SERVICING AND STORMWATER MANAGEMENT REPORT

3026 SOLANDT ROAD
OTTAWA, ONTARIO

Prepared by:

NOVATECH
Suite 200, 240 Michael Cowpland Drive
Kanata, Ontario
K2M 1P6

January 17, 2020

Novatech File: 119200
Ref No. R-2020-004

NOVATECH
Engineers, Planners & Landscape Architects

January 17, 2020

Planning and Infrastructure Approvals
City of Ottawa
110 Laurier Avenue West
Ottawa, Ontario, K1P 1J1

Attention: Ahmed Elsayed, P.Eng

Dear Mr. Elsayed

Reference: 3026 Solandt Road, Ottawa
Servicing and Stormwater Management Report
Our File No. : 119200

Please find enclosed the 'Servicing and Stormwater Management Report' for the above noted project. This report is hereby submitted for review and approval.

Should you have any questions or require additional information, please contact the undersigned.

Yours truly,

NOVATECH

Cara Ruddle, P.Eng.
Senior Project Manager | Land Development Engineering

cc: Bonnie Martell, Colonnade Bridgeport

Suite 200, 240 Michael Cowpland Drive, Ottawa ON K2M 1P6 Tel: 613.254.9643 Fax: 613.254.5867 www.novatech-eng.com

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF APPENDICIES

LIST OF ENGINEERING DRAWINGS

1.0 INTRODUCTION

Novatech has been retained to prepare a Servicing and Stormwater Management Report for the proposed development located at 3026 Solandt Road, Ottawa (formerly Kanata), Ontario. This report will support a Site Plan Application for the subject development. **Figure 1** Key Plan shows the site location.

2.0 EXISTING CONDITIONS

There is presently an existing 5-storey office building (450 March Road) located on the subject site with associated parking areas and access to March Road and Solandt Road. Previously there was also a 1-storey office building (4100m^2) which has been demolished. The site is bounded by Solandt Road to the north, asphalt parking and an office building (3000 Solandt Road) to the east, 350 March Road and the Kizell Drain to the south and March Road to the west. The site is generally flat and at grade with Solandt and March Roads, with drainage divided between the Kizell drain and Solandt Road. There are existing private services on the site which connect to municipal services under Solandt Road. **Figure 2** shows the existing site conditions.

The design for the original development was completed by David McManus Engineering Ltd. and presented in a report entitled 'Stormwater Management and Servicing Report, Betz Building – 3026 Solandt Road, Morguard Investments, City of Kanata' (McManus Report), dated February 2001. This report provides a basis for the design of the subject development as discussed in the following sections of this report. A copy of the McManus Report is provided in **Appendix A** for reference.

3.0 PROPOSED DEVELOPMENT

The site is a total of 2.6 hectares in size including the existing office building addressed 450 March Road. The area subject to re-development is approximately 1.6 hectares. It is proposed to develop a five-storey, office building with a building footprint of approximately 1859.2m^2. Access to the building is to be provided by the 2 entrances from Solandt Road. **Figure 3** for the proposed site layout.

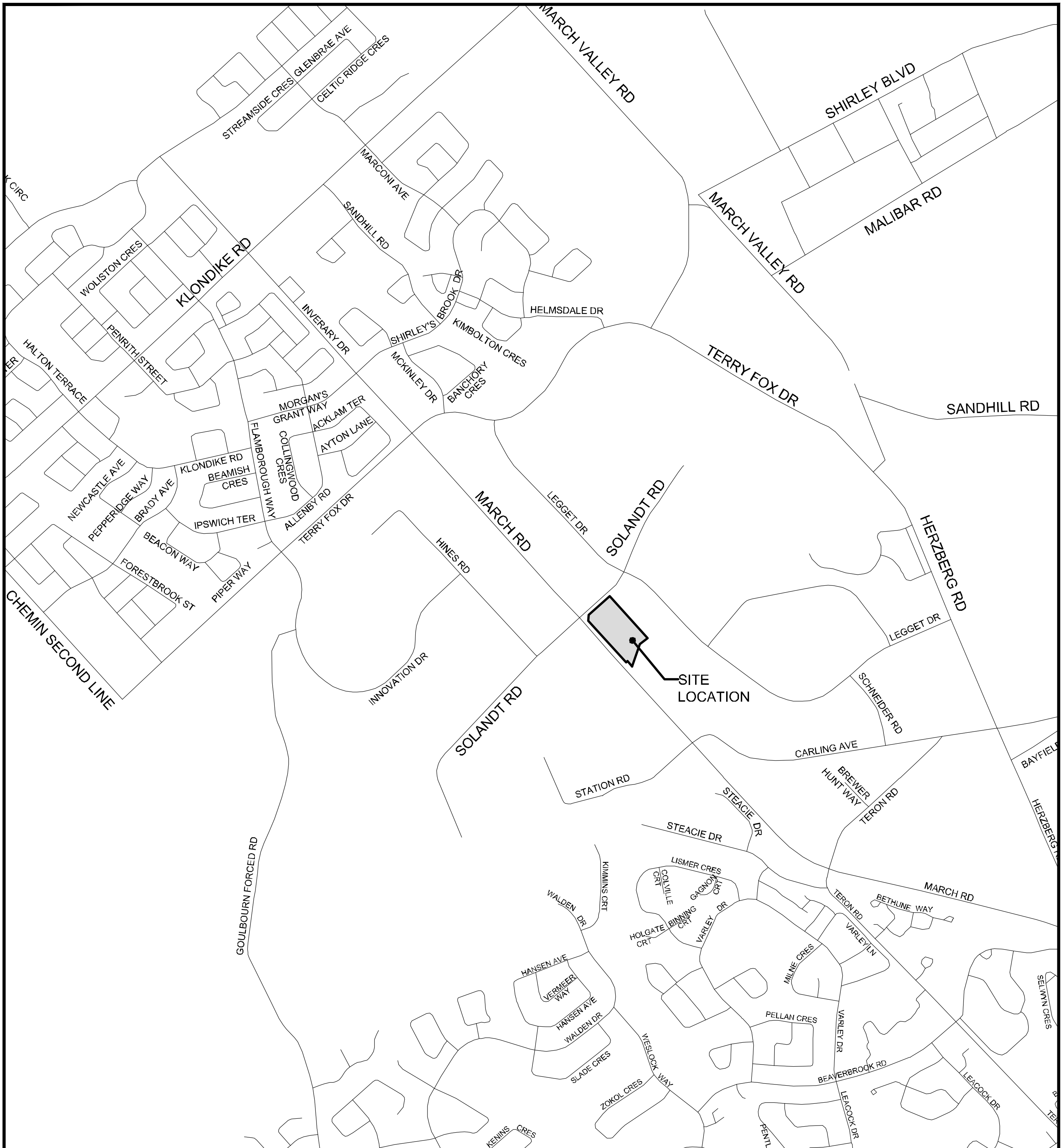
A Pre-Consultation meeting was held with the City on November 1, 2019 to discuss the proposed development. A copy of the Pre-Consultation meeting minutes is included in **Appendix B** for reference.

4.0 SITE CONSTRAINTS

A geotechnical investigation was completed for the subject development. A report entitled 'Geotechnical Investigation Proposed Multi-Storey Building 3026 Solandt Road Ottawa, Ontario' prepared by Paterson Group Inc. dated January 10, 2020. The report indicates there are some issues to be considered in the grading and servicing design due to the native soils present such as:

- seepage barriers along sewer trenches to prevent potential groundwater lowering and
- subdrains at catchbasins to provide adequate drainage of the parking areas and
- grade raise restriction of 2.0m.

The report also indicates that bedrock is present at an expected depth ranging from 3-10m. It should also be noted that an Environmental Activity and Sector Registry (EASR) may be required



NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6

Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

N

3026 SOLANDT ROAD

KEY PLAN

SCALE N.T.S		
DATE JAN 2020	JOB 119200	FIGURE FIG - 1

M:\2019\119200\CAD\Design\Figures\Report Figures\119200 - Fig2 - KP.dwg, FIGURE 2, Jan 13, 2020 - 9:19am, amestwarp

NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6

Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

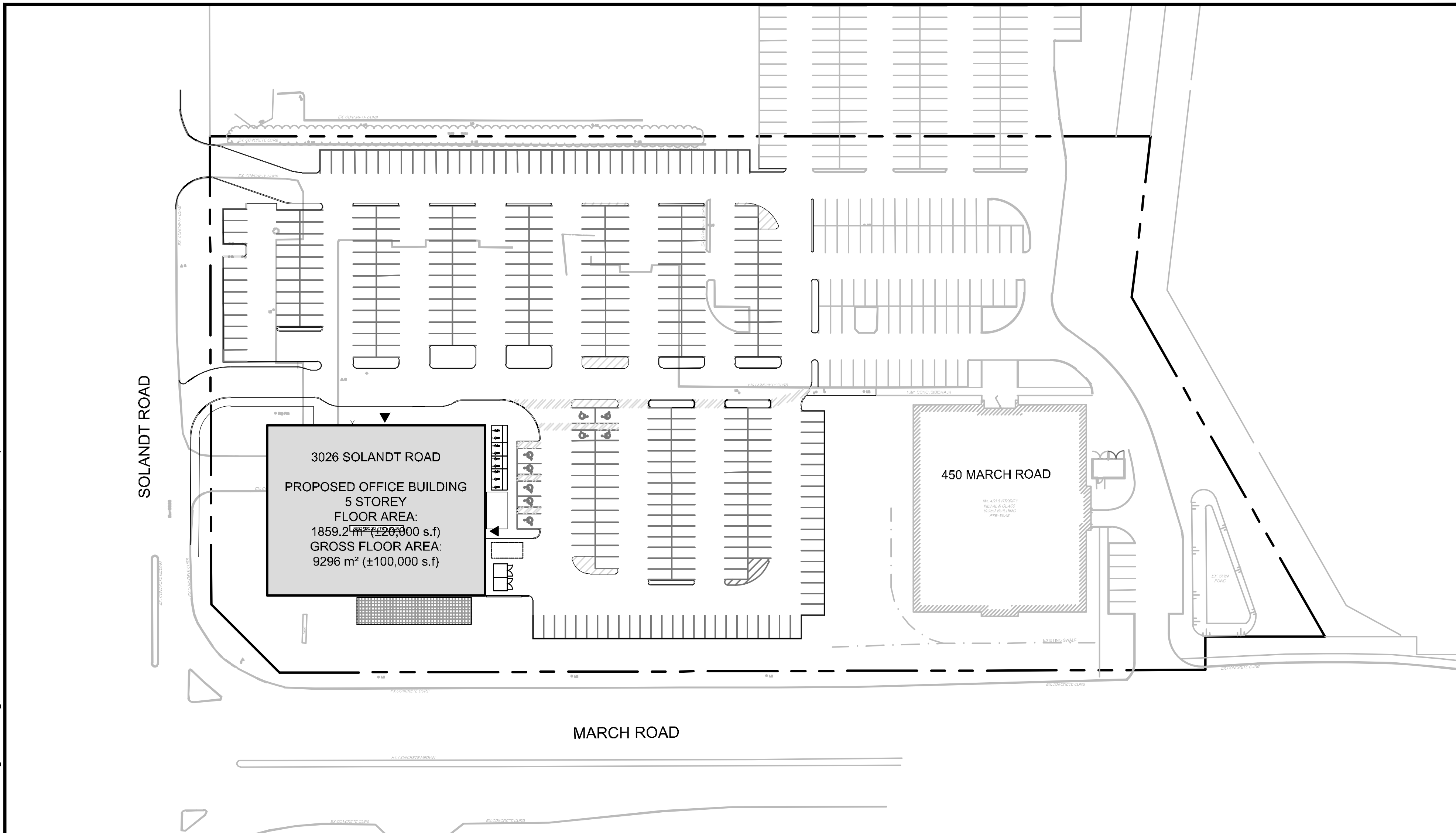
N

3026 SOLANDT ROAD

EXISTING CONDITIONS PLAN

SCALE 1 : 1500 (0, 15, 30, 45, 60)		
DATE JAN 2020	JOB 119200	FIGURE FIG - 2

SHT8X11.DWG - 216mmx279mm



M:\2019\119200\CAD\Design\Figures\Report Figures\119200 - Fig3 - KP.dwg, SITE PLAN, Jan 13, 2020 - 9:31am, amestwarp

NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6

Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

3026 SOLANDT ROAD

SITE PLAN

SCALE 1 : 1250 (0 10 20 30 40 50)

DATE JAN 2020 | JOB 119200 | FIGURE FIG - 3

SHT8X11.DWG - 216mmx279mm

depending on groundwater levels at the time of construction. A that a temporary permit to take water from the MOE may be required if more than 400,000 L/day are to be pumped during excavation and construction.

5.0 WATER SERVICING

There is an existing 400mm diameter watermain in the Soland Road right-of-way, and a 600mm diameter watermain in the March Road right-of-way. An existing 200mm diameter water service connected to the 400mm diameter main under Solandt Road provides service to the site. A 150mm private watermain connected to the 200mm water service provides service to the existing 450 March Road and an existing hydrant.

The Ontario Building Code (Table 8.2.1.3) was used to calculate the combined theoretical water demand for the proposed five-storey office building, and the existing five-storey office building at 350 March Road. The water demand has been calculated for the buildings based on a water demand of 75 L/9.3m^2/day and a summary of the flows is provided in **Table 6.1** below.

Table 5.1 Water Demand Summary

	Proposed Office Building	Existing Office Building	Total
Water Demand Rate (L/9.3m^2/d)	75		
Total Floor Area (m^2)	9296	9048	
Total Daily Volume (L)	74,967.7	72,967.7	147,935.5
Average Day Demand (L/s)	0.868	0.845	1.71
Maximum Daily Demand (L/s)	1.302	1.267	2.57
Peak Hour Demand (L/s)	2.343	2.280	4.62
FUS Fire Flow Requirement (L/s)	150.00	N/A	150
Max Day+Fire Flow (L/s)			152.57

The required fire demand was calculated using the Fire Underwriters Survey (FUS) Guidelines. The proposed building is to be sprinklered with the Siamese connection located by the front entrance of the building. A proposed hydrant will provide fire protection for the proposed development. The required fire demand was calculated to be 2,378 USGPM (or 9000 L/min). Refer to **Appendix C** for a copy of the water calculations, and the fire hydrant coverage plan.

This water demand information was submitted to the City and boundary conditions provided from the City's water model. The boundary conditions are provided in **Table 6.2**.

Table 6.2 Water Boundary Conditions

Criteria	Head (m)	Pressure (psi)
Max HGL	130.6	72.6
Peak Hour	126.5	66.7
Max Day + Fire Flow	124.7	64.1

These boundary conditions were used to analyze the performance of the proposed watermain for three theoretical conditions: 1) High Pressure check under Average Day conditions 2) Peak Hour demand 3) Maximum Day + Fire Flow demand. The following **Table 5.3** summarizes the results from the hydraulic water analysis.

Table 6.3 Water Analysis Results Summary

Condition	Demand (L/s)	Min/Max Allowable Operating Pressures (psi)	Limits of Design Operating Pressures (psi)
High Pressure	1.71	80psi (Max)	71.5
Maximum Daily Demand and *Fire Flow*	152.57	20psi (Min)	63.1
Peak Hour	4.62	40psi (Min)	65.7

Based on the proceeding analysis it can be concluded that the watermain, as designed, will provide adequate system pressures for the fire flow + maximum day demand and peak hour demand. Refer to **Appendix C** for detailed hydraulic calculations, and boundary conditions.

As per Ottawa design guidelines two service connections are required since the basic day demand exceeds 50 m^3/d. A second 150mm diameter water service connection to the existing 400mm diameter main under Solandt Road is proposed, in addition to the existing 200mm diameter water service to meet the above guideline. Refer to the General Plan of Services drawing (119200-GP) for water servicing information.

6.0 SANITARY SERVICING

The existing development is serviced by an existing 150mm diameter sanitary sewer that runs through the site and connects to the existing 750mm diameter trunk sewer along Solandt Road. To accommodate the development a portion of the existing 150mm diameter sanitary sewer within the site will be re-routed around the proposed building. The rerouted sewer will be utilized to service the proposed building. Refer to the General Plan of Services (119200-GP) for sanitary servicing information.

Sanitary flows for the proposed development have been calculated based on the total office floor areas, and found to be 1.83 L/s. Detailed sanitary flow calculations, sanitary design sheet and sanitary drainage area plan are included in **Appendix D** for reference. Design information on the existing sanitary sewer system servicing the previous development was taken from the McManus Report, included in **Appendix D**.

7.0 STORM SERVICING

There is an existing private storm sewer system currently servicing a portion of the existing development. The existing storm sewers range in diameter from 250mm to 375mm. The private storm sewer system outlets to the existing 375mm diameter storm sewer within the right-of-way of Solandt Road. The remainder of the site (western portion) drains to an existing stormwater management pond which outlets to the Kizell Drain.

The existing private storm sewer had minimal cover and will not be able to service the proposed development area. It is proposed to replace the existing storm sewer and construct a new connection to the 375mm diameter storm sewer along Solandt Road to achieve cover requirements. The proposed storm sewer will range in diameter from 250mm to 375mm diameter, as per the existing sewer design. The proposed storm sewers are part of a stormwater management system utilizing orifice controls to limit the release rate of stormwater discharging from the site. The underground storm sewer system will be utilized to store and convey stormwater. The existing and proposed storm servicing information is shown on the General Plan of Services (119200-GP).

The storm sewers are designed based on the criteria outlined in the Ottawa Sewer Design Guidelines. The design criteria used in sizing the storm sewers are summarized in **Table 7.1**.

Table 7.1: Storm Sewer Design Parameters

Parameter	Design Criteria
Private Roads	2 Year Return Period
Storm Sewer Design	Rational Method
IDF Rainfall Data	Ottawa Sewer Design Guidelines
Initial Time of Concentration (Tc)	10 min
Minimum Velocity	0.8 m/s
Maximum Velocity	3.0 m/s
Minimum Diameter	250 mm

A storm sewer drainage area plan and design sheet for the proposed storm sewer system i provided in **Appendix E** for reference.

8.0 STORMWATER MANAGEMENT

The proposed stormwater management design for the site is discussed in the following sections of the report.

8.1 Stormwater Management Criteria

The stormwater management criteria and objectives for the site are listed below, as per the City of Ottawa's requirements:

- Stormwater quantity control of stormwater is required for storms up to and including the 100-year storm event to pre-development conditions.
- There shall be no surface ponding in private parking areas during the 2-year storm event.
- Ensure that ponding is confined within the parking areas at a maximum depth of 0.35 m.
- Provide on-site stormwater quality control equivalent to an ‘Enhanced’ Level of Protection (80% long-term TSS removal).

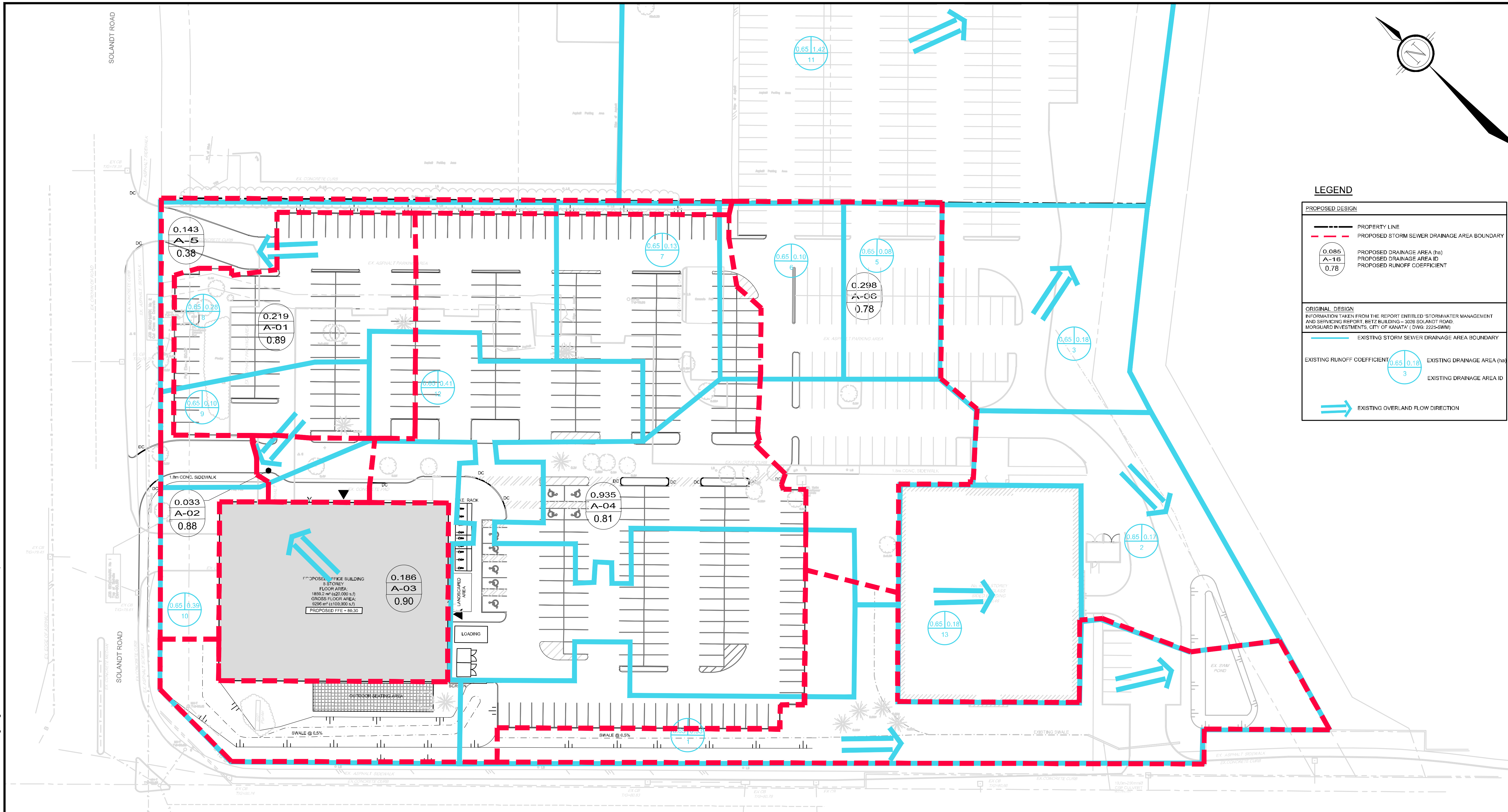
8.2 Quantity Control

As outlined in the McManus Report, the previous development released flows to the Solandt Road sewer system at a controlled rate of 98.15 L/s. This controlled release rate was used as the allowable release rate for the proposed development to be consistent with the original design. The proposed and previous drainage areas were also compared to ensure conformance with the original design. Refer to **Figure 4** for the combined drainage areas plan. The overall drainage areas to each outlet are consistent with the original design. The flows for the proposed site have been calculated utilizing the rational method and, as per City of Ottawa requirements, an assumed average release rate equal to 50% of the peak allowable rate shall be applied. Thus, the allowable design release rate used was 49.08 l/s. Refer to **Appendix F** for calculations.

Peak flows to the Solandt Road storm sewer system will be controlled using inlet control devices (ICDs) sized to restrict flows from the site to the allowable release rate. Underground storage is required for storms up to the 2-year storm event. The underground storage will be provided using Stormtech SC-740 arch-type chambers (or approved equivalent), which are covered in 50mm dia. (D50) clearstone. The chambers will be installed under the parking areas immediately upstream the ICDs. A total of 128 storage chambers will provide 271.4 m^3 of storage. Refer to **Appendix F** for calculations details. The proposed layout of underground storage chambers is shown on the General Plan of Services (drawing 119200-GP).

Storage for storms greater than the 2-year event will be provided on the building roof and as surface ponding in the parking areas. The total surface storage at each inlet is provided in **Appendix F**. Approximately 475.7 m^3 of surface storage is available within the low-points of the parking area, and grassed swale. The parking areas have been designed to store runoff from storms that exceed the capacity of the underground storage chambers at each inlet. The site has been graded to ensure that ponding is confined within the parking areas at a maximum depth of 0.35 m.

Overland flow paths have been provided to ensure that runoff from extreme storm events exceeding the available storage can be safely directed towards Solandt Road. The overland flow route is shown on the Grading Plan (drawing 119200-GR). A Stormwater Management Plan (drawing 119200 – SWM) is provided in **Appendix G** which shows the proposed drainage areas, inlet control device information and the limits of 5 and 100-year storm events. Stormwater management calculations including runoff coefficients, flows, storage required, and storage provided for each of the drainage areas is provided in **Appendix F**. **Table 8.1** below summarizes these calculations.



NOVATECH

Engineers, Planners & Landscape Architects

Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6

Telephone	(613) 254-9643
Facsimile	(613) 254-5867
Website	www.novatech-eng.com

3026 SOLANDT ROAD

EXISTING AND PROPOSED DRAINAGE BOUNDARIES

SCALE		
NTS		
DATE	JOB	FIGURE
JAN 2020	119200	FIGURE 4

M:\2019\119200\CAD\Design\Figures\SWM\119200 - SWM-PRE-VS-EX.dwg, Figure 4, Jan 17, 2020 - 11:14am, amestwerp

SHT11X17.DWG - 279mmX432mm

Table 8.1: Stormwater Management Summary

Structure ID	STM ID	ICD Parameters		2-Year		5-Year		100-year	
		Model / Diameter	T/G Elev. (m)	Flow Depth (m)	Peak Flow (L/s)	Flow Depth (m)	Peak Flow (L/s)	Flow Depth (m)	Peak Flow (L/s)
CBMH 103	A-01	LMF 70	79.55	0.00	3.8	0.12	6.0	0.26	6.2
CBMH 5	A-02	LMF 70	79.85	0.00	4.7	0.00	5.8	0.12	7.2
CBMH 104	A-04	LMF 94	79.60	0.00	8.7	0.18	13.3	0.34	13.8
STMMH 108	A-06	LMF 94	80.08	0.00	6.1	0.00	7.5	0.00	12.3

**From Rational Method Calculations.*

8.3 Quality Control

Quality control of stormwater shall be provided to an Enhanced level of treatment or 80% removal of total suspended solids. Quality control of stormwater for the site will be provided through the installation of an oil grit separator unit. The proposed water quality unit (CDS PMSU2015_4) located in the north-east corner of the site. This unit will achieve on site removal of 80% TSS, as required by the Conservation Authority prior to discharging to the Solandt Road system. Details for the proposed unit are included in **Appendix F**.

9.0 EROSION AND SEDIMENT CONTROL

9.1 Temporary Measures

Temporary erosion and sediment control measures will be implemented during construction. Silt fence, mud mats and filter socks in catchbasins will be used as erosion and sediment control measures.

Erosion and sediment control measures should be inspected daily and after every rain event to determine maintenance, repair or replacement requirements. Sediments or granulars that enter site sewers shall be removed immediately by the contractor. These measures will be implemented prior to the commencement of construction and maintained in good order until vegetation has been established. Refer to the Erosion and Sediment Control Plan (119200-ESC) for additional information.

10.0 CONCLUSIONS AND RECOMMENDATIONS

- Water servicing for the proposed development will be provided by the existing 200mm diameter service on the site, and a second proposed 150mm diameter service connecting to the 400mm watermain in the Solandt Road right-of-way. These services connect to the existing 400mm diameter watermain within the right-of-way of Solandt Road. The existing watermain infrastructure can provide adequate domestic flows and pressure for fire protection.
- The proposed building will be serviced by connecting to the existing 150mm diameter sanitary service present on the subject property. The existing service connects to the 750mm diameter trunk sewer within the Solandt Road right-of-way.
- Quantity control of stormwater will be provided for storms up to and including the 100-year storm event. Runoff from the property will be controlled with inlet control devices. The allowable release rate is 98.15 l/s, and the release rate used for design was 49.08 L/s as per the City of Ottawa guidelines for using the rational method.
- Quality control of stormwater is provided from the proposed water quality unit (CDS PMSU2015_4) located in the north-east corner of the site.
- An overland flow route is provided;
- Erosion and sediment control measures will be implemented prior to and during construction.

NOVATECH

Prepared by:	Reviewed by:
Anthony Mestwarp, P.Eng. Project Engineer Land Development Engineering	Cara Ruddle, P.Eng. Senior Project Manager Land Development Engineering

APPENDIX A
Referenced Reports

Library Copy

R-2784

David McManus
Engineering Ltd.

STORM WATER MANAGEMENT
AND SERVICING REPORT

BETZ BUILDING - 3026 SOLANDT
MORGUARD INVESTMENTS
CITY OF KANATA

Prepared by:

DAVID M^C^MANUS ENGINEERING LTD.

Project No. 2225

October, 2000
Revised February, 2001

TABLE OF CONTENTS

1.0 INTRODUCTION

David McManus Engineering Ltd. was appointed by Edmundson Matthews Architects to provide engineering services for the site development of a new building on the exisiting Morguard site. The development is located on the east corner of the intersection of March Road and Solandt Road. The location of the development is shown on Drawing 2225-S1 (Key Plan).

2.0 WATER DISTRIBUTION SYSTEM

This development will be serviced with a 152mm diameter from the existing 609.6mm diameter main located on March Road.

The location of the proposed water main on the site is shown on Drawing No. 2225-S1 attached to this report.

3.0 SANITARY SEWER DESIGN

The sanitary sewer service for this development is proposed to be a 150mm diameter connection and will connect to the existing sanitary system within the existing site The location of the proposed sanitary sewer on the site is shown on Drawing No. 2225-S1 attached to this report.

4.0 STORM DRAINAGE SYSTEM

This development site is designed to surface drain to proposed storm water ponds which will outlet to the Kizell Drain. Drawing No. 2225-SWM identifies the individual drainage areas for this site and outlet locations. At the request of the City of Kanata, an analysis of the existing storm system was conducted to determine the impact of the proposed storm sewer on the existing system. It was found that the existing storm system would not be able to accommodate the capacities produced without the use of inlet control devices (ICD's). Therefore, plate type ICD's will be placed under the frame and covers of the proposed catch basin in the front of the proposed building and in the existing catch basin located at the north west entrance to the site from Solandt Drive. "Uncontrolled" and "Controlled" Storm Sewer Design Sheets are attached hereto, and show the relationship between capacity and peak flows in controlled and uncontrolled conditions. Storage Volume Calculations and Orifice Sizing Calculations are included in this report.

5.0 STORM WATER MANAGEMENT CALCULATIONS

5.1 Storm Water Management Philosophy

To meet the City's and Conservation Authority's requirements, the runoff from the parking lot, landscaped areas and roof will be controlled to the pre development 5 year peak flow. Site BMP's will be implemented in the site grading design to provide quality enhancements to the storm water leaving the site. BMP's which will be implemented on this site include, grassed swales to convey runoff from parking lot areas and construction of detention ponds to provide quantity storage and filtration of runoff from frequent events.

Two detention ponds have been designed to provide storage and filtration for the first 15mm of runoff from the impervious areas. The West Pond will be controlled by an outlet pipe sized for the five year pre development release rate. Storms in excess of the 100 year rainfall event will be controlled by a spillway at the required elevation. The East Pond will have 15 mm (0.015 m) of runoff from the impervious areas. The West Pond will be controlled by an outlet pipe sized for the five year pre development release rate. Storms in excess of the 100 year rainfall event will be controlled by a spillway at the required elevation. The two ponds will also detain, store and slowly drain off the post development 5 and 100 year flows generated from the site.

5.2 West Pond Calculations

Allowable Pre-development Release rate

Area = (0.33+0.18+0.17)=0.68 Ha.
Pre-development Run-off Coefficient = 0.25
Time of Concentration = Tc = 20 min.
Rainfall Intensity (5 year)= 67 mm/hr.

$Q = 2.78\ C\ I\ A$
$Q = 2.78\ (0.25)\ (67)\ (0.68)$
$Q = 31.7$ L/s

Post Development Calculations
Average Run-off Coefficient
Impervious Areas (Roof and Asphalt, C = 0.90) = 0.27 ha.
Pervious Areas (Landscaped Areas, C= 0.25) = 0.41 ha.
Average Runoff Coeff. = 0.51

Quality Volume Calculations

The required volume of "quality" storage is calculated as follows:

Impervious area tributary to Pond # 1= 0.27 Ha. = 2700 m^2
"Quality" storage volume required = 2700 X 0.015 = 40.5 m^3

In addition to the "quality" storage volume, "quantity" storage volume will be provided in the pond to control runoff from the site to the pre-development 5 year level

The "quantity" storage volume required for the 5 year and 100 year design storms are shown in Table 1 below.

WEST POND
Storage Volume Calculations

Return Period	Time (min)	Intensity (mm/hr)	* Flow Q in l/s	** Allowable Runoff in l/s	Net Runoff To Be Stored in l/s	Storage Req'd m3
5 Year	14	84.3	81.3	31.7	49.6	41.6
	15	81.0	78.1	31.7	46.4	41.8
	16	**78.1**	**75.3**	31.7	**43.6**	**41.8**
	17	75.4	72.7	31.7	41.0	41.8
	18	72.9	70.3	31.7	38.6	41.7
	19	70.6	68.1	31.7	36.4	41.4
100 Year	15	136.4	131.5	31.7	99.8	89.8
	16	130.2	125.5	31.7	93.8	90.1
	17	124.6	120.1	31.7	88.4	90.2
	18	**119.5**	**115.3**	**31.7**	**83.6**	**90.2**
	19	115.0	110.8	31.7	79.1	90.2
	20	110.8	106.8	31.7	75.1	90.1

Avg. C = 0.51
Area = 0.68

* Q = 2.78 CiA

STORAGE AVAILABLE=159.1 m3

The pond volume required for "quantity" storage is as follows:

5 Year Storage Volume	= 41.8 m^3
100 Year Storage Volume	= 90.2m^3

The maximum storage required for quality and quantity is 130.7m^3

The storage volume available in the pond is 159.1 m^3 as calculated by the end area method.

The 5 year water level will be 78.90m to accommodate the 5 year storage required.

The 100 year water level will be 79.11m to accommodate the 100 year storage required.

When water exceeds elevation 79.11m, water will overflow and discharge to the Kizell Drain.

5.3 <u>West Pond Orifice Sizing</u>

An orifice will be installed in each of the outlet pipes located in the SWM Pond

West Pond - Orifice Size 100 year water level head = 79.11-78.69-(0.20/2)=0.32m

$$Q = (\text{Area of Orifice})\ (0.60)\ (2g \times \text{Head on Orifice})^{0.5}$$

$$\text{Area of Orifice} = \frac{0.0317}{(0.60)(2 \times 9.81 \times 0.32)^{0.5}} = 0.021\text{m}^2$$

Use 1 – 200mm diameter CSP with a plate type orifice with a 160mm diameter opening in the upstream end of the pipe to restrict outlet flow to the 5 year pre-development release rate of 74.5 L/s.

5.4 <u>East Pond Calculations</u>

Allowable Pre-development Release rate

Area = (1.42+0.18)=1.60 Ha.
Pre-development Run-off Coefficient = 0.25
Time of Concentration = Tc = 20 min.
Rainfall Intensity (5 year)= 67 mm/hr.

Q = 2.78 C I A
Q = 2.78 (0.25) (67) (1.60)

Q = 74.5 L/s
Post Development Calculations
Average Run-off Coefficient
Impervious Areas (Roof and Asphalt, C = 0.90) = 0.78 ha.
Pervious Areas (Landscaped Areas, C= 0.25) = 0.82 ha.
Average Runoff Coeff. = 0.57

Quality Volume Calculations

The required volume of "quality" storage is calculated as follows:

Impervious area tributary to Pond # 1= 0.78 Ha. = 7,800 m^2
"Quality" storage volume required = 7,800 X 0.015 = 117.0 m^3

In addition to the "quality" storage volume, "quantity" storage volume will be provided in the pond to control runoff from the site to the pre-development 5 year level

The "quantity" storage volume required for the 5 year and 100 year design storms are shown in Table 2 below.

EAST POND
Storage Volume Calculations

Return Period	Time (min)	Intensity (mm/hr)	* Flow Q in l/s	** Allowable Runoff in l/s	Net Runoff To Be Stored in l/s	Storage Req'd m3	
5 Year	5	140.6	256.4	74.5	281.9	84.6	Avg. C = 0.57
	10	101.2	256.5	74.5	182.0	109.2	Area = 1.60
	15	81.0	205.5	74.5	131.0	117.9	
	20	**68.5**	**173.5**	**74.5**	**99.0**	**118.9**	
	25	59.7	151.4	74.5	76.9	115.3	
	30	53.2	134.9	74.5	60.4	108.7	
100 Year	10	183.0	463.9	74.5	389.4	233.6	
	15	136.4	345.9	74.5	271.4	244.2	
	20	**110.8**	**280.8**	74.5	**206.3**	**247.6**	
	25	94.2	238.9	74.5	164.4	246.7	
	30	82.6	209.4	74.5	134.9	242.8	

* Q = 2.78 CiA

STORAGE AVAILABLE=388.4 m3

The pond volume required for "quantity" storage is as follows:

5 Year Storage Volume = 118.9m^3
100 Year Storage Volume = 247.6m^3

The maximum storage required for quality and quantity is 364.6m^3

The storage volume available in the pond is 388.4 m^3 as calculated by the end area method.

The 5 year water level will be 78.26 m to accommodate the 5 year storage required.

The 100 year water level will be 78.52m to accommodate the 100 year storage required.

When water exceeds elevation 78.52 m, water will overflow and discharge to the Kizell Drain.

5.5 East Pond Orifice Sizing

An orifice will be installed in each of the outlet pipes located in the SWM Pond

East Pond - Orifice Size 100 year water level head = 78.52-78.00-(0.25/2)=0.395m

$$Q = (\text{Area of Orifice})\ (0.60)\ (2g \text{ X Head on Orifice})^{0.5}$$

$$\text{Area of Orifice} = \frac{0.0745}{(0.60)(2 \text{ X } 9.81 \text{ X } 0.395)^{0.5}} = 0.045\text{m}^2$$

Use 1 – 250mm diameter CSP with orifice (plate type) in upstream end of pipe with a 240mm diameter opening to restrict flow to the Kizell Drain. However, this is not a practical solution. Since the culvert will have slightly less capacity than a simple orifice, it will be sufficiently accurate to assume that the 250mm diameter culvert itself will control the flows to 74.5 L/s.

5.6 Sedimentation Control During Construction

In order to control sediments leaving the site during construction a silt fence will be constructed along the Kizell Drain until final landscaping and vegetation has been established. The location of the silt fence has been shown on Drawing No. 2225-S1.

6.0 CONCLUSIONS

This report and design adequately addresses the method by which this site will meet the overall servicing and storm water management requirements of the City of Kanata and the Mississippi Valley Conservation Authority.

Prepared by
David M^c^Manus Engineering Ltd.

Larry S. Colbran J. David McManus, P. Eng.

February 14, 2001

Storm Design Sheet

UNCONTROLLED

LOCATION			AREA (ha)							PROPOSED SEWER							
AREA No.	FROM MH	TO MH	R= 0.65	R= 0.7	R= 0.62	INDIV 2.78 AR	ACCUM 2.78 AR	TIME OF CONC.	RAINFALL INTENSITY I	PEAK FLOW Q (l/s)	TYPE OF PIPE	PIPE SIZE (mm)	GRADE (%)	LENGTH (m)	CAPACITY (l/s)	FULL FLOW VELOCITY (m/s)	TIME OF FLOW (min.)
6	EXMH 1	EXMH 2	0.27			0.49	0.49	20.00	67.35	32.86	PVC	304.8	0.36	25	60.59	1.08	0.39
5	EXCB 3	EXCB 2	0.08			0.14	0.14	20.00	67.35	9.74	PVC	304.8	0.11	18.5	33.49	0.60	0.52
6	EXCB 2	EXMH 2	0.10			0.18	0.33	20.52	66.11	21.50	PVC	304.8	0.90	5.5	95.80	1.71	0.05
7	EXMH 2	EXCB 1					0.81	20.52	66.10	53.75	PVC	304.8	0.27	18.5	52.47	0.93	0.33
7	EXCB 1	EXMH 3	0.13			0.23	1.05	20.85	65.34	68.48	PVC	254	0.45	20	41.66	1.07	0.31
7_8	EXMH 3	EXMH 4					1.05	21.16	64.64	67.74	PVC	304.8	0.27	18.5	52.47	0.93	0.33
8	EXMH 4	OUTLET	0.69			1.25	2.29	21.49	63.91	146.67	PVC	381	0.29	75.5	98.60	1.12	1.12

Q = 2.78 AIR

where Q = peak flow in litres per second (L/s)
A = area in hectares (ha)
I = rainfall intensity in millimetres per hour (mm/h)
R = runoff coefficient

SPECIFY:
Coefficient of friction in pipe
N = 0.013

David McManus Engineering Ltd.

Storm Design Sheet

CONTROLLED

LOCATION			AREA (ha)							PROPOSED SEWER							
AREA No.	FROM MH	TO MH	R= 0.65	R= 0.7	R= 0.62	INDIV 2.78 AR	ACCUM 2.78 AR	TIME OF CONC.	RAINFALL INTENSITY I	PEAK FLOW Q (l/s)	TYPE OF PIPE	PIPE SIZE (mm)	GRADE (%)	LENGTH (m)	CAPACITY (l/s)	FULL FLOW VELOCITY (m/s)	TIME OF FLOW (min.)
4	BLDG	EXMH 1						20.00	67.35	**5.00**	PVC	203.2	1.00	38.5	34.25	1.37	0.47
6	EXMH 1	EXMH 2						20.47	66.22	5.00	PVC	304.8	0.36	25	60.59	1.08	0.39
5	EXCB 3	EXCB 2	0.08			0.14	0.14	20.00	67.35	9.74	PVC	304.8	0.11	18.5	33.49	0.60	0.52
6	EXCB 2	EXMH 2	0.10			0.18	0.33	20.52	66.11	21.50	PVC	304.8	0.90	5.5	95.80	1.71	0.05
7	EXMH 2	EXCB 1					0.33	20.52	66.10	26.50	PVC	304.8	0.27	18.5	52.47	0.93	0.33
7	EXCB 1	EXMH 3	0.13			0.23	0.56	20.85	65.34	41.60	PVC	254	0.45	20	41.66	1.07	0.31
7_8	EXMH 3	EXMH 4					0.56	21.16	64.64	41.21	PVC	304.8	0.27	18.5	52.47	0.93	0.33
8	EXMH 4	OUTLET	0.41			0.74	1.30	21.49	63.91	**98.15**	PVC	381	0.29	75.5	98.60	1.12	1.12

Q = 2.78 AIR

where Q = peak flow in litres per second (L/s)
A = area in hectares (ha)
I = rainfall intensity in millimetres per hour (mm/h)
R = runoff coefficient

PEAK FLOWS IN **BOLD** INDICATE A CONTROLLING ORIFICE PLATE TO LIMIT THE RELEASE RATE.

SPECIFY:
Coefficient of friction in pipe
N = 0.013

Storage Volume Calculations

RUNOFF= 0.65 **AREA # 4**
AREA(HA) = 0.27 **CATCH BASIN No.1**

Return Period	Time (min)	Intensity (mm/hr)	* Flow Q in l/s	** Allowable Runoff in l/s	Net Runoff To Be Stored in l/s	Storage Req'd m3
5 Year	40	44.1	21.5	5	16.5	39.7
	50	38.0	18.5	5	13.5	40.6
	60	33.6	**16.4**	**5**	**11.4**	**40.9**
	70	30.2	14.7	5	9.7	40.8
	80	27.5	13.4	5	8.4	40.3
	90	25.3	12.3	5	7.3	39.6

* Q = 2.78 CiA

STORAGE AVAILABLE=41.4m4

Q(L/S)	H(M)	ORIFICE AREA(SQ.M)	SQUARE (1-side mm)	CIRC (DIA-mm)
5.0	0.37	0.003	55.6	62.8

Storage Volume Calculations

RUNOFF= 0.65 **AREA # 8**
AREA(HA) = 0.28 **EXIST. CATCH BASIN No.4**

Return Period	Time (min)	Intensity (mm/hr)	* Flow Q in l/s	** Allowable Runoff in l/s	Net Runoff To Be Stored in l/s	Storage Req'd m3
5 Year	20	68.5	34.6	10	24.6	29.6
	30	**53.2**	**26.9**	**10**	**16.9**	**30.5**
	40	44.1	22.3	10	12.3	29.6
	50	38.0	19.2	10	9.2	27.7
	60	33.6	17.0	10	7.0	25.1
	70	30.2	15.3	10	5.3	22.1

* Q = 2.78 CiA

STORAGE AVAILABLE=30.8m4

Q(L/S)	H(M)	ORIFICE AREA(SQ.M)	SQUARE (1-side mm)	CIRC (DIA-mm)
10.0	0.33	0.007	80.9	91.3

STORMWATER MANAGEMENT
WEST POND SUMMARY CHART

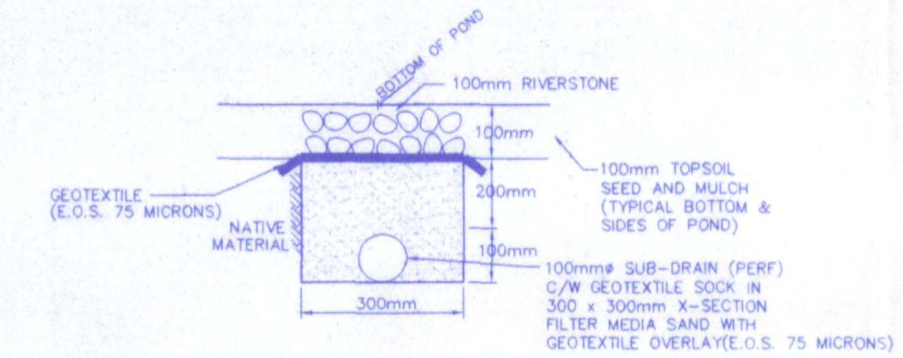
RETURN PERIOD	ALLOWABLE RELEASE RATE	VOLUME REQUIRED	W/L
5 YR	31.7 L/s	41.8 m^3	78.90
100 YR	31.7 L/s	90.2 m^3	79.11

* SPILLWAY ELEVATION = 79.11
POND INVERT ELEVATION = 78.45

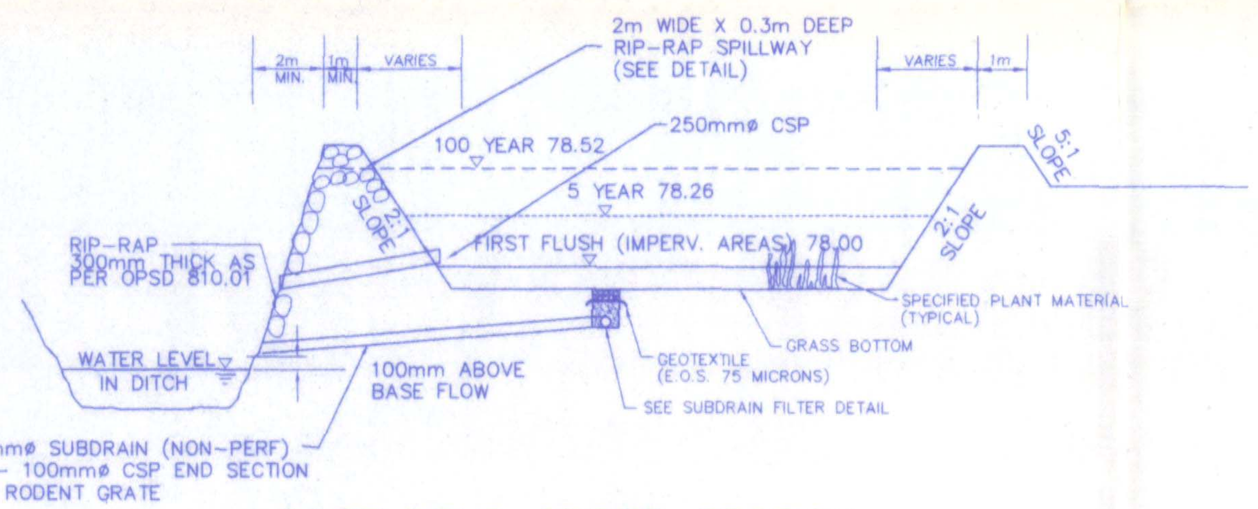
STORMWATER MANAGEMENT
EAST POND SUMMARY CHART

RETURN PERIOD	ALLOWABLE RELEASE RATE	VOLUME REQUIRED	W/L
5 YR	74.5 L/s	117.9m^3	78.26
100 YR	74.5 L/s	247.6 m^3	78.52

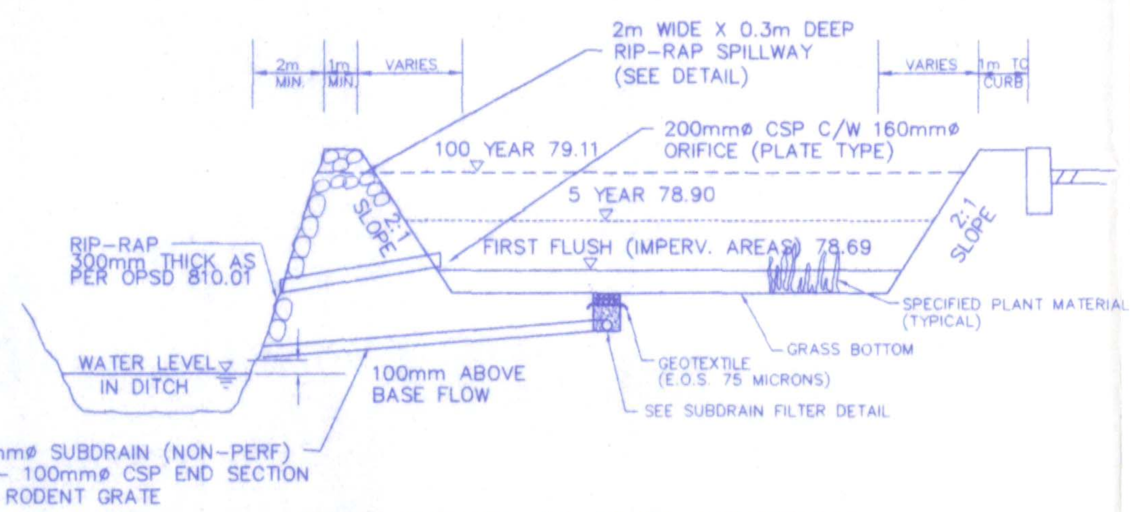
* SPILLWAY ELEVATION = 78.52
POND INVERT ELEVATION = 77.70



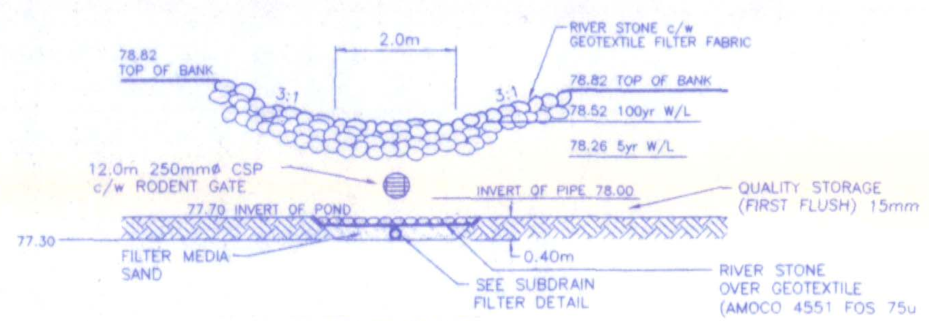
SUBDRAIN FILTER DETAIL (TYPICAL)
N.T.S.



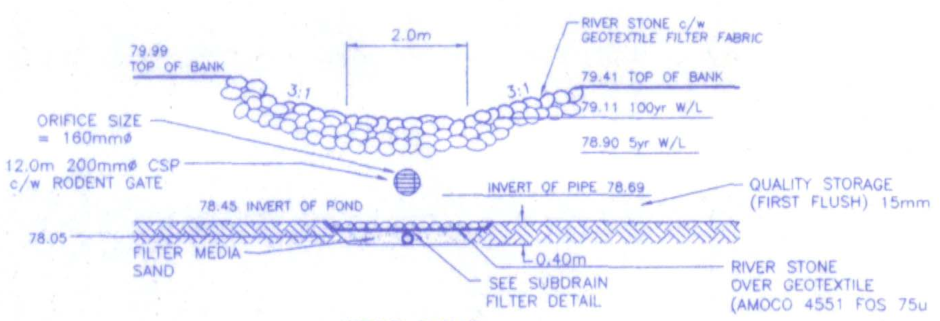
EAST POND CROSS-SECTION
N.T.S.



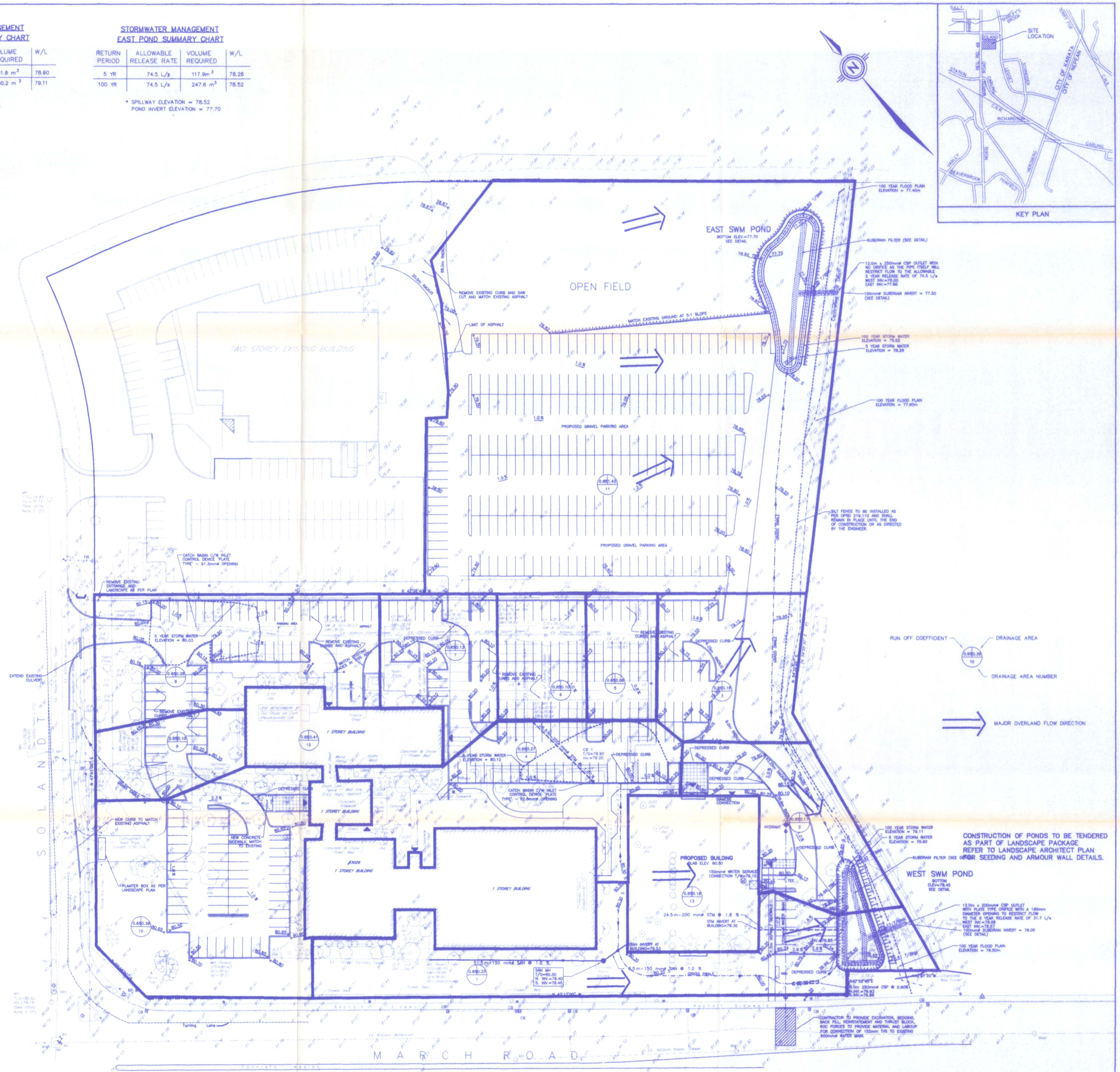
WEST POND CROSS-SECTION
N.T.S.



EAST POND SPILLWAY DETAIL
N.T.S.



WEST POND SPILLWAY DETAIL
N.T.S.



NOTE
THE POSITION OF ALL POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, DETERMINE THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

No.	REVISION	DATE	BY
3.	REVISED SWM PONDS AS PER MVC COMMENTS	FEB 14/01	JDM
2.	REVISED SWM PONDS	JAN 08/01	JLS
1.	ISSUED FOR APPROVAL	NOV 2/00	JLS

REGISTERED PROFESSIONAL ENGINEER
J. D. McMANUS
PROVINCE OF ONTARIO

DME Ltd.
David McManus Engineering Ltd.
200 - 39 Camelot Drive
Nepean Ontario, K2H 5W6
E-mail: mcmanus@dmel.on.ca
Ph. 225-1929 Fax. 225-7330

BASEPLAN	DME
DESIGN	LSC/JLS
CHECKED	JLS
CAD	LSC
PROJ. MGR.	JLS
APPROVED	JDM

SCALE 1:500 (0 10 20)

BETZ BUILDING ADDITION
CITY OF KANATA
STORM WATER MANAGEMENT PLAN

PROJECT No.	2225
SURVEY BY	DME
DATE	AUG 2000
DRAWING No.	2225-SWM

NOTES: GENERAL

1. CONTRACTOR IS RESPONSIBLE FOR ALL LAYOUT FOR CONSTRUCTION PURPOSES.
2. ALL ELEVATIONS ARE GEODETIC AND UTILIZE METRIC UNITS.
3. JOB BENCH MARK – CONFIRM WITH McMANUS ENGINEERING PRIOR TO UTILIZATION.
4. REFER TO SOILS REPORT BY GOLDER FOR SUBSURFACE CONDITIONS.
5. ALL GROUND SURFACES SHALL BE EVENLY GRADED WITHOUT PONDING AREAS AND WITHOUT LOW POINTS EXCEPT WHERE APPROVED SWALE OR CATCHBASIN OUTLETS ARE PROVIDED.
6. STRIP AND REMOVE ALL TOPSOIL FROM IMPROVED AREAS.
7. COORDINATE AND SCHEDULE ALL WORK WITH OTHER TRADES AND CONTRACTORS.
8. ALL EDGES OF DISTURBED PAVEMENT SHALL BE SAWCUT TO FORM A NEAT AND STRAIGHT LINE PRIOR TO PLACING NEW PAVEMENT.
9. CURBS TO BE AS PER CITY OF KANATA STANDARD KSD 600.110
10. CONTRACTOR IS TO COMPLY WITH THE CITY OF KANATA REQUIREMENTS FOR TRAFFIC CONTROL WHEN WORKING ON MARCH OR SOLANDT ROAD.
11. RESTORE PAVEMENT STRUCTURE, CURBS AND SURFACES ON EXISTING ROADS TO A CONDITION AT LEAST EQUAL TO ORIGINAL AND TO THE SATISFACTION OF THE MUNICIPAL AUTHORITIES.
12. IN EXISTING ASPHALT AREAS WHICH WILL BE OVERLAID AND REGRADED, THE EXISTING ASPHALT SHALL BE PULVERIZED. PULVERIZED MATERIAL TO BE REGRADED AND MIXED WITH NEW GRANULAR 'A' MATERIAL. EXISTING CURBS AND BOLLARDS NOT REQUIRED FOR THE PROPOSED PLAN SHALL BE REMOVED.
13. ALL MATERIAL SUPPLIED AND PLACED FOR PARKING LOT AND ACCESS ROAD CONSTRUCTION SHALL BE TO OPSS STANDARDS AND SPECIFICATIONS UNLESS OTHERWISE NOTED. (CONSTRUCTION OPSS 206, 310 & 314 MATERIALS OPSS 1001, 1003 & 1010).
14. REFER TO ARCHITECT'S PLANS FOR BUILDING DIMENSIONS AND SITE LAYOUT. DIMENSIONS AND LAYOUT INFORMATION SHALL BE CONFIRMED PRIOR TO COMMENCEMENT OF CONSTRUCTION.
15. SUPPLY AND INSTALL ALL PIPING AND APPURTENANCES AS SHOWN TO WITHIN 1.0m OF BUILDING WALLS. PROVIDE TEMPORARY CAPS.
16. REFER TO LANDSCAPE ARCHITECTS PLAN BY DOUGLAS ASSOCIATES LANDSCAPE ARCHITECT FOR SIDEWALK, PATHWAYS, CONCRETE MEDIAN, PLANTING AND OTHER LANDSCAPE FEATURE MATERIALS AND LOCATIONS.
17. ALL EXISTING CATCH BASINS SHALL BE INSTALLED WITH GEOTEXTILE FILTER CLOTH TO PREVENT DEBRIS FROM ENTERING THE CATCH BASIN DURING CONSTRUCTION. FILTER CLOTH SHALL REMAIN IN PLACE UNTIL THE END OF CONSTRUCTION OR AS DIRECTED BY THE ENGINEER.
18. A CIVIL ENGINEERING FIRM SHALL BE PROVIDED FOR FULL TIME INSPECTION FOR ALL WORKS UNDERTAKEN WITHIN THE CITY ROAD ALLOWANCE. THE CIVIL ENGINEERING FIRM SHALL BE RESPONSIBLE FOR SUPPLYING, WITHIN 48 HOURS OF REINSTATEMENT, A WRITTEN REPORT DETAILING THE WORKS WITHIN THE CITY'S ROAD ALLOWANCE. THIS REPORT SHALL CONFIRM THAT THE REINSTATEMENT HAS BEEN IN ACCORDANCE WITH THE CITY STANDARDS, SPECIFICATIONS AND BY-LAWS. FAILURE TO COMPLY SHALL MEAN SEIZURE OF SECURITIES TO COVER COSTS INCURRED BY THE CITY TO INVESTIGATE AND, WHERE REQUIRED, UNDERTAKE REINSTATEMENT TO THE SATISFACTION OF THE CITY OF KANATA.
19. CONTACT THE CITY FOR INSPECTION OF ROUGH GRADING OF PARKING LOTS, ROADWAYS AND LANDSCAPED AREAS PRIOR TO PLACEMENT OF ASPHALT AND TOPSOIL. ALL DEFICIENCIES NOTED SHALL BE RECTIFIED TO THE CITY'S SATISFACTION PRIOR TO PLACEMENT OF ANY ASPHALT OR TOPSOIL AND SOD.
20. DO NOT ALTER GRADING OF SITE WITHOUT PRIOR APPROVAL OF CITY.

NOTES: WATERMAIN

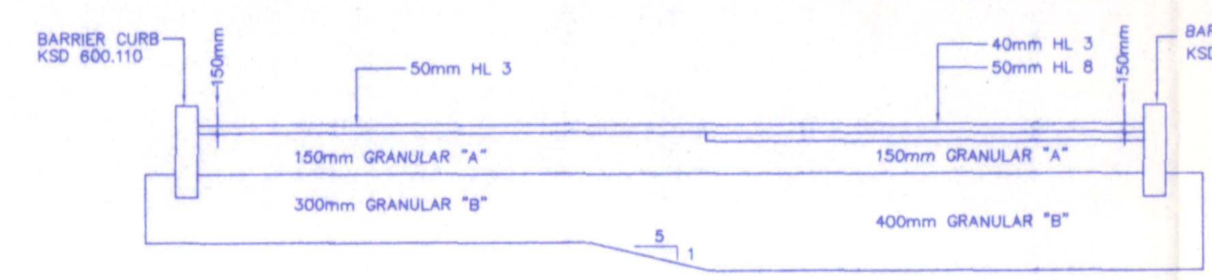
1. ALL WATERMAIN WORK AND MATERIAL SHALL BE IN ACCORANCE WITH R.O.C. STANDARDS. NO WORK SHALL COMMENCE UNLESS A REGIONAL WATER WORKS INSPECTOR IS ON SITE.
2. INSTALLATION OF WATER METER AND REMOTE RECEPTACLE SHALL BE IN ACCORDANCE WITH R.O.C. STANDARDS.
3. WATERMAIN IS TO BE 152mmø PVC DR18 (WITH TRACER WIRE AS PER R.O.C. STANDARD WSD-40).
4. VALVE BOXES AS PER R.O.C. DETAIL WSD-24.
5. ALL WATERMAIN TO BE INSTALLED AT MINIMUM COVER OF 2.4m.
6. WATERMAIN BEDDING IS TO BE AS PER R.O.C. DETAIL WSD-17.
7. CONCRETE THRUST BLOCKS AS PER OPSD 1103.01.
8. CATHODIC PROTECTION REQUIRED FOR ALL IRON FITTINGS PER R.O.C. DETAILS WSD-40 AND WSD-42.
9. IF WATERMAIN MUST BE DEFLECTED TO MEET ALIGNMENT, ENSURE THAT THE AMOUNT OF DEFLECTION USED IS LESS THAN HALF THE MAX RECOMMENDED BY THE MANUFACTURER.
10. FIRE HYDRANTS AND SIAMESE CONNECTION ARE IN ACCORDANCE WITH THE BUILDING CODE

NOTES: SEWER

1. SEWER BEDDING AS PER CITY OF KANATA STANDARD WITH 0.30m GRANULAR BEDDING COMPACTED TO 95% STANDARD PROCTOR DENSITY.
2. ALL WORK SHALL BE PERFORMED, AS APPLICABLE IN ACCORDANCE WITH R.O.C. STANDARD SPECIFICATIONS, CITY OF KANATA SPECIFICATIONS, AND IN PARTICULAR, WITH O.P.S.S. 407, AND 410.
3. ALL MANHOLES, CATCH BASINS TO BE BACK FILLED WITH MIN. 0.3m HORIZ. THICKNESS OF SAND.
4. SANITARY SEWERS SHALL BE PVC DR 35.

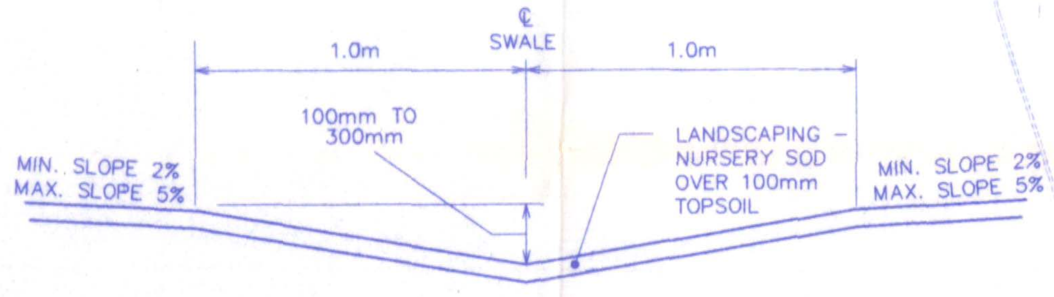
LEGEND

- PROPOSED GRADE
- EXISTING GRADE
- PROPOSED SWALE GRADE
- HYDRANT
- VALVE AND VALVE BOX
- SIAMESE FIRE CONNECTION
- PROPOSED CATCH BASIN
- WATER METER
- REMOTE WATER METER
- EXISTING SANITARY SEWER
- EXISTING STORM SEWER
- EXISTING WATERMAIN
- SANITARY SEWER
- WATERMAIN
- STORM SEWER
- HEAVY DUTY ASPHALT
- TERRACING
- PROPOSED DRAINAGE SLOPE
- LIMIT OF PHASE 1 CONSTRUCTION



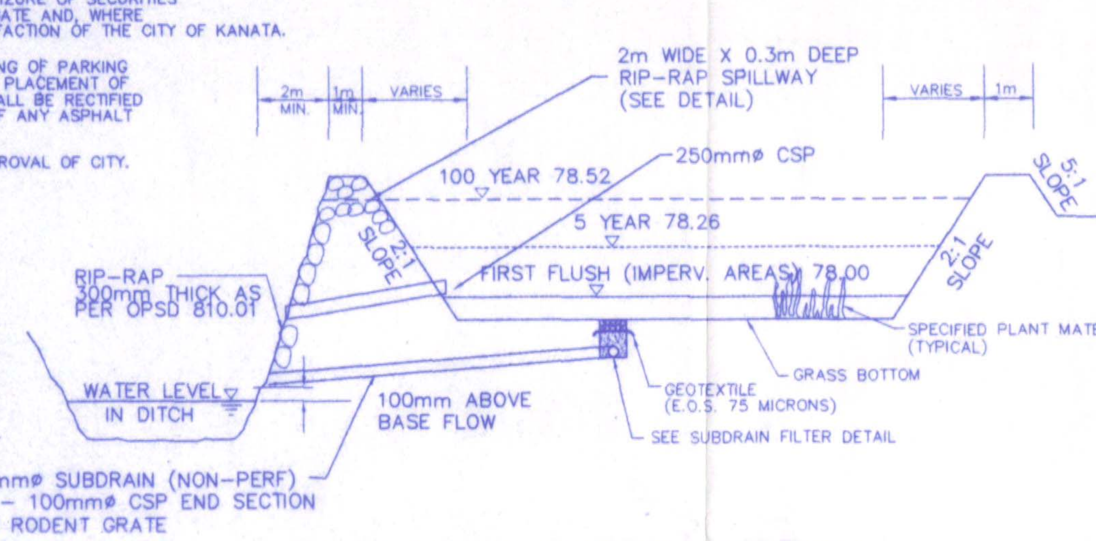
PARKING AREAS (LIGHT DUTY)

MAJOR ACCESS ROUTES (HEAVY DUTY)



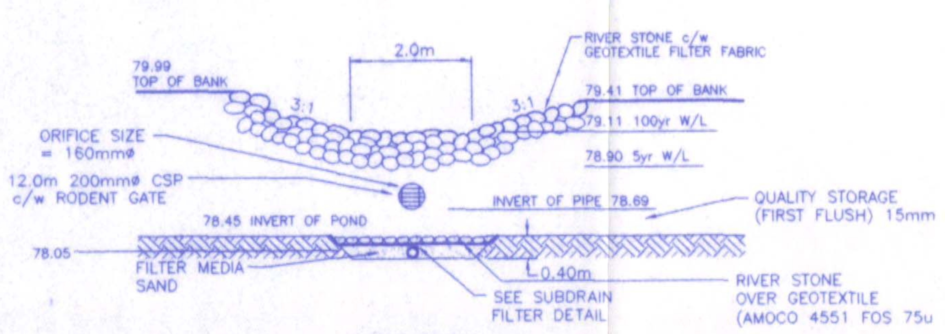
SWALE DETAIL

N.T.S.



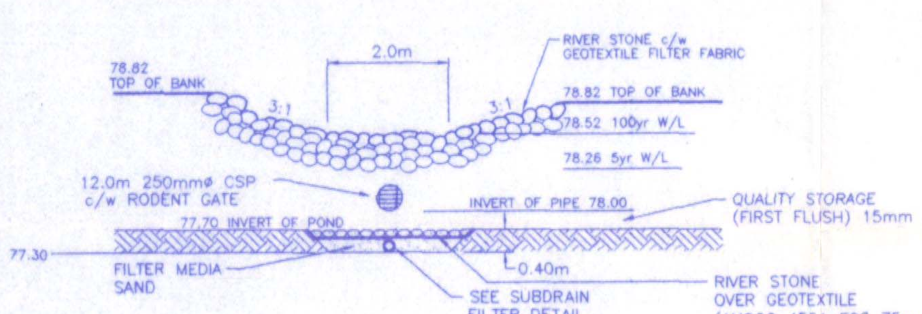
EAST POND CROSS-SECTION

N.T.S.



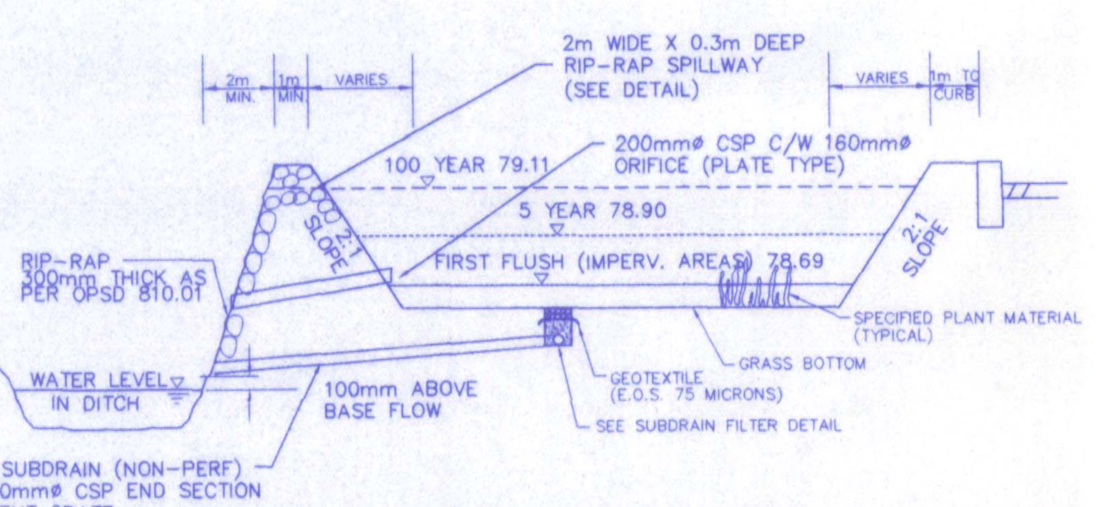
WEST POND SPILLWAY DETAIL

N.T.S.



EAST POND SPILLWAY DETAIL

N.T.S.

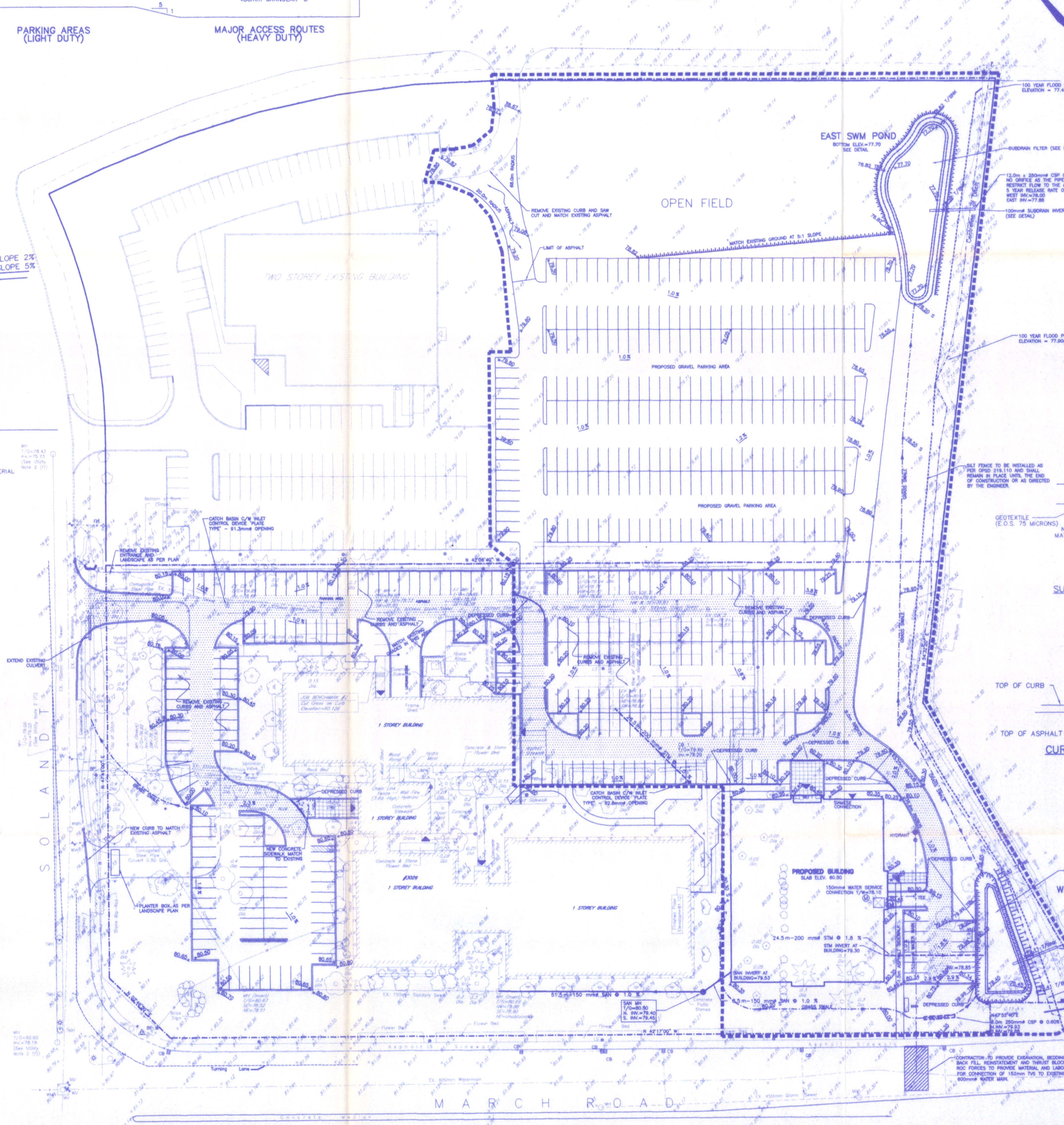


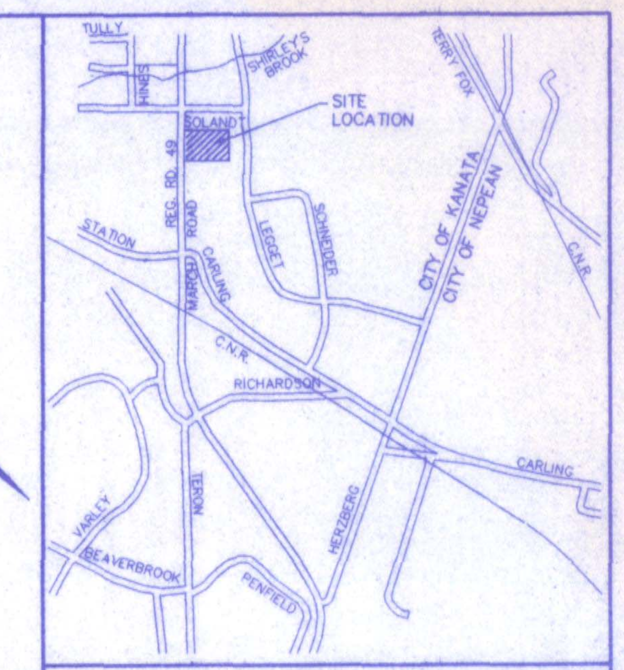
WEST POND CROSS-SECTION

N.T.S.

WATERMAIN TABLE

STATION	FIN/GRADE	T/W GRADE	COMMENT
0+000	EXISTING	EXISTING	CONNECTION TO EXISTING WITH 150mm TVS
0+009.9	81.12	78.72	VALVE
0+020.5	80.05	77.65	TOP OF WATER MAIN
0+041.0	80.05	77.65	TOP OF WATER MAIN
0+044.8	80.25	77.85	SERVICE TO BUILDING
0+059.0	80.25	77.85	VALVE
0+061.0	80.25	77.85	HYDRANT





KEY PLAN

STORMWATER MANAGEMENT
EAST POND SUMMARY CHART

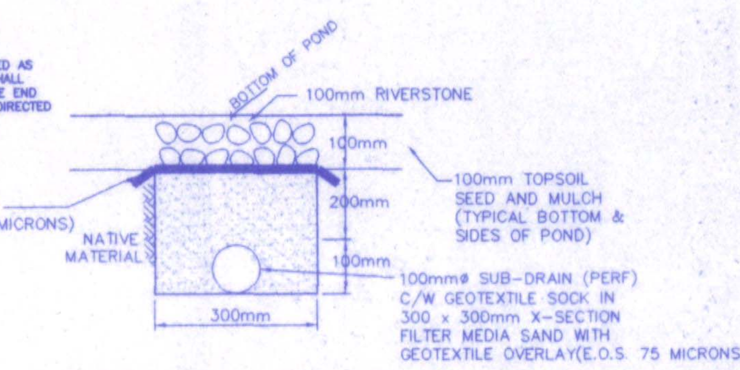
RETURN PERIOD	ALLOWABLE RELEASE RATE	VOLUME REQUIRED	W/L
5 YR	74.5 L/s	117.9m ^{3}	78.26
100 YR	74.5 L/s	247.6 m ^{3}	78.52

* SPILLWAY ELEVATION = 78.52
POND INVERT ELEVATION = 77.70

STORMWATER MANAGEMENT
WEST POND SUMMARY CHART

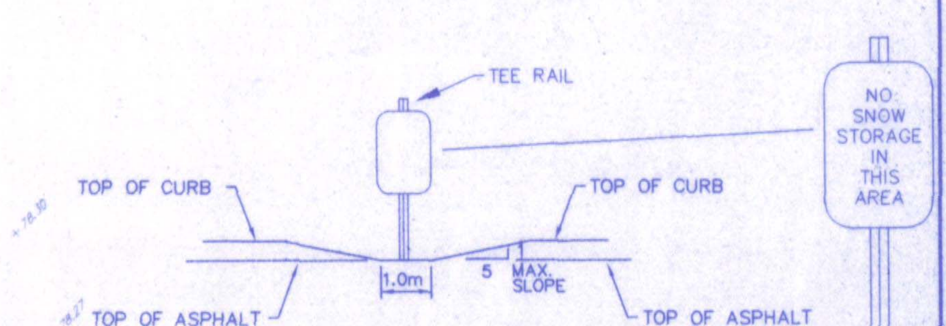
RETURN PERIOD	ALLOWABLE RELEASE RATE	VOLUME REQUIRED	W/L
5 YR	31.7 L/s	41.8 m ^{3}	78.90
100 YR	31.7 L/s	90.2 m ^{3}	79.11

* SPILLWAY ELEVATION = 79.11
POND INVERT ELEVATION = 78.45



SUBDRAIN FILTER DETAIL (TYPICAL)

N.T.S.



CURB DEPRESSION DETAIL

N.T.S.

(FOR DRAINAGE OUTLETS)

CONSTRUCTION OF PONDS TO BE TENDERED AS PART OF LANDSCAPE PACKAGE
REFER TO LANDSCAPE ARCHITECT PLAN FOR SEEDING AND ARMOUR WALL DETAILS.

NOTE
THE POSITION OF ALL POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, DETERMINE THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

No.	REVISION	DATE	BY	No.	REVISION	DATE	BY
				7.	ISSUED FOR STORM SEWER CONSTRUCTION	NOV 29/00	JLS
				6.	ADD STORM SERVICE TO PROPOSED BUILDING	NOV 7/00	JLS
				5.	REVISED CATCH BASINS AND SWM PONDS	NOV 2/00	JLS
11.	REVISED SWM PONDS AS PER MVC COMMENTS	FEB 14/01	JDM	4.	ISSUED FOR TENDER	OCT 19/00	JLS
10.	REVISED STORM SEWER, SWALE & SWM PONDS	JAN 08/01	JLS	3.	REVISED LOCATION OF WATER SERVICE	OCT 11/00	JLS
9.	REVISED HEAVY-DUTY ASPHALT AREA	DEC 19/00	JLS	2.	REVISED PARKING AND SWM POND LOCATIONS	OCT 3/00	JLS
8.	REVISED ENTRANCES, WEST SIDE AND LEGGET	DEC 18/00	JLS	1.	ISSUED FOR SITE PLAN APPROVAL	AUG 29/00	JLS

REGISTERED PROFESSIONAL ENGINEER
J. D. McMANUS
PROVINCE OF ONTARIO

DME Ltd.
David McManus Engineering Ltd.
200 – 39 Camelot Drive
Nepean Ontario, K2H 5W6
E-mail: mcmanus@dmel.on.ca
Ph. 225-1929 Fax 225-7330

BASEPLAN	DME
DESIGN	LSC/JLS
CHECKED	JLS
CAD	LSC
PROJ. MGR.	JLS
APPROVED	JDM

SCALE 1:500
0 10 20

BETZ BUILDING ADDITION

CITY OF KANATA

SITE SERVICING PLAN AND GRADING PLAN

PROJECT No.	2225
SURVEY BY	DME
DATE	AUG 2000
DRAWING No.	2225-S1

APPENDIX B
Pre-Consultation Meeting Minutes

File Number: PC 2019-0286
November 1, 2019

3026 Solandt Road
Pre-Consultation Meeting Minutes

Location: Room 4102E, City Hall
Date: November 1, 1:30pm to 2:30pm

Attendee	Role	Organization
Mark Young	Planner	City of Ottawa
Ahmed Elsayed	Project Manager (Infrastructure)	
Neeti Paudel	Project Manager (Transportation)	
Matthew Ippersiel	Planner (Urban Design)	
Samantha Gatchene	Planning Assistant	
Bonnie Martell	Owner’s Representative	Colonnade Bridgeport
Robert Matthews	Architect	N45
Lee Sheets	Civil Engineer	Novatech
Gordon Scobie	Transportation Engineer	CIMA

Comments from Applicant

1. The applicant is proposing the construction of a five-storey office building with approximately 100,000 square feet of office space.
2. Parking would be provided by an associated surface parking lot. Shared parking is proposed as the owner also owns the property to the east, 3000 Solandt Road.
3. Vehicle access is proposed via two access points from Solandt Road, in addition to existing shared access points on the abutting property.

Planning Comments

1. The proposal will require a complex site plan approval application.
2. Please ensure that all zoning requirements and provisions are indicated on the provided plans.
3. Please provide detailed parking counts if shared parking is proposed.

Urban Design Comments

1. Please provide strong pedestrian connection between both buildings on site and into the parking areas.
2. Please provide enhanced screening for the garbage and loading area abutting March Road.
3. Please ensure that the corner treatment of both the building and the landscape design enhance and emphasize the corner of March Road and Solandt Drive.

Parks Planning:

Cash-in-lieu of parkland may be required based on the parkland dedication by-law. If this has been provided previously confirmation will be required.

Engineering Comments

General

- Local Conservation Authority (MVCA) clearance is required.
- Please note that servicing and site works shall be in accordance with the following documents:
  - Ottawa Sewer Design Guidelines (October 2012)
  - Ottawa Design Guidelines-Water Distribution (July 2010)
  - Stormwater Management Planning and Design Manual, Ministry of the Environment, March 2003
  - Technical Bulletin PIEDTB-2016-01
  - Technical Bulletins ISTB-2018-01, ISTB-2018-02 and ISTB-2018-03.
  - Ottawa Design Guidelines – Water Distribution (2010)
  - Geotechnical Investigation and Reporting Guidelines for Development Applications in the City of Ottawa (2007)
  - City of Ottawa Accessibility Design Standards (2012)
  - Ottawa Standard Tender Documents (latest version)
  - Ontario Provincial Standards for Roads & Public Works (2013)

Stormwater Management Criteria:

- On site removal of 80% of TSS is required to be achieved.
- *The 100 year post development runoff from ICI sites are controlled to the 2 or 5 year predevelopment runoff rate. It can be accepted controlling to the 5 year pre if there is capacity in the receiving storm system (i.e. system was design to accommodate the 5 year pre from this site).*
- As per *Technical Bulletin PIEDTB-2016-01 section 8.3.11.1 (p.12 of 14)* **there shall be no surface ponding on private parking areas during the 2-year storm rainfall event**. Depending on the SWM strategy proposed underground or additional underground storage may be required to satisfy this requirement.
- When using the modified rational method to calculate the storage requirements for the site any underground storage (pipe storage etc.) should not be included in the overall available storage. The modified rational method assumes that the restricted flow rate is constant throughout the storm which

underestimates the storage requirement prior to the 1:100 year head elevation being
reached. Please note that if you wish to utilize any underground storage as available storage, the $Q_{(release)}$ must be modified to compensate for the lack of head on the orifice. An assumed average release rate equal to 50% of the peak allowable rate shall be applied. Otherwise, disregard the underground storage as available storage or provide modeling to support SWM strategy.

- Please note that the minimum orifice dia. for a plug style ICD is 83mm and the minimum flow rate from a vortex ICD is 6 L/s in order to reduce the likelihood of plugging.
- Please provide a **Pre-Development Drainage Area Plan** as part of the engineering drawing set to define the pre-development drainage area(s)/patterns.
- A stress-test (100-year plus 20%) of the stormwater management system shall be preformed as per Section 8.3.12 of the City's sewer design guidelines. Drainage systems shall be stress tested using design storms calculated on the basis of a 20% increase in the City's IDF curves rainfall values.
- A stormwater summary table shall be provided in the report.
- The new proposed building does not require an ECA, as for the existing building, the applicant is advised to do all necessary efforts to locate and include the ECA for the existing works on site, if no ECA was made, a new ECA will be required for the existing works

Sanitary:

- The sanitary sewer on Solandt Road is classified as a trunk (750 mm). Our guidelines discourages/prohibits direct connections off backbone sewers.
- Consultant confirmed existing sanitary pipes on site that can be used to service proposed building.
- Analysis and demonstration that there is sufficient/adequate residual capacity to accommodate any increase in wastewater flows in the receiving and downstream wastewater systems are required to be provided.
- Please review the wastewater design flow parameters *in Technical Bulletin PIEDTB-2018-01.*

Water:

- The site contains a private 152 mm watermain. Confirm size is adequate to support this development.
- The maximum fire flow capacity of a fire hydrant shall be reviewed and documented to ensure a sufficient number of fire hydrants are available to service the proposed development. Please review Technical Bulletin ISTB-2018-0. A **fire hydrant coverage plan** shall be provided.

- Please provide the following information to the City of Ottawa via email to request water distribution network boundary conditions for the subject site. Please note that once this information has been provided to the City of Ottawa it takes approximately 5-10 business days to receive boundary conditions.
    - Type of Development
    - Site Address
    - A plan showing the proposed water service connection location(s).
    - **Average Daily Demand** (L/s)
    - **Maximum Daily Demand** (L/s)
    - **Peak Hour Demand** (L/s)
    - **Fire Flow** (L/min)

      [*Fire flow demand requirements shall be based on Fire Underwriters Survey (FUS) Water Supply for Public Fire Protection 1999*]
    - **FUS Fire Flow Calculations**

Geotechnical Investigation:

- A Geotechnical Study shall be prepared in support of this development proposal.

Please note that these comments are considered preliminary based on the conceptual information provided to date and therefore maybe amended as additional details become available and presented to the City

<u>Transportation Comments</u>

1. Follow Traffic Impact Assessment Guidelines:
    a. A TIA is required.
    b. Start this process asap. The application will not be deemed complete until the submission of the draft step 1-4, including the functional draft RMA package (if applicable) and/or monitoring report (if applicable).
    c. Request base mapping asap if RMA is required. Contact Engineering Services (https://ottawa.ca/en/city-hall/planning-and-development/engineering-services).
2. ROW protection is as follows:
    a. March Rd between Terry Fox and Richardson is 44.5m even. This ROW protection appears to already be accounted for on the site plan.
    b. Solandt Rd along its entire length is 24m even.
    c. Legget Dr along its entire length is 24m even.

3. Corner triangles as per OP Annex 1 - Road Classification and Rights-of-Way at the following locations on the final plan will be required (measure on the property line/ROW protected line; no structure above or below this triangle):
    a. Collector Road to Arterial Road: 5 m x 5 m
4. Sight triangle as per Zoning by-law is 6 m x 6 m (measure on the curb line).
5. Corner Clearance is 55m for the site access.
6. Clear throat length for accesses on Solandt is to be 15m.
7. Sidewalks on property to be updated to City standard. Sidewalks are to be continuous across accesses as per City Specification 7.1.
8. On site plan:
    a. Show all details of the roads abutting the site up to and including the opposite curb; include such items as pavement markings, accesses and/or sidewalks.
    b. Turning templates will be required for all accesses showing the largest vehicle to access the site; required for internal movements and at all access (entering and exiting and going in both directions).
    c. Show all curb radii measurements; ensure that all curb radii are reduced as much as possible
    d. Show lane/aisle widths.
    e. Grey out any area that will not be impacted by this application.
9. AODA legislation is in effect for all organizations, please ensure that the design conforms to these standards (see attached checklist).
10. Noise Impact Study required for the Road noise.

Planning Forester:

1. a Tree Conservation Report (TCR) must be supplied for review along with the suite of other plans/reports required by the City; an approved TCR is a requirement of Site Plan or Plan of Subdivision approval
2. any removal of privately-owned trees 10cm or larger in diameter requires a tree permit issued under the Urban Tree Conservation Bylaw; the permit is based on the approved TCR
3. any removal of City-owned trees will require the permission of Forestry Services who will also review the submitted TCR
4. for this site, the TCR may be combined with the Landscape Plan provided all information is clearly displayed
    a. if possible, please submit separate plans showing 1) existing tree inventory, and 2) a plan showing to be retained and to be removed trees with tree protection details
5. the TCR must list all trees on site by species, diameter and health condition – separate stands of trees may be combined using averages
6. the TCR must address all trees with a critical root zone that extends into the developable area – all trees that could be impacted by the construction that are outside the developable area need to be addressed.

7. trees with a trunk that crosses/touches a property line are considered co-owned by both property owners; permission from the adjoining property owner must be obtained prior to the removal of co-owned trees
8. If trees are to be removed, the TCR must clearly show where they are, and document the reason they can not be retained – please provide a plan showing retained and removed treed areas
9. 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 listed on Ottawa.ca
    a. the location of tree protection fencing must be shown on a plan
    b. include distance indicators from the trunk of the retained tree to the nearest part of the tree protection fencing
    c. show the critical root zone of the retained trees
    d. if excavation will occur within the critical root zone, please show the limits of excavation and calculate the percentage of the area that will be disturbed
10. 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.
11. Please ensure newly planted trees have an adequate soil volume for their size at maturity
12. For more information on the process or help with tree retention options, contact Mark Richardson mark.richardson@ottawa.ca

Environment:

The parcel is adjacent to the Kizel Drain (runs along the southern property boundary). The MNRF has mapped portions of the Kizel Drain as Blanding's turtle habitat and the status of this section has not been assessed (the limit stops approximately 170 m west of the site. Accordingly I recommend that if they are proposing site alteration on their site within 30 m of the watercourse that an Environmental Impact Statement be prepared. If an EIS is triggered, I would like to meet on site to discuss the scope of the EIS.

Mississippi Valley Conservation Authority:

1. The southern portion of this site abuts the Kizell Drain, our regulation limit extends onto the property but not as far as the development proposed in the site plan that was provided.
2. Aerial imagery indicates that the portion of the lands proposed for development were previously developed with office buildings, which appear to have been demolished between 2014 and 2017. Mapping layers on the City of Ottawa website indicate that the storm sewers along Solandt Drive outlet to Shirley's Brook whereas the stormsewers along March Road outlet to Kizell. I suspect that

the redevelopment will be utilizing an existing infrastructure connection to outlet stormwater. If this is not the case, the stormwater should be directed towards the natural receiver – this would need to be confirmed through topographic conditions.

3. We have regulation mapping on both of these watercourses and erosion is a documented issue. The SWM for the proposed redevelopment should demonstrate post-to-pre runoff. We would be reviewing the formal reports to ensure no adverse impacts to our regulated floodplain and meander belt hazards. We also recommend that the applicant demonstrate enhanced treatment (80% TSS removal).

Requested Plans and Studies

1. A list of required plans and studies required for a complete Site Plan Control application have been attached.

Process

1. This is a pre-consultation for a Site Plan Control application at 3026 Solandt Road to the requirements for a complete application.

2. This proposal will trigger a Site Plan Control application, Manager Approval, subject to Public Consultation. The proposal would fall under the 'complex' category as per the Site Plan Control Subtype Threholds. The application form, timeline and fees can be found here.

Please refer to the links to "Guide to preparing studies and plans" and fees for general information. Additional information is available related to building permits, development charges, and the Accessibility Design Standards. Be aware that other fees and permits may be required, outside of the development review process. You may obtain background drawings by contacting informationcentre@ottawa.ca.

These pre-con comments are valid for one year. If you submit a development application(s) after this time, you may be required to meet for another pre-consultation meeting and/or the submission requirements may change. You are as well encouraged to contact us for a follow-up meeting if the plan/concept will be further refined.

Please contact me at Mark.Young@ottawa.ca or at 613-580-2424 extension 41396 if you have any questions.

Sincerely,

Mark Young

Mark Young MCIP RPP
Planner III
Development Review - West

APPENDIX C
Water Servicing Information

FUS - Fire Flow Calculations

As per 1999 Fire Underwriter's Survey Guidelines

NOVATECH
Engineers, Planners & Landscape Architects

Novatech Project #: 119200
Project Name: 3026 Solandt Road
Date: 1/17/2020
Input By: Anthony Mestwarp
Reviewed By: Cara Ruddle

Legend: Input by User; No Information or Input Required

Building Description: Proposed Office Building (5 Storey)
Non-combustible construction

Step			Input		Value Used	Total Fire Flow (L/min)
Base Fire Flow						
1	**Construction Material**			**Multiplier**		
	Coefficient related to type of construction C	Wood frame		1.5	0.8	
		Ordinary construction		1		
		Non-combustible construction	Yes	0.8		
		Modified Fire resistive construction (2 hrs)		0.6		
		Fire resistive construction (> 3 hrs)		0.6		
2	**Floor Area**					
	A	Building Footprint (m^2)	1859.2			
		Number of Floors/Storeys	5			
		Area of structure considered (m^2)			**9,296**	
	F	**Base fire flow without reductions** $F = 220\ C\ (A)^{0.5}$				**17,000**
Reductions or Surcharges						
3	**Occupancy hazard reduction or surcharge**			**Reduction/Surcharge**		
	(1)	Non-combustible		-25%	0%	17,000
		Limited combustible		-15%		
		Combustible	Yes	0%		
		Free burning		15%		
		Rapid burning		25%		
4	**Sprinkler Reduction**			**Reduction**		
	(2)	Adequately Designed System (NFPA 13)	Yes	-30%	-30%	**-8,500**
		Standard Water Supply	Yes	-10%	-10%	
		Fully Supervised System	Yes	-10%	-10%	
				Cumulative Total	**-50%**	
5	**Exposure Surcharge (cumulative %)**				**Surcharge**	
	(3)	North Side	> 45.1m		0%	**0**
		East Side	> 45.1m		0%	
		South Side	> 45.1m		0%	
		West Side	> 45.1m		0%	
				Cumulative Total	**0%**	
Results						
6	(1) + (2) + (3)	**Total Required Fire Flow, rounded to nearest 1000L/min**			**L/min**	**9,000**
		(2,000 L/min < Fire Flow < 45,000 L/min)		or	L/s	**150**
				or	USGPM	2,378
7	**Storage Volume**	Required Duration of Fire Flow (hours)			Hours	2
		Required Volume of Fire Flow (m^3)			m^3	1080

Proposed Development Conditions

	Proposed Office	Proposed Office	Totals
Total Floor Area (m^2)	9296	9048	
Total Daily Volume (Liters)	74967.7	72967.7	147935.5
Avg Day Demand (L/s)	0.868	0.845	1.71
Max Day Demand (L/s)	1.302	1.267	2.57
Peak Hour Demand (L/s)	2.343	2.280	4.62

Establishment	Daily Demand Volume		Source
Office:	75	l/9.3m² /day	Daily Demands from OBC Table 8.2.1.3
Industrial/Commercial:	28000	l/ha/day	

Commercial / Industrial Peaking Factors City of Ottawa Water Distrubution Guidelines

Conditions	Peaking Factor	
Maximum Day	1.5	x avg day
Peak Hour	1.8	x max day

Anthony Mestwarp

From: Elsayed, Ahmed <ahmed.elsayed@ottawa.ca>
Sent: Thursday, January 16, 2020 9:22 AM
To: Anthony Mestwarp
Cc: Cara Ruddle
Subject: RE: 3026 Solandt Road Watermain Boundary condition request
Attachments: 3026 Solandt Road _Boundary Conditions_15Jan2020.docx

Follow Up Flag: Follow up
Flag Status: Flagged

Hi Anthony,

Attached is the boundary conditions as requested.

Regards,

Ahmed Elsayed, P. Eng.
Project Manager, Infrastructure Approvals

Planning, Infrastructure and Economic Development Dept.

City of Ottawa
613.580.2400 ext. 21206

From: Anthony Mestwarp <a.mestwarp@novatech-eng.com>
Sent: January 07, 2020 1:52 PM
To: Elsayed, Ahmed <ahmed.elsayed@ottawa.ca>
Cc: Cara Ruddle <c.ruddle@novatech-eng.com>
Subject: 3026 Solandt Road Watermain Boundary condition request

Hi Ahmed,

Please find below water demand information for the proposed development at 3026 Solandt Road, which will add a 5 storey office building to the existing site. Also, attached is a key plan showing the site location. Please provide boundary conditions for the existing watermain infrastructure highlighted on the attached plan so we can confirm the existing infrastructure has capacity for the proposed development.

Water Demands proposed development (including the existing office building demands):

AVG DAY = 1.71 L/s
MAX DAY = 2.57 L/s

PEAK HOUR = 4.62 L/s
MAX DAY + FIRE =152.57 L/s

Thanks,

Anthony Mestwarp, **P.Eng.**, Project Engineer | Land Development Engineering
NOVATECH Engineers, Planners & Landscape Architects
240 Michael Cowpland Drive, Suite 200, Ottawa, ON, K2M 1P6 | Tel: 613.254.9643 Ext. 216 | Fax: 613.254.5867

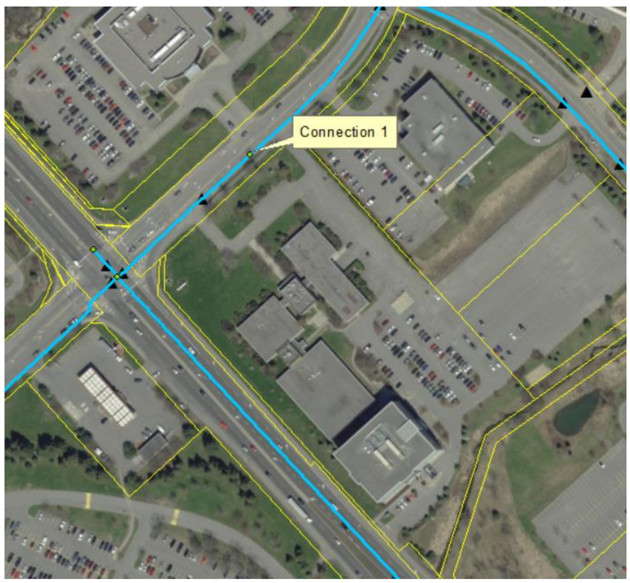
Boundary Conditions for 3026 Solandt Road

Provided Information:

Date Provided January-2020

Scenario	Demand	
	L/min	L/s
Average Daily Demand	103	1.71
Maximum Daily Demand	154	2.57
Peak Hour	277	4.62
Fire Flow Demand	9,000	150.00

Location:



Results:

Connection 1 - Solandt Road

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	130.6	72.6
Peak Hour	126.5	66.7
Max Day plus Fire 1	124.7	64.1

[1] Ground Elevation = 79.5m

Notes:

1. A second connection is required since the basic day demand exceeds 50 m^3/d (Ottawa Design Guidelines, Water Distribution, Section 4.3.1).

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.

CALCULATED WATER DEMNADS:

PROPOSED DEVELOPMENT (5 STOREY BUILDING)

AVERAGE DAY =	1.71	L/s
MAXIMUM DAY =	2.57	L/s
PEAK HOUR =	4.62	L/s
MAX DAY + FIRE =	152.57	L/s

CITY OF OTTAWA BOUNDARY CONDITIONS:

BOUNDAY CONDITIONS BASED ON CONNECTION TO 400mm DIA. WATERMAIN ON SOLANDT ROAD.

MINIMUM HGL =	126.5	m
MAXIMUM HGL =	130.6	m
MAX DAY + FIRE =	124.7	m

WATERMAIN ANALYSIS:

FINSIHED FLOOR GROUND ELEVATION = 80.30 m

HIGH PRESSURE TEST = MAX HGL - AVG GROUND ELEV x 1.42197 PSI/m < 80 PSI

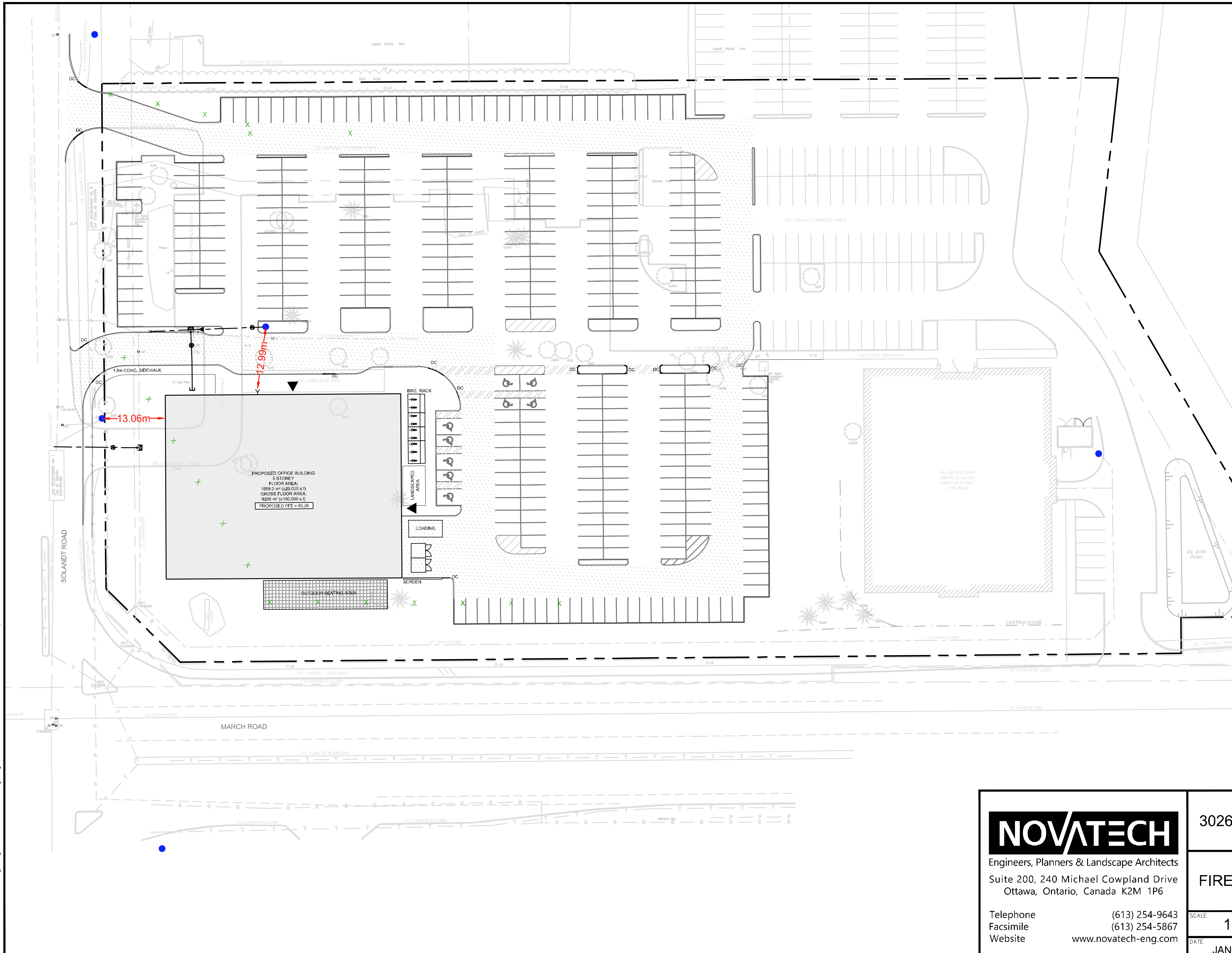
HIGH PRESSURE = 71.5 PSI

LOW PRESSURE TEST = MIN HGL - AVG GROUND ELEV x 1.42197 PSI/m > 40 PSI

LOW PRESSURE = 65.7 PSI

MAX DAY + FIRE TEST = MAX DAY + FIRE - AVG GROUND ELEV x 1.42197 PSI/m > 20 PSI

LOW PRESSURE = 63.1 PSI



LEGEND

- PROPERTY BOUNDARY
- HYDRANT LOCATION
- Y SIAMESE LOCATION
- HEAVY DUTY PAVEMENT/ FIRE ROUTE

M:\2019\119200\CAD\Design\Figures\Water\FHC.dwg, Figure 3, Jan 17, 2020 - 10:41am, amestwarp

NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6
Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

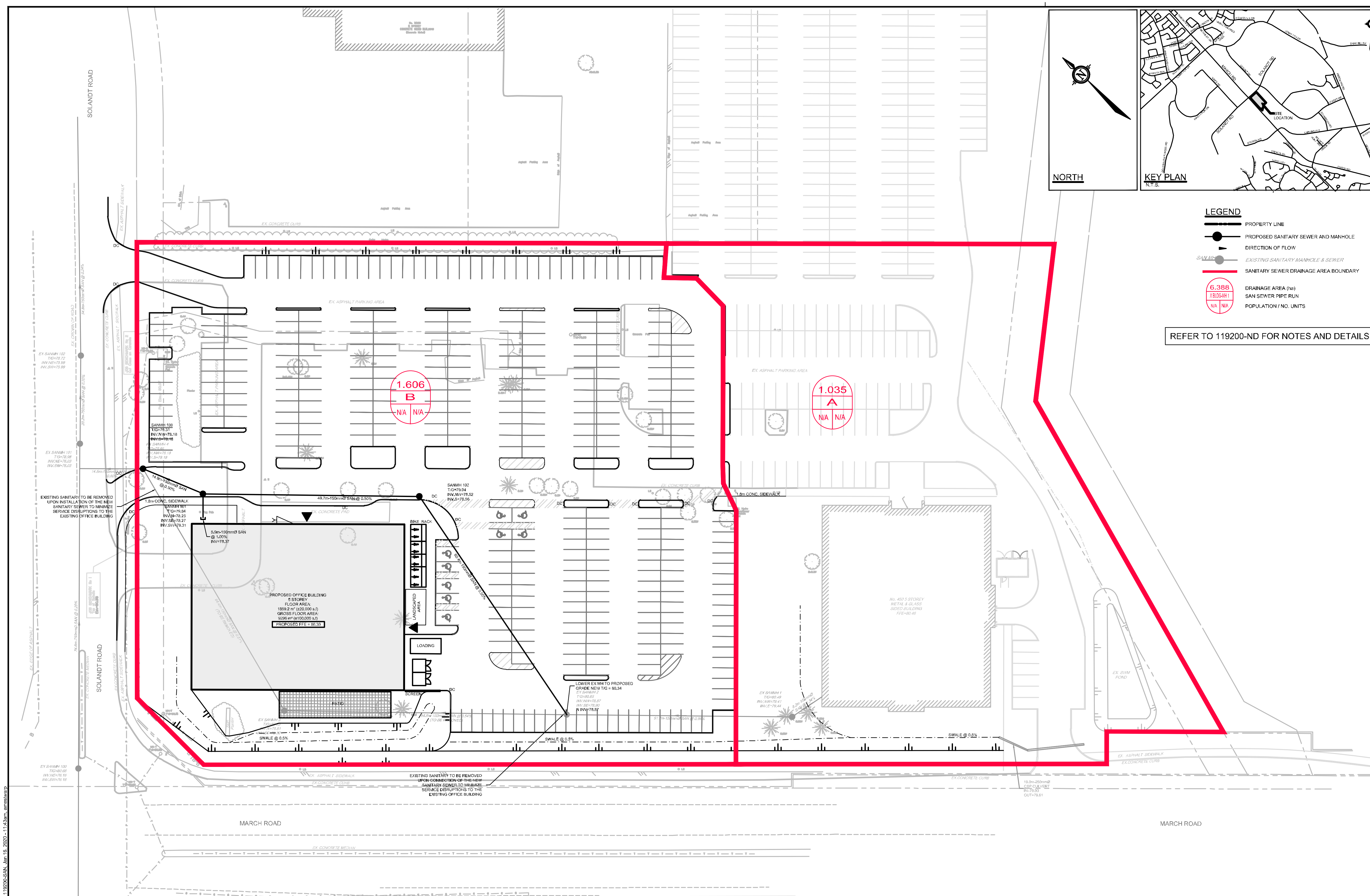
3026 SOLANDT ROAD

FIRE HYDRANT COVERAGE PLAN

SCALE	DATE	JOB	FIGURE
1 : 750	JAN 2020	119200	119200 - FHC

SHT11X17.DWG - 279mmX432mm

APPENDIX D
Sanitary Servicing Information



NOTE:
THE POSITION OF ALL POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, DETERMINE THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

No.	REVISION	DATE	BY
1.	ISSUED FOR SITE PLAN AGREEMENT	JAN 17/20	CJR

SCALE	
NTS	DESIGN: ARM
	CHECKED: CJR
	DRAWN: ARM
	CHECKED: CJR
	APPROVED: JLS

FOR REVIEW ONLY

NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6
Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

LOCATION
3026 SOLANDT ROAD, OTTAWA, ONTARIO

DRAWING NAME
SANITARY SEWER DRAINAGE AREA PLAN

PROJECT No. 119200
REV: REV #1
DRAWING No. 119200-SAN

PLANA1.DWG - 841mmx594mm

Project No. 119200
Project Name: 3026 Soldandt Rd
Project Location: Ottawa, Ontario

NOVATECH
Engineers, Planners & Landscape Architects

Date: January, 2020

Sanitary Sewer Design Sheet

LOCATION			COMMERCIAL / INDUTRIAL FLOW							PIPE					
AREA ID	FROM	TO	AREA (ha)	ACCUM AREA (ha)	PEAK FACTOR	PEAK FLOW (l/s)	ACCUM PEAK FLOW (l/s)	INFIL. FLOW (l/s)	TOTAL PEAK FLOW (l/s)	PIPE SIZE (mm)	PIPE SLOPE (%)	LENGTH (m)	CAPACITY (l/s)	VELOCITY (m/s)	Q/Qfull
A	Ex. Office	EX MH 1	1.035	1.035	1.5	1.27	1.27	0.34	1.61	150	1.34	8.2	17.6	1.0	9.1%
	EX MH 1	EX MH 2	0.000	1.035	1.5	0.00	1.27	0.34	1.61	150	0.99	51.7	15.1	0.9	10.6%
	EX MH 2	MH 102	0.000	1.035	1.5	0.00	1.27	0.34	1.61	150	0.50	60.4	10.8	0.6	15.0%
	MH 102	MH 101	0.000	1.035	1.5	0.00	1.27	0.34	1.61	150	0.50	49.7	10.8	0.6	15.0%
B	PR. OFFICE	MH 101	1.606	1.606	1.5	1.30	1.30	0.53	1.83	150	1.00	5.9	15.2	0.9	12.0%
	MH101	MH 100	0.000	2.641	1.5	0.00	2.57	0.87	3.44	150	0.50	14.9	10.8	0.6	32.0%

Design Parameters:

Ontario Building Code (Table 8.2.1.3)

Office per each 9.3m2 of floor space	75	l/9.3m² /day

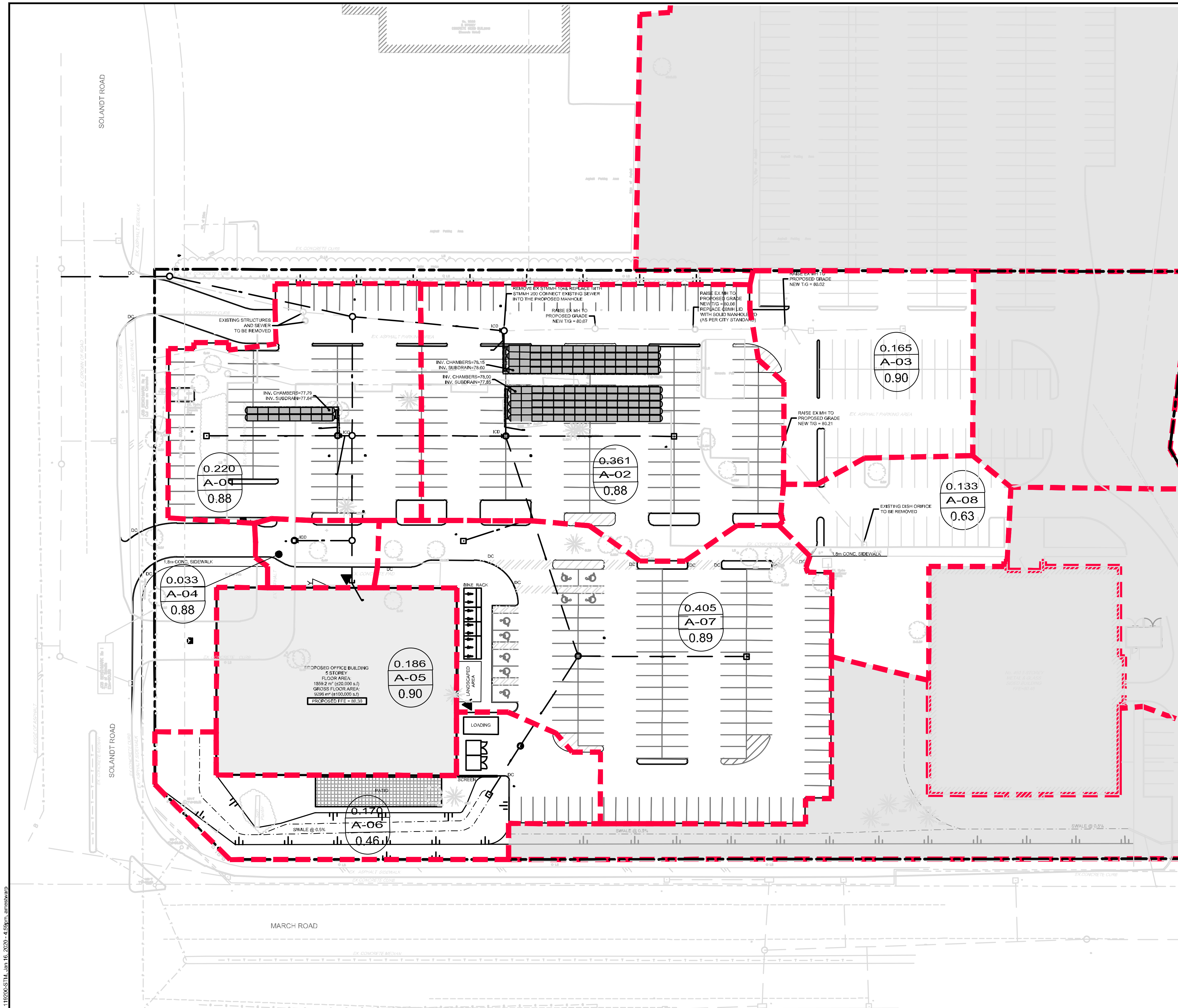
City of Ottawa Sewer Design Guidelines (Appendix 4-A)

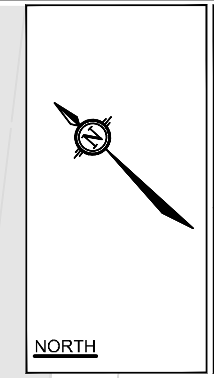
- Avg Commercial Flow	28000	l/ha/day
- Extraneous Flows	0.33	l/s/ha
- ICI Peaking Factor	1.5	

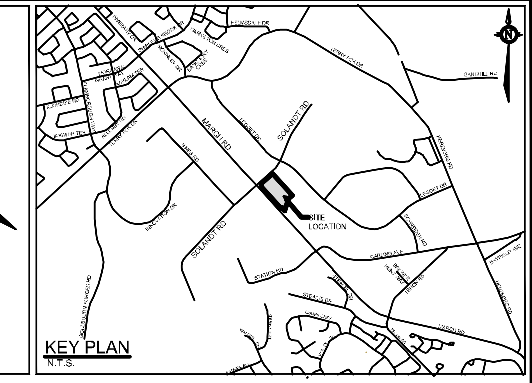
Proposed Office			Existing Office		
Gross Floor Area per floor	1859.2	m²	Gross Floor Area per floor	1809.6	m²
Floors	5		Floors	5	
Total Floor area	9296	m²	Total Floor area	9048	m²
Site Area	1.606	m²	Site Area	1.035	m²
Flow (Floor Area)	0.87	l/s	Flow (Floor Area)	0.84	l/s
Flow (28000 l/ha/day)	0.52	l/s	Flow (28000 l/ha/day)	0.34	l/s

Value used for design flow
Existing sanitary sewer

APPENDIX E
Storm Servicing Information







LEGEND

- PROPERTY LINE
- PROPOSED STORM SEWER AND MANHOLE
- DIRECTION OF FLOW
- PROPOSED CATCHBASIN MANHOLE
- PROPOSED CATCHBASIN
- PROPOSED STORMTECH STC-740 UNDERGROUND STORAGE SYSTEM (REFER 119200-ND FOR DETAILS)
- STM MH — EXISTING STORM MANHOLE & SEWER
- CB 1 — EXISTING CATCHBASIN
- STORM SEWER DRAINAGE AREA BOUNDARY
- AREA TRIBUTARY TO EXISTING SWMF PONDS
- 0.085 / A-16 / 0.78 — DRAINAGE AREA (ha) / DRAINAGE AREA ID / RUNOFF COEFFICIENT

REFER TO 119200-ND FOR NOTES AND DETAILS

TEMPEST LMF/MHF ICDs	
LOCATION	MODEL NO.
CBMH 103	LMF 70
CBMH 05	LMF 70
CBMH 104	LMF 105
STMMH 108	LMF 105

NOTE:
THE POSITION OF ALL POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, DETERMINE THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

No.	REVISION	DATE	BY
1.	ISSUED FOR SITE PLAN AGREEMENT	JAN 17/20	CJR

SCALE: NTS

DESIGN: ARM
CHECKED: CJR
DRAWN: ARM
CHECKED: CJR
APPROVED: JLS

FOR REVIEW ONLY

NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6
Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

LOCATION
3026 SOLANDT ROAD, OTTAWA, ONTARIO

DRAWING NAME
STORM SEWER DRAINAGE AREA PLAN

PROJECT No. 119200
REV: REV #1
DRAWING No. 119200-STM

PLANA1.DWG - 841mmx594mm

2 Year Storm Sewer Design Sheet - Controlled Flows

LOCATION			AREA (Ha)				UNCONTROLLED 2-YEAR FLOW					CONTROLLED 100-YEAR FLOW			PROPOSED SEWER							
AREA ID	FROM	TO	TOTAL AREA (ha)	R= 0.2	R= 0.9	R	INDIV 2.78 AR	ACCUM 2.78 AR	TIME OF CONC.	RAINFALL INTENSITY I	PEAK FLOW Q (l/s)	ICD LOCATION	FLOWS (L/S)	ACCUM FLOWS (L/S)	PIPE SIZE (mm)	PIPE SLOPE (%)	LENGTH (m)	CAPACITY (l/s)	FULL FLOW VELOCITY (m/s)	TIME OF FLOW (min.)	EXCESS CAPACITY (l/s)	Q/Qfull (Controled)
A-06	CBMH 106	CBMH 105	0.170	0.106	0.064	0.46	0.22	0.22	10.00	76.81	16.86				254.0	0.50	21.7	43.91	0.87	0.42	N/A	N/A
A-07	CBMH 105	CBMH 104	0.405	0.005	0.400	0.89	1.00	1.22	10.42	75.24	92.02				381.0	0.30	47.1	100.29	0.88	0.89	N/A	N/A
A-02	CBMH 104	STMMH 102	0.361	0.011	0.350	0.88	0.88	2.11	11.31	72.11	151.84	CBMH 104	13.8	13.8	381.0	0.50	31.2	129.47	1.13	0.46	115.67	0.11
A-05	BLDG	STMMH 107	0.186	0.000	0.186	0.90	0.47	0.47	10.00	76.81	35.74	BLDG	8.3	8.3	254.0	1.00	8.6	62.10	1.22	0.12	53.80	0.13
A-04	STMMH 107	STMMH 102	0.033	0.001	0.032	0.88	0.08	0.55	10.12	76.36	41.72	STMH 107	7.2	15.5	305.0	0.40	21.3	63.98	0.87	0.41	48.48	0.24
A-01	CBMH 103	STMMH 102	0.220	0.005	0.215	0.88	0.54	0.54	10.00	76.81	41.53	CBMH 103	6.2	6.2	305.0	0.50	3.0	71.53	0.98	0.05	65.33	0.09
	STMMH 102	STMMH 101	0.000	0.000	0.000	0.00	0.00	3.19	11.77	70.62	225.47		0.0	35.5	381.0	0.30	31.2	100.29	0.88	0.59	64.79	0.35
A-08	EX STMMH 100	EX STMMH 101	0.133	0.052	0.081	0.63	0.23	0.23	10.00	76.81	17.82				305.0	0.36	24.6	60.70	0.83	0.49	N/A	N/A
A-03	EX STMMH 101	EX STMMH 102	0.165	0.000	0.165	0.90	0.41	0.64	10.49	74.96	48.33				305.0	0.27	18.4	52.56	0.72	0.43	N/A	N/A
	EX STMMH 102	EX STMMH 103	0.000	0.000	0.000	0.00	0.00	0.64	10.92	73.44	47.35				254.0	0.44	20.3	41.19	0.81	0.42	N/A	N/A
	EX STMMH 103	STMMH 108		0.000	0.000	0.00	0.00	0.64	11.34	72.03	46.44				305.0	0.27	18.5	52.56	0.72	0.43	N/A	N/A
	STMMH 108	STMMH 101		0.000	0.000	0.00	0.00	0.64	11.77	70.63	45.54	STMMH 108	12.3	47.8	381.0	0.29	30.9	98.60	0.86	0.60	50.80	0.48
	STMMH 101	STMMH 100		0.000	0.000	0.00	0.00	3.84	12.36	68.79	263.97			47.8	381.0	0.30	38.0	100.29	0.88	0.72	52.49	0.48

***Note: Storm sewer design sheet flows are peak uncontrolled flows. Flows will be attenuated with ICD's which will increase the excess capacity in the pipes**

Existing storm sewer

Definitions
Q = 2.78 AIR
Q = Peak Flow, in Litres per second (L/s)
A = Area in hectares (ha)
I = 2 YEAR Rainfall Intensity (mm/h)

Notes:
1) Ottawa Rainfall-Intensity Curve
2) Min Velocity = 0.76 m/sec.
3) 2 Year intensity = 732.951 / (time + 6.199)$^{0.810}$

APPENDIX F
Stormwater Management Calculations

TABLE 1A: Post-Development Runoff Coefficient "C" - A-01

			5 Year Event		100 Year Event	
Area	0.4	Ha	"C"	C_{avg}	"C" + 25%	*C_{avg}
Total	Hard	0.217	0.90	0.89	1.00	0.99
0.220	Roof	0.000	0.90		1.00	
	Soft	0.003	0.20		0.25	

TABLE 1B: 2 YEAR EVENT QUANTITY STORAGE REQUIREMENT - A-01

0.220 =Area (ha)
0.89 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
2 YEAR	45	30.24	16.50	3.8	12.70	34.28
	50	28.04	15.30	3.8	11.50	34.49
	55	**26.17**	**14.28**	**3.8**	**10.48**	**34.57**
	60	24.56	13.40	3.8	9.60	34.55
	65	23.15	12.63	3.8	8.83	34.44

TABLE 1C: 5 YEAR EVENT QUANTITY STORAGE REQUIREMENT - A-01

0.220 =Area (ha)
0.89 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
5 YEAR	35	48.52	26.47	6.0	20.47	42.98
	40	44.18	24.10	6.0	18.10	43.45
	45	**40.63**	**22.16**	**6.0**	**16.16**	**43.64**
	50	37.65	20.54	6.0	14.54	43.62
	55	35.12	19.16	6.0	13.16	43.43

TABLE 1D: 100 YEAR EVENT QUANTITY STORAGE REQUIREMENT - A-01

0.22 =Area (ha)
0.99 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
100 YEAR	75	47.26	28.65	6.2	22.45	101.04
	80	44.99	27.28	6.2	21.08	101.18
	85	**42.95**	**26.04**	**6.2**	**19.84**	**101.21**
	90	41.11	24.93	6.2	18.73	101.13
	95	39.43	23.91	6.2	17.71	100.95

Equations:
Flow Equation
$Q = 2.78 \times C \times I \times A$
Where:
C is the runoff coefficient
I is the rainfall intensity, City of Ottawa IDF
A is the total drainage area

Runoff Coefficient Equation
$C_5 = (A_{hard} \times 0.9 + A_{soft} \times 0.2)/A_{Tot}$
$C_{100} = (A_{hard} \times 1.0 + A_{soft} \times 0.25)/A_{Tot}$

100 year Intensity = $1735.688 / (\text{Time in min} + 6.014)^{0.820}$
5 year Intensity = $998.071 / (\text{Time in min} + 6.053)^{0.814}$
2 year Intensity = $732.951 / (\text{Time in min} + 6.199)^{0.810}$

TABLE 1E: Structure information

Structures	Size Dia.(mm)	Area (m^2)	T/G	Inv IN	Inv OUT
CBMH 103	1200	1.13	79.55	77.74	77.64
CB 1	600	0.37	79.60	N/A	78.01

TABLE 1F: Pipe information

Structures	Size Dia.(mm)	Length	Inv UP	Inv DOWN
CB1 - CB103	200	26.60	78.01	77.74
STC740 - CBMH 103	250	3.50	77.79	77.69

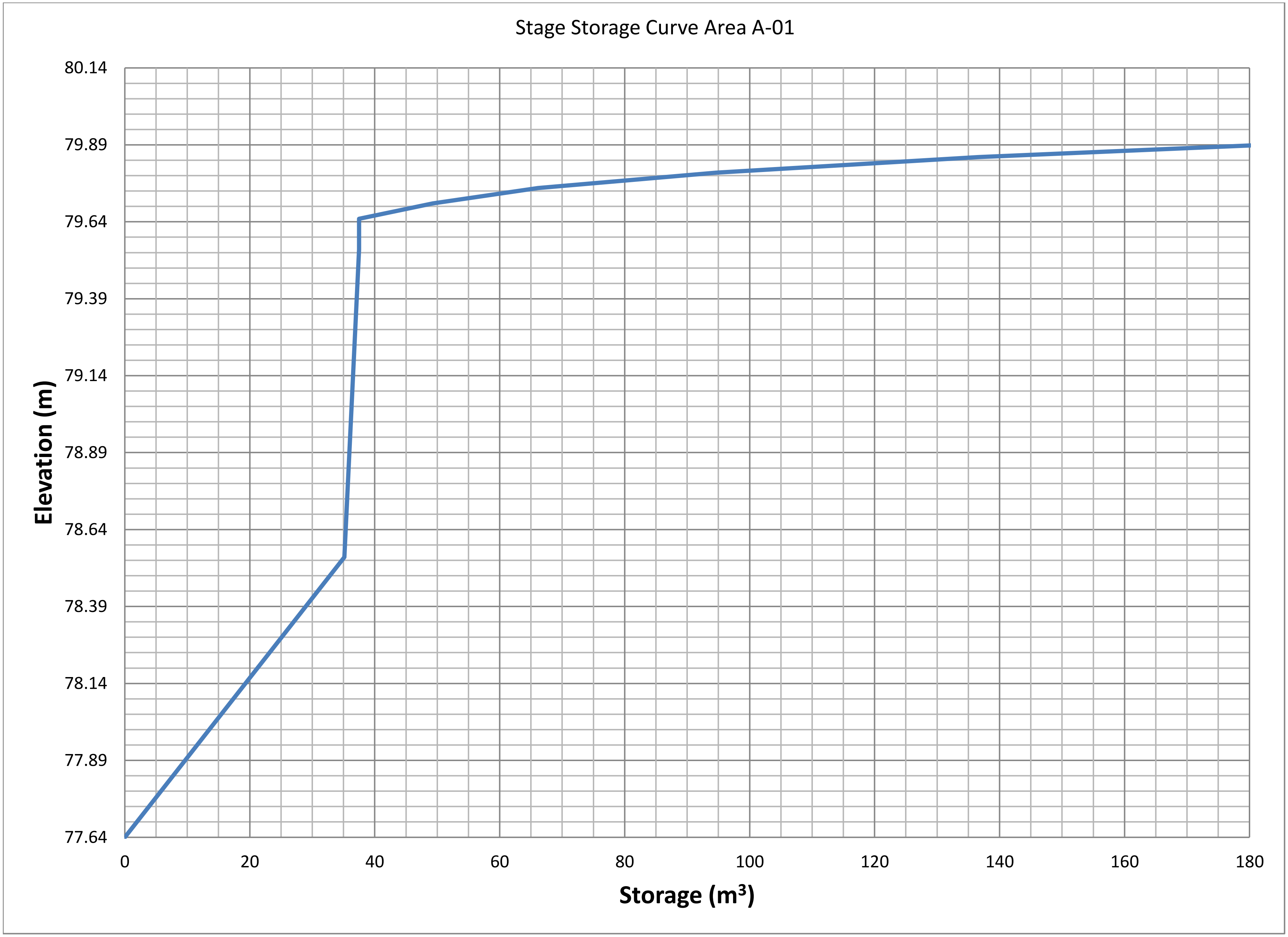
TABLE 1G: Storage Provided - A-01

Area A-01: Storage Table							Total Storage		
Elevation (m)	System Depth (m)	CBMH 103 Volume (m^3)	CB 1 Volume (m^3)	Pipe Volume (m^3)	Stormtech 740 Volume (m^3)	Underground Volume (m^3)*	Surface Ponding Volume (m^3)	Ponding Volume (m^3)	**Total Volume (m^3)**
77.640	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
78.550	0.91	1.03	0.20	0.84	33.92	35.15	0.00	0.00	**35.15**
79.550	1.91	2.16	0.57			37.49	0.00	0.00	**37.49**
79.600	1.96	-	0.59			37.51	0.50	0.00	**37.51**
79.650	2.01		-			37.51	3.44	0.00	**37.51**
79.700	2.06					37.51	11.79	11.79	**49.30**
79.750	2.11					37.51	28.62	28.62	**66.13**
79.800	2.16					37.51	57.11	57.11	**94.62**
79.850	2.21					37.51	99.11	99.11	**136.62**
79.900	2.26					37.51	156.34	156.34	**193.85**

TABLE 1H: Orfice Sizing information - A-01

Control Device					
Tempest LMF		70			
Design Event	**Flow (L/S)**	**Head (m)**	**Elev (m)**	**Outlet dia. (mm)**	**Volume (m^3)**
1:2 Year	3.8	0.74	78.53	300.00	34.57
1:5 Year	6.0	1.88	79.67	300.00	43.64
1:100 Year	6.2	2.02	79.81	300.00	101.21

**The design Head is calculated based on the centre of the pipe



Stage Storage Curve Area A-01
80.14
79.89
79.64
79.39
79.14
78.89
78.64
78.39
78.14
77.89
77.64
Elevation (m)
0
20
40
60
80
100
120
140
160
180
Storage (m³)

Chart 1: LMF 14 Preset Flow Curves

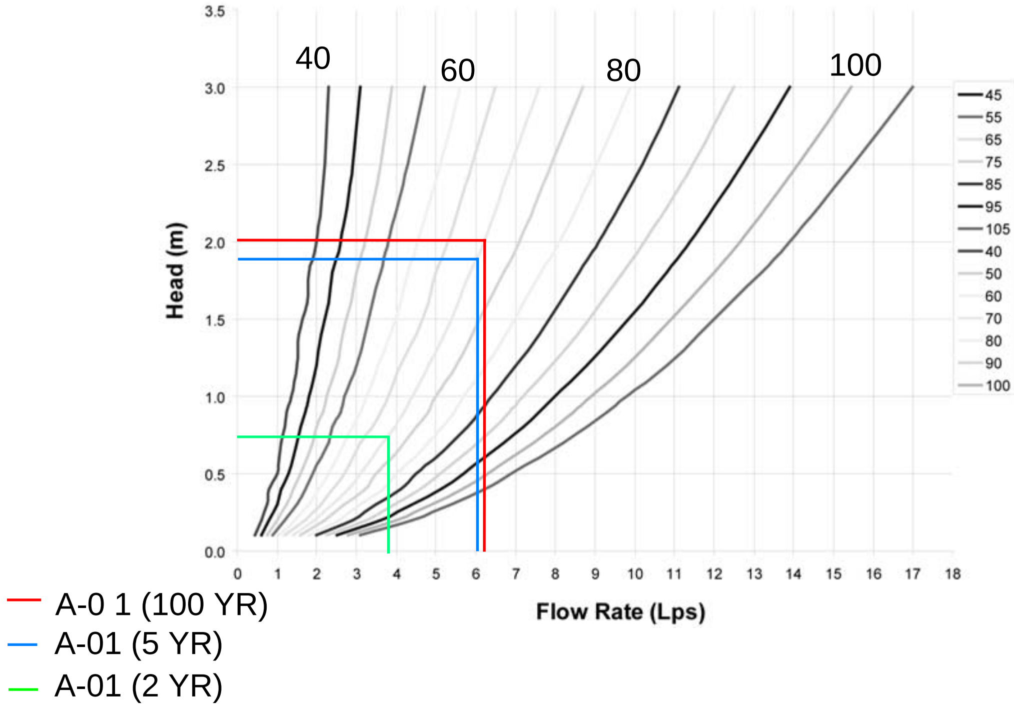


Chart 2: LMF Flow vs. ICD Alternatives

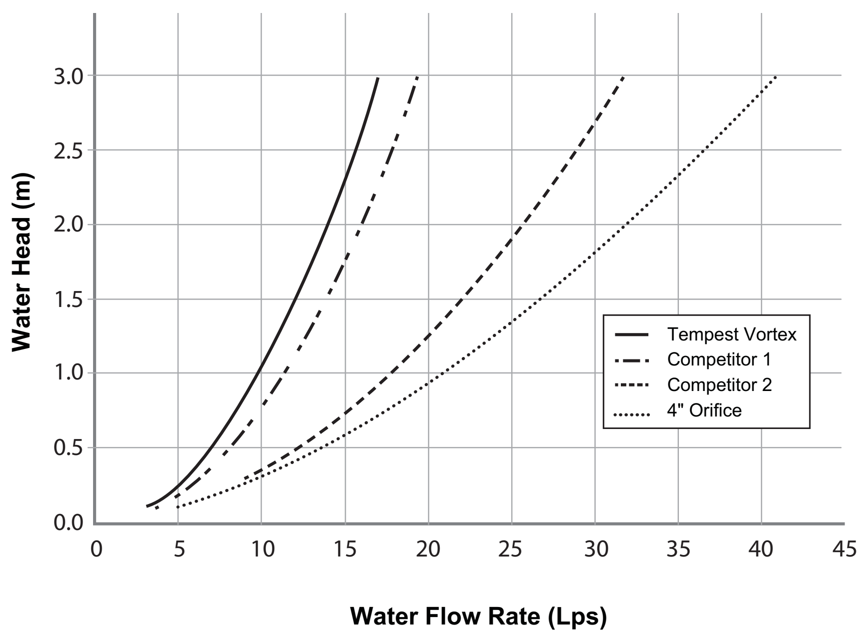


TABLE 2A: Post-Development Runoff Coefficient "C" - A-02

Area	0.4	Ha	5 Year Event "C"	5 Year Event C_{avg}	100 Year Event "C" + 25%	100 Year Event *C_{avg}
Total	Hard	0.032	0.90	0.88	1.00	0.98
0.033	Roof	0.000	0.90		1.00	
	Soft	0.001	0.20		0.25	

TABLE 2B: 2 YEAR EVENT QUANTITY STORAGE REQUIREMENT - A-02

0.033 =Area (ha)
0.88 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
2 YEAR	-5	632.75	51.26	4.7	46.61	-13.98
	0	167.22	13.55	4.7	8.90	0.00
	5	**103.57**	**8.39**	**4.7**	**3.74**	**1.12**
	10	76.81	6.22	4.7	1.57	0.94
	15	61.77	5.00	4.7	0.35	0.32

TABLE 2C: 5 YEAR EVENT QUANTITY STORAGE REQUIREMENT - A-02

0.033 =Area (ha)
0.88 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
5 YEAR	-5	956.98	77.52	5.8	71.72	-21.52
	0	230.48	18.67	5.8	12.87	0.00
	5	**141.18**	**11.44**	**5.8**	**5.64**	**1.69**
	10	104.19	8.44	5.8	2.64	1.58
	15	83.56	6.77	5.8	0.97	0.87

TABLE 2D: 100 YEAR EVENT QUANTITY STORAGE REQUIREMENT - A-02

0.033 =Area (ha)
0.98 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
100 YEAR	0	398.62	35.90	7.2	28.70	0.00
	5	242.70	21.86	7.2	14.66	4.40
	10	**178.56**	**16.08**	**7.2**	**8.88**	**5.33**
	15	142.89	12.87	7.2	5.67	5.10
	20	119.95	10.80	7.2	3.60	4.33

Equations:
Flow Equation
$Q = 2.78 \times C \times I \times A$
Where:
C is the runoff coefficient
I is the rainfall intensity, City of Ottawa IDF
A is the total drainage area

Runoff Coefficient Equation
$C_5 = (A_{hard} \times 0.9 + A_{soft} \times 0.2)/A_{Tot}$
$C_{100} = (A_{hard} \times 1.0 + A_{soft} \times 0.25)/A_{Tot}$

100 year Intensity = 1735.688 / (Time in min + 6.014) $^{0.820}$
5 year Intensity = 998.071 / (Time in min + 6.053) $^{0.814}$
2 year Intensity = 732.951 / (Time in min + 6.199) $^{0.810}$

TABLE 2E: Structure information

Structures	Size Dia.(mm)	Area (m^2)	T/G	Inv IN	Inv OUT
CBMH 5	1200	1.13	79.85	77.89	77.83

TABLE 2G: Storage Provided - A-03

Area A-3: Storage Table				Total Storage		
Elevation (m)	System Depth (m)	CBMH 5 Volume (m^3)	Underground Volume (m^3)*	Surface Ponding Volume (m^3)	Ponding Volume (m^3)	**Total Volume (m^3)**
77.830	0.00	0.00	0.00	0.00	0.00	**0.00**
78.750	0.92	1.04	1.04	0.00	0.00	**1.04**
79.000	1.17	1.32	1.32	0.00	0.00	**1.32**
79.250	1.42	1.61	1.61	0.00	0.00	**1.61**
79.500	1.67	1.89	1.89	0.00	0.00	**1.89**
79.750	1.92	2.17	2.17	0.00	0.00	**2.17**
79.850	2.02	2.28	2.28	0.00	0.00	**2.28**
79.900	2.07	2.34	2.34	0.31	0.31	**2.65**
79.950	2.12		2.34	1.80	1.80	**4.14**
79.980	2.15		2.34	3.65	3.65	**5.99**

TABLE 2H: Orfice Sizing information - A-03

Control Device					
Tempest LMF		75			
Design Event	**Flow (L/S)**	**Head (m)**	**Elev (m)**	**Outlet dia.**	**Volume (m^3)**
1:2 Year	4.7	0.86	78.82	250.00	1.12
1:5 Year	5.8	1.36	79.32	250.00	1.69
1:100 Year	7.2	2.02	79.97	250.00	5.33

**The design Head is calculated based on the centre of the pipe

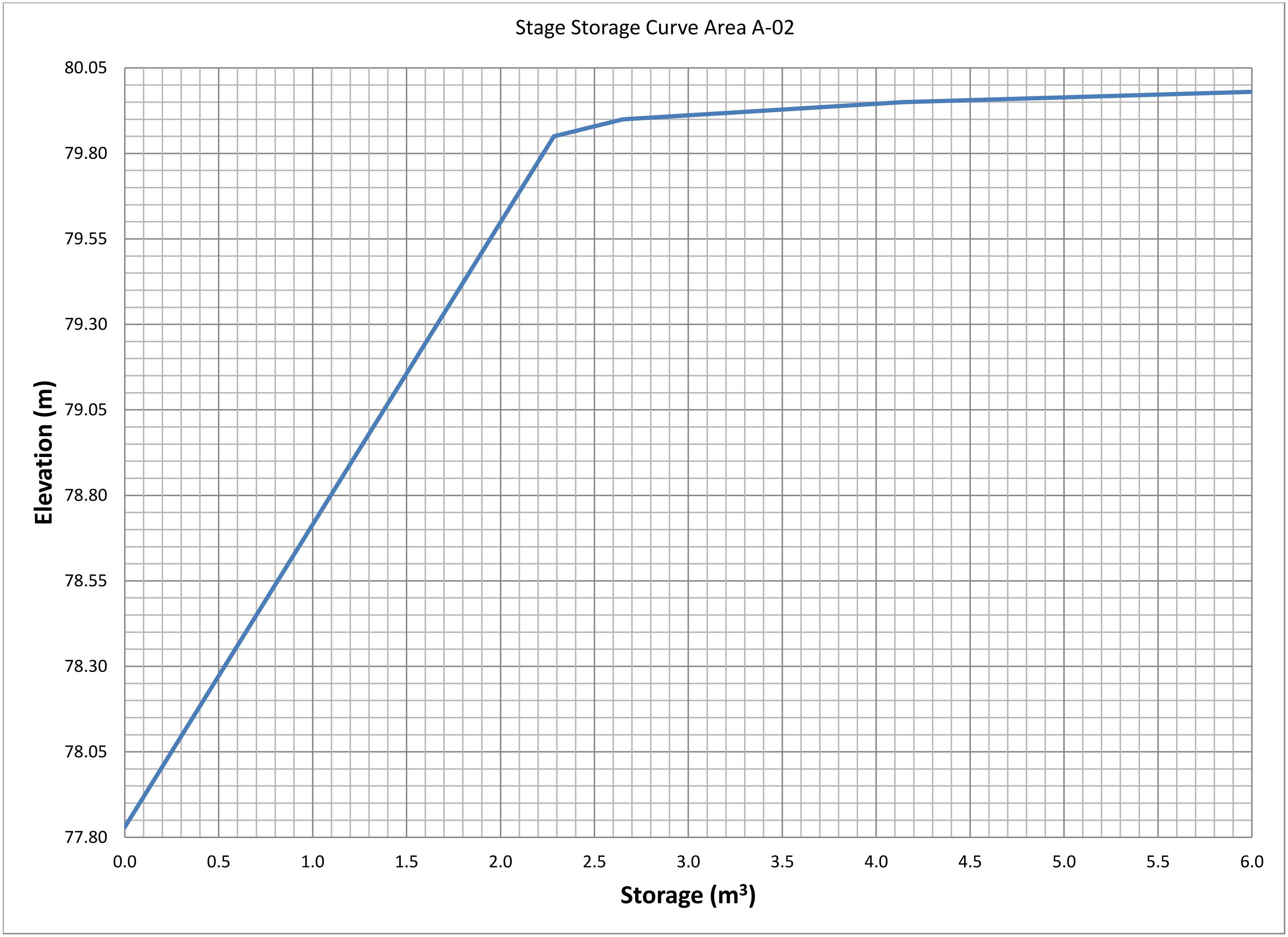
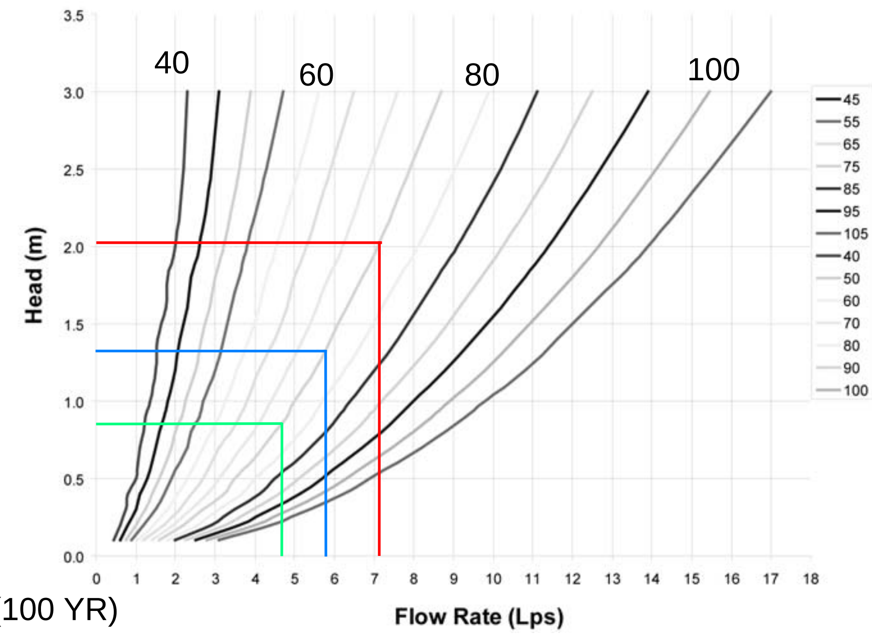

Stage Storage Curve Area A-02
Elevation (m)
80.05
79.80
79.55
79.30
79.05
78.80
78.55
78.30
78.05
77.80
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
5.0
5.5
6.0
Storage (m³)

Chart 1: LMF 14 Preset Flow Curves



A-02 (100 YR)
A-02 (5 YR)
A-02 (2 YR)

Chart 2: LMF Flow vs. ICD Alternatives

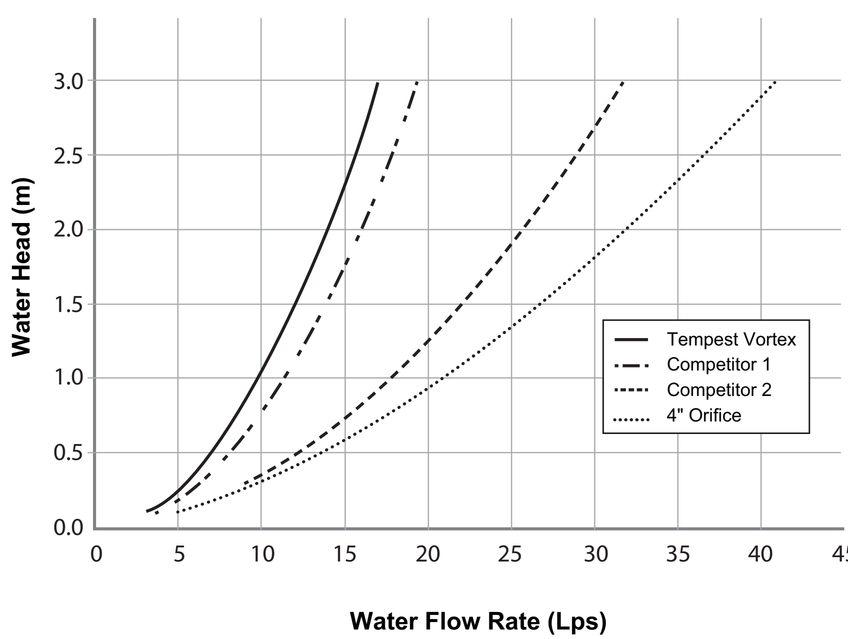


TABLE 3A: Post-Development Runoff Coefficient "C" - A-03 Controlled Roof Area

			5 Year Event		100 Year Event	
Area	Surface	Ha	"C"	C_{avg}	"C" + 25%	*C_{avg}
Total	Hard	0.000	0.90	0.90	1.00	1.00
0.186	Roof	0.186	0.90		1.00	
	Soft	0.000	0.20		0.25	

TABLE 3B: 5 YEAR EVENT QUANTITY STORAGE REQUIREMENT - A-03 Controlled Roof Area

0.186 =Area (ha)
0.90 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
2 YEAR	20	52.03	24.21	6.3	17.91	21.50
	25	45.17	21.02	6.3	14.72	22.08
	30	**40.04**	**18.64**	**6.3**	**12.34**	**22.20**
	35	36.06	16.78	6.3	10.48	22.01
	40	32.86	15.29	6.3	8.99	21.59

TABLE 3C: 5 YEAR EVENT QUANTITY STORAGE REQUIREMENT - A-03 Controlled Roof Area

0.186 =Area (ha)
0.90 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
5 YEAR	25	60.90	28.34	6.7	21.64	32.46
	30	53.93	25.10	6.7	18.40	33.12
	35	**48.52**	**22.58**	**6.7**	**15.88**	**33.35**
	40	44.18	20.56	6.7	13.86	33.27
	45	40.63	18.91	6.7	12.21	32.96

TABLE 3D: 100 YEAR EVENT QUANTITY STORAGE REQUIREMENT - A-03 Controlled Roof Area

0.186 =Area (ha)
1.00 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
100 YEAR	45	69.05	35.70	8.3	27.42	74.05
	50	63.95	33.07	8.3	24.79	74.37
	55	**59.62**	**30.83**	**8.3**	**22.55**	**74.41**
	60	55.89	28.90	8.3	20.62	74.24
	65	52.65	27.22	8.3	18.94	73.87

Equations:
Flow Equation
$Q = 2.78 \times C \times I \times A$
Where:
C is the runoff coefficient
I is the rainfall intensity, City of Ottawa IDF
A is the total drainage area

Runoff Coefficient Equation
$C_5 = (A_{hard} \times 0.9 + A_{soft} \times 0.2)/A_{Tot}$
$C_{100} = (A_{hard} \times 1.0 + A_{soft} \times 0.25)/A_{Tot}$

Table 3E: Roof Drain Flows

Roof Drains		
Roof Area	1860	m^2
Qty	10	
Type	Accutrol RD-100-A-ADJ	
Setting	1/4 Open	
Design Head	0.05-0.15	m
Design Flow 1" of head	0.32	L/s (ea)
Design Flow 2" of head	0.63	L/s (ea)
Design Flow 3" of head	0.71	L/s (ea)
Design Flow 4" of head	0.79	L/s (ea)
Design Flow 5" of head	0.87	L/s (ea)
Design Flow 6" of head	0.95	L/s (ea)

Table 3F: Total Roof Storage

Storm Event	Roof Drain ID	**Avg Area Per Roof Drain (m^2)	Avg Ponding Depth Per Roof Drain (m)	*Total Volume Per Drain (m^3)	Storage Volume (m^3)	Total Volume (m^3) Required
2 Year	RD 1-9	186.0	0.0508	3.15	31.50	22.20
5 Year	RD 1-10	186.0	0.0635	3.94	39.37	33.35
Max Storage	RD 1-10	186.0	0.1270	7.87	78.74	74.41

*Note: Ponding volumes calculated using cone equation:
**Note: Roof Drain Area accounts for 10% loss for roof furniture

TABLE 4A: Post-Development Runoff Coefficient "C" - A-04

			5 Year Event		100 Year Event	
Area	0.4	Ha	"C"	C_{avg}	"C" + 25%	*C_{avg}
Total	Hard	0.817	0.90	0.81	1.00	0.91
0.935	Roof	0.000	0.90		1.00	
	Soft	0.118	0.20		0.25	

TABLE 4B: 2 YEAR EVENT QUANTITY STORAGE REQUIREMENT - A-04

0.935 =Area (ha)
0.81 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
2 YEAR	85	18.94	39.96	8.7	31.26	159.43
	90	18.14	38.27	8.7	29.57	159.68
	95	**17.41**	**36.73**	**8.7**	**28.03**	**159.78**
	100	16.75	35.32	8.7	26.62	159.74
	105	16.13	34.03	8.7	25.33	159.59

TABLE 4C: 5 YEAR EVENT QUANTITY STORAGE REQUIREMENT - A-04

0.935 =Area (ha)
0.81 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
5 YEAR	70	29.37	61.96	13.3	48.66	204.35
	75	27.89	58.83	13.3	45.53	204.87
	80	**26.56**	**56.03**	**13.3**	**42.73**	**205.10**
	85	25.37	53.51	13.3	40.21	205.08
	90	24.29	51.23	13.3	37.93	204.84

TABLE 4D: 100 YEAR EVENT QUANTITY STORAGE REQUIREMENT - A-04

0.935 =Area (ha)
0.91 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
100 YEAR	140	29.15	68.59	13.8	54.79	460.24
	145	28.36	66.72	13.8	52.92	460.43
	150	**27.61**	**64.96**	**13.8**	**51.16**	**460.48**
	155	26.91	63.31	13.8	49.51	460.40
	160	26.24	61.74	13.8	47.94	460.20

Equations:
Flow Equation
$Q = 2.78 \times C \times I \times A$
Where:
C is the runoff coefficient
I is the rainfall intensity, City of Ottawa IDF
A is the total drainage area

Runoff Coefficient Equation
$C_5 = (A_{hard} \times 0.9 + A_{soft} \times 0.2)/A_{Tot}$
$C_{100} = (A_{hard} \times 1.0 + A_{soft} \times 0.25)/A_{Tot}$

100 year Intensity = 1735.688 / (Time in min + 6.014) $^{0.820}$
5 year Intensity = 998.071 / (Time in min + 6.053) $^{0.814}$
2 year Intensity = 732.951 / (Time in min + 6.199) $^{0.810}$

TABLE 4E: Structure information

Structures	Size Dia.(mm)	Area (m^2)	T/G	Inv IN	Inv OUT
CBMH 104	1200	1.13	79.60	77.83	77.77
CB 2	600	0.37	79.65		78.07
CB 3	600	0.37	79.70		78.27
CBMH 105	1200	1.13	79.65	78.10	77.98
CBMH 106	1200	1.13	79.82	78.22	78.21
CB 4	600	0.37	79.65	N/A	78.28
CB 6	600	0.37	79.85	N/A	78.12

TABLE 4F: Pipe information

Structures	Size Dia.(mm)	Length	Inv UP	Inv DOWN
CB4 - CBMH106	250	11.70	78.28	78.22
CBMH 106 - CBMH 105	250	21.74	78.21	78.10
CB 3 - CBMH 105	250	34.20	78.27	78.10
CBMH 105 - CBMH 104	375	47.11	77.98	77.83
CB 2 - CBMH 104	250	34.20	78.07	77.90
CB 6 - PIPE	200	14.82	78.12	77.97
STC 740 - CBMH 104	250	3.50	78.00	77.90

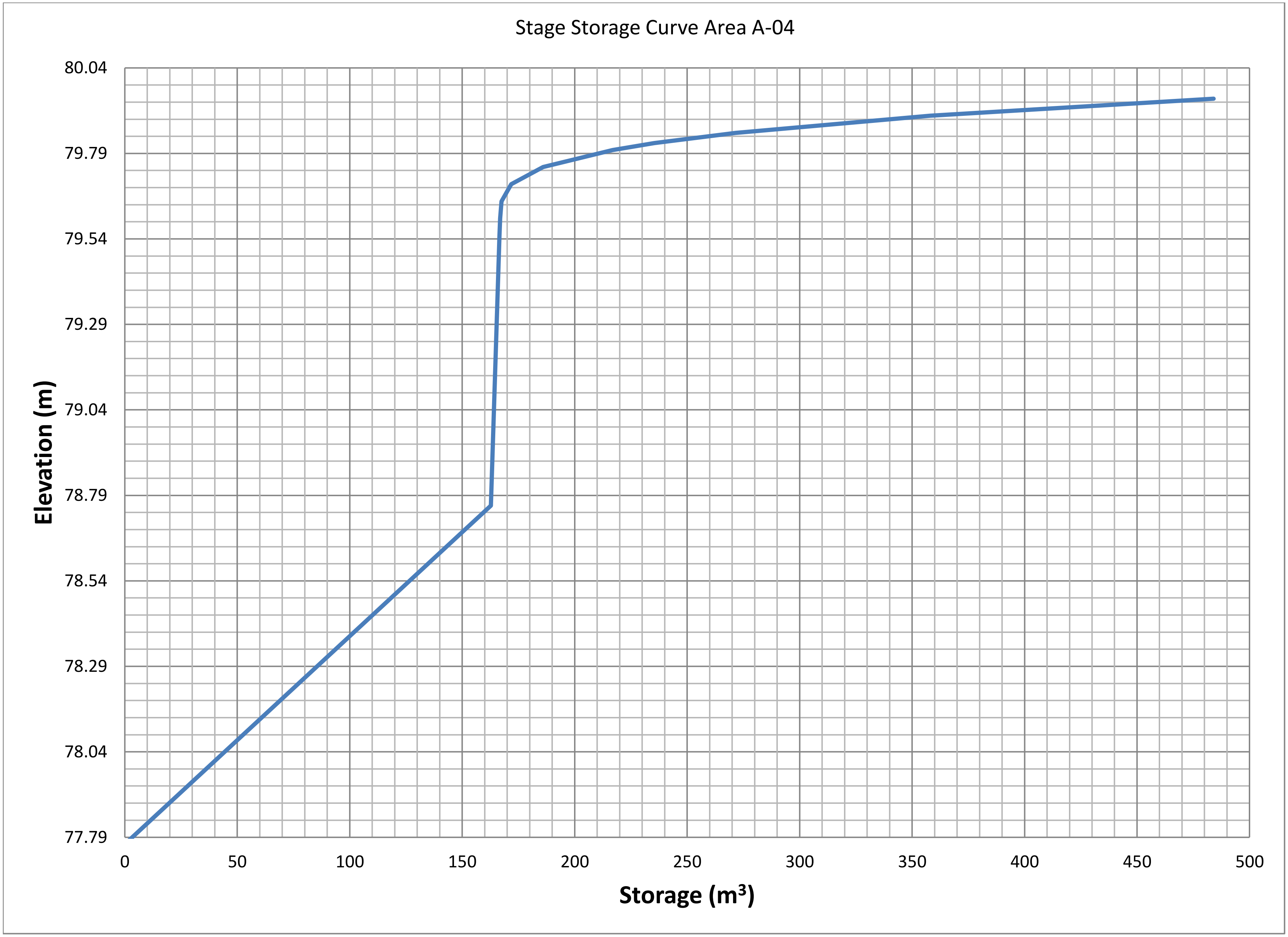
TABLE 4G: Storage Provided - A-04

Area A-4: Storage Table												Total Storage		
Elevation (m)	System Depth (m)	CBMH 104 Volume (m^3)	CB 2 Volume (m^3)	CB 3 Volume (m^3)	CBMH 105 Volume (m^3)	CBMH 106 Volume (m^3)	CB 4 Volume (m^3)	CB 6 Volume (m^3)	Pipe Volume (m^3)	Stormtech 740 Volume (m^3)	Underground Volume (m^3)*	Surface Ponding Volume (m^3)	Ponding Volume (m^3)	**Total Volume (m^3)**
77.770	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
78.760	0.99	1.12	0.26	0.18	0.88	0.62	0.18	0.24	10.84	148.40	162.72	0.00	0.00	**162.72**
78.800	1.03	1.16	0.27	0.20	0.93	0.67	0.19	0.25			162.91	0.00	0.00	**162.91**
79.050	1.28	1.45	0.36	0.29	1.21	0.95	0.29	0.35			164.13	0.00	0.00	**164.13**
79.300	1.53	1.73	0.46	0.38	1.49	1.23	0.38	0.44			165.36	0.00	0.00	**165.36**
79.550	1.78	2.01	0.55	0.48	1.78	1.52	0.47	0.53			166.58	0.00	0.00	**166.58**
79.600	1.83	2.07	0.57	0.49	1.83	1.57	0.49	0.55			166.82	0.00	0.00	**166.82**
79.650	1.88	-	0.59	0.51	1.89	1.63	0.51	0.57			167.01	0.50	0.50	**167.51**
79.700	1.93		-	0.53	-	1.69	-	0.59			167.10	4.70	4.70	**171.80**
79.750	1.98			-		1.74		0.61			167.18	18.75	18.75	**185.93**
79.800	2.03					1.80		0.63			167.25	49.58	49.58	**216.83**
79.820	2.05					1.82		0.63			167.28	68.17	68.17	**235.45**
79.850	2.08					-		0.64			167.29	104.25	104.25	**271.54**
79.900	2.13							-			167.29	190.76	190.76	**358.05**
79.950	2.18										167.29	316.75	316.75	**484.04**

TABLE 4H: Orfice Sizing information - A-04

Control Device					
Tempest LMF		105			
Design Event	**Flow (L/S)**	**Head (m)**	**Elev (m)**	**Outlet dia. (mm)**	**Volume (m^3)**
1:2 Year	8.7	0.78	78.74	375.00	159.78
1:5 Year	13.3	1.82	78.78	375.00	205.10
1:100 Year	13.8	1.98	79.94	375.00	460.48

**The design Head is calculated based on the centre of the pipe



Stage Storage Curve Area A-04
Elevation (m)
Storage (m³)
80.04
79.79
79.54
79.29
79.04
78.79
78.54
78.29
78.04
77.79
0
50
100
150
200
250
300
350
400
450
500

Chart 1: LMF 14 Preset Flow Curves

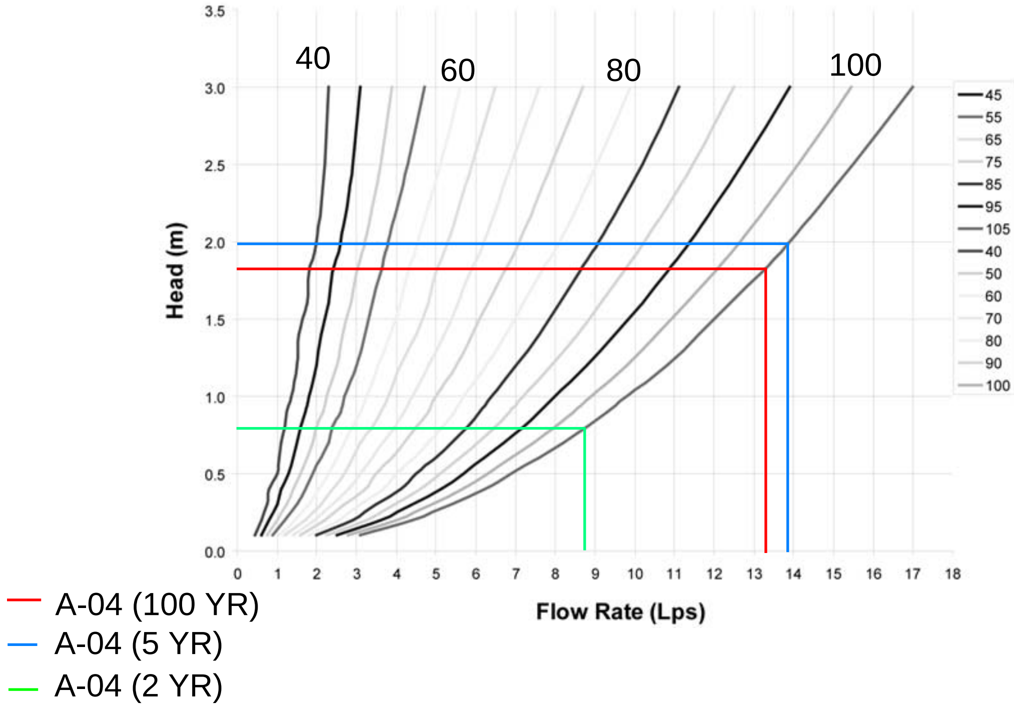
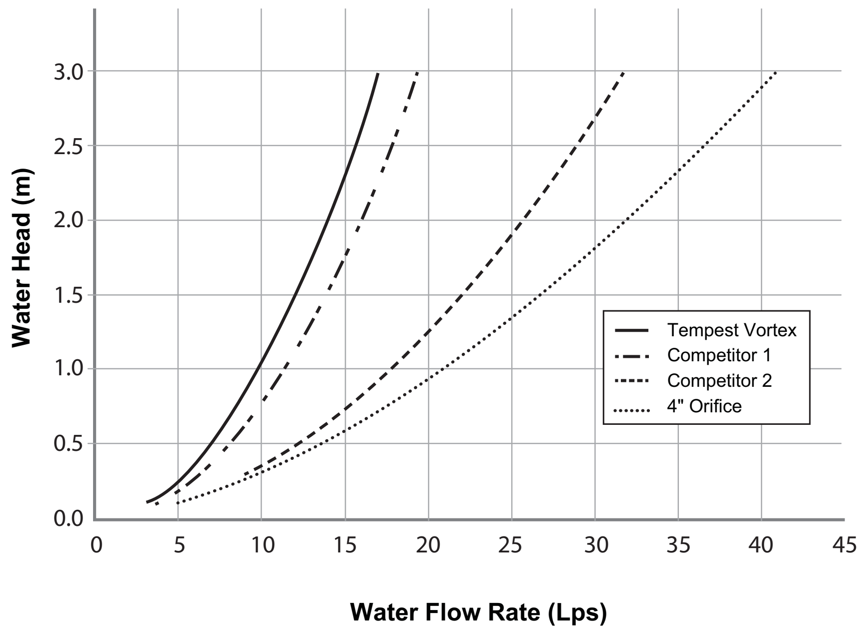


Chart 2: LMF Flow vs. ICD Alternatives



NOTE: Do not use or test the products in this manual with compressed air or other gases including air-over-water-boosters

TABLE 5A: Post-Development Runoff Coefficient "C" - A-05

Area	Surface	Ha	"C"	C_{avg}	*C_{100}
Total	Hard	0.037	0.90	0.38	0.44
0.143	Soft	0.106	0.20		

Runoff Coefficient Equation

$C = (A_{hard} \times 0.9 + A_{soft} \times 0.2)/A_{Tot}$

* Runoff Coefficient increases by 25% up to a maximum value of 1.00 for the 100-Year event

TABLE 5B: Post-Development A-05 Flows

Outlet Options	Area (ha)	C_{avg}	Tc (min)	$Q_{2\ Year}$ (L/s)	$Q_{5\ Year}$ (L/s)	$Q_{100\ Year}$ (L/s)
Solandt	0.143	0.38	10	**11.6**	**15.8**	**31.5**

Time of Concentration	Tc=	10.0	min
Intensity (2 Year Event)	I_2=	76.81	mm/hr
Intensity (5 Year Event)	I_5=	104.19	mm/hr
Intensity (100 Year Event)	I_{100}=	178.56	mm/hr

100 year Intensity = 1735.688 / (Time in min + 6.014) $^{0.820}$
5 year Intensity = 998.071 / (Time in min + 6.053) $^{0.814}$
2 year Intensity = 732.951 / (Time in min + 6.199) $^{0.810}$

Equations:
Flow Equation
$Q = 2.78 \times C \times I \times A$
Where:
C is the runoff coefficient
I is the rainfall intensity, City of Ottawa IDF
A is the total drainage area

TABLE 6A: Post-Development Runoff Coefficient "C" - A-06

			5 Year Event		100 Year Event	
Area	0.4	Ha	"C"	C_{avg}	"C" + 25%	*C_{avg}
Total	Hard	0.246	0.90	0.78	1.00	0.87
0.298	Roof	0.000	0.90		1.00	
	Soft	0.052	0.20		0.25	

TABLE 6B: 2 YEAR EVENT QUANTITY STORAGE REQUIREMENT - A-06

0.298 =Area (ha)
0.78 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
2 YEAR	30	40.04	25.77	6.1	19.72	35.49
	35	36.06	23.20	6.1	17.15	36.02
	40	**32.86**	**21.15**	**6.1**	**15.10**	**36.24**
	45	30.24	19.46	6.1	13.41	36.21
	50	28.04	18.04	6.1	11.99	35.98

TABLE 6C: 5 YEAR EVENT QUANTITY STORAGE REQUIREMENT - A-06

0.298 =Area (ha)
0.78 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
5 YEAR	35	48.52	31.22	7.5	23.72	49.82
	40	44.18	28.43	7.5	20.93	50.24
	45	**40.63**	**26.14**	**7.5**	**18.64**	**50.34**
	50	37.65	24.23	7.5	16.73	50.19
	55	35.12	22.60	7.5	15.10	49.84

TABLE 6D: 100 YEAR EVENT QUANTITY STORAGE REQUIREMENT - A-06

0.298 =Area (ha)
0.87 = C

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Allowable Runoff (L/s)	Net Flow to be Stored (L/s)	Storage Req'd (m^3)
100 YEAR	40	75.15	54.03	12.3	41.73	100.16
	45	69.05	49.65	12.3	37.35	100.85
	50	**63.95**	**45.99**	**12.3**	**33.69**	**101.06**
	55	59.62	42.87	12.3	30.57	100.89
	60	55.89	40.19	12.3	27.89	100.41

Equations:
Flow Equation
$Q = 2.78 \times C \times I \times A$
Where:
C is the runoff coefficient
I is the rainfall intensity, City of Ottawa IDF
A is the total drainage area

Runoff Coefficient Equation
$C_5 = (A_{hard} \times 0.9 + A_{soft} \times 0.2)/A_{Tot}$
$C_{100} = (A_{hard} \times 1.0 + A_{soft} \times 0.25)/A_{Tot}$

100 year Intensity = 1735.688 / (Time in min + 6.014) $^{0.820}$
5 year Intensity = 998.071 / (Time in min + 6.053) $^{0.814}$
2 year Intensity = 732.951 / (Time in min + 6.199) $^{0.810}$

TABLE 6E: Structure information

Structures	Size Dia.(mm)	Area (m^2)	T/G	Inv IN	Inv OUT
STMMH 200	1200	1.13	80.09	78.53	77.45
EX STMMH 103	1200	1.13	80.07	78.59	78.58
EX STMMH 102	1200	1.13	80.12	78.70	78.67
EX STMMH 101	1200	1.13	80.02	78.80	78.75
EX STMMH 100	1200	1.13	80.21	78.90	78.89
EX CB 01	600	0.37	79.84	N/A	79.15
EX CB 02	600	0.37	79.86	78.81	78.81
EX CB 03	600	0.37	79.86	N/A	78.83

TABLE 6F: Pipe information

Structures	Size Dia.(mm)	Length	Inv UP	Inv DOWN
EX STMMH 103 - 104	300	18.50	78.58	78.53
EX STMMH 102 - 103	250	20.30	78.67	78.59
EX STMMH 101 - 102	300	18.40	78.75	78.70
EX STMMH 100 - 101	300	24.60	78.89	78.80
EX CB 01 - EX STMMH 100	200	25.30	79.15	78.90
EX CB 02 - EX STMMH 101	300	5.20	78.81	78.76
EX CB 03 - 02	300	18.70	78.83	78.81
STC 740 - EX STMMH 104	250	3.50	78.15	78.04

TABLE 6G: Storage Provided - A-06

Area A-5: Storage Table														Total Storage	
Elevation (m)	System Depth (m)	STMMH 200 Volume (m^3)	EX STMMH 103 Volume (m^3)	EX STMMH 102 Volume (m^3)	EX STMMH 101 Volume (m^3)	EX STMMH 100 Volume (m^3)	EX CB 01 Volume (m^3)	EX CB 02 Volume (m^3)	EX CB 03 Volume (m^3)	Stormtech 740 Volume (m^3)	Pipe Volume (m^3)	Underground Volume (m^3)*	Surface Ponding Volume (m^3)	Ponding Volume (m^3)	**Total Volume (m^3)**
77.450	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
78.910	1.46	1.65	0.37	0.27	0.18	0.02	0.00	0.04	0.03	89.04	3.61	95.21	0.00	0.00	**95.21**
79.350	1.90	2.15	0.87	0.77	0.68	0.52	0.07	0.20	0.19		9.00	103.50	0.00	0.00	**103.50**
79.400	1.95	2.21	0.93	0.83	0.74	0.58	0.09	0.22	0.21			103.83	0.00	0.00	**103.83**
79.450	2.00	2.26	0.98	0.88	0.79	0.63	0.11	0.24	0.23			104.17	0.00	0.00	**104.17**
79.500	2.05	2.32	1.04	0.94	0.85	0.69	0.13	0.26	0.25			104.51	0.00	0.00	**104.51**
79.550	2.10	2.38	1.10	1.00	0.90	0.75	0.15	0.28	0.27			104.85	0.00	0.00	**104.85**
79.600	2.15	2.43	1.15	1.05	0.96	0.80	0.17	0.29	0.29			105.19	0.00	0.00	**105.19**
79.650	2.20	2.49	1.21	1.11	1.02	0.86	0.19	0.31	0.31			105.53	0.00	0.00	**105.53**
79.700	2.25	2.54	1.27	1.16	1.07	0.92	0.20	0.33	0.32			105.87	0.00	0.00	**105.87**
79.750	2.30	2.60	1.32	1.22	1.13	0.97	0.22	0.35	0.34			106.20	0.00	0.00	**106.20**
79.800	2.35	2.66	1.38	1.28	1.19	1.03	0.24	0.37	0.36			106.54	0.00	0.00	**106.54**
79.850	2.40	2.71	1.44	1.33	1.24	1.09	0.26	0.39	0.38			106.88	0.00	0.00	**106.88**

TABLE 6H: Orfice Sizing information - A-06

Control Device					
Tempest LMF		105			
Design Event	**Flow (L/S)**	**Head (m)**	**Elev (m)**	**Outlet dia. (mm)**	**Volume (m^3)**
1:2 Year	6.1	0.37	78.01	375.00	36.24
1:5 Year	7.5	0.58	78.22	375.00	50.34
1:100 Year	12.3	1.58	79.22	375.00	101.06

**The design Head is calculated based on the centre of the pipe

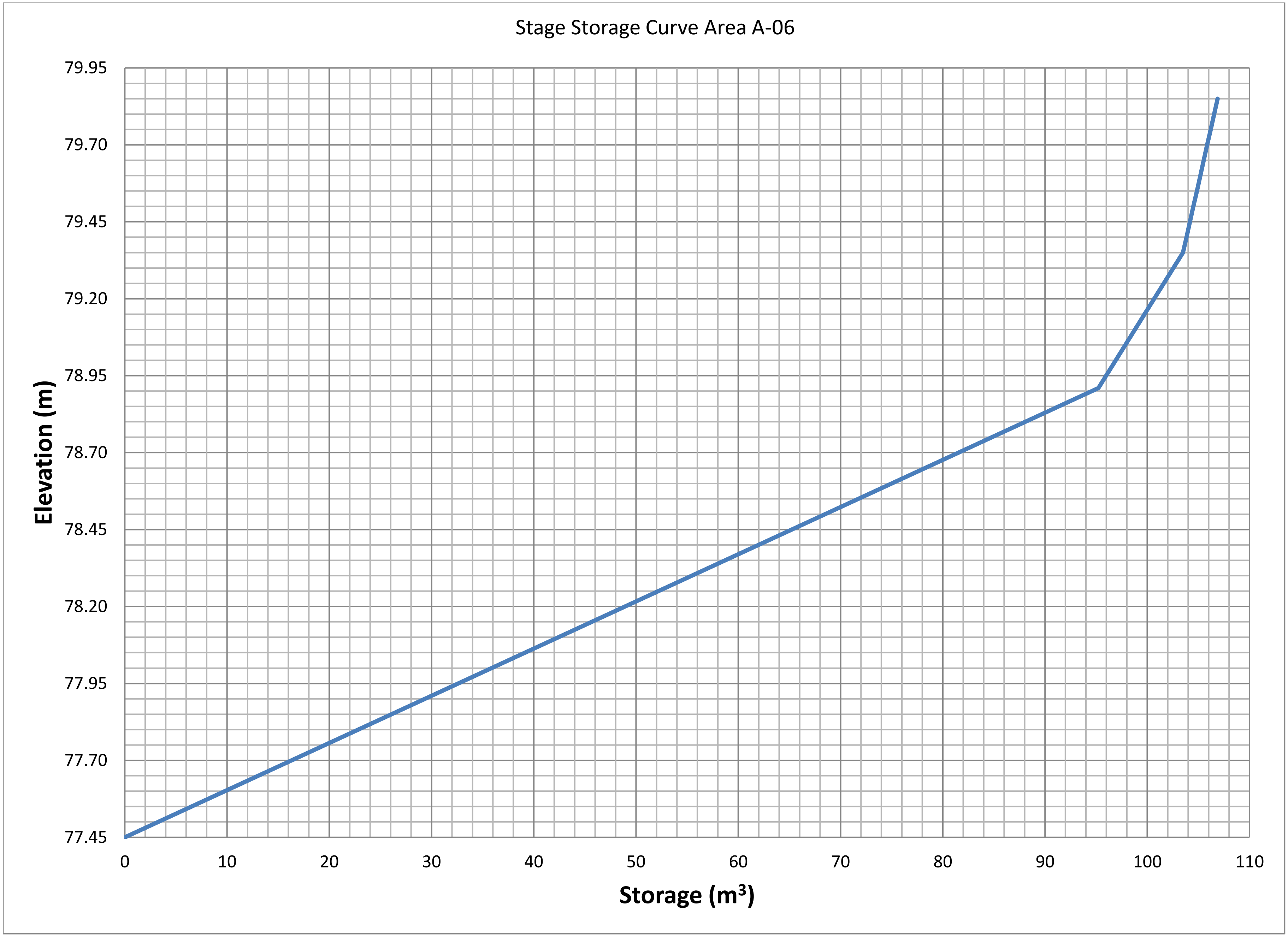

Stage Storage Curve Area A-06
Elevation (m)
79.95
79.70
79.45
79.20
78.95
78.70
78.45
78.20
77.95
77.70
77.45
0
10
20
30
40
50
60
70
80
90
100
110
Storage (m³)

Chart 1: LMF 14 Preset Flow Curves

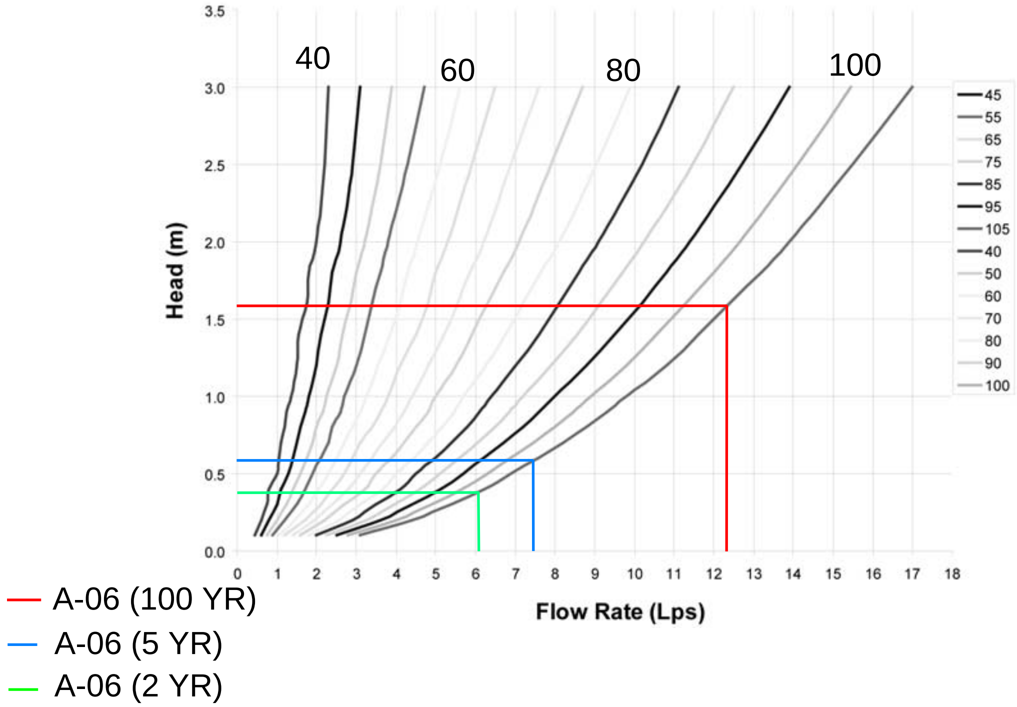
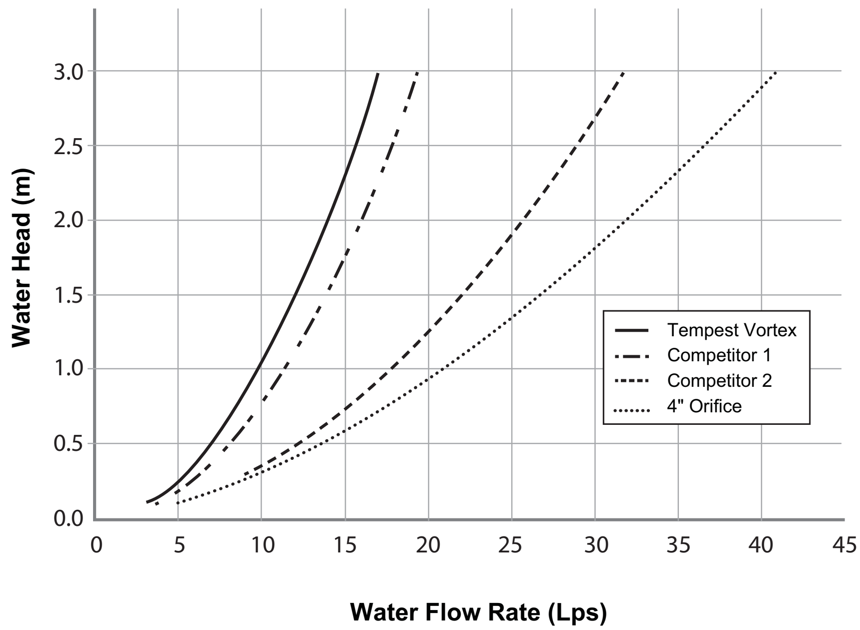


Chart 2: LMF Flow vs. ICD Alternatives



NOTE: Do not use or test the products in this manual with compressed air or other gases including air-over-water-boosters

TABLE 7A: Pre-Development Runoff Coefficient "C" - 9,10

Area	Surface	Ha	"C"	C_{avg}	$*C_{100}$
Total	Hard	0.315	0.90	0.65	0.73
0.490	Soft	0.175	0.20		

Runoff Coefficient Equation

$C = (A_{hard} \times 0.9 + A_{soft} \times 0.2)/A_{Tot}$

* Runoff Coefficient increases by 25% up to a maximum value of 1.00 for the 100-Year event

TABLE 7B: Pre-Development 9,10 Flows

Outlet Options	**Area (ha)**	C_{avg}	**Tc (min)**	$Q2_{Year}$ **(L/s)**	$Q_{5\ Year}$ **(L/s)**	$Q_{100\ Year}$ **(L/s)**
Solandt	0.490	0.65	10	**68.0**	**92.3**	**178.1**

Time of Concentration	Tc=	10.0	min
Intensity (2 Year Event)	I_2=	76.81	mm/hr
Intensity (5 Year Event)	I_5=	104.19	mm/hr
Intensity (100 Year Event)	I_{100}=	178.56	mm/hr

100 year Intensity = $1735.688 / (\text{Time in min} + 6.014)^{0.820}$
5 year Intensity = $998.071 / (\text{Time in min} + 6.053)^{0.814}$
2 year Intensity = $732.951 / (\text{Time in min} + 6.199)^{0.810}$

Equations:
Flow Equation
$Q = 2.78 \times C \times I \times A$
Where:
C is the runoff coefficient
I is the rainfall intensity, City of Ottawa IDF
A is the total drainage area

Table 8: Post-Development Stormwater Mangement Summary

					2 Year Storm Event				5 Year Storm Event				100 Year Storm Event			
Area ID	Area (ha)	1:5 Year Weighted Cw	Oulet Location	Orifice	Release (L/s)	Head (m)	Req'd Vol (cu.m)	Max. Vol. Provided (cu.m.)	Release (L/s)	Head (m)	Req'd Vol (cu.m)	Max. Vol. Provided (cu.m.)	Release (L/s)	Head	Req'd Vol (cu.m)	Max. Vol. Provided (cu.m.)
A-01	0.22	0.89	Solandt	LMF 70	3.8	0.7	34.57	193.85	6.0	1.9	43.6	193.8	6.2	2.02	101.21	193.8
A-02	0.033	0.88	Solandt	LMF 70	4.7	0.9	1.12	5.99	5.8	1.4	1.69	5.99	7.2	2.02	74.41	5.99
A-03	0.186	0.90	Solandt	Accutrol RD-100-A-ADJ	6.3	0.1	22.20	31.50	6.7	0.1	33.35	39.37	8.3	0.13	74.41	78.74
A-04	0.935	0.81	Solandt	LMF 105	8.7	0.8	159.78	484.04	13.3	1.8	205.10	484.04	13.8	1.98	460.48	484.04
A-06	0.298	0.78	Solandt	LMF 105	6.1	0.4	36.24	106.88	7.5	0.6	50.34	106.88	12.3	1.58	101.06	106.88
Total					**29.5**				**39.3**				**47.8**			
Allowable (98.15/2)					**49.1**				**49.1**				**49.1**			

Table 9: Direct Run-off

	Area ID	Area (ha)	1:5 Year Weighted Cw	2- Year Release (L/s)	5- Year Release (L/s)	100-Year Release (L/s)
Pre Development	9,10	0.49	0.65	68	92.3	178.1
Post Development	A-5	0.143	0.38	11.6	15.8	31.5
Direct Run-off Reduction		0.347	0.27	56.40	76.50	146.60

Table 10: STORMTECH 740 REQUIREMENTS

Storage Per Chamber (cu.m)	2.12

Area ID	Number of Stormtech 740 Chambers	Storage Provided (cu.m)
A-01	16	33.92
A-02	0	0.00
A-03	0	0.00
A-04	70	148.40
A-06	42	89.04
Total	128	271.36

Volume III: TEMPEST™ INLET CONTROL DEVICES

Municipal Technical Manual Series

SECOND EDITION

LMF (Low to Medium Flow) ICD

HF (High Flow) ICD

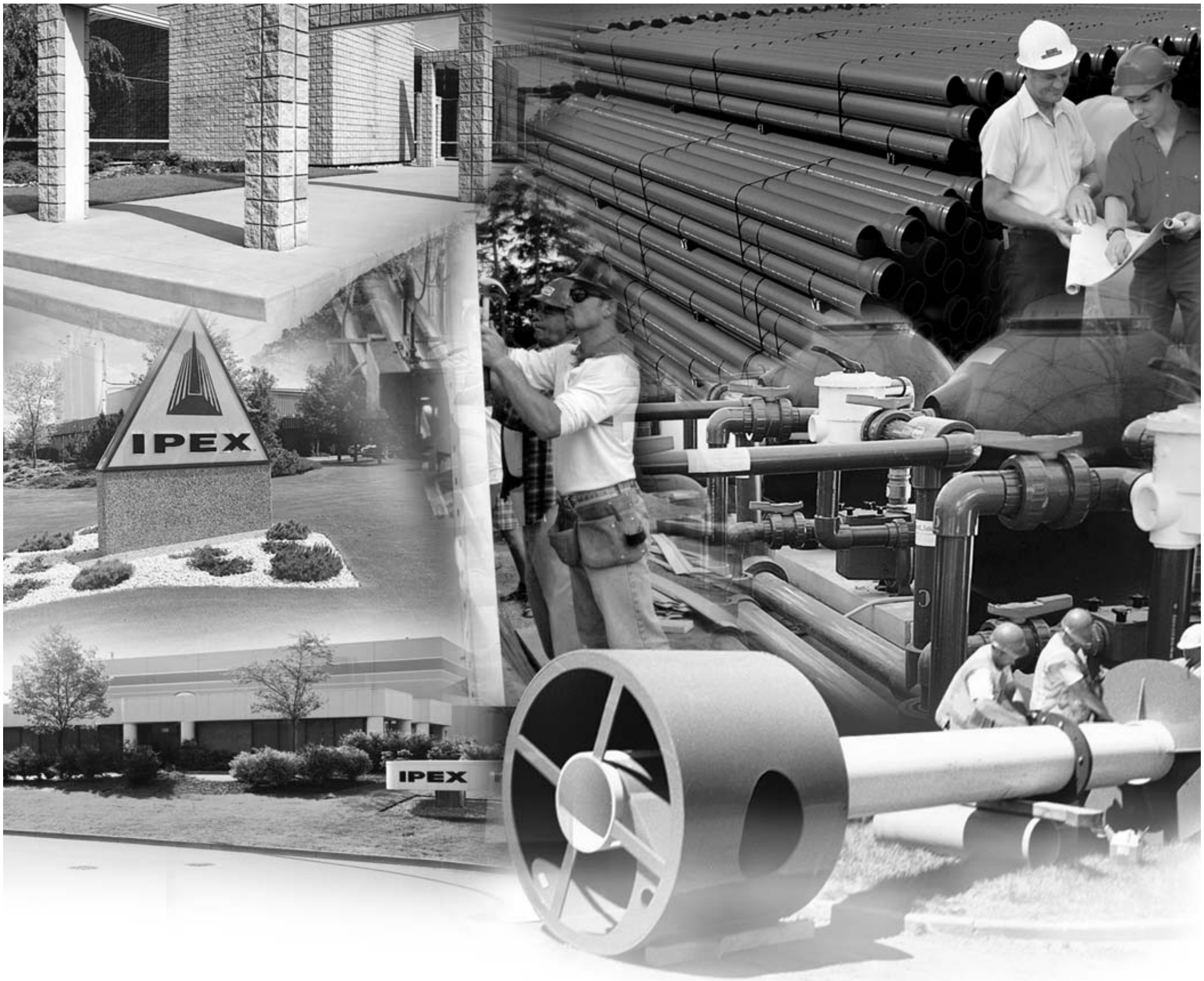
MHF (Medium to High Flow) ICD

IPEX

IPEX Tempest™ Inlet Control Devices

Municipal Technical Manual Series

Vol. I, 2nd Edition



About IPEX

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

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

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

CONTENTS

TEMPEST INLET CONTROL DEVICES Technical Manual

About IPEX

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

Purpose

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

Product Description

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

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

Product Function

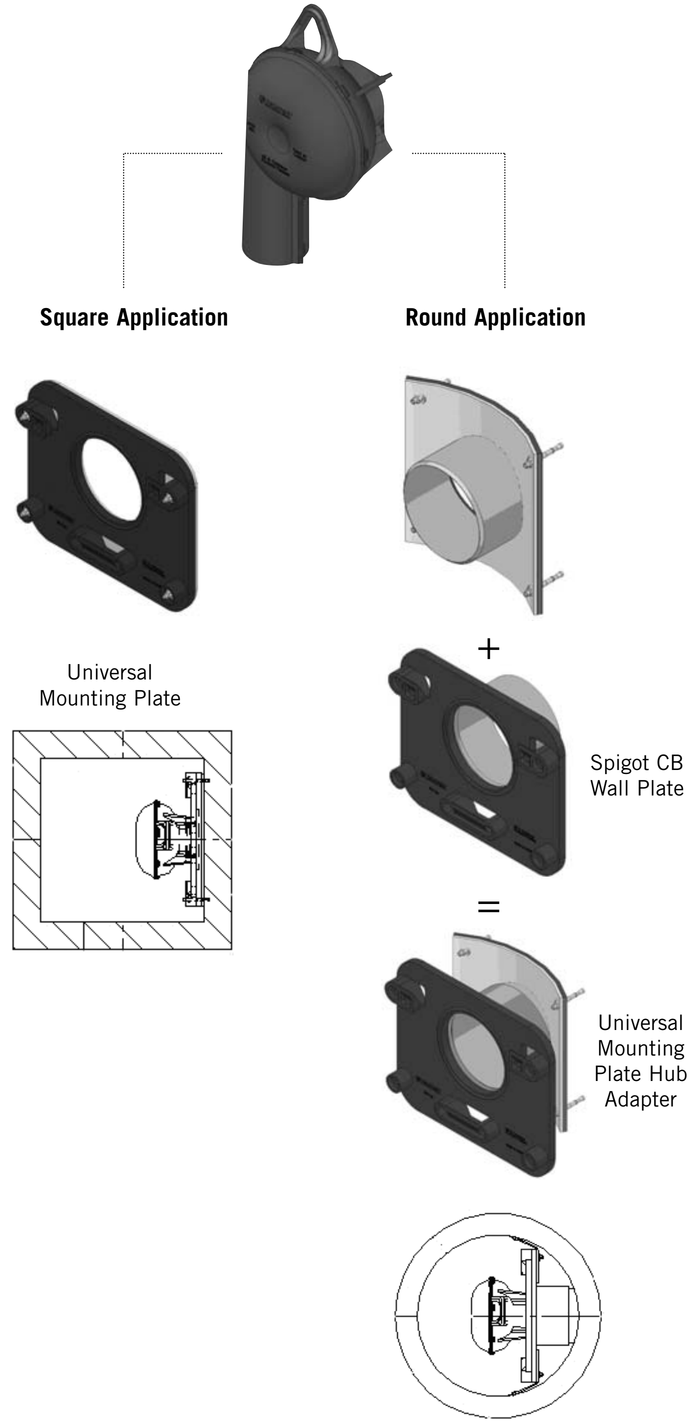
The LMF ICD vortex flow action allows the LMF ICD to provide a narrower flow curve using a larger orifice than a conventional orifice plate ICD, making it less likely to clog. When comparing flows at the same head level, the LMF ICD has the ability to restrict more flow than a conventional ICD during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

Product Construction

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

Product Applications

Will accommodate both square and round applications:



NOTE: Do not use or test the products in this manual with compressed air or other gases including air-over-water-boosters

Chart 1: LMF 14 Preset Flow Curves

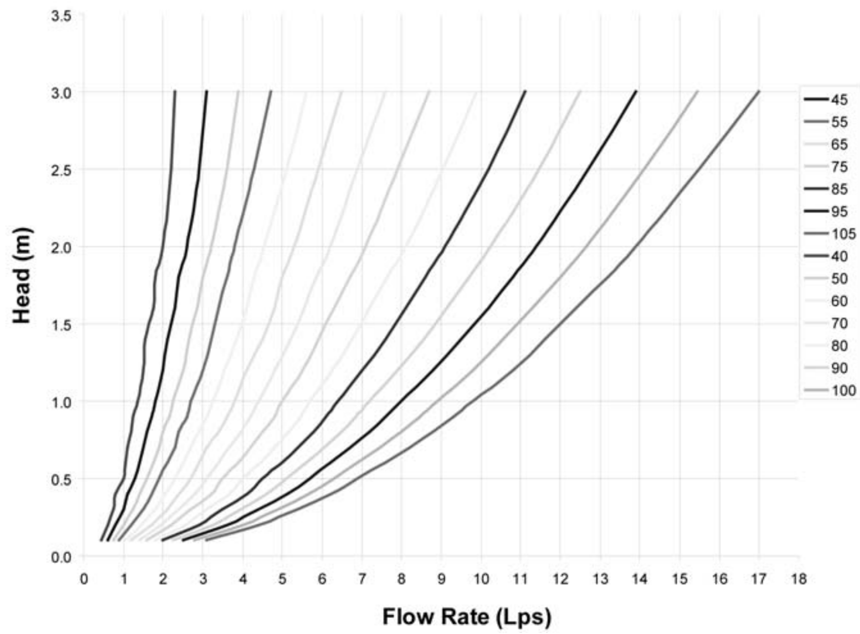
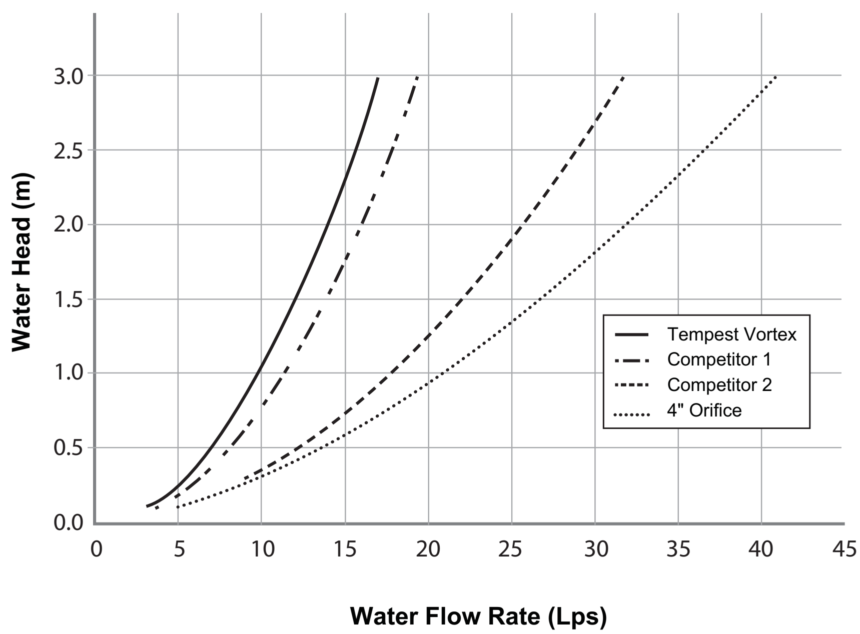


Chart 2: LMF Flow vs. ICD Alternatives



NOTE: Do not use or test the products in this manual with compressed air or other gases including air-over-water-boosters

TEMPEST LMF ICD

PRODUCT INSTALLATION

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

STEPS:

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

⚠ WARNING

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

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

STEPS:

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

⚠ WARNING

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

NOTE: Do not use or test the products in this manual with compressed air or other gases including air-over-water-boosters

PRODUCT TECHNICAL SPECIFICATION

General

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

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

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

ICD's shall have no moving parts.

Materials

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

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

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

All hardware will be made from 304 stainless steel.

Dimensioning

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

Installation

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

PRODUCT INFORMATION: TEMPEST HF & MHF ICD

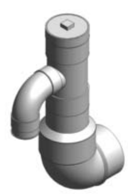
Product Description

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

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

Product Function

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



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

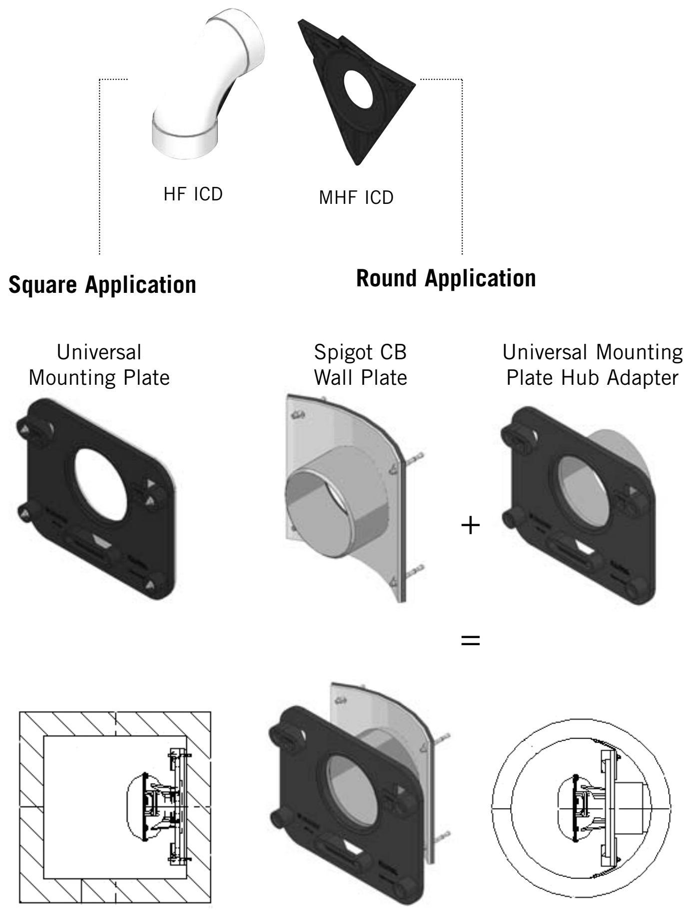
TEMPEST MHF (Medium to High Flow):
The MHF plate or plug is designed to control flow rates 9 L/s (143 gpm) or greater. It is not designed to prevent the propagation of odour and floatables.

Product Construction

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

Product Applications

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



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

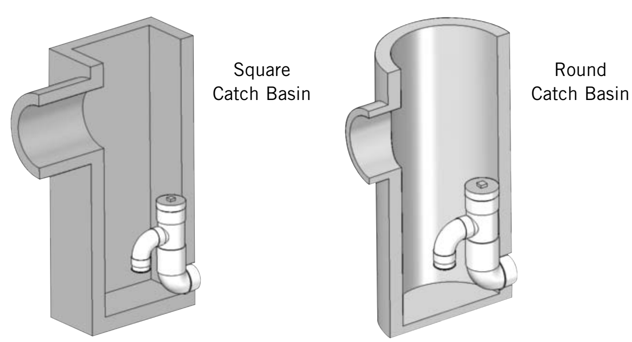
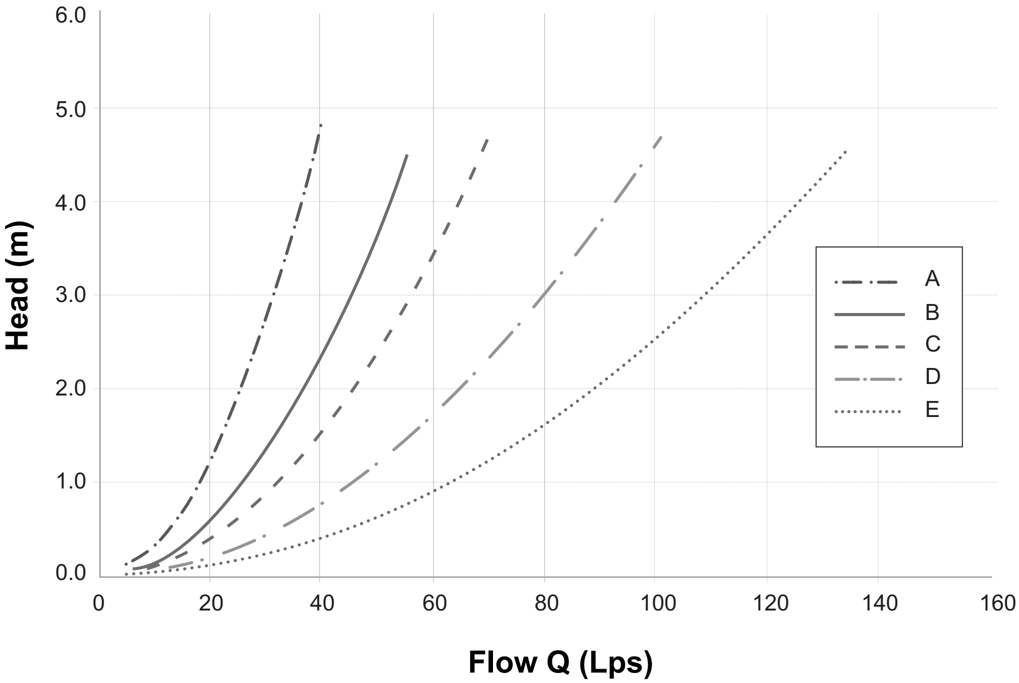


Chart 3: HF & MHF Preset Flow Curves



PRODUCT INSTALLATION

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

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

WARNING

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

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

STEPS:

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

WARNING

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

PRODUCT TECHNICAL SPECIFICATION

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

STEPS:

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

WARNING

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

General

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

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

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

ICD's shall have no moving parts.

Materials

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

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

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

All hardware will be made from 304 stainless steel.

Dimensioning

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

Installation

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

SALES AND CUSTOMER SERVICE

Canadian Customers call IPEX Inc.
Toll free: (866) 473-9462
www.ipexinc.com

U.S. Customers call IPEX USA LLC
Toll free: (800) 463-9572
www.ipexamerica.com

About the IPEX Group of Companies

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

Markets served by IPEX group products are:

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

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

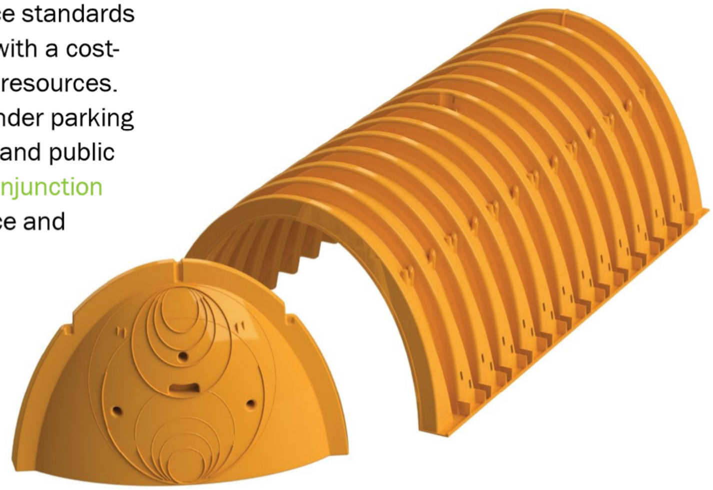
Tempest™ is a trademark of IPEX Branding Inc.

MNMNTPIP110817

IPEX

StormTech SC-740 Chamber

Designed to meet the most stringent industry performance standards for superior structural integrity while providing designers with a cost-effective method to save valuable land and protect water resources. The StormTech system is designed primarily to be used under parking lots, thus maximizing land usage for private (commercial) and public applications. StormTech chambers can also be used in conjunction with Green Infrastructure, thus enhancing the performance and extending the service life of these practices.



StormTech SC-740 Chamber (not to scale)

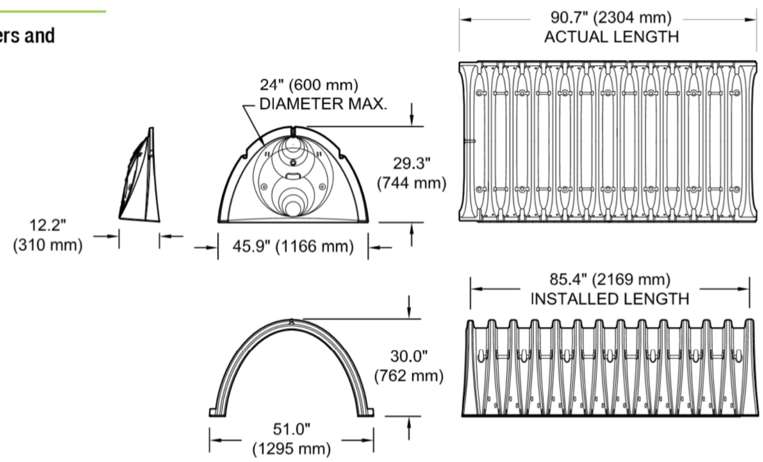
Nominal Chamber Specifications

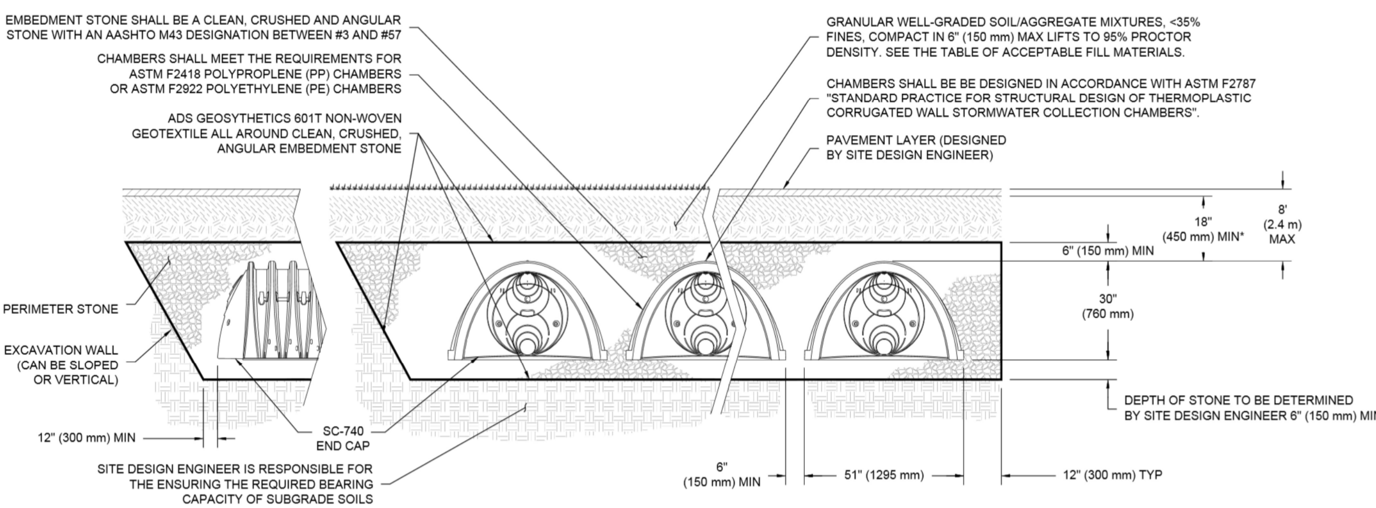
Size (L x W x H)	85.4” x 51.0” x 30.0” (2,170 x 1,295 x 762 mm)
Chamber Storage	45.9 ft^3 (1.30 m^3)
Min. Installed Storage*	74.9 ft^3 (2.12 m^3)
Weight	74.0 lbs (33.6 kg)

*Assumes 6” (150 mm) stone above, below and between chambers and 40% stone porosity.

Shipping

30 chambers/pallet
60 end caps/pallet
12 pallets/truck





*MINIMUM COVER TO BOTTOM OF FLEXIBLE PAVEMENT. FOR UNPAVED INSTALLATIONS WHERE RUTTING FROM VEHICLES MAY OCCUR, INCREASE COVER TO 24" (600 mm).

THE INSTALLED CHAMBER SYSTEM SHALL PROVIDE THE LOAD FACTORS SPECIFIED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS SECTION 12.12 FOR EARTH AND LIVE LOADS, WITH CONSIDERATION FOR IMPACT AND MULTIPLE VEHICLE PRESENCES.

StormTech®

SC-740 CUMLATIVE STORAGE VOLUMES PER CHAMBER

Assumes 40% Stone Porosity. Calculations are Based Upon a 6" (150 mm) Stone Base Under Chambers.

Depth of Water in System Inches (mm)	Cumulative Chamber Storage ft³ (m³)	Total System Cumulative Storage ft³ (m³)
42 (1067)	45.90 (1.300)	74.90 (2.121)
41 (1041)	45.90 (1.300)	73.77 (2.089)
40 (1016)	Stone 45.90 (1.300)	72.64 (2.057)
39 (991)	Cover 45.90 (1.300)	71.52 (2.025)
38 (965)	45.90 (1.300)	70.39 (1.993)
37 (940)	45.90 (1.300)	69.26 (1.961)
36 (914)	45.90 (1.300)	68.14 (1.929)
35 (889)	45.85 (1.298)	66.98 (1.897)
34 (864)	45.69 (1.294)	65.75 (1.862)
33 (838)	45.41 (1.286)	64.46 (1.825)
32 (813)	44.81 (1.269)	62.97 (1.783)
31 (787)	44.01 (1.246)	61.36 (1.737)
30 (762)	43.06 (1.219)	59.66 (1.689)
29 (737)	41.98 (1.189)	57.89 (1.639)
28 (711)	40.80 (1.155)	56.05 (1.587)
27 (686)	39.54 (1.120)	54.17 (1.534)
26 (660)	38.18 (1.081)	52.23 (1.479)
25 (635)	36.74 (1.040)	50.23 (1.422)
24 (610)	35.22 (0.977)	48.19 (1.365)
23 (584)	33.64 (0.953)	46.11 (1.306)
22 (559)	31.99 (0.906)	44.00 (1.246)
21 (533)	30.29 (0.858)	1.85 (1.185)
20 (508)	28.54 (0.808)	39.67 (1.123)
19 (483)	26.74 (0.757)	37.47 (1.061)
18 (457)	24.89 (0.705)	35.23 (0.997)
17 (432)	23.00 (0.651)	32.96 (0.939)
16 (406)	21.06 (0.596)	30.68 (0.869)
15 (381)	19.09 (0.541)	28.36 (0.803)
14 (356)	17.08 (0.484)	26.03 (0.737)
13 (330)	15.04 (0.426)	23.68 (0.670)
12 (305)	12.97 (0.367)	21.31 (0.608)
11 (279)	10.87 (0.309)	18.92 (0.535)
10 (254)	8.74 (0.247)	16.51 (0.468)
9 (229)	6.58 (0.186)	14.09 (0.399)
8 (203)	4.41 (0.125)	11.66 (0.330)
7 (178)	2.21 (0.063)	9.21 (0.264)
6 (152)	0 (0)	6.76 (0.191)
5 (127)	0 (0)	5.63 (0.160)
4 (102)	Stone 0 (0)	4.51 (0.128)
3 (76)	Foundation 0 (0)	3.38 (0.096)
2 (51)	0 (0)	2.25 (0.064)
1 (25)	0 (0)	1.13 (0.032)

Note: Add 1.13 ft³ (0.032 m³) of storage for each additional inch (25 mm) of stone foundation.

Storage Volume Per Chamber ft³ (m³)

	Bare Chamber Storage ft³ (m³)	Chamber and Stone Foundation Depth in. (mm)		
		6 (150)	12 (300)	18 (450)
SC-740 Chamber	45.9 (1.3)	74.9 (2.1)	81.7 (2.3)	88.4 (2.5)

Note: Assumes 6" (150 mm) stone above chambers, 6" (150 mm) row spacing and 40% stone porosity.

Amount of Stone Per Chamber

ENGLISH TONS (yds³)	Stone Foundation Depth		
	6"	12"	16"
SC-740	3.8 (2.8)	4.6 (3.3)	5.5 (3.9)
METRIC KILOGRAMS (m³)	150 mm	300 mm	450 mm
SC-740	3,450 (2.1)	4,170 (2.5)	4,490 (3.0)

Note: Assumes 6" (150 mm) of stone above and between chambers.

Volume Excavation Per Chamber yd³ (m³)

	Stone Foundation Depth		
	6 (150)	12 (300)	18 (450)
SC-740	5.5 (4.2)	6.2 (4.7)	6.8 (5.2)

Note: Assumes 6" (150 mm) of row separation and 18" (450 mm) of cover. The volume of excavation will vary as depth of cover increases.

CDS Average Annual Efficiency For TSS Removal & Total Annual Volume Treated

Project:	Solandt Rd 3026			
Location:	Ottawa, ON			
Date:	1/10/2020			
By:	EK			
PSD:	FINE		Area:	1.670 ha
CDS Model:	PMSU20_15_4		C-Value	0.83
CDS Design Flow:	20 l/s		IDF Data:	Ottawa, ON

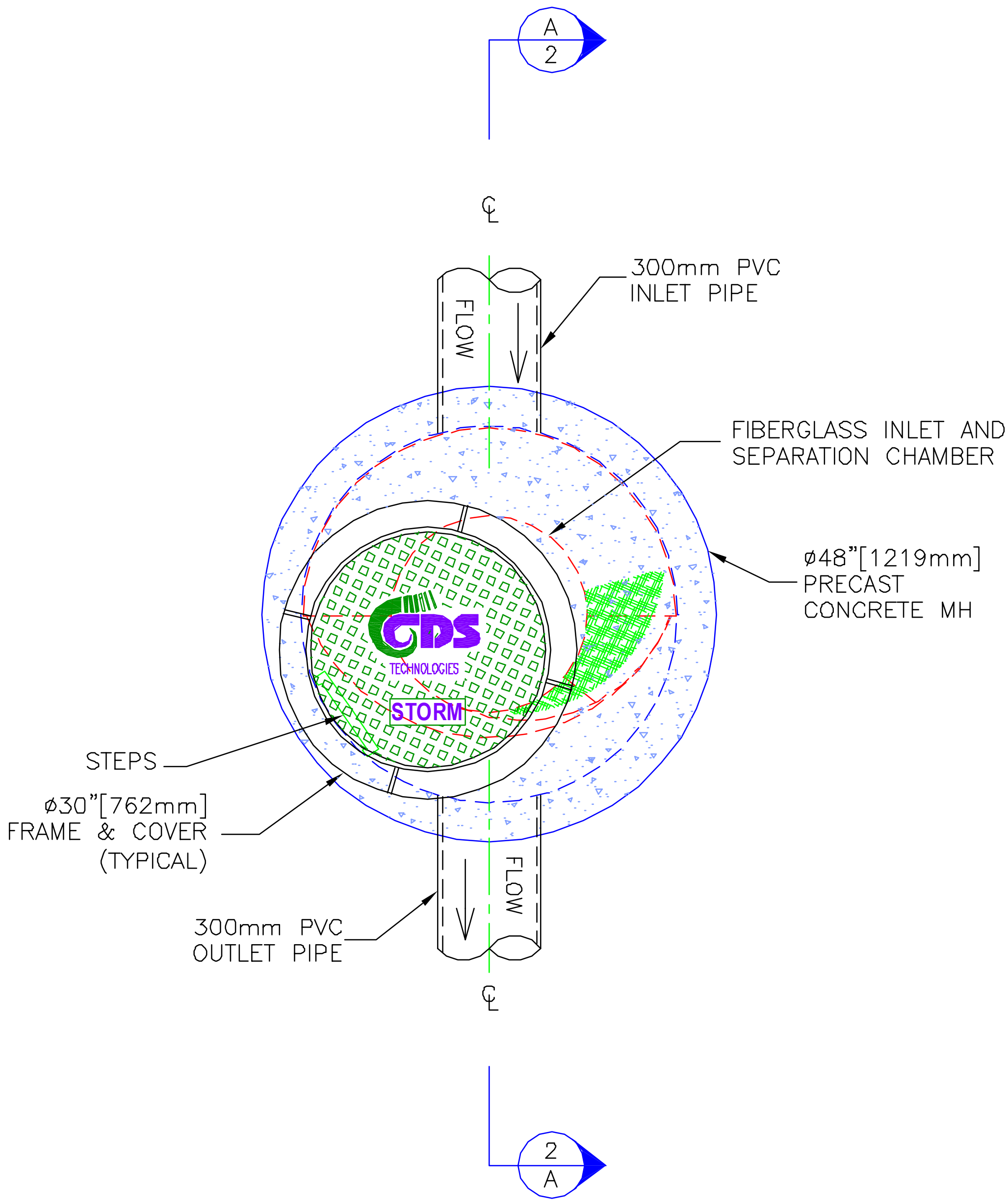
Return	Period	Peak Flow	TSS Percentage Captured	Treated Flow Volume	Total Flow Volume	Annual Exceedance Probability	System Flow	CDS Flow	By-Pass Flow	Volume Percentage Treated
month / yr	Yr	l/s	%	litres	litres	%	l/s	l/s	l/s	%
1-M	0.08	6.84	92.32	21667	21667	**100.00**	6.84	6.84	0.00	100.00
2-M	0.17	9.84	89.46	31188	31188	**99.75**	9.84	9.84	0.00	100.00
3-M	0.25	11.42	87.92	36342	36342	**98.17**	11.42	11.42	0.00	100.00
4-M	0.33	14.82	84.60	47656	47656	**95.04**	14.82	14.82	0.00	100.00
5-M	0.42	16.11	83.31	52114	52114	**90.91**	16.11	16.11	0.00	100.00
6-M	0.50	17.40	82.03	56571	56571	**86.47**	17.40	17.40	0.00	100.00
7-M	0.58	18.37	81.04	59971	59998	**82.01**	18.37	18.37	0.00	99.96
8-M	0.67	19.34	80.05	63370	63425	**77.67**	19.34	19.34	0.00	99.92
9-M	0.75	20.30	79.06	66770	66853	**73.64**	20.30	20.01	0.29	99.88
10-M	0.83	23.54	74.32	74419	79276	**69.90**	23.54	20.01	3.53	95.31
11-M	0.92	26.77	69.58	82068	91699	**66.40**	26.77	20.01	6.76	90.74
1-Yr	1	30.01	64.84	89717	104122	**63.21**	30.01	20.01	9.99	86.17
2-Yr	2	31.07	63.39	91789	108542	**39.35**	31.07	20.01	11.06	84.57
5-Yr	5	41.76	50.29	109411	157873	**18.13**	41.76	20.01	21.75	69.30
10-Yr	10	42.31	49.68	110173	160693	**9.52**	42.31	20.01	22.29	68.56
25-Yr	25	46.39	45.24	115419	182879	**3.92**	46.39	20.01	26.38	63.11
50-Yr	50	47.66	43.90	116867	190201	**1.98**	47.66	20.01	27.65	61.44
100-Yr	100	52.74	38.64	121403	222080	**1.00**	52.74	20.01	32.73	54.67

Average Annual TSS Removal Efficiency [%]: **81.1** Ave. Ann. T. Volume [%]: **97.18%**

ECHELON ENVIRONMENTAL

CDS TECHNOLOGIES

PLAN VIEW

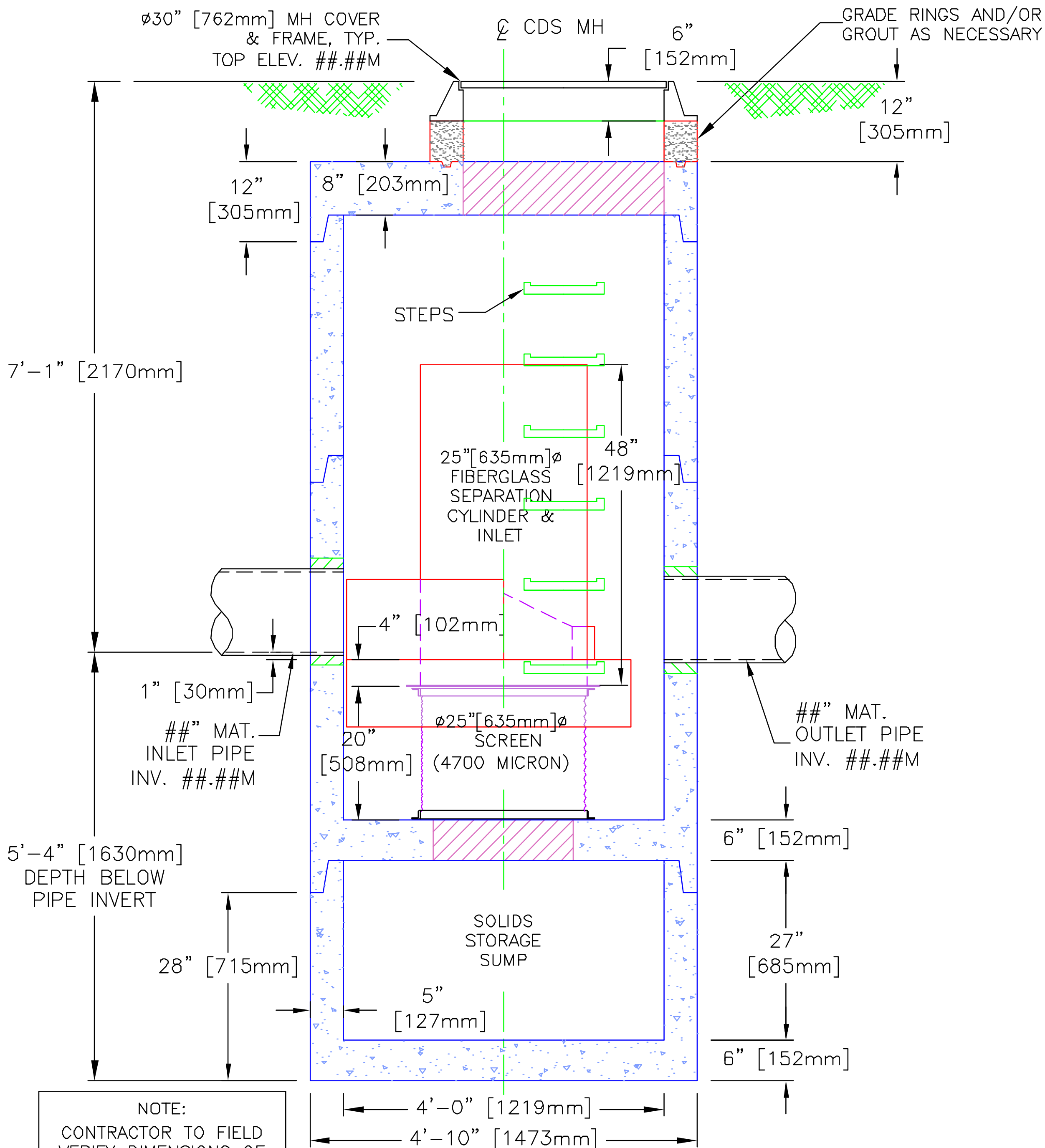


CDS MODEL PMSU20_15_4m
STORMWATER TREATMENT UNIT

CONTECH STORMWATER SOLUTIONS	PROJECT NAME CITY, STATE	JOB#	XX-##-###	SCALE 1" = 2'
		DATE	##/##/##	SHEET
		DRAWN	INITIALS	1
		APPROV.		

Echelon Environmental 505 Hood Road, Unit 26, Markham, Ontario L3R 5V6 Tel: (905) 948-0000 Fax: (905) 948-0577
CONTECH Stormwater Solutions Inc. 930 Woodcock Road, Suite 101, Orlando, Florida 32803 Tel: (800) 848-9955

SECTION A–A
ELEVATION VIEW



NOTE:
CONTRACTOR TO FIELD
VERIFY DIMENSIONS OF
OR CONCRETE SECTIONS

CDS MODEL PMSU20_15_4m
STORMWATER TREATMENT UNIT

CONTECH STORMWATER SOLUTIONS	PROJECT NAME CITY, STATE	JOB#	XX–##–###	SCALE 1" = 2'
		DATE	##/##/##	SHEET
		DRAWN	INITIALS	2
		APPROV.		

Echelon Environmental 505 Hood Road, Unit 26, Markham, Ontario L3R 5V6 Tel: (905) 948-0000 Fax: (905) 948-0577
CONTECH Stormwater Solutions Inc. 930 Woodcock Road, Suite 101, Orlando, Florida 32803 Tel: (800) 848-9955

APPENDIX G
Stormwater Management Drawings

APPENDIX H
Development Servicing Study Checklist

4. Development Servicing Study Checklist

The following section describes the checklist of the required content of servicing studies. It is expected that the proponent will address each one of the following items for the study to be deemed complete and ready for review by City of Ottawa Infrastructure Approvals staff.

The level of required detail in the Servicing Study will increase depending on the type of application. For example, for Official Plan amendments and re-zoning applications, the main issues will be to determine the capacity requirements for the proposed change in land use and confirm this against the existing capacity constraint, and to define the solutions, phasing of works and the financing of works to address the capacity constraint. For subdivisions and site plans, the above will be required with additional detailed information supporting the servicing within the development boundary.

4.1 General Content

N/A ☐ Executive Summary (for larger reports only).

☒ Date and revision number of the report.

☒ Location map and plan showing municipal address, boundary, and layout of proposed development.

☒ Plan showing the site and location of all existing services.

☒ Development statistics, land use, density, adherence to zoning and official plan, and reference to applicable subwatershed and watershed plans that provide context to which individual developments must adhere.

☒ Summary of Pre-consultation Meetings with City and other approval agencies.

☒ Reference and confirm conformance to higher level studies and reports (Master Servicing Studies, Environmental Assessments, Community Design Plans), or in the case where it is not in conformance, the proponent must provide justification and develop a defendable design criteria.

☒ Statement of objectives and servicing criteria.

☒ Identification of existing and proposed infrastructure available in the immediate area.

☒ Identification of Environmentally Significant Areas, watercourses and Municipal Drains potentially impacted by the proposed development (Reference can be made to the Natural Heritage Studies, if available).

☒ Concept level master grading plan to confirm existing and proposed grades in the development. This is required to confirm the feasibility of proposed stormwater management and drainage, soil removal and fill constraints, and potential impacts to neighbouring properties. This is also required to confirm that the proposed grading will not impede existing major system flow paths.

N/A ☐ Identification of potential impacts of proposed piped services on private services (such as wells and septic fields on adjacent lands) and mitigation required to address potential impacts.

N/A ☐ Proposed phasing of the development, if applicable.

☒ Reference to geotechnical studies and recommendations concerning servicing.

☒ All preliminary and formal site plan submissions should have the following information:

- Metric scale
- North arrow (including construction North)
- Key plan
- Name and contact information of applicant and property owner
- Property limits including bearings and dimensions
- Existing and proposed structures and parking areas
- Easements, road widening and rights-of-way
- Adjacent street names

4.2 Development Servicing Report: Water

N/A ☒ Confirm consistency with Master Servicing Study, if available

☒ Availability of public infrastructure to service proposed development

N/A ☐ Identification of system constraints

☒ Identify boundary conditions

☒ Confirmation of adequate domestic supply and pressure

☒ Confirmation of adequate fire flow protection and confirmation that fire flow is calculated as per the Fire Underwriter's Survey. Output should show available fire flow at locations throughout the development.

☒ Provide a check of high pressures. If pressure is found to be high, an assessment is required to confirm the application of pressure reducing valves.

N/A ☐ Definition of phasing constraints. Hydraulic modeling is required to confirm servicing for all defined phases of the project including the ultimate design

☒ Address reliability requirements such as appropriate location of shut-off valves

N/A ☐ Check on the necessity of a pressure zone boundary modification.

☒ Reference to water supply analysis to show that major infrastructure is capable of delivering sufficient water for the proposed land use. This includes data that shows that the expected demands under average day, peak hour and fire flow conditions provide water within the required pressure range

☒ Description of the proposed water distribution network, including locations of proposed connections to the existing system, provisions for necessary looping, and appurtenances (valves, pressure reducing valves, valve chambers, and fire hydrants) including special metering provisions.

N/A ☐ Description of off-site required feedermains, booster pumping stations, and other water infrastructure that will be ultimately required to service proposed development, including financing, interim facilities, and timing of implementation.

☒ Confirmation that water demands are calculated based on the City of Ottawa Design Guidelines.

☒ Provision of a model schematic showing the boundary conditions locations, streets, parcels, and building locations for reference.

4.3 Development Servicing Report: Wastewater

☒ Summary of proposed design criteria (Note: Wet-weather flow criteria should not deviate from the City of Ottawa Sewer Design Guidelines. Monitored flow data from relatively new infrastructure cannot be used to justify capacity requirements for proposed infrastructure).

☒ Confirm consistency with Master Servicing Study and/or justifications for deviations.

N/A ☐ Consideration of local conditions that may contribute to extraneous flows that are higher than the recommended flows in the guidelines. This includes groundwater and soil conditions, and age and condition of sewers.

☒ Description of existing sanitary sewer available for discharge of wastewater from proposed development.

☒ Verify available capacity in downstream sanitary sewer and/or identification of upgrades necessary to service the proposed development. (Reference can be made to previously completed Master Servicing Study if applicable)

☒ Calculations related to dry-weather and wet-weather flow rates from the development in standard MOE sanitary sewer design table (Appendix ‘C’) format.

☒ Description of proposed sewer network including sewers, pumping stations, and forcemains.

N/A ☐ Discussion of previously identified environmental constraints and impact on servicing (environmental constraints are related to limitations imposed on the development in order to preserve the physical condition of watercourses, vegetation, soil cover, as well as protecting against water quantity and quality).

N/A ☐ Pumping stations: impacts of proposed development on existing pumping stations or requirements for new pumping station to service development.

N/A ☐ Forcemain capacity in terms of operational redundancy, surge pressure and maximum flow velocity.

N/A ☐ Identification and implementation of the emergency overflow from sanitary pumping stations in relation to the hydraulic grade line to protect against basement flooding.

N/A ☐ Special considerations such as contamination, corrosive environment etc.

4.4 Development Servicing Report: Stormwater Checklist

☒ Description of drainage outlets and downstream constraints including legality of outlets (i.e. municipal drain, right-of-way, watercourse, or private property)

N/A ☐ Analysis of available capacity in existing public infrastructure.

☒ A drawing showing the subject lands, its surroundings, the receiving watercourse, existing drainage patterns, and proposed drainage pattern.

☒ Water quantity control objective (e.g. controlling post-development peak flows to pre-development level for storm events ranging from the 2 or 5 year event (dependent on the receiving sewer design) to 100 year return period); if other objectives are being applied, a rationale must be included with reference to hydrologic analyses of the potentially affected subwatersheds, taking into account long-term cumulative effects.

☒ Water Quality control objective (basic, normal or enhanced level of protection based on the sensitivities of the receiving watercourse) and storage requirements.

☒ Description of the stormwater management concept with facility locations and descriptions with references and supporting information.

N/A ☐ Set-back from private sewage disposal systems.

N/A ☐ Watercourse and hazard lands setbacks.

N/A ☐ Record of pre-consultation with the Ontario Ministry of Environment and the Conservation Authority that has jurisdiction on the affected watershed.

N/A ☐ Confirm consistency with sub-watershed and Master Servicing Study, if applicable study exists.

☒ Storage requirements (complete with calculations) and conveyance capacity for minor events (1:5 year return period) and major events (1:100 year return period).

N/A ☐ Identification of watercourses within the proposed development and how watercourses will be protected, or, if necessary, altered by the proposed development with applicable approvals.

☒ Calculate pre and post development peak flow rates including a description of existing site conditions and proposed impervious areas and drainage catchments in comparison to existing conditions.

N/A ☐ Any proposed diversion of drainage catchment areas from one outlet to another.

☒ Proposed minor and major systems including locations and sizes of stormwater trunk sewers, and stormwater management facilities.

N/A ☐ If quantity control is not proposed, demonstration that downstream system has adequate capacity for the post-development flows up to and including the 100-year return period storm event.

N/A ☐ Identification of potential impacts to receiving watercourses

N/A ☐ Identification of municipal drains and related approval requirements.

☒ Descriptions of how the conveyance and storage capacity will be achieved for the development.

N/A ☐ 100 year flood levels and major flow routing to protect proposed development from flooding for establishing minimum building elevations (MBE) and overall grading.

N/A ☐ Inclusion of hydraulic analysis including hydraulic grade line elevations.

☒ Description of approach to erosion and sediment control during construction for the protection of receiving watercourse or drainage corridors.

N/A ☐ Identification of floodplains – proponent to obtain relevant floodplain information from the appropriate Conservation Authority. The proponent may be required to delineate floodplain elevations to the satisfaction of the Conservation Authority if such information is not available or if information does not match current conditions.

☒ Identification of fill constraints related to floodplain and geotechnical investigation.

4.5 Approval and Permit Requirements: Checklist

The Servicing Study shall provide a list of applicable permits and regulatory approvals necessary for the proposed development as well as the relevant issues affecting each approval. The approval and permitting shall include but not be limited to the following:

☒ Conservation Authority as the designated approval agency for modification of floodplain, potential impact on fish habitat, proposed works in or adjacent to a watercourse, cut/fill permits and Approval under Lakes and Rivers Improvement Act. The Conservation Authority is not the approval authority for the Lakes and Rivers Improvement Act. Where there are Conservation Authority regulations in place, approval under the Lakes and Rivers Improvement Act is not required, except in cases of dams as defined in the Act.

N/A ☐ Application for Certificate of Approval (CofA) under the Ontario Water Resources Act.

N/A ☐ Changes to Municipal Drains.

N/A ☐ Other permits (National Capital Commission, Parks Canada, Public Works and Government Services Canada, Ministry of Transportation etc.)

4.6 Conclusion Checklist

☒ Clearly stated conclusions and recommendations

N/A ☐ Comments received from review agencies including the City of Ottawa and information on how the comments were addressed. Final sign-off from the responsible reviewing agency.

☒ All draft and final reports shall be signed and stamped by a professional Engineer registered in Ontario