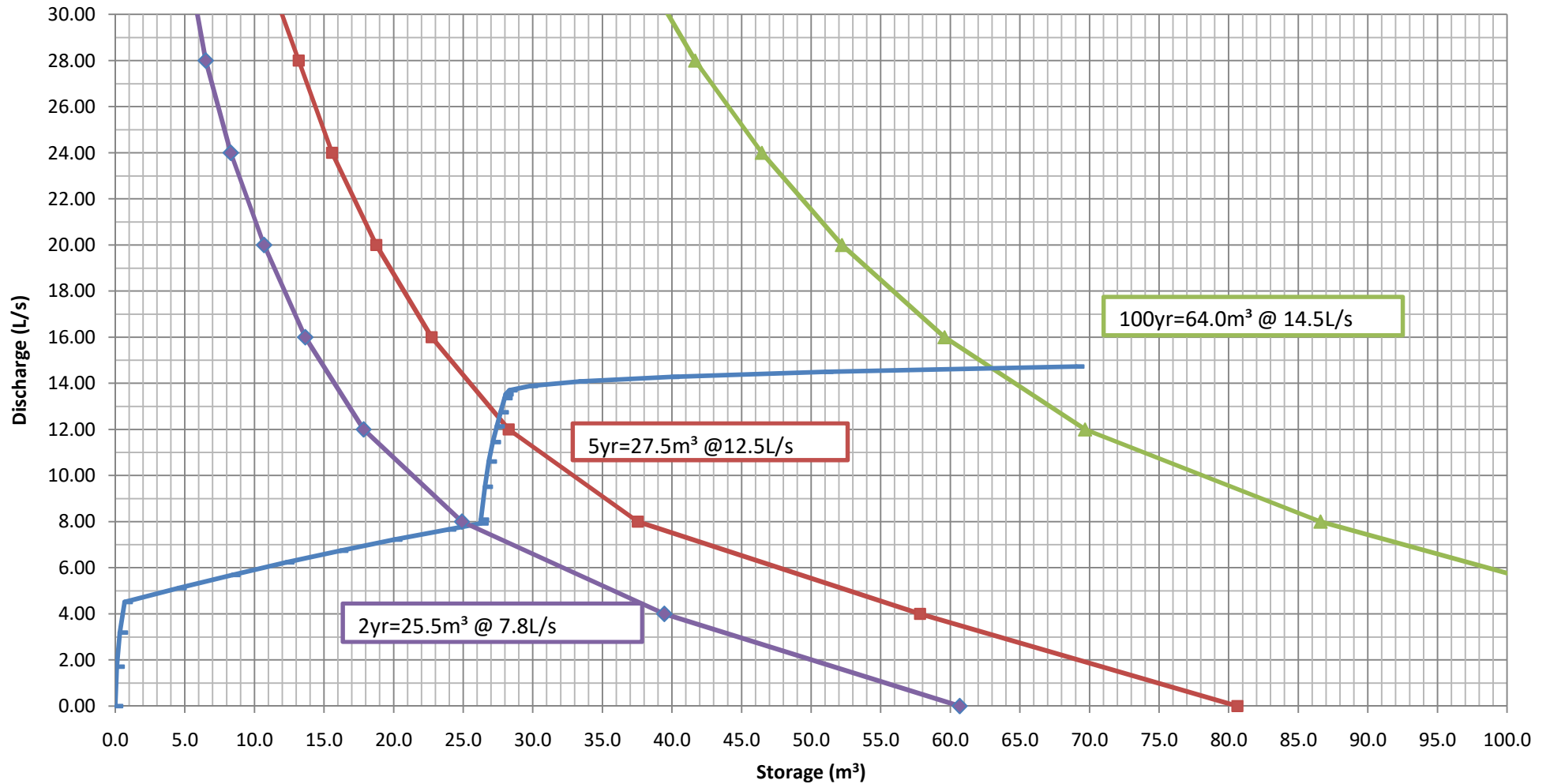
Stage, WSE Elev (m)	Comments	Layer Increment (m)	Surface Storage			GRAF Storage Modules Layer 1			Storage (flex chambers)		Manhole Storage (STM-MH2)		Tempest MHF ICD		Cummulative Storage Volume (m³)	Total ICD Flow (L/s)
			Top Layer Area (m^2)	Bottom Layer Area (m^2)	Layer Volume (m^3)	Module height (m)	Layer Thickness (m)	Layer Volume (m^3)	Head (m)	Layer Volume (m^3)	Head (m)	Layer Volume (m^3)	Head (m)	ICD Flow (L/sec)		
89.700	Maximum ponding elevation	0.050	447.7	277.2	18.0				1.90	0.000	2.20	0.06	2.20	14.73	69.04	14.7
89.650		0.050	277.2	167.4	11.0				1.85	0.000	2.15	0.06	2.15	14.50	51.03	14.5
89.600		0.050	167.4	97.4	6.5				1.80	0.000	2.10	0.06	2.10	14.28	39.98	14.3
89.550		0.050	97.4	46.2	3.5				1.75	0.000	2.05	0.06	2.05	14.08	33.38	14.1
89.500		0.050	46.2	13.8	1.4				1.70	0.000	2.00	0.06	2.00	13.89	29.81	13.9
89.450	Storage on Asphalt Surface	0.050	13.8	0	0.2				1.65	0.000	1.95	0.06	1.95	13.70	28.33	13.7
89.400	Top of Grate Flex Chamber	0.050	0	0	0.0				1.60	0.014	1.90	0.06	1.90	13.53	28.05	13.5
89.350		0.200			0.0				1.55	0.057	1.85	0.23	1.85	13.36	27.98	13.4
89.150		0.200			0.0				1.35	0.057	1.65	0.23	1.65	12.74	27.69	12.7
88.950		0.200			0.0				1.15	0.057	1.45	0.23	1.45	12.14	27.41	12.1
88.750		0.200			0.0				0.95	0.057	1.25	0.23	1.25	11.45	27.13	11.5
88.550		0.200			0.0				0.75	0.057	1.05	0.23	1.05	10.61	26.85	10.6
88.350		0.200			0.0				0.55	0.057	0.85	0.23	0.85	9.52	26.56	9.5
88.150		0.020			0.0				0.35	0.006	0.65	0.02	0.65	8.09	26.28	8.1
88.130	Top of Module	0.030			0.0	0.330	0.030	2.273	0.33	0.018	0.63	0.03	0.63	7.92	26.25	7.9
88.100		0.050			0.0	0.300	0.050	3.788	0.30	0.030	0.60	0.06	0.60	7.67	23.93	7.7
88.050		0.050			0.0	0.250	0.050	3.788	0.25	0.030	0.55	0.06	0.55	7.22	20.05	7.2
88.000		0.050			0.0	0.200	0.050	3.788	0.20	0.030	0.50	0.06	0.50	6.74	16.18	6.7
87.950		0.050			0.0	0.150	0.050	3.788	0.15	0.030	0.45	0.06	0.45	6.24	12.30	6.2
87.900		0.050			0.0	0.100	0.050	3.788	0.10	0.030	0.40	0.06	0.40	5.70	8.43	5.7
87.850		0.050			0.0	0.050	0.050	3.788	0.00	0.030	0.35	0.06	0.35	5.12	4.55	5.1
87.800	Module invert	0.100			0.0	0.000	0.000	0.000	0.00	0.000	0.30	0.34	0.30	4.51	0.68	4.5
87.700		0.100			0.0				0.00	0.000	0.20	0.23	0.20	3.19	0.34	3.2
87.600		0.100			0.0				0.00	0.000	0.10	0.11	0.10	1.71	0.11	1.7
87.50	pipe inv w/ ICD	0.000			0.0				0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.0

APPENDIX A: STORMWATER MANAGEMENT MODEL

Storage-Discharge Curve

Catchment K-9

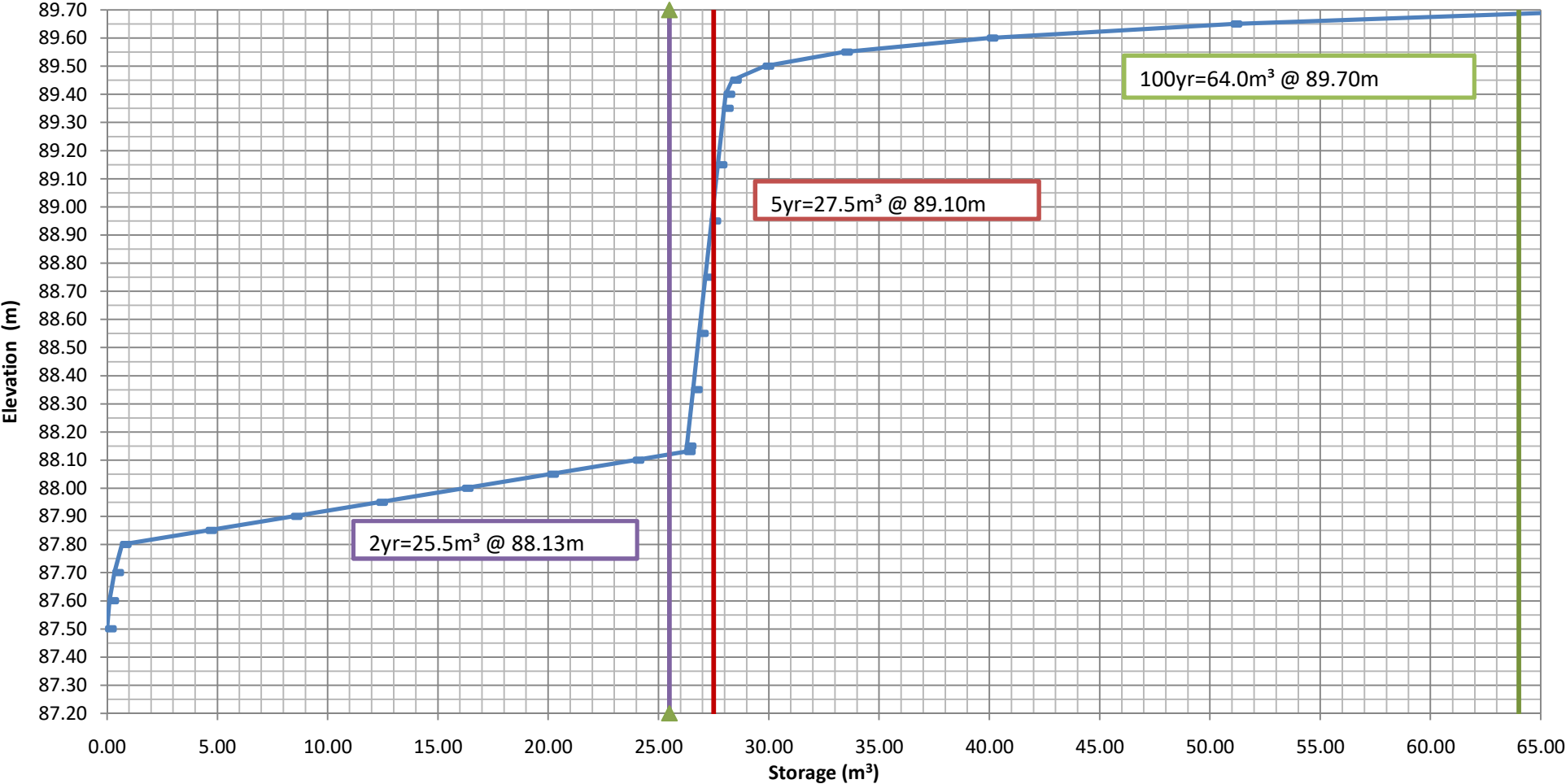
Client: Lawrence Architects Inc.
Job No.: 250557
Location: 2045 Mer-Bleue, Orleans ON
Date: August 10, 2026



APPENDIX A: STORMWATER MANAGEMENT MODEL

Client: Lawrence Architects Inc.
Job No.: 250557
Location: 2045 Mer-Bleue, Orleans ON
Date: August 10, 2026

Stage-Storage Curve
Catchment K-9



APPENDIX A: STORMWATER MANAGEMENT MODEL
REQUIRED STORAGE VS. RELEASE RATE (Catchment K-5)

Client: Lawrence Architects Inc.
Job No.: 250557
Location: 2045 Mer-Bleue Road, Orleans ON
Date: August 10, 2026

Pre Dev run-off Coefficient "C" K-4							
				5 Year Event		100 Year Event	
Area (ha)	Surface		Area (ha)	"C"	C _{avg}	"C" x 1.25	C _{100 avg}
Total	Roof		0.0000	0.90	0.89	1.00	0.99
	Asphalt/Concrete		0.1521	0.90		1.00	
	Grass		0.0030	0.20		0.25	
0.155							

Post Dev run-off Coefficient "C" K-5							
				5 Year Event		100 Year Event	
Area (ha)	Surface		Area (ha)	"C"	C _{avg}	"C" x 1.25	C _{100 avg}
Total	Roof		0.0000	0.90	0.89	1.00	0.99
	Asphalt/Concrete		0.1220	0.90		1.00	
	Grass		0.0010	0.20		0.25	
0.123							

Criteria 1: Control post-dev runoff up to and including the 100-year storm event to a 5-year pre-development level
Allowable Release Rate Q=2.78CIA Where C = max 0.5 I = 104.19 Tc = 10 min
Q = 22.46 L/s

Criteria 2: Maximum release rate from the catchments in the 2013 site SWM design by CIMA+
Allowable Release Rate Qmax from K-10 = 3.83 L/s Qmax from K-8 = 3.07 L/s Qmax from BLDG K = 4.3 L/s Qmax from K-5 = 5.58 L/s
Q = 16.78

Therefore the allowable release rate from K-5 = 16.78

TABLE 2 - REQUIRED STORAGE VERSUS RELEASE RATE FOR 2 YEAR STORM

Runoff Coefficient, C =		0.89		Duration Interval (min) =		5												
Drainage Area (ha) =		0.123		Release Rate Start (L/s) =		0												
Return Period (yrs) =		2		Release Rate Interval (L/s) =		9												
Release Rate -->								0	9	18	27	36	45	54	63	72	81	
Duration (min)	Rainfall Intensity (mm/hr)	Peak Flow from Catchment K-10 (L/sec)	Peak Flow from Catchment K-8 (L/sec)	Peak Flow from Catchment K-4 (L/sec)	Peak Flow from Catchment BLDG K (L/sec)	Peak Flow from Catchment BLDG Expansion (L/sec)	Total Peak Flow (L/sec)	Storage Required (m ³)										
0	167.2	3.83	3.07	6.8	4.3	35.75	104.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	103.6	3.83	3.07	4.2	4.3	21.90	68.8	20.7	18.0	15.3	12.6	9.9	7.2	4.5	1.8	-0.9	-3.6	-6.3
10	76.8	3.83	3.07	3.1	4.3	16.16	53.9	32.3	26.9	21.5	16.1	10.7	5.3	-0.1	-5.5	-10.9	-16.3	-21.7
15	61.8	3.83	3.07	2.5	4.3	12.96	45.5	40.9	32.8	24.7	16.6	8.5	0.4	-7.7	-15.8	-23.9	-32.0	-40.1
20	52.0	3.83	3.07	2.1	4.3	10.90	40.0	48.1	37.3	26.5	15.7	4.9	-5.9	-16.7	-27.5	-38.3	-49.1	-59.9
25	45.2	3.83	3.07	1.8	4.3	9.45	36.2	54.3	40.8	27.3	13.8	0.3	-13.2	-26.7	-40.2	-53.7	-67.2	-80.7
30	40.0	3.83	3.07	1.6	4.3	8.37	33.4	60.1	43.9	27.7	11.5	-4.7	-20.9	-37.1	-53.3	-69.5	-85.7	-101.9
35	36.1	3.83	3.07	1.5	4.3	7.53	31.2	65.5	46.6	27.7	8.8	-10.1	-29.0	-47.9	-66.8	-85.7	-104.6	-123.5
40	32.9	3.83	3.07	1.3	4.3	6.85	29.4	70.5	48.9	27.3	5.7	-15.9	-37.5	-59.1	-80.7	-102.3	-123.9	-146.6
45	30.2	3.83	3.07	1.2	4.3	6.30	27.9	75.4	51.1	26.8	2.5	-21.8	-46.1	-70.4	-94.7	-119.0	-143.3	-168.1
50	28.0	3.83	3.07	1.1	4.3	5.84	26.7	80.1	53.1	26.1	-0.9	-27.9	-54.9	-81.9	-108.9	-135.9	-162.9	-190.0
55	26.2	3.83	3.07	1.1	4.3	5.45	25.7	84.7	55.0	25.3	-4.4	-34.1	-63.8	-93.5	-123.2	-152.9	-182.6	-212.3
60	24.6	3.83	3.07	1.0	4.3	5.11	24.8	89.2	56.8	24.4	-8.0	-40.4	-72.8	-105.2	-137.6	-170.0	-202.4	-234.8
65	23.2	3.79	3.07	0.9	4.3	4.82	24.0	93.5	58.4	23.3	-11.8	-46.9	-82.0	-117.1	-152.2	-187.3	-222.4	-258.8
70	21.9	3.59	3.07	0.9	4.3	4.56	23.1	96.9	59.1	21.3	-16.5	-54.3	-92.1	-129.9	-167.7	-205.5	-243.3	-281.1
75	20.8	3.41	3.04	0.8	4.3	4.33	22.3	100.1	59.6	19.1	-21.4	-61.9	-102.4	-142.9	-183.4	-223.9	-264.4	-304.9
80	19.8	3.25	2.89	0.8	4.3	4.12	21.4	102.6	59.4	16.2	-27.0	-70.2	-113.4	-156.6	-199.8	-243.0	-286.2	-329.4
85	18.9	3.10	2.76	0.8	4.1	3.94	20.4	104.1	58.2	12.3	-33.6	-79.5	-125.4	-171.3	-217.2	-263.1	-309.0	-354.9
90	18.1	2.97	2.65	0.7	3.9	3.77	19.5	105.6	57.0	8.4	-40.2	-88.8	-137.4	-186.0	-234.6	-283.2	-331.8	-379.4
95	17.4	2.85	2.54	0.7	3.7	3.62	18.8	106.9	55.6	4.3	-47.0	-98.3	-149.6	-200.9	-252.2	-303.5	-354.8	-406.1
Maximum Storage Rate =								106.9	59.6	27.7	16.6	10.7	7.2	4.5	1.8	0.0	0.0	0.0

TABLE 3 - REQUIRED STORAGE VERSUS RELEASE RATE FOR 5 YEAR STORM

Runoff Coefficient, C =								0.89		Duration Interval (min) =		5											
Drainage Area (ha) =								0.123		Release Rate Start (L/s) =		0											
Return Period (yrs) =								5		Release Rate Interval (L/s) =		10											
Release Rate -->								0	10	20	30	40	50	60	70	80	90						
Duration (min)	Rainfall Intensity (mm/hr)	Peak Flow from Catchment K-10 (L/sec)	Peak Flow from Catchment K-8 (L/sec)	Peak Flow from Catchment K-4 (L/sec)	Peak Flow from Catchment BLDG K (L/sec)	Peak Flow from Catchment BLDG Expansion (L/sec)	Total Peak Flow (L/sec)	Storage Required (m³)															
								0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0					
0	230.5	3.83	3.07	9.4	4.3	68.71	159.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0						
5	141.2	3.83	3.07	5.7	4.3	41.83	101.7	30.5	27.5	24.5	21.5	18.5	15.5	12.5	9.5	6.5	3.5						
10	104.2	3.83	3.07	4.2	4.3	30.78	77.9	46.8	40.8	34.8	28.8	22.8	16.8	10.8	4.8	-1.2	-7.2						
15	83.6	3.83	3.07	3.4	4.3	24.63	64.7	58.2	49.2	40.2	31.2	22.2	13.2	4.2	-4.8	-13.8	-22.8						
20	70.3	3.83	3.07	2.9	4.3	20.67	56.1	67.3	55.3	43.3	31.3	19.3	7.3	-4.7	-16.7	-28.7	-40.7						
25	60.9	3.83	3.07	2.5	4.3	17.90	50.1	75.2	60.2	45.2	30.2	15.2	0.2	-14.8	-29.8	-44.8	-59.8						
30	53.9	3.83	3.07	2.2	4.3	15.83	45.6	82.2	64.2	46.2	28.2	10.2	-7.8	-25.8	-43.8	-61.8	-79.8						
35	48.5	3.83	3.07	2.0	4.3	14.23	42.2	88.6	67.6	46.6	25.6	4.6	-16.4	-37.4	-58.4	-79.4	-100.4						
40	44.2	3.83	3.07	1.8	4.3	12.95	39.4	94.6	70.6	46.6	22.6	-1.4	-25.4	-49.4	-73.4	-97.4	-121.4						
45	40.6	3.83	3.07	1.7	4.3	11.90	37.1	100.2	73.2	46.2	19.2	-7.8	-34.8	-61.8	-88.8	-115.8	-142.8						
50	37.7	3.83	3.07	1.5	4.3	11.02	35.2	105.6	75.6	45.6	15.6	-14.4	-44.4	-74.4	-104.4	-134.4	-164.4						
55	35.1	3.83	3.07	1.4	4.3	10.28	33.6	110.9	77.9	44.9	11.9	-21.1	-54.1	-87.1	-120.1	-153.1	-186.1						
60	32.9	3.83	3.07	1.3	4.3	9.63	32.2	115.9	79.9	43.9	7.9	-28.1	-64.1	-100.1	-136.1	-172.1	-208.1						
65	31.0	3.83	3.07	1.3	4.3	9.07	31.0	120.8	81.8	42.8	3.8	-35.2	-74.2	-113.2	-152.2	-191.2	-230.2						
70	29.4	3.83	3.07	1.2	4.3	8.58	29.9	125.6	83.6	41.6	-0.4	-42.4	-84.4	-126.4	-168.4	-210.4	-252.4						
75	27.9	3.83	3.07	1.1	4.3	8.14	29.0	130.4	85.4	40.4	-4.6	-49.6	-94.6	-139.6	-184.6	-229.6	-274.6						
80	26.6	3.83	3.07	1.1	4.3	7.75	28.1	135.0	87.0	39.0	-9.0	-57.0	-105.0	-153.0	-201.0	-249.0	-297.0						
85	25.4	3.83	3.07	1.0	4.3	7.40	27.4	139.5	88.5	37.5	-13.5	-64.5	-115.5	-166.5	-217.5	-268.5	-319.5						
90	24.3	3.83	3.07	1.0	4.3	7.09	26.7	144.0	90.0	36.0	-18.0	-72.0	-126.0	-180.0	-234.0	-288.0	-342.0						
95	23.3	3.82	3.07	0.9	4.3	6.80	26.0	148.3	91.3	34.3	-22.7	-79.7	-136.7	-193.7	-250.7	-307.7	-364.7						
Maximum Storage Rate =								148.3	91.3	46.6	31.3	22.8	16.8	12.5	9.5	6.5	3.5						

TABLE 4 - REQUIRED STORAGE VERSUS RELEASE RATE FOR 100 YEAR STORM

Runoff Coefficient, C =		0.99		Duration Interval (min) =		5												
Drainage Area (ha) =		0.123		Release Rate Start (L/s) =		0												
Return Period (yrs) =		100		Release Rate Interval (L/s) =		9												
Release Rate -->								0	9	18	27	36	45	54	63	72	81	
Duration (min)	Rainfall Intensity (mm/hr)	Peak Flow from Catchment K-10 (L/sec)	Peak Flow from Catchment K-8 (L/sec)	Peak Flow from Catchment K-4 (L/sec)	Peak Flow from Catchment BLDG K (L/sec)	Peak Flow from Catchment BLDG Expansion (L/sec)	Total Peak Flow (L/sec)	Storage Required (m³)										
0	398.6	3.83	3.07	18.4	4.3	68.71	233.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
5	242.7	3.83	3.07	11.2	4.3	41.83	146.4	43.9	41.2	38.5	35.8	33.1	30.4	27.7	25.0	22.3	19.6	
10	178.6	3.83	3.07	8.2	4.3	30.78	110.6	66.4	61.0	55.6	50.2	44.8	39.4	34.0	28.6	23.2	17.8	
15	142.9	3.83	3.07	6.6	4.3	24.63	90.8	81.7	73.6	65.5	57.4	49.3	41.2	33.1	25.0	16.9	8.8	
20	120.0	3.83	3.07	5.5	4.3	20.67	78.0	93.6	82.8	72.0	61.2	50.4	39.6	28.8	18.0	7.2	-3.6	
25	103.8	3.83	3.07	4.8	4.3	17.90	69.0	103.6	90.1	76.6	63.1	49.6	36.1	22.6	9.1	-4.4	-17.9	
30	91.9	3.83	3.07	4.2	4.3	15.83	62.4	112.3	96.1	79.9	63.7	47.5	31.3	15.1	-1.1	-17.3	-33.5	
35	82.6	3.83	3.07	3.8	4.3	14.23	57.2	120.1	101.2	82.3	63.4	44.5	25.6	6.7	-12.2	-31.1	-50.0	
40	75.1	3.83	3.07	3.5	4.3	12.95	53.0	127.3	105.7	84.1	62.5	40.9	19.3	-2.3	-23.9	-45.5	-67.1	
45	69.1	3.83	3.07	3.2	4.3	11.90	49.7	134.1	109.8	85.5	61.2	36.9	12.6	-11.7	-36.0	-60.3	-84.6	
50	64.0	3.83	3.07	2.9	4.3	11.02	46.8	140.5	113.5	86.5	59.5	32.5	5.5	-21.5	-48.5	-75.5	-102.5	
55	59.6	3.83	3.07	2.7	4.3	10.28	44.4	146.5	116.8	87.1	57.4	27.7	-2.0	-31.7	-61.4	-91.1	-120.8	
60	55.9	3.83	3.07	2.6	4.3	9.63	42.3	152.4	120.0	87.6	55.2	22.8	-9.6	-42.0	-74.4	-106.8	-139.2	
65	52.6	3.83	3.07	2.4	4.3	9.07	40.5	158.0	122.9	87.8	52.7	17.6	-17.5	-52.6	-87.7	-122.8	-157.9	
70	49.8	3.83	3.07	2.3	4.3	8.58	38.9	163.5	125.7	87.9	50.1	12.3	-25.5	-63.3	-101.1	-138.9	-176.7	
75	47.3	3.83	3.07	2.2	4.3	8.14	37.5	168.8	128.3	87.8	47.3	6.8	-33.7	-74.2	-114.7	-155.2	-195.7	
80	45.0	3.83	3.07	2.1	4.3	7.75	36.3	174.0	130.8	87.6	44.4	1.2	-42.0	-85.2	-128.4	-171.6	-214.8	
85	43.0	3.83	3.07	2.0	4.3	7.40	35.1	179.1	133.2	87.3	41.4	-4.5	-50.4	-96.3	-142.2	-188.1	-234.0	
90	41.1	3.83	3.07	1.9	4.3	7.09	34.1	184.1	135.5	86.9	38.3	-10.3	-58.9	-107.5	-156.1	-204.7	-253.3	
95	39.4	3.83	3.07	1.8	4.3	6.80	33.2	189.0	137.7	86.4	35.1	-16.2	-67.5	-118.8	-170.1	-221.4	-272.7	
100	37.9	3.83	3.07	1.7	4.3	6.53	32.3	193.9	139.9	85.9	31.9	-22.1	-76.1	-130.1	-184.1	-238.1	-292.1	
Maximum Storage Rate =								193.9	139.9	87.9	63.7	50.4	41.2	34.0	28.6	23.2	19.6	

APPENDIX A: STORMWATER MANAGEMENT MODEL
OUTLET CONTROL STRUCTURE DESIGN SHEET K-5

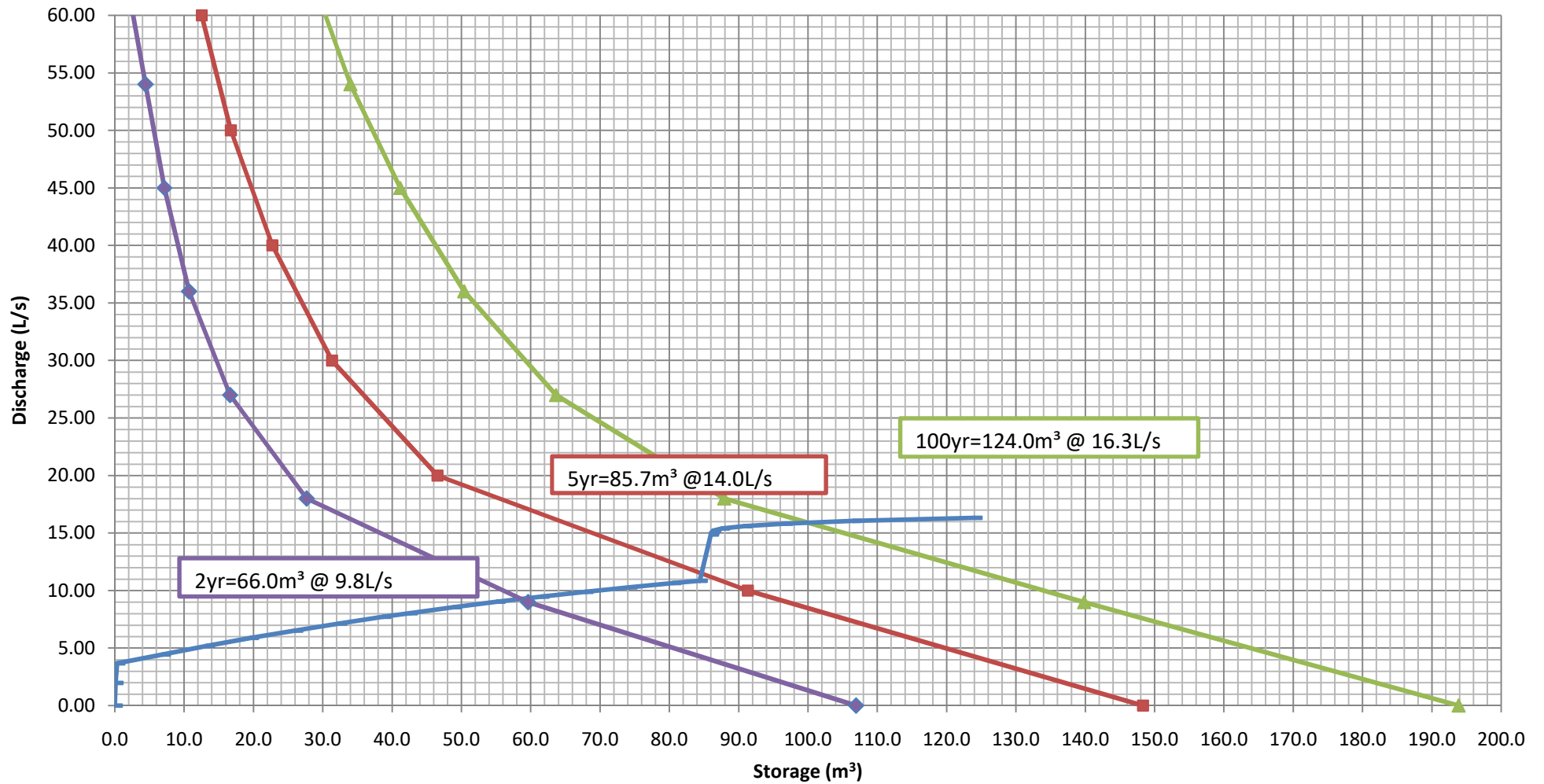
Client: Lawrence Architects Inc.
Job No.: 250557
Location: 2045 Mer-Bleue Road, Orleans ON
Date: August 10, 2026

GRAF Storage Modules		GRAF Storage Modules		Vario 800 Flex Shaft		Concrete Storm Manhole		Hydrovex 100 VHV-1	
number of modules in layer 1 (EcoBlock Inspect Smart)	207	number of modules in layer 2 (EcoBlock Inspect Smart)	207	number of catchbasin openings	1	Top of Grate Elevation	89.55	Pipe invert	87.30
storage volume per module (m^3)	0.2	storage volume per module (m^3)	0.2	storage volume per module (m^3)	0.2	Outlet Invert Elevation	87.3		
Height of modules (m)	0.33	Height of modules (m)	0.33	Height of modules (m)	0.33	manhole diameter (m)	1.2		
Module invert	87.5	Module invert	87.83	Module invert	87.5				
Top of module	87.83	Top of module	88.16	Top of module	98.35				
				riser diameter (m)	0.6				

Stage, WSE Elev (m)	Comments	Layer Increment (m)	Surface Storage			GRAF Storage Modules Layer 1			GRAF Storage Modules Layer 2			Storage (flex chambers)		Manhole Storage (STM-MH2)		Tempest MHF ICD		Cummulative Storage Volume (m³)	Total ICD Flow (L/s)
			Top Layer Area (m^2)	Bottom Layer Area (m^2)	Layer Volume (m^3)	Module height (m)	Layer Thickness (m)	Layer Volume (m^3)	Module height (m)	Layer Thicknes s (m)	Layer Volume (m^3)	Head (m)	Layer Volume (m^3)	Head (m)	Layer Volume (m^3)	Head (m)	ICD Flow (L/sec)		
89.650	Maximum ponding elevation	0.050	458.1	248.1	17.4							2.15	0.000	2.35	0.06	2.35	16.33	124.00	16.3
89.600		0.050	248.1	149.5	9.8							2.10	0.000	2.30	0.06	2.30	16.07	106.56	16.1
89.550		0.050	149.5	86.5	5.8							2.05	0.000	2.25	0.06	2.25	15.83	96.66	15.8
89.500		0.050	86.5	40.7	3.1							2.00	0.000	2.20	0.06	2.20	15.61	90.78	15.6
89.450		0.050	40.7	11.9	1.2							1.95	0.000	2.15	0.06	2.15	15.40	87.61	15.4
89.400	Storage on Asphalt Surface	0.050	11.9	0	0.2							1.90	0.000	2.10	0.06	2.10	15.21	86.31	15.2
89.350	Top of Grate Flex Chamber	0.050	0	0	0.0							1.85	0.014	2.05	0.06	2.05	15.04	86.06	15.0
89.300		1.140			0.0							1.80	0.322	2.00	1.29	2.00	14.87	85.99	14.9
88.160	Top of Module Layer 2	0.030			0.0				0.330	0.030	3.764	0.66	0.008	0.86	0.03	0.86	10.85	84.38	10.9
88.130		0.050			0.0				0.300	0.050	6.273	0.63	0.014	0.83	0.06	0.83	10.65	80.57	10.7
88.080		0.050			0.0				0.250	0.050	6.273	0.58	0.014	0.78	0.06	0.78	10.29	74.23	10.3
88.030		0.050			0.0				0.200	0.050	6.273	0.53	0.014	0.73	0.06	0.73	9.91	67.88	9.9
87.980		0.050			0.0				0.150	0.050	6.273	0.48	0.014	0.68	0.06	0.68	9.49	61.54	9.5
87.930		0.050			0.0				0.100	0.050	6.273	0.43	0.000	0.63	0.06	0.63	9.04	55.20	9.0
87.880		0.050			0.0				0.050	0.050	6.273	0.38	0.000	0.58	0.06	0.58	8.56	48.87	8.6
87.830	Top of Module Layer 1	0.030			0.0	0.330	0.030	3.764	0.000	0.000	0.000	0.33	0.018	0.53	0.03	0.53	8.04	42.54	8.0
87.800		0.050			0.0	0.300	0.050	6.273				0.30	0.030	0.50	0.06	0.50	7.72	38.72	7.7
87.750		0.050			0.0	0.250	0.050	6.273				0.25	0.030	0.45	0.06	0.45	7.15	32.36	7.1
87.700		0.050			0.0	0.200	0.050	6.273				0.20	0.030	0.40	0.06	0.40	6.53	26.00	6.5
87.650		0.050			0.0	0.150	0.050	6.273				0.15	0.030	0.35	0.06	0.35	5.88	19.64	5.9
87.600		0.050			0.0	0.100	0.050	6.273				0.10	0.030	0.30	0.06	0.30	5.19	13.28	5.2
87.550		0.050			0.0	0.050	0.050	6.273				0.05	0.030	0.25	0.28	0.25	4.45	6.93	4.5
87.500	Module invert	0.100			0.0	0.000	0.000	0.000				0.00	0.000	0.20	0.23	0.20	3.67	0.34	3.7
87.400		0.100			0.0							0.00	0.000	0.10	0.11	0.10	1.97	0.11	2.0
87.300	pipe inv w/ ICD	0.000			0.0							0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.0

APPENDIX A: STORMWATER MANAGEMENT MODEL
Storage-Discharge Curve
Catchment K-5

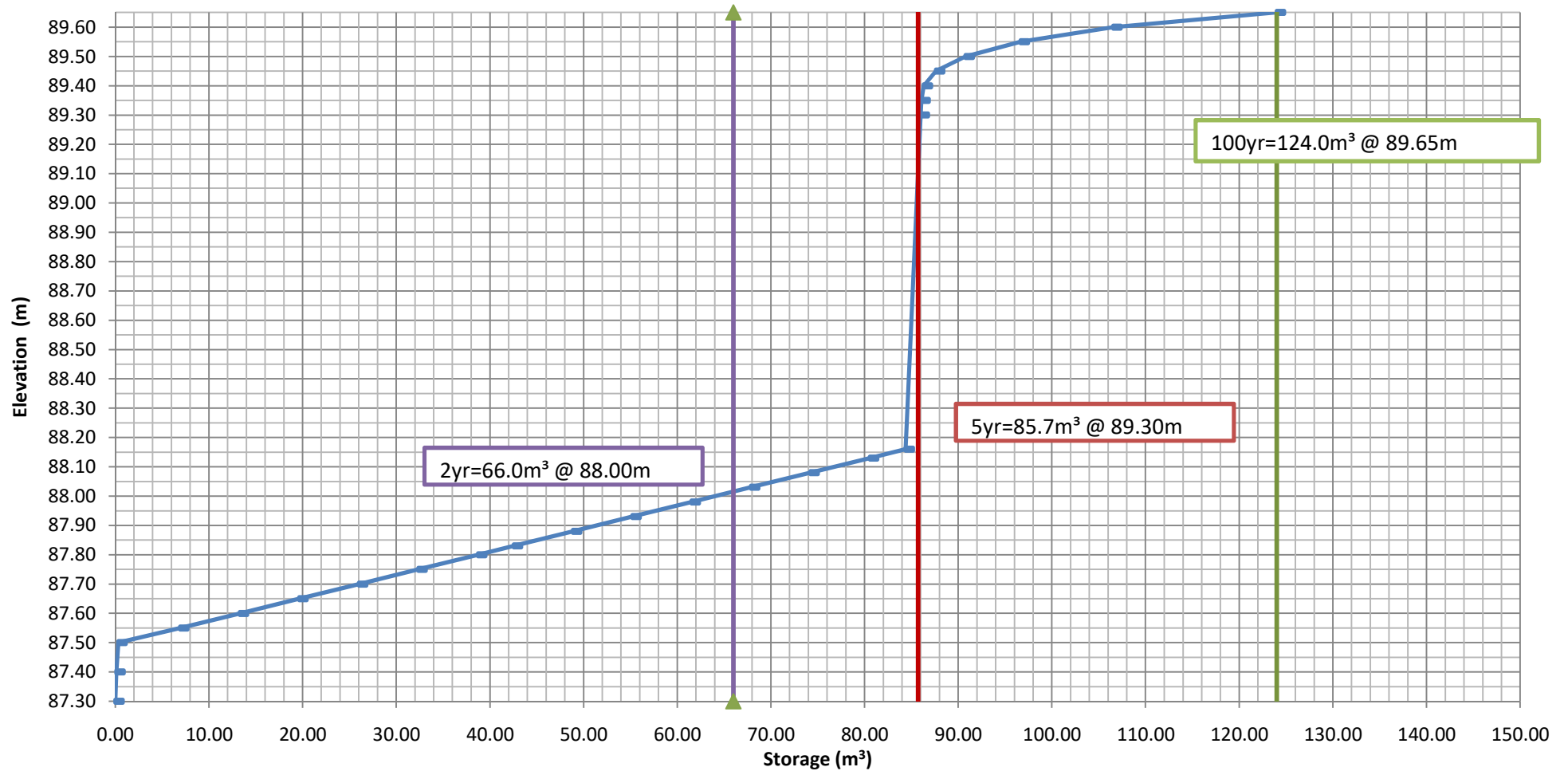
Client: Lawrence Architects Inc.
Job No.: 250557
Location: 2045 Mer-Bleue, Orleans ON
Date: August 10, 2026



APPENDIX A: STORMWATER MANAGEMENT MODEL

Stage-Storage Curve Catchment K-5

Client: Lawrence Architects Inc.
Job No.: 250557
Location: 2045 Mer-Bleue, Orleans ON
Date: August 10, 2026





Appendix C: Product Information

- GRAF Underground Storage Module Information
- Hydrovex Inlet Control Device Product Information
- Hydrovex Flow Curves (K-9)
- Hydrovex Flow Curves (K-5)
- Tempest Inlet Control Device Product Information
- Tempest Flow Curve (K-2)

EcoBloc Inspect Smart

Product Specifications
& Technical Data



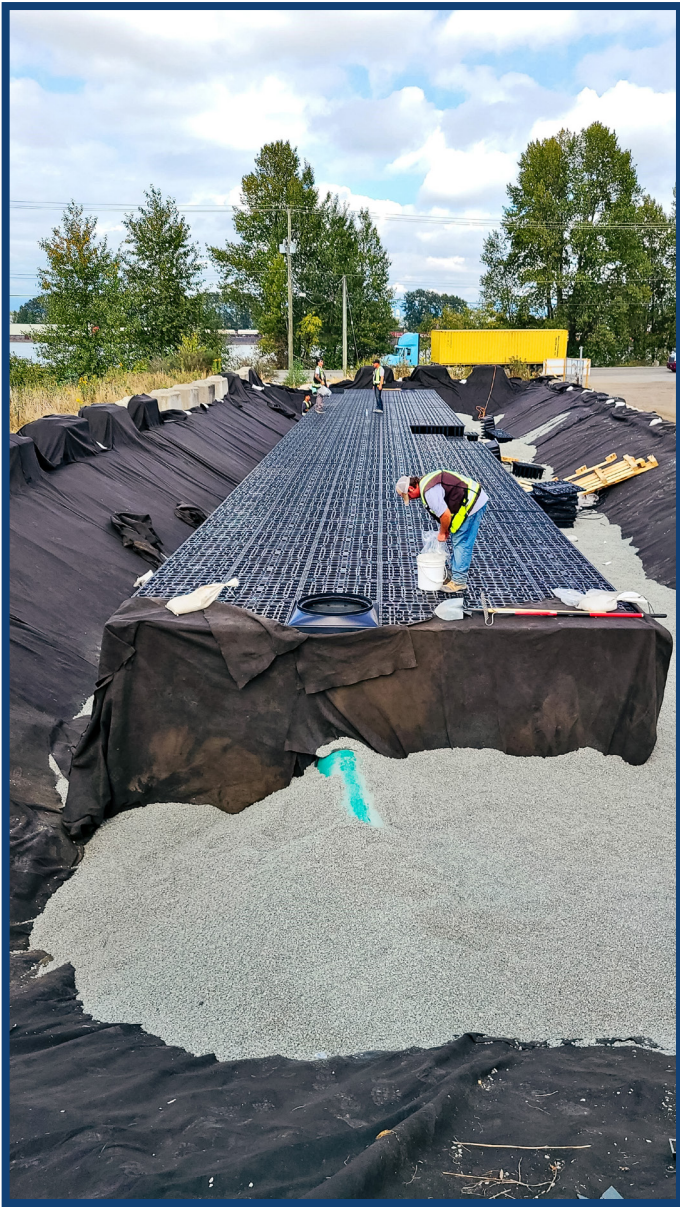
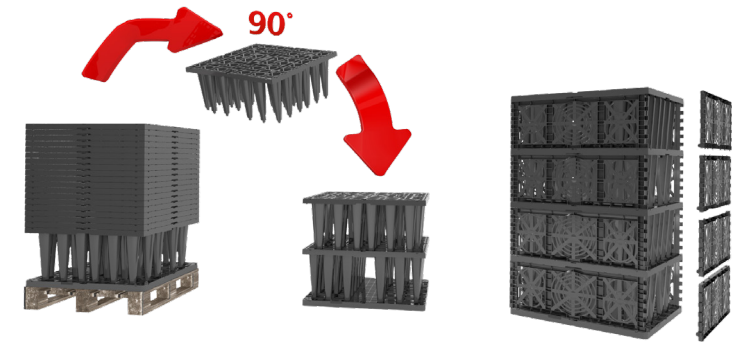
Stormwater
Management
Systems

GRAF EcoBloc Inspect Smart Series

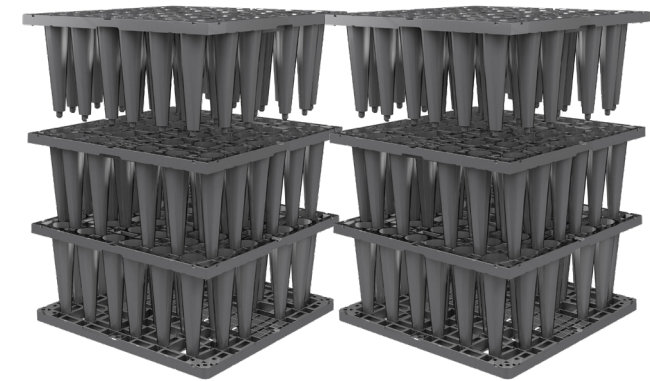
The next generation of GRAF Infiltration & Detention modules



Space Savings



Labour Savings



Infiltration & Detention Modules

GRAF EcoBloc Inspect Smart

The standard module for implementing large storage volumes in a typical installation window.

- Suitable for HGV loading up to HS-25 as per AASHTO standards.
- 96% storage coefficients.
- Can be inspected.
- Can be cleaned at high pressure.
- Maximum installation depth of up to 5.0m/16.4ft.

Volume [litres/gallons]	Length [mm/in]	Width [mm/in]	Height [mm/in]	Weight [kg/lb]	Colour	Item no.
211/55.7	800/31.5	800/ 31.5	330/13	10/22	Black	402500

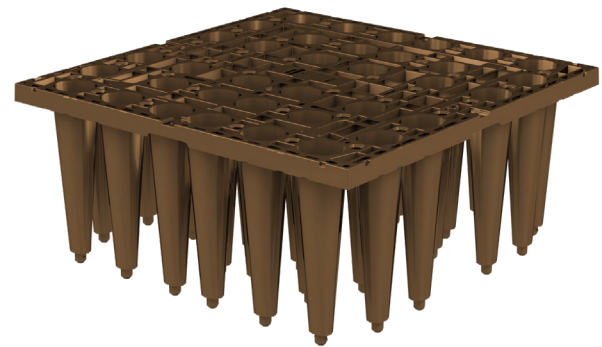


GRAF EcoBloc Inspect Smart Plus

The reinforced module for implementing large storage volumes with shallow earth coverings or deep installation depths.

- Suitable for HGV loading up to HS-25 as per AASHTO standards.
- 95% storage coefficients.
- Can be inspected.
- Can be cleaned at high pressure.
- Maximum installation depth of up to 6.0m/19.6ft.

Volume [litres/gallons]	Length [mm/in]	Width [mm/in]	Height [mm/in]	Weight [kg/lb]	Colour	Item no.
211/55.7	800/31.5	800/ 31.5	330/13	11.5/25.4	Brown	402530

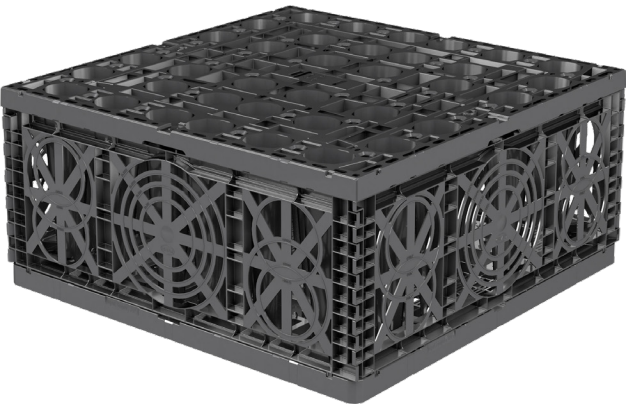


GRAF EcoBloc Inspect Smart Ultra

The high-performance module for storage volumes with very deep earth coverings or installation depths.

- High load areas over HS-25 loading or installation with deep earth covering.
- 95% storage coefficients.
- Can be inspected.
- Can be cleaned at high pressure.
- Maximum installation depth of up to 7.5m/24.6ft.

Volume [litres/gallons]	Length [mm/in]	Width [mm/in]	Height [mm/in]	Weight [kg/lb]	Colour	Item no.
211/55.7	800/31.5	800/ 31.5	330/13	12/26.5	Black	402560



Accessories

EcoBloc Connectors

For the horizontal connection of multiple EcoBloc modules and base plates to one another.

Item no. 402015	10 Units
Item no. 402018	25 Units
Item no. 402020	50 Units
Item no. 402025	200 Units



EcoBloc Pipe Adapter Plates

Pipe adapter plates for pipe connections.

EPA04	4" Dia.	EPA12	12" Dia.
EPA06	6" Dia.	EPA15-PVC	15" Dia.
EPA08	8" Dia.	EPA18-PVC	18" Dia.
EPA10	10" Dia.	EPA21-PVC	21" Dia.



EcoBloc Inspect Smart Plus shaft

Connection Surfaces	up to DN 250
Clear Width	400 mm
Inspection Crossways Possible	No
Fully Integrated Shaft System	Yes
Compatibility	Smart Plus
Usable as Choke Drain Shaft	No

EcoBloc Inspect Smart Plus shaft



EcoBloc Inspect Smart Plus shaft cover plate

Universal component that forms the top connection to all EcoBloc Inspect Smart Plus Shafts.

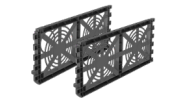
Item	Weight [kg/lbs]	Colour	Item no.
EcoBloc Inspect Smart Plus shaft cover plate	5/11	Black	450160



EcoBloc Inspect Smart Plus shaft

The reinforced module for implementing large storage volumes with shallow earth coverings or deep installation depths.

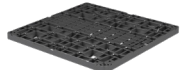
Volume [litres/gallons]	Length [mm/in]	Width [mm/in]	Height [mm/in]	Weight [kg/lbs]	Colour	Item no.
211/ 55.74	800/31.5	800/31.5	330/13	8.5/18.74	Black	450151



EcoBloc Inspect Smart end plates

The reinforced module for implementing large storage volumes with shallow earth coverings or deep installation depths.

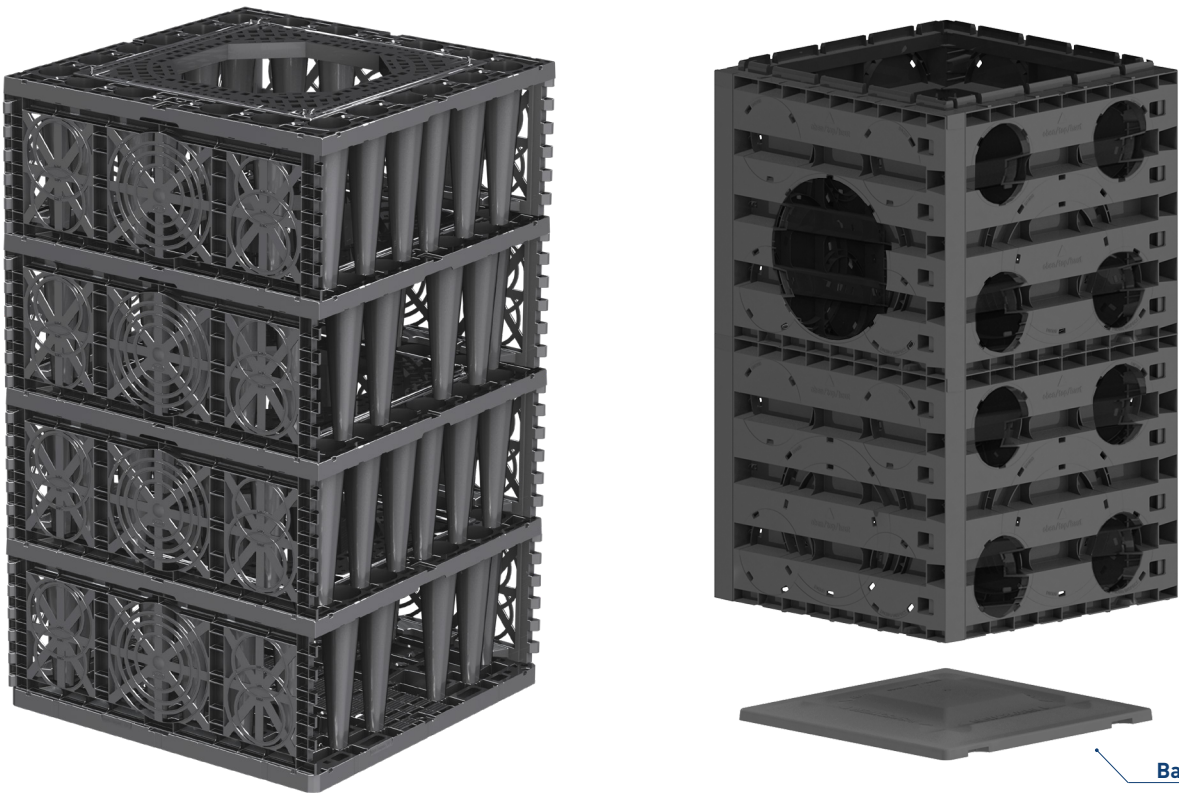
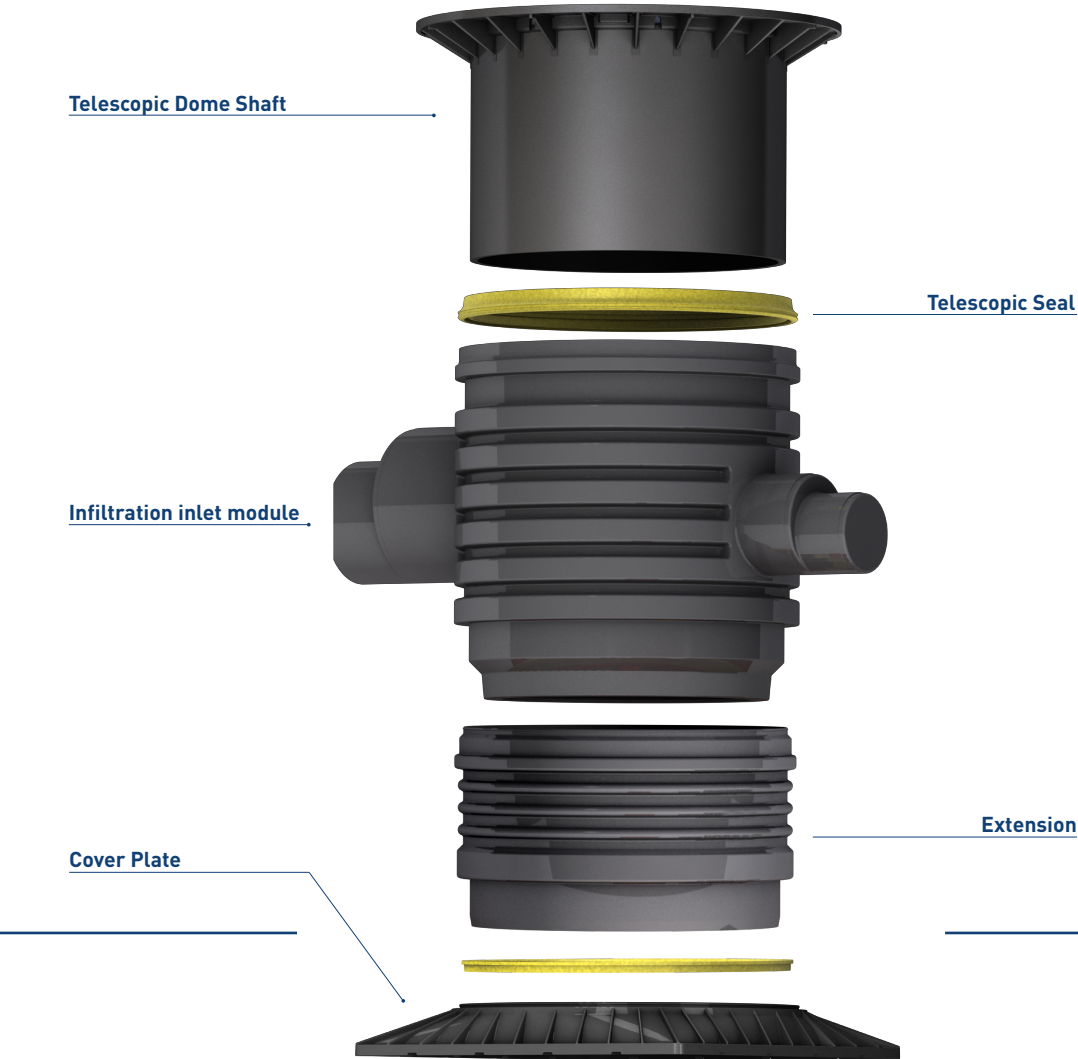
Item	Colour	Item no.
EcoBloc Inspect Smart end plates (set of 2)	Black	402503



EcoBloc Inspect Smart base plate

Base plate for constructing a system using the EcoBloc Inspect Smart family.

Volume [litres/gallons]	Length [mm/in]	Width [mm/in]	Height [mm/in]	Weight [kg/lbs]	Colour	Item no.
24/6.34	800/31.5	800/31.5	40/1.6	4/8.82	Black	402501



Vario 800 Flex Shaft

Connection Surfaces	up to DN 400
Clear Width	600 mm
Inspection Crossways Possible	Yes
Fully Integrated Shaft System	Yes
Compatibility	Smart Plus Ultra
Usable as Choke Drain Shaft	Yes

Vario 800 Flex shaft

Vario 800 Flex | Type 1

Shaft body for one or more layers of an EcoBloc system.



Volume [litres/gallons]	Length [mm/in]	Width [mm/in]	Height [mm/in]	Weight [kg/lbs]	Colour	Item no.
230/60.76	800/31.5	800/31.5	355/14	16/35.27	Grey	450050

Vario 800 Flex | Type 2

Shaft body for two or more layers of an EcoBloc system.



Volume [litres/gallons]	Length [mm/in]	Width [mm/in]	Height [mm/in]	Weight [kg/lbs]	Colour	Item no.
420/111	800/31.5	800/31.5	660/26	27/59.52	Grey	450051

Vario 800 Flex cover & base plate set

Base and cover plate for Vario 800 Flex shaft.

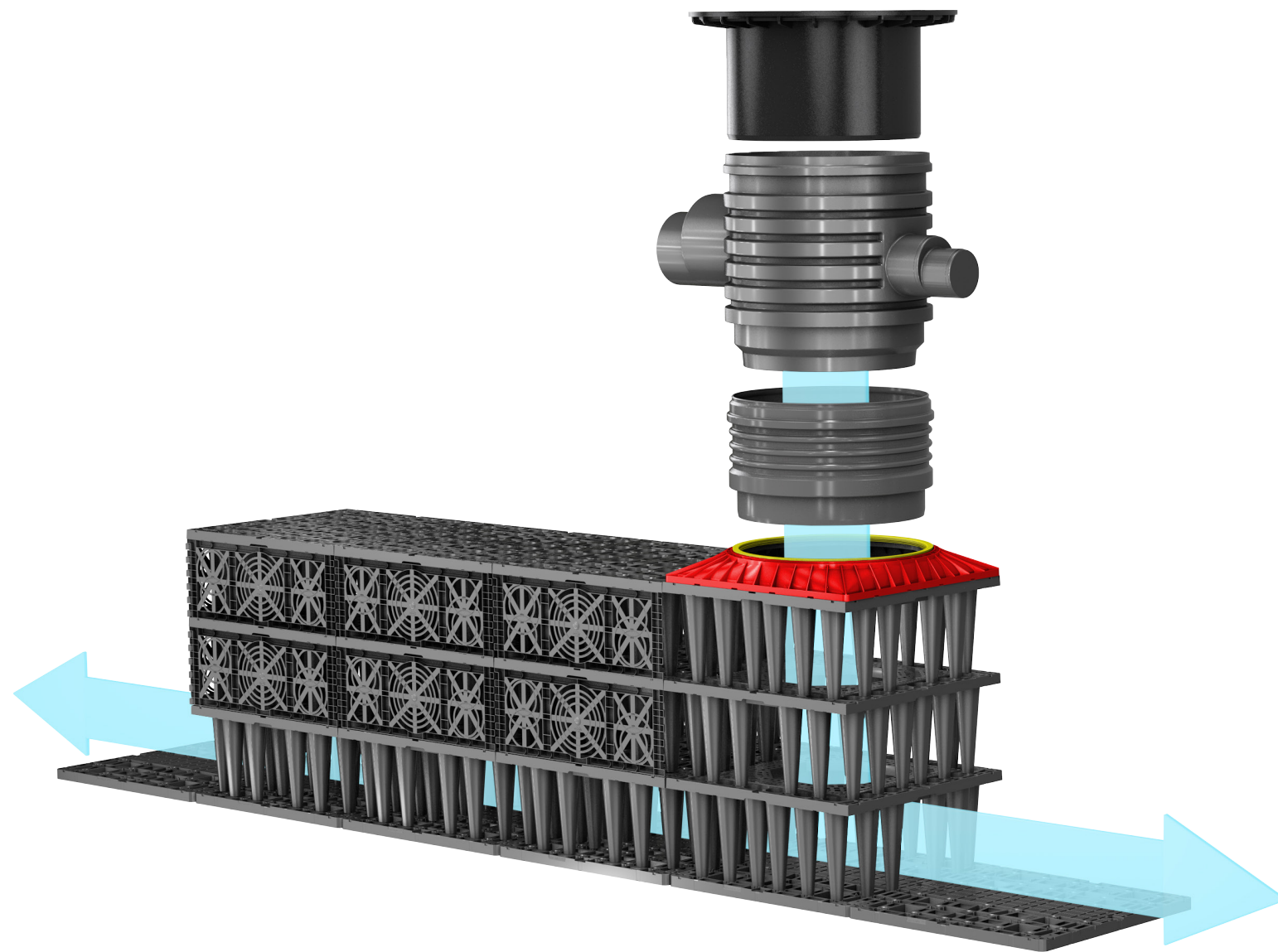


Item	Colour	Item no.
Vario 800 Flex cover and base plate set	Grey	450052

Base Plate

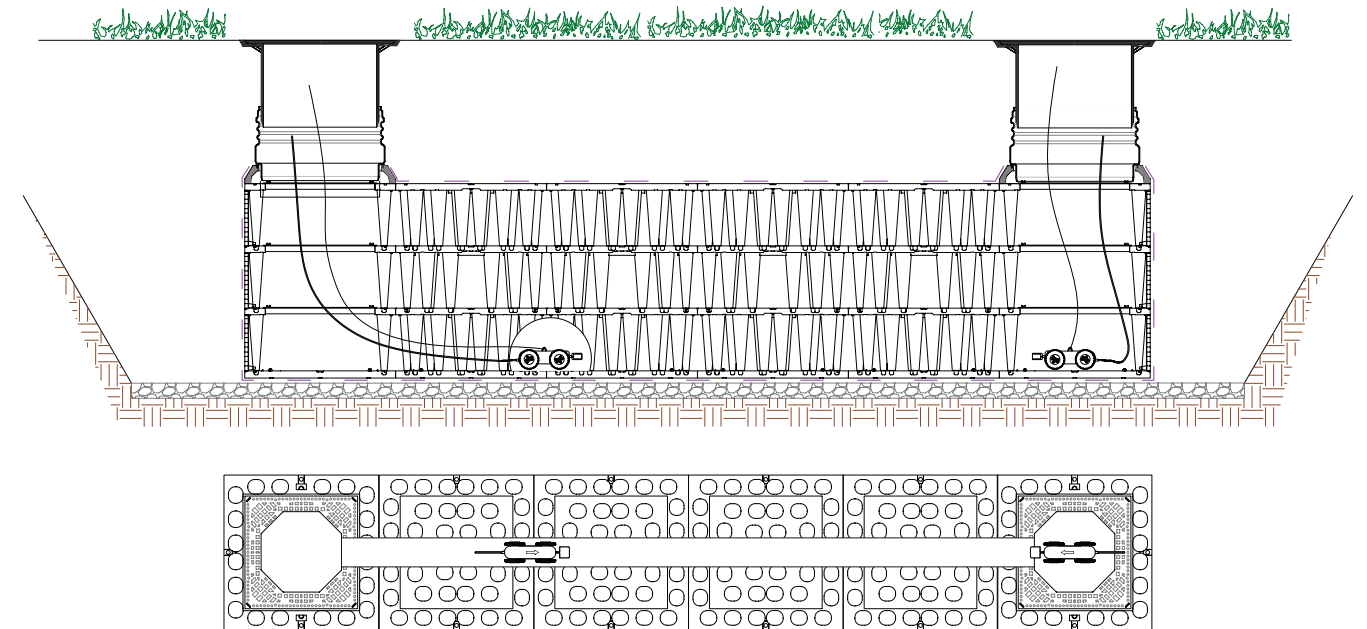
Inspectable and Cleanable

Open internal structure for inspection & cleaning



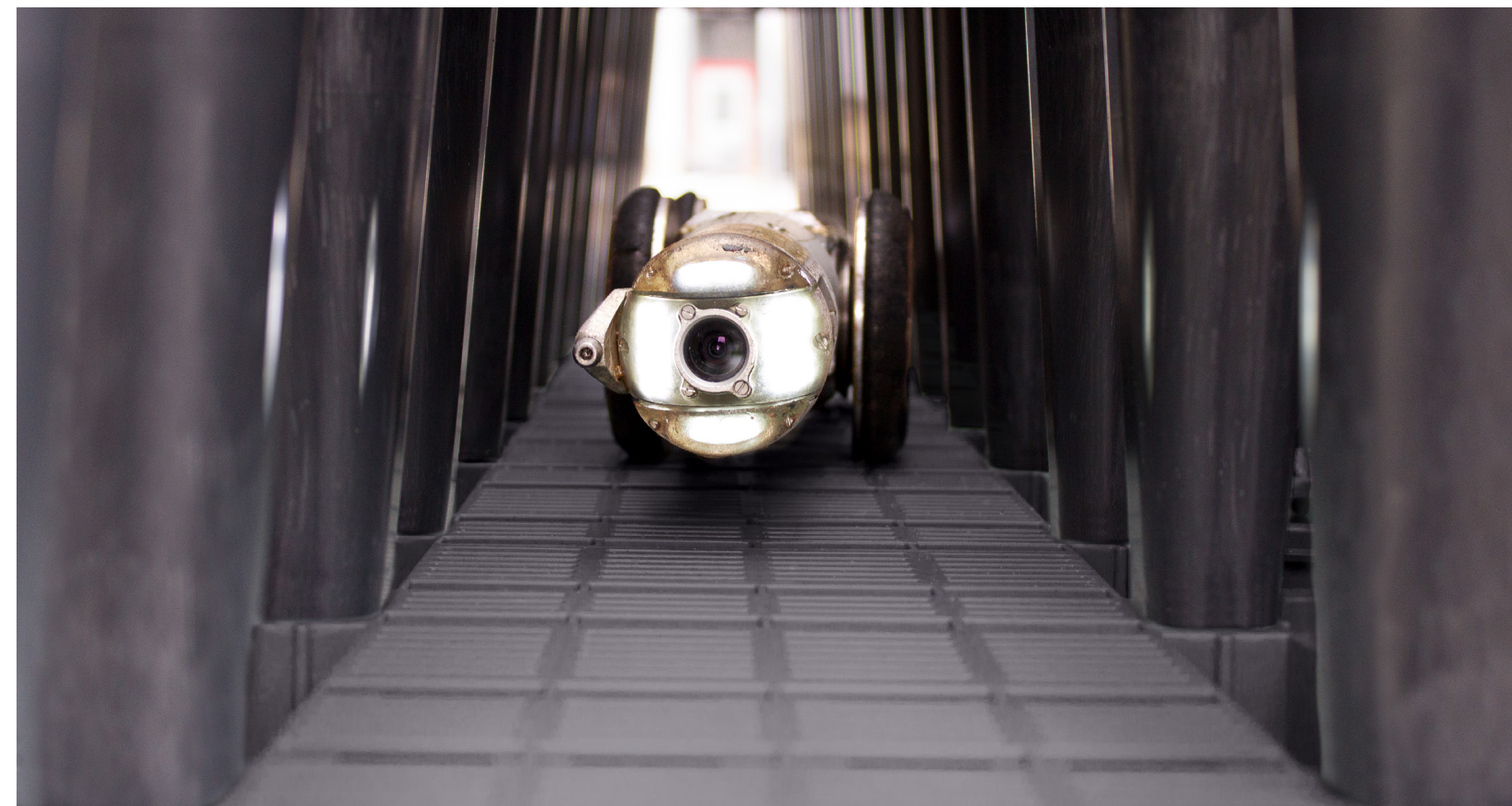
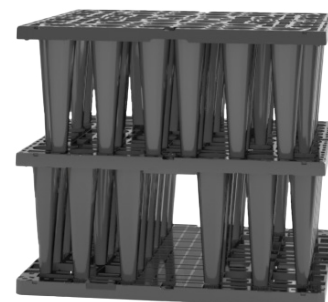
Orientation of the inspection channels

The inspection channels enable comprehensive inspection and flushing of the entire system. For this purpose, the inspection channels should run parallel to the long side of the system and form a continuous tunnel. Access is usually gained via the inspection shaft end-face for both flushing nozzles and inspection cameras.



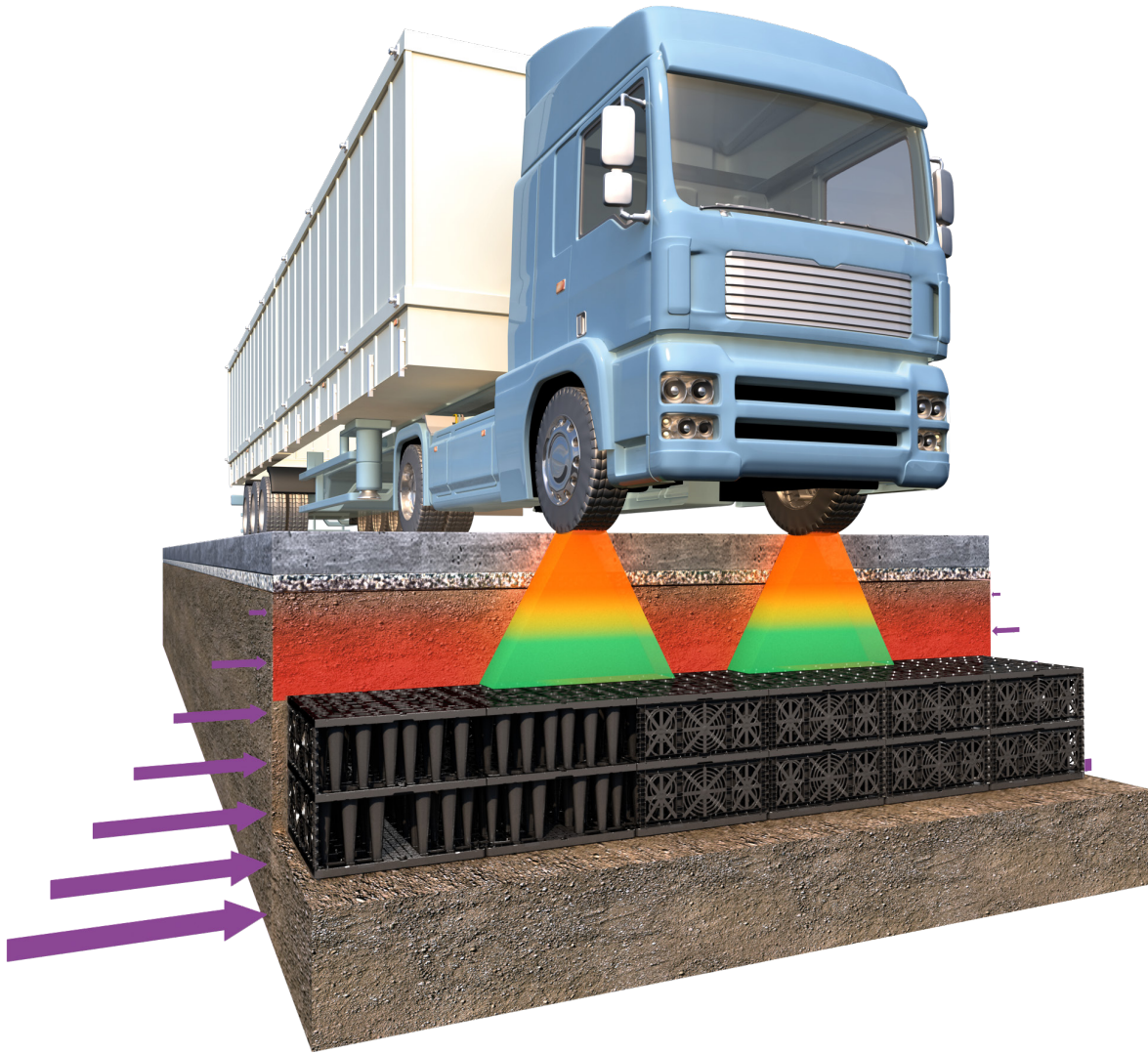
Cleanability of the Inspect Smart System

EcoBloc Inspect Smart systems have an integrated inspection channels that allow for easy inspection and maintenance. Flushing the entire system is accomplished by introducing washing nozzles into the system on one side of the tank and flushing any dirt and debris towards a suction hose on the opposite side of the system.



Load Distribution

Vertical & Lateral Resistances



Patented design

The design of Ecobloc Inspect Smart, Plus and Ultra is optimized for use as an underground structure for stormwater infiltration and detention. The patented pillar arrangement and the deck structure is optimized to spread vertical pressure evenly and precisely throughout the entire system.

Repeating Pattern

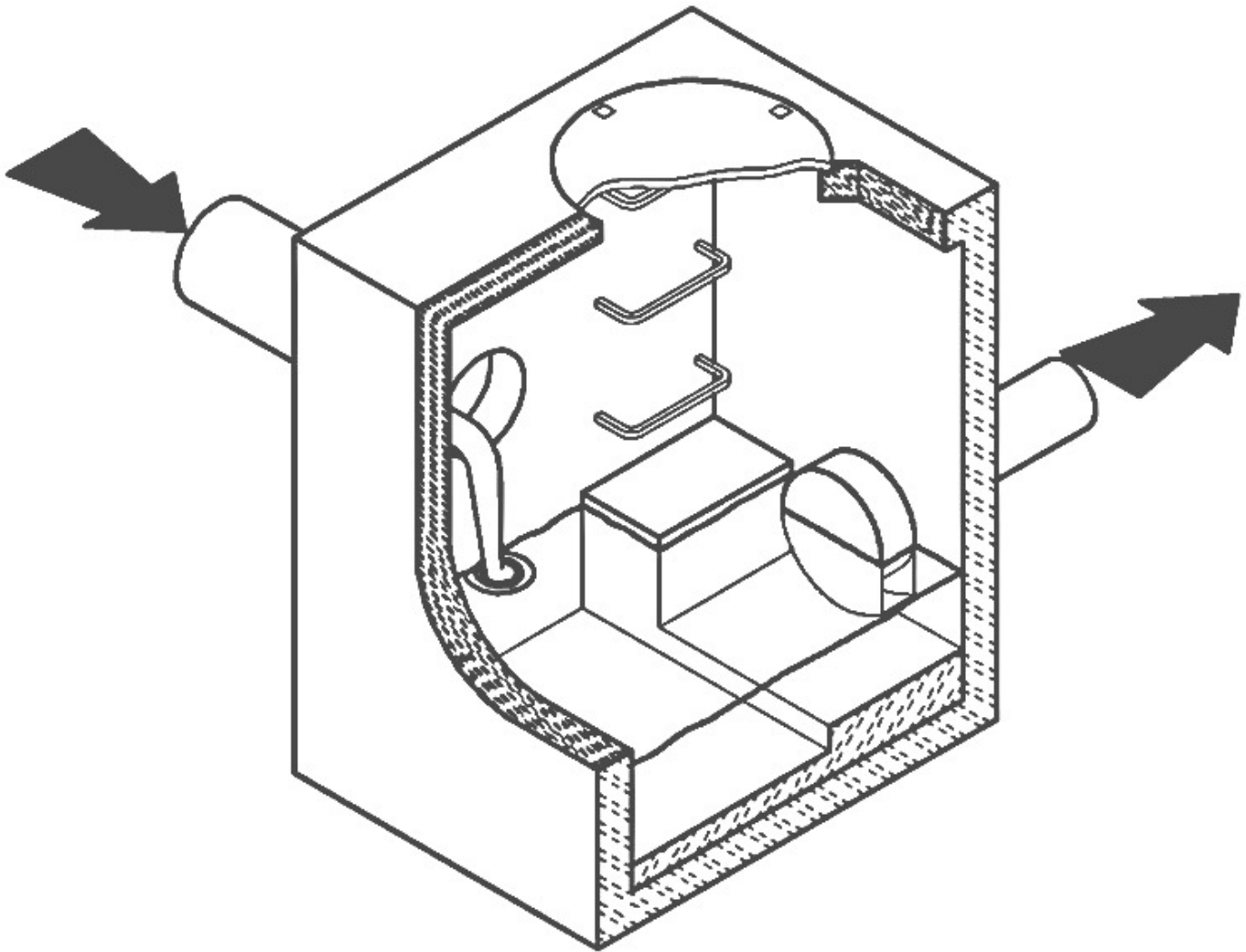
The recurring constant pattern of the EcoBloc Inspect Smart Modules provide a stability advantage in terms of lateral resistance. Each layer provides a suitable deck structure at the same intervals. This becomes extremely important in deep installation depths where considerable lateral forces can occur.



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HYDROVEX[®] VHV / SVHV Vertical Vortex Flow Regulator



JOHN MEUNIER

HYDROVEX® VHV / SVHV VERTICAL VORTEX FLOW REGULATOR

APPLICATIONS

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

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

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

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

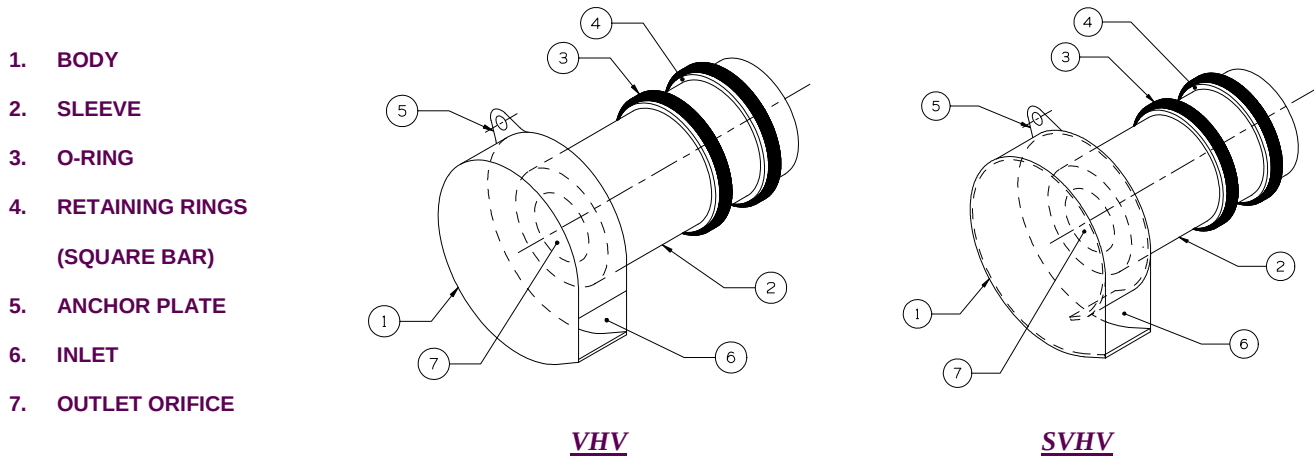


FIGURE 1: HYDROVEX® VHV-SVHV VERTICAL VORTEX FLOW REGULATORS

ADVANTAGES

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

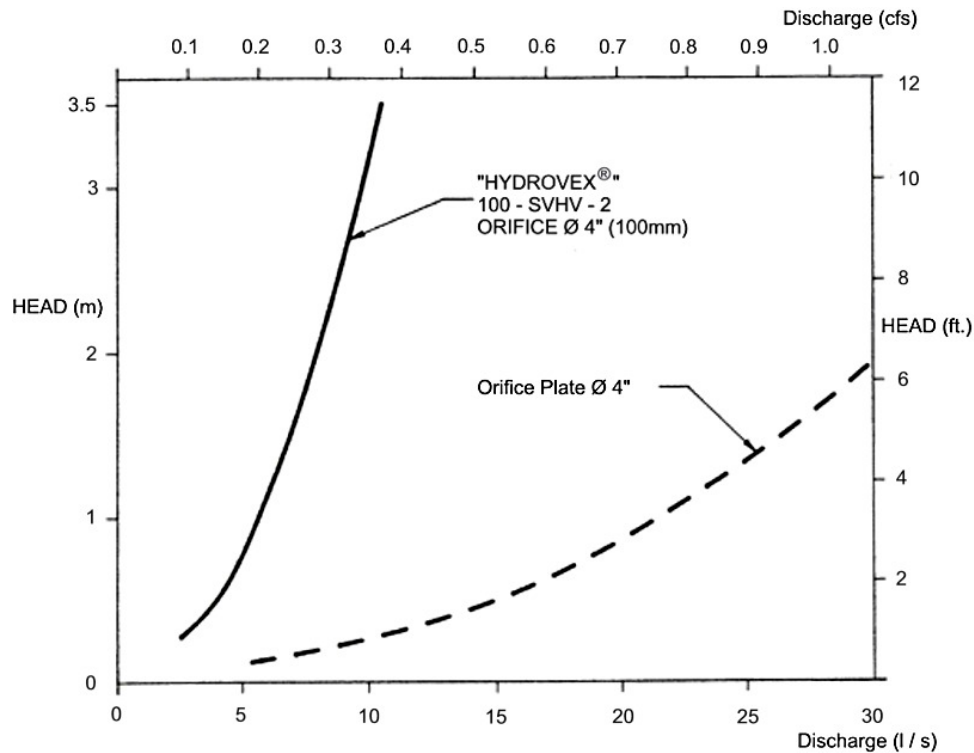


FIGURE 2: DISCHARGE CURVE SHOWING A HYDROVEX® FLOW REGULATOR VS AN ORIFICE PLATE

SELECTION

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

Example:

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

INSTALLATION REQUIREMENTS

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

SPECIFICATIONS

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

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

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

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

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



Typical VHV model in factory

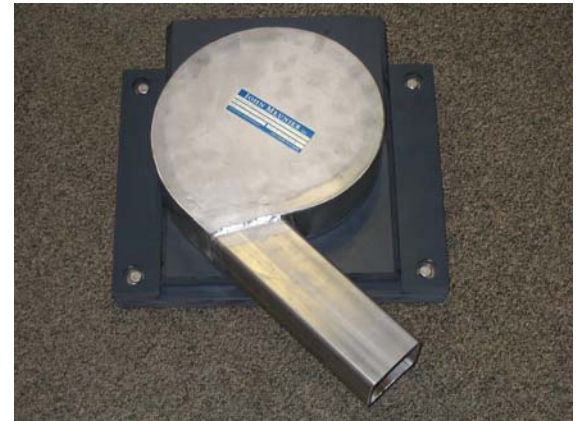
OPTIONS



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



FV – SVHV (mounted on sliding plate)



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



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



VHV with air vent for minimal slopes



VHV Vertical Vortex Flow Regulator

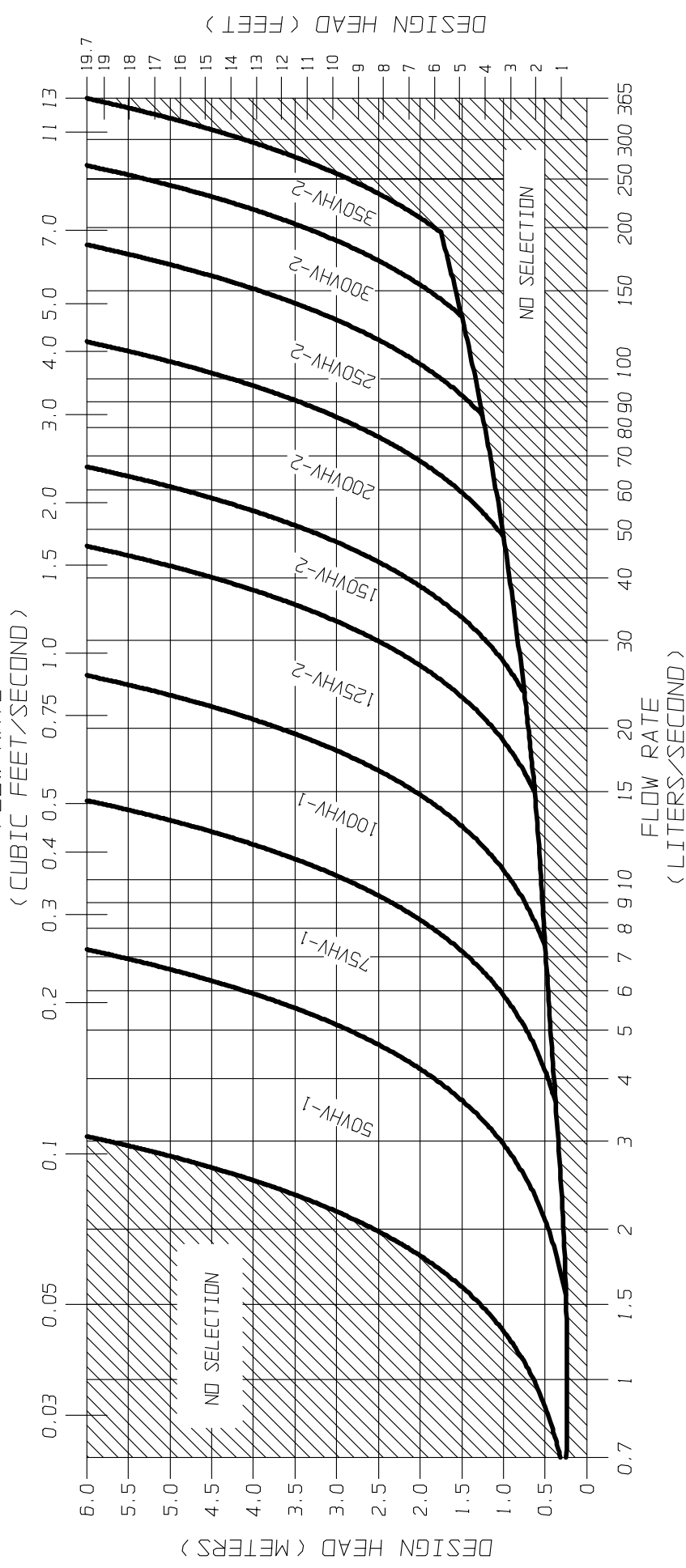


FIGURE 3 - VHV

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SVHV Vertical Vortex Flow Regulator

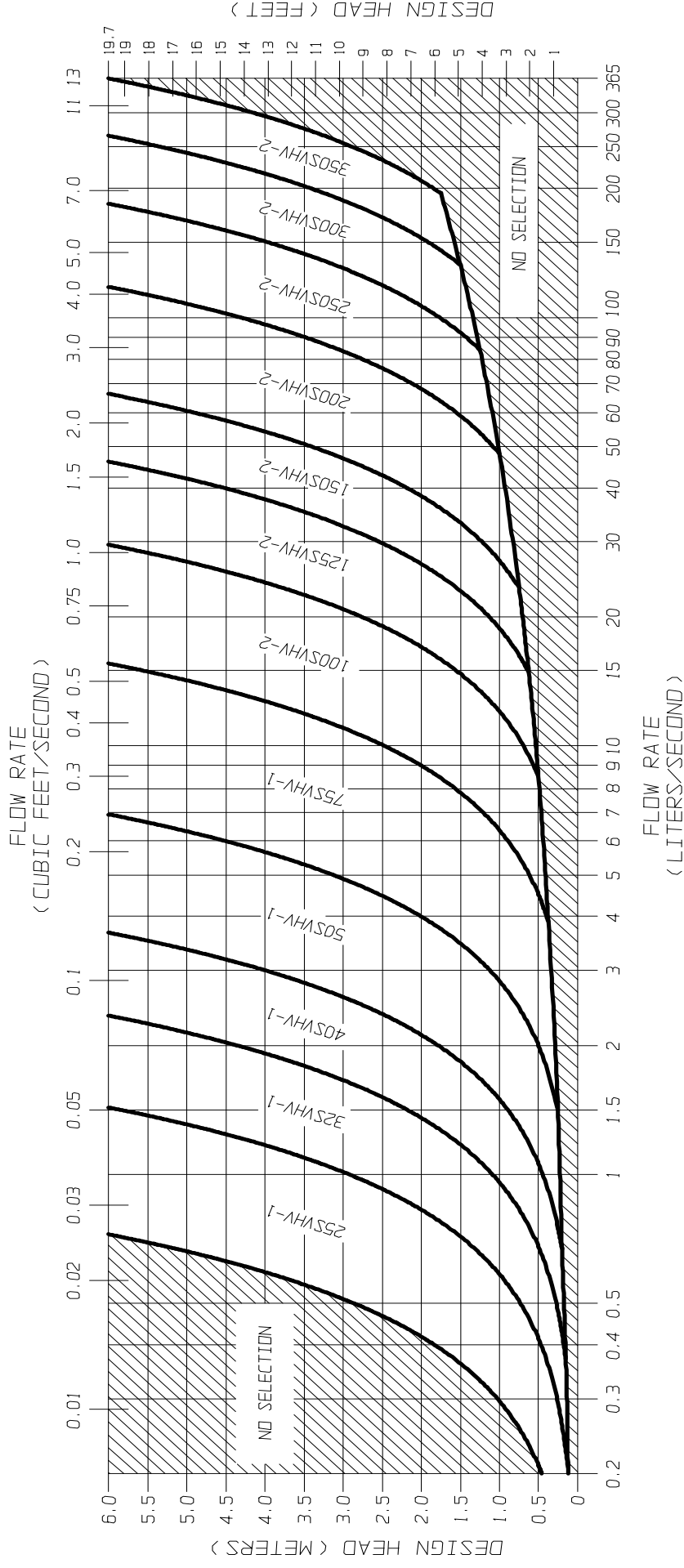
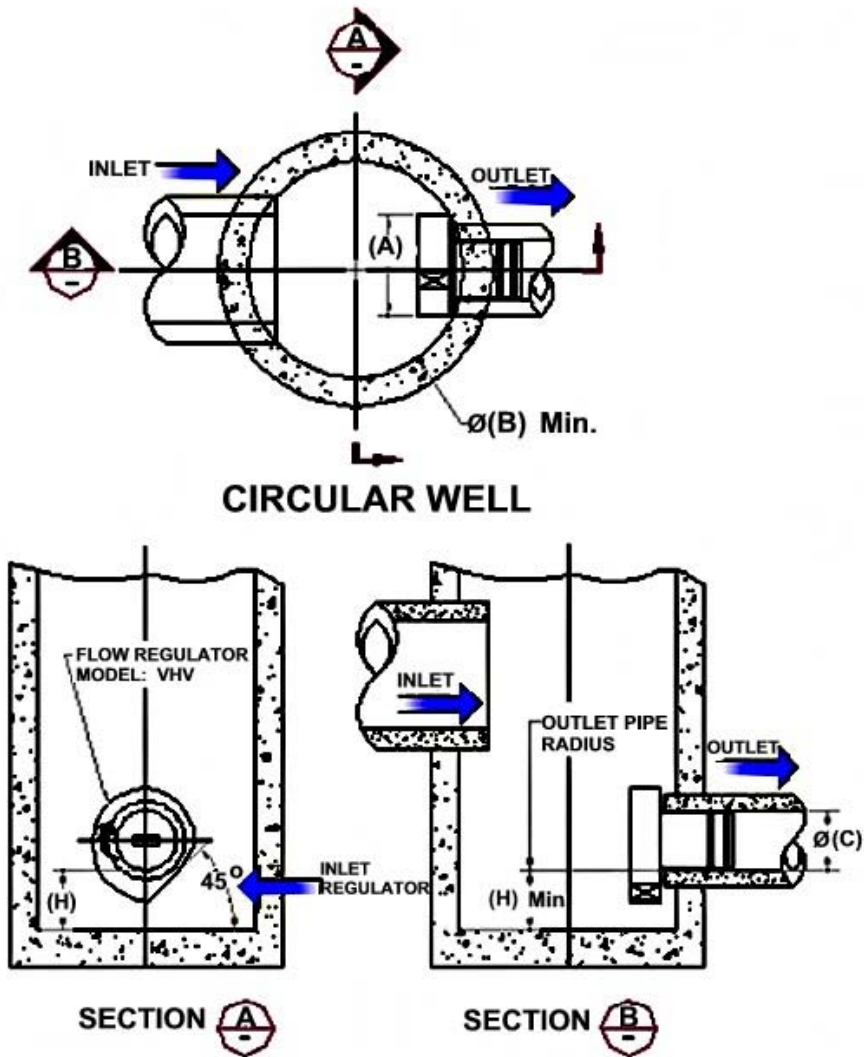


FIGURE 3 - SVHV

JOHN MEUNIER

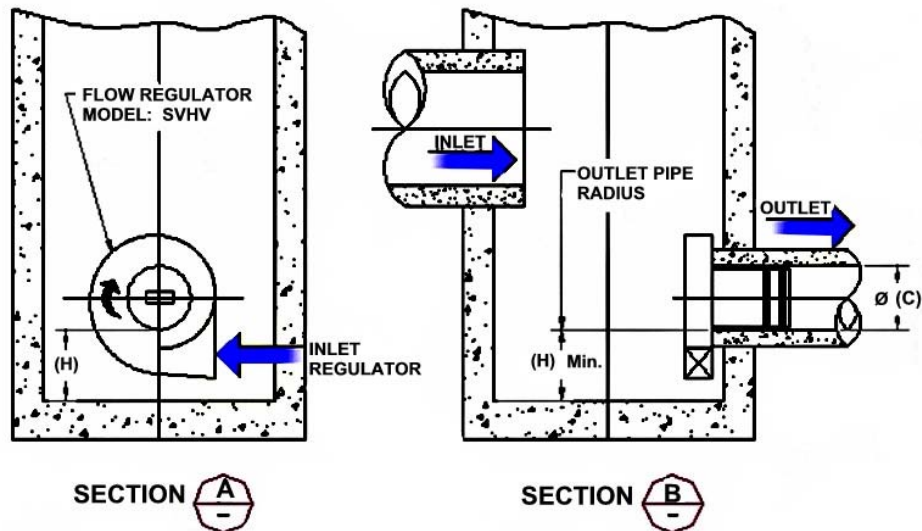
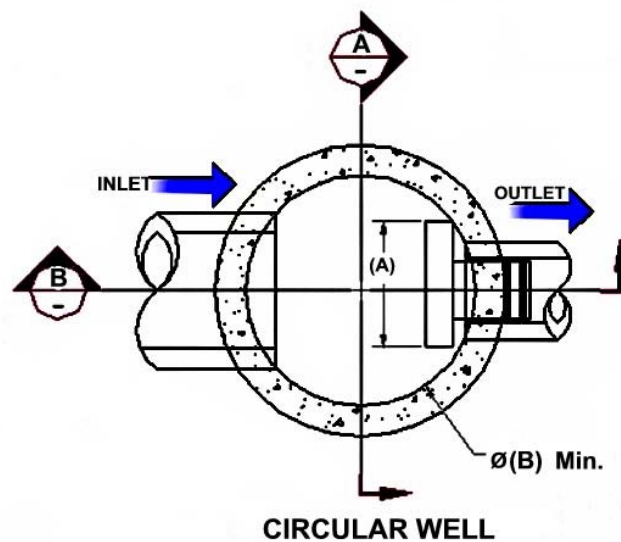
FLOW REGULATOR TYPICAL INSTALLATION IN CIRCULAR MANHOLE
FIGURE 4 (MODEL VHV)

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



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

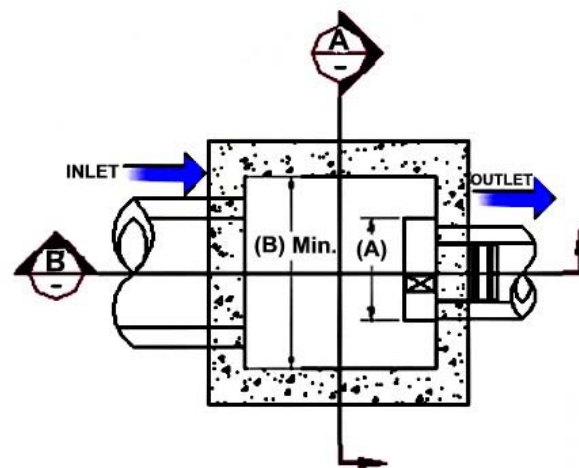
Model Number	Regulator Diameter		Minimum Manhole Diameter		Minimum Outlet Pipe Diameter		Minimum Clearance	
	A (mm)	A (in.)	B (mm)	B (in.)	C (mm)	C (in.)	H (mm)	H (in.)
25 SVHV-1	125	5	600	24	150	6	150	6
32 SVHV-1	150	6	600	24	150	6	150	6
40 SVHV-1	200	8	600	24	150	6	150	6
50 SVHV-1	250	10	600	24	150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



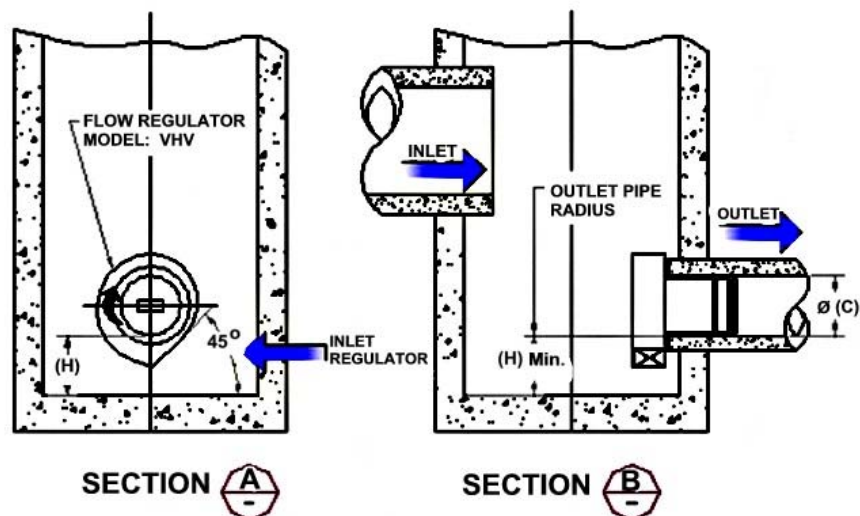
FLOW REGULATOR TYPICAL INSTALLATION IN SQUARE MANHOLE
FIGURE 4 (MODEL VHV)

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

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



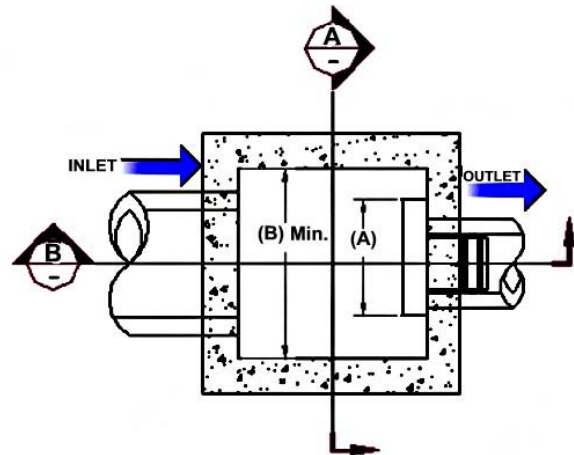
SQUARE / RECTANGULAR WELL



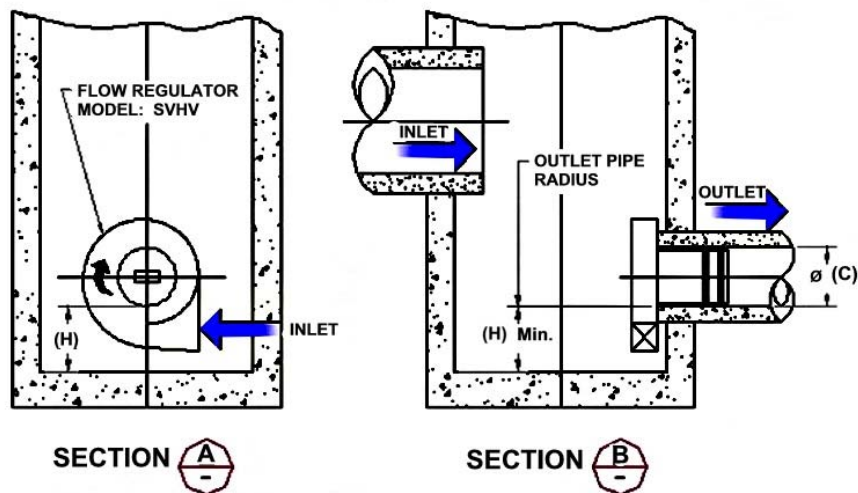
FLOW REGULATOR TYPICAL INSTALLATION IN SQUARE MANHOLE
FIGURE 4 (MODEL SVHV)

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

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



SQUARE / RECTANGULAR WELL



INSTALLATION

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

MAINTENANCE

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

GUARANTY

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

John Meunier Inc.

ISO 9001 : 2008

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VHV Vertical Vortex Flow Regulator

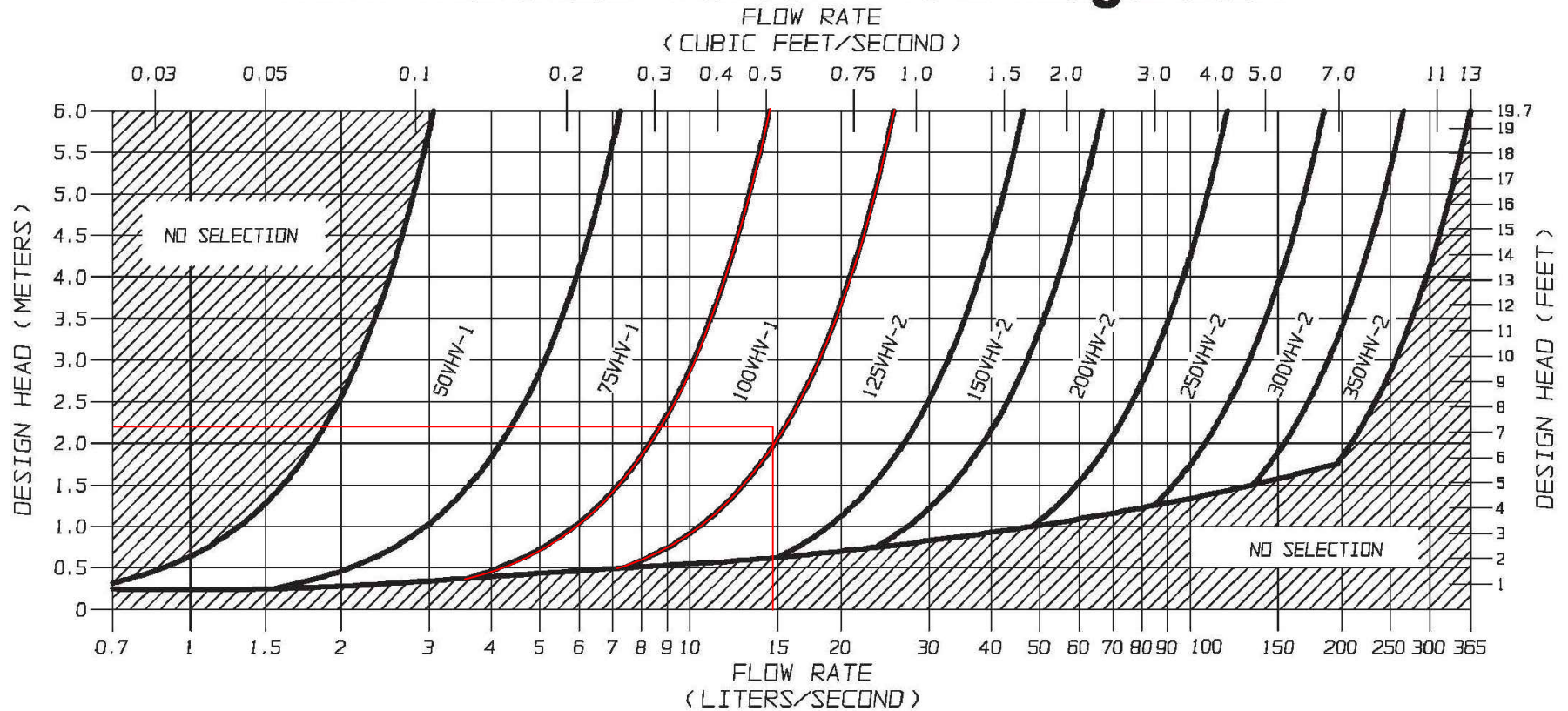


FIGURE 3 - VHV

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For Inlet control device in
STM-MH2
Max head = 2.2m
Max flow rate = 14.7L/s



VHV Vertical Vortex Flow Regulator

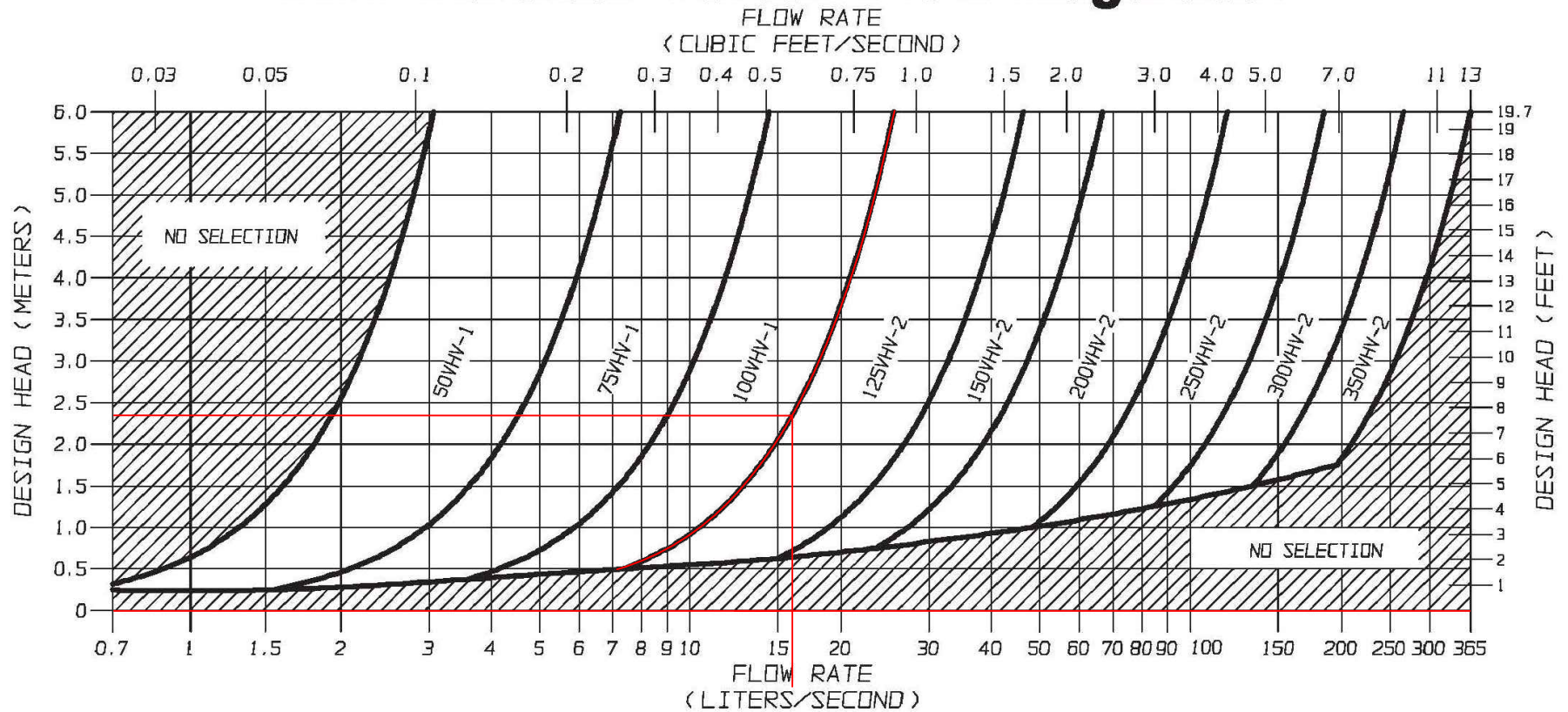


FIGURE 3 - VHV

JOHN MEUNIER

For Inlet control device in
STM-MH4
Max head = 2.35m
Max flow rate = 16.3L/s

Volume III: **TEMPEST™** INLET CONTROL DEVICES

Municipal Technical
Manual Series



SECOND EDITION

LMF (Low to Medium Flow) ICD

HF (High Flow) ICD

MHF (Medium to High Flow) ICD



IPEX

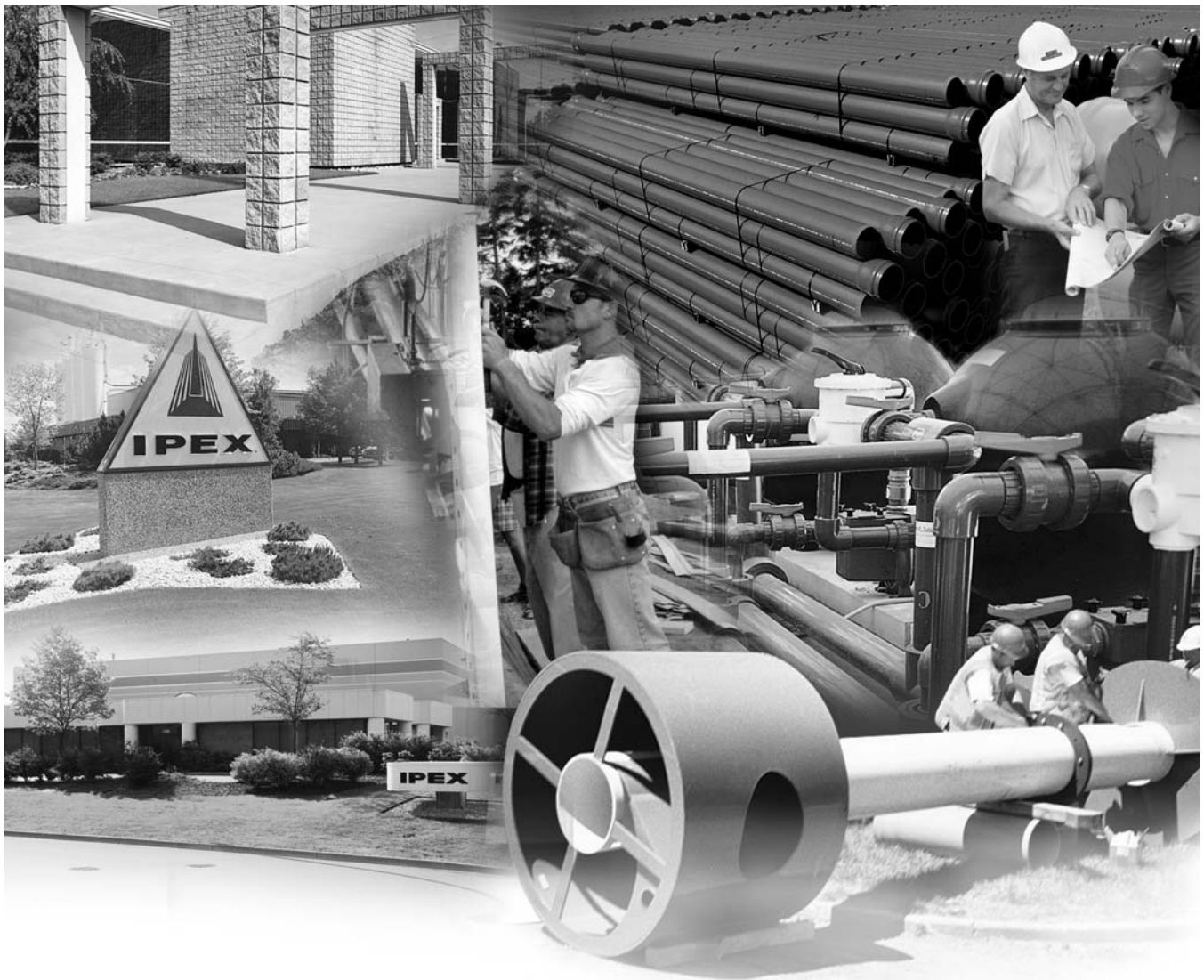
IPEX Tempest™ Inlet Control Devices

Municipal Technical Manual Series

Vol. I, 2nd Edition

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ABOUT IPEX

At IPEX, we have been manufacturing non-metallic pipe and fittings since 1951. We formulate our own compounds and maintain strict quality control during production. Our products are made available for customers thanks to a network of regional stocking locations throughout North America. We offer a wide variety of systems including complete lines of piping, fittings, valves and custom-fabricated items.

More importantly, we are committed to meeting our customers' needs. As a leader in the plastic piping industry, IPEX continually develops new products, modernizes manufacturing facilities and acquires innovative process technology. In addition, our staff take pride in their work, making available to customers their extensive thermoplastic knowledge and field experience. IPEX personnel are committed to improving the safety, reliability and performance of thermoplastic materials. We are involved in several standards committees and are members of and/or comply with the organizations listed on this page.

For specific details about any IPEX product, contact our customer service department.

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TEMPEST INLET CONTROL DEVICES Technical Manual

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PRODUCT INFORMATION: TEMPEST LOW, MEDIUM FLOW (LMF) ICD

Purpose

To control the amount of storm water runoff entering a sewer system by allowing a specified flow volume out of a catch basin or manhole at a specified head. This approach conserves pipe capacity so that catch basins downstream do not become uncontrollably surcharged, which can lead to basement floods, flash floods and combined sewer overflows.

Product Description

Our LMF ICD is designed to accommodate catch basins or manholes with sewer outlet pipes 6" in diameter and larger. Any storm sewer larger than 12" may require custom modification. However, IPEX can custom build a TEMPEST device to accommodate virtually any storm sewer size.

Available in 14 preset flow curves, the LMF ICD has the ability to provide flow rates: 2lps – 17lps (31gpm – 270gpm)

Product Function

The LMF ICD vortex flow action allows the LMF ICD to provide a narrower flow curve using a larger orifice than a conventional orifice plate ICD, making it less likely to clog. When comparing flows at the same head level, the LMF ICD has the ability to restrict more flow than a conventional ICD during a rain event, preserving greater sewer capacity.

Product Construction

Constructed from durable PVC, the LMF ICD is light weight 8.9 Kg (19.7 lbs).

Product Applications

Will accommodate both square and round applications:

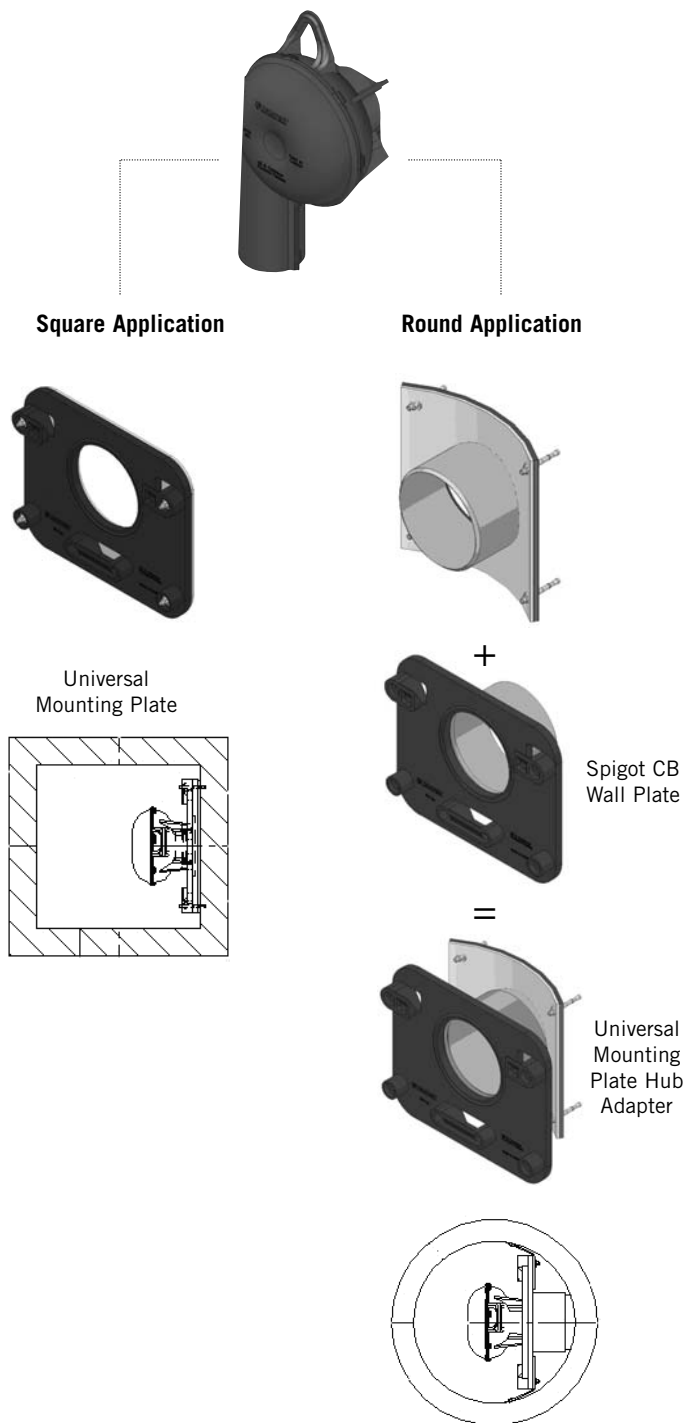


Chart 1: LMF 14 Preset Flow Curves

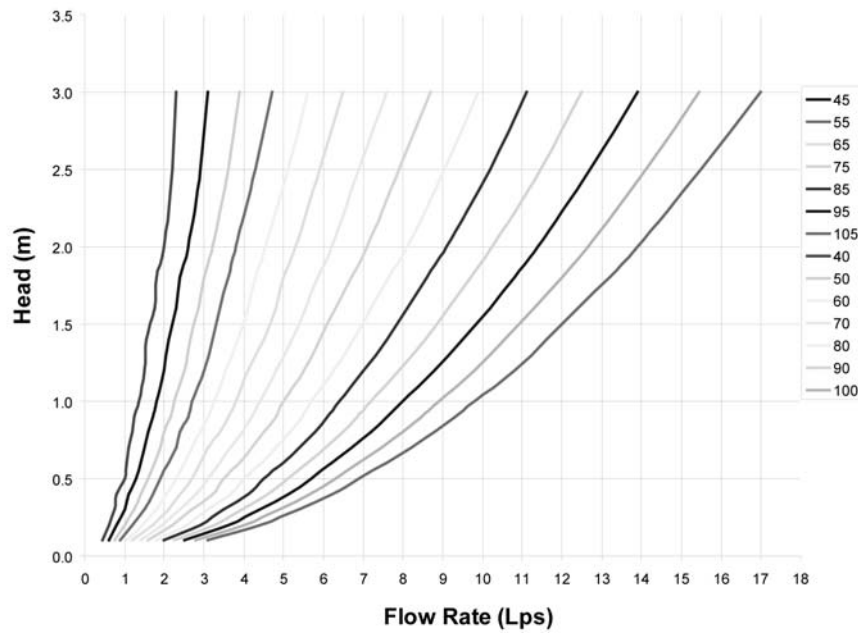
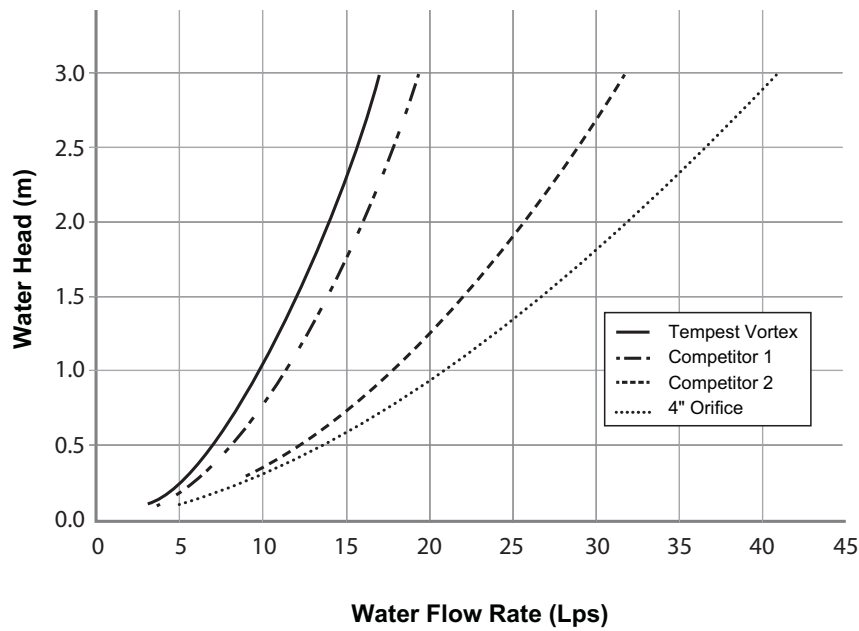


Chart 2: LMF Flow vs. ICD Alternatives



PRODUCT INSTALLATION

Instructions to assemble a TEMPEST LMF ICD into a Square Catch Basin:

STEPS:

1. Materials and tooling verification:
 - Tooling: impact drill, 3/8" concrete bit, torque wrench for 9/16" nut, hand hammer, level, and marker.
 - Material: (4) concrete anchor 3/8 x 3-1/2, (4) washers, (4) nuts, universal mounting plate, ICD device.
2. Use the mounting wall plate to locate and mark the hole (4) pattern on the catch basin wall. You should use a level to ensure that the plate is at the horizontal.
3. Use an impact drill with a 3/8" concrete bit to make the four holes at a minimum of 1-1/2" depth up to 2-1/2". Clean the concrete dust from the holes.
4. Install the anchors (4) in the holes by using a hammer. Thread the nuts on the top of the anchors to protect the threads when you hit the anchors with the hammer. Remove the nuts from the ends of the anchors.
5. Install the universal mounting plate on the anchors and screw the 4 nuts in place with a maximum torque of 40 N.m (30 lbf-ft). There should be no gap between the wall mounting plate and the catch basin wall.
6. From the ground above using a reach bar, lower the ICD device by hooking the end of the reach bar to the handle of the ICD device. Align the triangular plate portion into the mounting wall plate. Push down the device to be sure it has centered in to the universal mounting plate and has created a seal.



WARNING

- Verify that the outlet pipe doesn't protrude into the catch basin. If it does, cut down the pipe flush to the catch basin wall.
- Call your IPEX representative for more information or if you have any questions about our products.

Instructions to assemble a TEMPEST LMF ICD into a Round Catch Basin:

STEPS:

1. Materials and tooling verification.
 - Tooling: impact drill, 3/8" concrete bit, torque wrench for 9/16" nut, hand hammer, level and marker.
 - Material: (4) concrete anchor 3/8 x 3-1/2, (4) washers and (4) nuts, spigot CB wall plate, universal mounting plate hub adapter, ICD device.
2. Use the spigot catch basin wall plate to locate and mark the hole (4) pattern on the catch basin wall. You should use a level to ensure that the plate is at the horizontal.
3. Use an impact drill with a 3/8" concrete bit to make the four holes at a depth between 1-1/2" to 2-1/2". Clean the concrete dust from the holes.
4. Install the anchors (4) in the holes by using a hammer. Thread the nuts on the top of the anchors to protect the threads when you hit the anchors with the hammer. Remove the nuts from the ends of the anchors.
5. Install the CB spigot wall plate on the anchors and screw the 4 nuts in place with a maximum torque of 40 N.m (30 lbf-ft). There should be no gap between the spigot wall plate and the catch basin wall.
6. Apply solvent cement on the hub of the universal mounting plate, hub adapter and the spigot of the CB wall plate, then slide the hub over the spigot. Make sure the universal mounting plate is at the horizontal and its hub is completely inserted onto the spigot. Normally, the corners of the universal mounting plate hub adapter should touch the catch basin wall.
7. From ground above using a reach bar, lower the ICD device by hooking the end of the reach bar to the handle of the ICD device. Align the triangular plate portion into the mounting wall plate. Push down the device to be sure it has centered in to the mounting plate and has created a seal.



WARNING

- Verify that the outlet pipe doesn't protrude into the catch basin. If it does, cut back the pipe flush to the catch basin wall.
- The solvent cement which is used in this installation is to be approved for PVC.
- The solvent cement should not be used below 0°C (32°F) or in a high humidity environment. Refer to the IPEX solvent cement guide to confirm the required curing time or visit the IPEX Online Solvent Cement Training Course available at www.ipexinc.com.
- Call your IPEX representative for more information or if you have any questions about our products.

PRODUCT TECHNICAL SPECIFICATION

General

Inlet control devices (ICD's) are designed to provide flow control at a specified rate for a given water head level and also provide odour and floatable control. All ICD's will be IPEX Tempest or approved equal.

All devices shall be removable from a universal mounting plate. An operator from street level using only a T-bar with a hook will be able to retrieve the device while leaving the universal mounting plate secured to the catch basin wall face. The removal of the TEMPEST devices listed above must not require any unbolting or special manipulation or any special tools.

High Flow (HF) Sump devices will consist of a removable threaded cap which can be accessible from street level with out entry into the catchbasin (CB). The removal of the threaded cap shall not require any special tools other than the operator's hand.

ICD's shall have no moving parts.

Materials

ICD's are to be manufactured from Polyvinyl Chloride (PVC) or Polyurethane material, designed to be durable enough to withstand multiple freeze-thaw cycles and exposure to harsh elements.

The inner ring seal will be manufactured using a Buna or Nitrile material with hardness between Duro 50 and Duro 70.

The wall seal is to be comprised of a 3/8" thick Neoprene Closed Cell Sponge gasket which is attached to the back of the wall plate.

All hardware will be made from 304 stainless steel.

Dimensioning

The Low Medium Flow (LMF), High Flow (HF) and the High Flow (HF) Sump shall allow for a minimum outlet pipe diameter of 200mm with a 600mm deep Catch Basin sump.

Installation

Contractor shall be responsible for securing, supporting and connecting the ICD's to the existing influent pipe and catchbasin/manhole structure as specified and designed by the Engineer.

PRODUCT INFORMATION: TEMPEST HF & MHF ICD

Product Description

Our HF, HF Sump and MHF ICD's are designed to accommodate catch basins or manholes with sewer outlet pipes 6" in diameter or larger. Any storm sewer larger than 12" may require custom modification. However, IPEX can custom build a TEMPEST device to accommodate virtually any storm sewer size.

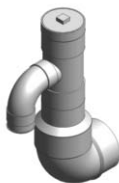
Available in 5 preset flow curves, these ICDs have the ability to provide constant flow rates: 9lps (143 gpm) and greater

Product Function

TEMPEST HF (High Flow): designed to manage moderate to higher flows 15 L/s (240 gpm) or greater and prevent the propagation of odour and floatables. With this device, the cross-sectional area of the device is larger than the orifice diameter and has been designed to limit head losses. The HF ICD can also be ordered without flow control when only odour and floatable control is required.



TEMPEST HF (High Flow) Sump: The height of a sewer outlet pipe in a catch basin is not always conveniently located. At times it may be located very close to the catch basin floor, not providing enough sump for one of the other TEMPEST ICDs with universal back plate to be installed. In these applications, the HF Sump is offered. The HF Sump offers the same features and benefits as the HF ICD; however, is designed to raise the outlet in a square or round catch basin structure. When installed, the HF sump is fixed in place and not easily removed. Any required service to the device is performed through a clean-out located in the top of the device which can be often accessed from ground level.



TEMPEST MHF (Medium to High Flow):

The MHF plate or plug is designed to control flow rates 9 L/s (143 gpm) or greater. It is not designed to prevent the propagation of odour and floatables.

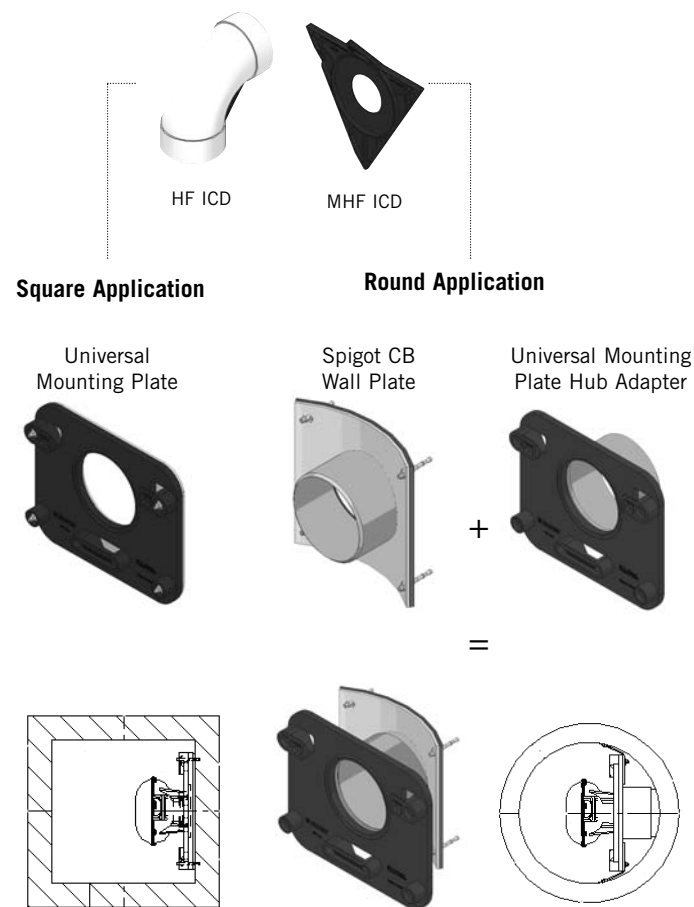


Product Construction

The HF, HF Sump and MHF ICDs are built to be light weight at a maximum weight of 6.8 Kg (14.6 lbs).

Product Applications

The HF and MHF ICD's are available to accommodate both square and round applications:



The HF Sump is available to accommodate low to no sump applications in both square and round catch basins:

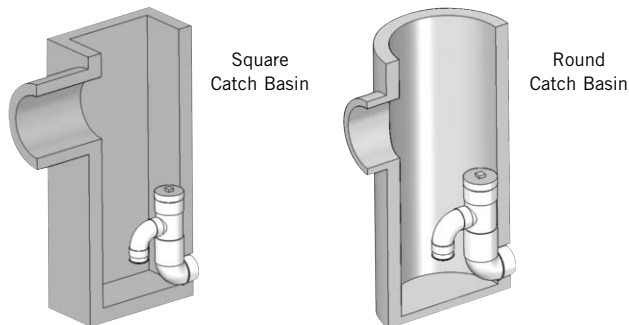
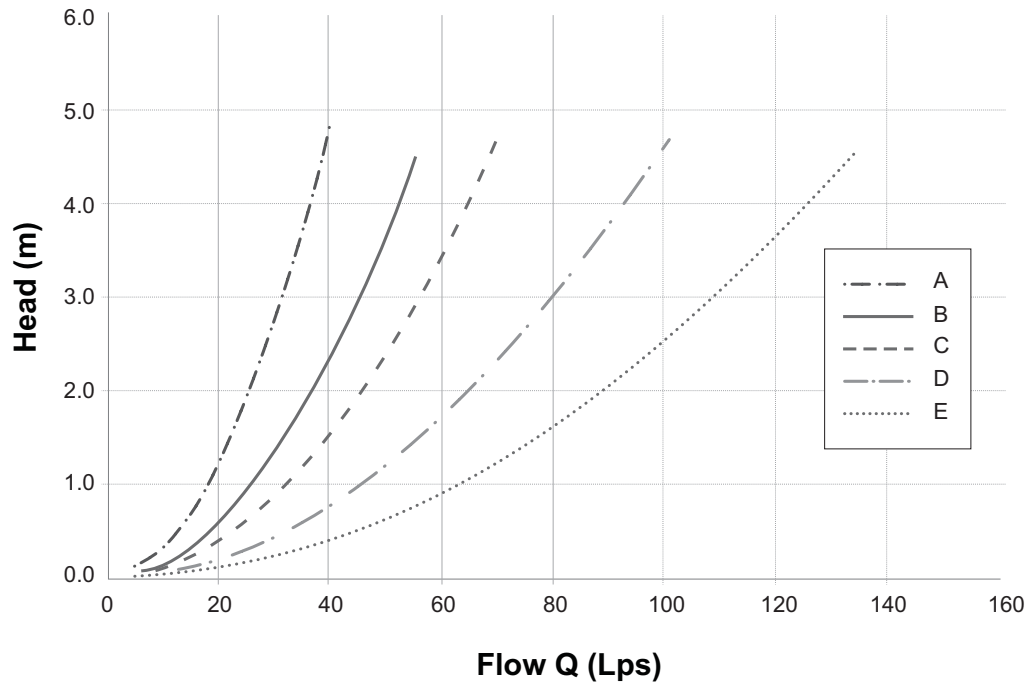


Chart 3: HF & MHF Preset Flow Curves



PRODUCT INSTALLATION

Instructions to assemble a TEMPEST HF or MHF ICD into a Square Catch Basin:

1. Materials and tooling verification:
 - Tooling: impact drill, 3/8" concrete bit, torque wrench for 9/16" nut, hand hammer, level, and marker.
 - Material: (4) concrete anchor 3/8 x 3-1/2, (4) washers, (4) nuts, universal mounting plate, ICD device
2. Use the mounting wall plate to locate and mark the hole (4) pattern on the catch basin wall. You should use a level to ensure that the plate is at the horizontal.
3. Use an impact drill with a 3/8" concrete bit to make the four holes at a minimum of 1-1/2" depth up to 2-1/2". Clean the concrete dust from the holes.
4. Install the anchors (4) in the holes by using a hammer. Thread the nuts on the top of the anchors to protect the threads when you hit the anchors with the hammer. Remove the nuts from the ends of the anchors.
5. Install the universal wall mounting plate on the anchors and screw the 4 nuts in place with a maximum torque of 40 N.m (30 lbf-ft). There should be no gap between the wall mounting plate and the catch basin wall.
6. From the ground above using a reach bar, lower the device by hooking the end of the reach bar to the handle of the ICD device. Align the triangular plate portion into the mounting wall plate. Push down the device to be sure it has centered in to the universal wall mounting plate and has created a seal.



WARNING

- Verify that the outlet pipe doesn't protrude into the catch basin. If it does, cut down the pipe flush to the catch basin wall.
- Call your IPEX representative for more information or if you have any questions about our products.

Instructions to assemble a TEMPEST HF or MHF ICD into a Round Catch Basin:

STEPS:

1. Materials and tooling verification.
 - Tooling: impact drill, 3/8" concrete bit, torque wrench for 9/16" nut, hand hammer, level and marker.
 - Material: (4) concrete anchor 3/8 x 3-1/2, (4) washers and (4) nuts, spigot CB wall plate, universal mounting plate hub adaptor, ICD device.
2. Use the round catch basin spigot adaptor to locate and mark the hole (4) pattern on the catch basin wall. You should use a level to ensure that the plate is at the horizontal.
3. Use an impact drill with a 3/8" concrete bit to make the four holes at a depth between 1-1/2" to 2-1/2". Clean the concrete dust from the holes.
4. Install the anchors (4) in the holes by using a hammer. Thread the nuts on the top of the anchors to protect the threads when you hit the anchors with the hammer. Remove the nuts from the ends of the anchors.
5. Install the spigot CB wall plate on the anchors and screw the 4 nuts in place with a maximum torque of 40 N.m (30 lbf-ft). There should be no gap between the spigot CB wall plate and the catch basin wall.
6. Put solvent cement on the hub of the universal mounting plate, hub adapter and the spigot of the CB wall plate, then slide the hub over the spigot. Make sure the universal mounting plate is at the horizontal and its hub is completely inserted onto the spigot. Normally, the corners of the hub adapter should touch the catch basin wall.
7. From ground above using a reach bar, lower the device by hooking the end of the reach bar to the handle of the ICD device. Align the triangular plate portion into the mounting wall plate. Push down the device to be sure it has centered in to the wall mounting plate and has created a seal.



WARNING

- Verify that the outlet pipe doesn't protrude into the catch basin. If it does, cut down the pipe flush to the catch basin wall.
- The solvent cement which is used in this installation is to be approved for PVC.
- The solvent cement should not be used below 0°C (32°F) or in a high humidity environment. Refer to the IPEX solvent cement guide to confirm the required curing time or visit the IPEX Online Solvent Cement Training Course available at www.ipexinc.com.
- Call your IPEX representative for more information or if you have any questions about our products.

PRODUCT TECHNICAL SPECIFICATION

Instructions to assemble a TEMPEST HF Sump into a Square or Round Catch Basin:

STEPS:

1. Materials and tooling verification:
 - Tooling: impact drill, 3/8" concrete bit, torque wrench for 9/16" nut, hand hammer, level, mastic tape and metal strapping
 - Material: (2) concrete anchor 3/8 x 3-1/2, (2) washers, (2) nuts, HF Sump pieces (2).
2. Apply solvent cement to the spigot end of the top half of the sump. Apply solvent cement to the hub of the bottom half of the sump. Insert the spigot of the top half of the sump into the hub of the bottom half of the sump.
3. Install the 8" spigot of the device into the outlet pipe. Use the mastic tape to seal the device spigot into the outlet pipe. You should use a level to be sure that the fitting is standing at the vertical.
4. Use an impact drill with a 3/8" concrete bit to make a series of 2 holes along each side of the body throat. The depth of the hole should be between 1-1/2" to 2-1/2". Clean the concrete dust from the 2 holes.
5. Install the anchors (2) in the holes by using a hammer. Put the nuts on the top of the anchors to protect the threads when you hit the anchors. Remove the nuts from the ends of the anchors.
6. Cut the metal strapping to length and connect each end of the strapping to the anchors. Screw the nuts in place with a maximum torque of 40 N.m (30 lbf-ft). The device should be completely flush with the catch basin wall.



WARNING

- Verify that the outlet pipe doesn't protrude into the catch basin. If it does, cut down the pipe flush to the catch basin wall.
- The solvent cement which is used in this installation is to be approved for PVC.
- The solvent cement should not be used below 0°C (32°F) or in a high humidity environment. Refer to the IPEX solvent cement guide to confirm the required curing time or visit the IPEX Online Solvent Cement Training Course available at www.ipexinc.com.
- Call your IPEX representative for more information or if you have any questions about our products.

General

Inlet control devices (ICD's) are designed to provide flow control at a specified rate for a given water head level and also provide odour and floatable control where specified. All ICD's will be IPEX Tempest or approved equal.

All devices shall be removable from a universal mounting plate. An operator from street level using only a T-bar with a hook shall be able to retrieve the device while leaving the universal mounting plate secured to the catch basin wall face. The removal of the TEMPEST devices listed above shall not require any unbolting or special manipulation or any special tools.

High Flow (HF) Sump devices shall consist of a removable threaded cap which can be accessible from street level with out entry into the catchbasin (CB). The removal of the threaded cap shall not require any special tools other than the operator's hand.

ICD's shall have no moving parts.

Materials

ICD's are to be manufactured from Polyvinyl Chloride (PVC) or Polyurethane material, designed to be durable enough to withstand multiple freeze-thaw cycles and exposure to harsh elements.

The inner ring seal will be manufactured using a Buna or Nitrile material with hardness between Duro 50 and Duro 70.

The wall seal is to be comprised of a 3/8" thick Neoprene Closed Cell Sponge gasket which is attached to the back of the wall plate.

All hardware will be made from 304 stainless steel.

Dimensioning

The Low Medium Flow (LMF), High Flow (HF) and the High Flow (HF) Sump shall allow for a minimum outlet pipe diameter of 200mm with a 600mm deep Catch Basin sump.

Installation

Contractor shall be responsible for securing, supporting and connecting the ICD's to the existing influent pipe and catchbasin/manhole structure as specified and designed by the Engineer.

SALES AND CUSTOMER SERVICE

Canadian Customers call IPEX Inc.

Toll free: (866) 473-9462

www.ipexinc.com

U.S. Customers call IPEX USA LLC

Toll free: (800) 463-9572

www.ipexamerica.com

About the IPEX Group of Companies

As leading suppliers of thermoplastic piping systems, the IPEX Group of Companies provides our customers with some of the largest and most comprehensive product lines. All IPEX products are backed by more than 50 years of experience. With state-of-the-art manufacturing facilities and distribution centers across North America, we have established a reputation for product innovation, quality, end-user focus and performance.

Markets served by IPEX group products are:

- Electrical systems
- Telecommunications and utility piping systems
- PVC, CPVC, PP, ABS, PEX, FR-PVDF and PE pipe and fittings (1/4" to 48")
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- Municipal pressure and gravity piping systems
- Plumbing and mechanical piping systems
- PE Electrofusion systems for gas and water
- Industrial, plumbing and electrical cements
- Irrigation systems

Products manufactured by IPEX Inc. and distributed in the United States by IPEX USA LLC.

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A policy of ongoing product improvement is maintained. This may result in modifications of features and/or specifications without notice.

MNMNTP110817
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Flow Parameters

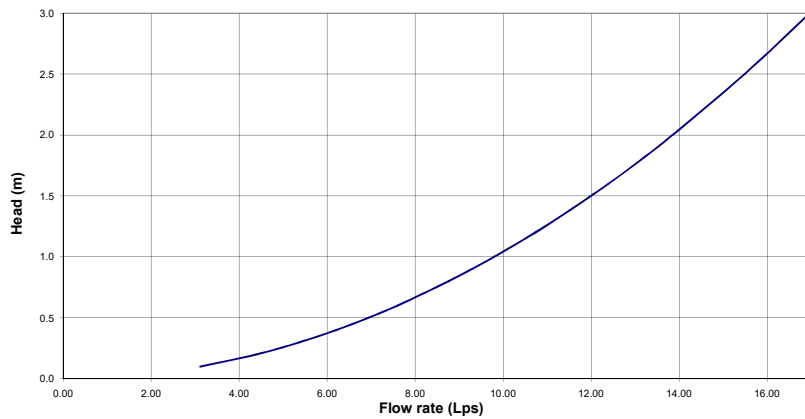
Head (m)	2.87
Flow (Lps)	16.7

Input desired parameters in green boxes at left and then refer to graphs below for corresponding flow curves. If your design criteria fall outside the maximum parameters of this flow curve calculator please contact your IPEX representative for your TEMPEST design.



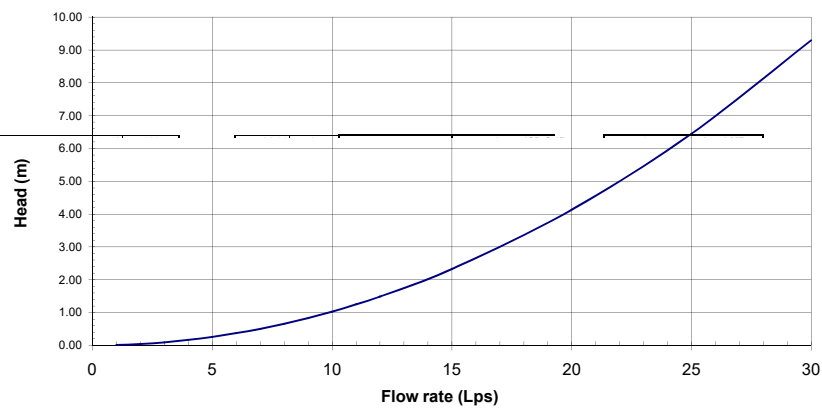
TEMPEST LMF flow curve

#1



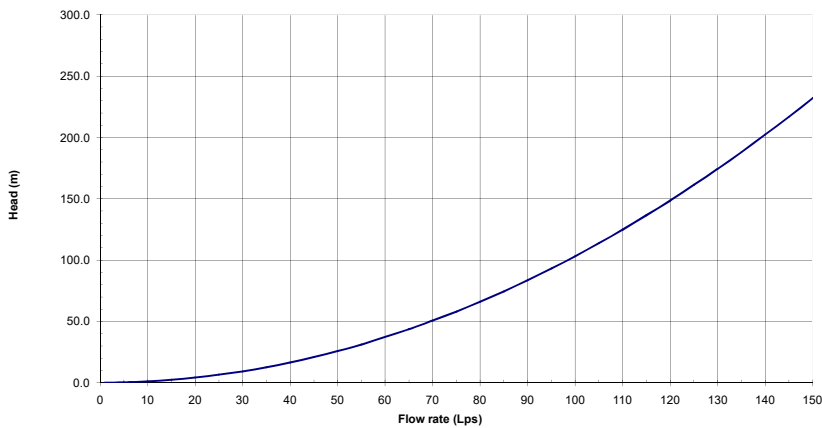
TEMPEST HF, HF Sump & MHF flow curve
(For flow rates <30 Lps)

#2



TEMPEST HF flow curve

#3



NOTE: GRAPH #3 IS AN EXPANDED VERSION OF GRAPH #2
TO BE USED FOR FLOW RATES ABOVE 30 Lps.

The following results are best estimates and subject to change upon review by an IPEX design representative.



Appendix D: Servicing Design Information

- Fireflow Calculations – OBC
- OBC Separation Distance Drawing
- Boundary Conditions Received

Fire Water Storage and Supply Flow Rate Requirements

The following equation from the latest version of the Ontario Building Code (2025) was used for calculation of the on-site supply rates required to be supplied by the hydrants.

Formulae:

$$Q = KVS_{Tot}$$

$$S_{Tot} = 1.0 + [S_{side1} + S_{side2} + S_{side3} + S_{side4} + \dots]$$

OBC Classification of Building Use	Group, Division	F2 (OBC T-3.1.2.1)	
Assumed Type of Construction	(Most Protective Type)	Building is of limited-combustible construction. Floor	
Water Supply Coefficient (Table 1, OBC)	K	17	
Exposure Distance 1	14.9	>10	m
Exposure Distance 2	30.7	>10	m
Exposure Distance 3	46.1	>10	m
Exposure Distance 4	79.2	>10	m
Spatial Coefficient 1	Sside	0	
Spatial Coefficient 2	Sside	0	
Spatial Coefficient 3	Sside	0	
Spatial Coefficient 4	Sside	0	
Total Spatial Coefficient	Stot	1	
Average Building Height	H	7.3	m
Building Footprint	A	1,501	sq.m
Total Building Volume	V	10,960	cu.m
Minimum Supply of Water	Q	186,324	L
Required Fire Flow	Qf	5400	L/min
		90	L/s

per Table 2 on A-3.2.5.7 of the OBC

OBC - Table 2 of A-3.2.5.7.

REQUIRE MINIMUM WATER SUPPLY FLOW RATE (L/min)

Qf =	2700	If Q ≤ 108 000 L
Qf =	3600	108 000L < Q ≤ 135 000 L
Qf =	4500	135 000L < Q ≤ 162 000 L
Qf =	5400	162 000L < Q ≤ 190 000 L
Qf =	6300	190 000L < Q ≤ 270 000 L
Qf =	9000	Q > 270 000 L

Subject: RE: PC2026-0017 2045 Mer Bleue - boundary condition request
From: "Giovannitti, Terenzo" <terenzo.giovannitti@ottawa.ca>
Date: 2026-07-29, 12:23 p.m.
To: "amanda@kollaard.ca" <amanda@kollaard.ca>
CC: "Armstrong, Justin" <justin.armstrong@ottawa.ca>

Hi Amanda,

Please see attached Boundary Condition results.
Regards,

Terenzo Giovannitti, P.Eng
Project Manager
Development Review
Planning, Development and Building Services Department
City of Ottawa
110 Laurier Ave W. Ottawa, ON
613-580-2424 (ext. 23436)
terenzo.giovannitti@ottawa.ca

From: Giovannitti, Terenzo
Sent: July 24, 2026 10:20 AM
To: 'Amanda VanBruggen' <amanda@kollaard.ca>
Cc: Armstrong, Justin <justin.armstrong@ottawa.ca>
Subject: RE: PC2026-0017 2045 Mer Bleue - boundary condition request

Hi Amanda,

I have forwarded this along to get your requested boundary conditions. I should have a response within a week.

Regards,
Terenzo Giovannitti, P.Eng
Project Manager
Development Review
Planning, Development and Building Services Department
City of Ottawa
110 Laurier Ave W. Ottawa, ON
613-580-2424 (ext. 23436)
terenzo.giovannitti@ottawa.ca

From: Amanda VanBruggen <amanda@kollaard.ca>
Sent: July 22, 2026 4:57 PM
To: Giovannitti, Terenzo <terenzo.giovannitti@ottawa.ca>; Armstrong, Justin <justin.armstrong@ottawa.ca>
Subject: PC2026-0017 2045 Mer Bleue - boundary condition request

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Good Afternoon Terenzo and Justin,

Please find the attached document with background calculations for a request for boundary conditions.

The water demand summary is as follows:

- Existing 200mm diameter service to be retained. Connecting to 400mm diameter watermain on Mer-Bleue Road.
- Type of Development: Commercial - Car Dealership Expansion
- The amount of fire flow required (per OBC)
 - OBC: 90 L/s
- Average daily demand = 0.23 L/s
- Maximum daily demand = 0.35 L/s
- Maximum hourly demand = 0.62 L/s

Could you circulate this information to the water resources department for their analysis?

Please let me know if you require any other information. Could you let us know how long it is typically taking to get the boundary conditions back.

Kind Regards,

--
Amanda Van Bruggen, P.ENG.
+1 613 860-0923


Civil • Geotechnical • Structural • Septic • Environmental • Hydrogeology
210 Prescott Street, Unit 1, P.O. Box 189, Kemptville, Ontario K0G 1J0 Canada
www.kollaard.ca

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— Attachments: —

2045 Mer Bleue_Boundary Condition (24uly2026).docx

1.3 MB

Boundary Conditions 2045 Mer Bleue–2026

Provided Information

Scenario	Demand	
	L/min	L/s
Average Daily Demand	13.8	0.23
Maximum Daily Demand	21.0	0.35
Peak Hour	37.2	0.62
Fire Flow Demand #1	5,400.0	90.00

Location



Results

Connection 1 –Mer Bleue

Demand Scenario	Head (m)	Pressure¹ (psi)
Maximum HGL	130.3	58
Peak Hour	127.6	54
Max Day plus Fire Flow #1	127.6	54

¹ Ground Elevation = 89.5 m

Notes

1. Any connection to a watermain 400 mm or larger should be approved by DWS as per the Water Design Guidelines Section 2.4 Review by Drinking Water Services.

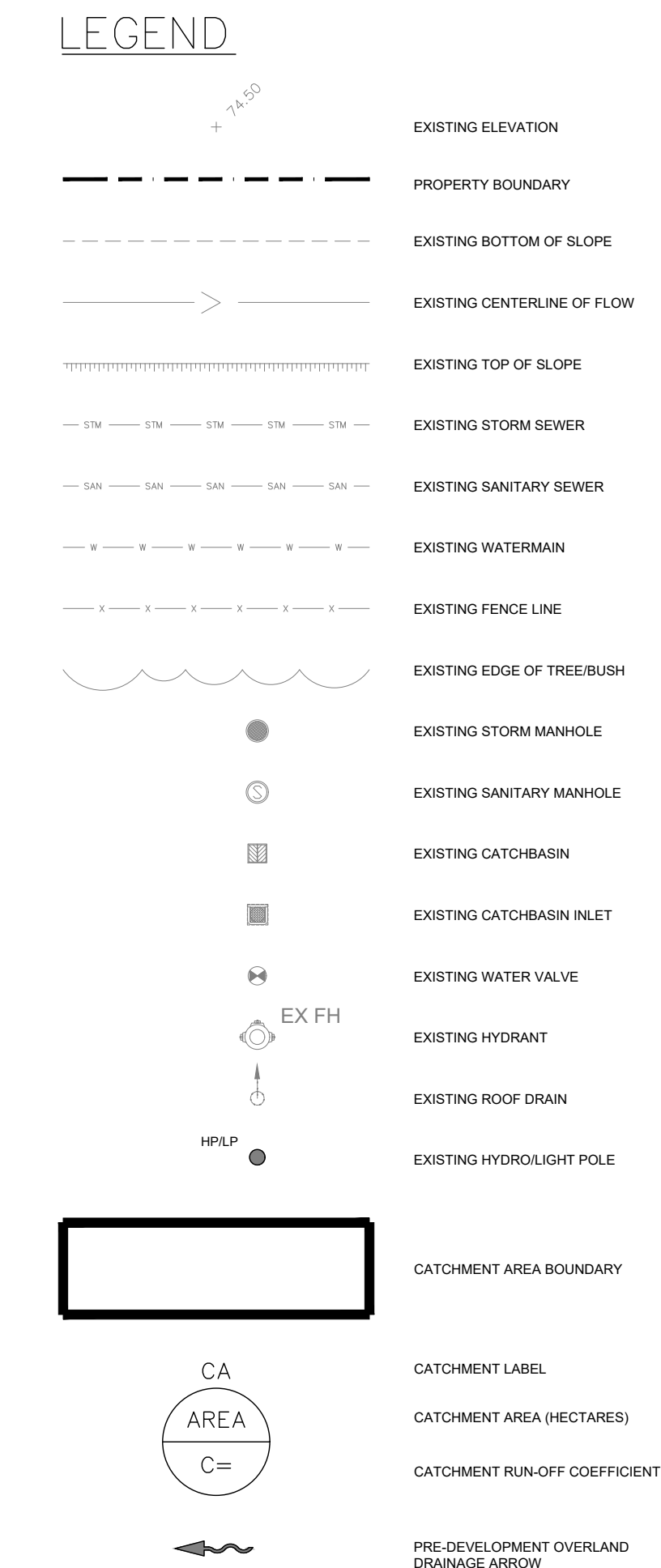
Disclaimer

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



Appendix E: 2026 Drawings

- 250557 – PRE – Pre-Development Drainage Areas
- 250557 – POST – Post-Development Drainage Areas
- 250557 – GRD – Site Grading Plan
- 250557 – SER – Site Servicing Plan
- 250557 – ESC – Erosion and Sediment Control Plan



LEGAL INFORMATION:
PLAN OF SURVEY OF
PART OF LOT 1, CONCESSION 11
GEOGRAPHIC TOWNSHIP OF CUMBERLAND
CITY OF OTTAWA
Surveyed by Annis, O'Sullivan, Vollebek Ltd.

TOPOGRAPHIC INFORMATION:
TOPOGRAPHIC SURVEY FILE #250557
DATE: 2028-02-23
Surveyed by Kollaard Associates Inc.

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[illegible]

SCALE:
0 20 40
1:400 METRES

- NOTES
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 - 13.2. TOPOGRAPHIC SURVEY: (yyyy-mm-dd)
 - 13.3. GEOTECHNICAL: (yyyy-mm-dd)
 - 13.4. STORMWATER MANAGEMENT REPORT: (yyyy-mm-dd)
 - 13.4. SERVICES BRIEF: (yyyy-mm-dd)

0	ISSUED FOR SITE PLAN APPLICATION	2026.08.10	AVB
No.	REVISION	DATE	BY

 **Kollaard Associates**
Engineers

(613) 860-0923
info@kollaard.ca

P.O. BOX 189, 210 PRESCOTT ST.
KEMPTVILLE, ONTARIO
K0G 1J0 FAX (613) 258-0475
<http://www.kollaard.ca>

CLIENT:

LAWRENCE ARCHITECTS INC.

PROJECT:

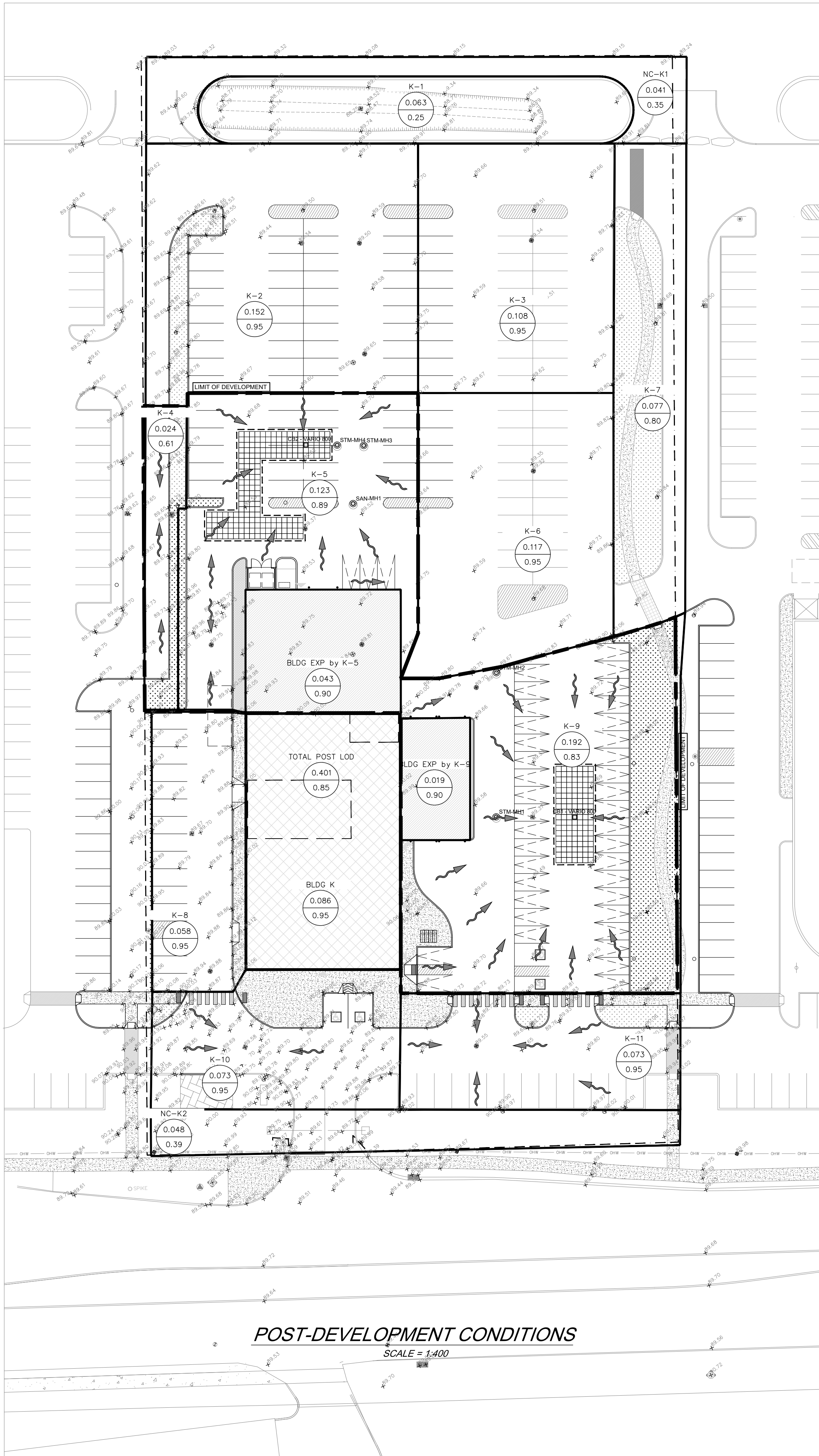
PROPOSED DEALERSHIP
ADDITION

LOCATION:
2045 MER-BLEUE ROAD,
ORLEANS ON

	DESIGNED BY:	AVB	CHECKED BY:	AVB
	DRAWN BY:	BM	APPROVED BY:	AVB
	DATE:			
	2026.08.10			
KOLLAARD FILE NUMBER:				
250557				

DRAWING NUMBER: 1 OF 1

DRAWING NAME: 250557 - PRE



LEGEND

PROPERTY BOUNDARY

PROPOSED TOP OF SLOPE

PROPOSED BOTTOM OF SLOPE

PROPOSED CENTERLINE OF FLOW

PROPOSED CATCHBASIN

PROPOSED MAINTENANCE HOLE

PROPOSED REAR YARD CATCHBASIN

EXISTING ELEVATION

EXISTING BOTTOM OF SLOPE

EXISTING CENTERLINE OF FLOW

EXISTING TOP OF SLOPE

EXISTING STORM SEWER

EXISTING SANITARY SEWER

EXISTING WATERMAIN

EXISTING FENCE LINE

EXISTING EDGE OF TREE/BUSH

EXISTING STORM MANHOLE

EXISTING SANITARY MANHOLE

EXISTING CATCHBASIN

EXISTING CATCHBASIN INLET

EXISTING WATER VALVE

EXISTING HYDRANT

EXISTING ROOF DRAIN

EXISTING LIGHT POST

TEMPORARY BENCHMARK

DEPRESSED CURB

CONTROLLED CATCHMENT AREA

UNCONTROLLED CATCHMENT AREA

CATCHMENT LABEL

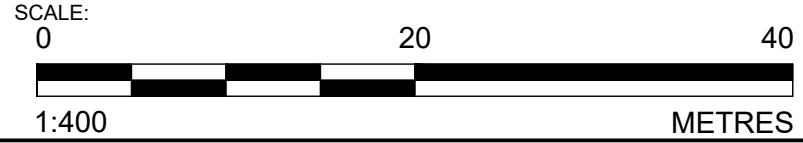
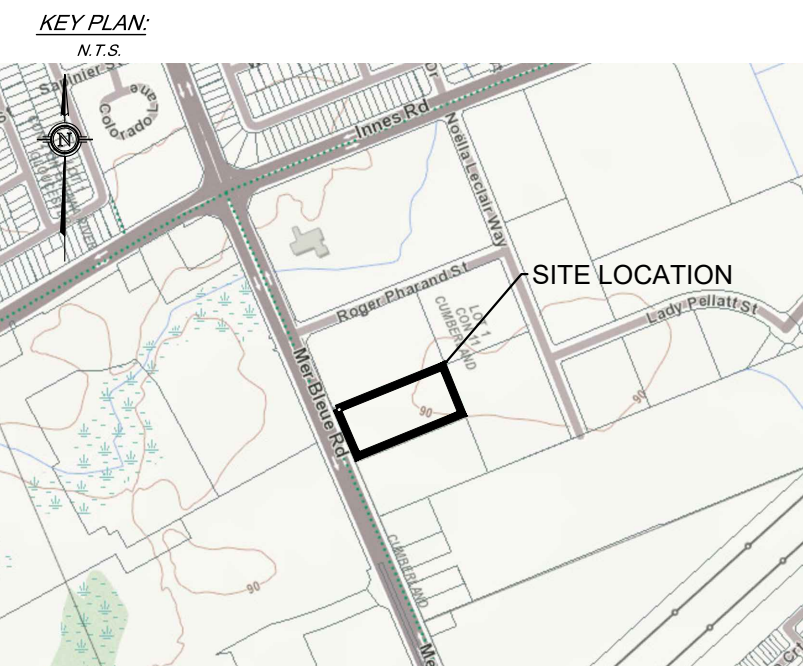
CATCHMENT AREA (HECTARES)

CATCHMENT RUN-OFF COEFFICIENT

POST-DEVELOPMENT OVERLAND DRAINAGE ARROW

DRAWING TITLE:

POST-DEV CONDITIONS



- NOTES:
- ALL DIMENSIONS ARE IN METRES, UNLESS OTHERWISE SPECIFIED.
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 - 13.2. TOPOGRAPHIC SURVEY: _____ (yyyy-mm-dd).
 - 13.3. GEOTECHNICAL: _____ (yyyy-mm-dd).
 - 13.3. STORMWATER MANAGEMENT REPORT: _____ (yyyy-mm-dd).
 - 13.4. SERVICING BRIEF: _____ (yyyy-mm-dd).

0	ISSUED FOR SITE PLAN APPLICATION	2026-08-10	AVB
No.	REVISION	DATE	BY

Kollaard Associates
Engineers

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info@kollaard.ca

P.O. BOX 189, 210 PRESCOTT ST.
KEMPTVILLE, ONTARIO
K0G 1J0 FAX (613) 258-0475
http://www.kollaard.ca

CLIENT:

LAWRENCE ARCHITECTS INC.

PROJECT:

PROPOSED DEALERSHIP
ADDITION

LOCATION:

2045 MER-BLEUE ROAD,
ORLEANS ON

DESIGNED BY: AVB	CHECKED BY: AVB
DRAWN BY: BM	APPROVED BY: AVB
DATE: 2026.08.10	
KOLLAARD FILE NUMBER: 250557	

DRAWING NUMBER:

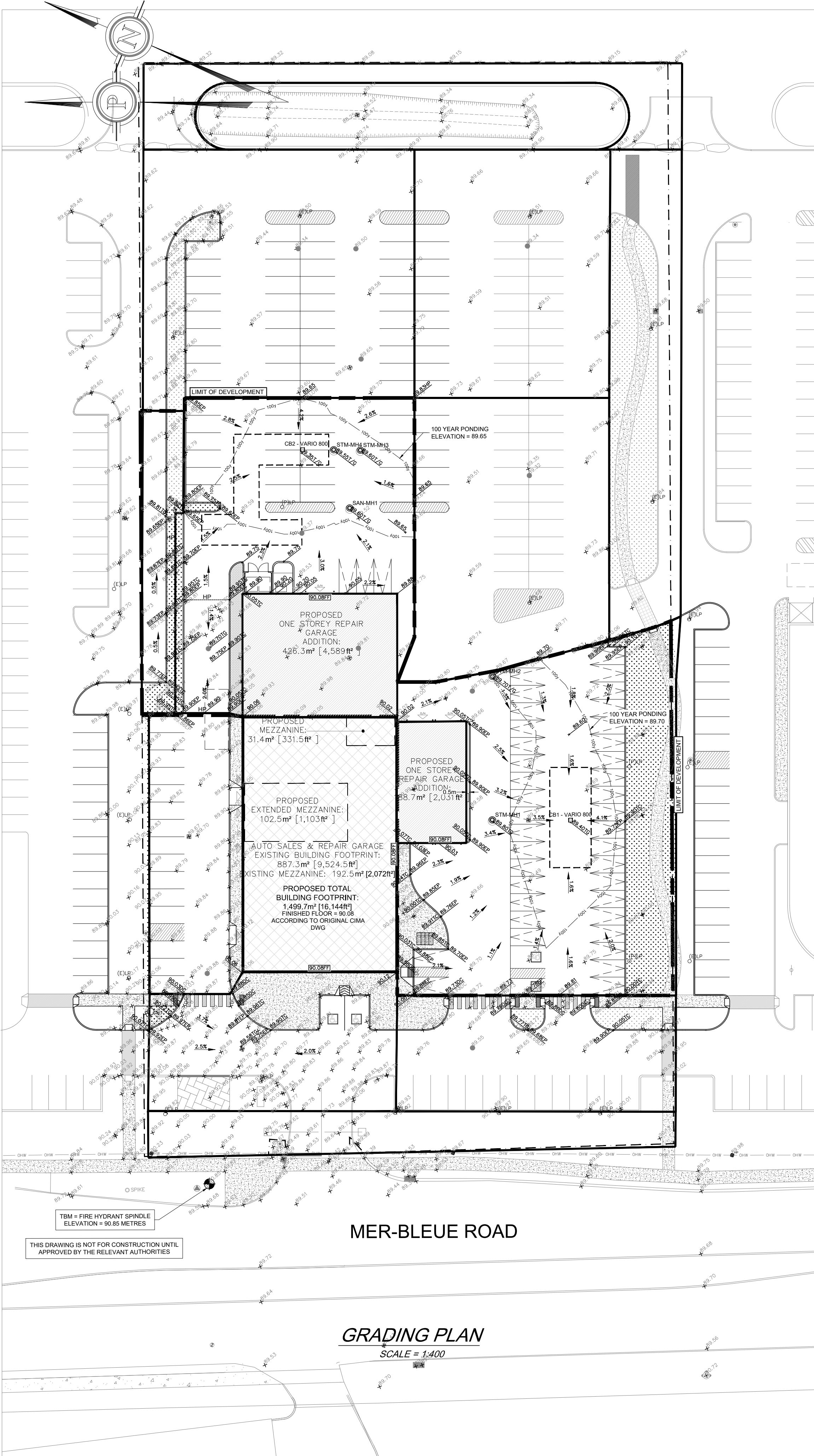
1 OF 1

DRAWING NAME:

250557 - POST

GRADING NOTES:

1. Finished grade around building to be as shown.
2. Maximum allowable slope on site is 3H:1V. Finished grade to slope away from building at all sides at a minimum of 2%, and a maximum of 7%.
3. The proposed grades have been set and verified for site grading control only. The grade raise at the building location should be verified with regard to subsurface conditions by qualified geotechnical personnel after completion of the excavation.
4. The underside of footing elevation has been set based on the information available and may not have accounted for actual ground water conditions at the exact house location and should be verified by qualified geotechnical personnel upon completion of the excavation.
5. A geotechnical engineer should be retained to provide recommendations with respect to the sub-grade conditions prior to footing installation.



LEGEND

- PROPERTY BOUNDARY
- ZONING SETBACK
- PROPOSED TOP OF GRATE ELEVATION
- PROPOSED TOP OF CURB ELEVATION
- PROPOSED DEPRESSED CURB ELEVATION
- PROPOSED EDGE OF PAVEMENT ELEVATION
- PROPOSED DRAINAGE SLOPE & ARROW
- PROPOSED CATCH BASIN
- PROPOSED STORM MAINTENANCE HOLE
- PROPOSED SANITARY MAINTENANCE HOLE
- EXISTING ELEVATION
- EXISTING BOTTOM OF SLOPE
- EXISTING TOP OF SLOPE
- EXISTING STORM MANHOLE
- EXISTING SANITARY MANHOLE
- EXISTING CATCHBASIN
- EXISTING CATCHBASIN INLET
- EXISTING WATER VALVE
- EXISTING HYDRANT
- EXISTING HYDROLIGHT POLE
- TEMPORARY BENCHMARK

HATCHING LEGEND

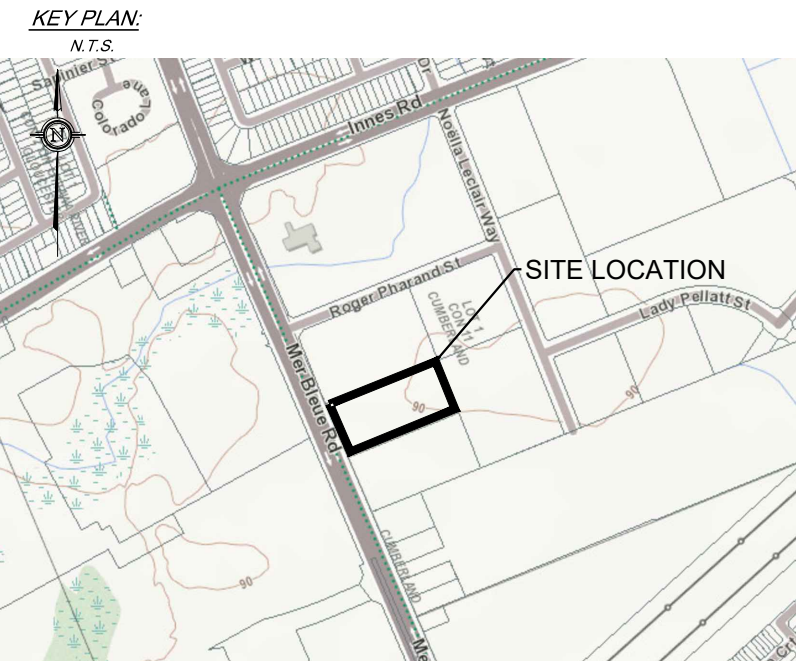
- CONCRETE SIDEWALK
- CROSSWALK
- NO PARKING
- FIRE LANE
- ASPHALTIC CONCRETE
- GRASS

LEGAL INFORMATION:
PLAN OF SURVEY OF
PART OF LOT 1, CONCESSION 11
GEOGRAPHIC TOWNSHIP OF CUMBERLAND
CITY OF OTTAWA
Surveyed by Arnis, O'Sullivan, Vollebakk Ltd.
TOPOGRAPHIC INFORMATION:
KOLLAARD FILE #250557
DATE: 2026-02-23
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DRAWING TITLE:

GRADING PLAN



SCALE:
0 20 40
1:400 METRES

NOTES:

1. ALL DIMENSIONS ARE IN METRES, UNLESS OTHERWISE SPECIFIED.
2. ALL ELEVATIONS ARE IN METRES AND ARE GEDDITIC.
3. TBM = FIRE HYDRANT SPINDLE ELEVATION = 90.85
4. THIS IS NOT A LEGAL SURVEY.
5. EXISTING SERVICES INFORMATION SHOWN ARE BASED ON BEST CURRENT INFORMATION. CONTRACTOR TO VERIFY EXACT LOCATION AND REPORT ANY DISCREPANCIES TO KOLLAARD ASSOCIATES INC.
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13. ANY CHANGES MADE TO THIS PLAN MUST BE VERIFIED AND APPROVED BY KOLLAARD ASSOCIATES, INC.
14. REFERENCES:
 - 14.1. LEGAL BOUNDARIES: ANNIS, O'SULLIVAN, VOLLEBEKK LTD. JOB # 12487-11 CIMA PT L11 C11 CU R F1 (2013-09-13).
 - 14.2. TOPOGRAPHIC SURVEY: KOLLAARD FILE #250557 (2026-02-23).
 - 14.3. GEOTECHNICAL: KOLLAARD FILE #250557 (2026-03-11).
 - 14.4. STORMWATER MANAGEMENT REPORT: KOLLAARD FILE #250557 (2026-03-11).
 - 14.5. SERVICING BRIEF: KOLLAARD FILE #250557 (2026-03-11).

0 ISSUED FOR SITE PLAN APPLICATION 2026-08-10 AVB

No. REVISION DATE BY

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info@kollaard.ca
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KEMPTVILLE, ONTARIO
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CLIENT:

LAWRENCE ARCHITECTS INC.

PROJECT:
**PROPOSED DEALERSHIP
ADDITION**

LOCATION:
**2045 MER-BLEUE ROAD,
ORLEANS ON**

LICENSED PROFESSIONAL ENGINEER
AUG. 10, 2026
A.L. VAN BRUGGEN
100518079
PROVINCE OF ONTARIO

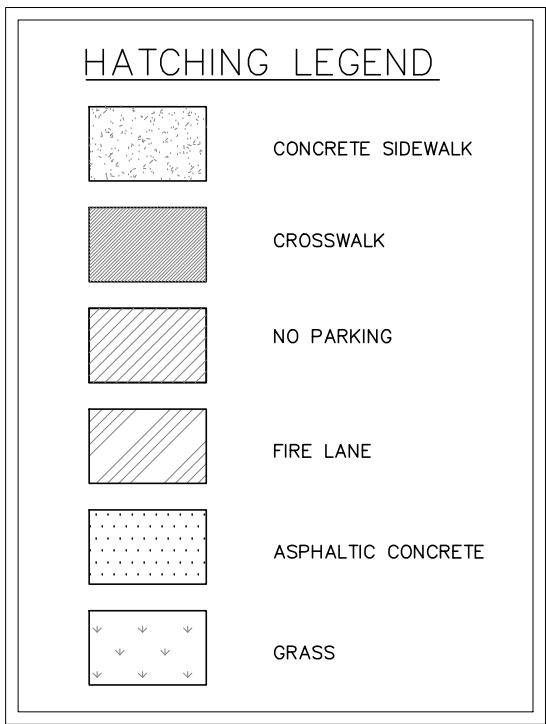
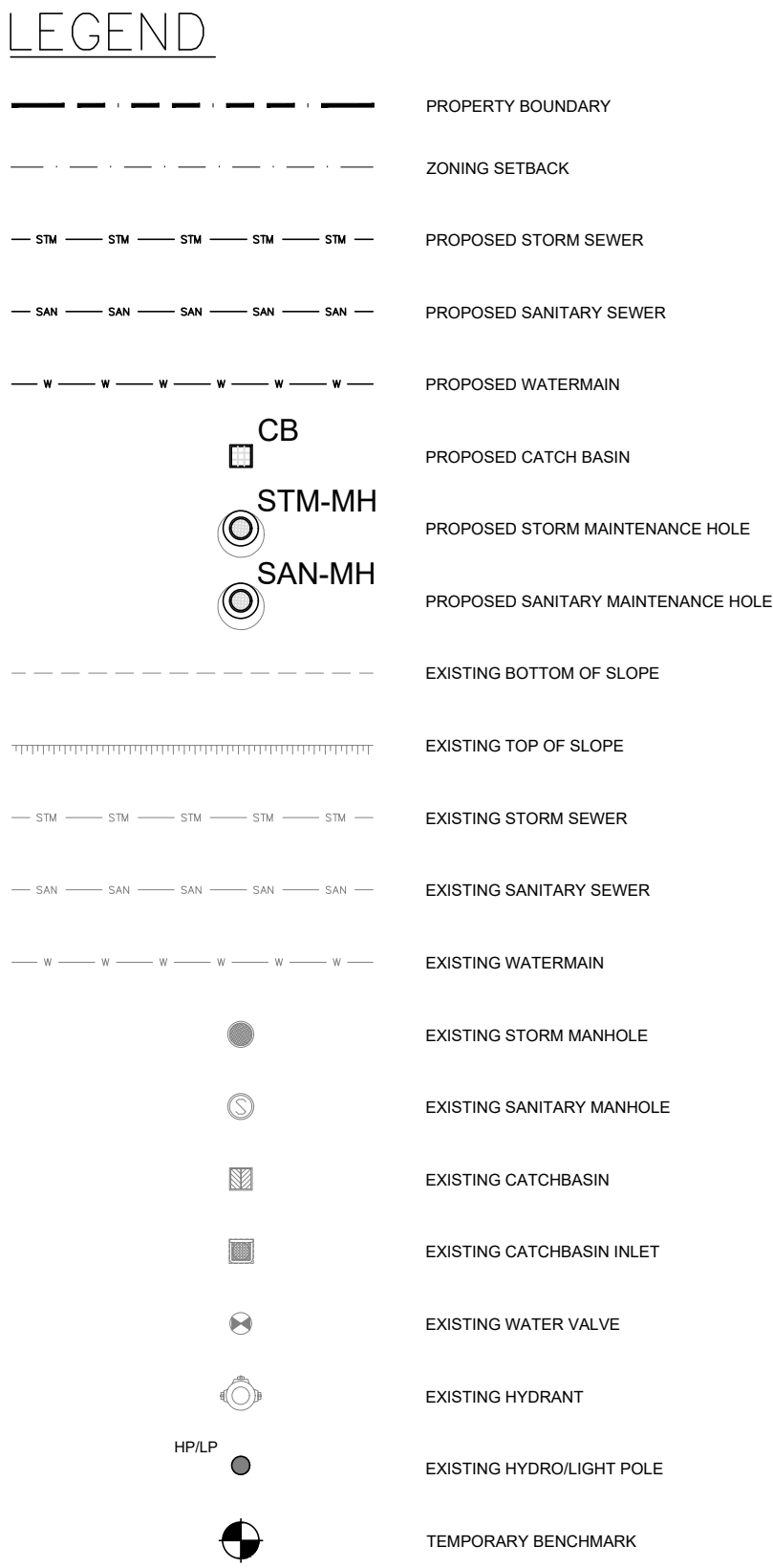
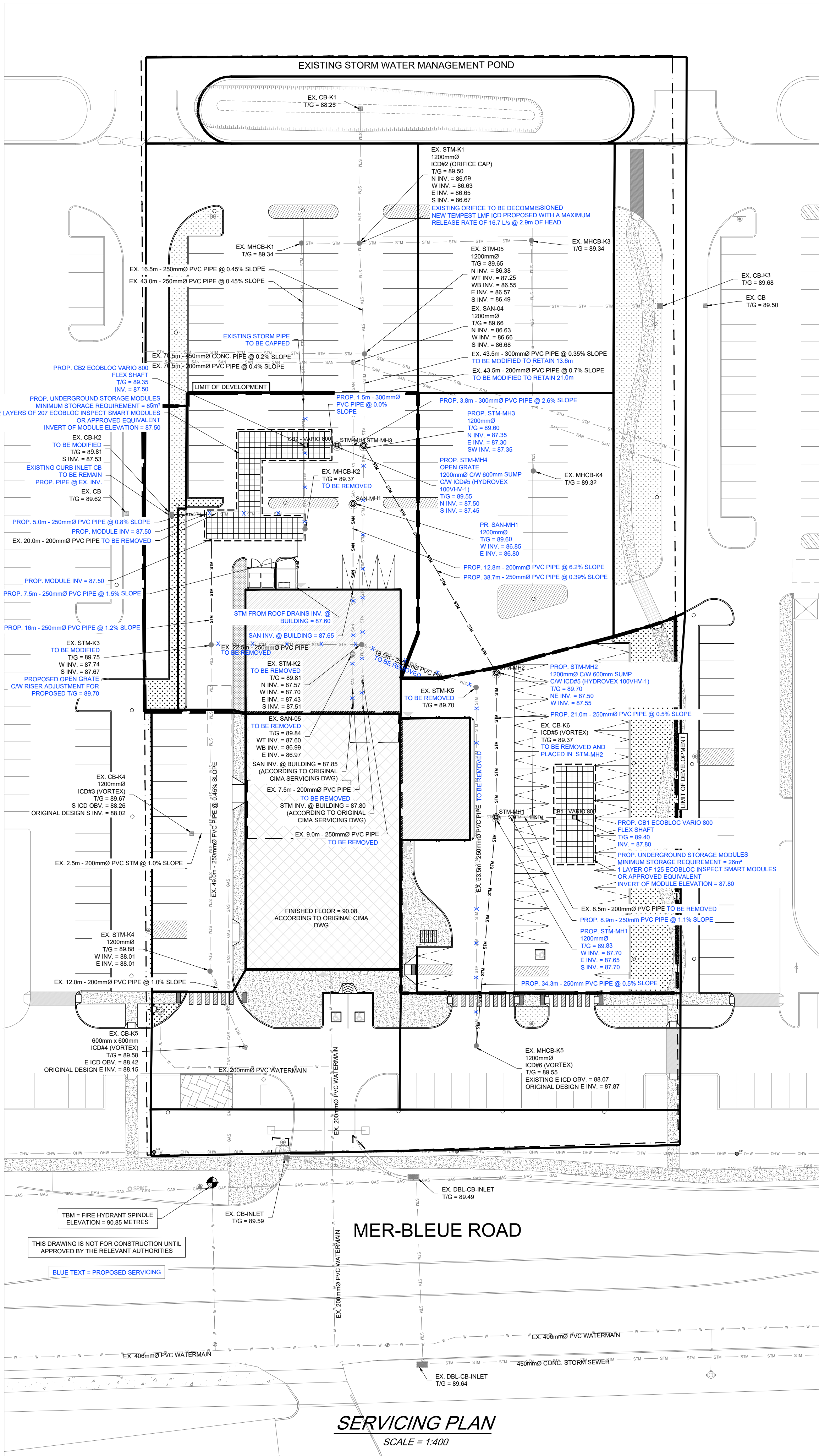
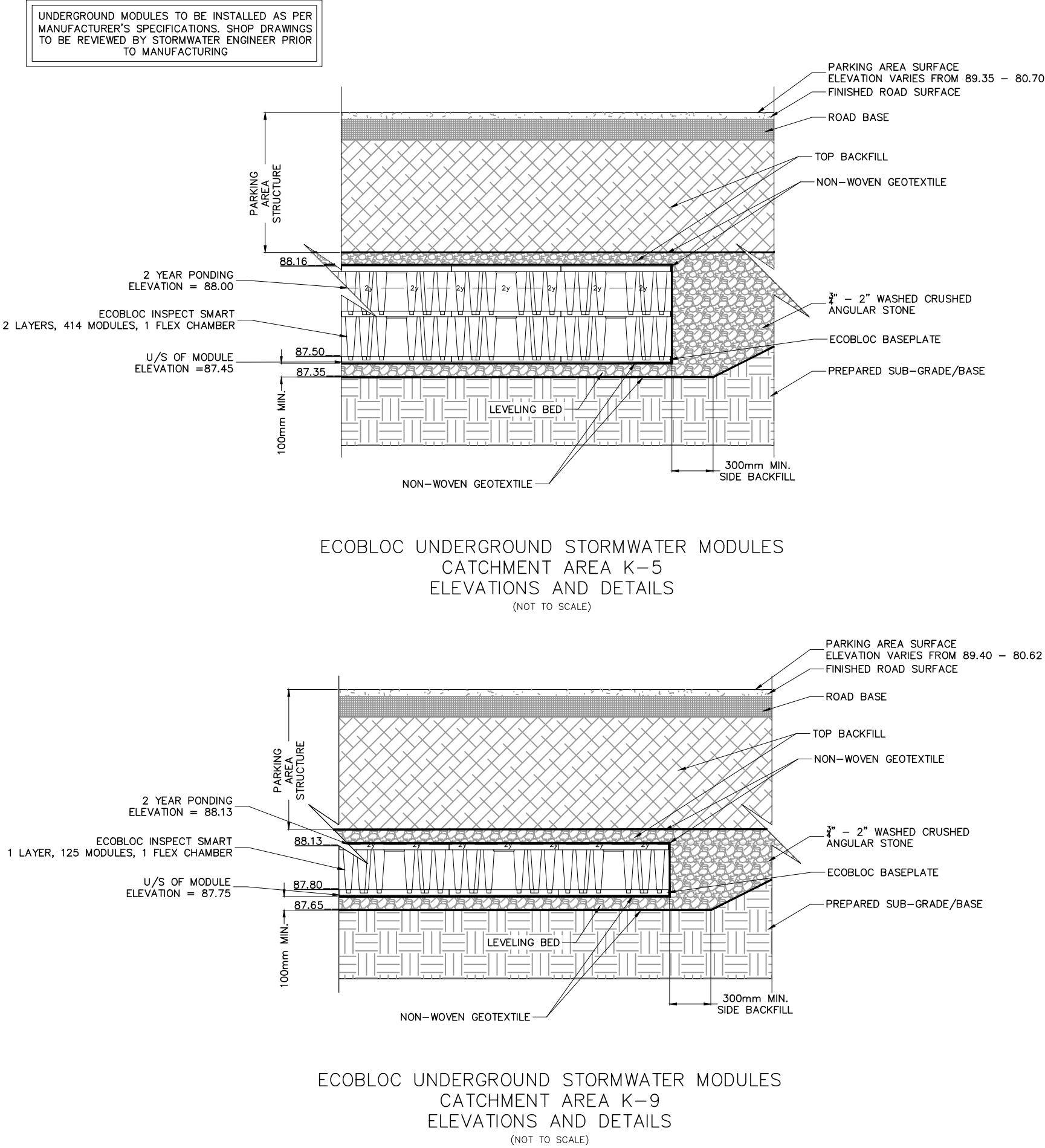
DESIGNED BY: AVB
DRAWN BY: BM
DATE: 2026.08.10
KOLLAARD FILE NUMBER: 250557

DRAWING NUMBER:

1 OF 3

DRAWING NAME:
250557 - GRD

- SEWER NOTES:
- SUPPLY AND CONSTRUCT ALL SEWERS AND APPURTENANCES IN ACCORDANCE WITH THE CITY OF OTTAWA STANDARDS AND SPECIFICATIONS AND ONTARIO PROVINCIAL STANDARDS FOR ROADS AND PUBLIC WORKS.
 - SPECIFICATIONS:
- | ITEM | SPEC. No. | CITY STD. DWG. No. |
|-----------------------------------|--------------|--------------------|
| CATCH BASIN (600mm x 600mm) | OPSD 705.010 | S2 |
| STORM/SANITARY MANHOLE (1200mm) | OPSD 701.010 | |
| SANITARY BENCHING | OPSD 701.021 | |
| CATCH BASIN & MANHOLE ADJUSTMENTS | OPSD 704.010 | S24.1 & S25 |
| STORM MANHOLE FRAME & COVER | OPSD 401.010 | S19, S22 & S23 |
| CATCH BASIN FRAME & COVER | OPSD 400.020 | S6 & S7 |
| SEWER TRENCH | OPSD 401.030 | S24 & S25 |
| SANITARY MANHOLE FRAME & COVER | OPSD 401.030 | |
- INSULATE ALL STORM PIPES THAT HAVE LESS THAN 1.5m COVER AND ALL SANITARY PIPES THAT HAVE LESS THAN 2.1m COVER WITH THERMAL INSULATION. PROVIDE 150mm CLEARANCE BETWEEN PIPE AND INSULATION.
 - PIPE BEDDING, COVER AND BACKFILL ARE TO BE COMPACTED TO AT LEAST 98% OF THE STANDARD PROCTOR MAXIMUM DRY DENSITY.
 - FLEXIBLE CONNECTIONS ARE REQUIRED FOR CONNECTION PIPES TO MANHOLES (FOR EXAMPLE KOR-N-SEAL, PSK: POSITIVE SEAL AND DURASEAL). SANITARY RUBBER GASKET TYPE JOINTS SHALL CONFORM TO CSA (B-182.2,3,4).
 - THE OWNER SHALL REQUIRE THAT THE SITE SERVICING CONTRACTOR PERFORM FIELD TESTS FOR QUALITY CONTROL OF ALL SANITARY SEWERS. LEAKAGE TESTING SHALL BE COMPLETED IN ACCORDANCE WITH OPS 410.07.16, 410.07.16.04 AND 407.07.24. THE FIELD TESTS SHALL BE PERFORMED IN THE PRESENCE OF A CERTIFIED PROFESSIONAL ENGINEER WHO SHALL SUBMIT A CERTIFIED COPY OF THE TEST RESULTS.
 - STORM MANHOLES AND CBMHs ARE TO HAVE 300mm SUMPS (AS PER SUMP DETAIL ON OPSD 701.010), UNLESS OTHERWISE INDICATED.
 - BUILDING CONTRACTOR TO PROVIDE TEMPORARY ADDITIONAL GRANULAR BACKFILL ABOVE SHALLOW STORM SEWERS TO SUPPORT HEAVY CONSTRUCTION EQUIPMENT.
 - CONTRACTOR TO TELEVIEW (CCTV) ALL PROPOSED SEWERS, 200mm OR GREATER PRIOR TO BASE COURSE ASPHALT. UPON COMPLETION OF CONTRACT, THE CONTRACTOR IS RESPONSIBLE TO FLUSH AND CLEAN ALL SEWERS & APPURTENANCES TO MUNICIPAL SATISFACTION.



DRAWING TITLE: **SERVICING PLAN**

KEY PLAN: N.T.S.

SCALE: 0 20 40 METRES

1:400

NOTES:

- ALL DIMENSIONS ARE IN METRES, UNLESS OTHERWISE SPECIFIED.
- ALL ELEVATIONS ARE IN METRES AND ARE GEDDETIC.
- TM = FIRE HYDRANT SPINDLE ELEVATION = 90.65
- THIS IS NOT A LEGAL SURVEY.
- EXISTING SERVICES INFORMATION SHOWN ARE BASED ON BEST CURRENT INFORMATION. CONTRACTOR TO VERIFY EXACT LOCATION AND REPORT ANY DISCREPANCIES TO KOLLAARD ASSOCIATES INC.
- CLIENT IS RESPONSIBLE FOR ACQUIRING ALL NECESSARY PERMITS. CONTRACTOR TO VERIFY THAT APPROPRIATE PERMITS HAVE BEEN ACQUIRED PRIOR TO ANY CONSTRUCTION.
- CONTRACTOR IS RESPONSIBLE FOR LOCATION AND PROTECTION OF UTILITIES.
- ALL DIMENSIONS TO BE VERIFIED ON SITE BY CONTRACTOR PRIOR TO CONSTRUCTION.
- THIS DRAWING IS NOT FOR CONSTRUCTION UNTIL ALL APPROVALS HAVE BEEN GRANTED.
- INSPECTION OF ROUGH GRADE BY KOLLAARD ASSOCIATES INC. AND MUNICIPALITY MUST BE CONDUCTED PRIOR TO PLACEMENT OF TOPSOIL OR SOD.
- HYDRO SERVICE TO BE INSTALLED ACCORDING TO THE SPECIFICATIONS OF SERVICE PROVIDER AND THE MECHANICAL ENGINEER.
- ALL MATERIALS AND CONSTRUCTION TO BE IN ACCORDANCE WITH MUNICIPAL STANDARDS AND ONTARIO PROVINCIAL STANDARDS AND SPECIFICATIONS
- ANY CHANGES MADE TO THIS PLAN MUST BE VERIFIED AND APPROVED BY KOLLAARD ASSOCIATES INC.
- REFERENCES:
 - LEGAL BOUNDARIES: ANNIS, O'SULLIVAN, VOLLEBEKK LTD. JOB # 12487-11 CIMA PT L1 C11 CU R F1 (2013-09-13).
 - TOPOGRAPHIC SURVEY: KOLLAARD FILE #250557 (2026-02-23).
 - GEOTECHNICAL: KOLLAARD FILE #250557 (2026-03-11).
 - STORMWATER MANAGEMENT REPORT: KOLLAARD FILE #250557 (2026-03-11).
 - SERVICING BRIEF: KOLLAARD FILE #250557 (2026-03-11).

No.	REVISION	DATE	BY
0	ISSUED FOR SITE PLAN APPLICATION	2026.08.10	AVB

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CLIENT: **LAWRENCE ARCHITECTS INC.**

PROJECT: **PROPOSED DEALERSHIP ADDITION**

LOCATION: **2045 MER-BLEUE ROAD, ORLEANS ON**

DESIGNED BY: AVB CHECKED BY: AVB

DRAWN BY: BM APPROVED BY: AVB

DATE: 2026.08.10

KOLLAARD FILE NUMBER: 250557

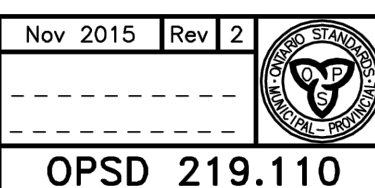
DRAWING NUMBER: **2 OF 3**

DRAWING NAME: **250557 - SER**

LEGAL INFORMATION:
PLAN OF SURVEY OF
PART OF LOT 1, CONCESSION 11
GEOGRAPHIC TOWNSHIP OF CUMBERLAND
CITY OF OTTAWA
Surveyed by Anna O'Sullivan, Vollebeek Ltd.

TOPOGRAPHIC INFORMATION:
KOLLAARD FILE #250557
DATE 2026-02-23
Surveyed by Kollaard Associates Inc.

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KOLLAARD ASSOCIATES INCORPORATED



	CONCRETE SIDEWALK
	CROSSWALK
	NO PARKING
	FIRE LANE
	ASPHALTIC CONCRETE
	GRASS

250557 - ESC

TOPOGRAPHIC INFORMATION:
KOLLAARD FILE #250557
DATE: 2026-02-23
Surveyed by Kollaard Associates Inc.

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