UPPER CANADA CONSULTANTS
ENGINEERS / PLANNERS

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FUNCTIONAL SERVICING REPORT

694 AND 698 NIAGARA STREET

CITY OF WELLAND
October 2025

INTRODUCTION

The purpose of this Functional Servicing Report (FSR) is to address the municipal servicing requirements for the proposed development seven (7) storey apartment building located at 694 and 698 Niagara Street located south of the Woodlawn Cemetery, west of Gadsby Avenue and east of Regional Road 50 (Niagara Street).

The development site approximately 0.78 hectares and will include an associated asphalt parking area, concrete curb, catch basins, storm sewers, sanitary sewers, and watermain.

The current zoning of the subject lands is R1 residential which reflects the single family dwellings. However, in the City of Welland Official Plan the subject lands are designated high density residential.

There is currently a 250mm diameter sanitary sewer that extends through an easement within the subject lands located at the western portion of the 694 Niagara Street property which will remain. There is also a 300mm diameter sanitary sewer that extends through an easement within the subject lands at the northern limits of 698 Niagara Street which will also remain. Additionally, there is an existing watercourse that extends through the western portion of 694 Niagara Street and outlets to existing storm sewers on Regional Road 50 (Niagara Street).

The objectives of this report are as follows:

1. Identify domestic and fire protection water servicing needs for the site;
2. Identify sanitary servicing needs for the site; and,
3. Identify stormwater management needs for the site.

WATER SERVICING

There is an existing 600mm diameter Regional watermain along the east side of Regional Road 50 (Niagara Street) that fronts the subject lands and a municipal 150mm diameter watermain on the west side of Regional Road 50 (Niagara Street). It is proposed to extend a single private 150mm diameter water service within the site from the existing 150mm diameter municipal watermain on Niagara Street to provide domestic water supply for the proposed building.

There is an existing fire hydrant located on the west side of Regional Road 50 (Niagara Street) approximately 30m southwest of the subject lands on the west side of Niagara Street which connects to the 150mm diameter watermain, that can provide fire protection for the subject lands.

The proposed development is expected to consist of a total population of approximately 369 people based on the assumption there will be 217 one to two bedroom units which will consist of 1.7 people per unit.

The estimated peak domestic water demands under the existing and proposed zoning have been summarized in Table 1 below using an average residential flow rate of 270 L/capita/day. Peaking factors for the maximum daily demand and maximum hourly demand were taken from the Table 3-1 of the Ministry of Environment Design Guidelines for Drinking Water Systems. The peak demands will be confirmed as part of the detailed engineering design.

Table 1. Estimated Peak Domestic Water Demand

	Proposed Zoning
Average Domestic Demand *Prop: 270 L/cap/day; 369 persons*	**1.15 L/s**
Maximum Day Peaking Factor	2.75
Maximum Day Domestic Demand	**3.17 L/s**
Peak Hour Peaking Factor	4.13
Peak Hour Domestic Demand	**4.76 L/s**

Therefore, there is expected to be adequate capacity to provide domestic water supply and fire protection within the subject lands.

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SANITARY SERVICING

As stated previously, there is currently a 250mm diameter sanitary sewer that extends through an easement within the subject lands located at the western portion of the 694 Niagara Street property that flows northerly. There is also a 300mm diameter sanitary sewer that extends through an easement within the subject lands at the northern limits of 698 Niagara Street that flows westerly. Both these sanitary sewers outlet to manhole at the northwest corner of the subject lands to a 250mm diameter sanitary sewer that crosses Regional Road 50 (Niagara Street) and outlets to the 250mm diameter sanitary sewer on Regional Road 50 (Niagara Street).

It is proposed to discharge sanitary flows to the existing 250mm diameter sanitary sewer located at the northwest limits of the subject lands, which outlets to the existing sanitary sewer on Niagara Street.

As shown in the sanitary sewer calculations included in Appendix A, the existing single family residential dwellings discharges a total peak flow 0.29 L/s to the existing sanitary sewer system on Niagara Street.

The proposed building is estimated to have a total population of 369 persons, which corresponds to a total peak flow 5.12 L/s and will occupy 15.1% of the total capacity of the existing 250mm diameter sewer.

Therefore, there is expected to be adequate capacity in the receiving sanitary sewer for the subject lands.

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STORMWATER MANAGEMENT

As part of the site development for the proposed development, the following is a summary of the stormwater management plan.

Based on the comments and outstanding policies from the City of Welland, Regional Municipality of Niagara, Niagara Peninsula Conservation Authority (NPCA), and the Ministry of the Environment, Conservation and Parks (MECP), the following site-specific considerations were identified:

a. Stormwater **quality** controls are to be provided for the more frequent storm events to provide Enhanced Protection (80% TSS removal per ETV criteria) in accordance with City of Welland requirements.

b. Stormwater **quantity** controls are to be provided to control the 5-year post development flows to the 5-year pre development flows for the minor storm events.

c. Stormwater **quantity** controls are to be provided to control the 100-year post development flows to the 100-year pre development flows for the major storm events.

Existing Conditions

There is an existing 1350mm diameter storm sewer on the east side of Regional Road 50 (Niagara Street) that conveys flows from the subject lands and upstream area to Woodlawn Road before ultimately outletting to the Welland Canal.

Stormwater flows within the subject lands are conveyed to the existing 1350mm diameter storm sewers through two outlets:

a) The existing ditch along the northern limit of the site, which outlets through an existing 300mm diameter sewer to Niagara Street (Outlet A).

b) The existing watercourse which runs through the western portion of the 698 Niagara Street property and outlets through an existing 450mm diameter storm sewer to Niagara Street (Outlet B).

As shown in the Existing Overall Storm Drainage Area Plan (Figure 1) in Appendix B the existing site is comprised of two single family dwellings with stormwater flows being conveyed to the watercourse at the western portion of the subject lands and ultimately to the existing 1350mm diameter storm sewer on Regional Road 50 (Niagara Street).

Drainage Area EX1 drains overland westerly to Outlet A located at the northwest portion of the site. Drainage Area EX2 flows westerly overland to the existing watercourse at the western limits of the site at Outlet B.

Proposed Conditions

It is proposed to collect future stormwater flows through an onsite storm sewer system and discharge to the existing storm sewers on Regional Road 50 (Niagara Street). Figure 2 (Appendix B) outlines the Future Overall Storm Drainage Area Plan for the proposed building.

Drainage Area A10 represents flows that will continue to outlet to the existing 1350mm diameter storm sewer unrestricted at Outlet A through the existing 300mm diameter pipe at the northwest limits of the property. Drainage Area A10 will consist of landscaped area and therefore, was assigned a runoff coefficient of 0.25.

Drainage Area A20 represents the lands that will discharge stormwater flows into the on-site storm sewer system that will outlet to the existing 1350mm diameter storm sewer at Outlet B. Drainage Area A20 will consist of an apartment building and parking lot and therefore was assigned a runoff coefficient of 0.70.

The proposed stormwater management plan for this site will restrict peak flows to the existing peak flows at Outlets A and B.

Quantity Controls

Using Modified Rational Method, the existing and allowable peak stormwater flow rates have been determined for the proposed development during the 5 and 100 year design storm event using the City of Welland IDF curves. All Modified Rational Method calculations have been included in Appendix C.

Table 1. Existing and Future Peak Flow Comparison

Design Storm	Peak Flow (m^3/s)		
	Existing	Future*	Change
Outlet A (Existing 300mm Diameter Sewer)			
5 Year	0.013	0.006	-53.8%
100 Year	0.021	0.009	-57.1%
Outlet B (Existing 450mm Diameter Sewer)			
5 Year	0.064	0.122	+90.6%
100 Year	0.102	0.192	+88.2%
Note: * Represents future stormwater conditions without stormwater quantity controls			

As outlined in Table 1 above, the total peak stormwater flows from the proposed site discharging to Outlet A at the northwest corner of the site are less then existing. Therefore, no stormwater quantity controls are required at Outlet A. The total peak stormwater flows from the proposed site discharging to the existing watercourse that crosses through the subject lands (Outlet B) are greater then existing. Therefore, quantity controls are required at Outlet B.

The proposed quantity controls will control future stormwater flows from Drainage Area A20 such that the future peak flow at Outlet B is below existing levels.

Table 2. Required Stormwater Storage (Drainage Area A20)

Design Storm Event	Maximum Allowable Outflow (L/s)	Minimum Required Storage (m^3)
5 Year	64.4	22.6
100 Year	101.7	31.6

As summarized in Table 2 above, in order to reduce future peak flows at Outlet B to existing conditions for the 5 year storm event a minimum of 22.6 m^3 of storage will be required. In order to reduce future peak flows at Outlet B to existing conditions for the 100 year storm event a minimum of 31.6 m^3 of storage will be required. A 1050mm diameter storm sewer that extends for 31.0m can provide the required stormwater storage, to control stormwater flows to allowable levels for the 5 and 100 year storm events.

Existing Watercourse

As stated previously, there is an existing watercourse that extends through the western portion of the subject lands flowing northerly and outlets to the 1350mm diameter storm sewers on Regional Road 50 (Niagara Street) through a 450mm diameter sewer located at the northwest limits of 694 Niagara Street.

It is proposed to entomb the watercourse within the subject lands, through a pipe that will extend from the south property limits where the watercourse enters the subject lands and outlet to the existing 450mm diameter pipe at the northwest limits of 694 Niagara Street.

Quality Controls

The subject lands will discharge stormwater flows to the existing storm sewer on Regional Road 50 (Niagara Street) where stormwater improvements will be required to MECP Enhanced Levels (80% TSS Removal). To improve stormwater quality levels to 80% TSS Removal prior to discharging from the site, an oil/grit separator is proposed. The contributing Drainage Area to the proposed oil/grit separator is approximately 0.69 hectares with a conservatively assumed impervious coverage of 72% (R=0.70). The modelling for a Hydroworks unit has indicated that an HD6 will provide 80.4% TSS removal and capture 99.8% of the stormwater flows. Therefore, the Hydroworks HD6 is proposed for this site development. Output calculations for the quality assessment can be found in Appendix D.

MAINTENANCE OF STORMWATER MANAGEMENT FACILITY

HD6 Oil/Grit Separator

The HD 6 oil/grit separator, will require maintenance on an annual basis. The following is a summary of the maintenance activities required.

Regular inspections of the stormwater Maintenance Hole (MH) oil/grit interceptor will indicate whether maintenance is required or not. They should be made after every significant storm during the first two years of operation to ensure that it is functioning properly. This will translate into an average of six inspections per year.

Points of regular inspections are as follows:

a) Is there sediment in the separator sump? The level of sediment can be measured from the surface without entry into the oil/grit separator via a dipstick tube equipped with a ball valve (Sludge Judge) or with a graduated pole with a flat plate attached to the bottom.

b) Is there oil in the separator sump? This can be checked from the surface by inserting a dipstick in the 150mm vent tube. The presence of oil is usually indicated by an oily sheen, frothing or unusual colouring. The separator should be cleaned in the event of a major spill contamination.

c) Is there debris or trash at the inlet weir and drop pipe? This can be observed from the surface without entry into the separator. Clogging at the inlet drop pipe will cause stormwater to bypass the sedimentation section and continue downstream without treatment.

d) Completion of the Inspection Report (a sample report is included in Appendix E for reference purposes). These reports will provide details about the operation and maintenance requirements for this type of stormwater quality device. After an evaluation period (usually 2 years) this information will be used to maximize efficiency and minimize the costs of operation and maintenance for the maintenance hole oil/grit separator.

Typically, stormwater MH oil/grit separators are cleaned out using vacuum pumping. No entry into the unit is required for maintenance. Cleaning should occur annually or whenever the accumulation reaches sediment storage specified by the manufacturer and after any major spills have occurred. Oil levels greater than 2.5 centimeters should be removed immediately by a licensed waste management firm.

Generally, the sediment removed from the separator will not be contaminated to the point that it would be classified as hazardous waste. However, the sediment should be tested to determine the disposal options. The Ministry of Environment, Conservation and Parks publishes sediment disposal guidelines which should be consulted for up-to-date information pertaining to the exact parameters and acceptable levels for the various disposal options. The preferred option is an off-site disposal, arranged by a licensed waste management firm.

The future owners of a Hydroworks facility are provided with an Owner's Manual upon installation, which explains the function, maintenance requirements and procedures for the facility with extensive use It is recommended to follow the manufacturers instructions to allow the oil/grit separator to perform as intended.

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CONCLUSIONS AND RECOMMENDATIONS

Therefore, based on the above comments and design calculations provided for this site, the following summarizes the servicing for this site:

1. The existing 150mm diameter municipal watermain is expected to have adequate capacity to provide both domestic and fire protection water supply for the subject lands.

2. The existing 250mm diameter municipal sanitary sewer on Regional Road 50 (Niagara Street) is expected to have adequate capacity for the proposed building.

3. The existing 250mm diameter sanitary sewer within the easement on the subject lands has adequate capacity to receive future sanitary flows from the subject lands.

4. Quantity controls will be provided by the on-site storm sewer system, and will control the 5 and 100 year storm events to existing levels.

5. Quality controls will be provided by a Hydroworks Oil/Grit separator to MECP Enhanced protection (80% TSS Removal)

6. The existing watercourse that traverses the subject lands will be entombed through proposed sewers that will outlet to the existing 450mm diameter pipe located at the northwest corner of 694 Niagara Street.

Based on the above and the accompanying calculations, there exists adequate municipal infrastructure for this development. We trust the above comments and enclosed calculations are satisfactory for approval. If you have any questions or require additional information, please do not hesitate to contact our office.

Prepared By:

Zach Barber, E.I.T.
October 24, 2025

Reviewed By:

Brendan Kapteyn, P.Eng.
October 24, 2025

Encl.

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APPENDICES

UPPER CANADA CONSULTANTS
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APPENDIX A

Sanitary Sewer Calculations

UPPER CANADA CONSULTANTS
30 HANNOVER DRIVE, UNIT 3
ST.CATHARINES, ON, L2W 1A3

DESIGN FLOWS

RESIDENTIAL: 255 LITRES/PERSON/DAY
INFILTRATION RATE: 0.286 LITRES/HECTARE (MECP FLOW ALLOWANCE)
POPULATION / UNIT: 2.4 PERSONS (SINGLE FAMILY RESIDENTIAL)
1.7 PERSONS (APARTMENT)

SEWER DESIGN

PIPE ROUGHNESS: 0.013 FOR MANNING'S EQUATION
PIPE SIZES: 1.016 IMPERIAL EQUIVALENT FACTOR
PERCENT FULL: TOTAL PEAK FLOW / CAPACITY

MUNICIPALITY: CITY OF WELLAND
PROJECT : 694 AND 698 NIAGARA STREET
PROJECT NO: 25031

SANITARY SEWER DESIGN SHEET

Peaking Factor= $M = 1 + \frac{14}{4 + P^{0.5}}$ Where P = design population in thousands

LOCATION			AREA					ACCUMULATED PEAK FLOW				DESIGN FLOW					
Description	From M.H	To M.H.	Increment (hectares)	Accumulated (hectares)	Population Increment	Total # of Units	Total Population Served (P)	Peaking Factor (PF)	Flow (L/s)	Infiltration Flow L/s	Total Peak Flow (L/s)	Pipe Length (m)	Pipe Diameter (mm)	Pipe Slope (%)	Full Flow Velocity (m/s)	Full Flow Capacity (L/s)	Percent Full
EXISTING BUILDINGS																	
EXISTING SINGLE FAMILY RESIDENTIAL DWELLINGS	TO NIAGARA STREET SAN SEWER		0.78	0.78	2.4	2	5	4.44	0.06	0.22	**0.29**	14.7	250	0.30	0.7	33.98	0.8%
PROPOSED BUILDING																	
TOTAL FLOW FROM PROP BUILDING	STUB	EX SAN MH	0.78	0.78	1.7	217	369	4.50	4.90	0.22	**5.12**	14.7	250	0.30	0.7	33.98	15.1%
CHANGE IN FLOW EX TO PROP	EX SAN MH	EX SAN MH									**4.84**	11.7	250	0.30	0.7	33.98	14.2%

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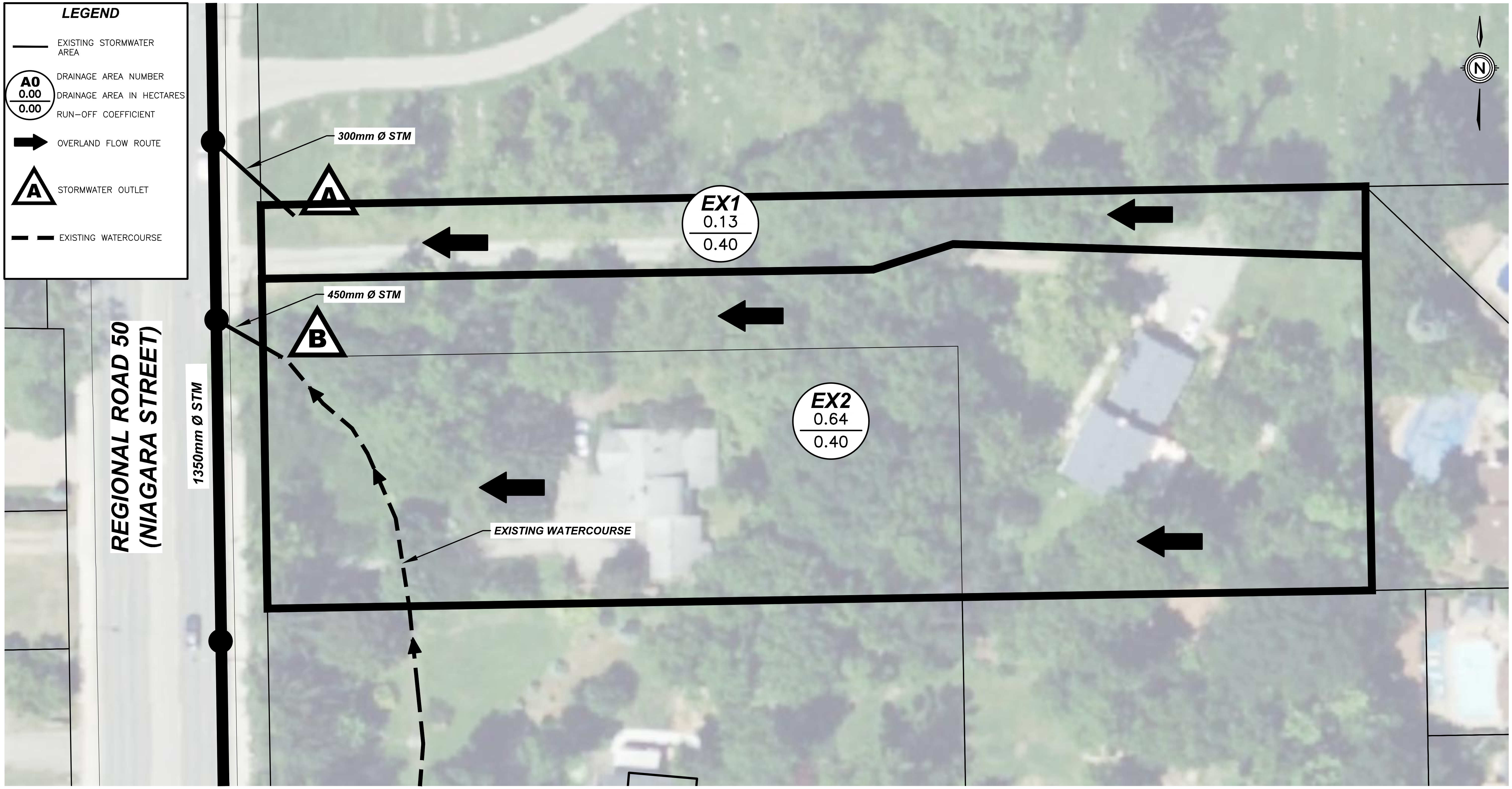
APPENDIX B

Existing Storm Drainage Area Plan

Future Storm Drainage Area Plan



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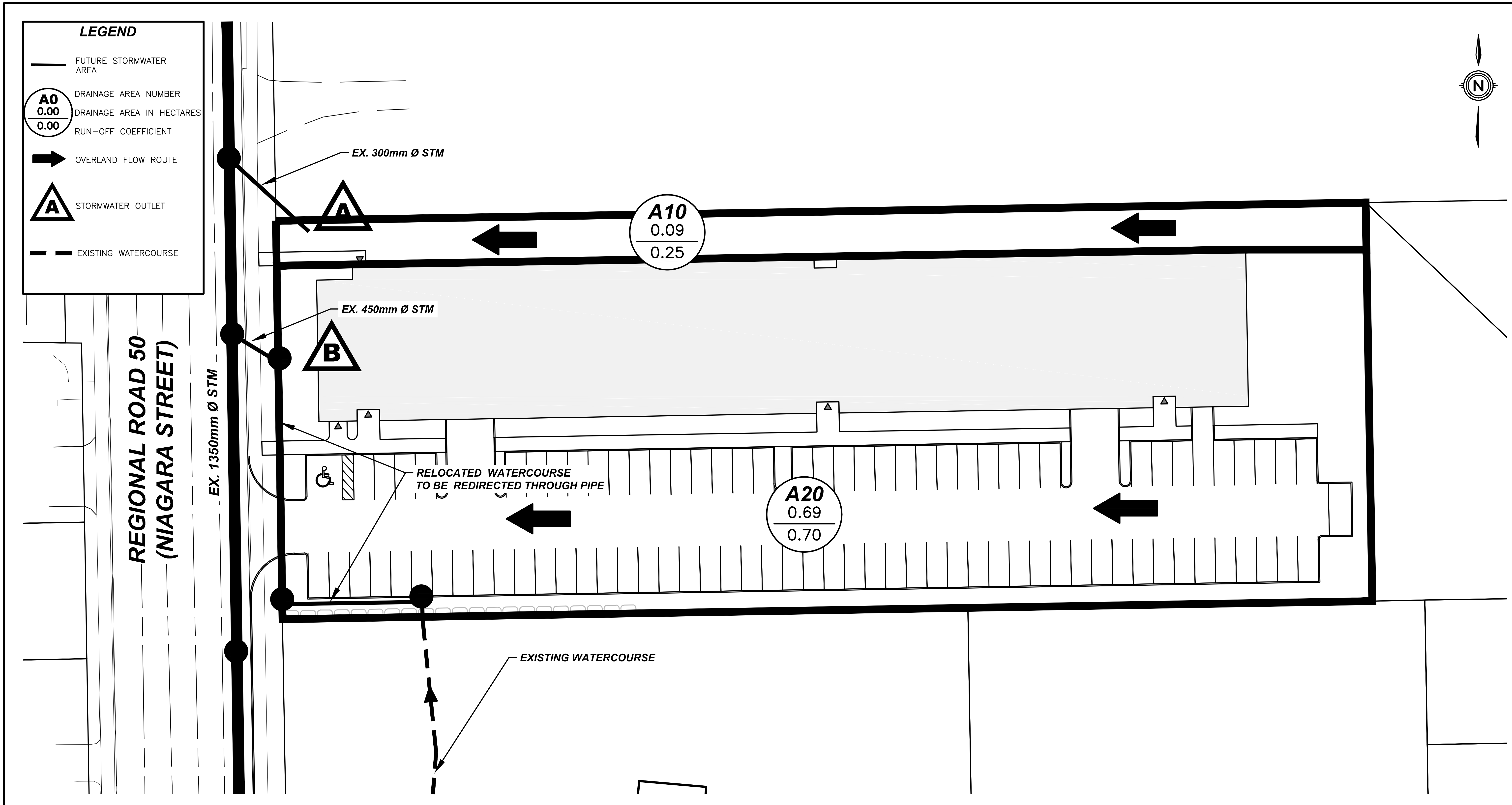
694 AND 698 NIAGARA STREET

CITY OF WELLAND
EXISTING STORM DRAINAGE AREAS

DATE	2025-10-22
SCALE	1:500 m
REF No.	.
DWG No.	25031-FIGURE 1



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694 AND 698 NIAGARA STREET

CITY OF WELLAND

FUTURE STORM DRAINAGE AREAS

DATE	2025-08-28
SCALE	1:500 m
REF No.	.
DWG No.	25031-FIGURE 2

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APPENDIX C

Modified Rational Method – Peak Stormwater Flows
Modified Rational Method – Storage Calculations

PEAK STORMWATER FLOWS

PROJECT: 694 AND 698 NIAGARA STREET, CITY OF WELLAND

LOCATION						TIME OF FLOW		STORMWATER ANALYSIS				
DESCRIPTION	FROM M.H.	TO M.H.	PIPE LENGTH (m)	INCREMENT AREA (hectares)	TOTAL AREA (hectares)	TO UPPER END (min)	IN SECTION (min)	RUNOFF COEFF	SECTION A X R	ACCUMLD A x R	RAINFALL INTENSITY (mm/hr)	PEAK FLOW (L/s)
EXISTING CONDITIONS												
EX1	SITE	OUTLET (A)		0.13	0.13	10.00	0.00	0.400	0.052	0.052	90.598	13.1
EX2	SITE	OUTLET (B)		0.64	0.64	10.00	0.00	0.400	0.256	0.256	90.598	64.4
FUTURE CONDITIONS												
A10 - Uncontrolled	SITE	OUTLET (A)		0.09	0.09	10.00	0.00	0.250	0.023	0.023	90.598	5.7
A20 - Controlled	SITE	OUTLET (B)		0.69	0.69	10.00	0.00	0.700	0.483	0.483	90.598	121.6
ALLOWABLE PEAK OUTFLOW FROM CONTROLLED AREA (A20)												**64.4**

DESIGN BY: **UPPER CANADA CONSULTANTS**
30 HANNOVER DRIVE, UNIT 3
ST. CATHARINES, ON L2W 1A3

DESIGN BY: **Z. BARBER E.I.T.**
DATE: **August-25**

RAINFALL PARAMETERS:

Time to Upper End = 10 min.
City of Welland - 5 Year IDF Curve

a = 830.00 mm/hr
b = 7.30 minutes
c = 0.78

Modified Rational Method (MRM) Required Storage Volume

Project: 694 AND 698 NIAGARA STREET, CITY OF WELLAND
Project No: 25031
Date: AUGUST 2025
Design By: Z. BARBER E.I.T.

Description: STORMWATER MANAGEMENT PLAN

Storm Event: **City of Welland - 5 Year IDF Curve**

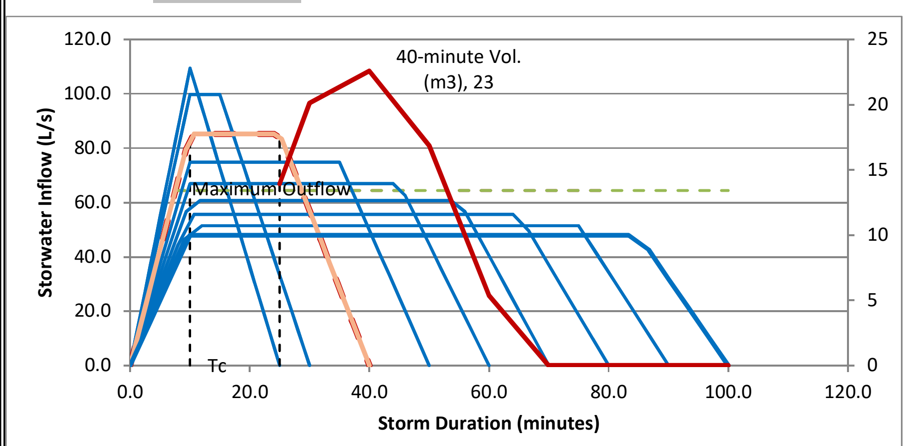
a = 830.00 mm/hr
b = 7.30 minutes
c = 0.78

Critical Storm Duration:	40.00	minutes	Tail Multiplier (x1-1	1.5
Tc From Design:	10.00	minutes		
Storm Tail Time:	25.00	minutes		
Accumulated Area x R (Ha):	0.483	<-- Area x Runoff Coefficient (Sewer Design Sheet)		
Peak Rainfall Intensity:	63.56	mm/hr		
Peak Inflow at Tc:	85.28	L/s		
Maximum Release Rate:	64.42	<-- Outlet Full Flow Capacity (Design Sheet)		
Time When Outlet Exceeded:	7.55			

Time (min)	Intensity (mm/hr)	Inflow (L/s)	Outflow (L/s)	Interval Volume (m3)	Total Required Volume (m3)
0.0	0.00	0.00	64.42	-3.9	0.0
1.3	8.47	11.37	64.42	-4.2	0.0
2.7	16.95	22.74	64.42	-3.3	0.0
4.0	25.42	34.11	64.42	-2.4	0.0
5.3	33.90	45.48	64.42	-1.5	0.0
6.7	42.37	56.85	64.42	-0.6	0.0
8.0	50.85	68.22	64.42	0.3	0.3
9.3	59.32	79.59	64.42	1.2	1.5
10.7	63.56	85.28	64.42	1.7	3.2
12.0	63.56	85.28	64.42	1.7	4.9
13.3	63.56	85.28	64.42	1.7	6.5
14.7	63.56	85.28	64.42	1.7	8.2
16.0	63.56	85.28	64.42	1.7	9.9
17.3	63.56	85.28	64.42	1.7	11.5
18.7	63.56	85.28	64.42	1.7	13.2
20.0	63.56	85.28	64.42	1.7	14.9
21.3	63.56	85.28	64.42	1.7	16.5
22.7	63.56	85.28	64.42	1.7	18.2
24.0	63.56	85.28	64.42	1.7	19.9
25.3	62.15	83.38	64.42	1.5	21.4
26.7	56.50	75.80	64.42	0.9	22.3
28.0	50.85	68.22	64.42	0.3	***22.6***
29.3	45.20	60.64	64.42	-0.3	22.3
30.7	39.55	53.06	64.42	-0.9	21.4
32.0	33.90	45.48	64.42	-1.5	19.9
33.3	28.25	37.90	64.42	-2.1	17.7
34.7	22.60	30.32	64.42	-2.7	15.0
36.0	16.95	22.74	64.42	-3.3	11.7
37.3	11.30	15.16	64.42	-3.9	7.7
38.7	5.65	7.58	64.42	-4.5	3.2
40.0	0.00	0.00	64.42	-5.2	0.0

Variable Storm Duration Storage Requirements

Duration	*Max Storage*	*Duration*	*Max Storage*	*Duration*	*Max Storage*
25 Min	13.9 m3	50 Min	16.9 m3	80 Min	0.0 m3
30 Min	20.1 m3	60 Min	5.4 m3	90 Min	0.0 m3
40 Min	**22.6 m3**	70 Min	0.0 m3	100 Min	0.0 m3



PEAK STORMWATER FLOWS

PROJECT: 694 AND 698 NIAGARA STREET, CITY OF WELLAND

LOCATION						TIME OF FLOW		STORMWATER ANALYSIS				
DESCRIPTION	FROM M.H.	TO M.H.	PIPE LENGTH (m)	INCREMENT AREA (hectares)	TOTAL AREA (hectares)	TO UPPER END (min)	IN SECTION (min)	RUNOFF COEFF	SECTION A X R	ACCUMLD A x R	RAINFALL INTENSITY (mm/hr)	PEAK FLOW (L/s)
EXISTING CONDITIONS												
EX1	SITE	OUTLET (A)		0.13	0.13	10.00	0.00	0.400	0.052	0.052	142.985	20.7
EX2	SITE	OUTLET (B)		0.64	0.64	10.00	0.00	0.400	0.256	0.256	142.985	101.7
FUTURE CONDITIONS												
A10 - Uncontrolled	SITE	OUTLET (A)		0.09	0.09	10.00	0.00	0.250	0.023	0.023	142.985	8.9
A20 - Controlled	SITE	OUTLET (B)		0.69	0.69	10.00	0.00	0.700	0.483	0.483	142.985	191.8
ALLOWABLE PEAK OUTFLOW FROM CONTROLLED AREA (A20)												**101.7**

DESIGN BY: **UPPER CANADA CONSULTANTS**
30 HANNOVER DRIVE, UNIT 3
ST. CATHARINES, ON L2W 1A3

DESIGN BY: **Z. BARBER E.I.T.**
DATE: **August-25**

RAINFALL PARAMETERS:

Time to Upper End = 10 min.
City of Welland - 100 Year IDF Curve

a = 1020.00 mm/hr
b = 4.70 minutes
c = 0.73

Modified Rational Method (MRM) Required Storage Volume

Project:	694 AND 698 NIAGARA STREET, CITY OF WELLAND
Project No:	25031
Date:	AUGUST 2025
Design By:	Z. BARBER E.I.T.
Description:	STORMWATER MANAGEMENT PLAN

Storm Event: **City of Welland - 100 Year IDF Curve**

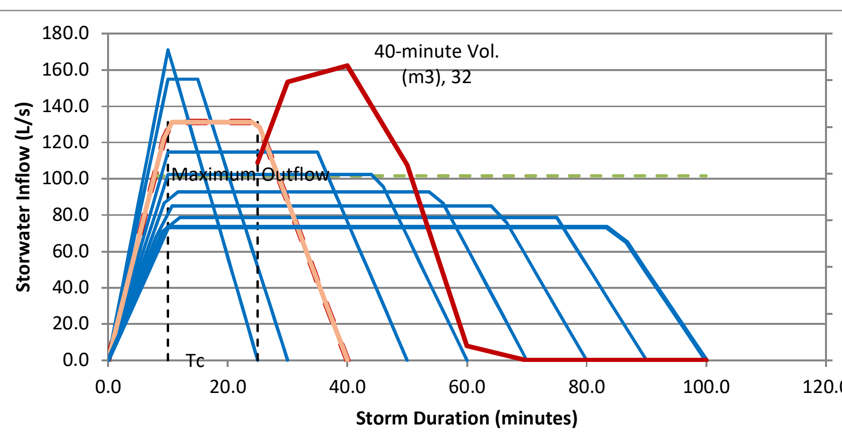
a =	1020.00	mm/hr
b =	4.70	minutes
c =	0.73	

Critical Storm Duration:	40.00	minutes Tail Multiplier (x1-1 1.5
Tc From Design:	10.00	minutes
Storm Tail Time:	25.00	minutes
Accumulated Area x R (Ha):	0.483	<-- Area x Runoff Coefficient (Sewer Design Sheet)
Peak Rainfall Intensity:	97.85	mm/hr
Peak Inflow at Tc:	131.28	L/s
Maximum Release Rate:	101.68	<-- Outlet Full Flow Capacity (Design Sheet)
Time When Outlet Exceeded:	7.75	

Time (min)	Intensity (mm/hr)	Inflow (L/s)	Outflow (L/s)	Interval Volume (m3)	Total Required Volume (m3)
0.0	0.00	0.00	101.68	-6.1	0.0
1.3	13.05	17.50	101.68	-6.7	0.0
2.7	26.09	35.01	101.68	-5.3	0.0
4.0	39.14	52.51	101.68	-3.9	0.0
5.3	52.18	70.01	101.68	-2.5	0.0
6.7	65.23	87.52	101.68	-1.1	0.0
8.0	78.28	105.02	101.68	0.3	0.3
9.3	91.32	122.52	101.68	1.7	1.9
10.7	97.85	131.28	101.68	2.4	4.3
12.0	97.85	131.28	101.68	2.4	6.7
13.3	97.85	131.28	101.68	2.4	9.0
14.7	97.85	131.28	101.68	2.4	11.4
16.0	97.85	131.28	101.68	2.4	13.8
17.3	97.85	131.28	101.68	2.4	16.1
18.7	97.85	131.28	101.68	2.4	18.5
20.0	97.85	131.28	101.68	2.4	20.9
21.3	97.85	131.28	101.68	2.4	23.2
22.7	97.85	131.28	101.68	2.4	25.6
24.0	97.85	131.28	101.68	2.4	28.0
25.3	95.67	128.36	101.68	2.1	30.1
26.7	86.97	116.69	101.68	1.2	31.3
28.0	78.28	105.02	101.68	0.3	***31.6***
29.3	69.58	93.35	101.68	-0.7	30.9
30.7	60.88	81.68	101.68	-1.6	29.3
32.0	52.18	70.01	101.68	-2.5	26.8
33.3	43.49	58.34	101.68	-3.5	23.3
34.7	34.79	46.68	101.68	-4.4	18.9
36.0	26.09	35.01	101.68	-5.3	13.6
37.3	17.39	23.34	101.68	-6.3	7.3
38.7	8.70	11.67	101.68	-7.2	0.1
40.0	0.00	0.00	101.68	-8.1	0.0

Variable Storm Duration Storage Requirements

Duration	*Max Storage*	*Duration*	*Max Storage*	*Duration*	*Max Storage*
25 Min	21.2 m3	50 Min	20.9 m3	80 Min	0.0 m3
30 Min	29.8 m3	60 Min	1.5 m3	90 Min	0.0 m3
40 Min	**31.6 m3**	70 Min	0.0 m3	100 Min	0.0 m3



UPPER CANADA CONSULTANTS
ENGINEERS / PLANNERS

APPENDIX D

Hydroworks Modelling Output

UPPER CANADA CONSULTANTS
ENGINEERS / PLANNERS

```
**************************************************
*      Storm Water Management Sizing Model       *
*               Hydroworks, LLC                  *
*                Version 4.4                     *
*        Continuous Simulation Program           *
*              Based on SWMM 4.4H                *
*              Hydroworks, LLC                   *
*               Graham Bryant                    *
*                2003 - 2021                     *
**************************************************
                Developed by
**************************************************
*               Hydroworks, LLC                  *
*             Metcalf & Eddy, Inc.               *
*            University of Florida               *
*       Water Resources Engineers, Inc.          *
*      (Now Camp Dresser & McKee, Inc.)          *
*              Modified SWMM 4.4                 *
**************************************************
          Distributed and Maintained by
**************************************************
*                Hydroworks, LLC                 *
*                 888-290-7900                   *
*              www.hydroworks.com                *
**************************************************
**************************************************
*     If any problems occur executing this       *
*     model, contact Mr. Graham Bryant at        *
*     Hydroworks, LLC by phone at 888-290-7900   *
*     or by e-mail: support@hydroworks.com       *
**************************************************
**************************************************
*     This model is based on EPA SWMM 4.4        *
*  "Nature is full of infinite causes which      *
*   have never occurred in experience" da Vinci *
**************************************************
****************************************************
* Entry made to the Rain Block                     *
* Created by the University of Florida - 1988      *
* Updated by Oregon State University, March 2000  *
****************************************************
694 AND 698 NIAGARA STREET
CITY OF WELLAND
HydroDome Simulation
    ########################################
    #  Precipitation Block Input Commands  #
    ########################################
   Station Name.........................  St. Catherines A
   Station Location.....................  Ontario
   Station, ISTA........................    7287
   Beginning date, IYBEG (Yr/Mo/Dy)......  1971/ 1/ 1
   Ending date, IYEND (Yr/Mo/Dy).........  2005/12/31
   Minimum interevent time, MIT..........     1
   Number of ranked storms, NPTS.........    10
   NWS format, IFORM (See text)..........     1
   Print storm summary, ISUM (O-No 1-Yes)     0
   Print all rainfall, IYEAR (O-No 1-Yes)     0
   Save storm event data on NSCRAT(1)....     0
   (IFILE =0 -Do not save, =1 -Save data)
   IDECID 0 - Create interface file
          1 - Create file and analyze
          2 - Synoptic analysis..........     2
   Plotting position parameter, A........  0.40
   Storm event statistics, NOSTAT........  1100
   KODEA (from optional group B0)........     2
    = 0, Do not include NCDC cumulative values.
    = 1, Average NCDC cumulative values.
    = 2, Use NCDC cumulative value as inst. rain.
   KODEPR (from optional group B0).......     0
    Print NCDC special codes in event summary:
    = 0, only on days with events.
    = 1, on all days with codes present.
    Codes: A = accumulated value, I = incomplete value,
           M = missing value,     O = other code present
********************************************************
*  Precipitation output created using the Rain block   *
*  Number of precipitation stations...        1        *
********************************************************
Location Station Number
-------- --------------
      1.     7287
```

UPPER CANADA CONSULTANTS
ENGINEERS / PLANNERS

```
STATION ID ON PRECIP. DATA INPUT FILE = 7287
REQUESTED STATION ID =     7287  CHECK TO BE SURE THEY MATCH.
$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$
Note, 15-min. data are being processed, but hourly
print-out, summaries, and statistics are based on
hourly totals only.  Data placed on interface file
are at correct 15-min. intervals.
$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$
###################################################
# Entry made to the Runoff Block, last updated by #
# Oregon State University, and Camp, Dresser and  #
# McKee, Inc., March 2002.                        #
###################################################
# "And wherever water goes, amoebae go along for  #
#  the ride"                       Tom Robbins     #
###################################################
                   694 AND 698 NIAGARA STREET
                   CITY OF WELLAND

Snowmelt parameter - ISNOW......................          0
Number of rain gages - NRGAG....................          1
Horton infiltration equation used - INFILM.......         2
Maximum infiltration volume is limited to RMAXINF input on  subcatchment lines.
Infiltration volume regenerates during  non rainfall periods.
Quality is simulated - KWALTY...................          1
IVAP is negative.  Evaporation will be set to zero
    during time steps with rainfall.
Read evaporation data on line(s) F1 (F2) - IVAP..         1
Hour of day at start of storm - NHR.............          1
Minute of hour at start of storm - NMN..........          1
Time TZERO at start of storm (hours)............      1.017
Use Metric units for I/O - METRIC...............          1
 ===> Ft-sec units used in all internal computations
Runoff input print control...                             0
Runoff graph plot control....                             1
Runoff output print control..                             0
Print headers every 50 lines - NOHEAD (0=yes, 1=no)       0
Print land use load percentages -LANDUPR (0=no, 1=yes)     0
Limit number of groundwater convergence messages to 10000 (if simulated)
Month, day, year of start of storm is:             1/ 1/1971
Wet time step length (seconds).......                 300.
Dry time step length (seconds).......                 900.
Wet/Dry time step length (seconds)...                 450.
Simulation length is......                       20051231.0 Yr/Mo/Dy
Percent of impervious area with zero detention depth    25.0
Horton infiltration model being used
Rate for regeneration of infiltration = REGEN * DECAY
DECAY is read in for each subcatchment
REGEN = .........................................  0.01000
********************************************************
*   Processed Precipitation will be read from file     *
********************************************************
  ############################
  #        Data Group F1      #
  # Evaporation Rate (mm/day) #
  ############################

 JAN.  FEB.  MAR.  APR.  MAY   JUN.  JUL.  AUG.  SEP.  OCT.  NOV.  DEC.
 ----  ----  ----  ----  ----  ----  ----  ----  ----  ----  ----  ----
 0.00  0.00  0.00  2.54  2.54  3.81  3.81  3.81  2.54  2.54  0.00  0.00
*********************************************************
*        C H A N N E L   A N D   P I P E   D A T A      *
*********************************************************
Input   NAMEG:     Drains                          Invert  L Side   R Side  Intial     Max  Mann-    Full
equen  Channel       to     Channel  Width  Length   Slope   Slope    Slope   Depth   Depth   ings    Flow
umber    ID #      NGTO:    Type     (m)    (m)     (m/m)   (m/m)    (m/m)     (m)     (m)    "N"   (cms)
-----  ------------------ -------- ------ -------  ------- -------- ------- ------- ------- -----  -----
  1        201        200  Dummy      0.0      0.0    0.0000   0.0000  0.0000     0.0     0.0  0.0000 0.00E+00
 ***************************************************
 *         S U B C A T C H M E N T   D A T A       *
 ***************************************************
*NOTE. SEE LATER TABLE FOR OPTIONAL SUBCATCHMENT PARAMETERS*
      SUBCATCH-  CHANNEL      WIDTH     AREA  PERCENT     SLOPE    RESISTANCE  FACTOR    DEPRES. STORAGE(MM) INFILTRATION    DECAY RATE GAGE
MAXIMUM
       MENT NO.  OR INLET       (M)      (HA)  IMPERV.     (M/M)      IMPERV.     PERV.   IMPERV.    PERV.      RATE(MM/HR)     (1/SEC)    NO.
VOLUME
                                                                                                            MAXIMUM MINIMUM
 (MM)
 ---  --------   -------- --------- --------  -----   -------    -------  --------    ------    ------    ----  -------  -------  ------
-------
  1        300        200     83.07     0.69  72.00    0.0200      0.015     0.250     0.510     5.080    63.50   10.16    0.00055     1
101.60000
```

```
TOTAL NUMBER OF SUBCATCHMENTS...            1
TOTAL TRIBUTARY AREA (HECTARES).         0.69
IMPERVIOUS AREA (HECTARES)......         0.50
PERVIOUS AREA (HECTARES)........         0.19
TOTAL WIDTH (METERS)............        83.07
PERCENT IMPERVIOUSNESS..........        72.00
********************************************************
*      U P S T R E A M   S T O R A G E   D A T A       *
********************************************************
     Storage        Flow
      (m3)         (m3/s)

         0.        0.000
        23.       64.420
********************************************************
*      G R O U N D W A T E R   I N P U T   D A T A     *
********************************************************

    SUB-     CHANNEL     ========== E L E V A T I O N S ========  =========== F L O W   C O N S T A N T S ============
    CATCH       OR       GROUND  BOTTOM   STAGE     BC      TW       A1         B1         A2          B2         A3
    NUMBER    INLET        (M)     (M)      (M)     (M)      (M)  (MM/HR-M^B1)        (MM/HR-M^B2)          (MM/HR-M^2)
    ------    -----      -------  ------  ------  ------  ------ -----------  ------- -----------  ------- -----------
         0      602        3.05    0.00    0.00    0.61    0.61   3.484E-04    2.600   0.000E+00    1.000    0.00E+00
***********************************************************
* G R O U N D W A T E R   I N P U T   D A T A (CONTINUED) *
***********************************************************
               S O I L   P R O P E R T I E S
                       SATURATED                                             PERCOLATION     E T  P A R A M E T E R S
       SUBCAT.           HYDRAULIC  WILTING  FIELD   INITIAL    MAX. DEEP   PARAMETERS          DEPTH  FRACTION OF ET
       NO.    POROSITY CONDUCTIVITY  POINT  CAPACITY MOISTURE  PERCOLATION   HCO     PCO        OF ET  TO UPPER ZONE
                         (mm/hr)                                (mm/hr)                           (m)
      ----   ------     -------     ------  ------   ------    ----------  ------  ------      ------      ------
         0    .4000     127.000     .1500   .3000    .3000     5.080E-02   10.00    4.57        4.27       0.350
*********************************************************
*    Arrangement of Subcatchments and Channel/Pipes     *
*********************************************************
* See second subcatchment output table for connectivity *
* of subcatchment to subcatchment flows.                *
*********************************************************
   Channel
   or Pipe
       201      No Tributary Channel/Pipes
                No Tributary Subareas.....

    INLET
       200      Tributary Channel/Pipes...        201
                Tributary Subareas........        300
***********************************************************
* Hydrographs will be stored for the following   1 INLETS *
***********************************************************
           200
###################################################
#              Quality Simulation                 #
###################################################
#      General Quality Control Data Groups        #
###################################################
 Description                            Variable       Value
 -----------                            --------       -----
 Number of quality constituents.....    NQS.......         1
 Number of land uses................  JLAND.......         1
 Standard catchbasin volume.........  CBVOL.......      1.22 cubic meters
 Erosion is not simulated.........    IROS........         0
 DRY DAYS PRIOR TO START OF STORM... DRYDAY.......      3.00 DAYS
 DRY DAYS REQUIRED TO RECHARGE
 CATCHBASIN CONCENTRATION TO
 INITIAL VALUES..................... DRYBSN.......      5.00 DAYS
 DUST AND DIRT
 STREET SWEEPING EFFICIENCY......... REFFDD.......     0.300
 DAY OF YEAR ON WHICH STREET
 SWEEPING BEGINS.................... KLNBGN.......       120
 DAY OF YEAR ON WHICH STREET
 SWEEPING ENDS...................... KLNEND.......       270
###########################################
#     Land use data on data group J2      #
###########################################
                                                             LIMITING                         CLEANING  AVAIL.    DAYS SINCE
                                                             BUILDUP    BUILDUP  BUILDUP      INTERVAL  FACTOR       LAST
AND USE   BUILDUP EQUATION TYPE    FUNCTIONAL DEPENDENCE OF  QUANTITY   POWER    COEFF.       IN DAYS   FRACTION   SWEEPING
LNAME)            (METHOD)         BUILDUP PARAMETER(JACGUT) (DDLIM)    (DDPOW)  (DDFACT)     (CLFREQ)  (AVSWP)     (DSLCL)
-------   ---------------------    ------------------------  --------   -------  --------     --------  -------    ---------
Urban De  EXPONENTIAL(1)                   AREA(1)          2.802E+01     0.500    67.250      30.000     0.300     30.000
```

```
##############################################
#    Constituent data on data group J3      #
##############################################
                               Total Su
                               --------
Constituent units........      mg/l
Type of units............           0
KALC.....................           2
Type of buildup calc.....    EXPONENTIAL(2)
KWASH....................           0
Type of washoff calc.....  POWER EXPONEN.(0)
KACGUT...................           1
Dependence of buildup....          AREA(1)
LINKUP...................           0
Linkage to snowmelt......   NO SNOW LINKAGE
Buildup param 1 (QFACT1).          28.020
Buildup param 2 (QFACT2).           0.500
Buildup param 3 (QFACT3).          67.250
Buildup param 4 (QFACT4).           0.000
Buildup param 5 (QFACT5).           0.000
Washoff power (WASHPO)...           1.100
Washoff coef. (RCOEF)....           0.086
Init catchb conc (CBFACT)         100.000
Precip. conc. (CONCRN)...           0.000
Street sweep effic (REFF)           0.300
Remove fraction (REMOVE).           0.000
1st order QDECAY, 1/day..           0.000
Land use number..........               1
*************************************************
* Constant Groundwater Quality Concentration(s) *
*************************************************
 Total Susp has a concentration of..    0.0000   mg/l
************************************************
* REMOVAL FRACTIONS FOR SELECTED CHANNEL/PIPES *
* FROM J7 LINES                                *
************************************************
  CHANNEL/   CONSTITUENT
     PIPE Total Susp
----------  --------
       201     0.000
*****************************************************
*     Subcatchment surface quality on data group L1 *
*****************************************************
                                Total   Number   Input
                         Land   Gutter    of    Loading
                Land     Use    Length   Catch-  load/ha
           No.  Usage    No.      Km     Basins   Total Su
       ------ --------  ----   -------- --------  -------
   1        300 Urban De  1         0.17      2.00  0.0E+00
   Totals (Loads in kg or other)    0.17      2.00  0.0E+00
    ***********************
    *    DATA GROUP M1    *
    ***********************
TOTAL NUMBER OF PRINTED GUTTERS/INLETS...NPRNT..        1
NUMBER OF TIME STEPS BETWEEN PRINTINGS..INTERV..        0
STARTING AND STOPPING PRINTOUT DATES............        0        0
    ***********************
    *    DATA GROUP M3    *
    ***********************
CHANNEL/INLET PRINT DATA GROUPS......       -200
          ******************************************
          * Rainfall from Nat. Weather Serv. file  *
          * in units of hundredths of an inch      *
          ******************************************
         694 AND 698 NIAGARA STREET
         CITY OF WELLAND
Rainfall Station    St. Catherines A
State/Province      Ontario
Rainfall Depth Summary (mm)
```

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
1971.	31.	0.	0.	0.	0.	0.	126.	93.	52.	60.	29.	0.	391.
1972.	0.	0.	0.	47.	65.	100.	39.	115.	63.	90.	1.	0.	521.
1973.	0.	0.	0.	103.	77.	71.	53.	29.	63.	139.	0.	0.	534.
1974.	0.	0.	0.	67.	105.	62.	50.	31.	74.	37.	110.	0.	536.
1975.	0.	0.	0.	0.	0.	94.	78.	76.	73.	56.	59.	6.	442.
1976.	0.	0.	0.	119.	136.	87.	101.	60.	72.	73.	13.	1.	662.
1977.	0.	0.	0.	94.	29.	69.	57.	150.	230.	71.	0.	1.	701.
1978.	0.	0.	0.	72.	43.	72.	43.	86.	156.	95.	0.	0.	567.
1979.	0.	0.	0.	84.	92.	33.	91.	88.	84.	129.	71.	0.	673.
1980.	0.	0.	0.	81.	39.	122.	60.	32.	79.	96.	45.	0.	554.
1981.	0.	0.	0.	91.	71.	106.	122.	61.	123.	91.	84.	0.	749.
1982.	0.	0.	0.	28.	65.	97.	36.	66.	82.	25.	143.	0.	544.

1983.	0.	0.	0.	78.	100.	65.	55.	106.	75.	122.	92.	0.	694.
1984.	0.	0.	0.	31.	113.	136.	19.	51.	144.	24.	44.	0.	562.
1985.	0.	0.	67.	32.	52.	64.	40.	94.	42.	109.	0.	1.	501.
1986.	0.	0.	0.	93.	113.	60.	85.	83.	98.	80.	43.	65.	719.
1987.	0.	2.	11.	77.	42.	80.	122.	97.	99.	71.	94.	34.	730.
1988.	0.	0.	41.	71.	42.	21.	110.	82.	70.	68.	75.	5.	585.
1989.	0.	0.	13.	63.	137.	108.	36.	45.	89.	73.	84.	0.	647.
1990.	0.	2.	38.	99.	124.	44.	68.	95.	56.	112.	96.	0.	735.
1991.	0.	0.	86.	124.	67.	31.	85.	57.	79.	64.	61.	28.	682.
1992.	0.	0.	29.	127.	56.	92.	185.	116.	77.	47.	103.	38.	869.
1993.	3.	0.	7.	83.	56.	86.	32.	61.	71.	92.	80.	38.	610.
1994.	0.	0.	44.	88.	105.	124.	48.	77.	117.	15.	0.	15.	633.
1995.	112.	23.	16.	48.	37.	60.	123.	66.	8.	137.	94.	0.	724.
1998.	0.	0.	0.	0.	51.	54.	64.	29.	9.	0.	1.	0.	207.
1999.	0.	0.	0.	79.	59.	35.	61.	58.	116.	78.	0.	0.	487.
2000.	0.	0.	0.	123.	134.	216.	51.	0.	0.	0.	10.	0.	534.
2001.	0.	0.	0.	56.	88.	45.	25.	30.	81.	129.	0.	0.	454.
2002.	0.	0.	0.	73.	104.	64.	53.	49.	52.	65.	8.	0.	468.
2003.	0.	0.	0.	10.	163.	77.	81.	64.	67.	73.	2.	0.	537.
2004.	0.	0.	0.	131.	126.	99.	115.	40.	88.	17.	0.	0.	616.
2005.	0.	0.	0.	38.	42.	78.	53.	120.	112.	0.	0.	0.	443.

Total Rainfall Depth for Simulation Period 19310. (mm)

Rainfall Intensity Analysis (mm/hr)

(mm/hr)	(#)	(%)	(mm)	(%)
2.50	21481	74.6	6454.	33.4
5.00	3585	12.4	3088.	16.0
7.50	1973	6.8	2886.	14.9
10.00	575	2.0	1233.	6.4
12.50	389	1.4	1070.	5.5
15.00	194	0.7	660.	3.4
17.50	210	0.7	846.	4.4
20.00	66	0.2	306.	1.6
22.50	92	0.3	487.	2.5
25.00	39	0.1	232.	1.2
27.50	37	0.1	246.	1.3
30.00	34	0.1	245.	1.3
32.50	29	0.1	228.	1.2
35.00	5	0.0	42.	0.2
37.50	10	0.0	90.	0.5
40.00	10	0.0	97.	0.5
42.50	12	0.0	124.	0.6
45.00	9	0.0	99.	0.5
47.50	1	0.0	12.	0.1
50.00	3	0.0	37.	0.2
>50.00	49	0.2	829.	4.3

Total # of Intensities 28803

Daily Rainfall Depth Analysis (mm)

(mm)	(#)	(%)	(mm)	(%)
2.50	1077	38.9	1247.	6.5
5.00	507	18.3	1850.	9.6
7.50	326	11.8	2006.	10.4
10.00	226	8.2	1958.	10.1
12.50	150	5.4	1672.	8.7
15.00	111	4.0	1495.	7.7
17.50	100	3.6	1620.	8.4
20.00	67	2.4	1260.	6.5
22.50	45	1.6	958.	5.0
25.00	37	1.3	881.	4.6
27.50	23	0.8	609.	3.2
30.00	20	0.7	575.	3.0
32.50	20	0.7	631.	3.3
35.00	12	0.4	405.	2.1
37.50	8	0.3	290.	1.5
40.00	9	0.3	350.	1.8
42.50	4	0.1	165.	0.9
45.00	4	0.1	173.	0.9
47.50	2	0.1	91.	0.5
50.00	4	0.1	192.	1.0
>50.00	15	0.5	882.	4.6

Total # Days with Rain 2767

```
************************************************
*      End of time step DO-loop in Runoff      *
************************************************
Final Date (Mo/Day/Year)   =                 1/ 1/2006
Total number of time steps =                   2056420
Final Julian Date  =                           2006001
Final time of day  =                                1. seconds.
Final time of day  =                              0.00   hours.
Final running time =                       306816.0000   hours.
Final running time =                        12784.0000    days.
**************************************************
*     Extrapolation Summary for Watersheds       *
```

```
* # Steps ==> Total Number of Extrapolated Steps *
* # Calls ==> Total Number of OVERLND Calls      *
***************************************************
 Subcatch   # Steps   # Calls  Subcatch   # Steps   # Calls  Subcatch   # Steps   # Calls
 --------   -------   -------  --------   -------   -------  --------   -------   -------
      300   6216732   1579720
***************************************************
*     Extrapolation Summary for Channel/Pipes    *
* # Steps ==> Total Number of Extrapolated Steps *
* # Calls ==> Total Number of GUTNR Calls        *
***************************************************
Chan/Pipe   # Steps   # Calls Chan/Pipe   # Steps   # Calls Chan/Pipe   # Steps   # Calls
 --------   -------   -------  --------   -------   -------  --------   -------   -------
      201         0         0
***********************************************
*       Continuity Check for Surface Water   *
***********************************************
                                                                    Millimeters over
                                                      cubic meters  Total Basin
Total Precipitation (Rain plus Snow)                       132911.     19263.
Total Infiltration                                          37027.      5366.
Total Evaporation                                            9736.      1411.
Surface Runoff from Watersheds                              86997.     12609.
Total Water remaining in Surface Storage                        0.         0.
Infiltration over the Pervious Area...                      37027.     19165.
                      --------
Infiltration + Evaporation +
Surface Runoff + Snow removal +
Water remaining in Surface Storage +
Water remaining in Snow Cover.........                     133759.     19386.
Total Precipitation + Initial Storage.                     132911.     19263.
The error in continuity is calculated as
**************************************
* Precipitation + Initial Snow Cover  *
*       - Infiltration -              *
*Evaporation - Snow removal -         *
*Surface Runoff from Watersheds -     *
*Water in Surface Storage -           *
*Water remaining in Snow Cover        *
*------------------------------------*
* Precipitation + Initial Snow Cover  *
**************************************
Error.................................       -0.639 Percent
***********************************************
*       Continuity Check for Channel/Pipes   *
***********************************************
                                                                    Millimeters over
                                                      cubic meters  Total Basin
Initial Channel/Pipe Storage................                    0.         0.
Final Channel/Pipe Storage..................                    0.         0.
Surface Runoff from Watersheds..............                86997.     12609.
Baseflow....................................                    0.
Groundwater Subsurface Inflow...............                    0.         0.
Evaporation Loss from Channels..............                    0.         0.
Channel/Pipe/Inlet Outflow..................                86997.     12609.
Initial Storage + Inflow....................                86997.     12609.
Final Storage + Outflow.....................                86997.     12609.
*******************************************
* Final Storage + Outflow + Evaporation  - *
* Watershed Runoff - Groundwater Inflow  - *
*     Initial Channel/Pipe Storage        *
*     ----------------------------------  *
*  Final Storage + Outflow  + Evaporation  *
*******************************************
Error.....................................      0.000 Percent
***************************************************
*     Continuity Check for Subsurface Water       *
***************************************************

                                                                     Millimeters over
                                                  cubic meters       Subsurface Basin

Total Infiltration                                              0.         0.
Total Upper Zone ET                                             0.         0.
Total Lower Zone ET                                             0.         0.
Total Groundwater flow                                          0.         0.
Total Deep percolation                                          0.         0.
Initial Subsurface Storage                                   6309.       914.
Final Subsurface Storage                                     6309.       914.
Upper Zone ET over Pervious Area                                0.         0.
Lower Zone ET over Pervious Area                                0.         0.
******************************************
```

```
* Infiltration + Initial Storage - Final *
* Storage - Upper and Lower Zone ET -    *
* Groundwater Flow - Deep Percolation    *
* -------------------------------------- *
*     Infiltration + Initial Storage     *
******************************************
Error ...................................     0.000 Percent
                                  SUMMARY STATISTICS FOR SUBCATCHMENTS
                                  ====================================
                                                   PERVIOUS AREA     IMPERVIOUS AREA     TOTAL SUBCATCHMENT AREA
                                                ------------------  -----------------  -------------------------
                                       TOTAL    TOTAL         PEAK                PEAK                PEAK     PEAK
               GUTTER                SIMULATED  RUNOFF TOTAL RUNOFF   RUNOFF   RUNOFF       RUNOFF  RUNOFF   UNIT
   SUBCATCH-  OR INLET  AREA  PERCENT  RAINFALL   DEPTH LOSSES  RATE    DEPTH    RATE         DEPTH  RATE    RUNOFF
   MENT NO.     NO.     (HA)   IMPER.   (MM)      (MM)   (MM)   (CMS)    (MM)   (CMS)         (MM)  (CMS)   (MM/HR)
  -----------------------------------------------------------------------------------------------------------------
       300        200    0.69    72.019262.47    98.685********   0.06317469.771    0.271 12605.867    0.333  175.411

          *** NOTE *** IMPERVIOUS AREA STATISTICS AGGREGATE IMPERVIOUS AREAS WITH AND WITHOUT DEPRESSION STORAGE
                                       SUMMARY STATISTICS FOR CHANNEL/PIPES
                                    ================================================
                                       MAXIMUM   MAXIMUM   MAXIMUM  MAXIMUM     TIME        LENGTH     MAXIMUM    RATIO OF  RATIO OF
            FULL     FULL       FULL   COMPUTED  COMPUTED  COMPUTED COMPUTED     OF           OF       SURCHARGE  MAX. TO  MAX. DEPTH
   CHANNEL  FLOW   VELOCITY     DEPTH    INFLOW   OUTFLOW    DEPTH  VELOCITY OCCURRENCE    SURCHARGE   VOLUME     FULL      TO FULL
    NUMBER  (CMS)   (M/S)        (M)     (CMS)     (CMS)      (M)    (M/S)    DAY   HR.     (HOUR)     (CU-M)     FLOW       DEPTH
  -------- -------------------------   -------------------------------------------------   ---------------------- -------------------
       201                               0.00                               1/ 0/1900  0.00
       200                               0.33                               8/14/1972 14.25
                                              TOTAL NUMBER OF CHANNELS/PIPES =     2
 *** NOTE ***  THE MAXIMUM FLOWS AND DEPTHS ARE CALCULATED AT THE END OF THE TIME INTERVAL
                #####################################################
                #             Runoff Quality Summary Page           #
                # If NDIM = 0 Units for:   loads    mass rates      #
                #             METRIC = 1    lb        lb/sec        #
                #             METRIC = 2    kg        kg/sec        #
                # If NDIM = 1 Loads are in units of quantity        #
                #             and mass rates are quantity/sec       #
                # If NDIM = 2 loads are in units of concentration   #
                #             times volume and mass rates have units#
                #             of concentration times volume/second  #
                #####################################################
               Total Su NDIM =  0
               METRIC =  2
                                  Total Su
                                  --------
Inputs
------
 1. INITIAL SURFACE LOAD........       15.
 2. TOTAL SURFACE BUILDUP.......    12058.
 3. INITIAL CATCHBASIN LOAD.....        0.
 4. TOTAL CATCHBASIN LOAD.......        0.
 5. TOTAL CATCHBASIN AND
    SURFACE BUILDUP (2+4).......    12058.
Remaining Loads
---------------
 6. LOAD REMAINING ON SURFACE...        6.
 7. REMAINING IN CATCHBASINS....        0.
 8. REMAINING IN CHANNEL/PIPES..        0.
Removals
--------
 9. STREET SWEEPING REMOVAL.....     1020.
10. NET SURFACE BUILDUP (2-9)...    11038.
11. SURFACE WASHOFF.............    11031.
12. CATCHBASIN WASHOFF..........        0.
13. TOTAL WASHOFF (11+12).......    11031.
14. LOAD FROM OTHER CONSTITUENTS        0.
15. PRECIPITATION LOAD..........        0.
15a.SUM SURFACE LOAD (13+14+15).    11031.
16. TOTAL GROUNDWATER LOAD......        0.
16a.TOTAL I/I LOAD..............        0.
17. NET SUBCATCHMENT LOAD
    (15a-15b-15c-15d+16+16a)....    11031.
>>Removal in channel/pipes (17a, 17b):
17a.REMOVE BY BMP FRACTION......        0.
17b.REMOVE BY 1st ORDER DECAY...        0.
18. TOTAL LOAD TO INLETS........    11031.
19. FLOW WT'D AVE.CONCENTRATION  mg/l
    (INLET LOAD/TOTAL FLOW).....      127.
Percentages
-----------
20. STREET SWEEPING (9/2).......        8.
21. SURFACE WASHOFF (11/2)......       91.
```

```
22. NET SURFACE WASHOFF(11/10)..      100.
23. WASHOFF/SUBCAT LOAD(11/17)..      100.
24. SURFACE WASHOFF/INLET LOAD
    (11/18)....................       100.
25. CATCHBASIN WASHOFF/
    SUBCATCHMENT LOAD (12/17)...        0.
26. CATCHBASIN WASHOFF/
    INLET LOAD (12/18)..........        0.
27. OTHER CONSTITUENT LOAD/
    SUBCATCHMENT LOAD (14/17)...        0.
28. INSOLUBLE FRACTION/
    INLET LOAD (14/18)..........        0.
29. PRECIPITATION/
    SUBCATCHMENT LOAD (15/17)...        0.
30. PRECIPITATION/
    INLET LOAD (15/18)..........        0.
31. GROUNDWATER LOAD/
    SUBCATCHMENT LOAD (16/17)...        0.
32. GROUNDWATER LOAD/
    INLET LOAD (16/18)..........        0.
32a.INFILTRATION/INFLOW LOAD/
    SUBCATCHMENT LOAD (16a/17)..        0.
32b.INFILTRATION/INFLOW LOAD/
    INLET LOAD (16a/18).........        0.
32c.CH/PIPE BMP FRACTION REMOVAL/
    SUBCATCHMENT LOAD (17a/17)..        0.
32d.CH/PIPE 1st ORDER DECAY REMOVAL/
    SUBCATCHMENT LOAD (17b/17)..        0.
33. INLET LOAD SUMMATION ERROR
    (18+8+6a+17a+17b-17)/17.....        0.
CAUTION. Due to method of quality routing (Users Manual, Appendix IX)
quality routing through channel/pipes is sensitive to the time step.
Large "Inlet Load Summation Errors" may result.
These can be reduced by adjusting the time step(s).
Note: surface accumulation during dry time steps at end of simulation is
not included in totals.  Buildup is only performed at beginning of
wet steps or for street cleaning.
********************************************************
*            TSS Particle Size Distribution            *
********************************************************
```

Diameter (um)	%	Specific Gravity	Settling Velocity (m/s)	Critical Peclet Number
1.	5.0	2.65	0.000001	0.052246
4.	5.0	2.65	0.000011	0.058936
6.	5.0	2.65	0.000024	0.063356
7.	5.0	2.65	0.000033	0.065554
18.	15.0	2.65	0.000216	0.089204
45.	10.0	2.65	0.001327	0.143150
70.	5.0	2.65	0.003114	0.187900
90.	10.0	2.65	0.004985	0.220100
125.	15.0	2.65	0.008981	0.268750
200.	15.0	2.65	0.019288	0.340457
400.	5.0	2.65	0.047806	0.524584
850.	5.0	2.65	0.097934	0.839438

```
****************************************************
*              Summary of TSS Removal              *
****************************************************
```

TSS Removal based on Lab Performance Curve

Model #	Low Q Treated (cms)	High Q Treated (cms)	Runoff Treated (%)	TSS Removed (%)
Unavailabl	0.060	0.060	98.5	62.5
HD 4	0.060	0.060	98.5	69.6
HD 5	0.060	0.060	98.5	75.8
HD 6	0.060	0.060	98.5	80.4
HD 7	0.060	0.060	98.5	83.7
HD 8	0.060	0.060	98.5	86.3
HD 10	0.060	0.060	98.5	91.8
HD 12	0.060	0.060	98.5	94.9

```
****************************************************
*  Summary of Annual Flow Treatmnet & TSS Removal  *
****************************************************
```

Unavailabl

Year	Flow Vol (m3)	Flow Treated (m3)	TSS In (kg)	TSS Rem (kg)	TSS Out (kg)	TSS Byp (kg)	Flow Treated (%)	TSS Removal (%)
1971.	21743.	20373.	213.	128.	85.	0.	93.7	60.2
1972.	27958.	25350.	280.	180.	100.	0.	90.7	64.3
1973.	27772.	27747.	307.	191.	116.	0.	99.9	62.2
1974.	28326.	27661.	322.	217.	105.	0.	97.7	67.5
1975.	24020.	23420.	278.	171.	107.	0.	97.5	61.5

1976.	35791.	34731.	346.	220.	126.	0.	97.0	63.6
1977.	38365.	37208.	338.	190.	147.	0.	97.0	56.4
1978.	30618.	30615.	327.	193.	134.	0.	100.0	59.1
1979.	36612.	35772.	369.	232.	137.	0.	97.7	63.0
1980.	29480.	29250.	348.	215.	133.	0.	99.2	61.8
1981.	40722.	40510.	390.	252.	138.	0.	99.5	64.6
1982.	28672.	28606.	317.	207.	110.	0.	99.8	65.4
1983.	37846.	37236.	401.	250.	151.	0.	98.4	62.2
1984.	30460.	30460.	314.	189.	125.	0.	100.0	60.2
1985.	26568.	26568.	309.	196.	113.	0.	100.0	63.4
1986.	38737.	38609.	421.	271.	150.	0.	99.7	64.3
1987.	40050.	39407.	422.	260.	162.	0.	98.4	61.6
1988.	32021.	31657.	354.	226.	129.	0.	98.9	63.7
1989.	35287.	34759.	341.	222.	119.	0.	98.5	65.1
1990.	40010.	39749.	433.	283.	150.	0.	99.3	65.4
1991.	37463.	37082.	404.	256.	148.	0.	99.0	63.4
1992.	47648.	47483.	470.	279.	192.	0.	99.7	59.2
1993.	32406.	32406.	400.	264.	136.	0.	100.0	66.0
1994.	34742.	32920.	318.	187.	131.	0.	94.8	58.7
1995.	40305.	39450.	383.	232.	151.	0.	97.9	60.5
1998.	10466.	10466.	151.	94.	57.	0.	100.0	62.1
1999.	25594.	25479.	302.	192.	110.	0.	99.6	63.7
2000.	29471.	29451.	265.	142.	123.	0.	99.9	53.6
2001.	23315.	23315.	247.	170.	77.	0.	100.0	68.8
2002.	24347.	24347.	289.	188.	101.	0.	100.0	65.0
2003.	27688.	27565.	298.	184.	114.	0.	99.6	61.8
2004.	33186.	33186.	306.	187.	119.	0.	100.0	61.2
2005.	23977.	22741.	229.	131.	97.	0.	94.8	57.4

HD 4

Year	Flow Vol (m3)	Flow Treated (m3)	TSS In (kg)	TSS Rem (kg)	TSS Out (kg)	TSS Byp (kg)	Flow Treated (%)	TSS Removal (%)
1971.	21743.	20373.	211.	141.	70.	0.	93.7	66.8
1972.	27958.	25350.	277.	196.	81.	0.	90.7	70.8
1973.	27772.	27747.	307.	211.	96.	0.	99.9	68.9
1974.	28326.	27661.	319.	235.	84.	0.	97.7	73.8
1975.	24020.	23420.	276.	187.	88.	0.	97.5	68.0
1976.	35791.	34731.	342.	242.	101.	0.	97.0	70.6
1977.	38365.	37208.	334.	216.	118.	0.	97.0	64.8
1978.	30618.	30615.	327.	218.	109.	0.	100.0	66.6
1979.	36612.	35772.	366.	257.	109.	0.	97.7	70.1
1980.	29480.	29250.	347.	240.	107.	0.	99.2	69.2
1981.	40722.	40510.	389.	277.	112.	0.	99.5	71.3
1982.	28672.	28606.	317.	227.	90.	0.	99.8	71.5
1983.	37846.	37236.	397.	279.	118.	0.	98.4	70.2
1984.	30460.	30460.	314.	214.	100.	0.	100.0	68.2
1985.	26568.	26568.	309.	216.	93.	0.	100.0	70.0
1986.	38737.	38609.	420.	298.	123.	0.	99.7	70.8
1987.	40050.	39407.	421.	294.	127.	0.	98.4	69.9
1988.	32021.	31657.	354.	252.	102.	0.	98.9	71.1
1989.	35287.	34759.	339.	243.	96.	0.	98.5	71.8
1990.	40010.	39749.	430.	310.	121.	0.	99.3	71.9
1991.	37463.	37082.	402.	285.	118.	0.	99.0	70.8
1992.	47648.	47483.	469.	316.	154.	0.	99.7	67.3
1993.	32406.	32406.	400.	290.	109.	0.	100.0	72.7
1994.	34742.	32920.	311.	209.	101.	0.	94.8	67.4
1995.	40305.	39450.	377.	257.	120.	0.	97.9	68.1
1998.	10466.	10466.	151.	104.	47.	0.	100.0	68.9
1999.	25594.	25479.	301.	210.	91.	0.	99.6	69.7
2000.	29471.	29451.	264.	166.	98.	0.	99.9	62.9
2001.	23315.	23315.	247.	182.	65.	0.	100.0	73.6
2002.	24347.	24347.	289.	206.	84.	0.	100.0	71.1
2003.	27688.	27565.	297.	205.	92.	0.	99.6	69.0
2004.	33186.	33186.	306.	209.	97.	0.	100.0	68.4
2005.	23977.	22741.	225.	146.	79.	0.	94.8	64.8

HD 5

Year	Flow Vol (m3)	Flow Treated (m3)	TSS In (kg)	TSS Rem (kg)	TSS Out (kg)	TSS Byp (kg)	Flow Treated (%)	TSS Removal (%)
1971.	21743.	20373.	209.	154.	55.	0.	93.7	73.5
1972.	27958.	25350.	276.	212.	64.	0.	90.7	76.7
1973.	27772.	27747.	307.	231.	76.	0.	99.9	75.2
1974.	28326.	27661.	317.	252.	65.	0.	97.7	79.5
1975.	24020.	23420.	274.	205.	70.	0.	97.5	74.6
1976.	35791.	34731.	341.	262.	79.	0.	97.0	76.9
1977.	38365.	37208.	332.	238.	94.	0.	97.0	71.6
1978.	30618.	30615.	327.	240.	87.	0.	100.0	73.3
1979.	36612.	35772.	365.	279.	86.	0.	97.7	76.4
1980.	29480.	29250.	345.	261.	84.	0.	99.2	75.5
1981.	40722.	40510.	388.	300.	89.	0.	99.5	77.2
1982.	28672.	28606.	317.	244.	72.	0.	99.8	77.2
1983.	37846.	37236.	394.	301.	93.	0.	98.4	76.3

1984.	30460.	30460.	314.	234.	80.	0.	100.0	74.5
1985.	26568.	26568.	309.	235.	75.	0.	100.0	75.9
1986.	38737.	38609.	420.	321.	98.	0.	99.7	76.6
1987.	40050.	39407.	420.	320.	100.	0.	98.4	76.1
1988.	32021.	31657.	353.	273.	80.	0.	98.9	77.3
1989.	35287.	34759.	337.	263.	74.	0.	98.5	78.1
1990.	40010.	39749.	429.	336.	93.	0.	99.3	78.3
1991.	37463.	37082.	401.	308.	93.	0.	99.0	76.9
1992.	47648.	47483.	468.	347.	121.	0.	99.7	74.1
1993.	32406.	32406.	400.	313.	86.	0.	100.0	78.4
1994.	34742.	32920.	306.	230.	77.	0.	94.8	75.0
1995.	40305.	39450.	372.	279.	93.	0.	97.9	74.9
1998.	10466.	10466.	151.	112.	38.	0.	100.0	74.5
1999.	25594.	25479.	301.	224.	77.	0.	99.6	74.5
2000.	29471.	29451.	264.	187.	78.	0.	99.9	70.6
2001.	23315.	23315.	247.	196.	51.	0.	100.0	79.3
2002.	24347.	24347.	289.	222.	67.	0.	100.0	76.7
2003.	27688.	27565.	296.	221.	76.	0.	99.6	74.5
2004.	33186.	33186.	306.	226.	80.	0.	100.0	73.8
2005.	23977.	22741.	223.	158.	65.	0.	94.8	70.9

HD 6

Year	Flow Vol (m3)	Flow Treated (m3)	TSS In (kg)	TSS Rem (kg)	TSS Out (kg)	TSS Byp (kg)	Flow Treated (%)	TSS Removal (%)
1971.	21743.	20373.	208.	162.	46.	0.	93.7	77.9
1972.	27958.	25350.	275.	223.	52.	0.	90.7	81.1
1973.	27772.	27747.	306.	244.	62.	0.	99.9	79.6
1974.	28326.	27661.	317.	265.	51.	0.	97.7	83.8
1975.	24020.	23420.	273.	216.	57.	0.	97.5	79.2
1976.	35791.	34731.	340.	278.	62.	0.	97.0	81.8
1977.	38365.	37208.	331.	252.	78.	0.	97.0	76.3
1978.	30618.	30615.	327.	254.	73.	0.	100.0	77.6
1979.	36612.	35772.	364.	295.	69.	0.	97.7	81.1
1980.	29480.	29250.	344.	276.	68.	0.	99.2	80.1
1981.	40722.	40510.	388.	318.	70.	0.	99.5	81.9
1982.	28672.	28606.	316.	259.	58.	0.	99.8	81.8
1983.	37846.	37236.	393.	318.	75.	0.	98.4	81.0
1984.	30460.	30460.	314.	248.	67.	0.	100.0	78.8
1985.	26568.	26568.	309.	248.	61.	0.	100.0	80.2
1986.	38737.	38609.	419.	341.	78.	0.	99.7	81.3
1987.	40050.	39407.	419.	338.	81.	0.	98.4	80.7
1988.	32021.	31657.	353.	288.	65.	0.	98.9	81.7
1989.	35287.	34759.	336.	280.	55.	0.	98.5	83.5
1990.	40010.	39749.	428.	356.	72.	0.	99.3	83.2
1991.	37463.	37082.	400.	326.	73.	0.	99.0	81.7
1992.	47648.	47483.	467.	369.	98.	0.	99.7	78.9
1993.	32406.	32406.	400.	331.	69.	0.	100.0	82.8
1994.	34742.	32920.	303.	242.	61.	0.	94.8	79.9
1995.	40305.	39450.	369.	296.	73.	0.	97.9	80.2
1998.	10466.	10466.	151.	118.	33.	0.	100.0	78.3
1999.	25594.	25479.	300.	239.	62.	0.	99.6	79.4
2000.	29471.	29451.	264.	198.	66.	0.	99.9	74.9
2001.	23315.	23315.	247.	206.	41.	0.	100.0	83.3
2002.	24347.	24347.	289.	235.	54.	0.	100.0	81.3
2003.	27688.	27565.	296.	234.	62.	0.	99.6	78.9
2004.	33186.	33186.	306.	240.	65.	0.	100.0	78.6
2005.	23977.	22741.	221.	167.	54.	0.	94.8	75.8

HD 7

Year	Flow Vol (m3)	Flow Treated (m3)	TSS In (kg)	TSS Rem (kg)	TSS Out (kg)	TSS Byp (kg)	Flow Treated (%)	TSS Removal (%)
1971.	21743.	20373.	206.	168.	38.	0.	93.7	81.5
1972.	27958.	25350.	275.	232.	43.	0.	90.7	84.4
1973.	27772.	27747.	306.	253.	53.	0.	99.9	82.7
1974.	28326.	27661.	316.	276.	40.	0.	97.7	87.2
1975.	24020.	23420.	273.	225.	47.	0.	97.5	82.7
1976.	35791.	34731.	339.	288.	51.	0.	97.0	84.9
1977.	38365.	37208.	330.	264.	66.	0.	97.0	80.0
1978.	30618.	30615.	327.	264.	63.	0.	100.0	80.8
1979.	36612.	35772.	364.	305.	59.	0.	97.7	83.9
1980.	29480.	29250.	343.	284.	59.	0.	99.2	82.9
1981.	40722.	40510.	387.	331.	57.	0.	99.5	85.3
1982.	28672.	28606.	316.	270.	46.	0.	99.8	85.4
1983.	37846.	37236.	391.	330.	61.	0.	98.4	84.4
1984.	30460.	30460.	314.	258.	56.	0.	100.0	82.2
1985.	26568.	26568.	309.	259.	50.	0.	100.0	83.7
1986.	38737.	38609.	419.	354.	64.	0.	99.7	84.6
1987.	40050.	39407.	419.	351.	68.	0.	98.4	83.8
1988.	32021.	31657.	353.	300.	53.	0.	98.9	85.0
1989.	35287.	34759.	335.	289.	46.	0.	98.5	86.3
1990.	40010.	39749.	427.	368.	59.	0.	99.3	86.1
1991.	37463.	37082.	399.	338.	61.	0.	99.0	84.7
1992.	47648.	47483.	466.	385.	81.	0.	99.7	82.5
1993.	32406.	32406.	400.	343.	56.	0.	100.0	85.9

1994.	34742.	32920.	302.	253.	49.	0.	94.8	83.8
1995.	40305.	39450.	367.	306.	61.	0.	97.9	83.5
1998.	10466.	10466.	151.	124.	27.	0.	100.0	81.9
1999.	25594.	25479.	300.	249.	51.	0.	99.6	82.9
2000.	29471.	29451.	264.	207.	57.	0.	99.9	78.5
2001.	23315.	23315.	247.	213.	34.	0.	100.0	86.2
2002.	24347.	24347.	289.	244.	45.	0.	100.0	84.4
2003.	27688.	27565.	296.	243.	53.	0.	99.6	82.0
2004.	33186.	33186.	306.	251.	55.	0.	100.0	82.0
2005.	23977.	22741.	220.	175.	45.	0.	94.8	79.5

```
****************************************************
*      Summary of Toronto Rainfall Intensities     *
****************************************************
Rainfall Intensity (mm/h)   Flow (L/s)     Percentage %

         1.50                  2.1           30.0
         2.25                  3.2           10.2
         3.00                  4.3            7.8
         3.75                  5.3            4.7
         4.75                  6.7            6.0
         5.75                  8.2            5.1
         8.00                 11.3            8.2
        10.00                 14.2            4.5
        15.50                 22.0            7.7
        23.25                 33.0           15.7
****************************************************
*  Summary of Quantity and Quality Results at      *
*  Location        200  INFlow in cms.             *
*  Values are instantaneous at indicated time step *
****************************************************
  694 AND 698 NIAGARA STREET
 CITY OF WELLAND
     Date     Time        Flow   Total Su
 Mo/Da/Year  Hr:Min        cum/s  mg/l
 ----------  -------    -------  --------
Flow wtd means.....        0.002      124.
Flow wtd std devs..        0.005       69.
Maximum value......        0.333      402.
Minimum value......        0.000        0.
Total loads........       86806.    10722.
                        Cub-Met  KILOGRAM
===> Runoff simulation ended normally.
===> SWMM 4.4    simulation ended normally.
     Always check output file for possible warning messages.
*******************************************************
*       SWMM 4.4    Simulation Date and Time Summary  *
*******************************************************
* Starting Date... August     28, 2025                *
*          Time...         16:35:33.375               *
*   Ending Date... August     28, 2025                *
*          Time...         16:35:36.633               *
*  Elapsed Time...               0.054 minutes.       *
*  Elapsed Time...               3.258 seconds.       *
*******************************************************
```

UPPER CANADA CONSULTANTS
ENGINEERS / PLANNERS

APPENDIX E

Oil/Grit Sample Inspection Report

UPPER CANADA CONSULTANTS
ENGINEERS / PLANNERS

SAMPLE INSPECTION REPORT

Owner:

Location:

Manhole Oil/Grit Separator:

Type of Inspection	☐ Monthly	☐ Annually	☐ Special

Inlet/Outlet Information

	Inlet		Outlet	
Clear of Debris	☐ Yes	☐ No	☐ Yes	☐ No
Build Up of Sediment	☐ Yes	☐ No	☐ Yes	☐ No

Action Taken:

Sediment Tank Information

A. Manhole Sump Depth: ± m from cover rim (to be as-constructed verified)

B. Measurement from Rim to Sediment Level m

C. Depth of Sediment: m (A - B)

Note: If the measured depth of sediment is greater than **200mm** then sediment removal is required.

Presence of Contaminants

Oil	☐ Yes	☐ No	Depth	m
Foam	☐ Yes	☐ No	Depth	m

Action Taken:

Name of Regulatory Agency

Telephone No.:

Transaction No.:

Name of Licensed Waste Management Collector

Telephone No.:

Transaction No.:

Owner Notification ☐ Yes ☐ No Other:

Time: Date:

Name of Inspector:

Signed: Date: