D.B. Gray Engineering Inc.

Stormwater Management - Grading & Drainage - Storm & Sanitary Sewers - Watermains

700 Long Point Circle
Ottawa, Ontario K1T 4E9

613-425-8044
d.gray@dbgrayengineering.com

SITE SERVICING & STORMWATER MANAGEMENT REPORT

TONY GRAHAM PREP SHOP
2500 PALLADIUM DRIVE,
UNIT 4
OTTAWA, ONTARIO

REPORT NO. 25023

JUNE 26, 2025
REVISED SEPTEMBER 11, 2025
REVISED OCTOBER 22, 2025
REVISED NOVEMBER 12, 2025

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LIST OF APPENDICES

1.0 INTRODUCTION

This report has been prepared in support of the Site Plan Control application for a proposed 'Tony Graham Prep Shop' located in Ottawa at 2500 Palladium Drive, 'Unit 4' of the Palladium Auto-Park condominium in Ottawa. This report describes the servicing for the proposed building and stormwater management for the 1.90-hectare property, of which 0.72 hectares is proposed to be developed at this time. The property is currently vacant. Refer to Pre-Application Consultation meeting notes in Appendix D.

This report forms part of the site servicing and stormwater management design for the proposed development. Also refer to drawings C-1 to C-8 prepared by D.B. Gray Engineering Inc.

The Geotechnical Investigation Report, dated October 7, 2025, prepared by AllRock Consulting Ltd. (Alrock File 25013), has been reviewed and any recommendations and requirements that pertain to the designs prepared by D.B. Gray Engineering Inc. have been considered.

2.0 WATER SERVICING

2.1 WATER SUPPLY FOR FIREFIGHTING

The closest existing fire hydrant is a private Class AA fire hydrant located in front of the subject property on the far side of the street, ±73 m unobstructed distance to the far end of the façade of the proposed building that faces the fire route. Since this is less than the maximum 90 m required by the Ontario Building Code (OBC); therefore, an additional private fire hydrant is not required.

In accordance with City of Ottawa Technical Bulletin IWSTB-2024-05, when calculating the required fire flow on private property in urban areas, the Ontario Building Code (OBC) method is to be used. Using the OBC method, the required fire flow is calculated to be 5,400 L/min (90 L/s). Refer to calculations in Appendix A.

A hydrant flow test was performed on the nearest existing fire hydrant (located in the boulevard opposite the entrance to the subject property). Refer to Appendix A. Using the Hazen-Williams Formula, it is calculated that 90 L/s is available from a single 2.5" nozzle at 601 kPa (87 psi) (and 510 L/s is available at 138 (20 psi)). Since the required fire flow is available above the Ontario Building Code's minimum required pressure of 140 kPa (20 psi), there is an adequate water supply for firefighting from the existing municipal and private water distribution system.

Palladium Auto-Park is served by a 305 mm private looped watermain system that connects to municipal watermains at two points; at a 305 mm watermain in Huntmar Drive (at the intersection with Cyclone Taylor Boulevard) and at a 305 mm watermain in Palladium Drive (at the south entrance to the auto park). Boundary conditions at the Huntmar Drive connection provided by the City of Ottawa for the 90 L/s fire flow at the subject property indicate a hydraulic grade line (HGL) of 155.6 m and a pressure of 76.0 psi (assuming a ground elevation of 102.1 m). It is assumed that HGL is the same at the Palladium Drive connection; a reasonable assumption since the fire flow is relatively low and the municipal watermian between the two connection points is large (300 mm in diameter). Using EPANET, a model was created to analyze the hydraulics of the existing private watermain. Based on 155.6 m HGL, a 90.4 L/s demand (90 L/s fire flow + 0.4 L/s maximum daily demand); the pressure at the fire hydrant is calculated to 513 kPa (74 psi). Refer to Appendix A. Since this pressure is above the OBC's minimum required pressure of 138 kPa (20 psi), there is an adequate water supply for firefighting from the existing municipal and private water distribution system.

In accordance with City of Ottawa Technical Bulletin ISTB-2018-02, the aggregate flow of all contributing fire hydrants within 150 m of the building shall not be less than the required fire flow; and as per ISTB-2018-02

Appendix I, Class AA fire hydrants within 75 m can contribute 5,700 L/min (95 L/s). Therefore, the existing private fire hydrant discussed above can contribute 5,700 L/min (95 L/s); greater than the required fire flow of 5,400 L/min (90 L/s).

2.2 DOMESTIC WATER SUPPLY

In accordance with the City of Ottawa Water Design Guidelines for the consumption rate (28,000 L/day) and peaking factors for a commercial property, the average daily demand is calculated to be 0.3 L/s, the maximum daily demand is calculated to be 0.4 L/s and the maximum hourly demand is calculated to be 0.8 L/s. Refer to calculations in Appendix A.

The boundary conditions at the connection to 300 mm Huntmar Drive municipal watermain provided by the City of Ottawa indicate a maximum HGL of 162.6 m and a minimum HGL of 155.6 m. Refer to Appendix A. Based on these boundary conditions, the pressure at the proposed water meter is calculated to vary between 569 kPa (82 psi) and 500 kPa (73 psi). (During the fire hydrant flow test the pressure was measured to be higher at 90 psi.) Since water pressure can be above 80 psi at times the installation of a pressure-reducing valve (PRV) immediately downstream of the water meter will be required.

Based on the AWWA water flow demand curve, and a water pressure at the meter at 80 psi, the peak demand is expected to be 3.2 l/s (195 L/min / 51 USgpm). Refer to Appendix A. The AWWA method calculates the instantaneous demand and is used to size the water service. This peak demand will produce an acceptable velocity of 1.7m/s in the proposed 50 mm water service connection.

3.0 SANITARY SERVICING

In accordance with

i. the City of Ottawa Sewer Design Guidelines for the peaking factor for a commercial property, and
ii. City of Ottawa Technical Bulletin ISTB-2018-01 for the average daily flow for a commercial property (28,000 L/day) and infiltration allowance,

the post-development sanitary flow rate is calculated to be 0.59 L/s. A 150 mm sanitary sewer system is proposed, and the last segment, at 0.65% slope, has a capacity of 11.63 L/s. At the design flow rate the sanitary sewer will only be at 5% of its capacity. The proposed 150 mm sanitary sewer will connect to an existing 150 mm sanitary sewer stub located near the northwest corner of the proposed development. Refer to calculations in Appendix B. The proposed redevelopment is expected to have an acceptable impact on the existing sanitary sewers.

The above agrees with Table 5 in Section 2.2 of Stantec's Sanitary Sewer Analysis, dated March 18, 2016, a unit rate of 28,000 L/d/ha and a peaking factor of 1.5 shall be used for future commercial developments. Refer to the relevant pages in Appendix E. Additionally, the servicing report, completed by McIntosh Perry, for the development of Unit 12 for a Nissan dealership has been reviewed, and it has also followed the recommendations found in Stantec's Sanitary Sewer Analysis (a unit rate of 28,000 L/d/ha and a peaking factor of 1.5). Refer to relevant pages in Appendix F.

4.0 STORMWATER MANAGEMENT

4.1 QUALITY CONTROL

Permanent quality control measures, such as an oil grit separator (OGS) manhole, are not required. As per Section 6.4 of J.L. Richards & Associates Limited's report, quality control is carried out for the entire auto park using the stormwater management pond. Refer to Appendix G.

4.2 QUANTITY CONTROL

As per Pre-Consultation Meeting Feedback: *"The site must reference to the existing stormwater management design report for the auto park for the stormwater management criteria for this specific site."* As per the Stormwater Management Report for the Palladium Auto-Park, dated April 2003, prepared by J.L. Richards & Associates Limited, there is a maximum release rate of 84 L/s per lot for the 100-year storm event. However, since only 38% (0.72 ha) of 1.90 ha property is being developed at this time, the maximum allowable release rate for the proposed development is 31.90 L/s (38% of 84 L/s). Also, as per J.L. Richards' report, there is a minimum on-site storage volume requirement based on post-development areas, which, for the subject site, is calculated to be 241.71 m^3. Refer to Section 5.3 of J.L. Richards & Associates Limited's report in Appendix G. Refer to calculations in Appendix C.

The Rational and Modified Rational Methods are used to calculate the post-development flow rates and corresponding storage volumes. The runoff coefficients for the 100-year event are increased by 25% to maximum 1.00. (The Ministry Transportation (MTO) requires the analysis of additional storm events: The runoff coefficients for the 25-year and 50-year event are increased by 10% and 20%, respectively, to maximum 1.00.) Refer to calculations in Appendix C.

Drainage Area I (Uncontrolled Flow Off Site – 725 m^2)
Areas around the perimeter of the property will drain uncontrolled off site. The flow rates are calculated at a time of concentration of 10 minutes.

	100-Year Event	5-Year Event
Maximum Flow Rate	9.00 L/s	4.20 L/s

Additional Storm Events (as required by MTO):

	50-Year Event	25-Year Event	10-Year Event	2-Year Event
Maximum Flow Rate	7.81 L/s	6.42 L/s	4.92 L/s	3.10 L/s

Drainage Area II (6,498 m^2)
An inlet control device (ICD) located in the outlet pipe of catch basin / manhole CB/MH-15 will restrict the flow of stormwater and cause it to backup into the upstream infrastructure (including underground chambers) and pond in the pavement above catch basins. The ICD will be a plug style with trash basket and a round orifice located at the bottom of the plug manufactured by Pedro Plastics or approved equivalent, and sized by the manufacturer for a release rate of 22.91 L/s at 2.58 m. It is calculated that an orifice area of 5,281 mm^2 ($\pm$82 mm dia.) with a discharge coefficient of 0.61 will restrict the release rate to 22.91 L/s at a head of 2.58 m. Based on this orifice the maximum release rate for the 5-year storm event is calculated to be 22.58 L/s at 2.50 m. (Also based on this orifice, the maximum release rates for the additional storm events required by MTO, are calculated to be 22.33 L/s at 2.45 m, 22.67 L/s at 2.52 m, 22.80 L/s at 2.55 m, and 22.86 L/s at 2.57 m for the 2, 10, 25 and 50-year storm events, respectively.) Since underground storage infrastructure is proposed, an average release rate equal to 50% of the maximum release rate is used to calculate the required storage volumes. The underground

storage infrastructure will consist of 7 – Soleno HydroStor HS180 open bottom chambers surrounded by clear stone wrapped in geotextile fabric.

	100-Year Event	5-Year Event
Maximum Release Rate	22.91 L/s	22.58 L/s
Maximum Water Elevation	103.40 m	103.32 m
Maximum Volume Stored	309.75 m^3	135.79 m^3

Additional Storm Events (as required by MTO):

	50-Year Event	25-Year Event	10-Year Event	2-Year Event
Maximum Release Rate	22.86 L/s	22.80 L/s	22.67 L/s	22.33 L/s
Maximum Water Elevation	103.39 m	103.37 m	103.34 m	103.27 m
Maximum Volume Stored	272.01 m^3	233.27 m^3	166.46 m^3	91.44 m^3

Summary

	100-Year Event	5-Year Event
Maximum Allowable Release Rate	31.90 L/s	31.90 L/s
Maximum Release Rate	31.90 L/s	26.78 L/s
Maximum Volume Required & Stored	309.75 m^3	135.79 m^3
Maximum Volume Available	315.85 m^3	315.85 m^3
Volume Required as per J.L. Richards' Report	241.71 m^3	241.71 m^3

The maximum post-development release rate during the 100-year event is calculated to be 31.90 L/s, which is equal to the maximum allowable release rate. To achieve the maximum allowable release rate, a maximum storage volume of 309.69 m^3 is required and a maximum of 315.85 m^3 is provided, which is about 31% more than the minimum 241.71 m^3 required by the J.L. Richards report. The maximum release rate during the 5-year event is calculated to be 26.78 L/s, which is 16% less than the maximum allowable release rate.

Additional Storm Events (as required by MTO):

	50-Year Event	25-Year Event	10-Year Event	2-Year Event
Maximum Allowable Release Rate	31.90 L/s	31.90 L/s	31.90 L/s	31.90 L/s
Maximum Release Rate	30.67 L/s	29.22 L/s	27.59 L/s	26.00 L/s
Maximum Volume Required & Stored	271.50 m^3	233.27 m^3	166.16 m^3	91.44 m^3
Maximum Volume Available	315.85 m^3	315.85 m^3	315.85 m^3	315.85 m^3
Volume Required as per J.L. Richards' Report	241.71 m^3	241.71 m^3	241.71 m^3	241.71 m^3

The maximum release rates during the 2, 10, 25 and 50-year event are calculated to be 4% to 20% less than the maximum allowable release rate.

The restricted post development flow rates are expected to have an acceptable impact on the existing downstream storm sewers.

4.3 STORM SERVICING

An on-site storm sewer system is proposed to connect to an existing 375 mm storm sewer stub located near the northwest corner of the proposed development. The peak unrestricted flow rate in the last segment of the proposed storm sewer system during the 2-year event is calculated to be 101.3 L/s; which would be at 97% of its capacity. However, the restricted flow rate through the ICD is 21.44 L/s; which is only 21% of the capacity of the 375 mm sewer. Refer to calculations in Appendix C.

The Ministry of Environment, Conservation and Parks (MECP) is expected to consider the property 'industrial lands'; therefore, an Environmental Activity and Sector Registry (EASR) is expected to be required for the proposed stormwater management facility.

4.4 ASSESSMENT OF MONITORING

The proposed stormwater management facility has an infiltration component; however, it is not in a 'wellhead protection area' or an 'issue contributing area'; therefore, monitoring the discharge from the stormwater management facility is not considered necessary given the low risk of posing a significant drinking water threat.

4.5 OPERATION & MAINTENANCE

Catch Basins and Catch Basin/Manholes:
The sump in a catch basin tends to remove coarse sediment, debris and other material from runoff. To ensure the effectiveness of the downstream infrastructure; annually, in the spring (and more frequently, if necessary), remove any accumulated material from the sumps; manually by shovel, or by vacuum truck. Removed material should be disposed of at a facility licensed to accept such material. A maintenance log template has been provided in Appendix C.

Underground Storage Chambers:
The underground storage chambers consist of 7 Soleno Hydrostor HS180 Chambers surrounded by clear stone and wrapped in a geotextile fabric (refer to drawings C-2 and C-5). The chambers are offset from the main storm sewers and are installed at a higher elevation so that stormwater from minor rainfall events, and the "first flush" (initial surface runoff) of a storm, does not enter the chambers (and it is these events that typically carry higher concentration of sediment and debris). As previously mentioned, stormwater enters the chambers when the ICD at MH/CB-15 restricts the flow and forces the stormwater to back up into them. Regardless, as stormwater flows to the chambers, it will carry some sediment and debris that can collect within the chambers.

Two 250mm diameter inspection/access ports (at each end of the row of chambers) are provided. In addition, catch basin/manholes CB/MH-7 is available for inspections and access. At end of the construction of any phase of the development, it is recommended that the chambers are cleaned (see recommended method below). After the initial cleaning, an inspection and a set of measurements should be conducted at each inspection/access port. Measurements can be taken with a measuring rod. These measurements will allow for future sediment height measurements to be taken and recorded in an Underground Storage Chamber Inspection & Maintenance Log. A maintenance log template has been provided in Appendix C.

During the first year of operation a minimum of two inspections, in the spring and fall, should be conducted to determine the rate at which the chambers collect sediment and debris. After the first year, an inspection in the spring should be conducted (and, if required, in the fall). In the spring, the inspection should be done after any accumulated sediment is removed from the catch basin and catch basin/manhole sumps.

During inspections, sediment height should measure at both inspection/access ports. These measurements should be recorded on the Storage Chamber Inspection & Maintenance Log. When the sediment reaches a height of 50 mm, the chambers should be cleaned.

Clean the chambers during dry weather when there is no flow into the chambers system and the chambers do not have any standing water in them. Before cleaning begins, plug the 375 mm outlet pipe at CB/MH-7 (using, for an example, an inflatable plug), to ensure that sediment and debris does not flow into downstream pipes and structures.

Cleaning should be done by a vacuum truck with a high-pressure nozzle with rear facing jets. (The underground storage chambers are installed directly on top of a biaxial geogrid fabric over two layers of a woven geotextile fabric. The biaxial geogrid fabric provides the strength to support the chambers and protects the woven geotextile fabric which serves as a filter and prevents the sediment from clogging the bedding stone. The three layers of fabric are intended to be sufficiently durable to withstand cleaning using high-pressure nozzles. Regardless, care needs to be taken to ensure damage to the geotextile fabric does not occur when removing sediment and debris.) The nozzle should be inserted into the access port at the north end of the chambers (the port closest to CB/MH-7) and used to direct the sediment and debris to CB/MH-7 where the sediment can then be vacuumed out of the sump. At the end of the cleaning process remove the plug

Sediment, debris and other material that has been vacuumed and removed should be disposed at a facility licensed to accept such material.

Inlet Control Device:
An inlet control device (ICD) is located in the outlet pipe of catch basin/manhole CB/MH-15. Annually, in the spring after any accumulated sediment is removed from the catch basin and catch basin/manhole sumps and the underground storage chambers are cleaned (see above), the ICD should be inspected for damage and blockages. At any time of year, if water ponding above the catch basins or catch basin/manholes does not drain down within about five to twelve hours, this is an indication that the ICD is blocked and should be inspected.

4.6 EROSION & SEDIMENT CONTROL PLAN

An Erosion & Sediment Control Plan has been developed to be implemented during construction. Refer to drawing C-4 and notes 2.1 to 2.6 on drawing C-6:

i. Sediment capture filter sock inserts are to be installed in all existing and proposed catch basins and catch basin manholes adjacent to and within the site,
ii. A silt fence barrier is to be installed along the perimeter of the site, and
iii. Any material deposited on the public road is to be removed.

Log daily erosion and sediment control efforts. A maintenance log template has been provided in Appendix C.

5.0 CONCLUSIONS

1. An additional private fire hydrant is not required.

2. There is an adequate water supply for firefighting from the existing municipal and private water distribution system.

3. The existing fire hydrants can contribute a flow which is greater than the required fire flow.

4. The water pressure can be above 80 psi at times; therefore, a pressure reducing valve (PRV) immediately downstream of the water meter will be required.

5. The post-development sanitary flow rate will be adequately handled by the proposed sanitary sewer system.

6. The proposed redevelopment is expected to have an acceptable impact on the existing sanitary sewers.

7. An oil grit separator (OGS) is not required.

8. An Erosion & Sediment Control Plan has been developed to be implemented during construction.

9. The proposed stormwater management facility will restrict post-development release rate to the maximum allowable release rate; and during the 5-year event, 34% less than the pre-development flow rate and 16% less than the maximum allowable release rate. The maximum release rates during the 2, 10, 25 and 50-year event are calculated to be 4% to 20% less than the maximum allowable release rate.

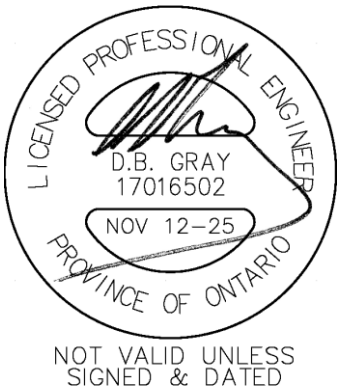
10. To achieve the maximum allowable release rate, a maximum storage volume of 309.69 m^3 is required and a maximum of 315.85 m^3 is provided, which is about 31% more than the minimum 241.71 m^3 required by the J.L. Richards report.

11. The restricted flow rates are expected to have an acceptable impact on the existing downstream storm sewers.

12. The peak unrestricted flow rates during the 2-year event will be adequately handled by the proposed private site storm sewer system.

13. The MECP is expected to consider the property 'industrial lands'; therefore, an EASR is expected to be required for the proposed stormwater management facility.

Prepared by D.B. Gray Engineering Inc.



APPENDIX A

WATER SERVICING

D.B. Gray Engineering Inc.

Stormwater Management - Grading & Drainage - Storm & Sanitary Sewers - Watermains

700 Long Point Circle
Ottawa, Ontario K1T 4E9

613-425-8044
d.gray@dbgrayengineering.com

May 15, 2025

2500 Palladium Dr

Ottawa, Ontario

FIRE FLOW CALCULATIONS
OBC Method

Q = Required water supply in litres
= KVS_{Total}

K = Water supply coefficient as per OBC A-3.2.5.7. Table 1
= 27 F-2 Building of noncombustible construction with fire separations, but with no fire resistance ratings.

V = Building volume in cubic meters

	Floor Area (sq.m)	Height (m)	Volume (cu.m)
Ground floor:	139	3.44	478
Ground floor(high ceilings):	714	7.66	5,469
Mezzanine	139	4.22	587
			6,534

S_{Total} = Total of spatial coefficients from exposure distances
= $1.0 + S_{Side\ 1} + S_{Side\ 2} + S_{Side\ 3} + S_{Side\ 4}$

	Spatial Coefficient	Exposure Distance (m)	
$S_{Side\ 1}$	0.0	24.7	(to centerline of Autopark Dr)
$S_{Side\ 2}$	0.0	24.3	(to end of development area)
$S_{Side\ 3}$	0.0	29.8	(to South property line)
$S_{Side\ 4}$	0.0	16.4	(to East property line)
S_{Total}	1.0		

Q = 176,417 L
= 5,400 L/min as per OBC A-3.2.5.7. Table 2
= 90 L/s

DATE	16-Jun-25

CLIENT	Pri-Tec Construction Ltd.	INSPECTOR NAME	Ilyas Omari
BUILDING NAME	2500 Palladium Drive	COMPANY	Avangard Fire & Life Safety
STREET	2500 Palladium Drive	STREET	2979 Merivale Road
CITY	Kanata, Ontario	CITY	Ottawa, Ontario
SITE CONTACT		PHONE #	(613) 223-2223
PHONE #		LICENSE #	13866906

FIRE HYDRANT FLOW TEST RESULTS

HYDRANT #1 FLOW TEST

FLOW HYDRANT LOCATION: 2500 PALLADIUM UNIT #9

PRESSURE GAUGE HYDRANT LOCATION: 2500 PALLADIUM UNIT #10

DEVICES USED TO MEASURE FLOW/PRESSURE: HOSE MONSTER 25FT x 2.5" HOSE x 1

STATIC PRESSURE (PSI)	NOZZLE SIZE (INCH)	PITOT READING (PSI)	GPM	RESIDUAL PRESSURE (PSI)
90	2.5	50	1186	88

HYDRANT #2 FLOW TEST

FLOW HYDRANT LOCATION:

PRESSURE GAUGE HYDRANT LOCATION:

DEVICES USED TO MEASURE FLOW/PRESSURE:

STATIC PRESSURE (PSI)	NOZZLE SIZE (INCH)	PITOT READING (PSI)	GPM	RESIDUAL PRESSURE (PSI)

HYDRANT #3 FLOW TEST

FLOW HYDRANT LOCATION:

PRESSURE GAUGE HYDRANT LOCATION:

DEVICES USED TO MEASURE FLOW/PRESSURE:

STATIC PRESSURE (PSI)	NOZZLE SIZE (INCH)	PITOT READING (PSI)	GPM	RESIDUAL PRESSURE (PSI)

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d.gray@dbgrayengineering.com

18-Jun-25

2500 Palladium Dr
Ottawa, Ontario

Fire Hydrant Flow Test Calculations

RESIDUAL HYDRANT
2500 PALLADIUM UNIT #9
FLOW HYDRANT
2500 PALLADIUM UNIT #10

Measured Static	90	psi	
Measured Residual	88	psi	
Measured Flowrate	1186	USgpm	
Calculated Flowrate at:	138	kPa	
	20.0	psi	
	8088	USgpm	Hazen-Williams
	30612	l/min	
	510	L/s	
Calculated Flowrate at:	601	kPa	
	87	psi	
	1427	USgpm	Hazen-Williams
	5400	l/min	
	90	L/s	

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15-May-25
REVISED 29-May-25
REVISED 11-Sep-25

2500 Palladium Dr

Ottawa, Ontario

Water Demand

COMMERCIAL DAILY AVERAGE:	28,000	L /gross ha / day (as per Ottawa Design Guidelines)				
	0.72	ha (land area)				
	20160	L/day				
	20	hour day				
	16.8	L/min	0.3	L/s	4.4	USgpm
MAXIMUM DAILY DEMAND:	1.5	(Peaking Factor as per Ottawa Design Guidelines)				
	25.2	L/min	0.4	L/s	6.7	USgpm
MAXIMUM HOURLY DEMAND:	1.8	(Peaking Factor as per Ottawa Design Guidelines)				
	45.4	L/min	0.8	L/s	12.0	USgpm

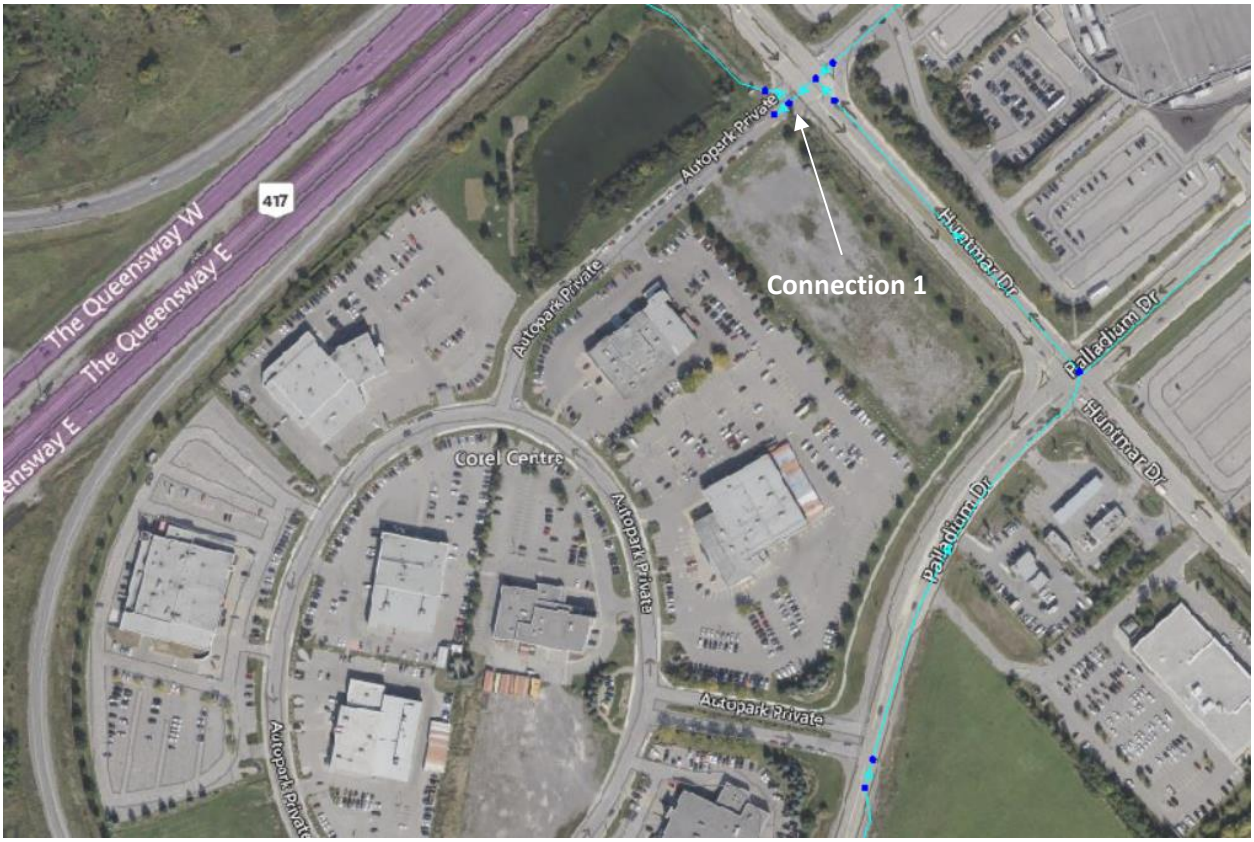
			Static Pressure at Water Meter			
Elevation of Water Meter:	104.60	m ASL				
Finish Floor Elevation:	103.70	m ASL				
MINIMUM HGL:	162.6	m ASL	82	psi	569	kPa
MAXIMUM HGL:	155.6	m ASL	73	psi	500	kPa

Boundary Conditions
2500 Palladium Drive

Provided Information

Scenario	Demand	
	L/min	L/s
Average Daily Demand	18	0.30
Maximum Daily Demand	24	0.40
Peak Hour	48	0.80
Fire Flow Demand #1	5,400	90.00

Location



Results

Connection 1 – Autopark Priv. & Huntmar Dr.

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	162.6	86.0
Peak Hour	155.6	76.0
Max Day plus Fire Flow #1	155.6	76.0

[1] Ground Elevation = 102.1 m

Note:

1. The Infrastructure and Waster Services Department (IWSD) has recently updated their water modelling software. Any perceived significant difference between previously received boundary condition (BC) results and newly received BC results can be attributed to this change.
2. As per the Ontario Building Code in areas that may be occupied, the static pressure at any fixture shall not exceed 552 kPa (80 psi.) Pressure control measures to be considered are as follows, in order of preference:
   a. If possible, systems to be designed to residual pressures of 345 to 552 kPa (50 to 80 psi) in all occupied areas outside of the public right-of-way without special pressure control equipment.
   b. Pressure reducing valves to be installed immediately downstream of the isolation valve in the home/ building, located downstream of the meter so it is owner maintained.

Disclaimer

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

September 11, 2025

2500 Palladium Drive

Ottawa, Ontario

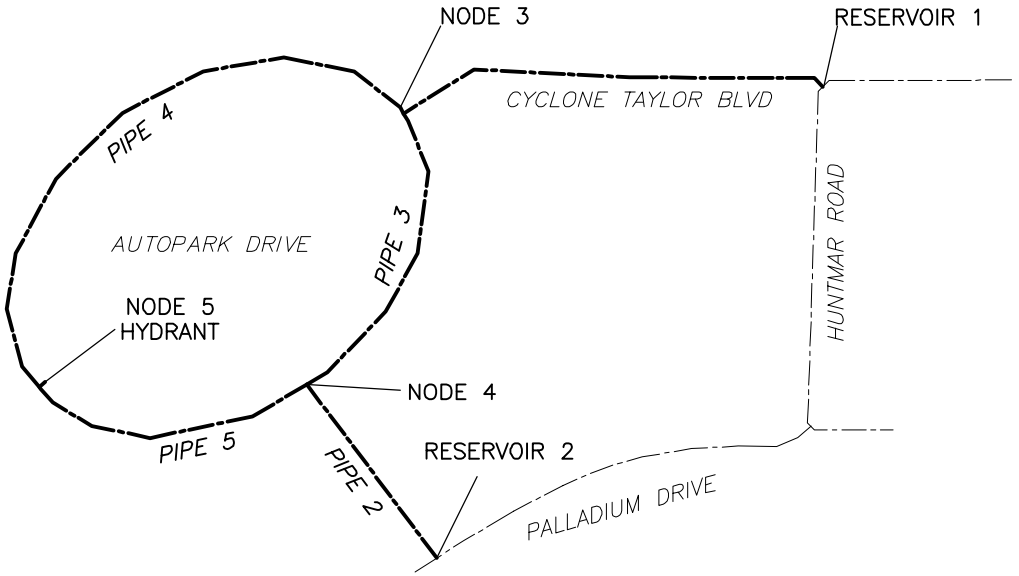
EPANET RESULTS

Fire Flow Demand:	90.0	L/s
Maximum Daily Demand:	0.4	L/s
Fire Flow + Maximum Daily Demand:	90.4	L/s
Fire Flow + Maximum Daily Demand HGL:	155.6	m

Node ID	Demand (L/s)	HGL (m)	Elevation (m)	Pressure		
				(m)	(kPa)	(psi)
1 - Reservoir: Huntmar Dr 305mm WM at Cyclone Taylor Blvd	-37.55	155.60	102.45	53.2	521	76
2 - Reservoir: Palladium Dr 305mm WM at entrarnce to Auto Park	-52.85	155.60	103.15	52.5	514	75
3	0.00	155.17	102.12	53.1	520	75
4	0.00	155.17	102.40	52.8	517	75
5 - Fire Hydrant	90.40	155.48	103.30	52.2	512	74

PIpe ID	Length (m)	Diameter (mm)	Roughness Coefficient	Minor Loss Coefficient	Flow (L/s)	Velocity (m/s)
1	270	305	120	9.35	37.55	0.51
2	143	305	120	4.75	52.85	0.72
3	214	305	120	7.85	0.16	0.00
4	421	305	120	15.55	37.71	0.52
5	196	305	120	10.40	52.69	0.72

EPANET PLAN



PIPE 1:
LENGTH = 270m
11.25° = 0
22.5° = 3
45° = 7
TEE (BRANCH FLOW)= 2
TEE (LINE FLOW) = 3
VALVE = 2

PIPE 2:
LENGTH = 143m
11.25° = 1
22.5° = 0
45° = 0
TEE (BRANCH FLOW)= 2
TEE (LINE FLOW) = 1
VALVE = 2

PIPE 3:
LENGTH = 214m
11.25° = 2
22.5° = 3
45° = 0
TEE (BRANCH FLOW)= 3
TEE (LINE FLOW) = 2
VALVE = 1

PIPE 4:
LENGTH = 421m
11.25° = 1
22.5° = 8
45° =
TEE (BRANCH FLOW)= 6
TEE (LINE FLOW) = 4
VALVE = 1

PIPE 5:
LENGTH = 196m
11.25° =
22.5° = 4
45° =
TEE (BRANCH FLOW)= 4
TEE (LINE FLOW) = 3
VALVE = 2

Network Table - Nodes

Node ID	Elevation m	Base Demand LPS	Demand LPS	Head m	Pressure m
Junc 3	102.1	0	0.00	155.17	53.07
Junc 4	103.3	0	0.00	155.17	51.87
Junc 5	103.3	90.4	90.40	154.48	51.18
Resvr 1	155.6	#N/A	-37.55	155.60	0.00
Resvr 2	155.6	#N/A	-52.85	155.60	0.00

Network Table - Links

Link ID	Length m	Diameter mm	Roughness	Flow LPS	Velocity m/s
Pipe 1	270	305	120	37.55	0.51
Pipe 2	143	305	120	52.85	0.72
Pipe 3	214	305	120	0.16	0.00
Pipe 4	421	305	120	37.71	0.52
Pipe 5	196	305	120	52.69	0.72

D.B. Gray Engineering Inc.

Stormwater Management - Grading & Drainage - Storm & Sanitary Sewers - Watermains

700 Long Point Circle
Ottawa, Ontario K1T 4E9

613-425-8044
d.gray@dbgrayengineering.com

25-Jun-25

2500 Palladium Dr
Ottawa, Ontario
Peak Water Demand

WATER FIXTURE VALUE
(AWWA Manual M22 - Sizing Water Service Lines and Meters)

	No.	F.V.	Total
Bathtub		8	0
Toilet - tank	4	6	24
Toilet - flush valve		24	0
Lavs.	4	1.5	6
Bidet		2	0
Urinal - wall flush valve		10	0
Shower		2.5	0
K. Sink	1	1.8	1.8
Dishwasher		1.3	0
Clothes Washer		3	0
Commercial Sink		4	0
J. Sink	1	4	4
Commercial Dishwasher		4	0
Commercial Washer		4	0
Hose 1/2 in	5	5	25
Hose 3/4 in		12	0
			60.8

Peak Demand (fig 4-2 or 4-3 AWWA M22) 44 USgpm

Pressure @ Meter 552 kPa 80 psi (assumed)
Pressure Factor (table 4-1 AWWA M22) 1.17

Peak Demand 51 USgpm

Irrigation - hose 1/2 in 0 0 USgpm (includes pressure factor)
(assumes hose bibs operating in non peak hours)

TOTAL PEAK DEMAND 195 l/min 51 USgpm 3.2 l/s

Nominal Size 2.0 in 50 mm
5.4 ft/s 1.7 m/s

APPENDIX B

SANITARY SERVICING

D.B. Gray Engineering Inc.

Stormwater Management - Grading & Drainage - Storm & Sanitary Sewers - Watermains

700 Long Point Circle
Ottawa, Ontario K1T 4E9

613-425-8044
d.gray@dbgrayengineering.com

SANITARY SEWER CALCULATIONS

2500 Palladium Dr
Prep Shop
Ottawa, Ontario

August 27, 2025

Residential Average Daily Flow:	280	L/capita/day	Residential Peaking Factor:	Harmon Formula
Commercial Average Daily Flow:	28,000	L/ha/day	Harmon Formula Correction Factor:	0.8
Institutional Average Daily Flow:	28,000	L/ha/day	Commercial Peaking Factor:	1.5
Light Industrial Average Daily Flow:	35,000	L/ha/day	Institutional Peaking Factor:	1.5
Heavy Industrial Average Daily Flow:	55,000	L/ha/day	Industrial Peaking Factor:	Ministry of the Environment
Infiltration Allowance:	0.33	L/s/ha	Manning's Roughness Coefficient:	0.013

		Residential													Non-Residential				Infiltration			Q	Sewer Data						
		Individual									Cumulative				Individual			Cumulative	Individual	Cumulative		Total							
Location		Single	Semi		Apartment				Area	Population	Area	Population	Peaking	Flow Rate	Area	Daily Flow	Peaking	Flow Rate	Area	Area	Flow Rate	Flow Rate	Length	Nominal Diameter	Actual Diameter	Slope	Velocity	Q_{Full} Capacity	
From	To	Family	Detached	Duplex	(1 Bed)	(2 Bed)	(3 Bed)	(Average)	(ha)		(ha)		Factor	(L/s)	(ha)	L/ha/day	Factor	(L/s)	(ha)	(ha)	(L/s)	(L/s)	(m)	(mm)	(mm)	(%)	(m/s)	(L/s)	Q / Q_{Full}
		ppu = 3.4	ppu = 2.7	ppu = 2.3	ppu = 1.4	ppu = 2.1	ppu = 3.1	ppu = 1.8																					
Building	MH SA.1									0	0.0000	0	3.2	0.00	0.7223	28,000	1.5	0.35	0.7223	0.7223	0.24	0.59	4	150	147	1	0.85	14.43	0.04
MH SA.1	MH SA.2									0	0.0000	0	3.2	0.00	0.0000	28,000	1.5	0.35	0.0000	0.7223	0.24	0.59	64.2	150	147	0.65	0.69	11.63	0.05
																			Existing 150mm Sanitary Service:				150	147	1.00	0.85	14.43	

APPENDIX C

STORMWATER MANAGEMENT

SUMMARY TABLES

100-YEAR EVENT

Drainage Area	Maximum Allowable Release Rate (L/s)	Minimum Storage Volume Required (cu.m)	Maximum Release Rate (L/s)	Maximum Volume Required (cu.m)	Maximum Volume Stored (cu.m)
AREA I (Uncontrolled Flow Off Site)	-	-	9.00	-	-
AREA II	-	-	22.91	309.75	309.75
TOTAL	31.90	241.71	31.90	309.75	309.75

5-YEAR EVENT

Drainage Area	Maximum Allowable Release Rate (L/s)	Minimum Storage Volume Required (cu.m)	Maximum Release Rate (L/s)	Maximum Volume Required (cu.m)	Maximum Volume Stored (cu.m)
AREA I (Uncontrolled Flow Off Site)	-	-	4.20	-	-
AREA II	-	-	22.58	135.79	135.79
TOTAL	31.90	241.71	26.78	135.79	135.79

SUMMARY TABLES

(additional storm events as required by MTO)

2-YEAR EVENT

Drainage Area	Maximum Allowable Release Rate (L/s)	Minimum Storage Volume Required (cu.m)	Maximum Release Rate (L/s)	Maximum Volume Required (cu.m)	Maximum Volume Stored (cu.m)
AREA I (Uncontrolled Flow Off Site)	-	-	3.10	-	-
AREA II	-	-	22.33	91.44	91.44
TOTAL	31.90	241.71	25.43	91.44	91.44

10-YEAR EVENT

Drainage Area	Maximum Allowable Release Rate (L/s)	Minimum Storage Volume Required (cu.m)	Maximum Release Rate (L/s)	Maximum Volume Required (cu.m)	Maximum Volume Stored (cu.m)
AREA I (Uncontrolled Flow Off Site)	-	-	4.92	-	-
AREA II	-	-	22.67	166.46	166.46
TOTAL	31.90	241.71	27.59	166.46	166.46

SUMMARY TABLES

(additional storm events as required by MTO - continued)

25-YEAR EVENT

Drainage Area	Maximum Allowable Release Rate (L/s)	Minimum Storage Volume Required (cu.m)	Maximum Release Rate (L/s)	Maximum Volume Required (cu.m)	Maximum Volume Stored (cu.m)
AREA I (Uncontrolled Flow Off Site)	-	-	6.42	-	-
AREA II	-	-	22.80	233.27	233.27
TOTAL	31.90	241.71	29.22	233.27	233.27

50-YEAR EVENT

Drainage Area	Maximum Allowable Release Rate (L/s)	Minimum Storage Volume Required (cu.m)	Maximum Release Rate (L/s)	Maximum Volume Required (cu.m)	Maximum Volume Stored (cu.m)
AREA I (Uncontrolled Flow Off Site)	-	-	7.81	-	-
AREA II	-	-	22.86	272.01	272.01
TOTAL	31.90	241.71	30.67	272.01	272.01

November 12, 2025

2500 Palladium Dr

Ottawa, Ontario

STORMWATER MANAGEMENT CALCULATIONS
Modified Rational Method

100-YEAR EVENT

MAXIMUM ALLOWABLE RELEASE RATE

As per SWM report prepared by J.L. Richards & Associates Limited,
there is a maximum release rate of 84L/s per lot for the 100yr storm

Lot 4 area:	19022	sq.m
Development area:	7223	sq.m
Percentage of Lot 4 being developed:	38%	
Maximum allowable release rate for developed area:	31.90	L/s

STORAGE VOLUME REQUIREMENT

As per SWM report prepared by J.L. Richards & Associates Limited,
there is an on-site storage volume requirement based on post-development areas

			C	A x C
Roof Area:	0.0853	ha	1.00	0.085
Hard Area:	0.4922	ha	0.90	0.443
Soft Area:	0.1448	ha	0.20	0.029
Total Catchment Area:	0.7223	ha	0.77	0.557

Volume if A x C <1.6 = (632.094 x "A x C") - 110.52

Volume if A x C >1.6 = $10^{(("A \times C" \times 0.3437)+2.4051)}$

Storage volume Required= 241.71 cu.m

DRAINAGE AREA I (Uncontrolled Flow Off Site)

(100-YEAR EVENT)

			C
Roof Area:	0	sq.m	1.00
Hard Area:	0	sq.m	1.00
Gravel Area:	0	sq.m	1.00
Soft Area:	725	sq.m	0.25
Total Catchment Area:	725	sq.m	0.25
Area (A):	725	sq.m	
Time of Concentration:	10	min	
Rainfall Intensity (i):	179	mm/hr	
Runoff Coeficient (C):	0.25		
Flow Rate (2.78AiC):	9.00	L/s	

DRAINAGE AREA II

(100-YEAR EVENT)

			C
Roof Area:	853	sq.m	1.00
Hard Area:	4,922	sq.m	1.00
Gravel Area:	0	sq.m	1.00
Soft Area:	723	sq.m	0.25
Total Catchment Area:	6,498	sq.m	0.92

Water Elevation:	103.40	m
Head:	2.58	m
Centroid of ICD Orifice: (ICD in Outlet Pipe of CB/MH-15)	100.82	m
Invert of Outlet Pipe of CB/MH-15:	100.78	m
Orifice Diameter:	82	mm
Orifice Area:	5,281	sq.mm
Discharge Coefficient:	0.61	
Maximum Release Rate:	22.91	L/s

CB/MH	Top Area (sq.m)	Depth (m)	Volume	
CB-1	275	0.20	18.19	cu.m
CB-2	248	0.20	16.37	cu.m
CB-3	252	0.20	16.63	cu.m
CB-4	166	0.16	8.78	cu.m
CB-5	689	0.20	45.55	cu.m
CB/MH-6	235	0.20	15.53	cu.m
CB-8	381	0.20	25.21	cu.m
CB/MH-9	143	0.15	7.05	cu.m
CB-10	215	0.20	14.23	cu.m
CB-11	132	0.20	8.71	cu.m
CB/MH-12	176	0.17	9.90	cu.m
CB-13	169	0.20	11.18	cu.m
CB/MH-14	82	0.14	3.78	cu.m
CB/MH-15	376	0.20	24.82	cu.m

Chamber Storage

No. of Chambers	Volume Per Chamber	No. of Rows	No. of End Caps	Volume Per End Cap	Volume	
7	3.22	1	2	0.43	23.40	cu.m

Clear Stone Storage

Length	Width	Depth	Volume	40% Voids	
16.891	2.576	1.46	40.13	16.05	cu.m

DRAINAGE AREA II (Continued)

(100-YEAR EVENT)

CB/MH Storage

CB/MH	Invert	Size	Volume	
CB-1	101.12	0.61	0.85	cu.m
CB-2	101.10	0.61	0.86	cu.m
CB-3	101.13	0.61	0.84	cu.m
CB-4	101.04	0.61	0.88	cu.m
CB-5	101.02	0.61	0.88	cu.m
CB/MH-6	101.03	1.219	2.76	cu.m
CB/MH-7	101.24	1.219	2.52	cu.m
CB-8	100.97	0.61	0.90	cu.m
CB/MH-9	100.89	1.219	2.93	cu.m
CB-10	101.21	0.61	0.81	cu.m
CB-11	101.06	0.61	0.87	cu.m
CB/MH-12	101.24	1.219	2.52	cu.m
CB-13	100.90	0.61	0.93	cu.m
CB/MH-14	100.93	1.219	2.88	cu.m
CB/MH-15	100.78	1.219	3.06	cu.m

Pipe Storage

From	Invert	To	Invert	Length	Diameter	Volume	
CB-1	101.12	CB/MH-6	101.03	19.1	250	0.94	cu.m
CB-2	101.10	pipe	101.20	15.6	250	0.77	cu.m
CB-3	101.13	pipe	100.98	31.4	250	1.54	cu.m
CB-4	101.04	pipe	101.01	4.3	250	0.21	cu.m
CB-5	101.02	pipe	100.95	14.4	250	0.71	cu.m
CB/MH-6	101.03	CB/MH-9	100.89	39.0	300	2.76	cu.m
CB-8	100.97	pipe	100.92	9.2	250	0.45	cu.m
CB/MH-9	100.89	CB/MH-15	100.78	39.3	375	4.34	cu.m
CB-10	101.21	pipe	101.16	9.5	250	0.47	cu.m
CB-11	101.06	pipe	101.00	9.4	250	0.46	cu.m
CB/MH-12	101.24	CB/MH-14	100.93	70.3	250	3.45	cu.m
CB-13	100.90	pipe	100.87	4.6	250	0.23	cu.m
CB/MH-14	100.93	CB/MH-15	100.78	34.0	250	1.67	cu.m
CB/MH-7	101.24	CB/MH-9	101.20	17.1	375	1.89	cu.m

Maximum Volume Stored: 309.75 cu.m

Maximum Volume Required: 309.75 cu.m

DRAINAGE AREA II (Continued)

(100-YEAR EVENT)

Time (min)	i (mm/hr)	2.78AiC (L/s)	50% of ICD Release Rate (L/s)	Stored Rate (L/s)	Required Storage Volume (cu.m)
10	179	295.64	11.45	284.19	170.51
15	143	236.59	11.45	225.14	202.62
20	120	198.60	11.45	187.15	224.58
25	104	171.94	11.45	160.49	240.73
30	92	152.11	11.45	140.65	253.17
35	83	136.73	11.45	125.27	263.07
40	75	124.42	11.45	112.96	271.11
45	69	114.33	11.45	102.87	277.76
50	64	105.89	11.45	94.43	283.30
55	60	98.72	11.45	87.27	287.98
60	56	92.54	11.45	81.09	291.93
65	53	87.17	11.45	75.71	295.28
70	50	82.44	11.45	70.98	298.13
75	47	78.24	11.45	66.79	300.54
80	45	74.49	11.45	63.04	302.58
85	43	71.12	11.45	59.66	304.29
90	41	68.07	11.45	56.61	305.71
95	39	65.29	11.45	53.84	306.88
100	38	62.76	11.45	51.30	307.81
105	36	60.43	11.45	48.97	308.54
110	35	58.28	11.45	46.83	309.08
115	34	56.30	11.45	44.85	309.46
120	33	54.46	11.45	43.01	309.67
125	32	52.75	11.45	41.30	309.75
130	31	51.16	11.45	39.70	309.69
135	30	49.67	11.45	38.21	309.52
140	29	48.27	11.45	36.81	309.23
145	28	46.95	11.45	35.50	308.84
150	28	45.72	11.45	34.26	308.35
180	24	39.58	11.45	28.12	303.71
210	21	35.01	11.45	23.56	296.79
240	19	31.47	11.45	20.01	288.20
270	17	28.63	11.45	17.18	278.33
300	16	26.31	11.45	14.86	267.44
360	14	22.72	11.45	11.26	243.32
420	12	20.06	11.45	8.61	216.87
480	11	18.01	11.45	6.55	188.68
540	10	16.37	11.45	4.91	159.16
600	9	15.03	11.45	3.57	128.57
660	8	13.91	11.45	2.45	97.10
720	8	12.96	11.45	1.50	64.90
780	7	12.14	11.45	0.69	32.09
840	7	11.43	11.43	0.00	0.00
900	7	10.80	10.80	0.00	0.00

5-YEAR EVENT

DRAINAGE AREA I (Uncontrolled Flow Off Site)

(5-YEAR EVENT)

			C
Roof Area:	0	sq.m	0.90
Hard Area:	0	sq.m	0.90
Gravel Area:	0	sq.m	0.80
Soft Area:	725	sq.m	0.20
Total Catchment Area:	725	sq.m	0.20
Area (A):	725	sq.m	
Time of Concentration:	10	min	
Rainfall Intensity (i):	104	mm/hr	
Runoff Coeficient (C):	0.20		
Flow Rate (2.78AiC):	4.20	L/s	

DRAINAGE AREA II

(5-YEAR EVENT)

			C
Roof Area:	853	sq.m	0.90
Hard Area:	4,922	sq.m	0.90
Gravel Area:	0	sq.m	0.80
Soft Area:	723	sq.m	0.20
Total Catchment Area:	6,498	sq.m	0.82

Water Elevation:	103.32	m
Head:	2.50	m
Centroid of ICD Orifice: (ICD in Outlet Pipe of CB/MH-15)	100.82	m
Invert of Outlet Pipe of CB/MH-15:	100.78	m
Orifice Diameter:	82	mm
Orifice Area:	5,281	sq.mm
Discharge Coefficient:	0.61	
Maximum Release Rate:	22.58	L/s

CB/MH	Top Area (sq.m)	Depth (m)	Volume	
CB-1	125	0.12	5.21	cu.m
CB-2	102	0.12	4.26	cu.m
CB-3	100	0.12	4.14	cu.m
CB-4	48	0.08	1.35	cu.m
CB-5	273	0.12	11.33	cu.m
CB/MH-6	89	0.12	3.70	cu.m
CB-8	151	0.12	6.27	cu.m
CB/MH-9	36	0.07	0.90	cu.m
CB-10	102	0.12	4.22	cu.m
CB-11	190	0.12	7.91	cu.m
CB/MH-12	25	0.09	0.79	cu.m
CB-13	14	0.12	0.57	cu.m
CB/MH-14	18	0.06	0.39	cu.m
CB/MH-15	41	0.12	1.69	cu.m

Chamber Storage

No. of Chambers	Volume Per Chamber	No. of Rows	No. of End Caps	Volume Per End Cap	Volume	
7	3.22	1	2	0.43	23.40	cu.m

Clear Stone Storage

Length	Width	Depth	Volume	40% Voids	
16.891	2.576	1.46	40.13	16.05	cu.m

DRAINAGE AREA II (Continued)

(5-YEAR EVENT)

CB/MH Storage

CB/MH	Invert	Size	Volume	
CB-1	101.12	0.61	0.82	cu.m
CB-2	101.10	0.61	0.83	cu.m
CB-3	101.13	0.61	0.82	cu.m
CB-4	101.04	0.61	0.85	cu.m
CB-5	101.02	0.61	0.86	cu.m
CB/MH-6	101.03	1.22	2.68	cu.m
CB/MH-7	101.24	1.22	2.43	cu.m
CB-8	100.97	0.61	0.88	cu.m
CB/MH-9	100.89	1.22	2.84	cu.m
CB-10	101.21	0.61	0.79	cu.m
CB-11	101.06	0.61	0.84	cu.m
CB/MH-12	101.24	1.22	2.43	cu.m
CB-13	100.90	0.61	0.90	cu.m
CB/MH-14	100.93	1.22	2.79	cu.m
CB/MH-15	100.78	1.22	2.97	cu.m

Pipe Storage

From	Invert	To	Invert	Length	Diameter	Volume	
CB-1	101.12	CB/MH-6	101.03	19.1	250	0.94	cu.m
CB-2	101.10	pipe	101.20	15.6	250	0.77	cu.m
CB-3	101.13	pipe	100.98	31.4	250	1.54	cu.m
CB-4	101.04	pipe	101.01	4.3	250	0.21	cu.m
CB-5	101.02	pipe	100.95	14.4	250	0.71	cu.m
CB/MH-6	101.03	CB/MH-9	100.89	39.0	300	2.76	cu.m
CB-8	100.97	pipe	100.92	9.2	250	0.45	cu.m
CB/MH-9	100.89	CB/MH-15	100.78	39.3	375	4.34	cu.m
CB-10	101.21	pipe	101.16	9.5	250	0.47	cu.m
CB-11	101.06	pipe	101.00	9.4	250	0.46	cu.m
CB/MH-12	101.24	CB/MH-14	100.93	70.3	250	3.45	cu.m
CB-13	100.90	pipe	100.87	4.6	250	0.23	cu.m
CB/MH-14	100.93	CB/MH-15	100.78	34.0	250	1.67	cu.m
CB/MH-7	101.24	CB/MH-9	101.20	17.1	375	1.89	cu.m

Maximum Volume Stored: 135.79 cu.m

Maximum Volume Required: 135.79 cu.m

DRAINAGE AREA II (Continued)

(5-YEAR EVENT)

Time (min)	i (mm/hr)	2.78AiC (L/s)	50% of ICD Release Rate (L/s)	Stored Rate (L/s)	Required Storage Volume (cu.m)
10	104	154.74	11.29	143.45	86.07
15	84	124.09	11.29	112.80	101.52
20	70	104.33	11.29	93.04	111.65
25	61	90.44	11.29	79.15	118.72
30	54	80.09	11.29	68.80	123.84
35	49	72.05	11.29	60.76	127.61
40	44	65.62	11.29	54.33	130.39
45	41	60.34	11.29	49.05	132.43
50	38	55.92	11.29	44.63	133.89
55	35	52.16	11.29	40.87	134.88
60	33	48.92	11.29	37.64	135.49
65	31	46.10	11.29	34.81	135.77
70	29	43.62	11.29	32.33	135.79
75	28	41.42	11.29	30.13	135.58
80	27	39.45	11.29	28.16	135.16
85	25	37.67	11.29	26.39	134.57
90	24	36.07	11.29	24.78	133.82
95	23	34.61	11.29	23.32	132.94
100	22	33.28	11.29	21.99	131.93
105	22	32.05	11.29	20.76	130.81
110	21	30.92	11.29	19.63	129.59
115	20	29.88	11.29	18.59	128.27
120	19	28.91	11.29	17.62	126.88
125	19	28.01	11.29	16.72	125.41
130	18	27.17	11.29	15.88	123.87
135	18	26.38	11.29	15.09	122.26
140	17	25.65	11.29	14.36	120.59
145	17	24.95	11.29	13.66	118.87
150	16	24.30	11.29	13.01	117.09
180	14	21.06	11.29	9.77	105.51
210	13	18.65	11.29	7.36	92.70
240	11	16.77	11.29	5.48	78.97
270	10	15.27	11.29	3.98	64.55
300	9	14.04	11.29	2.75	49.58
360	8	12.14	11.29	0.85	18.36
420	7	10.73	10.73	0.00	0.00
480	6	9.64	9.64	0.00	0.00
540	6	8.77	8.77	0.00	0.00
600	5	8.05	8.05	0.00	0.00
660	5	7.46	7.46	0.00	0.00
720	5	6.95	6.95	0.00	0.00
780	4	6.52	6.52	0.00	0.00
840	4	6.14	6.14	0.00	0.00
900	4	5.80	5.80	0.00	0.00

2-YEAR EVENT

DRAINAGE AREA I (Uncontrolled Flow Off Site)

(2-YEAR EVENT)

			C
Roof Area:	0	sq.m	0.90
Hard Area:	0	sq.m	0.90
Gravel Area:	0	sq.m	0.80
Soft Area:	725	sq.m	0.20
Total Catchment Area:	725	sq.m	0.20
Area (A):	725	sq.m	
Time of Concentration:	10	min	
Rainfall Intensity (i):	77	mm/hr	
Runoff Coeficient (C):	0.20		
Flow Rate (2.78AiC):	3.10	L/s	

DRAINAGE AREA II

(2-YEAR EVENT)

			C
Roof Area:	853	sq.m	0.90
Hard Area:	4,922	sq.m	0.90
Gravel Area:	0	sq.m	0.80
Soft Area:	723	sq.m	0.20
Total Catchment Area:	6,498	sq.m	0.82

Water Elevation:	103.27	m
Head:	2.45	m
Centroid of ICD Orifice: (ICD in Outlet Pipe of CB/MH-15)	100.82	m
Invert of Outlet Pipe of CB/MH-15:	100.78	m
Orifice Diameter:	82	mm
Orifice Area:	5,281	sq.mm
Discharge Coefficient:	0.61	
Maximum Release Rate:	22.33	L/s

CB/MH	Top Area (sq.m)	Depth (m)	Volume	
CB-1	40	0.07	0.93	cu.m
CB-2	32	0.07	0.76	cu.m
CB-3	32	0.07	0.74	cu.m
CB-4	6	0.03	0.06	cu.m
CB-5	86	0.07	2.02	cu.m
CB/MH-6	28	0.07	0.66	cu.m
CB-8	48	0.07	1.12	cu.m
CB/MH-9	3	0.02	0.02	cu.m
CB-10	32	0.07	0.75	cu.m
CB-11	60	0.07	1.41	cu.m
CB/MH-12	4	0.04	0.06	cu.m
CB-13	4	0.07	0.10	cu.m
CB/MH-14	0	0.01	0.00	cu.m
CB/MH-15	13	0.07	0.30	cu.m

Chamber Storage

No. of Chambers	Volume Per Chamber	No. of Rows	No. of End Caps	Volume Per End Cap	Volume	
7	3.22	1	2	0.43	23.40	cu.m

Clear Stone Storage

Length	Width	Depth	Volume	40% Voids	
16.891	2.576	1.46	40.13	16.05	cu.m

DRAINAGE AREA II (Continued)

(2-YEAR EVENT)

CB/MH Storage

CB/MH	Invert	Size	Volume	
CB-1	101.12	0.61	0.80	cu.m
CB-2	101.10	0.61	0.81	cu.m
CB-3	101.13	0.61	0.80	cu.m
CB-4	101.04	0.61	0.83	cu.m
CB-5	101.02	0.61	0.84	cu.m
CB/MH-6	101.03	1.22	2.61	cu.m
CB/MH-7	101.24	1.22	2.37	cu.m
CB-8	100.97	0.61	0.86	cu.m
CB/MH-9	100.89	1.22	2.78	cu.m
CB-10	101.21	0.61	0.77	cu.m
CB-11	101.06	0.61	0.82	cu.m
CB/MH-12	101.24	1.22	2.37	cu.m
CB-13	100.90	0.61	0.88	cu.m
CB/MH-14	100.93	1.22	2.73	cu.m
CB/MH-15	100.78	1.22	2.91	cu.m

Pipe Storage

From	Invert	To	Invert	Length	Diameter	Volume	
CB-1	101.12	CB/MH-6	101.03	19.1	250	0.94	cu.m
CB-2	101.10	pipe	101.20	15.6	250	0.77	cu.m
CB-3	101.13	pipe	100.98	31.4	250	1.54	cu.m
CB-4	101.04	pipe	101.01	4.3	250	0.21	cu.m
CB-5	101.02	pipe	100.95	14.4	250	0.71	cu.m
CB/MH-6	101.03	CB/MH-9	100.89	39.0	300	2.76	cu.m
CB-8	100.97	pipe	100.92	9.2	250	0.45	cu.m
CB/MH-9	100.89	CB/MH-15	100.78	39.3	375	4.34	cu.m
CB-10	101.21	pipe	101.16	9.5	250	0.47	cu.m
CB-11	101.06	pipe	101.00	9.4	250	0.46	cu.m
CB/MH-12	101.24	CB/MH-14	100.93	70.3	250	3.45	cu.m
CB-13	100.90	pipe	100.87	4.6	250	0.23	cu.m
CB/MH-14	100.93	CB/MH-15	100.78	34.0	250	1.67	cu.m
CB/MH-7	101.24	CB/MH-9	101.20	17.1	375	1.89	cu.m

Maximum Volume Stored: 91.44 cu.m

Maximum Volume Required: 91.44 cu.m

DRAINAGE AREA II (Continued)

(2-YEAR EVENT)

Time (min)	i (mm/hr)	2.78AiC (L/s)	50% of ICD Release Rate (L/s)	Stored Rate (L/s)	Required Storage Volume (cu.m)
10	77	114.06	11.17	102.90	61.74
15	62	91.73	11.17	80.57	72.51
20	52	77.27	11.17	66.11	79.33
25	45	67.08	11.17	55.91	83.87
30	40	59.47	11.17	48.30	86.95
35	36	53.55	11.17	42.39	89.01
40	33	48.81	11.17	37.64	90.34
45	30	44.91	11.17	33.74	91.11
50	28	41.64	11.17	30.48	91.44
55	26	38.87	11.17	27.70	91.41
60	25	36.47	11.17	25.30	91.10
65	23	34.38	11.17	23.22	90.54
70	22	32.54	11.17	21.38	89.78
75	21	30.91	11.17	19.74	88.85
80	20	29.45	11.17	18.28	87.76
85	19	28.13	11.17	16.97	86.54
90	18	26.94	11.17	15.78	85.20
95	17	25.86	11.17	14.70	83.76
100	17	24.87	11.17	13.70	82.23
105	16	23.96	11.17	12.79	80.61
110	16	23.12	11.17	11.96	78.91
115	15	22.35	11.17	11.18	77.14
120	15	21.63	11.17	10.46	75.32
125	14	20.96	11.17	9.79	73.43
130	14	20.33	11.17	9.17	71.49
135	13	19.75	11.17	8.58	69.50
140	13	19.20	11.17	8.03	67.46
145	13	18.68	11.17	7.52	65.38
150	12	18.20	11.17	7.03	63.26
180	11	15.78	11.17	4.62	49.85
210	9	13.98	11.17	2.82	35.50
240	8	12.59	11.17	1.42	20.45
270	8	11.47	11.17	0.30	4.88
300	7	10.55	10.55	0.00	0.00
360	6	9.12	9.12	0.00	0.00
420	5	8.07	8.07	0.00	0.00
480	5	7.25	7.25	0.00	0.00
540	4	6.60	6.60	0.00	0.00
600	4	6.07	6.07	0.00	0.00
660	4	5.62	5.62	0.00	0.00
720	4	5.24	5.24	0.00	0.00
780	3	4.91	4.91	0.00	0.00
840	3	4.63	4.63	0.00	0.00
900	3	4.38	4.38	0.00	0.00

10-YEAR EVENT

DRAINAGE AREA I (Uncontrolled Flow Off Site)

(10-YEAR EVENT)

			C
Roof Area:	0	sq.m	0.90
Hard Area:	0	sq.m	0.90
Gravel Area:	0	sq.m	0.80
Soft Area:	725	sq.m	0.20
Total Catchment Area:	725	sq.m	0.20
Area (A):	725	sq.m	
Time of Concentration:	10	min	
Rainfall Intensity (i):	122	mm/hr	
Runoff Coeficient (C):	0.20		
Flow Rate (2.78AiC):	4.92	L/s	

DRAINAGE AREA II

(10-YEAR EVENT)

			C
Roof Area:	853	sq.m	0.90
Hard Area:	4,922	sq.m	0.90
Gravel Area:	0	sq.m	0.80
Soft Area:	723	sq.m	0.20
Total Catchment Area:	6,498	sq.m	0.82

Water Elevation:	103.34	m
Head:	2.52	m
Centroid of ICD Orifice: (ICD in Outlet Pipe of CB/MH-15)	100.82	m
Invert of Outlet Pipe of CB/MH-15:	100.78	m
Orifice Diameter:	82	mm
Orifice Area:	5,281	sq.mm
Discharge Coefficient:	0.61	
Maximum Release Rate:	22.67	L/s

CB/MH	Top Area (sq.m)	Depth (m)	Volume	
CB-1	168	0.14	8.09	cu.m
CB-2	137	0.14	6.62	cu.m
CB-3	134	0.14	6.43	cu.m
CB-4	72	0.10	2.52	cu.m
CB-5	366	0.14	17.61	cu.m
CB/MH-6	119	0.14	5.74	cu.m
CB-8	202	0.14	9.75	cu.m
CB/MH-9	58	0.09	1.82	cu.m
CB-10	136	0.14	6.56	cu.m
CB-11	255	0.14	12.29	cu.m
CB/MH-12	36	0.11	1.39	cu.m
CB-13	19	0.14	0.89	cu.m
CB/MH-14	31	0.08	0.86	cu.m
CB/MH-15	55	0.14	2.63	cu.m

Chamber Storage

No. of Chambers	Volume Per Chamber	No. of Rows	No. of End Caps	Volume Per End Cap	Volume	
7	3.22	1	2	0.43	23.40	cu.m

Clear Stone Storage

Length	Width	Depth	Volume	40% Voids	
16.891	2.576	1.46	40.13	16.05	cu.m

DRAINAGE AREA II (Continued)

(10-YEAR EVENT)

CB/MH Storage

CB/MH	Invert	Size	Volume	
CB-1	101.12	0.61	0.83	cu.m
CB-2	101.10	0.61	0.84	cu.m
CB-3	101.13	0.61	0.82	cu.m
CB-4	101.04	0.61	0.86	cu.m
CB-5	101.02	0.61	0.86	cu.m
CB/MH-6	101.03	1.22	2.70	cu.m
CB/MH-7	101.24	1.22	2.46	cu.m
CB-8	100.97	0.61	0.88	cu.m
CB/MH-9	100.89	1.22	2.86	cu.m
CB-10	101.21	0.61	0.79	cu.m
CB-11	101.06	0.61	0.85	cu.m
CB/MH-12	101.24	1.22	2.46	cu.m
CB-13	100.90	0.61	0.91	cu.m
CB/MH-14	100.93	1.22	2.82	cu.m
CB/MH-15	100.78	1.22	2.99	cu.m

Pipe Storage

From	Invert	To	Invert	Length	Diameter	Volume	
CB-1	101.12	CB/MH-6	101.03	19.1	250	0.94	cu.m
CB-2	101.10	pipe	101.20	15.6	250	0.77	cu.m
CB-3	101.13	pipe	100.98	31.4	250	1.54	cu.m
CB-4	101.04	pipe	101.01	4.3	250	0.21	cu.m
CB-5	101.02	pipe	100.95	14.4	250	0.71	cu.m
CB/MH-6	101.03	CB/MH-9	100.89	39.0	300	2.76	cu.m
CB-8	100.97	pipe	100.92	9.2	250	0.45	cu.m
CB/MH-9	100.89	CB/MH-15	100.78	39.3	375	4.34	cu.m
CB-10	101.21	pipe	101.16	9.5	250	0.47	cu.m
CB-11	101.06	pipe	101.00	9.4	250	0.46	cu.m
CB/MH-12	101.24	CB/MH-14	100.93	70.3	250	3.45	cu.m
CB-13	100.90	pipe	100.87	4.6	250	0.23	cu.m
CB/MH-14	100.93	CB/MH-15	100.78	34.0	250	1.67	cu.m
CB/MH-7	101.24	CB/MH-9	101.20	17.1	375	1.89	cu.m

Maximum Volume Stored: 166.46 cu.m

Maximum Volume Required: 166.46 cu.m

DRAINAGE AREA II (Continued)

(10-YEAR EVENT)

Time (min)	i (mm/hr)	2.78AiC (L/s)	50% of ICD Release Rate (L/s)	Stored Rate (L/s)	Required Storage Volume (cu.m)
10	122	181.39	11.33	170.06	102.04
15	98	145.32	11.33	133.99	120.59
20	82	122.09	11.33	110.76	132.91
25	71	105.77	11.33	94.44	141.66
30	63	93.63	11.33	82.30	148.13
35	57	84.21	11.33	72.87	153.03
40	52	76.66	11.33	65.33	156.79
45	47	70.47	11.33	59.14	159.67
50	44	65.30	11.33	53.96	161.89
55	41	60.90	11.33	49.56	163.55
60	38	57.10	11.33	45.77	164.78
65	36	53.80	11.33	42.47	165.63
70	34	50.90	11.33	39.56	166.16
75	33	48.32	11.33	36.98	166.43
80	31	46.01	11.33	34.68	166.46
85	30	43.94	11.33	32.61	166.29
90	28	42.06	11.33	30.73	165.94
95	27	40.36	11.33	29.02	165.43
100	26	38.80	11.33	27.46	164.78
105	25	37.36	11.33	26.03	164.00
110	24	36.05	11.33	24.71	163.10
115	23	34.83	11.33	23.49	162.10
120	23	33.69	11.33	22.36	160.99
125	22	32.64	11.33	21.31	159.81
130	21	31.66	11.33	20.32	158.53
135	21	30.74	11.33	19.41	157.19
140	20	29.88	11.33	18.54	155.77
145	20	29.07	11.33	17.73	154.29
150	19	28.31	11.33	16.97	152.75
180	17	24.52	11.33	13.19	142.43
210	15	21.70	11.33	10.37	130.68
240	13	19.52	11.33	8.19	117.88
270	12	17.77	11.33	6.44	104.28
300	11	16.34	11.33	5.00	90.03
360	10	14.11	11.33	2.78	60.08
420	8	12.47	11.33	1.14	28.65
480	8	11.20	11.20	0.00	0.00
540	7	10.18	10.18	0.00	0.00
600	6	9.35	9.35	0.00	0.00
660	6	8.66	8.66	0.00	0.00
720	5	8.07	8.07	0.00	0.00
780	5	7.57	7.57	0.00	0.00
840	5	7.12	7.12	0.00	0.00
900	5	6.74	6.74	0.00	0.00

25-YEAR EVENT

DRAINAGE AREA I (Uncontrolled Flow Off Site)

(25-YEAR EVENT)

			C
Roof Area:	0	sq.m	0.99
Hard Area:	0	sq.m	0.99
Gravel Area:	0	sq.m	0.88
Soft Area:	725	sq.m	0.22
Total Catchment Area:	725	sq.m	0.22
Area (A):	725	sq.m	
Time of Concentration:	10	min	
Rainfall Intensity (i):	145	mm/hr	
Runoff Coeficient (C):	0.22		
Flow Rate (2.78AiC):	6.42	L/s	

DRAINAGE AREA II

(25-YEAR EVENT)

			C
Roof Area:	853	sq.m	0.99
Hard Area:	4,922	sq.m	0.99
Gravel Area:	0	sq.m	0.88
Soft Area:	723	sq.m	0.22
Total Catchment Area:	6,498	sq.m	0.90

Water Elevation:	103.37	m
Head:	2.55	m
Centroid of ICD Orifice: (ICD in Outlet Pipe of CB/MH-15)	100.82	m
Invert of Outlet Pipe of CB/MH-15:	100.78	m
Orifice Diameter:	82	mm
Orifice Area:	5,281	sq.mm
Discharge Coefficient:	0.61	
Maximum Release Rate:	22.80	L/s

CB/MH	Top Area (sq.m)	Depth (m)	Volume	
CB-1	245	0.17	14.28	cu.m
CB-2	201	0.17	11.68	cu.m
CB-3	195	0.17	11.35	cu.m
CB-4	120	0.13	5.39	cu.m
CB-5	534	0.17	31.07	cu.m
CB/MH-6	174	0.17	10.13	cu.m
CB-8	296	0.17	17.20	cu.m
CB/MH-9	101	0.12	4.18	cu.m
CB-10	199	0.17	11.58	cu.m
CB-11	373	0.17	21.69	cu.m
CB/MH-12	58	0.14	2.79	cu.m
CB-13	27	0.17	1.58	cu.m
CB/MH-14	56	0.11	2.15	cu.m
CB/MH-15	80	0.17	4.64	cu.m

Chamber Storage

No. of Chambers	Volume Per Chamber	No. of Rows	No. of End Caps	Volume Per End Cap	Volume	
7	3.22	1	2	0.43	23.40	cu.m

Clear Stone Storage

Length	Width	Depth	Volume	40% Voids	
16.891	2.576	1.46	40.13	16.05	cu.m

DRAINAGE AREA II (Continued)

(25-YEAR EVENT)

CB/MH Storage

CB/MH	Invert	Size	Volume	
CB-1	101.12	0.61	0.84	cu.m
CB-2	101.10	0.61	0.85	cu.m
CB-3	101.13	0.61	0.84	cu.m
CB-4	101.04	0.61	0.87	cu.m
CB-5	101.02	0.61	0.88	cu.m
CB/MH-6	101.03	1.22	2.74	cu.m
CB/MH-7	101.24	1.22	2.49	cu.m
CB-8	100.97	0.61	0.89	cu.m
CB/MH-9	100.89	1.22	2.90	cu.m
CB-10	101.21	0.61	0.81	cu.m
CB-11	101.06	0.61	0.86	cu.m
CB/MH-12	101.24	1.22	2.49	cu.m
CB-13	100.90	0.61	0.92	cu.m
CB/MH-14	100.93	1.22	2.85	cu.m
CB/MH-15	100.78	1.22	3.03	cu.m

Pipe Storage

From	Invert	To	Invert	Length	Diameter	Volume	
CB-1	101.12	CB/MH-6	101.03	19.1	250	0.94	cu.m
CB-2	101.10	pipe	101.20	15.6	250	0.77	cu.m
CB-3	101.13	pipe	100.98	31.4	250	1.54	cu.m
CB-4	101.04	pipe	101.01	4.3	250	0.21	cu.m
CB-5	101.02	pipe	100.95	14.4	250	0.71	cu.m
CB/MH-6	101.03	CB/MH-9	100.89	39.0	300	2.76	cu.m
CB-8	100.97	pipe	100.92	9.2	250	0.45	cu.m
CB/MH-9	100.89	CB/MH-15	100.78	39.3	375	4.34	cu.m
CB-10	101.21	pipe	101.16	9.5	250	0.47	cu.m
CB-11	101.06	pipe	101.00	9.4	250	0.46	cu.m
CB/MH-12	101.24	CB/MH-14	100.93	70.3	250	3.45	cu.m
CB-13	100.90	pipe	100.87	4.6	250	0.23	cu.m
CB/MH-14	100.93	CB/MH-15	100.78	34.0	250	1.67	cu.m
CB/MH-7	101.24	CB/MH-9	101.20	17.1	375	1.89	cu.m

Maximum Volume Stored: 233.27 cu.m

Maximum Volume Required: 233.27 cu.m

DRAINAGE AREA II (Continued)

(25-YEAR EVENT)

Time (min)	i (mm/hr)	2.78AiC (L/s)	50% of ICD Release Rate (L/s)	Stored Rate (L/s)	Required Storage Volume (cu.m)
10	145	236.37	11.40	224.97	134.98
15	116	189.22	11.40	177.82	160.04
20	97	158.88	11.40	147.48	176.97
25	84	137.58	11.40	126.17	189.26
30	75	121.73	11.40	110.32	198.58
35	67	109.43	11.40	98.03	205.87
40	61	99.59	11.40	88.19	211.66
45	56	91.53	11.40	80.13	216.34
50	52	84.78	11.40	73.38	220.14
55	48	79.05	11.40	67.65	223.23
60	45	74.11	11.40	62.71	225.75
65	43	69.81	11.40	58.41	227.78
70	40	66.02	11.40	54.62	229.42
75	38	62.67	11.40	51.27	230.70
80	37	59.67	11.40	48.27	231.68
85	35	56.97	11.40	45.57	232.40
90	33	54.53	11.40	43.13	232.89
95	32	52.31	11.40	40.91	233.17
100	31	50.28	11.40	38.88	233.27
105	30	48.42	11.40	37.02	233.20
110	29	46.70	11.40	35.30	232.98
115	28	45.11	11.40	33.71	232.62
120	27	43.64	11.40	32.24	232.14
125	26	42.27	11.40	30.87	231.55
130	25	41.00	11.40	29.60	230.85
135	24	39.80	11.40	28.40	230.06
140	24	38.68	11.40	27.28	229.17
145	23	37.63	11.40	26.23	228.20
150	22	36.64	11.40	25.24	227.16
180	19	31.73	11.40	20.32	219.50
210	17	28.07	11.40	16.67	210.02
240	15	25.23	11.40	13.83	199.18
270	14	22.96	11.40	11.56	187.32
300	13	21.10	11.40	9.70	174.64
360	11	18.22	11.40	6.82	147.40
420	10	16.09	11.40	4.69	118.27
480	9	14.45	11.40	3.05	87.75
540	8	13.13	11.40	1.73	56.15
600	7	12.06	11.40	0.66	23.70
660	7	11.16	11.16	0.00	0.00
720	6	10.40	10.40	0.00	0.00
780	6	9.75	9.75	0.00	0.00
840	6	9.18	9.18	0.00	0.00
900	5	8.68	8.68	0.00	0.00

50-YEAR EVENT

DRAINAGE AREA I (Uncontrolled Flow Off Site)

(50-YEAR EVENT)

			C
Roof Area:	0	sq.m	1.00
Hard Area:	0	sq.m	1.00
Gravel Area:	0	sq.m	0.96
Soft Area:	725	sq.m	0.24
Total Catchment Area:	725	sq.m	0.24
Area (A):	725	sq.m	
Time of Concentration:	10	min	
Rainfall Intensity (i):	161	mm/hr	
Runoff Coeficient (C):	0.24		
Flow Rate (2.78AiC):	7.81	L/s	

DRAINAGE AREA II

(50-YEAR EVENT)

			C
Roof Area:	853	sq.m	1.00
Hard Area:	4,922	sq.m	1.00
Gravel Area:	0	sq.m	0.96
Soft Area:	723	sq.m	0.24
Total Catchment Area:	6,498	sq.m	0.92

Water Elevation:	103.39	m
Head:	2.57	m
Centroid of ICD Orifice: (ICD in Outlet Pipe of CB/MH-15)	100.82	m
Invert of Outlet Pipe of CB/MH-15:	100.78	m
Orifice Diameter:	82	mm
Orifice Area:	5,281	sq.mm
Discharge Coefficient:	0.61	
Maximum Release Rate:	22.86	L/s

CB/MH	Top Area (sq.m)	Depth (m)	Volume	
CB-1	285	0.19	17.84	cu.m
CB-2	233	0.19	14.58	cu.m
CB-3	226	0.19	14.17	cu.m
CB-4	145	0.15	7.17	cu.m
CB-5	619	0.19	38.80	cu.m
CB/MH-6	202	0.19	12.65	cu.m
CB-8	343	0.19	21.47	cu.m
CB/MH-9	124	0.14	5.68	cu.m
CB-10	231	0.19	14.46	cu.m
CB-11	432	0.19	27.09	cu.m
CB/MH-12	69	0.16	3.65	cu.m
CB-13	31	0.19	1.97	cu.m
CB/MH-14	70	0.13	2.99	cu.m
CB/MH-15	92	0.19	5.79	cu.m

Chamber Storage

No. of Chambers	Volume Per Chamber	No. of Rows	No. of End Caps	Volume Per End Cap	Volume	
7	3.22	1	2	0.43	23.40	cu.m

Clear Stone Storage

Length	Width	Depth	Volume	40% Voids	
16.891	2.576	1.46	40.13	16.05	cu.m

DRAINAGE AREA II (Continued)

(50-YEAR EVENT)

CB/MH Storage

CB/MH	Invert	Size	Volume	
CB-1	101.12	0.61	0.84	cu.m
CB-2	101.10	0.61	0.85	cu.m
CB-3	101.13	0.61	0.84	cu.m
CB-4	101.04	0.61	0.87	cu.m
CB-5	101.02	0.61	0.88	cu.m
CB/MH-6	101.03	1.22	2.75	cu.m
CB/MH-7	101.24	1.22	2.51	cu.m
CB-8	100.97	0.61	0.90	cu.m
CB/MH-9	100.89	1.22	2.92	cu.m
CB-10	101.21	0.61	0.81	cu.m
CB-11	101.06	0.61	0.87	cu.m
CB/MH-12	101.24	1.22	2.51	cu.m
CB-13	100.90	0.61	0.93	cu.m
CB/MH-14	100.93	1.22	2.87	cu.m
CB/MH-15	100.78	1.22	3.04	cu.m

Pipe Storage

From	Invert	To	Invert	Length	Diameter	Volume	
CB-1	101.12	CB/MH-6	101.03	19.1	250	0.94	cu.m
CB-2	101.10	pipe	101.20	15.6	250	0.77	cu.m
CB-3	101.13	pipe	100.98	31.4	250	1.54	cu.m
CB-4	101.04	pipe	101.01	4.3	250	0.21	cu.m
CB-5	101.02	pipe	100.95	14.4	250	0.71	cu.m
CB/MH-6	101.03	CB/MH-9	100.89	39.0	300	2.76	cu.m
CB-8	100.97	pipe	100.92	9.2	250	0.45	cu.m
CB/MH-9	100.89	CB/MH-15	100.78	39.3	375	4.34	cu.m
CB-10	101.21	pipe	101.16	9.5	250	0.47	cu.m
CB-11	101.06	pipe	101.00	9.4	250	0.46	cu.m
CB/MH-12	101.24	CB/MH-14	100.93	70.3	250	3.45	cu.m
CB-13	100.90	pipe	100.87	4.6	250	0.23	cu.m
CB/MH-14	100.93	CB/MH-15	100.78	34.0	250	1.67	cu.m
CB/MH-7	101.24	CB/MH-9	101.20	17.1	375	1.89	cu.m

Maximum Volume Stored: 272.01 cu.m

Maximum Volume Required: 272.01 cu.m

DRAINAGE AREA II (Continued)

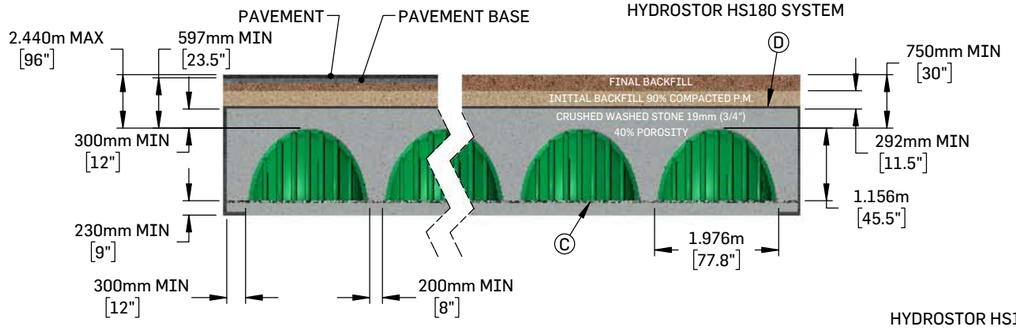
(50-YEAR EVENT)

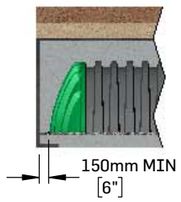
Time (min)	i (mm/hr)	2.78AiC (L/s)	50% of ICD Release Rate (L/s)	Stored Rate (L/s)	Required Storage Volume (cu.m)
10	161	267.02	11.43	255.59	153.35
15	129	213.69	11.43	202.26	182.03
20	108	179.38	11.43	167.95	201.54
25	94	155.30	11.43	143.87	215.80
30	83	137.38	11.43	125.95	226.71
35	75	123.49	11.43	112.06	235.32
40	68	112.37	11.43	100.94	242.26
45	62	103.26	11.43	91.83	247.94
50	58	95.64	11.43	84.21	252.62
55	54	89.16	11.43	77.73	256.52
60	51	83.59	11.43	72.16	259.76
65	48	78.73	11.43	67.30	262.46
70	45	74.46	11.43	63.03	264.71
75	43	70.67	11.43	59.24	266.56
80	41	67.28	11.43	55.85	268.08
85	39	64.23	11.43	52.80	269.30
90	37	61.48	11.43	50.05	270.26
95	36	58.97	11.43	47.54	270.98
100	34	56.68	11.43	45.25	271.50
105	33	54.58	11.43	43.15	271.84
110	32	52.64	11.43	41.21	272.00
115	31	50.85	11.43	39.42	272.01
120	30	49.19	11.43	37.76	271.88
125	29	47.65	11.43	36.22	271.62
130	28	46.21	11.43	34.78	271.25
135	27	44.86	11.43	33.43	270.76
140	26	43.59	11.43	32.16	270.18
145	26	42.41	11.43	30.98	269.50
150	25	41.29	11.43	29.86	268.73
180	22	35.74	11.43	24.31	262.59
210	19	31.62	11.43	20.19	254.38
240	17	28.42	11.43	16.99	244.67
270	16	25.86	11.43	14.43	233.80
300	14	23.76	11.43	12.33	222.01
360	12	20.52	11.43	9.09	196.32
420	11	18.12	11.43	6.69	168.52
480	10	16.26	11.43	4.83	139.15
540	9	14.78	11.43	3.35	108.58
600	8	13.57	11.43	2.14	77.04
660	8	12.56	11.43	1.13	44.71
720	7	11.70	11.43	0.27	11.72
780	7	10.96	10.96	0.00	0.00
840	6	10.32	10.32	0.00	0.00
900	6	9.76	9.76	0.00	0.00

A GENERIC MANUFACTURER'S SHEET THAT IS NOT SPECIFIC TO THIS PROJECT

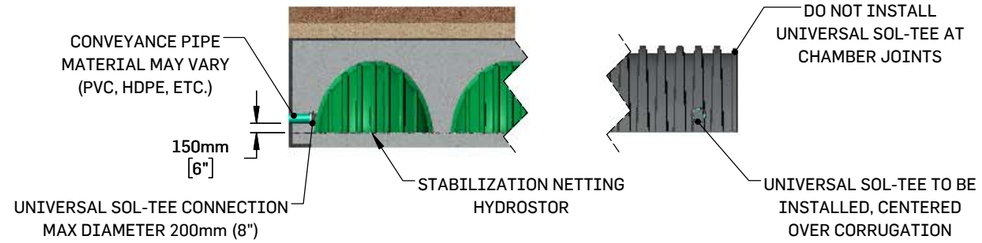
SOLENO HYDROSTOR HS180 SYSTEM

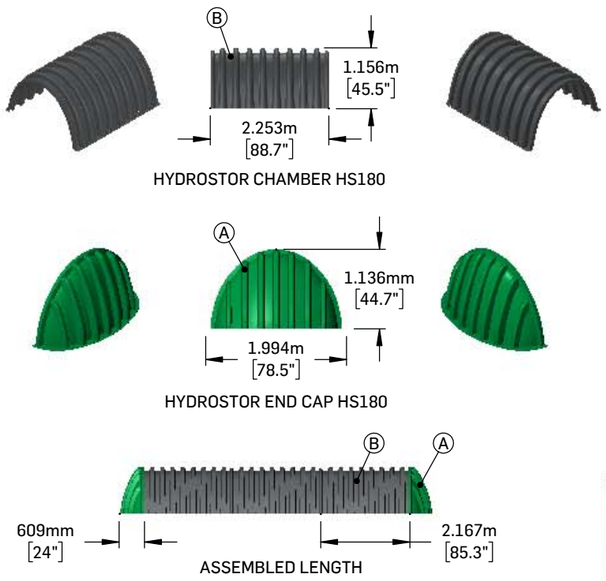
RECOMMENDED INSTALLATION OF
HYDROSTOR HS180 SYSTEM



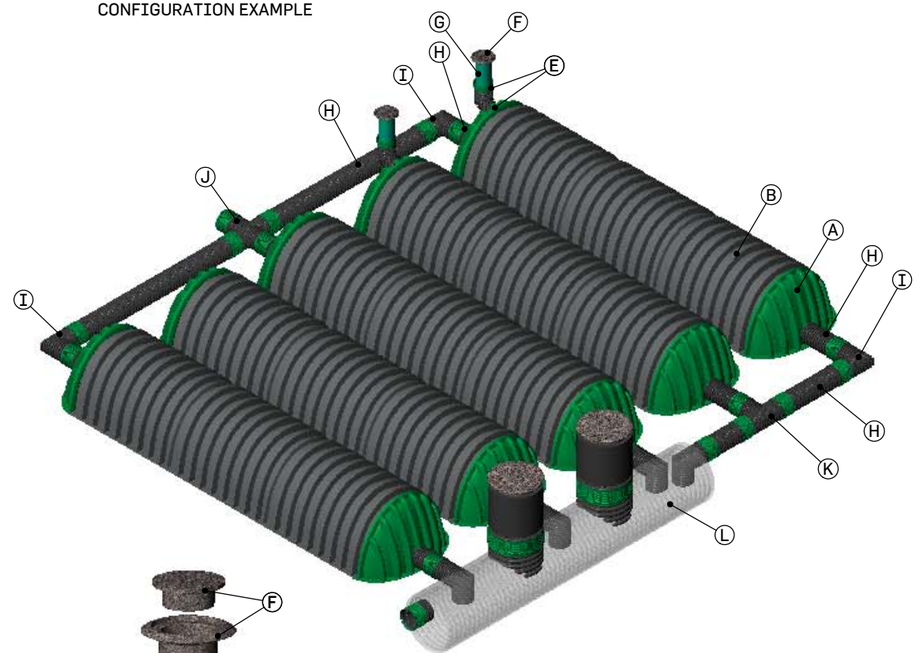


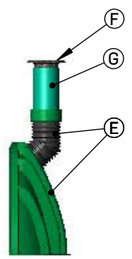
LATERAL UNIVERSAL SOL-TEE DETAIL





HYDROSTOR HS180
CONFIGURATION EXAMPLE





HYDROSTOR END CAP HS180 WITH WELDED ELBOW
SOLFLO MAX 250mm (10") FOR ACCESS WELL

ADJUSTABLE FRAME
AND COVER
250mm (10")

PART	DESCRIPTION
A	HYDROSTOR END CAP HS180
B	HYDROSTOR CHAMBER HS180
C	STABILIZATION NETTING HYDROSTOR
D	SOLENO TX-90 SEPARATION NONWOVEN GEOTEXTILE, ABOVE AND ON THE SIDES
E	HYDROSTOR END CAP HS180 WITH WELDED ELBOW SOLFLO MAX 250mm (10") FOR ACCESS WELL
F	ADJUSTABLE FRAME AND COVER 250mm (10")
G	PVC PIPE ACCESS WELL 250mm (10") (PROVIDED BY OTHERS)
H	STD LENGTH 6m (236") SOLFLO MAX 300mm (12")
I	ELBOW SOLFLO MAX 300mm (12")
J	CROSS SOLFLO MAX 300mm (12")
K	TEE SOLFLO MAX 300mm (12")
L	PRETREATEMENT UNIT

1. INSTALLATION MUST BE MADE IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.
2. SYSTEM IS DESIGNED TO WITHSTAND TRAFFIC LOAD CSA CL-625 AND AASHTO H-20.
3. HS180 CHAMBERS MUST BE MINIMALLY BACKFILLED WITH 300mm (12") OF CRUSHED STONE AND 292mm (11.5") OF GRANULAR MATERIAL COMPACTED AT 90% P.M.
4. HYDROSTOR GEOGRID FOR FOUNDATION STABILIZATION IS CONSIDERED UNDER ALL THE CHAMBERS.

2017-11-22

D.B. Gray Engineering Inc.

Stormwater Management - Grading & Drainage - Storm & Sanitary Sewers - Watermains

700 Long Point Circle
Ottawa, Ontario K1T 4E9

613-425-8044
d.gray@dbgrayengineering.com

STORM SEWER CALCULATIONS

nal Method

2-YEAR EVENT

2500 Palladium Dr
Ottawa, Ontario

August 27, 2025

Manning's Roughness Coefficient: 0.013

Location		Individual					Cumulative				Sewer Data							
From	To	Roof C = 0.90 (ha)	Hard C = 0.90 (ha)	Gravel C = 0.80 (ha)	Soft C = 0.20 (ha)	2.78AC	2.78AC	Time (min)	Rainfall Intensity (mm/hr)	Q Flow Rate (L/s)	Length (m)	Nominal Diameter (mm)	Actual Diameter (mm)	Slope (%)	Velocity (m/s)	Q_{Full} Capacity (L/s)	Time (min)	Q / Q_{Full}
CB-1	CB/MH-6		0.0480			0.1201	0.1201	10.00	77	9.2	19.1	250	251	0.43	0.80	39.4	0.4	0.23
CB-2	CB/MH-6		0.0257		0.0018	0.0653	0.0653	10.00	77	5.0	15.6	250	251	0.43	0.80	39.4	0.3	0.13
CB-3	CB/MH-6		0.0261		0.0098	0.0708	0.0708	10.00	77	5.4	31.4	250	251	0.43	0.80	39.4	0.7	0.14
CB-4	CB/MH-6	0.0105	0.0287			0.0981	0.0981	10.00	77	7.5	4.3	250	251	0.43	0.80	39.4	0.1	0.19
CB-5	CB/MH-6	0.0111	0.0814		0.0054	0.2344	0.2344	10.00	77	18.0	14.4	250	251	0.43	0.80	39.4	0.3	0.46
CB/MH-6	CB/MH-9		0.0242			0.0605	0.6492	10.66	74	48.3	39	300	299	0.34	0.80	55.9	0.8	0.86
CB-8	CB/MH-9	0.0345	0.0535		0.0155	0.2288	0.2288	10.00	77	17.6	9.2	250	251	0.43	0.80	39.4	0.2	0.45
CB/MH-7	CB/MH-9					0.0000	0.0000	10.00	77	0.0	17.1	375	366	0.26	0.80	83.8	0.4	0.00
CB/MH-9	CB/MH-15	0.0292	0.0272			0.1411	1.0191	11.47	72	72.9	39.3	375	366	0.26	0.80	83.8	0.8	0.87
CB-10	CB/MH-12		0.0477		0.0029	0.1210	0.1210	10.00	77	9.3	9.5	250	251	0.43	0.80	39.4	0.2	0.24
CB-11	CB/MH-12		0.0368		0.0073	0.0961	0.0961	10.00	77	7.4	9.4	250	251	0.43	0.80	39.4	0.2	0.19
CB/MH-12	CB/MH-14		0.0203		0.0019	0.0518	0.2689	10.20	76	20.5	70.3	250	251	0.43	0.80	39.4	1.5	0.52
CB-13	CB/MH-14		0.0201		0.0104	0.0561	0.0561	10.00	77	4.3	4.6	250	251	0.43	0.80	39.4	0.1	0.11
CB/MH-14	CB/MH-15		0.0101		0.0019	0.0263	0.3513	11.67	71	24.9	34	250	251	0.43	0.80	39.4	0.7	0.63
CB/MH-15	MH-16		0.0423		0.0155	0.1145	1.4849	12.38	69	102.1	19.7	375	366	0.4	0.99	103.9	0.3	0.98
							FLOW THROUGH ICD:			21.44	19.7	375	366	0.40	0.99	103.9	0.3	0.21
									Existing 375 mm Storm Service:			375	366	0.31	0.87	91.5		

Catchbasin, Catchbasin/Manhole & Manhole Sump Cleaning Maintenance Log

Location: 2500 Palladium Drive, Ottawa

Date	CB-1	CB-2	CB-3	CB-4	CB-5	CB/MH-6	CB/MH-7	CB-8	CB/MH-9	CB-10	CB-11	CB/MH-12	CB-13	CB/MH-14	CB/MH-15	MH-16	Inspector Name	Comments/Notes

Hydrostor Chambers Maintenance Log

Location: 2500 Palladium Drive, Ottawa

Access / Inspection Ports Manholes		Chambers		Manhole
		North Port	South Port	CB/MH-7
Date:	Invert Depth			
	Sediment Depth			
Inspector's Name:				
Maintenance Performed / Notes				
Date:	Invert Depth			
	Sediment Depth			
Inspector's Name:				
Maintenance Performed / Notes				
Date:	Invert Depth			
	Sediment Depth			
Inspector's Name:				
Maintenance Performed / Notes				
Date:	Invert Depth			
	Sediment Depth			
Inspector's Name:				
Maintenance Performed / Notes				

Inlet Control Device (ICD) Maintenance Log

Location: 2500 Palladium Drive, Ottawa

Date	ICD in CB/MH-15 Inspected for damage and blockages	Inspector's Name	Comments/Notes

Erosion & Sediment Control Maintenance Log

Location: 2500 Palladium Drive, Unit 4, Ottawa

Date	**Sediment Capture Filter Sock(s)** Inspect for sediment and damage at the end of each day. Remove sediment as per manufacturer's recommendations. Repair or replace damaged socks.	**Silt Fence Barriers** Inspect all silt fence barriers at the end of each day and after each rainfall. Remove sediment deposits when the level of deposits reaches one third the height of the fence. Immediately repair or replace any damaged sections of fence.	**Remove Material From Public Road** Inspect for material deposited on road and remove at the end of each day by sweeping, shoveling or vacuuming. Dispose of sediment in a controlled area.	Inspector's Name	Comments/Notes

APPENDIX D

PRE-CONSULTATION MEETING NOTES

File No.: PC2025-0052

March 25, 2025

Sheldon Creek Developments
Via email: josh@sheldoncreek.com

Subject: Pre-Consultation: Meeting Feedback
Proposed Site Plan Application – 2500 Palladium Drive

Please find below information regarding next steps as well as consolidated comments from the above-noted pre-consultation meeting held on March 6, 2025.

Pre-Consultation Preliminary Assessment

1 ☐	**2** ☐	**3** ☐	**4** ☒	**5** ☐

One (1) indicates that considerable major revisions are required while five (5) suggests that the proposal appears to meet the City's key land use policies and guidelines. This assessment is purely advisory and does not consider technical aspects of the proposal or in any way guarantee application approval.

Next Steps

1. A review of the proposal and materials submitted for the above-noted pre-consultation has been undertaken. Should you choose, proceed to complete a Phase 2 / Phase 3 Pre-consultation Application Form. Please submit this information together with the necessary studies and/or plans to planningcirculations@ottawa.ca.

2. In your subsequent pre-consultation submission, please ensure that all comments or issues detailed herein are addressed. A detailed cover letter stating how each issue has been addressed is requested with the submission materials. Please coordinate the numbering of your responses within the cover letter with the comment number(s) herein.

3. Please note, if your development proposal changes significantly in scope, design, or density it is recommended that a subsequent pre-consultation application be submitted.

Supporting Information and Material Requirements

1. The attached **Study and Plan Identification List** outlines the information and material that has been identified, during this phase of pre-consultation, as either required (R) or advised (A) as part of a future complete application submission.

    a. The required plans and studies must meet the City's Terms of Reference (ToR) and/or Guidelines, as available on Ottawa.ca. These ToR and Guidelines outline

the specific requirements that must be met for each plan or study to be deemed adequate.

Consultation with Technical Agencies

1. You are encouraged to consult with technical agencies early in the development process and throughout the development of your project concept. A list of technical agencies and their contact information is enclosed.

Planning

Comments:

Phasing

1. If the intention is for site plan to apply to the entire property (including Phase 2) then we will need interim measures that prevent the parking of vehicles on Phase 2 lands. Armourstone, which is already being used around the perimeter of the site, is a preferred measure over concrete barriers.

2. Consider the future conditions of both Phase 1 and 2 acting as one site in your planning of the first phase.

Landscaping

3. Per Table 188E (j) Only 25% of the frontage may be used for the display of vehicles, balance must be landscaped.

    a. I interpret the policy applying to the 'storage' of any vehicles as well. Unless the parking spaces are designated for employee parking, the 25% must be provided.

4. Where a yard is provided and not used for required driveways, aisles, parking or loading spaces, the whole yard must be landscaped.

5. Please include landscaped islands within the parking area and interspersed along the edges of the site, painted lines are not an acceptable alternative.

Misc.

6. Show snow storage areas on the site plan, ensuring that no required drive aisles, parking, or drainage areas are covered.

Urban Design

Comments:

Submission Requirements

7. An Urban Design Brief is required. Please see attached customized Terms of Reference to guide the preparation of the submission.

    a. The Urban Design Brief should be structured by generally following the headings highlighted under **Section 3 – Contents of these Terms of Reference**.
8. Additional drawings and studies are required as shown on the SPIL. Please follow the terms of reference (Planning application submission information and materials | City of Ottawa) to prepare these drawings and studies. These include:

    b. Landscape Plan.

Comments on Preliminary Design

9. The following element of the preliminary design are of concern:

    a. Volume of asphalt.

Recommendations

10. We recommend there be soil volume and a tree planted at the end of each line of stacked parking spaces on the site.

11. We recommend additional trees be planted in support of the screening along the ring road surrounding the site.

12. In reference to the future phase of the site which will be more public focused, we recommending finding additional ways to provide a fulsome landscaping scheme, especially around the pedestrian paths of travel, facing the public right of way, and around the main entrance of the future building.

13. We recommend additional landscaping be provided facing the street.

Engineering

Comments:

14. Stormwater Management:

    a. The site must reference to the existing stormwater management design report for the auto park for the stormwater management criteria for this specific site.

15. Sanitary Sewer:

a. There are known sanitary constraints within the local sanitary sewer. The auto park may be near capacity and should reference to the background studies along with recent developments within the auto park to demonstrate that there is adequate capacity. Further discussions with the City are strongly recommended if there are sanitary sewer upgrades that are required.

16. Water

    a. Water Boundary condition requests must include the location of the service (map or plan with connection location(s) indicated) and the expected loads required by the proposed development, including calculations. Please provide the following information:
        i. Location of service
        ii. Type of development
        iii. The amount of fire flow required (per OBC or FUS).
        iv. Average daily demand: ___ l/s.
        v. Maximum daily demand: ___l/s.
        vi. Maximum hourly daily demand: ___ l/s.
    b. Water boundary conditions will be provided at the City main and the consultant must anaylsis the private watermain system to ensure there is adequate pressure.

17. The grading and drainage should follow the approved grading plan of the business park, if applicable.

18. The geotechnical report should provide be completed as per the City of Ottawa Geotechnical Design Guidelines.

19. An MECP Environmental Compliance Approval Industrial Sewage Works may be required for the proposed development. A Ministry contact has been provided below but please work with City staff on the need of an application.

    a. Shannon Hamilton-Browne at (613) 521-3450 or Shannon.Hamilton-Browne@ontario.ca

Feel free to contact Rubina Rasool, Project Manager, for follow-up questions.

Noise

Comments:

20. As per the City's Noise Control Guidelines, it is best practice to address noise for the following types of spaces: general offices, reception areas, individual or semi-private office, and retail stores. It is therefore recommended to review the roadway noise for the site due to the proximity to Highway 417 and Palladium Dr

and to ensure mitigation is provided (as required) so that workers and visitors are not adversely affected.

Feel free to contact Josiane Gervais, TPM, for follow-up questions.

Transportation

Comments:

21. A Transportation Impact Assessment (TIA) is not required.

22. You are strongly encouraged to complete and submit the Transportation Demand Management Measures Checklist and the Transportation Demand Management Supportive Development Design and Infrastructure Checklist in support of the application.

23. ROW Protection:

    a. Ensure that the development proposal complies with the Right-of-Way protection requirements of the Official Plan's Schedule C16.

    b. Any requests for exceptions to ROW protection requirements must be discussed with Transportation Planning and concurrence provided by Transportation Planning management.

24. Nearby planned construction and infrastructure projects include road resurfacing is planned with a target start of 1-2 years along Palladium Dr between Convergence St and Huntmar.

25. As the proposed site is commercial, AODA legislation applies.

    a. Ensure all crosswalks located internally on the site provide a TWSI at the depressed curb, per requirements of the Integrated Accessibility Standards Regulation under the AODA.

    b. Clearly define accessible parking stalls and ensure they meet AODA standards (include an access aisle next to the parking stall and a pedestrian curb ramp at the end of the access aisle, as required).

    c. Please consider using the City's Accessibility Design Standards, which provide a summary of AODA requirements.

26. On site plan:

    a. Show all details of the roads abutting the site; include such items as pavement markings, signage, accesses, on-street parking, and/or sidewalks.

b. Turning movement diagrams recommended for internal movements (loading areas, garbage).

c. Show dimensions for site elements (i.e. lane/aisle widths, access width and throat length, parking stalls, sidewalks, pedestrian pathways, etc.)

Feel free to contact Josiane Gervais, Transportation Project Manager, for follow-up questions.

Environment

Comments:

27. There are no triggers for an Environmental Impact Study.

28. Bird-Safe Design Guidelines - Please review and incorporate bird safe design elements. Some of the risk factors include glass and related design traps such as corner glass and fly-through conditions, ventilation grates and open pipes, landscaping, light pollution. More guidance and solutions are available in the guidelines which can be found here: https://documents.ottawa.ca/sites/documents/files/birdsafedesign_guidelines_en.pdf

29. Please consider if there are features that can be added reduce the urban heat island effect (see OP 10.3.3). For example, this impact can be reduced by adding large canopy trees, green roofs or vegetation walls, or incorporating building with low heat absorbing materials.Significant environmental features

Feel free to contact Matthew Hayley, Environmental Planner, for follow-up questions.

Forestry

Comments:

30. **Tree Conservation Report (TCR)** requirements - The following have been adapted from the Schedule E of the Urban Tree Protection Guidelines – for more information on these requirements please contact mark.richardson@ottawa.ca

    a. A Tree Conservation Report (TCR) must be supplied for review

        i. An approved TCR is a requirement of Site Plan approval.

    b. Any removal of privately-owned trees 10cm or larger in diameter, or city-owned trees of any diameter requires a tree permit issued under the Tree Protection Bylaw (Bylaw 2020 – 340); the permit will be based on an approved TCR and made available at or near plan approval.

        i. The removal of boundary trees will require the permission of the adjoining landowner

ii. The planning forester will accept the site-wide removal of unhealthy, dead, or hazardous trees

c. The TCR must contain 2 separate plans:
   i. Plan/Map 1 - show existing conditions with tree cover information
   ii. Plan/Map 2 - show proposed development with tree cover information.

d. The TCR must list all trees on site, as well as off-site trees if the CRZ (critical root zone) extends into the developed area, by species, diameter and health condition.
   i. For ease of review, the Planning Forester suggests that all trees be numbered and referenced in an inventory table.

e. Please identify trees by ownership – private onsite, private on adjoining site, city owned, co-owned (trees on a property line)

f. If trees are to be removed, the TCR must clearly show where they are, and document the reason they cannot be retained.
   i. Compensation may be required for the removal of city owned trees.

g. The removal of trees on a property line will require the permission of both property owners.

h. All retained trees must be shown, and all retained trees within the area impacted by the development process must be protected as per City guidelines available at Tree Protection Specification or by searching Ottawa.ca
   i. The location of tree protection fencing must be shown on the plan.
   ii. Show the critical root zone of the retained trees.

i. The city encourages the retention of healthy trees; if possible, please seek opportunities for retention of trees that will contribute to the design/function of the site.

31. **Landscape Plan** tree planting requirements - for more information on these requirements please contact mark.richardson@ottawa.ca
   a. Please ensure all retained trees are shown on the LP
   b. Minimum Setbacks
      i. Maintain 1.5m from sidewalk, MUP/cycle track, water service laterals.
      ii. Maintain 2.5m from curb.
      iii. Coniferous species require a minimum 4.5m setback from curb, sidewalk, or MUP/cycle track/pathway.

b. Adhere to Ottawa Hydro's planting guidelines (species and setbacks) when planting around overhead primary conductors.

c. Tree specifications

    i. Minimum stock size: 50mm tree caliper for deciduous, 200cm height for coniferous.

    ii. Maximize the use of large deciduous species wherever possible to maximize future canopy coverage.

d. Tree planting on city property shall be in accordance with the City of Ottawa's Tree Planting Specification; if possible, include watering and warranty as described in the specification.

e. No root barriers, dead-man anchor systems, or planters are permitted.

f. No tree stakes unless necessary

g. Hard surface planting

    i. If there are hard surface plantings, a planting detail must be provided.

    ii. Curb style planter is highly recommended.

    iii. No grates are to be used and if guards are required, City of Ottawa standard (which can be provided) shall be used.

    iv. Trees are to be planted at grade.

i. Soil Volume - Please demonstrate as per the **Landscape Plan Terms of Reference** that the available soil volumes for new plantings will meet or exceed the following:

Tree Type/Size	Single Tree Soil Volume (m3)	Multiple Tree Soil Volume (m3/tree)
Ornamental	15	9
Columnar	15	9
Small	20	12
Medium	25	15
Large	30	18
Conifer	25	15

j. Sensitive Marine Clay - Please follow the City's 2017 Tree Planting in Sensitive Marine Clay guidelines.

k. The city requests that consideration be given to planting native species wherever there is a high probability of survival to maturity.

l. Efforts shall be made to provide as much future canopy cover as possible at a site level, through tree planting and tree retention. The Landscape Plan shall show/document that the proposed tree planting and retention will contribute to the City's overall canopy cover over time. Please provide a projection of the future canopy cover for the site to 40 years.

m. Page 7 of the Landscape Plan Terms of Reference requires applicants to submit a digital, georeferenced CAD or GIS file of the final approved LP. Please follow this link to review the submission requirements: Feel free to contact Insert Name, Forester, for follow-up questions.

Parkland

Comments:

Parkland Dedication:

32. The amount of required parkland conveyance is to be calculated as per the City of Ottawa Parkland Dedication By-law No.2022-280 (or as amended):

    For conveyance of parkland, cash-in-lieu of conveyance parkland, or combination thereof 2% of the gross land area (commercial & industrial uses).

33. Therefore, Parkland Dedication requirements applies.

Form of Parkland Dedication:

34. PFP will be requesting **cash-in-lieu of conveyance of parkland** for parkland dedication in accordance with the Parkland Dedication By-law.

1st Pre-consultation Preliminary Parkland Dedication Calculation:

35. Parkland conveyance calculations based on information provided/identified in the pre-application consultation, is calculated to be **square meters** as per the table below. The information provided indicated the site area is 4.8 acres (1.942 hectares).

Proposed Use	**Gross Land Area (m^2)**	**Limit of construction Area (m^2)**	**Parkland Dedication Rate**	**Parkland Dedication (m^2)**
Commercial	1.942 hectares	NA	2% of gross land area.	388.4 meters sq

	19,420 meters sq.			
Total				**388.4**

	Total requirement:	388.4 meters square
	Conveyance of Parkland in land:	0.00
	Cash-in-lieu of Conveyance of Parkland:	388.4 meters sq.

- Site Area = 19420 sq.m (as per information provided in pre consult)

36. Please note, if the total area of the site is different than information provided at preconsult, the parkland dedication will be adjusted.

37. Cash-in-lieu of conveyance of parkland will be required prior to registration of the Site Plan Agreement. The Owner shall also pay the parkland appraisal fee as referenced in Schedule "B" of the site plan agreement.

38. CREO will provide an appraisal and PFP will calculate the fee for Schedule "B".

39. Full suite of park conditions will be included when a formal site plan application is submitted.

Reference Documents:

40. Please review the following City of Ottawa reference documents which outline the requirements for parkland conveyance and/or cash-in-lieu of parkland.

    - Official Plan (2021)
    - Parks and Recreation Facilities Master Plan (2021)
    - Park Development Manual, 2nd edition
    - Parkland Dedication By-Law (2022-280) and Planning Act amendments
    - City of Ottawa Standard Parks Conditions

Please note that the park comments are preliminary and will be finalized (and subject to change) upon receipt of accurate information on the area of the site, the development application and the requested supporting documentation.

Feel free to contact Diane Emmerson, Parks Planner, for follow-up questions.

Other

41. The High Performance Development Standard (HPDS) is a collection of voluntary and required standards that raise the performance of new building projects to achieve sustainable and resilient design and will be applicable to Site Plan Control and Plan of Subdivision applications.

    a. The HPDS was passed by Council on April 13, 2022, but is not in effect at this time, as Council has referred the 2023 HPDS Update Report back to staff with the direction to bring forward an updated report to Committee at a later date. The timing of an updated report to Committee is unknown at this time, and updates will be shared when they are available.

    b. Please refer to the HPDS information at ottawa.ca/HPDS for more information.

42. Under the Affordable Housing Community Improvement Plan, a Tax Increment Equivalent Grant (TIEG) program was created to incentivize the development of affordable rental units. It provides a yearly fixed grant for 20 years. The grant helps offset the revenue loss housing providers experience when incorporating affordable units in their developments.

    a. To be eligible for the TIEG program you must meet the following criteria:

        i. the greater of five units OR 15 per cent of the total number of units within the development must be made affordable

        ii. provide a minimum of 15 per cent of each unit type in the development as affordable

        iii. enter into an agreement with the city to ensure the units maintain affordable for a minimum period of 20 years at or below the city-wide average market rent for the entire housing stock based on building form and unit type, as defined by the Canada Mortgage and Housing Corporation

        iv. must apply after a formal Site Plan Control submission, or Building Permit submission for projects not requiring Site Plan Control, and prior to Occupancy Permit issuance

    b. Please refer to the TIEG information *at* *Affordable housing community improvement plan* / *Plan d'améliorations communautaires pour le*

logement abordable for more details or contact the TIEG coordinator via email at affordablehousingcip@ottawa.ca.

Submission Requirements and Fees

1. Site Plan Control – Complex Application
    a. Additional information regarding fees related to planning applications can be found here.
2. The attached **Study and Plan Identification List** outlines the information and material that has been identified as either required (R) or advised (A) as part of a future complete application submission.
    a. The required plans and studies must meet the City's Terms of Reference (ToR) and/or Guidelines, as available on Ottawa.ca. These ToR and Guidelines outline the specific requirements that must be met for each plan or study to be deemed adequate.
3. All of the above comments or issues should be addressed to ensure the effectiveness of the application submission review.

Should there be any questions, please do not hesitate to contact myself or the contact identified for the above areas / disciplines.

Yours Truly,
John Bernier, MCIP, RPP
Planner II

APPENDIX E

STANTEC SANITARY SEWER ANALYSIS

2.2. ANALYSIS OF ULTIMATE FLOW RATES

Unit flow rates outlined in **Section 1.2** above were applied to the AutoPark and PAP-2 lots to estimate ultimate peak flows to the Cyclone Taylor Blvd sanitary sewer and ultimately the Carp River siphon. Peak sanitary and infiltration rates for the CTC ultimate condition are 62.2 L/s and 2.8 L/s, respectively, based on the JLR 2013 tech memo. As this peak flow is higher than that calculated from the flow monitoring data, it was selected to be applied to the hydraulic model assessment to allow for a conservative evaluation of the residual capacity for the AutoPark land. The infiltration rate allocated to the CTC land in the JLR 2013 tech memo is equivalent to that calculated from the average SRPS rate (0.07L/s/ha x 39.8ha = 2.8L/s). **Table 5** below, details the ultimate flow calculations for the AutoPark and PAP-2 lands. It is noted that the resulting flow is slightly higher than the 18.6 L/s maximum previously identified by the City of Ottawa.

Table 5: AutoPark ultimate flows

Land Use	Lot Area (ha)	Building Area (ha)	Peaking factor	Unit Rate (l/d/ha gross)	Peak Sanitary (L/s)	I/I (L/s)	Total Flow (L/s)
North of Palladium and Existing							
Existing Commercial	13.51	2.55	1.50	10,000	2.3	3.1	5.4
Existing Road	6.07	0.00	1.00	10,000	0.7	1.7	2.4
Future Commercial	5.07	0.00	1.50	28,000	2.5	1.4	3.9
Sub-total	**24.6**				5.5	6.2	11.7
Co-tenancy 1							
Future Commercial	0.54	0.35	1.50	28,000	0.17	0.1	0.2
Future Hotel*	1.61	0.81	4.15	-	2.16	0.2	2.4
Sub-total Co-tenancy 1	**2.2**				2.33	0.28	2.61
PAP-2							
Future Roads	2.46	0	1	28,000	0.8	0.7	1.5
Future Commercial	6.24	2.13	1.50	28,000	3.0	1.2	4.2
Sub-total PAP-2	**8.7**				3.8	1.8	5.7
Total AutoPark	**35.5**				**11.7**	**8.3**	**20.0**

* Hotel flow rate per *Palladium AutoPark Sanitary Sewer Flow Monitoring – 2013*, prepared by MMM Group, August 2013

APPENDIX F

MCINTOSH PERRY REPORT

5.2 Sanitary Servicing

The existing 150 mm sanitary stub will be extended to the proposed building and have a new monitoring manhole placed within the property limits. The existing sanitary stub outlets to the existing 250 mm diameter sanitary sewer within Ring Road and flows north. The sanitary network within Ring Road has been approved as part of the Auto Park. The sanitary main within Ring Road carries flows east to Auto Park Private and into Cyclone Taylor Boulevard and ultimately to the Carp River siphon.

The peak design flow for the proposed development was determined to be 2.59 L/s. This flow was determined using an average flow of 28,000 L/gross ha/day identified in the Palladium Auto Park Sanitary Flow Analysis completed by Stantec. The actual peak flow was calculated based on the occupancy of the building. Using the City of Ottawa SDG and Appendix 4-A and unit values from the architect and client, the actual peak flow for the site was calculate as 1.69 L/s.

Therefore the existing 150 mm diameter stub and new extension will have sufficient capacity to convey the expected flow (see Appendix 'C' for detailed calculations). It is anticipated that there will be no issues with capacity constraints within the existing lateral or sanitary main as the amount of flow leaving the site is less than the allowable peak design flow based on the Stantec report (1.69 L/s < 2.59 L/s).

5.2.1 *Palladium Auto Park Sanitary Flow Analysis*

Stantec was retained to complete an analysis of the Auto Park and the downstream infrastructure. The report outlines a maximum flow rate from the Auto Park of 18.6 L/s after 100% build out. The report continues to summarize previous flow monitoring data and approved reports and provides an analysis of the results.

The conclusion of the report states that the unit flow rate of 8,400 L/d/gross ha is appropriate for the Auto Park along with an infiltration rate of 0.28 L/s. Future developments should apply a unit rate of 28,000 L/s/gross ha as per MOE guidelines and the City of Ottawa's request.

The report recommends that the total release rate from the Auto Park be increased from 18.6 L/s to 19.5 L/s as the analysis showed minimal increase to the Hydraulic Grade Line (HGL) and does not increase any additional surcharge areas. Therefore, the existing 150mm sanitary lateral on site has the capacity to accommodate the new sanitary flows.

5.3 Storm Servicing

A new sewer system shall be constructed from one of the existing 375 mm diameter storm stubs that has been extended from the Ring Road storm sewer. The new onsite pipe network will collect storm flows and restrict the runoff prior to leaving the site. The storm system will be further detailed in Section 6.0.

APPENDIX G

J.L. RICHARDS & ASSOCIATES LIMITED REPORT

Table 9.0 - Hydrological Properties

Return Period (yrs)	Peak Inflow (m^3/s)	Peak Outflow (m^3/s)	Storage Volume (m^3)	Water Surface Elevation (m)
25 mm*	0.62	0.05	4160	99.18
2	0.95	0.23	5820	99.40
5	1.29	0.27	7430	99.60
10	1.52	0.30	8800	99.76
25	1.75	0.33	10640	99.98
50	1.88	0.35	12050	100.15
100	1.97	0.38	13450	100.30

* Note: 4 hour 25 mm Chicago Design Storm Event.

6.4 Stormwater Management Facility Design and Operation

This section of the report has been developed based on the storm servicing scheme presented in Section 5.3 and on the facility's configuration shown on Drawings PD1, PD2 and SW. The following presents a brief description and applicable calculations of the engineering features that have been incorporated into the final design of the facility.

.1 Pond Geometry and Excavation

Through an iterative process, the overall site grading of the facility, including the wet portion, was developed to provide the storage requirements presented in Tables 6.0 and 7.0 to control erosion, post-development flow rates to their pre-development levels and also provide the water quality treatment for adequate fish habitat protection. The facility's geometry, shown on Drawing PD1, was developed to exceed the minimum length to width ratio of 3:1 as recommended by the MOE Guidelines.

The proposed wet detention facility can be divided into three basic components. The bottom portion, referred as the permanent pool storage (between elevations 97.60 m and 98.60 m) and

the middle portion referred as extended detention storage (between elevations 98.60 m and 99.30 m) are together responsible for the water quality treatment of storm runoff in meeting the requirement of removing 75% of the TSS loading (i.e. removal between a level No. 1 and No. 2). The third component, the top portion, referred as water quantity storage (between elevations 98.60 m and 100.50 m) is responsible of controlling erosion and for routing storm inflows to their pre-development levels. To allow for natural colonisation of the facility by native wetland plantings, the grading of the facility was developed using a 5:1 side slope between elevations 98.30 m to 98.90 m (i.e. 0.30 m above and below the normal water level). The grading below 98.30 m and above 98.90 m was developed out using a 3:1 side slope.

.2 Sedimentation Forebay

The primary function of a sedimentation forebay is to remove the coarsest particles from storm runoff prior to its release to the secondary sedimentation basin for further treatment. The settlement of particles in a sedimentation forebay is caused by a sudden increase in effective flow area and, therefore, a decrease in velocities, which promotes settling. A forebay is an important feature since maintenance will generally be restricted to this area only, minimizing the need to disturb the wet pond vegetation. To facilitate its maintenance (sediment removal), a 300 mm compacted Granular "B" base within the sedimentation forebay and secondary settling basin has been provided.

To improve removal efficiency, the sedimentation forebay was separated from the wet pond (i.e. secondary sedimentation basin) by means of a gabion berm, set slightly below the normal permanent pool elevation (i.e. 98.40 m). To determine the optimum size of the forebay, the calculation procedure presented on page 4-67 of the "Stormwater Management Planning and Design Manual, (MOE, Draft Final Report, November 1999)" was followed. These calculations (refer to Appendix "G" for detailed calculations) showed that the proposed sedimentation forebay configuration should settled approximately 40% by mass of the total suspended solid loading based on the Nationwide Urban Runoff Program (N.U.R.P.) settling data.

.3 Secondary Sedimentation Basin (Wet Pond)

Once the coarser particles are settled in the forebay, stormwater runoff will flow to the secondary sedimentation basin (wet pond) where further settlement will occur. To access the secondary settling basin under frequent storm events, stormwater will be conveyed to this basin by overtopping the gabion berm (set at an elevation of 98.40 m). It should be noted that the extended detention storage (between elevations of 98.60 m and 99.30 m) was designed to drain over a 48 hour period using the following equation (drawdown relationship for a drawdown time of 48 hours):

$$A_o = ((0.66 \times C_2 \times h^{1.5}) + (2 \times C_3 \times h^{0.5})) / (2.75 \times 2 \times 24 \times 3600)$$

For its entire length, the wet facility has a bottom elevation of 97.60 m and a depth of standing water of 1.00 m under dry weather conditions.

Given the site constraints (i.e. location of outlet CSP culvert), low flow berming using gabion baskets is proposed to increase the flow path during frequent storm events. To achieve this, the provision of three rows of gabion baskets is proposed to minimize the risk of short circuiting. These low flow berms will extend from the pond bottom (i.e. 97.60 m) to 0.20 m below the normal water level of the facility (i.e. 98.40 m) during dry weather conditions as show on Drawing PD1.

To ensure that the velocities do not cause any scouring of the pond's base, a scouring analysis has been carried out to determine the expected velocities achieved under various flow conditions (i.e. 25 mm and 1:100 year design storm events) and flow depths. This analysis revealed that velocities of 0.021 m/s and 0.038 m/s are expected for the 25 mm and 1:100 year storm events respectively, which is below the scouring velocity of 0.15 m/s (refer to Appendix "H" for detailed calculations).

.4 Quantity Storage

To control the post-development flows to their pre-development levels, on-site storage by means of parking lot storage combined with water quantity storage in the facility was provided. The design of the facility, as presented on Drawing PD1, provides a total of 15,216 m^3 of water quantity storage (refer to Table 7.0). During infrequent storm events, stormwater runoff will fillup the extended detention storage (5,078 m^3 between the elevation of 98.60 m and 99.30 m)

and the parking lot depressions and street sags. If runoff flows are prolonged, excess stormwater runoff will fillup the water quantity storage component of the facility (10,138 m^3 between elevations 99.30 m and 100.50 m). Through computer modelling, it was determined that the maximum water surface elevation (WSEL) encountered during a 1:100 year storm event is 100.30 m with the proposed stormwater management servicing presented in this report.

.5 Outlet Structure

The proposed outlet structure (i.e. 1200 mm x 600 mm ditch inlet catch basin) and associated piping and restrictors were designed to provide water quality treatment, erosion protection and water quantity control to mitigate the impacts of development. Each function of the outlet structure is described in Sub-sections 5A and 5B.

.5A Outlet Structure (Water Quality Component)

The outflow rate for the extended detention storage will be controlled by a 178 mm diameter circular restrictor (using the drawdown time relationship presented in item 6.4.3) installed at the downstream end of a 200 mm High Density Polyethylene reverse sloped pipe (invert elevation set at 98.60 m) attached to the proposed 1200 mm x 600 mm ditch inlet. This orifice diameter was found to generate a drawdown time of the extended detention storage of 48 hours, which should be sufficient to achieve 75% of total suspended solid removal (refer to Appendix "I" for restrictor sizing calculation).

.5B Outlet Structure (Water Quantity Component)

In addition to the water quality control requirement, the proposed outlet structure was also designed to control the post-development flow rates to levels below the pre-development flow rates. To do so, a 3 m long pipe section will act as a water quantity restrictor to control post-development flows to their pre-development levels. Based on the orifice equation, it was determined that a 375 mm diameter restrictor (i.e. 3 m pipe section) would provide adequate water quantity control. A stage-discharge curve was developed and used in the hydrological modelling presented Section 6.3 (refer to Appendix "J" for the Stage-Discharge Table) based on a maximum hydraulic head of 1.90 m (between elevations 98.60 m and 100.50 m).

.6 Maintenance

Because of the grade limitation of the existing outlet (i.e. 1560 mm CSP culvert), there is no opportunity to provide a low flow maintenance pipe to drain the permanent pool volume for maintenance purposes. When required, the drawdown of the permanent pool must, therefore, be carried out with the use of pumps. During this activity, it is recommended that either of the following methods be utilized to contain sediments within the facility:

- the permanent pool content should be filtered through a double row straw bale barrier, wrapped up with geotextile prior to its discharge to the outlet culvert; or

- the permanent pool contents should be filtered through a geotextile bag.

Once the permanent pool is emptied, it is recommended that small rubber-tired earth moving equipment be used to push the accumulated sediments along the pond's southern perimeter. From these locations, most of the sediments could then be removed using sewage vacuum equipment. The remaining of the sediments should be removed and stockpiled onto the adjacent area using a hydraulic shovel until its water content has substantially decreased. To prevent any wind transport of dried material, it is recommended that the stock-piled material be covered with a tarp. Once the water content of the stock-piled sediments is low, hauling of dried material to a municipal landfill site should be carried out (refer to Section 9.0 for Inspection Requirements and Maintenance).

.7 Emergency Spillway

In order to provide a defined flow path during extreme storm events, an emergency spillway, with rip rap erosion protection, was provided. This emergency spillway was designed using the pond's perimeter grading to evacuate storm runoff during extreme storm events. The pond's perimeter grading was set to an elevation of 100.50 m with the exception of the northeastern corner of the facility (near the outlet structure). At this location, the pond's perimeter grading was set to an elevation of 100.30 m to allow for an emergency relief. With these perimeter grades, stormwater will be contained in the stormwater management facility to an elevation of 100.30 m allowing some emergency discharge to the Huntmar Road ditch system.

Table 4.0 - OttHymo Simulation Results from Rain-on-Snowmelt Event Modelling

Peak Runoff Rates (m^3/s)		
Return Period (yr)	Pre-Development	Post-Development (uncontrolled)
2	0.45	0.90
5	0.62	1.22
10	0.74	1.43
25	0.88	1.70
50	0.98	1.92
100	1.09	2.12

5.3 Critical Design Storm Event and Stormwater Management Servicing

Simulation results presented in Section 5.1 and Section 5.2 show that water quantity storage has to be provided to control post-development peak runoff rates to the pre-development levels. Furthermore, these results have shown that the largest storage volume requirement between pre-development and post-development conditions is generated by a synthetic design storm event, namely the 12 hour Chicago Design Storm Event.

To reduce post-development peak flows to their pre-development levels, the following methods could be utilized:

- combination of parking lot storage and interconnected catch basins with the downstream catch basin equipped with an ICD;
- rooftop storage and restrictors;
- underground storage by means of oversized pipes with restrictors; or
- with an end-of-pipe facility.

If water quantity storage is provided solely by the proposed SWMF, then its footprint would be significantly large due to the shallow elevation of the outlet (i.e. 1560 mm CSP culvert at approximately 98.40 m) in relation with the natural topography of the site. To minimize the area allocated for stormwater management, the design of the facility was carried out based on the provision of on-site storage at each individual lot by means of parking lot storage. To do so, ICDs were utilized in the design to limit the captured flows into the storm sewer conveyed to the facility. With the use of ICDs and by allowing some ponding in the parking areas and along the road sags, this will allow an attenuation in the post-development flows and, therefore, a reduction of the water quantity storage required in the SWMF. The storm sewer servicing was carried out using the following two types of ICDs:

- Ipex Type "C" ICD (release rate of 42 L/s); and
- Ipex Type "D" ICD (release rate of 95 L/s).

The Type "C" ICD will be utilized at each individual property (two per lot, maximum release rate of 84 L/s per lot) and along the ring road (interconnected with one ICD, release rate of 42 L/s) and secondary entrance (interconnected with one ICD, release rate of 42 L/s) while the Type "D" ICD will only be used along the main entry between Lots No. 1 and No. 8. The surface water ponding in the parking areas should be limited to a maximum of 0.30 m, the design standard in new urban development within the City of Ottawa. The grading along the main entry, secondary entry and ring road was developed to limit ponding to a maximum depth of 0.20 m minimizing the inconvenience during such events.

The stormwater servicing for the North Block has, therefore, been completed using the following ICD configuration and on-site storage requirement:

- A total of 38 contributing catch basins equipped with ICDs was utilized for the storm servicing of the North Block. A total of 37 contributing catch basins equipped with Ipex Type "C" ICD (at 42 L/s) was utilized at the following locations (refer to Drawing S1 for locations):

  A) 2 Type "C" ICDs per Lot for Lot No. 1 to Lot No. 12, and 2 ICDs for Lot No. 14 (26 ICDs total) ;

  B) 2 Type "C" ICDs along the secondary entry;

C) 9 Type "C" ICDs along the ring road.

- One Ipex Type "D" ICD along the main entry between Lot No. 1 and Lot No. 8 (refer to Drawing S1 for location);

- To detain the 1:100 year storm event, road sag storage of 675 m^3 has been provided by the grading (refer to Grading Plans G1, G2 and G3). The OttHymo modelling showed that 380 m^3 was required to detain, along the right-of-ways, the 1:100 year storm event. Furthermore, the grading was developed such that any major overland flow generated from a storm event exceeding the 1:100 year would be conveyed along the ring road to the main entry and then be redirected to the SWMF near Manhole No. 120; and

- Parking lot storage volumes ranging from 620 m^3 to 920 m^3 are required to detain the 1:100 year storm event on-site with the exception of Lot No. 14 where an on-site storage volume of 1,290 m^3 has to be provided. A typical conceptual grading plan has been developed for Lot No. 2 (refer to Appendix "D" for Conceptual Grading Plan) which shows a servicing alternative meeting the on-site storage volume requirement. Table 5.0 presents the storage volume requirements for Lot No. 1 to Lot No. 12 and for Lot No. 14.

Table 5.0 - On-Site Storage Volume Requirement

Lot Number	Area (ha) at C =		"A x C" (ha)	Storage Volume Requirement (m^3)
	0.9	1.0		
1	1.42	0.17	1.448	800
2	1.48	0.11	1.442	800
3	1.46	0.11	1.424	790
4	1.52	0.17	1.538	860
5	1.26	0.11	1.244	680
6	1.31	0.17	1.349	740
7	1.45	0.11	1.415	790
8	1.62	0.17	1.628	920
9	1.11	0.16	1.159	620
10	1.11	0.16	1.159	620
11	1.11	0.16	1.159	620
12	1.10	0.16	1.150	620
14	2.28	Nil	2.052	1,290

The above table shows the storage volume requirements based on the current lot configuration (i.e. lot delineation). To determine the storage volume requirements based on a different lotting configuration, a regression analysis was conducted. This analysis was carried out based on the storage volume requirements and "A x C" ratio presented in Table 5.0. Multiple regressions were conducted and, it has been determined that the best regression equations were generated by a linear regression up to an "A x C" ratio of 1.6 and by a logarithmic regression for an "A x C" ratio exceeding 1.6. The following regressions should be used to determined future on-site storage requirements as they were derived from the most critical storm event namely the 1:100 year 12 hour Chicago hyetograph (refer to Appendix "E" for graphical results of regressions):

Recommended Relationship for "A x C" < 1.6

Volume (m^3) = (632.094 x "A x C") - 110.52

Recommended Relationship for "A x C" > 1.6

Volume (m^3) = $10^{(("A \times C" \times 0.3437) + 2.4051)}$

6.0 PROPOSED STORMWATER MANAGEMENT FACILITY

6.1 General

Urbanization of the lands referred as the Palladium Auto-Park will tend to modify the hydrological regime of the receiving stream if proper stormwater management measures are not implemented. The potential problems associated with urban runoff arise primarily from the amount of urban area that is impervious to runoff generated by either rain or snowmelt water. These impervious urban surfaces increase the amount of surface runoff that is generated and, at the same time, is conveyed more efficiently to the receiving stream. Furthermore, direct runoff from urban areas is known to carry a range of potentially undesirable compounds such as high loadings of suspended solids, heavy metals, nutrient compounds, etc. To mitigate these adverse impacts, this document has formulated a storm servicing alternative which will address these concerns. The proposed stormwater management scheme developed herein includes the provision of a wet retention pond (incorporating water quality and quantity volumes) to meet the current water quality and quantity guidelines and at the same time protect the receiving stream's existing environmental features. This facility will service the North Block of the proposed Palladium Auto-Park development (refer to Drawing S1 for location of end-of pipe SWMF).

6.2 Water Quality Storage Requirement

The proposed end-of pipe stormwater management facility has been sized to meet the requirements of Table 3.1 of the MOE Stormwater Manual entitled "Stormwater Management Planning and Design Manual, page 3-13, (MOE, Draft Final Report November, 1999)". This table recommends that the following storage volume requirements be provided for wet ponds (extrapolated based on a weighted imperviousness of 95%):

- provide 270 m^3/ha of water quality storage for a fish habitat protection level no. 1. As such, 230 m^3/ha should be allocated as a permanent pool volume and the remaining 40 m^3/ha be allocated as extended detention storage; and