D.G. BIDDLE & ASSOCIATES
CONSULTING ENGINEERS & PLANNERS

OSHAWA
200-481 Taunton Road West
Oshawa, ON L1J 0G3
905-576-8500

PETERBOROUGH
402-150 King Street
Peterborough, ON K9J 2R9
705-201-0272

dgbiddle.com

Original: Oct 2024
Rev1: June 23, 2025
Rev2: July 29, 2026
Rev3: October 29, 2026

Barry Bryan Associates
201 – 250 Water Street
Whitby, ON L1N 0G5
nswerdfeger@bba-archeng.com

Attention: Nick Swerdfeger

Re: Stormwater Management and Functional Servicing Report
Bowmanville Medical Centre
222 King Street East, Bowmanville
Site Plan Application - SPA2026-0038 (Previously SPA2024-0042)
Our File: 125807

Dear Mr. Swerdfeger,

In support of the proposed Health CT Clinic Expansion of the existing Bowmanville Medical Center property located at 222 King Street East, we herewith submit the following Functional Servicing and Stormwater Management Report. This report primarily addresses the Municipality of Clarington and Region of Durham drainage and servicing requirements towards Site Plan Application Approval. This report identifies the infrastructure that exists and what is required to provide adequate servicing for the proposed development.

Please contact our office at your convenience should you have any questions or require additional information on the enclosed report.

Yours truly,
D.G. BIDDLE & ASSOCIATES LIMITED



Benjamin Yan, BASc.
Junior Designer
Civil Group





Colin Flamminio, P. Eng.
Project Engineer
Supervisor, Civil Group

X:\Staff\Job Files\125000\125100 222 King Street East - Bowmanville Health CT Clinic Expansion\125807 Reports

D.G. BIDDLE & ASSOCIATES
CONSULTING ENGINEERS & PLANNERS

OSHAWA
200-481 Taunton Road West
Oshawa, ON L1J 0G3
905-576-8500

PETERBOROUGH
402-150 King Street
Peterborough, ON K9J 2R9
705-201-0272

dgbiddle.com

STORMWATER MANAGEMENT AND FUNCTIONAL SERVICING REPORT

FOR

BARRY BRYAN ASSOCIATES

222 KING STREET EAST, BOWMANVILLE, ONTARIO

MUNICIPALITY OF CLARINGTON

PROJECT NO. 125807

DATED: OCT 2024
REV1: JUNE 23, 2025
REV2: JULY 29, 2026
REV3: OCT 29, 2026

TABLE OF CONTENTS

1.0 INTRODUCTION

2.0 EXISTING SERVICES
- 2.1 Existing Water Service
- 2.2 Existing Sanitary Service
- 2.3 Existing Storm Sewer Service

3.0 PROPOSED SERVICES
- 3.1 Water Service
- 3.2 Sanitary Sewer Service
- 3.3 Storm Sewer Service & Foundation Drainage

4.0 STORMWATER MANAGEMENT
- 4.1 Stormwater Quantity Control
- 4.2 Stormwater Quality Control

5.0 TEMPORARY EROSION AND SEDIMENT CONTROLS

6.0 CONCLUSIONS

LIST OF FIGURES

FIGURE 1 - Site Location Plan
FIGURE 2 - Post-Development Storm Drainage Plan
FIGURE 3 - Visual OTTHYMO Scheme

LIST OF DRAWINGS

125807-SG-1 - Site Grading Plan
125807-SS-1 - Site Servicing Plan
125807-ES-1 - Erosion and Sediment Control Plan

1.0 INTRODUCTION

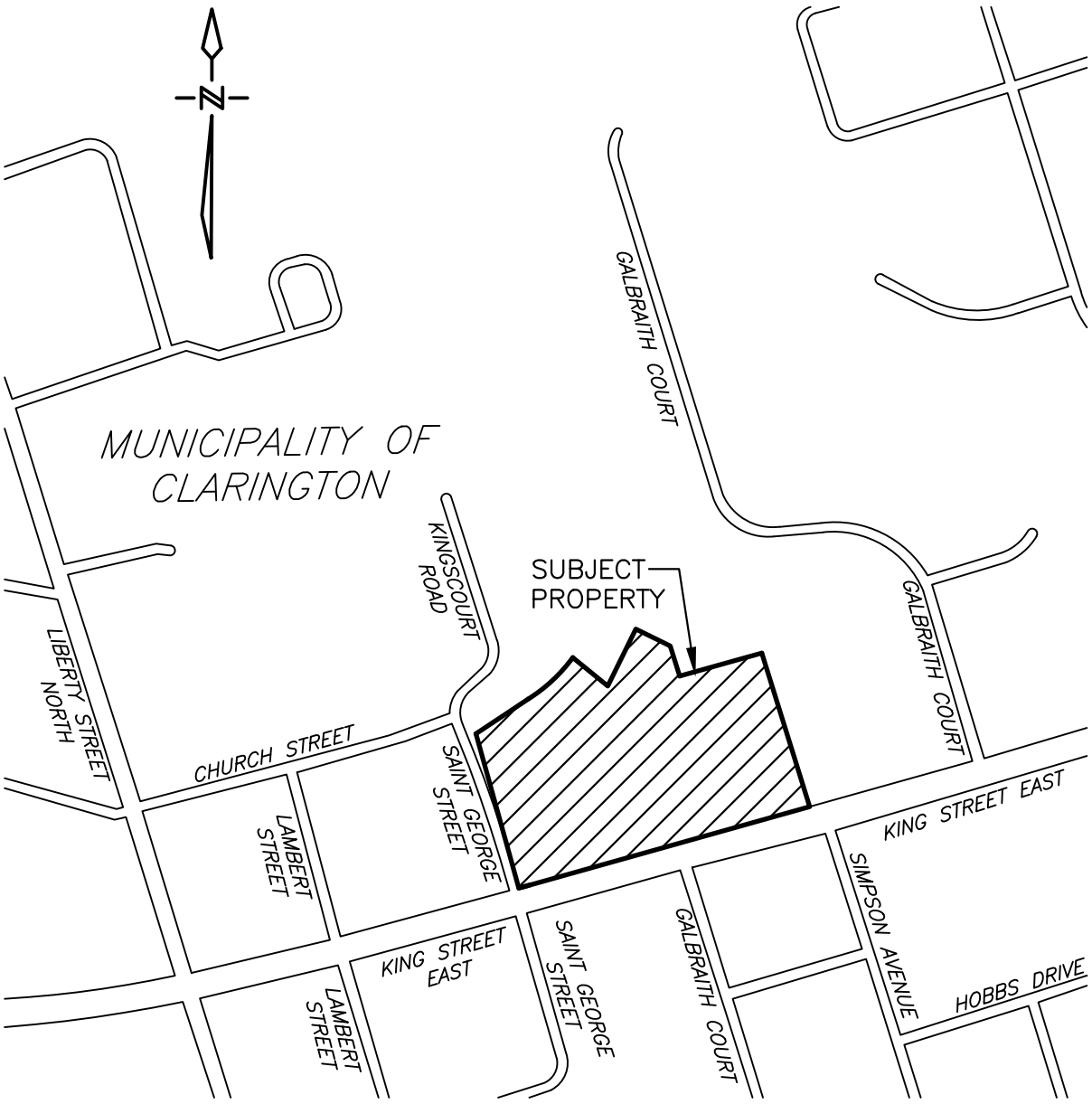
This Functional Servicing and Stormwater Management Report has been prepared to review the infrastructure and servicing requirements to facilitate development on the subject property. The Site Plan, by Barry Bryan Associates, illustrates the proposal for the construction of a new 4-storey medical building and parking lot expansion.

In its existing condition, the subject property is used as a medical services clinic with several buildings situated on the north-east corner of King Street East and Saint George Street North (south-west corner of the site). The property is municipally addressed as 222 King Street East, in Bowmanville within the Municipality of Clarington.

It is understood the proponent has acquired the parcel to the east of 222 King Street E. which originally consisted of a Home Hardware building and associated gravel storage area in the rear. The rear gravel storage area has been repurposed for parking for the medical clinic property while the portion of the property encompassing the existing buildings will remain as-is. It is understood that the eastern parking lot expansion and King Street East entrance enhancements were approved and constructed at the time of this reporting, in line with planning approvals provided by the municipality.

The development site encompasses an area of approximately 1.814 ha with frontages on King Street East to the south and Saint George Street North to the West. The site is also bounded on the north by municipal parkland and on the east by residential apartment buildings. Refer to the Site Location Plan, **Figure 1**, attached.

The purpose of this report is to address site grading modifications, storm sewer servicing, sanitary sewer servicing, water servicing as well as storm water quantity and quality controls. Site Servicing and Stormwater Management is to be in accordance with the requirements of the Municipality of Clarington, the Regional Municipality of Durham, and Central Lake Ontario Conservation Authority (CLOCA).



222 KING STREET EAST, BOWMANVILLE FOR: BARRY BRYAN ASSOCIATES

SITE LOCATION PLAN

D.G. BIDDLE & ASSOCIATES
CONSULTING ENGINEERS & PLANNERS

200-481 Taunton Road West
Oshawa, Ontario, L1J 0G3
Phone: 905-576-8500
info@dgbiddle.com
dgbiddle.com

PROJECT NO. 125807

SCALE:	N.T.S.	DRAWN BY:	B.K.Y.
DATE:	JULY 2026	CHECKED BY:	C.J.F.

DRAWING NO. FIGURE 1

2.0 EXISTING SERVICES

The existing municipal servicing within the vicinity of the project, as well as existing service connections to the property, are illustrated on drawing **125807-SS-1**, the Site Servicing Plan.

2.1 Existing Water Service

There are existing water service connections provided to the property that are currently being utilized by the existing medical clinic buildings. Records indicate the site has a 100mm domestic water service and a 150mm fire line service located in the south-west corner of the property connected to the existing 150mm watermain on Saint George Street North.

2.2 Existing Sanitary Service

There is an existing 375mm sanitary sewer on Saint George Street North. Records indicate the property is serviced with a 150mm PVC sanitary sewer connection in the south-west corner of the property which currently services the existing medical clinic buildings.

2.3 Existing Storm Service

There is an existing 300mm storm sewer on Saint George Street North and an existing 1150x730mm Storm Sewer in the south boulevard of King Street East. In addition, there is an existing sewer through the municipal parkland to the north towards Galbraith Court.

Records indicate there are multiple existing storm sewer connections for the property, including two 300mm storm sewer connections to the King Street East sewers as well as a 375mm connection to the parkland to the north that ultimately conveys to Galbraith Court.

In its existing condition, drainage from the site is generally managed using a conventional minor storm system consisting of positive drainage surfaces and catch basins situated throughout the property. It is understood the majority of drainage is conveyed to the existing sewer through the municipal parkland to Galbraith Court while a portion of drainage in the south-west is directed to King Street East sewers. Major overland flow for the property is generally directed to the north-east towards municipal parklands and ultimately Galbraith Court. Stormwater runoff from the gravelled storage area (on the acquired parcel to the east) generally drains overland to the parkland north of the property where it is ultimately conveyed to Galbraith Court.

Storm analysis indicated the pipe run between *EX DCBMH-9* and *EX CBMH-6* is over-capacity under existing conditions. Discussion regarding this pipe run has been detailed under Section 3.3 of this report.

3.0 PROPOSED SERVICES

As noted in **Section 1.0**, the proposal for the development is to construct a 4-storey medical building and expand the existing parking lot. The following sections detail a potential servicing scheme capable of fulfilling the servicing needs for the proposed development. Refer to the Site Servicing Plan, Drawing **125807-SS-1** for details.

3.1 Water Services

As noted in **Section 2.1**, the existing development is serviced through a 100mm domestic water service connection and a 150mm fireline service connection from the 150mm watermain within the Saint George Street North right of way to the existing building in the south-west corner of the property. There are no proposed changes to these services.

To provide the proposed 4 storey medical building with adequate water servicing, both a 100mm domestic water service connection and a 150mm fire line service connection will be required to be routed through the existing building on the south-west corner of the property and extended further to connect to the proposed building through the drive aisle.

To provide adequate fire protection to the proposed building, a fire hydrant is proposed to be installed in the public right of way, near the south-west corner of the proposed 4 storey building and be connected to the existing 150mm watermain on Saint George Street North. The proposed building will also have a fire department connection located on the south-east corner.

For further details, refer to the Site Servicing Plan, Drawing **125807-SS-1**.

3.2 Sanitary Sewer Service

As noted in **Section 2.2**, there is an existing 150mm sanitary connection to the property which is connected to the 375mm sanitary sewer on Saint George Street North. There are no proposed changes to these services.

Sanitary effluent from the proposed 4 storey medical building development is to be conveyed to the existing 375mm regional sanitary sewer on Saint George Street North by a new 150mm sanitary connection from the site. An inspection manhole will be provided 1.50m inside the property line located near the south-west corner of the proposed 4 storey medical building, inside the existing drive aisle.

Table 1 describes the sanitary effluent from the subject property in accordance with the Region of Durham Design Specifications for Sanitary Sewers.

Table 1: Sanitary Flow Calculations – 222 King Street East, Bowmanville ON

Building		Lot Area (ha)	Floor Space Index	Gross Floor Area (ha)
Prop Building	4 Storeys	0.058	0.5	0.116
Total		**0.058**		**0.116**
Commercial Drainage Flow				=0.241 L/s
Infiltration Drainage Flow		0.116 ha		=0.00L/s
Total Flow				=0.241L/s

In accordance with the Region of Durham Criteria, the proposed 4 storey medical building will produce a peak sanitary flow of 0.241L/s. A Sanitary Sewer Design Sheet has been prepared and can be found appended to this report under **Schedule 1**.

3.3 Storm Sewer Service

As noted in **Section 2.3**, stormwater runoff for the subject property is intercepted by an on-site minor storm sewer system capable of conveying the 5-year storm event per Municipality of Clarington Design Criteria. The existing storm system consists of orifice controls designed to capture and attenuate flows for the 2-100-year rainfall event. A retrofit of the quantity control system is proposed to capture, attenuate, and convey runoff under ultimate post-development conditions – further discussion is provided under Section 4.1.

In general, the existing drainage pattern for the site is not proposed to be altered from the pre-developed condition.

As noted previously, works regarding the gravelled storage area on the acquired parcel and King Street East entrance enhancements have been approved and completed at the time of this report. The completed works include storm sewer infrastructure capable of conveying the 2- through 100-year rainfall events for the tributary catchment area. Runoff generated by the completed works (drive aisle, pervious/impervious landscape areas) are captured through catch basins installed in the east parking lot area and conveyed to underground storm sewers where flows are orifice controlled and discharged toward Galbraith Court. Major flow from this area is conveyed overland to the sewers to the north, and ultimately to the Galbraith Court

sewers, similar to existing conditions.

Stormwater runoff from the proposed 4 storey medical building will ultimately be conveyed to the existing storm sewer and maintain the existing drainage pattern.

The existing catch basin manhole and storm manhole, identified as *EX CBMH-4* and *EX MH-5*, respectively, have been removed. New storm manholes (STM MH-4 & STM MH-5) have been provided to re-route the drainage system for ultimate capture in the quantity control system and conveyance to Galbraith Court. Additional underground storage has been proposed in the form of a StormBrixx SD900 system. Details on the quantity control system are discussed under **Section 4.1**.

For details regarding the removal of existing storm sewer infrastructure and proposed infrastructure, refer to the Site Servicing Plan **125807-SS-1**.

The existing storm sewers for the property have been analysed under the proposed site conditions to ensure the capacity is not negatively affected by the proposal. Notably the sewer run between *EX DCBMH-9* and *CBMH-6* is over-capacity with a loading rate of 103.5%. The capacity of the existing 300mm pipe at 1.50% is 123.54 l/s, which exceeds the 100-year orifice flow-rate of the associated quantity control system (115 l/s). As such, the existing pipe is expected to have capacity to convey flow by way of the quantity control system without issue and the existing pipe run is proposed to remain.

A 5-year Storm Sewer Design Sheet analysing the existing sewers and detailing the design of the proposed sewers can be found appended under **Schedule 1**.

4.0 STORMWATER MANAGEMENT

4.1 Stormwater Quantity Control

The re-development of the subject property is required to comply with Municipality of Clarington Engineering Criteria as well as the outlined requirements detailed in the previous Stormwater Management Report prepared by this office, dated May 2015. Municipal Criteria and the noted report require all stormwater flows be captured, detained, and attenuated on-site at or below pre-development levels and discharged to the existing storm sewer, and ultimately to the Galbraith Court storm system.

As part of the proposal, the site will generally maintain the existing drainage patterns on the property.

A portion of drainage from the King Street East frontage drains to the existing King Street East sewers. While the construction of the new entrance on King Street East will result in a minor increase in impervious area draining to the King Street East storm sewer, no adverse impacts to the existing downstream storm sewer system is anticipated.

A portion of drainage from the site frontage on Saint George Street North drains to the existing Staint George Street North sewers, however the development will not result in an increase in runoff to this frontage and no adverse impacts to the existing storm sewer system are anticipated.

Since the existing site included a quantity control system up-stream of the stormwater outlet to Galbraith Court, the pre-development peak flows from the subject property were determined through the previously approved *Stormwater Management Letter / Report* completed by this office, dated May 2015. The allowable flow-rates for the existing stormwater management system have been conservatively derived based on the post-development discharge rates outlined in the May 2015 report. Excerpts from the May 2015 Stormwater Management Report have been included under **Schedule 2**, including details on the pre- and post-development flow rates for the original site. These flow-rates have been summarized in **Table 2**.

As mentioned previously, development involving the removal of the existing gravel area at the rear of the existing Home Hardware building and reconstruction of an asphalt parking area has already been completed at the time of this report. In order to review the site quantity control system as a whole, the pre-development flow-rate for the east parking lot area has been defined to determine the additional flow-rate for the system, and ultimately the total allowable

flow to Galbraith Court.

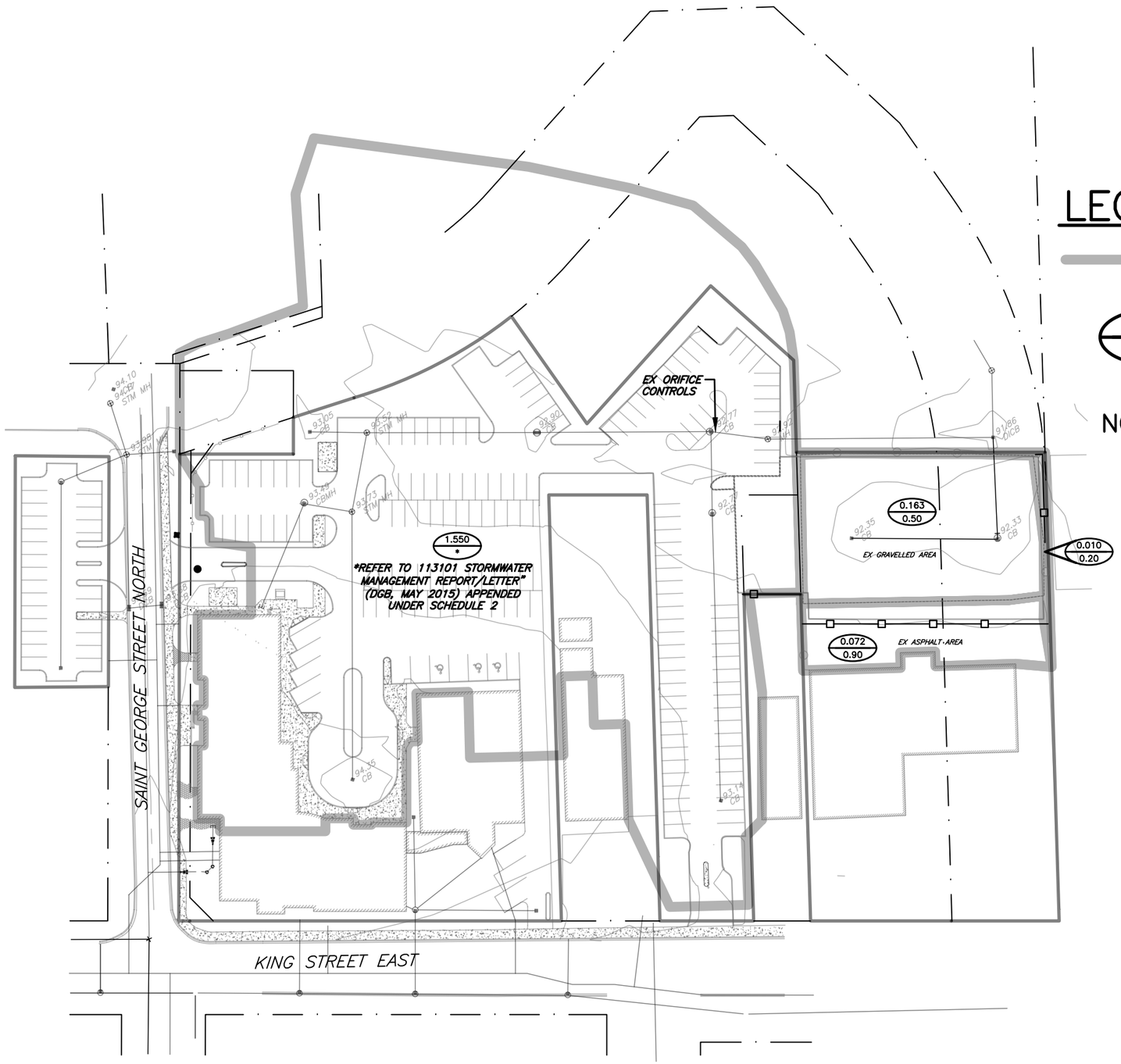
The pre-development peak flows from the East parking lot area have been calculated based on the pre-constructed condition. Flows were modelled using VISUAL OTTHYMO V6.3. The STANDHYD SUB ROUTINE was used to simulate the runoff generated from the catchment area to accurately determine the allowable pre-development peak flows. The model was used to determine the peak flows for the 2 through 100-year return frequency events per the Municipality of Clarington Design Guidelines and Standard Drawings. The pre-development areas used to define the additional catchment area are summarized on **Figure 2A**, the Pre-Development Storm Drainage Plan. Refer to the Visual OTTHYMO Output, appended under Schedule 3, for the pre-development flow-rates from the additional parking area. A summary of the pre-development flows is provided in **Table 2**, below:

Table 2: Summary of Pre-Development Flows

DESIGN STORM (YEARS)	[1]PRE-DEV PEAK FLOWS (L/s)	[2]ADDITIONAL PRE-DEV PEAK FLOWS (L/s)	TOTAL ALLOWABLE PRE-DEV PEAK FLOWS (L/s)
2 Year	73	31	**104**
5 Year	75	40	**115**
10 Year	76	47	**123**
25 Year	107	52	**159**
50 Year	142	68	**210**
100 Year	175	102	**277**

1.The Pre-Development Peak Flows were conservatively derived as the post-development peak flows generated by the existing storm system from the previously approved SWM Report completed by D.G. Biddle (May 2015) – Refer to Schedule 2.
2. Additional Pre-Dev Peak Flows are calculated based on the additional area for the East Parking Lot expansion. The modelled catchment area is illustrated under the Figure 2A, the Pre-Development Storm Drainage Scheme.

In order to attenuate peak flows at or below the allowable flow rates listed in Table 2, a retrofit of the existing quantity control systems has been proposed. The original Storm system for the property will herein be referred to as System 1 and the constructed Storm system for the east parking lot area will herein be referred to as System 2 for ease of reference.



LEGEND

DRAINAGE BOUNDARY

0.25 / 0.90 — DRAINAGE AREA / RUNOFF COEFFICIENT

NOTE: THIS PLAN IS FOR STORM DRAINAGE AREAS ONLY

NO.	SUBMISSION	DATE

BARRY BRYAN ASSOCIATES
222 KING STREET EAST, BOWMANVILLE

PRE-DEVELOPMENT DRAINAGE SCHEME

D.G. BIDDLE & ASSOCIATES
CONSULTING ENGINEERS & PLANNERS
96 King Street East
Oshawa, Ontario, L1H 1B6
Phone: 905-576-8500
info@dgbiddle.com
dgbiddle.com

SCALE: 1:500	PROJECT NO.: 125807
DESIGNED BY: B.K.Y.	DRAWING NO.:
CHECKED BY: C.J.F.	FIGURE 2A

X:\DATA\DGB FILES\125000\125100 222 KING STREET EAST - BOWMANVILLE HEALTH CT CLINIC EXPANSION\125100 DRAWINGS\125100 DRAWINGS CIVIL\125100 ENGINEERING DRAWINGS\125100-2016100-SIM FIGURES

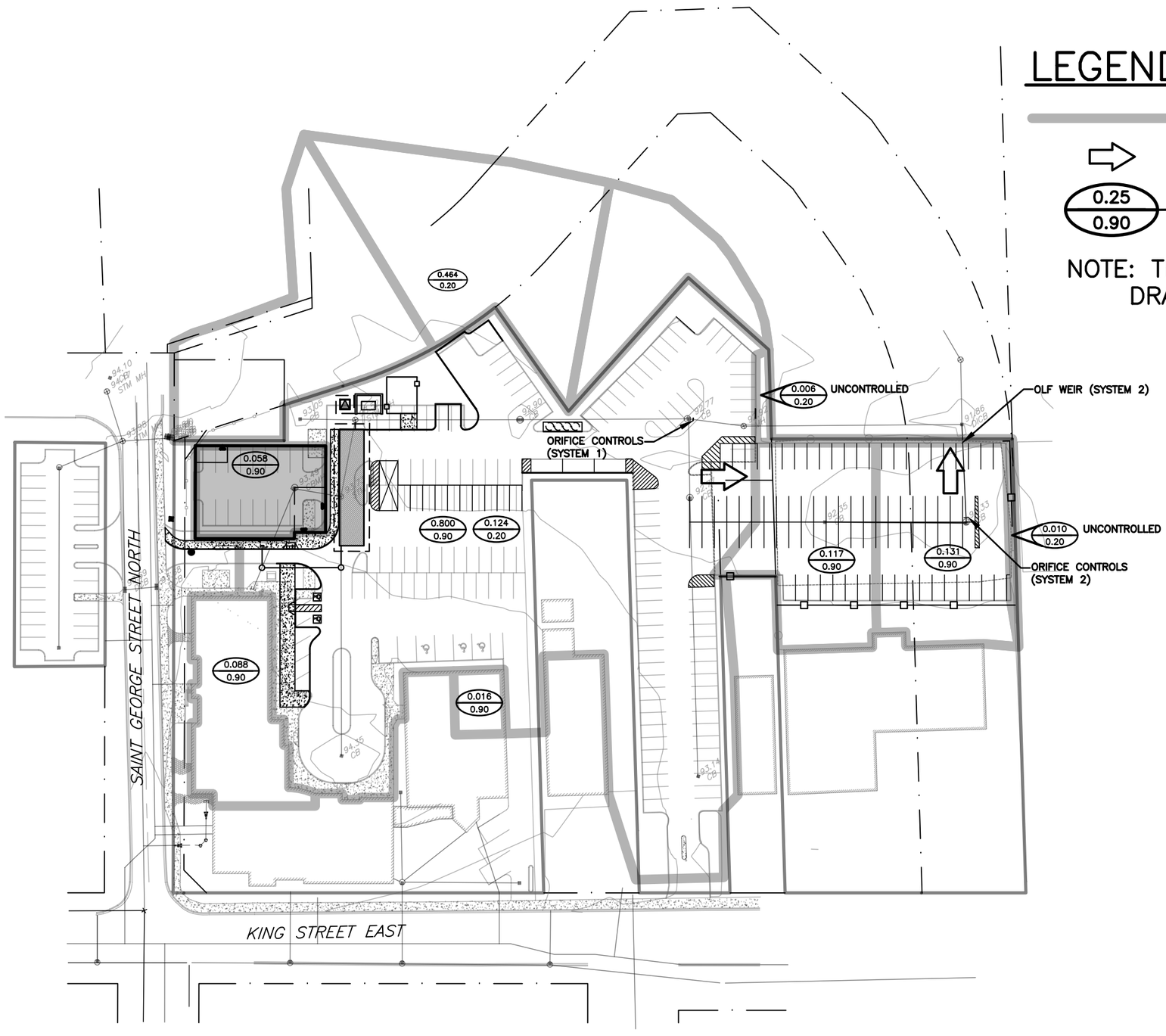
System 1 has been evaluated to simulate the surface characteristics of the site under post-development conditions. The introduction of the east parking lot area resulted in a reduction in the surface storage volume available for System 1. As such, additional quantity controls have been proposed to include underground storage to account for the differential in storage volume. While the existing system provides a stormwater detention volume of approximately 89m^3, additional volume is provided in the form of a StormBrixx SD900 system, capable of providing up to 122.8m^3 of stormwater storage. In addition, the existing Ipex Type D Inlet Control Device, located on the downstream end of *EX CBMH-6,* has been proposed to be removed and replaced with a 190mm plate orifice. During larger storm events (i.e. exceeding the 10-year return frequency event), drainage tributary to System 1 will ultimately overflow to System 2 via overland flow route where it will be attenuated prior to discharge downstream.

System 2 was also evaluated under post-development conditions to determine the increase in runoff from the constructed asphalt parking area. System 2 was designed to attenuate runoff via surface ponding storage in conjunction with a 90mm plate orifice. A 4.0m wide weir is proposed to be cut into the existing curb on the north end of the existing parking area to provide an overland flow route to the existing DICB north of the east parking lot area.

The proposed quantity control systems were modeled using VISUAL OTTHYMO V6.3 to determine the post-development peak flows for the property. The site's impervious areas were modelled based on the STANDHyd Sub-Routine. The site landscape areas were modelled based on the NASHyd Sub-Routine. The ROUTE RESERVOIR Sub-Routine was used to simulate the performance of the stormwater storage in the form of underground chambers, sewer pipe/structure storage, and surface ponding in conjunction with flow attenuation devices (Orifice, Weir).

The Post-Development Drainage Areas are illustrated on the Post-development Drainage Plan, **Figure 2B**. The Visual OTTHYMO output is provided as **Figure 3**, appended to this report under **Schedule 3**. The storage volume calculations and stage-storage-discharge relationship are attached at the end of this report.

The pre- and post-development peak flow rates and required stormwater storage volumes are summarized in the following table::



LEGEND

DRAINAGE BOUNDARY

OVERLAND FLOW

0.25 / 0.90 — DRAINAGE AREA / RUNOFF COEFFICIENT

NOTE: THIS PLAN IS FOR STORM DRAINAGE AREAS ONLY

NO.	SUBMISSION	DATE

BARRY BRYAN ASSOCIATES
222 KING STREET EAST, BOWMANVILLE

POST–DEVELOPMENT DRAINAGE SCHEME

D.G. BIDDLE & ASSOCIATES
CONSULTING ENGINEERS & PLANNERS
96 King Street East
Oshawa, Ontario, L1H 1B6
Phone: 905-576-8500
info@dgbiddle.com
dgbiddle.com

SCALE: 1:500	PROJECT NO.: 125807
DESIGNED BY: B.K.Y.	DRAWING NO.: FIGURE 2B
CHECKED BY: C.J.F.	

X:\DWFS\125000\125150 222 KING STREET EAST - BOWMANVILLE HEALTH CT CLINIC EXPANSION\125150 DRAWINGS\125150 DRAWINGS DWG\125150 ENGINEERING DRAWINGS\125150-2501150-MAY FIGURES

Table 3: Summary of Pre and Post Development Flows

DESIGN STORM (YEARS)	TOTAL ALLOWABLE PRE-DEV PEAK FLOWS (L/s)	POST-DEV PEAK FLOWS (L/s)	REQUIRED STORAGE (System 1) (m^3)	REQUIRED STORAGE (System 2) (m^3)
2 Year	**104**	**102**	78	21
5 Year	**115**	**110**	120	31
10 Year	**123**	**116**	150	38
25 Year	**159**	**129**	210[1]	52
50 Year	**210**	**193**	212[1]	101
100 Year	**277**	**218**	212[1]	126

1.Flows in excess of System 1 shall overflow to System 2 – Refer to Visual OTTHYMO Output, Schedule 3.

As the preceding table illustrates, post-development peak flows will be attenuated at or below the pre-development levels for all return frequency events. Additionally, the required storage volume of 212m^3 and 126m^3 for System 1 and System 2, respectively, are less than or equal to the available storage volumes of 212m^3 and 148m^3.

Accordingly, the proposed quantity controls are adequate and no adverse impacts to the receiving drainage network are anticipated.

4.2 Stormwater Quality Control

The development will result in an overall increase of 0.039ha from landscape to impervious area (asphalt/rooftop), as well as a conversion of 0.163ha from gravel to asphalt. The proposed increase in impervious area (0.202ha), is below the threshold of 0.25ha where quality controls are typically required.

This 0.039ha site area converted from landscape to asphalt will follow the same drainage pattern as the pre-developed condition and continue to be captured and treated by the existing Stormceptor Model 750 OGS unit located at the east side of the site, upstream of the stormwater outlet. The minor increase in area is not expected to have an impact on the performance of the existing Stormceptor unit.

It is notable that the 0.163ha conversion from graveled area to asphalt area will provide passive benefit, as gravel is more susceptible to erosion and sedimentation than asphalt.

The proposed re-development is not anticipated to increase in TSS loading across the site and therefore, no negative impacts to the downstream watercourse are expected.

5.0 TEMPORARY EROSION AND SEDIMENT CONTROLS

During the construction period, the removal of natural vegetation causes the transport of large amounts of sediment during rainfall events. To minimize the sediment-laden stormwater leaving the site during construction, the following sediment control techniques are proposed to be implemented. These measures are detailed on the Erosion and Sediment Control Plan, drawing **125807-ES-1**, appended to this report.

1. Catch Basin Filtration
2. Perimeter Enviro Fence
3. Mud Mat
4. Good Engineering Practices

6.0 CONCLUSIONS

The preceding report identifies the method in which the proposed development can be serviced in accordance with Municipality of Clarington, the Region of Durham, and the Central Lake Ontario Conservation Authority requirements. The investigations into these requirements have resulted in the following conclusions for the future Site Plan Application:

- Domestic and Fireline water service connections from the existing building will be required for water servicing for subject property. A Public hydrant is proposed from the existing 150mm Watermain on St. George St. N. A new fire department connection is located on the proposed 4 storey medical building;
- An inspection manhole is proposed 1.50m inside the property line from the existing 375mm sanitary sewer on St. George St. N. A sanitary connection from the proposed inspection manhole will be extended to the proposed 4 storey medical building;
- A 375mm storm sewer connection has been provided to convey drainage from the completed construction of the east parking lot asphalt area;
- The site will provide adequate quantity controls to meet Municipality of Clarington Quantity Control requirements. Additional stormwater management infrastructure will be implemented, to attenuate total post-development flows to acceptable pre-development levels, inclusive of an underground stormwater detention system, a retrofit of the existing orifice to a 190mm plate orifice, and an overland flow weir;
- Additional quality controls are not anticipated to be required for the development due to the small area of redevelopment;
- Erosion and Sediment Control during construction is to be implemented with catch basin filtration, entrance mud mat, silt fence installation and good housekeeping practices.

We trust the Municipality of Clarington and Region of Durham concur with the above. If there are any questions or concerns, please contact our office at your earliest convenience.

OSHAWA
200-481 Taunton Road West
Oshawa, ON L1J 0G3
905-576-8500

PETERBOROUGH
402-150 King Street
Peterborough, ON K9J 2R9
705-201-0272

dgbiddle.com

SCHEDULE 1

5-YR STORM SEWER DESIGN SHEET

SANITARY SEWER DESIGN SHEET

RUNOFF COEFFICIENT CALCULATIONS

STAGE–STORAGE–DISCHARGE CALCULATIONS

STORM SEWER DESIGN SHEET

D.G.BIDDLE & ASSOCIATES LTD.

consulting engineers

MUNICPALITY	CLARINGTON	**DESIGN BY**	BKY
PROJECT	BOWMANVILLE PROFESSIONAL BUILDING	**CHK'D BY**	CJF
PROJECT #	125807	**DATE**	MAY 2/14
		REV1	Sept 25, 2015
		REV2	July 28, 2026
		REV3	October 30, 2026

CRITERIA		**RUN OFF CO-EFFICIENTS**	
n	0.013	PARK	I=0.20
STORM	5 YEAR	SINGLE,SEMI	I=0.50
A	2464	TOWNHOUSES,SCHOOL	I=0.70
B	16	APARTMENTS	I=0.65
C	1	COMMERCIAL	I=0.90

LOCATION			DRAINAGE DATA				RATIONAL DESIGN			PIPE DATA								
STREET	**FROM MH**	**TO MH**	**AREA** (ha)	**I**	**AxI**	**ACCUM** AxI	**T.C** min	**R** mm/hr	**FLOW** L/sec	**SIZE** mm	**GRADE** %	**CAPACITY** L/sec	**VELOCITY** m/s	**LENGTH** m	**TIME** min	**TOTAL TIME**	**% LOAD**	
Site	*EX BLDG*	PROP STM MH-4	0.088	0.90	0.079	0.079	15.00	79.48	17.46	250	2.50	98.08	1.94	5.19	0.04	15.04	17.80	
	PROP BLDG	PROP STM MH-4	0.058	0.90	0.052	0.052	15.00	79.48	11.49	150	2.00	22.47	1.23	4.94	0.07	15.07	51.14	
	PROP STM MH-4	PROP STM MH-5				0.131	15.07	79.31	28.88	250	1.50	75.97	1.50	17.51	0.19	15.26	38.02	
	EX ST-3	PROP STM MH-5	0.039	0.90	0.035	0.035	15.00	79.48	7.73	250	1.50	75.97	1.50	41.70	0.46	15.46	10.18	
	PROP STM MH-5	STORMBRIXX				0.166	15.26	78.82	36.37	250	1.50	75.97	1.50	4.83	0.05	15.32	47.88	
	STORMBRIXX	*EX MH-6*				0.166	15.32	78.68	36.31	250	2.40	96.10	1.90	2.08	0.02	15.33	37.78	
	OFFSITE	*EX STM CB-11*	0.170	0.20	0.034	0.034	15.00	79.48	7.51									
	EX STM CB-11	*EX MH-6*	0.038	0.20	0.008	0.042	15.00	79.48	9.19	300	0.50	71.33	0.98	12.19	0.21	15.21	12.89	
	EX ST-6	*EX DCBMH 9*				0.208	15.32	78.68	45.50	300	0.50	71.33	0.98	35.75	0.61	15.92	63.79	
	OFF SITE	*EX DCBMH 9*	0.206	0.20	0.041	0.041	15.00	79.48	9.06									
	ROOF	*EX DCBMH 9*	0.016	0.90	0.014	0.014	15.00	79.48	3.09									
	EX DCBMH 9	*EX CBMH 6*	0.396	0.84	0.333	0.596	15.92	77.18	127.88	300	1.50	123.54	1.69	37.75	0.37	16.30	103.51	
	EX CBMH 8	*EX CBMH 7*	0.100	0.77	0.077	0.077	15.00	79.48	17.01	1200	0.30	2227.67	1.91	60.50	0.53	15.53	0.76	
	EX CBMH 7	*EX CBMH 6*	0.219	0.87	0.191	0.268	15.53	78.15	58.23	375	0.50	129.33	1.13	17.56	0.26	15.79	45.02	
	OFF SITE	*EX CBMH 6*	0.088	0.20	0.018	0.018	15.00	79.48	3.98									
190mm Plate Orifice	*EX CBMH 6*	*STC 750*	0.132	0.77	0.102	0.984	16.30	76.29	**115.00**	375	0.50	129.33	1.13	12.90	0.19	16.49	88.92	1
115 L/s	*STC 750*	*EX CBMH*				0.984	16.49	75.85	**115.00**	375	1.00	182.90	1.60	48.78	0.51	16.99	62.88	1
124004 Parking Lot	*EX CB-2*	*EX CBMH-1*	0.117	0.90	0.11	0.106	15.00	79.48	23.42	250	0.50	43.86	0.87	31.05	0.60	15.60	53.40	2
Expansion	*EX CBMH-1*	*EX CBMH*	0.131	0.90	0.12	0.224	15.60	77.98	**23.60**	250	0.50	43.86	0.87	21.73	0.42	16.02	53.80	2

1. Flow-rate adjusted to 100-year post-development orifice flow-rate from System 1 (115 L/s) - Refer to Visual OTTHymo

2. Flow-rate adjusted to 100-year post-development orifice flow-rate from System 2 (23.42 L/s) - Refer to Visual OTTHymo

SANITARY SEWER DESIGN SHEET

D.G.BIDDLE & ASSOCIATES LTD.

consulting engineers

MUNICIPALITY Bowmanville, ON
PROJECT 222 King Street West
PROJECT # 125807

DESIGN BY BKY
CHK'D BY CJF
DATE Jul-26

		RESIDENTIAL						COMMERCIAL			INDUSTRIAL	INSTITUT'N	FLOW (L/s)						PIPE DATA			
FROM MH	TO MH	GROSS AREA (ha)	DEN-SITY	POPU-LATION	PFF	TOTAL POPU-LATION	TOTAL AREA (ha)	LOT AREA (ha)	FLOOR SPACE INDEX	FLOOR AREA (ha)	LOT AREA (ha)	LOT AREA (ha)	RES INFIL 0.26	SEWAGE 0.0042	COMM 2.08	INDUS 1.04	INST 1.30	TOTAL FLOW l/s	SIZE mm	GRADE %	CAPACITY l/s	VELOCITY m/s
PROP BUILDING	**SAN MH-1**							0.232	0.500	0.116			0.00	0.000	0.241	0.00	0.00	0.241	150	1.00	15.89	0.87
SAN MH-1	***EX SEWER***							0.232	0.500	0.116			0.00	0.000	0.241	0.00	0.00	0.241	150	0.50	11.23	0.62

PROJECT	222 King Street East, Bowmanville ON
PROJECT #	125807
DATE	Oct-26

Composite Runoff Coefficient Calculations - East Parking Lot - Post-Development

East parking lot area tributary to Galbraith Court — 0.245 ha

Item *[HYMO catchment ID]*	Runoff Coefficient 'c'	Area (ha)	A*c	%IMP
Asphalt area	0.90	0.072	0.065	
Gravelled area	0.50	0.163	0.082	
Landscape area	0.20	0.010	0.002	
East Parking Lot Area (Pre-Dev) ***[15]***	**0.61**	**0.245**		**57.90%**

Composite Runoff Coefficient Calculations - Post-Development

Total Site Area — ***1.814 ha***

On-Site Tributary to Ex CB-11 — 0.038 ha

Item	Runoff Coefficient 'c'	Area (ha)	A*c
Pervious Area	0.20	0.038	0.008
Runoff Coefficient 'c' =	**0.20**		

On-Site Rooftops — 0.162 ha

Item	Runoff Coefficient 'c'	Area (ha)	A*c
Ex Rooftop	0.90	0.088	0.079
Ex Rooftop	0.90	0.016	0.014
Prop Bldg	0.90	0.058	0.052
Runoff Coefficient 'c' =	**0.90**		

On-Site Tributary to *Ex DICB-9* — 0.396 ha

Item	Runoff Coefficient 'c'	Area (ha)	A*c
Pervious Area	0.20	0.034	0.007
Impervious Area	0.90	0.362	0.326
Runoff Coefficient 'c' =	**0.84**		

On-Site Tributary to *Ex ST-6* — 0.039 ha

Item	Runoff Coefficient 'c'	Area (ha)	A*c
Impervious Area	0.90	0.039	0.035
Runoff Coefficient 'c' =	**0.90**		

On-Site Tirbutary to *Ex CBMH-6* — 0.132 ha

Item	Runoff Coefficient 'c'	Area (ha)	A*c
Pervious Area	0.20	0.024	0.005
Impervious Area	0.90	0.108	0.097
Runoff Coefficient 'c' =	**0.77**		

On-Site Tributary to *Ex CBMH-8* — 0.100 ha

Item	Runoff Coefficient 'c'	Area (ha)	A*c
Pervious Area	0.20	0.019	0.004
Impervious Area	0.90	0.081	0.073
Runoff Coefficient 'c' =	**0.77**		

On-Site Tributary to *Ex CBMH-7* — 0.219 ha

Item	Runoff Coefficient 'c'	Area (ha)	A*c
Pervious Area	0.20	0.009	0.002
Impervious Area	0.90	0.210	0.189
Runoff Coefficient 'c' =	**0.87**		

On-Site Tributary to CB-1 — 0.117 ha

Item	Runoff Coefficient 'c'	Area (ha)	A*c
Impervious Area	0.90	0.117	0.105
Runoff Coefficient 'c' =	**0.90**		

On-Site Tributary to CBMH-2 — 0.131 ha

Item	Runoff Coefficient 'c'	Area (ha)	A*c
Impervious Area	0.90	0.131	0.118
Runoff Coefficient 'c' =	**0.90**		

On-Site Uncontrolled Drainage — 0.016 ha

Item	Runoff Coefficient 'c'	Area (ha)	A*c
Pervious Area	0.20	0.016	0.003
Runoff Coefficient 'c' =	**0.20**		

Off-Site Drainage — 0.464 ha

Item	Runoff Coefficient 'c'	Area (ha)	A*c
Pervious Area	0.20	0.464	0.093
Runoff Coefficient 'c' =	**0.20**		

Total Site — 1.814 ha

Item *[HYMO catchment ID]*	Runoff Coefficient 'c'	Area (ha)	A*c	%IMP
On-Site Rooftops (Rooftop retention) ***[1]***	0.90	0.088	0.079	
On-Site Rooftops (To Grade) ***[2]***	0.90	0.074	0.067	
On-Site Controlled Impervious Area Tributary to Galbraith Court ***[3]***	0.90	0.800	0.720	
On-Site Controlled Pervious Area Tributary to Galbraith Court ***[4]***	0.20	0.124	0.025	
Off-Site Controlled Tributary to Galbraith Court ***[5]***	0.20	0.464	0.093	
On-Site East Parking Lot Expansion ***[6]***	0.90	0.248	0.223	
Uncontrolled Drainage Tributary to Galbraith Court ***[7]***	0.20	0.016	0.003	
Runoff Coefficient 'c' (Total)	**0.67**	1.814		66.71%

System 1 - Stage Storage Discharge

Project No. **125807**

Date: **2026-10-29**

C/L Orifice: 90.70 m

Elevation (m)	Head (m)	Surface Storage (m3)	Stormbrixx Storage (m^3)	Pipe Storage (m^3)	Total Storage (m^3)	Plate Orifice Discharge (m^3/s)
90.70	0	0.00	0.00	0.00	0.00	0.0000
91.55	0.85	0.00	0.00	38.61	38.61	0.0718
91.90	1.20	0.00	47.76	77.21	124.97	0.0853
92.25	1.55	0.00	95.51	77.21	172.72	0.0969
92.45	1.75	0.00	122.80	77.21	200.01	0.1073
92.77	2.07	0.00	122.80	77.21	200.01	0.1120
92.80	2.10	0.28	122.80	77.21	200.29	0.1128
92.85	2.15	4.37	122.80	77.21	204.38	0.1142
92.88	2.18	11.70	122.80	77.21	211.71	0.1155

System 1 - Plate Orifice Discharge

Project No. **125807**

Date: **2026-10-29**

Orifice 1 (Plate Orifice)		
$Q=CA(2gh)^{0.5}$		
Type	Plate	
Diameter=	0.190	m
Area=	0.0284	m²
C=	0.62	Coefficient
C/L Elev=	90.70	m

Q= 0.0176 (2*GH)^0.5

Elevation (m)	Head (m)	Discharge (m3/s)	Discharge (L/s)
90.70	0.00	0.00000	0.00
91.55	0.85	0.07179	71.79
91.90	1.20	0.08530	85.30
92.25	1.55	0.09694	96.94
92.60	1.90	0.10733	107.33
92.77	2.07	0.11203	112.03
92.80	2.10	0.11284	112.84
92.85	2.15	0.11417	114.17
92.90	2.20	0.11549	115.49

Orifice Equation based on:
Q=CA(2GH)^0.5

G = Gravitational Constant
H = Head (m)
C = Weir Coefficient
B = Weir Width (m)

System 1 - Surface Storage

Project No. **125807**

Date: **2026-10-29**

Structure: *EX CBMH 6*

Rim: 92.77

	Elevation (m)	End Area (m2)	Avg Area (m2)	Depth (m)	Volume (m3)	Total Volume (m3)
Rim	92.770	0.000				
			2.985	0.030	0.090	0.090
	92.800	5.970				
			31.370	0.050	1.568	1.658
	92.850	56.770				
			116.775	0.030	3.503	5.161
	92.880	176.780				

System 1 - Surface Storage

Project No. **125807**

Date: **2026-10-29**

Structure: *EX CBMH 7*

Rim: 92.77

	Elevation (m)	End Area (m2)	Avg Area (m2)	Depth (m)	Volume (m3)	Total Volume (m3)
Rim	92.770	0.000				
			6.430	0.030	0.193	0.193
	92.800	12.860				
			50.345	0.050	2.517	2.710
	92.850	87.830				
			127.670	0.030	3.830	6.540
	92.880	167.510				

System 1 - Surface Storage

Project No. **125807**

Date: **2026-10-29**

	Surface Volume		
Elevation	*EX CBMH 6*	*EX CBMH 7*	Total Volume
(m)	(m3)	(m3)	(m3)
92.770	0.000	0.000	0.000
92.800	0.090	0.193	0.282
92.850	1.658	2.710	4.368
92.900	5.161	6.540	11.702

System 1 - Pipe Storage

Project No. **125807**

Date: **2026-10-29**

	Diameter (mm)	X-Sect Area (m^2)	Length (m)	Volume (m^3)
EX CBMH 8 to *EX CBMH 7*	1200	1.13097	60.50	68.424
EX CBMH 7 to *EX CBMH 6*	375	0.11045	17.90	1.977
EX DCBMH-9 TO EX CBMH-6	300	0.07069	37.00	2.615
EX MH-6 to *EX DCBMH 9*	300	0.07069	35.75	2.527
EX CB-11 to *EX MH-6*	150	0.01767	12.19	0.215
STORMBRIX to EX *MH 6*	250	0.04909	2.08	0.102
MH-5 to STORMBRIXX	250	0.04909	4.83	0.237
MH-4 to MH-5	250	0.04909	17.51	0.860
BLDG TO MH-4	250	0.04909	5.19	0.255
			Total	77.212

222 King Street East
Project No. 125807
2026-10-29

System 2 - East Parking Lot - Storage/Discharge

			Storage				Orifice		Weir	
Elevation	Delta H (mm)	Depth (mm)	Cumulative Structure and Pipe Storage (m³)	Cumulative Surface Storage (m³)	Total Storage (m³)	**Total Storage (ha.m)**	Head (m)	**Discharge (m³/s)**		**TOTAL Discharge (m³/s)**
90.80	0.00	0	0.00	0.00	0.00	0.00000	0.00	0.0000	0.0000	0.0000
91.00	0.20	200.00	6.24	0.00	6.24	0.00062	0.20	0.0078	0.0000	0.0078
91.20	0.20	400.00	6.24	0.00	6.24	0.00062	0.40	0.0110	0.0000	0.0110
91.40	0.20	600.00	6.24	0.00	6.24	0.00062	0.60	0.0135	0.0000	0.0135
91.60	0.20	800.00	6.24	0.00	6.24	0.00062	0.80	0.0156	0.0000	0.0156
91.80	0.20	1000.00	6.24	0.00	6.24	0.00062	1.00	0.0175	0.0000	0.0175
92.00	0.20	1200.00	6.24	0.00	6.24	0.00062	1.20	0.0191	0.0000	0.0191
92.20	0.20	1400.00	6.24	0.00	6.24	0.00062	1.40	0.0207	0.0000	0.0207
92.35	0.15	1550.00	6.24	0.00	6.24	0.00062	1.55	0.0218	0.0000	0.0218
92.40	0.05	1600.00	6.24	0.72	6.96	0.00070	1.60	0.0221	0.0000	0.0221
92.45	0.05	1650.00	6.24	7.08	13.32	0.00133	1.65	0.0224	0.0000	0.0224
92.50	0.05	1700.00	6.24	26.52	32.77	0.00328	1.70	0.0228	0.0000	0.0228
92.55	0.05	1750.00	6.24	64.56	70.81	0.00708	1.75	0.0231	0.0000	0.0231
92.60	0.05	1800.00	6.24	117.93	124.18	0.01242	1.80	0.0234	0.0762	0.0996
92.62	0.02	1820.00	6.24	141.80	148.05	0.01480	1.82	0.0236	0.1262	0.1498

*Note: Surface storage updated to match as-built condition

Orifice (Plate Orifice)		
$Q=CA(2gh)^{0.5}$		
Type	Plate	
Diameter=	0.090	m
Area=	0.0064	m2
C=	0.62	
C/L Elev=	90.810	m

Structure Storage

Structure	Cross Section Area	Rim	Invert	Depth	Volume (m3)
CBMH-1	1.131	92.35	90.76	1.59	1.80
CB-2	1.131	92.35	90.97	1.38	1.56
				Total	3.36

Pipe Storage

Size (mm)	Length (m)	Area (m2)	Total Volume (m3)
250	58.78	0.0491	2.89
		Total	2.89

Surface Storage

Elevation (m)	Total Volume (m3)
92.35	0.00
92.40	0.72
92.45	7.08
92.50	26.52
92.55	64.56
92.60	117.93
92.62	141.80
Total	141.80

222 King Street East
Project No. 125807
2026-10-29

System 2 - East Parking Lot - Surface Storage

Structure: *EX CBMH ST-B*
Rim: 93.35 m
Max Ponding Elevation: 93.62 m
Max Ponding Depth: 0.27 m

Elevation (m)	End Area (m2)	Avg Area (m2)	Depth (m)	Volume (m3)	Cum. Volume (m3)
93.35	0.00				0
		8.45	0.05	0.42	
93.40	16.89				0.4
		74.00	0.05	3.70	
93.45	131.11				4.1
		222.80	0.05	11.14	
93.50	314.49				15.3
		380.40	0.05	19.02	
93.55	446.30				34.3
		510.59	0.05	25.53	
93.60	574.87				59.8
		594.25	0.02	11.88	
93.62	613.63				71.7

Structure: *EX CB ST-A*
Rim: 93.35 m
Max Ponding Elevation: 93.62 m
Max Ponding Depth: 0.27 m

Elevation (m)	End Area (m2)	Avg Area (m2)	Depth (m)	Volume (m3)	Cum. Volume (m3)
93.35	0.00				0
		5.96	0.05	0.30	
93.40	11.92				0.3
		53.18	0.05	2.66	
93.45	94.43				3.0
		166.06	0.05	8.30	
93.50	237.69				11.3
		380.38	0.05	19.02	
93.55	523.07				30.3
		556.86	0.05	27.84	
93.60	590.65				58.1
		599.35	0.02	11.99	
93.62	608.04				70.1

System 2 - East Parking Lot - Weir Discharge

Project No. 125807

Date: **2026-10-29**

Weir Width:	4.00	m
Weir Coeff:	0.577	
Invert:	92.55	m
Gravity Constant	9.81	m/s2

Elevation (m)	Head (m)	Discharge (m3/s)
92.55	0.00	0.00000
92.60	0.05	0.07620
92.62	0.07	0.12622

Orifice Discharge Equation

$$Q = 6.8154\ H^{(3/2)}$$

Orifice Equation based on:

$Q=(2/3)CB\sqrt{2G}(H^{3/2})$

G = Gravitational Constant
H = Head (m)
C = Weir Coefficient
B = Weir Width (m)

SCHEDULE 2

EXCERPTS FROM
"Stormwater Management Letter / Report – Bowmanville Professional Building, 222 King Street East – DGB File: 113101" (May 2015)

D. G. Biddle & Associates Limited
consulting engineers and planners

June 6, 2014
Revised May 15, 2015

Municipality of Clarington
40 Temperance Street
Bowmanville, ON L1C 3A6

Attention: Paul Wirch, Planning Services

Re: Stormwater Management Letter / Report
Bowmanville Professional Building
222 King Street East
Bowmanville, Municipality of Clarington
Our File: 113101

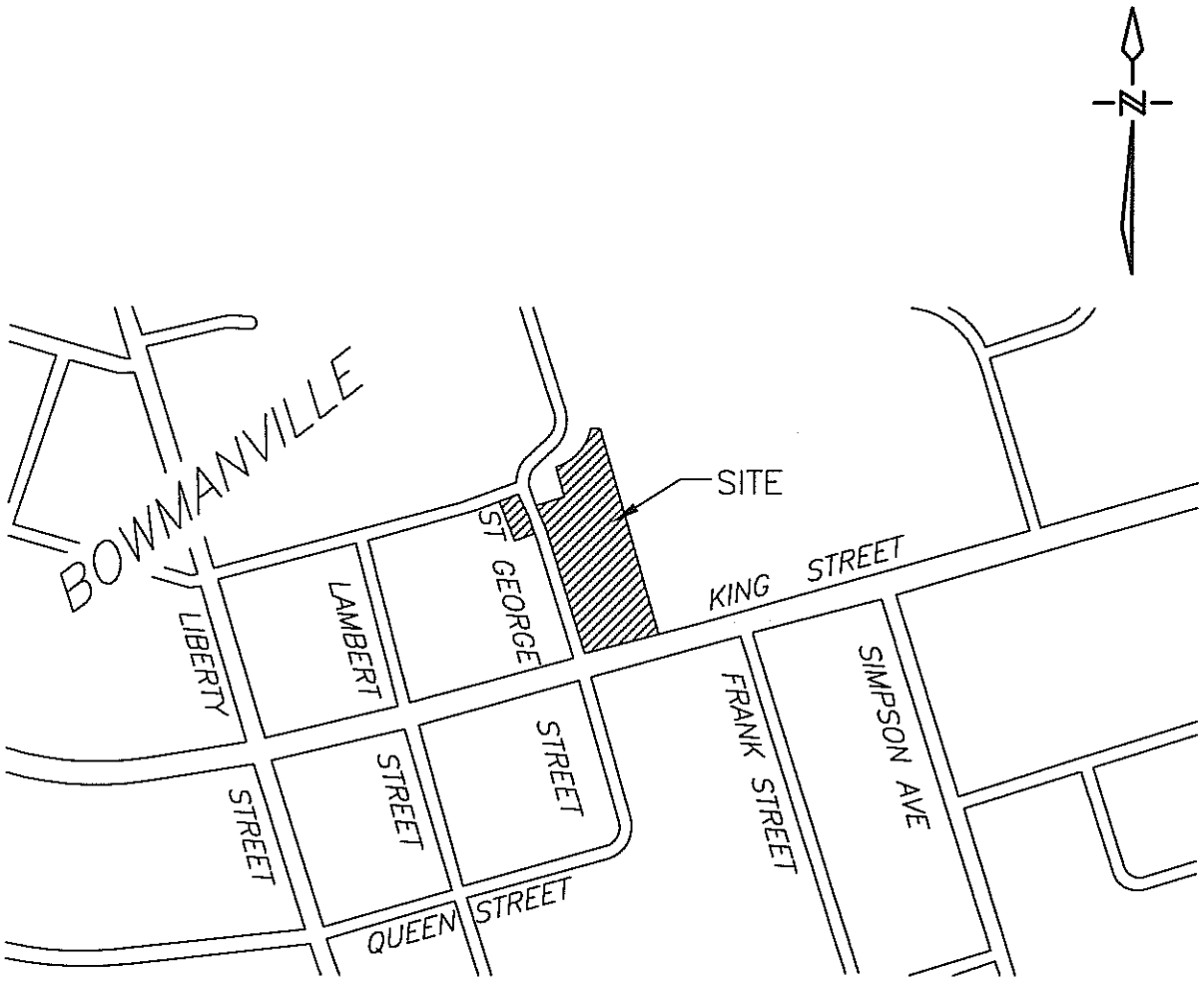
Dear Mr. Wirch:

In support of the Site Plan Application for the above referenced proposal, we herewith submit the following Stormwater Management Letter / Report. This letter / report has been prepared to identify the method in which the proposed development will meet the requirements of the Municipality of Clarington and Central Lake Ontario Conservation Authority in regards to stormwater drainage.

1.0 INTRODUCTION

The subject plan is located on the east side of St. George Street, Part of Lot 10, Concession 1 in the Municipality of Clarington, Regional Municipality of Durham. The proposed development will consist of a 3 storey office building addition and associated asphalt parking area. An additional parking area is proposed at the southwest corner of Church Street and St. George Street. A Site Location Plan illustrating the subject site is attached as Figure 1.

96 KING STREET EAST • OSHAWA, ONTARIO • L1H 1B6 • TELEPHONE (905) 576-8500 • FAX (905) 576-9730
e-mail: info@dgbiddle.com



222 KING STREET EAST, BOWMANVILLE

SITE LOCATION PLAN

D.G. Biddle & Associates Limited
consulting engineers and planners
96 KING STREET EAST • OSHAWA, ON • L1H 1B6
PHONE (905)576-8500 • FAX (905)576-9730
info@dgbiddle.com

SCALE	N.T.S.
DRAWN	P.D.C.
DESIGN	P.D.C.
CHECKED	M.B.C.
DATE	MAY2014

PROJECT 113101

DWG FIG 1

The Bowmanville Professional Building currently exists on the property. The site is bounded on the south by King Street East, on the east by existing commercial properties, on the north by vacant land, and on the west by St. George Street.

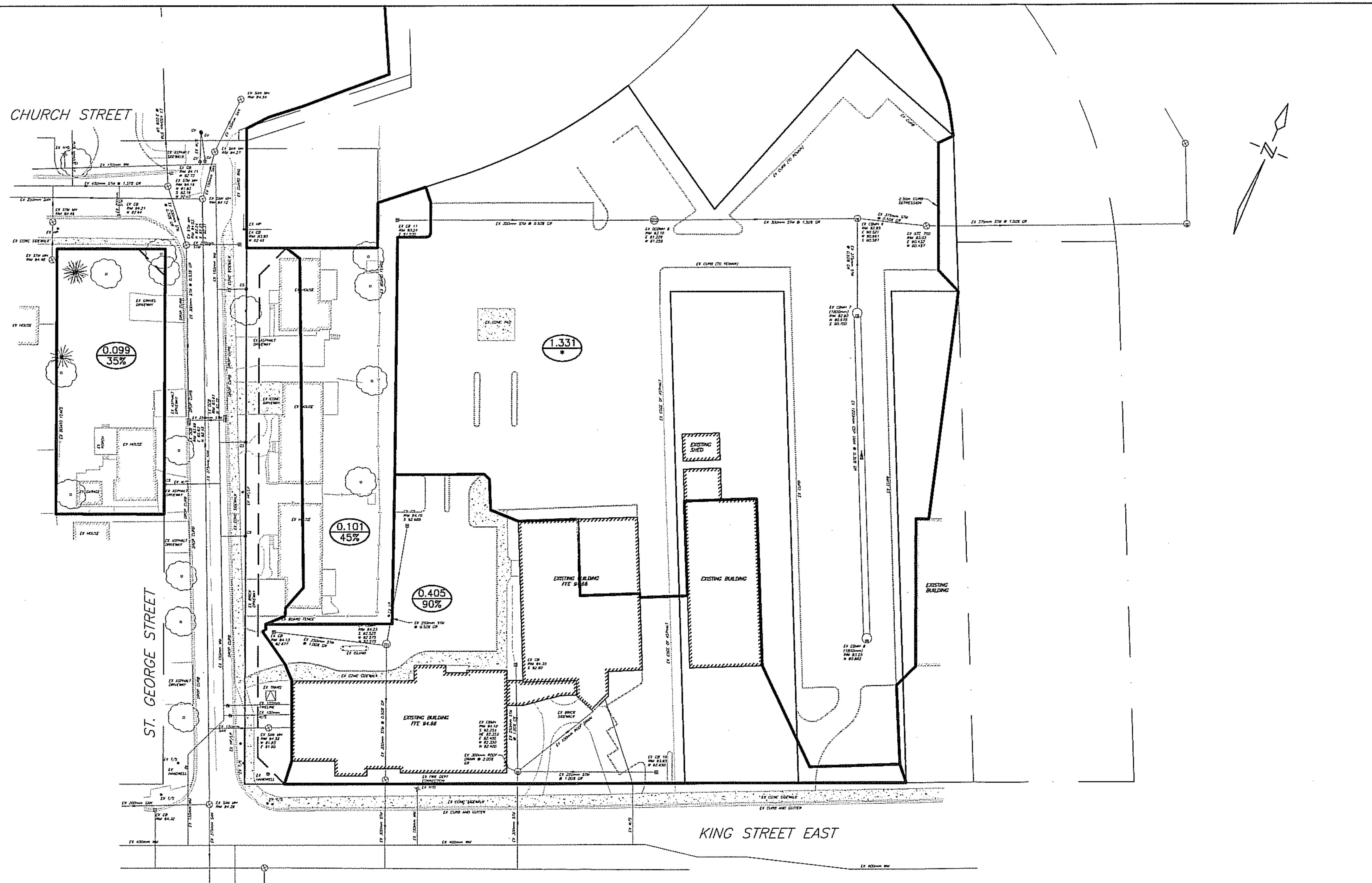
The proposed auxiliary parking area is currently occupied by an existing residential dwelling. The parking area is bounded on the south and west by existing residential properties, on the north by Church Street and on the east by St. George Street.

2.0 STORMWATER QUANTITY CONTROLS

As noted above, the Bowmanville Professional Building currently occupies the site. The proposed development will comply with the stormwater requirements as per the previous Stormwater Management Report prepared by this office, dated August 2004. All stormwater flows from the northern parking lot will be detained on site and discharge through the existing storm sewer to Galbraith Court at pre-development levels. Attenuation of the stormwater will be provided by the existing orifice control device installed at Existing CBMH 6. The pre-development drainage scheme is attached as Figure 2.

Drainage from the south end of the turnaround area will be intercepted and directed towards the existing storm sewer system on King Street East. The existing drainage paths for the remainder of the site to King Street East will be maintained.

In addition to the stormwater controls implemented on the site at 222 King Street, stormwater quantity controls are also required for the proposed auxiliary parking lot on the southwest corner of Church Street and St. George Street. Stormwater drainage from the proposed auxiliary parking lot will be contained onsite and discharged to the existing storm sewer system on St. George Street at pre-development levels. This will be achieved



LEGEND

DRAINAGE BOUNDARY

0.250 — DRAINAGE AREA

45% — % IMPERVIOUS

* REFER TO PRE-DEVELOPMENT AREA CALCULATIONS

NOTE: THIS PLAN IS FOR STORM DRAINAGE AREAS ONLY

222 KING STREET EAST, BOWMANVILLE

PRE-DEVELOPMENT DRAINAGE SCHEME

D.G. Biddle & Associates Limited
consulting engineers and planners
96 KING STREET EAST · OSHAWA,ON · L1H 1B6
PHONE (905)576-8500 · FAX (905)576-9730
info@dgbiddle.com

SCALE	1:750
DRAWN	P.D.C.
DESIGN	P.D.C.
CHECKED	J.A.I.
DATE	5/15/15
PROJECT	113101
DWG	FIG 2

\\DATA\STAFF\JOB FILES\113000\113101 BOWMANVILLE PROFESSIONAL BLDG. MEDICAL CENTRE\113101 DRAWINGS\113101-SWM FIGURES.DWG

through the implementation of an orifice control device and surface storage. Details of the orifice control device are provided on the Site Servicing Plan, Drawing 113101 SS-1.

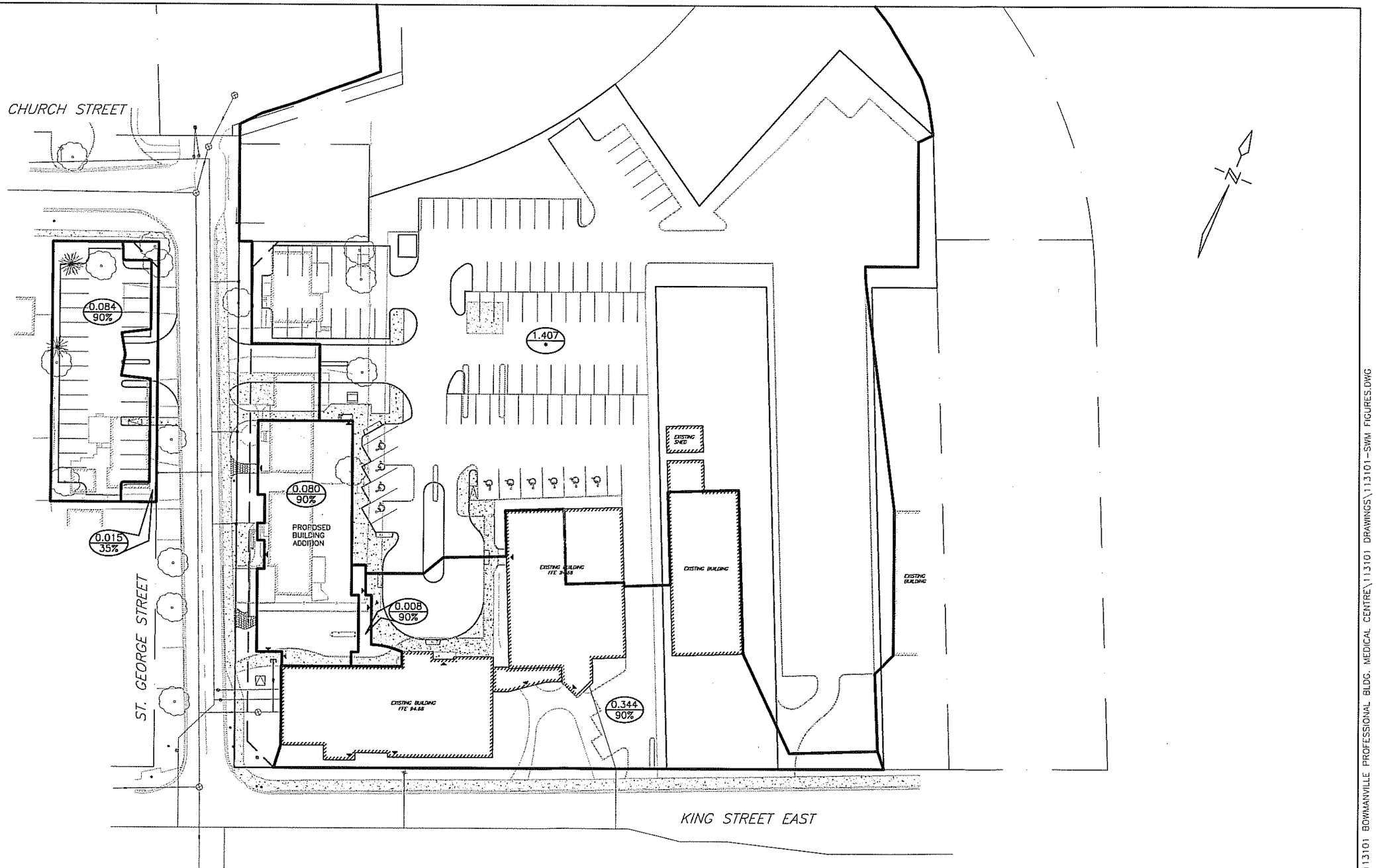
As indicated on the Site Grading and Servicing Plan, Drawings 113101 SG-1 and SS-1, the proposed parking lots are to be drained using a conventional storm drainage system consisting of positive draining surfaces intercepted by a minor storm sewer system.

The site storm sewer system as proposed has been sized to accommodate a 5-year return frequency post-development event as per Municipality of Clarington Design Criteria. The Storm Sewer Design Sheet is attached.

As mentioned above, all flows up to and including the 100-year storm event will be detained on-site to discharge at the pre-development levels. A positive overland flow route to Galbraith Court has been provided. The proposed storm sewer system is illustrated on drawing 113101-SS-1.

The STANDHYD Sub-Routine in the computer model VISUAL OTTHYMO 3.0 was used to simulate the post-development peak flows for the site. Peak flows were computed using a 2-hour Chicago distribution rainfall for the 5 year to 100 year return frequency events. The results are attached at the end of this report. The post-development drainage area tributary to the proposed internal storm sewer system for attenuation is 1.50ha. The Post-Development Drainage Scheme is attached as Figure 3. The ROUTE RESERVOIR Sub-Routine was used to simulate the performance of the rooftop storage volumes, surface storage volumes and orifice control plates.

The storage volume calculations and stage-storage-discharge relationship are attached at the end of this letter/report. Tabulated below is a comparison of the attenuated post-development peak flows to pre-development peak flows.



LEGEND

DRAINAGE BOUNDARY

0.250 / 45% — DRAINAGE AREA / % IMPERIVOUS

* REFER TO POST DEVELOPMENT AREA CALCULATIONS

NOTE: THIS PLAN IS FOR STORM DRAINAGE AREAS ONLY

222 KING STREET EAST, BOWMANVILLE

POST DEVELOPMENT DRAINAGE SCHEME

D.G. Biddle & Associates Limited
consulting engineers and planners
96 KING STREET EAST · OSHAWA,ON · L1H 1B6
PHONE (905)576-8500 · FAX (905)576-9730
info@dgbiddle.com

SCALE	1:750
DRAWN	P.D.C.
DESIGN	P.D.C.
CHECKED	J.A.I.
DATE	5/15/15
PROJECT	113101
DWG	FIG 3

\\DATA\STAFF\JOB FILES\113000\113101 BOWMANVILLE PROFESSIONAL BLDG. MEDICAL CENTRE\113101 DRAWINGS\113101-SWM FIGURES.DWG

TABLE 1: POST-DEVELOPMENT PEAK FLOWS TO KING STREET

RETURN FREQUENCY (YEARS)	PRE-DEVELOPMENT PEAK FLOW (L/s)	POST-DEVELOPMENT PEAK FLOW (L/s)	% DECREASE (%)
5	98	83	15.3
10	112	96	14.3
25	122	104	14.8
50	147	125	15.0
100	214	182	15.0

As is reported above, there is a 15% decrease in peak flows to King Street with the proposed development. Therefore, no adverse impact on the existing drainage network on King Street is anticipated. The VISUAL OTTHYMO 3.0 output files are attached at the end of this letter/report.

Tabulated below is a comparison of the attenuated post-development peak flows to pre-development peak flows for stormwater drainage being conveyed to Galbraith Court in the re-development design.

TABLE 2: POST-DEVELOPMENT PEAK FLOWS TO GALBRAITH COURT

RETURN FREQUENCY (YEARS)	PRE-DEVELOPMENT PEAK FLOW (L/s)	POST-DEVELOPMENT PEAK FLOW (L/s)	RETAINED ROOFTOP VOLUME (cu.m)	RETAINED VOLUME (cu.m)
5	75	75	16	120
10	76	76	19	150
25	108	107	25	209
50	150	142	30	241
100	185	175	32	253

TABLE 3: POST DEVELOPMENT OVERLAND FLOWS TO EX EASEMENT

RETURN FREQUENCY (YEARS)	PRE-DEVELOPMENT OVERLAND FLOW (L/s)	POST-DEVELOPMENT OVERLAND FLOW (L/s)	% DECREASE (%)
5	0	0	0
10	0	0	0
25	31	30	3.2
50	73	65	11.0
100	107	97	9.3

As is reported above, post-development peak flows to Galbraith Court are less than or equal to pre-development peak flows; therefore, no adverse impact on the existing drainage network on Galbraith Court is anticipated. The VISUAL OTTHYMO 3.0 output files are attached at the end of this letter/report.

In addition to the above analysis, stormwater attenuation is proposed for the auxiliary parking lot to ensure the increased impervious area does not have an adverse impact on the existing Church Street storm sewer system. Attenuation will be implemented through the use of a 50mm orifice control device and surface storage on the parking area. Tabulated below is the comparison of the post development peak flows to the pre-development peak flows for the stormwater runoff draining to St. George Street.

TABLE 4: POST-DEVELOPMENT PEAK FLOWS TO ST. GEORGE STREET

RETURN FREQUENCY (YEARS)	PRE-DEVELOPMENT PEAK FLOW (L/s)	POST-DEVELOPMENT ROUTED PEAK FLOW (L/s)	RETAINED VOLUME – SURFACE (cu.m)
2	8	8	8
5	10	8	11
10	11	9	14
25	13	9	20
50	16	9	25
100	23	11	29

As is reported above, post-development peak flows to St. George Street are less than or equal to pre-development peak flows; therefore, no adverse impact on the existing drainage network on St. George Street is anticipated. The VISUAL OTTHYMO 3.0 output files are attached at the end of this letter/report.

3.0 STORMWATER QUALITY CONTROLS

The re-development site is situated within the Soper Creek Watershed. As such, Level 1 Enhanced quality control is required for the proposed asphalt parking surfaces. Stormwater quality controls for the existing parking lot are currently provided by a Stormceptor STC-750. Under the previous development proposal, the Stormceptor unit provided treatment for 0.232ha of proposed asphalt. Under the proposed development, the Stormceptor unit will provide treatment for 0.237ha of asphalt. The existing Stormceptor STC-750 will continue to provide Level 1 treatment for the proposed parking area addition.

In addition to the parking lot extension located on the main site, an additional asphalt parking area is proposed on the southwest corner of Church Street and St George Street. The asphalt area to be paved is 0.08ha. The Central Lake Ontario Conservation Authority

requires stormwater quality controls for asphalt areas larger than 0.25ha. As the proposed area is less than 0.25ha, stormwater quality controls are not proposed for the auxiliary parking area.

4.0 EROSION AND SEDIMENT CONTROLS

During the construction period, the removal of natural vegetation causes the transport of large amounts of sediment during rainfall events. To minimize the sediment laden storm water leaving the site during construction, the following sediment control techniques are proposed to be implemented. These measures are detailed on the Erosion and Sediment Control Plan included in the site plan submission.

1. Construction Vehicle Access Route (Mud Mat)
2. Catch Basin Filtration
3. Perimeter Enviro Fence
4. Good Engineering Practices

5.0 CONCLUSIONS

The preceding letter/report identifies the stormwater management requirements for the development proposal. The investigations into these requirements have resulted in the following conclusions for the development proposal:

- The quantity control proposal for the development is to control all post-development peak flows to pre-development levels. A positive overland flow route to Galbraith Court has been provided;

- Below grade and surface storage, in conjunction with orifice control plates are proposed to detain all flows to the pre-development level;

- On-site storm sewers have been sized to accommodate a 5-year return frequency post-development event as per Municipality of Clarington Design Criteria;

- Permanent stormwater quality controls are proposed for the asphalt parking area expansion through the use of the existing Stormceptor STC-750;

- Temporary sediment controls during construction can be managed by the use of perimeter enviro fence, construction vehicle access route, catchbasin filtration and good engineering practices;

We trust the Municipality of Clarington and the Central Lake Ontario Conservation Authority concur with our recommendations. Please provide positive comments on the Site Plan Application to facilitate development. Should you have any questions on the foregoing, please do not hesitate to contact our office.

Yours truly,

D.G. BIDDLE & ASSOCIATES LIMITED

LICENSED PROFESSIONAL ENGINEER
J. A. IANTOMASI
100160767
PROVINCE OF ONTARIO

P. D. Cane, B.SC.E

J. A. Iantomasi, P.Eng.

JAI/PDC/jai

\\job Files\113000\113101 Bowmanville Professional Building\113101 Correspondence\113101 SWM.doc

STORM SEWER DESIGN SHEET

D.G.BIDDLE & ASSOCIATES LTD.

consulting engineers

MUNICPALITY	CLARINGTON	**DESIGN BY**	P.D.C.	**CRITERIA**	
PROJECT	BOWMANVILLE PROFESSIONAL BUILDING	**CHK'D BY**	M.B.C.	n	0.013
PROJECT #	113101	**DATE**	MAY 2/14, Revised May 14/15	STORM	5 YEAR
				A	2464
				B	16
				C	1

RUN OFF CO-EFFICIENTS	
PARK	I=0.20
SINGLE,SEMI	I=0.50
TOWNHOUSES,SCHOOL	I=0.70
APARTMENTS	I=0.65
COMMERCIAL	I=0.90

LOCATION			DRAINAGE DATA				RATIONAL DESIGN			PIPE DATA							
STREET	FROM MH	TO MH	AREA (ha)	I	AxI	ACCUM AxI	T.C min	R mm/hr	FLOW L/sec	SIZE mm	GRADE %	CAPACITY L/sec	VELOCITY m/s	LENGTH m	TIME min	TOTAL TIME	% LOAD
Aux Parking Lot	ST-1	ST-2	0.040	0.90	0.036	0.036	15.00	79.48	7.95	250	0.50	43.86	0.87	40.00	0.77	15.77	18.13
	ST-2	*EX MH*	0.043	0.90	0.039	0.075	15.77	77.56	16.17	250	0.50	43.86	0.87	14.71	0.28	16.05	36.87
Site	ROOF	ST-4	0.088	0.90	0.079	0.079	15.00	79.48	17.46	250	1.00	62.03	1.22	25.64	0.35	15.35	28.14
	ST-4	ST-5	0.172	0.90	0.155	0.234	15.35	78.60	51.13	250	1.00	62.03	1.22	14.84	0.20	15.55	82.42
	ST-5	*EX DCBMH 9*	0.190	0.20	0.038	0.272	15.55	78.10	59.05	300	0.50	71.33	0.98	48.10	0.82	16.37	82.79
	OFF SITE	*EX DCBMH 9*	0.206	0.20	0.041	0.041	15.00	79.48	9.06								
	ROOF	*EX DCBMH 9*	0.016	0.90	0.014	0.014	15.00	79.48	3.09								
	EX DCBMH 9	*EX CBMH 6*	0.300	0.90	0.270	0.597	16.37	76.12	126.33	300	1.50	123.54	1.69	37.90	0.37	16.74	102.25
	EX CBMH 8	*EX CBMH 7*	0.100	0.90	0.090	0.090	15.00	79.48	19.89	1200	0.30	2227.67	1.91	60.50	0.53	15.53	0.89
	EX CBMH 7	*EX CBMH 6*	0.202	0.90	0.182	0.272	15.53	78.15	59.10	375	0.50	129.33	1.13	17.56	0.26	15.79	45.69
	OFF SITE	*EX CBMH 6*	0.088	0.20	0.018	0.018	15.00	79.48	3.98								
ICD TYPE D	*EX CBMH 6*	*STC 750*	0.132	0.90	0.119	1.006	16.74	75.25	80.00	375	0.50	129.33	1.13	12.90	0.19	16.93	61.86
80 L/s	*STC 750*	*EX CBMH*	0.000	0.90	0.000	1.006	16.93	74.82	80.00	375	1.00	182.90	1.60	48.78	0.51	17.44	43.74
TO KING ST	CB ST-3	*EX CB*	0.039	0.90	0.035	0.035	15.00	79.48	7.73	250	1.00	62.03	1.22	15.34	0.21	15.21	12.47
	ROOF	*EX CB*	0.033	0.90	0.030	0.030	15.00	79.48	6.63								
	EX CB	*EX CBMH*	0.005	0.20	0.001	0.066	15.21	78.95	14.49	250	1.00	62.03	1.22	19.90	0.27	15.48	23.35
	EX CB 10	*EX CBMH*	0.043	0.90	0.039	0.039	15.00	79.48	8.62	250	1.00	62.03	1.22	26.00	0.35	15.35	13.89
	ROOF	*EX CBMH*	0.020	0.90	0.018	0.018	15.00	79.48	3.98	100	1.00	5.39	0.66	17.95	0.45	15.45	73.82
	ROOF	*EX CBMH*	0.075	0.90	0.068	0.125	15.00	79.48	27.62	300	2.00	142.66	1.96	2.00	0.02	15.02	19.36
	EX CBMH	*EX STM*	0.009	0.20	0.002	0.250	15.48	78.27	54.40	300	0.50	71.33	0.98	18.12	0.31	15.79	76.27

POST DEVELOPMENT DRAINAGE

→ DRAINAGE TRIBUTARY TO NORTH PARKING LOT + STORMWATER CONTROLS

DRAINAGE AREA TRIBUTARY TO:

CBMH ST-4

ITEM	AREA	%IMP	RUNOFF
ASPHALT	1223.45m²	100%	0.90
CONC S/W	222.66m²	100%	0.90
LANDSCAPE	275.41m²	0%	0.20
	1721.52m²		

% IMPERVIOUS

→ BASED ON WEIGHTED AVERAGE

$$= \frac{1223.45m^2 + 222.66m^2}{1721.52m^2} \times 100\%$$

$$= 84.0\%$$

RUNOFF

→ BASED ON WEIGHTED AVERAGE

$$= \frac{1223.45m^2 + 222.66m^2}{1721.52m^2} \times 0.90 + \frac{275.41m^2}{1721.52m^2} \times 0.20$$

$$= 0.756 + 0.032$$

$$= 0.788$$

CBMH ST-5

ITEM	AREA	%IMP	RUNOFF
LANDSCAPE	190.27 m^2	0%	0.20
OFF SITE	1715.69 m^2	0%	0.20
	1905.96 m^2		

Ex DCBMH 9

ITEM	AREA	%IMP	RUNOFF
ROOF	158.68 m^2	100%	0.90
ASPHALT	2476.39 m^2	100%	0.90
LANDSCAPE	529.66 m^2	0%	0.20
OFF SITE	2063.25 m^2	0%	0.20
	5227.98 m^2		

% IMPERVIOUS

$$= \frac{158.68 + 2476.39 m^2}{5227.98 m^2} \times 100\%$$

$$= 50.4\%$$

RUNOFF

$$= \frac{158.68 + 2476.39 m^2}{5227.98 m^2} \times 0.90 + \frac{529.66 m^2 + 2063.25 m^2}{5227.98 m^2} \times 0.20$$

$$= 0.454 + 0.099$$

$$= 0.553$$

Ex CBMH 6

ITEM	AREA	% IMP	RUNOFF
ASPHALT	$1014.91m^2$	100%	0.90
LANDSCAPE	$301.87m^2$	0%	0.20
OFF-SITE	$883.03m^2$	0%	0.20
	$2199.81m^2$		

% IMPERVIOUS

$$= \frac{1014.91m^2}{2199.81m^2} \times 100\%$$

$$= 46.1\%$$

RUNOFF

$$= \frac{1014.91m^2}{2199.81m^2} \times 0.90 + \frac{301.87m^2 + 883.03m^2}{2199.81m^2} \times 0.20$$

$$= 0.415 + 0.108$$

$$= 0.523$$

Ex CBMH 7

ITEM	AREA	%IMP	RUNOFF
ASPHALT	1842.21m²	100%	0.90
LANDSCAPE	175.24m²	0%	0.20
	2017.45m²		

% IMPERVIOUS

$$= \frac{1842.21\,m^2}{2017.45\,m^2} \times 100\%$$

$$= 91.3\%$$

RUNOFF

$$= \frac{1842.21\,m^2}{2017.45\,m^2} \times 0.90 + \frac{175.24\,m^2}{2017.45\,m^2} \times 0.20$$

$$= 0.822 + 0.017$$

$$= 0.839$$

Ex CBMH 8

ITEM	AREA	%IMP	RUNOFF
ASPHALT	753.66m²	100%	0.90
LANDSCAPE	248.64m²	0%	0.20
	1002.30m²		

% IMPERVIOUS

$$= \frac{753.66\,m^2}{1002.30\,m^2} \times 100\%$$

$$= 75.2\%$$

RUNOFF

$$= \frac{753.66\,m^2}{1002.30\,m^2} \times 0.90 + \frac{248.64\,m^2}{1002.30\,m^2} \times 0.20$$

$$= 0.677 + 0.050 = 0.727.$$

BASED ON THE ABOVE CALCULATIONS, THE TOTAL DRAINAGE AREAS TRIBUTARY TO THE EXISTING STORMWATER CONTROL SYSTEM IS:

→ 7691.96m² @ 100% IMPERVIOUS
→ 6383.06m² @ 0% IMPERVIOUS.
→ PLUS DRAINAGE FROM ROOFTOP.

∴ TOTAL DRAINAGE AREA FOR POST DEV SCHEME

$= 7691.96m^2 + 6383.06m^2$

$= 14075.02m^2$

PROPOSED BUILDING ADDITION

→ ROOFTOP STORAGE

ROOFTOP CONTROLS ARE PROPOSED FOR THE MAIN PORTION OF THE PROPOSED BUILDING

ROOFTOP CONTROLS ARE NOT PROPOSED FOR THE ROOF AREAS ABOVE THE STAIRWAYS & MAIN ENTRANCE

∴ ROOF AREA AVAILABLE FOR STORAGE IS: $663.84 m^2$
MAX STORAGE DEPTH = 4" (0.10m)
DRAINS = 5
WEIRS = 5

HOPPER/WEIR FLOW

- FROM PRODUCT SPECS → 5 US GPM / 1" HEAD

→ $5 GPM \times \frac{3.785 L}{GAL} \times \frac{1 min}{60 s} = 0.315 L/s$ PER 0.025m HEAD

5 WEIRS ARE REQUIRED

∴ DISCHARGE IS EQUAL TO:

$5 \times 0.315 L/s \times 2 = 3.15 L/s$ PER 0.05m HEAD

Rooftop Storage

→ Max Ponding Depth = 4" (0.10m)

Head (m)	End Area (m^2)	Avg Area (m^2)	Depth (m)	Volume (m^3)	Total Volume (m^3)
0.00	—				0.00
		165.96	0.05	8.30	
0.05	331.92				8.30
		497.88	0.05	24.89	
0.10	663.84				33.19

Stage – Storage – Discharge

Head (m)	Discharge (L/s)	(m^3/s)	Storage (m^3)
0.00	—	—	—
0.05	3.15	0.00315	8.30
0.10	6.30	0.0063	33.19

```
       V    V   I    SSSSS  U   U    A    L
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
Developed and Distributed by Civica Infrastructure
Copyright 2007 - 2013 Civica Infrastructure
All rights reserved.

                    *****  S U M M A R Y   O U T P U T  *****

  Input   filename: C:\Program Files (x86)\VH Suite 3.0\VO2\voin.dat
  Output  filename: C:\Users\Peter\AppData\Local\Temp\7a5011ce-1225-408f-a508-5c4597e2afe8\Scenario.out
  Summary filename: C:\Users\Peter\AppData\Local\Temp\7a5011ce-1225-408f-a508-5c4597e2afe8\Scenario.sum

DATE: 05/15/2015                                TIME: 08:47:18

USER:

COMMENTS: 5 yr PRE-DEV

  ******************************
  ** SIMULATION NUMBER:   2 **
  ******************************

  W/E COMMAND                HYD ID   DT     AREA     Qpeak  Tpeak   R.V.  R.C.   Qbase
                                      min     ha       cms    hrs     mm            cms

      START @  0.00 hrs
      --------------------
      CHIC STORM                     10.0
      [ Ptot= 36.18 mm ]

  *   CALIB STANDHYD      0001  1  5.0    0.10     0.01   0.67   17.86  0.49   0.000  <-- TO CHURCH ST
      [I%=35.0:S%= 1.00]

  *   CALIB NASHYD        0003  1  5.0    0.64     0.02   0.92    7.19  0.20   0.000
      [CN=71.0        ]
      [ N = 3.0:Tp 0.20]

  *   CALIB STANDHYD      0002  1  5.0    0.75     0.18   0.67   32.52  0.90   0.000
      [I%=90.0:S%= 2.00]

  *   CALIB STANDHYD      0004  1  5.0    0.10     0.01   0.67   20.52  0.57   0.000
      [I%=45.0:S%= 2.00]

      ADD [0002 + 0003]   0005  3  5.0    1.39     0.19   0.67   20.79   n/a   0.000

      ADD [0005 + 0004]   0005  1  5.0    1.49     0.20   0.67   20.78   n/a   0.000

      RESRVR [ 2 : 0005]  0006  1  5.0    1.49     0.08   0.92   20.76   n/a   0.000 <-- TO GALBRAITH
      {ST=  0.01 ha.m }

  *   CALIB STANDHYD      0007  1  5.0    0.40     0.10   0.67   32.53  0.90   0.000 <-- TO KING ST
      [I%=90.0:S%= 2.00]

FINISH
```

```
V    V   I    SSSSS  U   U    A    L
V    V   I    SS     U   U   A A   L
 V  V    I     SS    U   U  AAAAA  L
 V  V    I      SS   U   U  A   A  L
  VV     I    SSSSS  UUUUU  A   A  LLLLL

 OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
O   O    T      T    H   H   Y Y   MM MM  O   O
O   O    T      T    H   H    Y    M   M  O   O
 OOO     T      T    H   H    Y    M   M   OOO
Developed and Distributed by Civica Infrastructure
Copyright 2007 - 2013 Civica Infrastructure
All rights reserved.

                  *****  S U M M A R Y   O U T P U T  *****

  Input   filename: C:\Program Files (x86)\VH Suite 3.0\VO2\voin.dat
  Output  filename: C:\Users\Peter\AppData\Local\Temp\368a4a4d-31b3-42ff-8b39-98ea0504d92a\Scenario.out
  Summary filename: C:\Users\Peter\AppData\Local\Temp\368a4a4d-31b3-42ff-8b39-98ea0504d92a\Scenario.sum

DATE: 05/15/2015                              TIME: 08:49:18

USER:

COMMENTS: 10 YR PRE-DEV

  ******************************
  ** SIMULATION NUMBER:   3 **
  ******************************

  W/E COMMAND              HYD ID   DT     AREA    Qpeak  Tpeak   R.V.  R.C.   Qbase
                                    min     ha      cms    hrs     mm            cms

      START @  0.00 hrs
      --------------------
      CHIC STORM                    10.0
      [ Ptot= 41.39 mm ]

  *   CALIB STANDHYD     0001  1  5.0    0.10    0.01   0.67   21.24  0.51   0.000   <-- TO CHURCH ST
      [I%=35.0:S%= 1.00]

  *   CALIB NASHYD       0003  1  5.0    0.64    0.02   0.92    9.43  0.23   0.000
      [CN=71.0       ]
      [ N = 3.0:Tp 0.20]

  *   CALIB STANDHYD     0002  1  5.0    0.75    0.21   0.67   37.46  0.90   0.000
      [I%=90.0:S%= 2.00]

  *   CALIB STANDHYD     0004  1  5.0    0.10    0.01   0.67   24.18  0.58   0.000
      [I%=45.0:S%= 2.00]

      ADD [0002 + 0003]  0005  3  5.0    1.39    0.22   0.67   24.48   n/a   0.000

      ADD [0005 + 0004]  0005  1  5.0    1.49    0.23   0.67   24.46   n/a   0.000

      RESRVR [ 2 : 0005] 0006  1  5.0    1.49    0.08   0.92   24.45   n/a   0.000   <-- TO CALBRAITH
      {ST=  0.02 ha.m }

  *   CALIB STANDHYD     0007  1  5.0    0.40    0.11   0.67   37.46  0.90   0.000   <-- TO KING
      [I%=90.0:S%= 2.00]

  FINISH
```

```
       V    V   I    SSSSS  U   U    A    L
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
Developed and Distributed by Civica Infrastructure
Copyright 2007 - 2013 Civica Infrastructure
All rights reserved.
```

***** S U M M A R Y O U T P U T *****

Input filename: C:\Program Files (x86)\VH Suite 3.0\VO2\voin.dat
Output filename: C:\Users\Peter\AppData\Local\Temp\9901b1db-3ecc-475f-9d24-e819644607d7\Scenario.out
Summary filename: C:\Users\Peter\AppData\Local\Temp\9901b1db-3ecc-475f-9d24-e819644607d7\Scenario.sum

DATE: 05/15/2015 TIME: 08:49:36

USER:

COMMENTS: 25 YR PRE-DEV

****
** SIMULATION NUMBER: 4 **
****

W/E	COMMAND	HYD ID		DT min	AREA ha	Qpeak cms	Tpeak hrs	R.V. mm	R.C.	Qbase cms	
	START @ 0.00 hrs										
	CHIC STORM [Ptot= 58.62 mm]			10.0							
*	CALIB STANDHYD [I%=35.0:S%= 1.00]	0001	1	5.0	0.10	0.01	0.67	33.27	0.57	0.000	← TO CHURCH ST
*	CALIB NASHYD [CN=71.0] [N = 3.0:Tp 0.20]	0003	1	5.0	0.64	0.04	0.92	18.23	0.31	0.000	
*	CALIB STANDHYD [I%=90.0:S%= 2.00]	0002	1	5.0	0.75	0.22	0.67	53.88	0.92	0.000	
*	CALIB STANDHYD [I%=45.0:S%= 2.00]	0004	1	5.0	0.10	0.02	0.67	37.01	0.63	0.000	
	ADD [0002 + 0003]	0005	3	5.0	1.39	0.24	0.67	37.38	n/a	0.000	
	ADD [0005 + 0004]	0005	1	5.0	1.49	0.26	0.67	37.35	n/a	0.000	
	RESRVR [2 : 0005] {ST= 0.02 ha.m }	0006	1	5.0	1.49	0.11	1.00	37.34	n/a	0.000	← TO GALBRAITH
*	CALIB STANDHYD [I%=90.0:S%= 2.00]	0007	1	5.0	0.40	0.12	0.67	53.88	0.92	0.000	← TO KING

FINISH

```
       V    V   I    SSSSS  U   U    A    L
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
Developed and Distributed by Civica Infrastructure
Copyright 2007 - 2013 Civica Infrastructure
All rights reserved.
```

***** S U M M A R Y O U T P U T *****

```
  Input   filename: C:\Program Files (x86)\VH Suite 3.0\VO2\voin.dat
  Output  filename: C:\Users\Peter\AppData\Local\Temp\e60966d6-8b07-478a-bc75-6c34595c6597\Scenario.out
  Summary filename: C:\Users\Peter\AppData\Local\Temp\e60966d6-8b07-478a-bc75-6c34595c6597\Scenario.sum

DATE: 05/15/2015                          TIME: 08:49:50

USER:

COMMENTS: 50 yr PRE-DEV

  ******************************
  ** SIMULATION NUMBER:   5 **
  ******************************
```

W/E	COMMAND	HYD ID	DT min	AREA ha	Qpeak cms	Tpeak hrs	R.V. mm	R.C.	Qbase cms	
	START @ 0.00 hrs									
	CHIC STORM [Ptot= 65.84 mm]		10.0							
*	CALIB STANDHYD [I%=35.0:S%= 1.00]	0001	1 5.0	0.10	0.02	0.67	38.61	0.59	0.000	← TO CHURCH
*	CALIB NASHYD [CN=71.0] [N = 3.0:Tp 0.20]	0003	1 5.0	0.64	0.05	0.92	22.44	0.34	0.000	
*	CALIB STANDHYD [I%=90.0:S%= 2.00]	0002	1 5.0	0.75	0.27	0.67	60.81	0.92	0.000	
*	CALIB STANDHYD [I%=45.0:S%= 2.00]	0004	1 5.0	0.10	0.02	0.67	42.67	0.65	0.000	
	ADD [0002 + 0003]	0005	3 5.0	1.39	0.30	0.67	43.05	n/a	0.000	
	ADD [0005 + 0004]	0005	1 5.0	1.49	0.32	0.67	43.02	n/a	0.000	
	RESRVR [2 : 0005] {ST= 0.02 ha.m }	0006	1 5.0	1.49	0.15	0.92	43.01	n/a	0.000	← TO CALIBRATH
*	CALIB STANDHYD [I%=90.0:S%= 2.00]	0007	1 5.0	0.40	0.15	0.67	60.81	0.92	0.000	← TO KING

```
FINISH
```

```
       V    V   I    SSSSS  U   U    A    L
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
Developed and Distributed by Civica Infrastructure
Copyright 2007 - 2013 Civica Infrastructure
All rights reserved.

                    *****  D E T A I L E D   O U T P U T *****

  Input   filename: C:\Program Files (x86)\VH Suite 3.0\VO2\voin.dat
  Output  filename: C:\Users\Peter\AppData\Local\Temp\315f79e8-209b-4d34-b108-0d815750dadb\Scenario.out
  Summary filename: C:\Users\Peter\AppData\Local\Temp\315f79e8-209b-4d34-b108-0d815750dadb\Scenario.sum

DATE: 05/15/2015                          TIME: 08:57:16

USER:

COMMENTS: 100 YR  PRE-DEV
```

```
  ****************************
  ** SIMULATION NUMBER:   6 **
  ****************************

--------------------
  CHICAGO STORM     |     IDF curve parameters: A=1770.000
  Ptotal= 67.89 mm  |                           B=   4.000
--------------------                           C=   0.820
                          used in:   INTENSITY =  A / (t + B)^C

                          Duration of storm  =  2.00 hrs
                          Storm time step    = 10.00 min
                          Time to peak ratio =  0.33
```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.17	9.77	0.67	203.31	1.17	17.18	1.67	8.96
0.33	15.10	0.83	50.96	1.33	13.06	1.83	7.78
0.50	38.21	1.00	25.51	1.50	10.60	2.00	6.90

```
--------------------
  CALIB             |
  STANDHYD  (0001)  |   Area     (ha)=   0.10
ID= 1 DT= 5.0 min   |   Total Imp(%)=  35.00   Dir. Conn.(%)=  35.00
--------------------
```

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.03	0.06
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	1.00
Length	(m)=	25.71	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	9.77	0.583	203.31	1.083	17.18	1.58	8.96
0.167	9.77	0.667	203.31	1.167	17.18	1.67	8.96
0.250	15.10	0.750	50.96	1.250	13.06	1.75	7.78
0.333	15.10	0.833	50.96	1.333	13.06	1.83	7.78
0.417	38.21	0.917	25.51	1.417	10.60	1.92	6.90
0.500	38.21	1.000	25.51	1.500	10.60	2.00	6.90

Max.Eff.Inten.(mm/hr)=		203.31	70.97
over (min)		5.00	15.00

```
     Storage Coeff.  (min)=       0.85 (ii)    10.82 (ii)
     Unit Hyd. Tpeak (min)=       5.00         15.00
     Unit Hyd. peak  (cms)=       0.34          0.09
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.02          0.01       0.023 (iii)
     TIME TO PEAK    (hrs)=       0.67          0.83        0.67
     RUNOFF VOLUME    (mm)=      66.89         25.91       40.17
     TOTAL RAINFALL   (mm)=      67.89         67.89       67.89
     RUNOFF COEFFICIENT   =       0.99          0.38        0.59

 ***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
  CALIB             |
  NASHYD    (0003)  |   Area     (ha)=   0.64   Curve Number    (CN)= 71.0
 ID= 1 DT= 5.0 min  |   Ia       (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

     Unit Hyd Qpeak  (cms)=   0.123

     PEAK FLOW       (cms)=   0.061 (i)
     TIME TO PEAK    (hrs)=   0.833
     RUNOFF VOLUME    (mm)=  23.688
     TOTAL RAINFALL   (mm)=  67.888
     RUNOFF COEFFICIENT   =   0.349

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
  CALIB             |
  STANDHYD  (0002)  |   Area     (ha)=   0.75
 ID= 1 DT= 5.0 min  |   Total Imp(%)=  90.00   Dir. Conn.(%)=  90.00
--------------------

                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.67          0.07
     Dep. Storage     (mm)=       1.00          1.50
     Average Slope     (%)=       1.00          2.00
     Length            (m)=      70.54         40.00
     Mannings n           =      0.013         0.250

     Max.Eff.Inten.(mm/hr)=     203.31         70.97
               over (min)          5.00          5.00
     Storage Coeff.  (min)=       1.56 (ii)     3.77 (ii)
     Unit Hyd. Tpeak (min)=       5.00          5.00
     Unit Hyd. peak  (cms)=       0.33          0.25
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.38          0.02       0.395 (iii)
     TIME TO PEAK    (hrs)=       0.67          0.67        0.67
     RUNOFF VOLUME    (mm)=      66.89         25.91       62.79
     TOTAL RAINFALL   (mm)=      67.89         67.89       67.89
     RUNOFF COEFFICIENT   =       0.99          0.38        0.92

 ***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
  CALIB             |
  STANDHYD  (0004)  |   Area     (ha)=   0.10
 ID= 1 DT= 5.0 min  |   Total Imp(%)=  45.00   Dir. Conn.(%)=  45.00
--------------------

                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.05          0.06
     Dep. Storage     (mm)=       1.00          1.50
     Average Slope     (%)=       1.00          2.00
     Length            (m)=      26.00         40.00
     Mannings n           =      0.013         0.250

     Max.Eff.Inten.(mm/hr)=     203.31         70.97
               over (min)          5.00         10.00
     Storage Coeff.  (min)=       0.86 (ii)     8.95 (ii)
```

TO CHURCH STREET

```
     Unit Hyd. Tpeak (min)=       5.00         10.00
     Unit Hyd. peak  (cms)=       0.34          0.12
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.03          0.01        0.031 (iii)
     TIME TO PEAK    (hrs)=       0.67          0.75         0.67
     RUNOFF VOLUME    (mm)=      66.89         25.91        44.30
     TOTAL RAINFALL   (mm)=      67.89         67.89        67.89
     RUNOFF COEFFICIENT   =       0.99          0.38         0.65

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

--------------------
 ADD HYD   (0005) |
   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
         ID1= 1 (0002):      0.75    0.395     0.67    62.79
       + ID2= 2 (0003):      0.64    0.061     0.83    23.69
         ==========================================================
         ID = 3 (0005):      1.39    0.432     0.67    44.68

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------

--------------------
 ADD HYD   (0005) |
   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
         ID1= 3 (0005):      1.39    0.432     0.67    44.68
       + ID2= 2 (0004):      0.10    0.031     0.67    44.30
         ==========================================================
         ID = 1 (0005):      1.49    0.463     0.67    44.66

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
 RESERVOIR (0006) |
 IN= 2---> OUT= 1 |
 DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)  |    (cms)     (ha.m.)
                        0.0000      0.0000   |  0.0750      0.0115
                        0.0720      0.0076   |  0.0760      0.0164
                        0.0730      0.0077   |  0.1246      0.0232
                        0.0740      0.0086   |  0.2127      0.0265

                                  AREA      QPEAK      TPEAK       R.V.
                                  (ha)      (cms)      (hrs)       (mm)
    INFLOW : ID= 2 (0005)        1.491      0.463       0.67       44.66
    OUTFLOW: ID= 1 (0006)        1.491      0.185       0.75       44.64

                PEAK   FLOW   REDUCTION [Qout/Qin](%)= 40.02
                TIME SHIFT OF PEAK FLOW         (min)=  5.00
                MAXIMUM  STORAGE   USED        (ha.m.)=  0.0255

--------------------------------------------------------------------------------
--------------------
 CALIB              |
 STANDHYD  (0007)   |   Area    (ha)=   0.40
ID= 1 DT= 5.0 min   |   Total Imp(%)=  90.00   Dir. Conn.(%)=  90.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=      0.36          0.04
    Dep. Storage     (mm)=      1.00          1.50
    Average Slope     (%)=      1.00          2.00
    Length            (m)=     51.95         40.00
    Mannings n           =     0.013         0.250

    Max.Eff.Inten.(mm/hr)=    203.31         70.97
              over (min)        5.00          5.00
    Storage Coeff.  (min)=      1.30 (ii)     3.50 (ii)
    Unit Hyd. Tpeak (min)=      5.00          5.00
    Unit Hyd. peak  (cms)=      0.33          0.26
                                                        *TOTALS*
    PEAK FLOW       (cms)=      0.21          0.01        0.214 (iii)
    TIME TO PEAK    (hrs)=      0.67          0.67         0.67
```

TO CALBRAITH COURT

TO KING ST

```
     RUNOFF VOLUME     (mm)=      66.89         25.91          62.79
     TOTAL RAINFALL    (mm)=      67.89         67.89          67.89
     RUNOFF COEFFICIENT   =       0.99          0.38           0.92

 ***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

 FINISH
================================================================================
```

```
=============================================================================================================

       V    V   I    SSSSS  U   U    A    L
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO    TTTTT  TTTTT  H   H  Y   Y  M   M   OOO     TM
       O   O     T      T    H   H   Y Y   MM MM  O   O
       O   O     T      T    H   H    Y    M   M  O   O
        OOO      T      T    H   H    Y    M   M   OOO
Developed and Distributed by Civica Infrastructure
Copyright 2007 - 2013 Civica Infrastructure
All rights reserved.

                    *****  S U M M A R Y   O U T P U T  *****

  Input   filename: C:\Program Files (x86)\VH Suite 3.0\VO2\voin.dat
  Output  filename: C:\Users\Peter\AppData\Local\Temp\aa1c4655-5a21-4998-9122-190862fc5c16\Scenario.out
  Summary filename: C:\Users\Peter\AppData\Local\Temp\aa1c4655-5a21-4998-9122-190862fc5c16\Scenario.sum

DATE: 05/15/2015                                  TIME: 08:59:53

USER:

COMMENTS: 5 YR POST DEV

  ****************************
  ** SIMULATION NUMBER:   2 **
  ****************************

  W/E COMMAND                HYD ID   DT     AREA    Qpeak  Tpeak   R.V.  R.C.   Qbase
                                      min     ha      cms    hrs     mm            cms

      START @  0.00 hrs
      --------------------
      CHIC STORM                     10.0
      [ Ptot= 36.18 mm ]

  **  CALIB NASHYD       0006  1  5.0    0.64    0.02   0.92    7.19  0.20   0.000
      [CN=71.0       ]
      [ N = 3.0:Tp 0.20]

  *   CALIB STANDHYD     0005  1  5.0    0.77    0.18   0.67   32.52  0.90   0.000
      [I%=90.0:S%= 2.00]

  *   CALIB STANDHYD     0007  1  5.0    0.08    0.02   0.67   33.17  0.92   0.000
      [I%=90.0:S%= 2.00]

      RESRVR [ 2 : 0007] 0008  1  5.0    0.08    0.00   0.92   32.39   n/a   0.000
      {ST=  0.00 ha.m }

  *   CALIB STANDHYD     0009  1  5.0    0.01    0.00   0.67   33.33  0.92   0.000
      [I%=90.0:S%= 2.00]

      ADD [0005 + 0006]  0010  3  5.0    1.41    0.19   0.67   21.04   n/a   0.000

      ADD [0010 + 0008]  0010  1  5.0    1.49    0.20   0.67   21.64   n/a   0.000

      ADD [0010 + 0009]  0010  3  5.0    1.50    0.20   0.67   21.71   n/a   0.000

      RESRVR [ 2 : 0010] 0011  1  5.0    1.50    0.08   0.92   21.70   n/a   0.000 <-- TO CALBRAITH
      {ST=  0.01 ha.m }

  *   CALIB STANDHYD     0012  1  5.0    0.34    0.08   0.67   32.53  0.90   0.000 <-- TO KING
      [I%=90.0:S%= 2.00]

  *   CALIB STANDHYD     0001  1  5.0    0.08    0.02   0.67   32.52  0.90   0.000
      [I%=90.0:S%= 2.00]

      RESRVR [ 2 : 0001] 0002  1  5.0    0.08    0.01   0.83   32.43   n/a   0.000 <-- AUX PARKING STORAGE
      {ST=  0.00 ha.m }

  *   CALIB STANDHYD     0003  1  5.0    0.02    0.00   0.67   17.32  0.48   0.000
      [I%=35.0:S%= 2.00]

      ADD [0002 + 0003]  0004  3  5.0    0.10    0.01   0.67   30.12   n/a   0.000 <-- TO CHURCH ST
```

```
       V    V   I    SSSSS  U   U    A    L
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
Developed and Distributed by Civica Infrastructure
Copyright 2007 - 2013 Civica Infrastructure
All rights reserved.
```

***** S U M M A R Y O U T P U T *****

Input filename: C:\Program Files (x86)\VH Suite 3.0\VO2\voin.dat
Output filename: C:\Users\Peter\AppData\Local\Temp\67baf918-65c9-451d-b99b-25376049bb74\Scenario.out
Summary filename: C:\Users\Peter\AppData\Local\Temp\67baf918-65c9-451d-b99b-25376049bb74\Scenario.sum

DATE: 05/15/2015 TIME: 09:00:09

USER:

COMMENTS: 10 YR POST DEV

****
** SIMULATION NUMBER: 3 **
****

W/E	COMMAND	HYD ID		DT min	AREA ha	Qpeak cms	Tpeak hrs	R.V. mm	R.C.	Qbase cms	
	START @ 0.00 hrs										
	CHIC STORM [Ptot= 41.39 mm]			10.0							
**	CALIB NASHYD [CN=71.0] [N = 3.0:Tp 0.20]	0006	1	5.0	0.64	0.02	0.92	9.43	0.23	0.000	
*	CALIB STANDHYD [I%=90.0:S%= 2.00]	0005	1	5.0	0.77	0.21	0.67	37.46	0.90	0.000	
*	CALIB STANDHYD [I%=90.0:S%= 2.00]	0007	1	5.0	0.08	0.02	0.67	38.22	0.92	0.000	
	RESRVR [2 : 0007] {ST= 0.00 ha.m }	0008	1	5.0	0.08	0.00	0.92	37.51	n/a	0.000	
*	CALIB STANDHYD [I%=90.0:S%= 2.00]	0009	1	5.0	0.01	0.00	0.67	38.34	0.93	0.000	
	ADD [0005 + 0006]	0010	3	5.0	1.41	0.22	0.67	24.75	n/a	0.000	
	ADD [0010 + 0008]	0010	1	5.0	1.49	0.23	0.67	25.43	n/a	0.000	
	ADD [0010 + 0009]	0010	3	5.0	1.50	0.23	0.67	25.50	n/a	0.000	
	RESRVR [2 : 0010] {ST= 0.02 ha.m }	0011	1	5.0	1.50	0.08	0.92	25.49	n/a	0.000	← TO CALBRAITH
*	CALIB STANDHYD [I%=90.0:S%= 2.00]	0012	1	5.0	0.34	0.10	0.67	37.46	0.90	0.000	← TO KIMA
*	CALIB STANDHYD [I%=90.0:S%= 2.00]	0001	1	5.0	0.08	0.02	0.67	37.45	0.90	0.000	
	RESRVR [2 : 0001] {ST= 0.00 ha.m }	0002	1	5.0	0.08	0.01	0.92	37.33	n/a	0.000	
*	CALIB STANDHYD [I%=35.0:S%= 2.00]	0003	1	5.0	0.02	0.00	0.67	20.69	0.50	0.000	
	ADD [0002 + 0003]	0004	3	5.0	0.10	0.01	0.67	34.78	n/a	0.000	← TO CHURCH

```
       V    V   I    SSSSS  U   U    A    L
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
Developed and Distributed by Civica Infrastructure
Copyright 2007 - 2013 Civica Infrastructure
All rights reserved.
```

***** S U M M A R Y O U T P U T *****

Input filename: C:\Program Files (x86)\VH Suite 3.0\VO2\voin.dat
Output filename: C:\Users\Peter\AppData\Local\Temp\15883d3c-80f0-4361-b61e-548af2940814\Scenario.out
Summary filename: C:\Users\Peter\AppData\Local\Temp\15883d3c-80f0-4361-b61e-548af2940814\Scenario.sum

DATE: 05/15/2015 TIME: 09:00:21

USER:

COMMENTS: 25 YR POST DEV

****
** SIMULATION NUMBER: 4 **
****

W/E	COMMAND	HYD ID	DT min	AREA ha	Qpeak cms	Tpeak hrs	R.V. mm	R.C.	Qbase cms	
	START @ 0.00 hrs									
	CHIC STORM [Ptot= 58.62 mm]		10.0							
**	CALIB NASHYD [CN=71.0] [N = 3.0:Tp 0.20]	0006 1	5.0	0.64	0.04	0.92	18.23	0.31	0.000	
*	CALIB STANDHYD [I%=90.0:S%= 2.00]	0005 1	5.0	0.77	0.23	0.67	53.88	0.92	0.000	
*	CALIB STANDHYD [I%=90.0:S%= 2.00]	0007 1	5.0	0.08	0.02	0.67	55.04	0.94	0.000	
	RESRVR [2 : 0007] {ST= 0.00 ha.m }	0008 1	5.0	0.08	0.01	1.08	54.31	n/a	0.000	
*	CALIB STANDHYD [I%=90.0:S%= 2.00]	0009 1	5.0	0.01	0.00	0.67	57.08	0.97	0.000	
	ADD [0005 + 0006]	0010 3	5.0	1.41	0.25	0.67	37.71	n/a	0.000	
	ADD [0010 + 0008]	0010 1	5.0	1.49	0.25	0.67	38.61	n/a	0.000	
	ADD [0010 + 0009]	0010 3	5.0	1.50	0.26	0.67	38.71	n/a	0.000	
	RESRVR [2 : 0010] {ST= 0.02 ha.m }	0011 1	5.0	1.50	0.11	1.00	38.69	n/a	0.000	← TO GALBRAITH
*	CALIB STANDHYD [I%=90.0:S%= 2.00]	0012 1	5.0	0.34	0.10	0.67	53.88	0.92	0.000	← TO KING
*	CALIB STANDHYD [I%=90.0:S%= 2.00]	0001 1	5.0	0.08	0.03	0.67	53.87	0.92	0.000	
	RESRVR [2 : 0001] {ST= 0.00 ha.m }	0002 1	5.0	0.08	0.01	1.00	53.79	n/a	0.000	
*	CALIB STANDHYD [I%=35.0:S%= 2.00]	0003 1	5.0	0.02	0.00	0.67	32.72	0.56	0.000	
	ADD [0002 + 0003]	0004 3	5.0	0.10	0.01	0.67	50.57	n/a	0.000	← TO CHURCH

```
 V    V   I    SSSSS  U   U    A    L
 V    V   I    SS     U   U   A A   L
  V  V    I     SS    U   U  AAAAA  L
  V  V    I      SS   U   U  A   A  L
   VV     I    SSSSS  UUUUU  A   A  LLLLL

  OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
 O   O    T      T    H   H   Y Y   MM MM  O   O
 O   O    T      T    H   H    Y    M   M  O   O
  OOO     T      T    H   H    Y    M   M   OOO
Developed and Distributed by Civica Infrastructure
Copyright 2007 - 2013 Civica Infrastructure
All rights reserved.
```

***** S U M M A R Y O U T P U T *****

Input filename: C:\Program Files (x86)\VH Suite 3.0\VO2\voin.dat
Output filename: C:\Users\Peter\AppData\Local\Temp\0006b2c1-c48b-46ff-9258-a6c178aac649\Scenario.out
Summary filename: C:\Users\Peter\AppData\Local\Temp\0006b2c1-c48b-46ff-9258-a6c178aac649\Scenario.sum

DATE: 05/15/2015 TIME: 09:00:35

USER:

COMMENTS: 50 YR POST DEV

****
** SIMULATION NUMBER: 5 **
****

W/E	COMMAND	HYD ID		DT min	AREA ha	Qpeak cms	Tpeak hrs	R.V. mm	R.C.	Qbase cms	
	START @ 0.00 hrs										
	CHIC STORM [Ptot= 65.84 mm]			10.0							
**	CALIB NASHYD [CN=71.0] [N = 3.0:Tp 0.20]	0006	1	5.0	0.64	0.05	0.92	22.44	0.34	0.000	
*	CALIB STANDHYD [I%=90.0:S%= 2.00]	0005	1	5.0	0.77	0.28	0.67	60.81	0.92	0.000	
*	CALIB STANDHYD [I%=90.0:S%= 2.00]	0007	1	5.0	0.08	0.03	0.67	62.13	0.94	0.000	
	RESRVR [2 : 0007] {ST= 0.00 ha.m }	0008	1	5.0	0.08	0.01	1.08	61.38	n/a	0.000	
*	CALIB STANDHYD [I%=90.0:S%= 2.00]	0009	1	5.0	0.01	0.00	0.67	64.30	0.98	0.000	
	ADD [0005 + 0006]	0010	3	5.0	1.41	0.30	0.67	43.41	n/a	0.000	
	ADD [0010 + 0008]	0010	1	5.0	1.49	0.31	0.67	44.38	n/a	0.000	
	ADD [0010 + 0009]	0010	3	5.0	1.50	0.31	0.67	44.49	n/a	0.000	
	RESRVR [2 : 0010] {ST= 0.02 ha.m }	0011	1	5.0	1.50	0.14	0.92	44.47	n/a	0.000	← TO GALBRAITH
*	CALIB STANDHYD [I%=90.0:S%= 2.00]	0012	1	5.0	0.34	0.12	0.67	60.81	0.92	0.000	← TO KING
*	CALIB STANDHYD [I%=90.0:S%= 2.00]	0001	1	5.0	0.08	0.03	0.67	60.80	0.92	0.000	
	RESRVR [2 : 0001] {ST= 0.00 ha.m }	0002	1	5.0	0.08	0.01	1.00	60.68	n/a	0.000	
*	CALIB STANDHYD [I%=35.0:S%= 2.00]	0003	1	5.0	0.02	0.00	0.67	38.31	0.58	0.000	
	ADD [0002 + 0003]	0004	3	5.0	0.10	0.01	0.67	57.26	n/a	0.000	← TO CHURCH

```
V    V   I    SSSSS  U   U    A    L
V    V   I    SS     U   U   A A   L
 V  V    I     SS    U   U  AAAAA  L
 V  V    I      SS   U   U  A   A  L
  VV     I    SSSSS  UUUUU  A   A  LLLLL

 OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
O   O    T      T    H   H   Y Y   MM MM  O   O
O   O    T      T    H   H    Y    M   M  O   O
 OOO     T      T    H   H    Y    M   M   OOO
```

Developed and Distributed by Civica Infrastructure
Copyright 2007 - 2013 Civica Infrastructure
All rights reserved.

***** D E T A I L E D O U T P U T *****

Input filename: C:\Program Files (x86)\VH Suite 3.0\VO2\voin.dat
Output filename: C:\Users\Peter\AppData\Local\Temp\693a1d7b-3658-4958-9173-32b37c2b5863\Scenario.out
Summary filename: C:\Users\Peter\AppData\Local\Temp\693a1d7b-3658-4958-9173-32b37c2b5863\Scenario.sum

DATE: 05/15/2015 TIME: 09:00:46

USER:

COMMENTS: 100 YR Post Dev

****
** SIMULATION NUMBER: 6 **
****

CHICAGO STORM | Ptotal= 67.89 mm |

IDF curve parameters: A=1770.000
B= 4.000
C= 0.820
used in: INTENSITY = A / (t + B)^C

Duration of storm = 2.00 hrs
Storm time step = 10.00 min
Time to peak ratio = 0.33

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.17	9.77	0.67	203.31	1.17	17.18	1.67	8.96
0.33	15.10	0.83	50.96	1.33	13.06	1.83	7.78
0.50	38.21	1.00	25.51	1.50	10.60	2.00	6.90

CALIB NASHYD (0006) | ID= 1 DT= 5.0 min |

Area (ha)= 0.64 Curve Number (CN)= 71.0
Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.20

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	9.77	0.583	203.31	1.083	17.18	1.58	8.96
0.167	9.77	0.667	203.31	1.167	17.18	1.67	8.96
0.250	15.10	0.750	50.96	1.250	13.06	1.75	7.78
0.333	15.10	0.833	50.96	1.333	13.06	1.83	7.78
0.417	38.21	0.917	25.51	1.417	10.60	1.92	6.90
0.500	38.21	1.000	25.51	1.500	10.60	2.00	6.90

Unit Hyd Qpeak (cms)= 0.122

PEAK FLOW (cms)= 0.060 (i)
TIME TO PEAK (hrs)= 0.833
RUNOFF VOLUME (mm)= 23.688
TOTAL RAINFALL (mm)= 67.888
RUNOFF COEFFICIENT = 0.349

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB
STANDHYD (0005) | Area (ha)= 0.77
ID= 1 DT= 5.0 min | Total Imp(%)= 90.00 Dir. Conn.(%)= 90.00

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	0.69	0.08	
Dep. Storage	(mm)=	1.00	1.50	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	71.61	40.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.(mm/hr)=		203.31	70.97	
over (min)		5.00	5.00	
Storage Coeff.	(min)=	1.57 (ii)	3.78 (ii)	
Unit Hyd. Tpeak	(min)=	5.00	5.00	
Unit Hyd. peak	(cms)=	0.33	0.25	
				TOTALS
PEAK FLOW	(cms)=	0.39	0.02	0.407 (iii)
TIME TO PEAK	(hrs)=	0.67	0.67	0.67
RUNOFF VOLUME	(mm)=	66.89	25.91	62.79
TOTAL RAINFALL	(mm)=	67.89	67.89	67.89
RUNOFF COEFFICIENT	=	0.99	0.38	0.92

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 71.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB
STANDHYD (0007) | Area (ha)= 0.08
ID= 1 DT= 5.0 min | Total Imp(%)= 90.00 Dir. Conn.(%)= 90.00

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	0.07	0.01	
Dep. Storage	(mm)=	1.00	1.50	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	23.07	40.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.(mm/hr)=		203.31	116.81	
over (min)		5.00	5.00	
Storage Coeff.	(min)=	0.80 (ii)	3.00 (ii)	
Unit Hyd. Tpeak	(min)=	5.00	5.00	
Unit Hyd. peak	(cms)=	0.34	0.28	
				TOTALS
PEAK FLOW	(cms)=	0.04	0.00	0.043 (iii)
TIME TO PEAK	(hrs)=	0.67	0.67	0.67
RUNOFF VOLUME	(mm)=	66.89	39.63	64.15
TOTAL RAINFALL	(mm)=	67.89	67.89	67.89
RUNOFF COEFFICIENT	=	0.99	0.58	0.94

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 85.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

RESERVOIR (0008) |
IN= 2---> OUT= 1 |
DT= 5.0 min |

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.0063	0.0033
0.0032	0.0008	0.0000	0.0000

ROOF TOP STORAGE

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0007)	0.080	0.043	0.67	64.15
OUTFLOW: ID= 1 (0008)	0.080	0.006	0.92	63.43

PEAK FLOW REDUCTION [Qout/Qin](%)= 14.17
TIME SHIFT OF PEAK FLOW (min)= 15.00

MAXIMUM STORAGE USED (ha.m.)= 0.0032

CALIB STANDHYD (0009) | Area (ha)= 0.01
ID= 1 DT= 5.0 min | Total Imp(%)= 90.00 Dir. Conn.(%)= 90.00

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	0.01	0.00	
Dep. Storage	(mm)=	1.00	1.50	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	7.40	40.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.(mm/hr)=		203.31	195.30	
over (min)		5.00	5.00	
Storage Coeff. (min)=		0.40 (ii)	2.61 (ii)	
Unit Hyd. Tpeak (min)=		5.00	5.00	
Unit Hyd. peak (cms)=		0.34	0.29	
				TOTALS
PEAK FLOW	(cms)=	0.00	0.00	0.005 (iii)
TIME TO PEAK	(hrs)=	0.67	0.67	0.67
RUNOFF VOLUME	(mm)=	66.89	61.58	66.35
TOTAL RAINFALL	(mm)=	67.89	67.89	67.89
RUNOFF COEFFICIENT	=	0.99	0.91	0.98

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 98.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0010)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0005):	0.77	0.407	0.67	62.79
+ ID2= 2 (0006):	0.64	0.060	0.83	23.69
ID = 3 (0010):	1.41	0.443	0.67	45.05

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0010)
3 + 2 = 1

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 3 (0010):	1.41	0.443	0.67	45.05
+ ID2= 2 (0008):	0.08	0.006	0.92	63.43
ID = 1 (0010):	1.49	0.448	0.67	46.04

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0010)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0010):	1.49	0.448	0.67	46.04
+ ID2= 2 (0009):	0.01	0.005	0.67	66.35
ID = 3 (0010):	1.50	0.453	0.67	46.15

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR (0011)
IN= 2---> OUT= 1
DT= 5.0 min

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.0750	0.0117
0.0720	0.0078	0.0760	0.0166
0.0730	0.0079	0.1246	0.0234
0.0740	0.0088	0.2127	0.0267

SURFACE / UNDERGROUND STORAGE

FLOW TO GALBRAITH

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0010)	1.496	0.453	0.67	46.15
OUTFLOW: ID= 1 (0011)	1.496	0.175	0.83	46.14

PEAK FLOW REDUCTION [Qout/Qin](%)= 38.61
TIME SHIFT OF PEAK FLOW (min)= 10.00
MAXIMUM STORAGE USED (ha.m.)= 0.0253

CALIB STANDHYD (0012) ID= 1 DT= 5.0 min

Area (ha)= 0.34
Total Imp(%)= 90.00 Dir. Conn.(%)= 90.00

FLOW TO MING ST

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	0.31	0.03	
Dep. Storage	(mm)=	1.00	1.50	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	47.88	40.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.	(mm/hr)=	203.31	70.97	
over	(min)	5.00	5.00	
Storage Coeff.	(min)=	1.24 (ii)	3.44 (ii)	
Unit Hyd. Tpeak	(min)=	5.00	5.00	
Unit Hyd. peak	(cms)=	0.33	0.26	
				TOTALS
PEAK FLOW	(cms)=	0.17	0.01	0.182 (iii)
TIME TO PEAK	(hrs)=	0.67	0.67	0.67
RUNOFF VOLUME	(mm)=	66.89	25.91	62.79
TOTAL RAINFALL	(mm)=	67.89	67.89	67.89
RUNOFF COEFFICIENT	=	0.99	0.38	0.92

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 71.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB STANDHYD (0001) ID= 1 DT= 5.0 min

Area (ha)= 0.08
Total Imp(%)= 90.00 Dir. Conn.(%)= 90.00

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	0.08	0.01	
Dep. Storage	(mm)=	1.00	1.50	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	23.66	40.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.	(mm/hr)=	203.31	70.97	
over	(min)	5.00	5.00	
Storage Coeff.	(min)=	0.81 (ii)	3.02 (ii)	
Unit Hyd. Tpeak	(min)=	5.00	5.00	
Unit Hyd. peak	(cms)=	0.34	0.28	
				TOTALS
PEAK FLOW	(cms)=	0.04	0.00	0.045 (iii)
TIME TO PEAK	(hrs)=	0.67	0.67	0.67
RUNOFF VOLUME	(mm)=	66.89	25.91	62.78
TOTAL RAINFALL	(mm)=	67.89	67.89	67.89
RUNOFF COEFFICIENT	=	0.99	0.38	0.92

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 71.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

RESERVOIR (0002)
IN= 2---> OUT= 1
DT= 5.0 min

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.0067	0.0007
0.0065	0.0004	0.0068	0.0015

```
                        0.0066      0.0005   |    0.0069       0.0034
```

AUX PARKING LOT STORAGE

```
                              AREA      QPEAK      TPEAK       R.V.
                              (ha)      (cms)      (hrs)       (mm)
    INFLOW : ID= 2 (0001)     0.084     0.045       0.67       62.78
    OUTFLOW: ID= 1 (0002)     0.084     0.007       0.92       62.65

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 15.43
                  TIME SHIFT OF PEAK FLOW          (min)= 15.00
                  MAXIMUM  STORAGE   USED        (ha.m.)=  0.0029

--------------------------------------------------------------------------------
--------------------
 CALIB              |
 STANDHYD  (0003)   |   Area    (ha)=   0.02
ID= 1 DT= 5.0 min   |   Total Imp(%)=  35.00   Dir. Conn.(%)=  35.00
--------------------

                                IMPERVIOUS    PERVIOUS (i)
    Surface Area      (ha)=        0.01          0.01
    Dep. Storage      (mm)=        1.00          1.50
    Average Slope      (%)=        1.00          2.00
    Length             (m)=       10.05         40.00
    Mannings n            =       0.013         0.250

    Max.Eff.Inten.(mm/hr)=      203.31         70.97
              over (min)            5.00         10.00
    Storage Coeff.  (min)=        0.48 (ii)     8.58 (ii)
    Unit Hyd. Tpeak (min)=        5.00         10.00
    Unit Hyd. peak  (cms)=        0.34          0.12
                                                          *TOTALS*
    PEAK FLOW         (cms)=      0.00          0.00       0.004 (iii)
    TIME TO PEAK      (hrs)=      0.67          0.75        0.67
    RUNOFF VOLUME      (mm)=     66.89         25.91       39.99
    TOTAL RAINFALL     (mm)=     67.89         67.89       67.89
    RUNOFF COEFFICIENT    =      0.99          0.38        0.59

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  71.0     Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

--------------------
 ADD HYD   (0004)   |
   1 +  2 =  3      |          AREA     QPEAK     TPEAK      R.V.
--------------------          (ha)      (cms)     (hrs)      (mm)
         ID1= 1 (0002):      0.08     0.007      0.92      62.65
       + ID2= 2 (0003):      0.02     0.004      0.67      39.99
         ==========================================================
         ID = 3 (0004):      0.10     0.011      0.67      59.18

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------

 FINISH
================================================================================
```

FLOW TO CHURCH ST

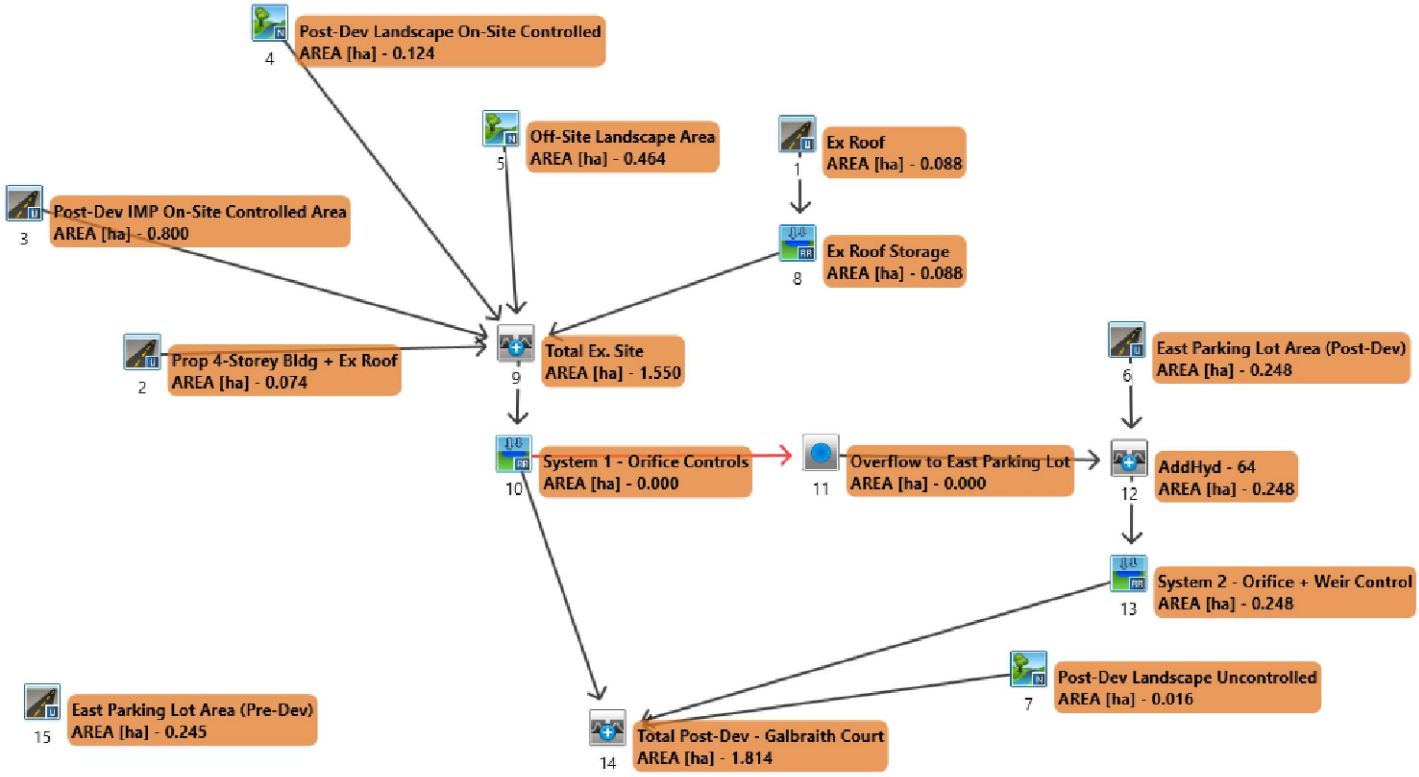
OSHAWA
200-481 Taunton Road West
Oshawa, ON L1J 0G3
905-576-8500

PETERBOROUGH
402-150 King Street
Peterborough, ON K9J 2R9
705-201-0272

dgbiddle.com

SCHEDULE 3

VISUAL OTTHYMO RESULTS



222 KING STREET EAST, BOWMANVILLE FOR: BARRY BRYAN ASSOCIATES

HYMO SCHEME

D.G. BIDDLE & ASSOCIATES
CONSULTING ENGINEERS & PLANNERS

200-481 Taunton Road West
Oshawa, Ontario, L1J 0G3
Phone: 905-576-8500
info@dgbiddle.com
dgbiddle.com

PROJECT NO. 125807

SCALE:	N.T.S.	DRAWN BY:	B.K.Y.
DATE:	JULY 2026	CHECKED BY:	C.J.F.

DRAWING NO. FIGURE 3

```
================================================================================================================

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
Developed and Distributed by Smart City Water Inc
Copyright 2007 - 2022 Smart City Water Inc
All rights reserved.


                  *****  D E T A I L E D   O U T P U T *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2.2015\VO2\voin.dat
  Output  filename: C:\Users\Colin\AppData\Local\Civica\VH5\e72d54cd-959d-4ec8-9200-c0e4f41d014c\5b0c4b2e-68b2
  Summary filename: C:\Users\Colin\AppData\Local\Civica\VH5\e72d54cd-959d-4ec8-9200-c0e4f41d014c\5b0c4b2e-68b2


DATE: 10-29-2026                          TIME: 09:05:50

USER:


COMMENTS: _____________________________________________________


----------------------------------------------------------------------------------------------------------------
  ************************************************
  ** SIMULATION : 1 - 2 Year                    **
  ************************************************

--------------------
| CHICAGO STORM    |    IDF curve parameters: A=1778.000
| Ptotal= 26.70 mm |                          B=  13.000
--------------------                          C=   1.000
                       used in:   INTENSITY =  A / (t + B)^C

                       Duration of storm  =  2.00 hrs
                       Storm time step    = 10.00 min
                       Time to peak ratio =  0.33

                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.00    2.46 |  0.50   77.30 |  1.00    6.42 |  1.50    2.09
               0.17    5.25 |  0.67   26.45 |  1.17    4.10 |  1.67    1.60
               0.33   18.95 |  0.83   11.48 |  1.33    2.84 |  1.83    1.26


--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0015)|   Area    (ha)=   0.25
|ID= 1 DT= 5.0 min |   Total Imp(%)=  57.90   Dir. Conn.(%)=  57.90
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      0.14         0.10
     Dep. Storage     (mm)=      1.00         1.50
     Average Slope     (%)=      1.00         2.00
     Length            (m)=     40.41        40.00
     Mannings n           =     0.013        0.250

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                             ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    2.46 | 0.583   77.30 | 1.083    6.42 |  1.58    2.09
               0.167    2.46 | 0.667   77.30 | 1.167    6.42 |  1.67    2.09
               0.250    5.25 | 0.750   26.45 | 1.250    4.10 |  1.75    1.60
               0.333    5.25 | 0.833   26.45 | 1.333    4.10 |  1.83    1.60
               0.417   18.95 | 0.917   11.48 | 1.417    2.84 |  1.92    1.26
               0.500   18.95 | 1.000   11.48 | 1.500    2.84 |  2.00    1.26

     Max.Eff.Inten.(mm/hr)=      77.30        19.97
                over (min)        5.00        20.00

     Storage Coeff.  (min)=       1.64 (ii)   15.09 (ii)
     Unit Hyd. Tpeak (min)=       5.00        20.00
     Unit Hyd. peak  (cms)=       0.32         0.07
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.03         0.00          0.031 (iii)
     TIME TO PEAK    (hrs)=       0.67         0.92           0.67
     RUNOFF VOLUME    (mm)=      25.70         9.07          18.66
     TOTAL RAINFALL   (mm)=      26.70        26.70          26.70
     RUNOFF COEFFICIENT   =       0.96         0.34           0.70

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  85.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0005)|   Area    (ha)=   0.46   Curve Number   (CN)= 71.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                             ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    2.46 | 0.583   77.30 | 1.083    6.42 |  1.58    2.09
               0.167    2.46 | 0.667   77.30 | 1.167    6.42 |  1.67    2.09
               0.250    5.25 | 0.750   26.45 | 1.250    4.10 |  1.75    1.60
               0.333    5.25 | 0.833   26.45 | 1.333    4.10 |  1.83    1.60
               0.417   18.95 | 0.917   11.48 | 1.417    2.84 |  1.92    1.26
               0.500   18.95 | 1.000   11.48 | 1.500    2.84 |  2.00    1.26

     Unit Hyd Qpeak  (cms)=   0.089

     PEAK FLOW       (cms)=   0.007 (i)
     TIME TO PEAK    (hrs)=   0.917
     RUNOFF VOLUME    (mm)=   3.746
     TOTAL RAINFALL   (mm)=  26.701
     RUNOFF COEFFICIENT   =   0.140

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0004)|   Area    (ha)=   0.12   Curve Number   (CN)= 71.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                             ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    2.46 | 0.583   77.30 | 1.083    6.42 |  1.58    2.09
               0.167    2.46 | 0.667   77.30 | 1.167    6.42 |  1.67    2.09
               0.250    5.25 | 0.750   26.45 | 1.250    4.10 |  1.75    1.60
               0.333    5.25 | 0.833   26.45 | 1.333    4.10 |  1.83    1.60
               0.417   18.95 | 0.917   11.48 | 1.417    2.84 |  1.92    1.26
               0.500   18.95 | 1.000   11.48 | 1.500    2.84 |  2.00    1.26

     Unit Hyd Qpeak  (cms)=   0.024

     PEAK FLOW       (cms)=   0.002 (i)
     TIME TO PEAK    (hrs)=   0.917
     RUNOFF VOLUME    (mm)=   3.742
     TOTAL RAINFALL   (mm)=  26.701
     RUNOFF COEFFICIENT   =   0.140

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0002)|   Area    (ha)=   0.07
|ID= 1 DT= 5.0 min |   Total Imp(%)=  90.00   Dir. Conn.(%)=  90.00
--------------------
```

```
                                IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=          0.07          0.01
     Dep. Storage     (mm)=          1.00          1.50
     Average Slope     (%)=          1.00          2.00
     Length            (m)=         22.21         40.00
     Mannings n           =         0.013         0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                          ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
              0.083    2.46 | 0.583   77.30 | 1.083    6.42 |  1.58    2.09
              0.167    2.46 | 0.667   77.30 | 1.167    6.42 |  1.67    2.09
              0.250    5.25 | 0.750   26.45 | 1.250    4.10 |  1.75    1.60
              0.333    5.25 | 0.833   26.45 | 1.333    4.10 |  1.83    1.60
              0.417   18.95 | 0.917   11.48 | 1.417    2.84 |  1.92    1.26
              0.500   18.95 | 1.000   11.48 | 1.500    2.84 |  2.00    1.26

     Max.Eff.Inten.(mm/hr)=         77.30         23.69
               over (min)           5.00          5.00
     Storage Coeff.  (min)=         1.15 (ii)     4.40 (ii)
     Unit Hyd. Tpeak (min)=         5.00          5.00
     Unit Hyd. peak  (cms)=         0.34          0.23
                                                  *TOTALS*
     PEAK FLOW       (cms)=         0.01          0.00          0.015 (iii)
     TIME TO PEAK    (hrs)=         0.67          0.67           0.67
     RUNOFF VOLUME    (mm)=        25.70          9.07          24.03
     TOTAL RAINFALL   (mm)=        26.70         26.70          26.70
     RUNOFF COEFFICIENT   =         0.96          0.34           0.90

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  85.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0001)|   Area    (ha)=   0.09
|ID= 1 DT= 5.0 min |   Total Imp(%)=  90.00   Dir. Conn.(%)=  90.00
--------------------
                                IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=          0.08          0.01
     Dep. Storage     (mm)=          1.00          1.50
     Average Slope     (%)=          1.00          2.00
     Length            (m)=         24.22         40.00
     Mannings n           =         0.013         0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                          ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
              0.083    2.46 | 0.583   77.30 | 1.083    6.42 |  1.58    2.09
              0.167    2.46 | 0.667   77.30 | 1.167    6.42 |  1.67    2.09
              0.250    5.25 | 0.750   26.45 | 1.250    4.10 |  1.75    1.60
              0.333    5.25 | 0.833   26.45 | 1.333    4.10 |  1.83    1.60
              0.417   18.95 | 0.917   11.48 | 1.417    2.84 |  1.92    1.26
              0.500   18.95 | 1.000   11.48 | 1.500    2.84 |  2.00    1.26

     Max.Eff.Inten.(mm/hr)=         77.30         23.69
               over (min)           5.00          5.00
     Storage Coeff.  (min)=         1.21 (ii)     4.46 (ii)
     Unit Hyd. Tpeak (min)=         5.00          5.00
     Unit Hyd. peak  (cms)=         0.33          0.23
                                                  *TOTALS*
     PEAK FLOW       (cms)=         0.02          0.00          0.018 (iii)
     TIME TO PEAK    (hrs)=         0.67          0.67           0.67
     RUNOFF VOLUME    (mm)=        25.70          9.07          24.03
     TOTAL RAINFALL   (mm)=        26.70         26.70          26.70
     RUNOFF COEFFICIENT   =         0.96          0.34           0.90

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  85.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
```

```
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0008)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0063     0.0033
                          0.0032     0.0008   |   0.0000     0.0000

                                AREA     QPEAK     TPEAK      R.V.
                                (ha)     (cms)     (hrs)      (mm)
   INFLOW : ID= 2 (  0001)     0.088     0.018      0.67      24.03
   OUTFLOW: ID= 1 (  0008)     0.088     0.004      0.92      23.37

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 21.10
                  TIME SHIFT OF PEAK FLOW         (min)= 15.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0013

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0003)|   Area    (ha)=   0.80
|ID= 1 DT= 5.0 min |   Total Imp(%)=  90.00   Dir. Conn.(%)=  90.00
--------------------
                                IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=          0.72          0.08
     Dep. Storage     (mm)=          1.00          1.50
     Average Slope     (%)=          1.00          2.00
     Length            (m)=         73.03         40.00
     Mannings n           =         0.013         0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                          ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
              0.083    2.46 | 0.583   77.30 | 1.083    6.42 |  1.58    2.09
              0.167    2.46 | 0.667   77.30 | 1.167    6.42 |  1.67    2.09
              0.250    5.25 | 0.750   26.45 | 1.250    4.10 |  1.75    1.60
              0.333    5.25 | 0.833   26.45 | 1.333    4.10 |  1.83    1.60
              0.417   18.95 | 0.917   11.48 | 1.417    2.84 |  1.92    1.26
              0.500   18.95 | 1.000   11.48 | 1.500    2.84 |  2.00    1.26

     Max.Eff.Inten.(mm/hr)=         77.30         12.08
               over (min)           5.00         10.00
     Storage Coeff.  (min)=         2.35 (ii)     5.59 (ii)
     Unit Hyd. Tpeak (min)=         5.00         10.00
     Unit Hyd. peak  (cms)=         0.30          0.16
                                                  *TOTALS*
     PEAK FLOW       (cms)=         0.15          0.00          0.155 (iii)
     TIME TO PEAK    (hrs)=         0.67          0.75           0.67
     RUNOFF VOLUME    (mm)=        25.70          4.93          23.62
     TOTAL RAINFALL   (mm)=        26.70         26.70          26.70
     RUNOFF COEFFICIENT   =         0.96          0.18           0.88

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0009)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0002):     0.07    0.015     0.67    24.03
     + ID2= 2 (  0003):     0.80    0.155     0.67    23.62
       ================================================
       ID = 3 (  0009):     0.87    0.169     0.67    23.66

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0009)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
```

```
      ID1= 3 (  0009):     0.87   0.169     0.67    23.66
    + ID2= 2 (  0004):     0.12   0.002     0.92     3.74
      ================================================
      ID = 1 (  0009):     1.00   0.170     0.67    21.18

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0009)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
      ID1= 1 (  0009):     1.00   0.170     0.67    21.18
    + ID2= 2 (  0005):     0.46   0.007     0.92     3.75
      ================================================
      ID = 3 (  0009):     1.46   0.173     0.67    15.65

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0009)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
      ID1= 3 (  0009):     1.46   0.173     0.67    15.65
    + ID2= 2 (  0008):     0.09   0.004     0.92    23.37
      ================================================
      ID = 1 (  0009):     1.55   0.177     0.67    16.09

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| RESERVOIR(  0010)|     OVERFLOW IS ON
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE    |  OUTFLOW    STORAGE
--------------------      (cms)    (ha.m.)    |   (cms)    (ha.m.)
                          0.0000     0.0000    |   0.1120     0.0200
                          0.0718     0.0039    |   0.1128     0.0200
                          0.0853     0.0125    |   0.1142     0.0204
                          0.0969     0.0173    |   0.1155     0.0212
                          0.1073     0.0200    |   0.0000     0.0000

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0009)     1.550     0.177      0.67      16.09
   OUTFLOW: ID= 1 (  0010)     1.550     0.078      0.83      16.08
   OVERFLOW:ID= 3 (  0003)     0.000     0.000      0.00       0.00

                  TOTAL NUMBER OF SIMULATION OVERFLOW  =     0
                  CUMULATIVE TIME OF OVERFLOW  (HOURS) =  0.00
                  PERCENTAGE OF TIME OVERFLOWING   (%) =  0.00

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 44.08
                  TIME SHIFT OF PEAK FLOW         (min)= 10.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0078
--------------------------------------------------------------------------------

  --------------------------
  | Junction Command(0011) |
  --------------------------

                           AREA     QPEAK   TPEAK     R.V.
                           (ha)     (cms)    (hrs)    (mm)
  INFLOW : ID= 3(  0010)    0.00     0.00    0.00     0.00
  OUTFLOW: ID= 2(  0011)    0.00     0.00    0.00     0.00

  --------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0006)|   Area    (ha)=   0.25
|ID= 1 DT= 5.0 min |   Total Imp(%)=  90.00   Dir. Conn.(%)=  90.00
--------------------

                         IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.22          0.02
     Dep. Storage     (mm)=       1.00          1.50
     Average Slope     (%)=       1.00          2.00
     Length            (m)=      40.66         40.00
     Mannings n           =      0.013         0.250

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                            ---- TRANSFORMED HYETOGRAPH ----
```

```
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    2.46 | 0.583   77.30 | 1.083    6.42 |  1.58    2.09
               0.167    2.46 | 0.667   77.30 | 1.167    6.42 |  1.67    2.09
               0.250    5.25 | 0.750   26.45 | 1.250    4.10 |  1.75    1.60
               0.333    5.25 | 0.833   26.45 | 1.333    4.10 |  1.83    1.60
               0.417   18.95 | 0.917   11.48 | 1.417    2.84 |  1.92    1.26
               0.500   18.95 | 1.000   11.48 | 1.500    2.84 |  2.00    1.26

     Max.Eff.Inten.(mm/hr)=      77.30         23.69
           over (min)            5.00          5.00
     Storage Coeff.  (min)=      1.65 (ii)     4.90 (ii)
     Unit Hyd. Tpeak (min)=      5.00          5.00
     Unit Hyd. peak  (cms)=      0.32          0.22
                                                        *TOTALS*
     PEAK FLOW       (cms)=      0.05          0.00        0.049 (iii)
     TIME TO PEAK    (hrs)=      0.67          0.67         0.67
     RUNOFF VOLUME    (mm)=     25.70          9.07        24.03
     TOTAL RAINFALL   (mm)=     26.70         26.70        26.70
     RUNOFF COEFFICIENT   =      0.96          0.34         0.90

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  85.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0012)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
*** W A R N I N G :  HYDROGRAPH   0011 <ID= 1> IS DRY.
*** W A R N I N G :  HYDROGRAPH   0012 = HYDROGRAPH 0006
       ID1= 1 (  0011):     0.00   0.000     0.00     0.00
     + ID2= 2 (  0006):     0.25   0.049     0.67    24.03
       ================================================
       ID = 3 (  0012):     0.25   0.049     0.67    24.03

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0013)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE    |  OUTFLOW    STORAGE
--------------------      (cms)    (ha.m.)    |   (cms)    (ha.m.)
                          0.0000     0.0000    |   0.0218     0.0006
                          0.0078     0.0006    |   0.0221     0.0007
                          0.0110     0.0006    |   0.0224     0.0013
                          0.0135     0.0006    |   0.0228     0.0033
                          0.0156     0.0006    |   0.0231     0.0071
                          0.0175     0.0006    |   0.0996     0.0124
                          0.0191     0.0006    |   0.1498     0.0148
                          0.0207     0.0006    |   0.0000     0.0000

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0012)     0.248     0.049      0.67      24.03
   OUTFLOW: ID= 1 (  0013)     0.248     0.023      0.75      24.03

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 45.58
                  TIME SHIFT OF PEAK FLOW         (min)=  5.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0021
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0007)|   Area    (ha)=   0.02   Curve Number   (CN)= 80.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                            ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    2.46 | 0.583   77.30 | 1.083    6.42 |  1.58    2.09
               0.167    2.46 | 0.667   77.30 | 1.167    6.42 |  1.67    2.09
               0.250    5.25 | 0.750   26.45 | 1.250    4.10 |  1.75    1.60
               0.333    5.25 | 0.833   26.45 | 1.333    4.10 |  1.83    1.60
```

```
              0.417   18.95 | 0.917   11.48 | 1.417    2.84 |  1.92    1.26
              0.500   18.95 | 1.000   11.48 | 1.500    2.84 |  2.00    1.26

     Unit Hyd Qpeak  (cms)=   0.003

     PEAK FLOW       (cms)=   0.000 (i)
     TIME TO PEAK    (hrs)=   0.917
     RUNOFF VOLUME    (mm)=   5.410
     TOTAL RAINFALL   (mm)=  26.701
     RUNOFF COEFFICIENT   =   0.203

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0014)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0010):     1.55   0.078     0.83    16.08
     + ID2= 2 (  0013):     0.25   0.023     0.75    24.03
       ================================================
       ID = 3 (  0014):     1.80   0.100     0.75    17.18

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0014)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0014):     1.80   0.100     0.75    17.18
     + ID2= 2 (  0007):     0.02   0.000     0.92     5.41
       ================================================
       ID = 1 (  0014):     1.81   0.101     0.83    17.07

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
================================================================================================================================

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M  M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
Developed and Distributed by Smart City Water Inc
Copyright 2007 - 2022 Smart City Water Inc
All rights reserved.

                  *****  D E T A I L E D   O U T P U T *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2.2015\VO2\voin.dat
  Output  filename: C:\Users\Colin\AppData\Local\Civica\VH5\e72d54cd-959d-4ec8-9200-c0e4f41d014c\a570d938-4981
  Summary filename: C:\Users\Colin\AppData\Local\Civica\VH5\e72d54cd-959d-4ec8-9200-c0e4f41d014c\a570d938-4981


DATE: 10-29-2026                          TIME: 09:05:51

USER:


COMMENTS: _____________________________________________________


--------------------------------------------------------------------------------------------------------------------------------
  ************************************************
  ** SIMULATION : 2 - 5 Year                    **
  ************************************************

--------------------
| CHICAGO STORM    |    IDF curve parameters: A=2464.000
| Ptotal= 36.18 mm |                          B=  16.000
--------------------                          C=   1.000
                         used in:   INTENSITY =  A / (t + B)^C

                         Duration of storm  =  2.00 hrs
                         Storm time step    = 10.00 min
                         Time to peak ratio =  0.33

                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.00    3.95 |  0.50   94.77 |  1.00    9.92 |  1.50    3.37
                0.17    8.18 |  0.67   36.99 |  1.17    6.46 |  1.67    2.60
                0.33   27.06 |  0.83   17.18 |  1.33    4.54 |  1.83    2.06


--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0015)|   Area    (ha)=   0.25
|ID= 1 DT= 5.0 min |   Total Imp(%)=  57.90   Dir. Conn.(%)=  57.90
--------------------
                                IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        0.14          0.10
     Dep. Storage     (mm)=        1.00          1.50
     Average Slope     (%)=        1.00          2.00
     Length            (m)=       40.41         40.00
     Mannings n             =      0.013         0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                              ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    3.95 | 0.583   94.77 | 1.083    9.92 |  1.58    3.37
               0.167    3.95 | 0.667   94.77 | 1.167    9.92 |  1.67    3.37
               0.250    8.18 | 0.750   36.99 | 1.250    6.46 |  1.75    2.60
               0.333    8.18 | 0.833   36.99 | 1.333    6.46 |  1.83    2.60
               0.417   27.06 | 0.917   17.18 | 1.417    4.54 |  1.92    2.06
               0.500   27.06 | 1.000   17.18 | 1.500    4.54 |  2.00    2.06

     Max.Eff.Inten.(mm/hr)=      94.77         31.23
           over (min)            5.00         15.00
     Storage Coeff.  (min)=      1.52 (ii)    12.76 (ii)
     Unit Hyd. Tpeak (min)=      5.00         15.00
     Unit Hyd. peak  (cms)=      0.33          0.08
                                                          *TOTALS*
     PEAK FLOW       (cms)=      0.04          0.01          0.040 (iii)
     TIME TO PEAK    (hrs)=      0.67          0.83          0.67
     RUNOFF VOLUME    (mm)=     35.18         15.13         26.70
     TOTAL RAINFALL   (mm)=     36.18         36.18         36.18
     RUNOFF COEFFICIENT   =      0.97          0.42          0.74

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  85.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0005)|   Area    (ha)=   0.46   Curve Number   (CN)= 71.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                              ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    3.95 | 0.583   94.77 | 1.083    9.92 |  1.58    3.37
               0.167    3.95 | 0.667   94.77 | 1.167    9.92 |  1.67    3.37
               0.250    8.18 | 0.750   36.99 | 1.250    6.46 |  1.75    2.60
               0.333    8.18 | 0.833   36.99 | 1.333    6.46 |  1.83    2.60
               0.417   27.06 | 0.917   17.18 | 1.417    4.54 |  1.92    2.06
               0.500   27.06 | 1.000   17.18 | 1.500    4.54 |  2.00    2.06

     Unit Hyd Qpeak  (cms)=   0.089

     PEAK FLOW       (cms)=   0.013 (i)
     TIME TO PEAK    (hrs)=   0.917
     RUNOFF VOLUME    (mm)=   7.190
     TOTAL RAINFALL   (mm)=  36.179
     RUNOFF COEFFICIENT   =   0.199
```

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB					
NASHYD (0004)	Area (ha)= 0.12	Curve Number (CN)= 71.0			
ID= 1 DT= 5.0 min	Ia (mm)= 5.00	# of Linear Res.(N)= 3.00			
	U.H. Tp(hrs)= 0.20				

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	3.95	0.583	94.77	1.083	9.92	1.58	3.37
0.167	3.95	0.667	94.77	1.167	9.92	1.67	3.37
0.250	8.18	0.750	36.99	1.250	6.46	1.75	2.60
0.333	8.18	0.833	36.99	1.333	6.46	1.83	2.60
0.417	27.06	0.917	17.18	1.417	4.54	1.92	2.06
0.500	27.06	1.000	17.18	1.500	4.54	2.00	2.06

Unit Hyd Qpeak (cms)=	0.024		
PEAK FLOW	(cms)=	0.003 (i)	
TIME TO PEAK	(hrs)=	0.917	
RUNOFF VOLUME	(mm)=	7.186	
TOTAL RAINFALL	(mm)=	36.179	
RUNOFF COEFFICIENT	=	0.199	

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB					
STANDHYD (0002)	Area (ha)= 0.07				
ID= 1 DT= 5.0 min	Total Imp(%)= 90.00	Dir. Conn.(%)= 90.00			

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.07	0.01
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	22.21	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	3.95	0.583	94.77	1.083	9.92	1.58	3.37
0.167	3.95	0.667	94.77	1.167	9.92	1.67	3.37
0.250	8.18	0.750	36.99	1.250	6.46	1.75	2.60
0.333	8.18	0.833	36.99	1.333	6.46	1.83	2.60
0.417	27.06	0.917	17.18	1.417	4.54	1.92	2.06
0.500	27.06	1.000	17.18	1.500	4.54	2.00	2.06

Max.Eff.Inten.(mm/hr)=		94.77	36.59	
over (min)		5.00	5.00	
Storage Coeff. (min)=		1.06 (ii)	4.05 (ii)	
Unit Hyd. Tpeak (min)=		5.00	5.00	
Unit Hyd. peak (cms)=		0.34	0.24	
				TOTALS
PEAK FLOW	(cms)=	0.02	0.00	0.018 (iii)
TIME TO PEAK	(hrs)=	0.67	0.67	0.67
RUNOFF VOLUME	(mm)=	35.18	15.13	33.17
TOTAL RAINFALL	(mm)=	36.18	36.18	36.18
RUNOFF COEFFICIENT	=	0.97	0.42	0.92

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 85.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB					
STANDHYD (0001)	Area (ha)= 0.09				
ID= 1 DT= 5.0 min	Total Imp(%)= 90.00	Dir. Conn.(%)= 90.00			

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.08	0.01
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	24.22	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	3.95	0.583	94.77	1.083	9.92	1.58	3.37
0.167	3.95	0.667	94.77	1.167	9.92	1.67	3.37
0.250	8.18	0.750	36.99	1.250	6.46	1.75	2.60
0.333	8.18	0.833	36.99	1.333	6.46	1.83	2.60
0.417	27.06	0.917	17.18	1.417	4.54	1.92	2.06
0.500	27.06	1.000	17.18	1.500	4.54	2.00	2.06

Max.Eff.Inten.(mm/hr)=		94.77	36.59	
over (min)		5.00	5.00	
Storage Coeff. (min)=		1.11 (ii)	4.11 (ii)	
Unit Hyd. Tpeak (min)=		5.00	5.00	
Unit Hyd. peak (cms)=		0.34	0.24	
				TOTALS
PEAK FLOW	(cms)=	0.02	0.00	0.022 (iii)
TIME TO PEAK	(hrs)=	0.67	0.67	0.67
RUNOFF VOLUME	(mm)=	35.18	15.13	33.17
TOTAL RAINFALL	(mm)=	36.18	36.18	36.18
RUNOFF COEFFICIENT	=	0.97	0.42	0.92

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 85.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

RESERVOIR(0008)	OVERFLOW IS OFF			
IN= 2---> OUT= 1				
DT= 5.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.0063	0.0033
	0.0032	0.0008	0.0000	0.0000

		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0001)		0.088	0.022	0.67	33.17
OUTFLOW: ID= 1 (0008)		0.088	0.004	0.92	32.49
	PEAK FLOW REDUCTION [Qout/Qin](%)=		19.89		
	TIME SHIFT OF PEAK FLOW		(min)=	15.00	
	MAXIMUM STORAGE USED		(ha.m.)=	0.0018	

CALIB					
STANDHYD (0003)	Area (ha)= 0.80				
ID= 1 DT= 5.0 min	Total Imp(%)= 90.00	Dir. Conn.(%)= 90.00			

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.72	0.08
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	73.03	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	3.95	0.583	94.77	1.083	9.92	1.58	3.37
0.167	3.95	0.667	94.77	1.167	9.92	1.67	3.37
0.250	8.18	0.750	36.99	1.250	6.46	1.75	2.60
0.333	8.18	0.833	36.99	1.333	6.46	1.83	2.60
0.417	27.06	0.917	17.18	1.417	4.54	1.92	2.06
0.500	27.06	1.000	17.18	1.500	4.54	2.00	2.06

```
     Max.Eff.Inten.(mm/hr)=      94.77        19.49
               over (min)         5.00        10.00
     Storage Coeff.  (min)=       2.16 (ii)    5.16 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.31         0.16
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.19         0.00          0.191 (iii)
     TIME TO PEAK    (hrs)=       0.67         0.75           0.67
     RUNOFF VOLUME    (mm)=      35.18         8.69          32.53
     TOTAL RAINFALL   (mm)=      36.18        36.18          36.18
     RUNOFF COEFFICIENT   =       0.97         0.24           0.90

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

-------------------
| ADD HYD  (  0009)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0002):     0.07   0.018     0.67    33.17
     + ID2= 2 (  0003):     0.80   0.191     0.67    32.53
       ================================================
       ID = 3 (  0009):     0.87   0.209     0.67    32.58

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

-------------------
| ADD HYD  (  0009)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
-------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0009):     0.87   0.209     0.67    32.58
     + ID2= 2 (  0004):     0.12   0.003     0.92     7.19
       ================================================
       ID = 1 (  0009):     1.00   0.211     0.67    29.43

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

-------------------
| ADD HYD  (  0009)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0009):     1.00   0.211     0.67    29.43
     + ID2= 2 (  0005):     0.46   0.013     0.92     7.19
       ================================================
       ID = 3 (  0009):     1.46   0.217     0.67    22.37

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

-------------------
| ADD HYD  (  0009)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
-------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0009):     1.46   0.217     0.67    22.37
     + ID2= 2 (  0008):     0.09   0.004     0.92    32.49
       ================================================
       ID = 1 (  0009):     1.55   0.221     0.67    22.94

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
-------------------
| RESERVOIR(  0010)|     OVERFLOW IS ON
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
-------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                         0.0000     0.0000   |   0.1120     0.0200
                         0.0718     0.0039   |   0.1128     0.0200
                         0.0853     0.0125   |   0.1142     0.0204
                         0.0969     0.0173   |   0.1155     0.0212
                         0.1073     0.0200   |   0.0000     0.0000

                              AREA     QPEAK     TPEAK       R.V.
                              (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0009)    1.550     0.221     0.67       22.94
   OUTFLOW: ID= 1 (  0010)    1.550     0.084     0.92       22.94

    OVERFLOW:ID= 3 (  0003)     0.000     0.000     0.00       0.00

                  TOTAL NUMBER OF SIMULATION OVERFLOW  =     0
                  CUMULATIVE TIME OF OVERFLOW  (HOURS) =  0.00
                  PERCENTAGE OF TIME OVERFLOWING   (%) =  0.00

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 38.08
                  TIME SHIFT OF PEAK FLOW         (min)= 15.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0120

--------------------------------------------------------------------------------

  -------------------------
  | Junction Command(0011) |
  -------------------------

                              AREA     QPEAK    TPEAK     R.V.
                              (ha)     (cms)    (hrs)     (mm)
  INFLOW : ID= 3(  0010)     0.00      0.00     0.00      0.00
  OUTFLOW: ID= 2(  0011)     0.00      0.00     0.00      0.00

  --------------------------------------------------------------------------------
-------------------
| CALIB             |
| STANDHYD (  0006)|   Area    (ha)=   0.25
|ID= 1 DT= 5.0 min |   Total Imp(%)=  90.00   Dir. Conn.(%)=  90.00
-------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.22          0.02
     Dep. Storage     (mm)=       1.00          1.50
     Average Slope     (%)=       1.00          2.00
     Length            (m)=      40.66         40.00
     Mannings n            =      0.013         0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.

                              ---- TRANSFORMED HYETOGRAPH ----
              TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
               hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
             0.083    3.95 | 0.583   94.77 | 1.083    9.92 |  1.58    3.37
             0.167    3.95 | 0.667   94.77 | 1.167    9.92 |  1.67    3.37
             0.250    8.18 | 0.750   36.99 | 1.250    6.46 |  1.75    2.60
             0.333    8.18 | 0.833   36.99 | 1.333    6.46 |  1.83    2.60
             0.417   27.06 | 0.917   17.18 | 1.417    4.54 |  1.92    2.06
             0.500   27.06 | 1.000   17.18 | 1.500    4.54 |  2.00    2.06

     Max.Eff.Inten.(mm/hr)=      94.77        36.59
               over (min)         5.00         5.00
     Storage Coeff.  (min)=       1.52 (ii)    4.52 (ii)
     Unit Hyd. Tpeak (min)=       5.00         5.00
     Unit Hyd. peak  (cms)=       0.33         0.23
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.06         0.00          0.061 (iii)
     TIME TO PEAK    (hrs)=       0.67         0.67           0.67
     RUNOFF VOLUME    (mm)=      35.18        15.13          33.16
     TOTAL RAINFALL   (mm)=      36.18        36.18          36.18
     RUNOFF COEFFICIENT   =       0.97         0.42           0.92

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  85.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

-------------------
| ADD HYD  (  0012)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------         (ha)    (cms)    (hrs)     (mm)
*** W A R N I N G :  HYDROGRAPH   0011 <ID= 1> IS DRY.
*** W A R N I N G :  HYDROGRAPH   0012 = HYDROGRAPH 0006
       ID1= 1 (  0011):     0.00   0.000     0.00     0.00
     + ID2= 2 (  0006):     0.25   0.061     0.67    33.16
       ================================================
       ID = 3 (  0012):     0.25   0.061     0.67    33.16

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
-------------------
| RESERVOIR(  0013)|     OVERFLOW IS OFF
```

```
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE    |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)    |   (cms)     (ha.m.)
                         0.0000     0.0000    |  0.0218      0.0006
                         0.0078     0.0006    |  0.0221      0.0007
                         0.0110     0.0006    |  0.0224      0.0013
                         0.0135     0.0006    |  0.0228      0.0033
                         0.0156     0.0006    |  0.0231      0.0071
                         0.0175     0.0006    |  0.0996      0.0124
                         0.0191     0.0006    |  0.1498      0.0148
                         0.0207     0.0006    |  0.0000      0.0000

                                  AREA     QPEAK     TPEAK       R.V.
                                  (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0012)      0.248     0.061      0.67      33.16
   OUTFLOW: ID= 1 (  0013)      0.248     0.023      0.83      33.16

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 37.18
                  TIME SHIFT OF PEAK FLOW         (min)= 10.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0031

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0007)|   Area    (ha)=   0.02   Curve Number   (CN)= 80.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                        ---- TRANSFORMED HYETOGRAPH ----
              TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
             0.083    3.95 | 0.583   94.77 | 1.083    9.92 |  1.58    3.37
             0.167    3.95 | 0.667   94.77 | 1.167    9.92 |  1.67    3.37
             0.250    8.18 | 0.750   36.99 | 1.250    6.46 |  1.75    2.60
             0.333    8.18 | 0.833   36.99 | 1.333    6.46 |  1.83    2.60
             0.417   27.06 | 0.917   17.18 | 1.417    4.54 |  1.92    2.06
             0.500   27.06 | 1.000   17.18 | 1.500    4.54 |  2.00    2.06

    Unit Hyd Qpeak  (cms)=   0.003

    PEAK FLOW       (cms)=   0.001 (i)
    TIME TO PEAK    (hrs)=   0.917
    RUNOFF VOLUME    (mm)=  10.140
    TOTAL RAINFALL   (mm)=  36.179
    RUNOFF COEFFICIENT   =   0.280

    (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0014)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0010):     1.55   0.084     0.92    22.94
     + ID2= 2 (  0013):     0.25   0.023     0.83    33.16
       ================================================
       ID = 3 (  0014):     1.80   0.107     0.92    24.35

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0014)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0014):     1.80   0.107     0.92    24.35
     + ID2= 2 (  0007):     0.02   0.001     0.92    10.14
       ================================================
       ID = 1 (  0014):     1.81   0.107     0.92    24.22

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
================================================================================================================

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

         OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
        O   O    T      T    H   H   Y Y   MM MM  O   O
        O   O    T      T    H   H    Y    M   M  O   O
         OOO     T      T    H   H    Y    M   M   OOO
Developed and Distributed by Smart City Water Inc
Copyright 2007 - 2022 Smart City Water Inc
All rights reserved.

                  *****  D E T A I L E D   O U T P U T *****

  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2.2015\VO2\voin.dat
  Output  filename: C:\Users\Colin\AppData\Local\Civica\VH5\e72d54cd-959d-4ec8-9200-c0e4f41d014c\cd765d39-1a96
  Summary filename: C:\Users\Colin\AppData\Local\Civica\VH5\e72d54cd-959d-4ec8-9200-c0e4f41d014c\cd765d39-1a96

DATE: 10-29-2026                          TIME: 09:05:51

USER:


COMMENTS: _____________________________________________________

--------------------------------------------------------------------------------------------------------------------
  ************************************************
  ** SIMULATION : 3 - 10 Year                   **
  ************************************************

--------------------
| CHICAGO STORM    |    IDF curve parameters: A=2819.000
| Ptotal= 41.39 mm |                          B=  16.000
--------------------                          C=   1.000
                        used in:   INTENSITY =  A / (t + B)^C

                        Duration of storm  =  2.00 hrs
                        Storm time step    = 10.00 min
                        Time to peak ratio =  0.33

              TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
              0.00    4.51 |  0.50  108.42 |  1.00   11.35 |  1.50    3.85
              0.17    9.35 |  0.67   42.32 |  1.17    7.39 |  1.67    2.97
              0.33   30.96 |  0.83   19.65 |  1.33    5.20 |  1.83    2.36

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0015)|   Area    (ha)=   0.25
|ID= 1 DT= 5.0 min |   Total Imp(%)=  57.90   Dir. Conn.(%)=  57.90
--------------------

                                IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        0.14          0.10
     Dep. Storage     (mm)=        1.00          1.50
     Average Slope     (%)=        1.00          2.00
     Length            (m)=       40.41         40.00
     Mannings n             =      0.013         0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                        ---- TRANSFORMED HYETOGRAPH ----
              TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
             0.083    4.51 | 0.583  108.42 | 1.083   11.35 |  1.58    3.85
             0.167    4.51 | 0.667  108.42 | 1.167   11.35 |  1.67    3.85
             0.250    9.35 | 0.750   42.32 | 1.250    7.39 |  1.75    2.97
             0.333    9.35 | 0.833   42.32 | 1.333    7.39 |  1.83    2.97
             0.417   30.96 | 0.917   19.65 | 1.417    5.20 |  1.92    2.36
             0.500   30.96 | 1.000   19.65 | 1.500    5.20 |  2.00    2.36

     Max.Eff.Inten.(mm/hr)=     108.42         46.15
               over (min)         5.00         15.00
     Storage Coeff.  (min)=       1.44 (ii)    11.05 (ii)
     Unit Hyd. Tpeak (min)=       5.00         15.00
     Unit Hyd. peak  (cms)=       0.33          0.09
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.04          0.01        0.047 (iii)
     TIME TO PEAK    (hrs)=       0.67          0.83         0.67
     RUNOFF VOLUME    (mm)=      40.39         18.78        31.27
     TOTAL RAINFALL   (mm)=      41.39         41.39        41.39
```

```
     RUNOFF COEFFICIENT   =       0.98         0.45           0.76

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  85.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB             |
| NASHYD   (  0005)|   Area    (ha)=   0.46   Curve Number   (CN)= 71.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                          ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
              0.083    4.51 | 0.583  108.42 | 1.083   11.35 |  1.58    3.85
              0.167    4.51 | 0.667  108.42 | 1.167   11.35 |  1.67    3.85
              0.250    9.35 | 0.750   42.32 | 1.250    7.39 |  1.75    2.97
              0.333    9.35 | 0.833   42.32 | 1.333    7.39 |  1.83    2.97
              0.417   30.96 | 0.917   19.65 | 1.417    5.20 |  1.92    2.36
              0.500   30.96 | 1.000   19.65 | 1.500    5.20 |  2.00    2.36

     Unit Hyd Qpeak  (cms)=   0.089

     PEAK FLOW       (cms)=   0.017 (i)
     TIME TO PEAK    (hrs)=   0.917
     RUNOFF VOLUME    (mm)=   9.431
     TOTAL RAINFALL   (mm)=  41.391
     RUNOFF COEFFICIENT   =   0.228

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB             |
| NASHYD   (  0004)|   Area    (ha)=   0.12   Curve Number   (CN)= 71.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                          ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
              0.083    4.51 | 0.583  108.42 | 1.083   11.35 |  1.58    3.85
              0.167    4.51 | 0.667  108.42 | 1.167   11.35 |  1.67    3.85
              0.250    9.35 | 0.750   42.32 | 1.250    7.39 |  1.75    2.97
              0.333    9.35 | 0.833   42.32 | 1.333    7.39 |  1.83    2.97
              0.417   30.96 | 0.917   19.65 | 1.417    5.20 |  1.92    2.36
              0.500   30.96 | 1.000   19.65 | 1.500    5.20 |  2.00    2.36

     Unit Hyd Qpeak  (cms)=   0.024

     PEAK FLOW       (cms)=   0.005 (i)
     TIME TO PEAK    (hrs)=   0.917
     RUNOFF VOLUME    (mm)=   9.428
     TOTAL RAINFALL   (mm)=  41.391
     RUNOFF COEFFICIENT   =   0.228

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB             |
| STANDHYD (  0002)|   Area    (ha)=   0.07
|ID= 1 DT= 5.0 min |   Total Imp(%)=  90.00   Dir. Conn.(%)=  90.00
--------------------

                         IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.07         0.01
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      22.21        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.
```

```
                          ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
              0.083    4.51 | 0.583  108.42 | 1.083   11.35 |  1.58    3.85
              0.167    4.51 | 0.667  108.42 | 1.167   11.35 |  1.67    3.85
              0.250    9.35 | 0.750   42.32 | 1.250    7.39 |  1.75    2.97
              0.333    9.35 | 0.833   42.32 | 1.333    7.39 |  1.83    2.97
              0.417   30.96 | 0.917   19.65 | 1.417    5.20 |  1.92    2.36
              0.500   30.96 | 1.000   19.65 | 1.500    5.20 |  2.00    2.36

     Max.Eff.Inten.(mm/hr)=     108.42        46.15
               over (min)          5.00         5.00
     Storage Coeff.  (min)=        1.00 (ii)    3.84 (ii)
     Unit Hyd. Tpeak (min)=        5.00         5.00
     Unit Hyd. peak  (cms)=        0.34         0.25
                                                          *TOTALS*
     PEAK FLOW       (cms)=        0.02         0.00          0.021 (iii)
     TIME TO PEAK    (hrs)=        0.67         0.67           0.67
     RUNOFF VOLUME    (mm)=       40.39        18.78          38.22
     TOTAL RAINFALL   (mm)=       41.39        41.39          41.39
     RUNOFF COEFFICIENT   =        0.98         0.45           0.92

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  85.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB             |
| STANDHYD (  0001)|   Area    (ha)=   0.09
|ID= 1 DT= 5.0 min |   Total Imp(%)=  90.00   Dir. Conn.(%)=  90.00
--------------------

                         IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.08         0.01
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      24.22        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                          ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
              0.083    4.51 | 0.583  108.42 | 1.083   11.35 |  1.58    3.85
              0.167    4.51 | 0.667  108.42 | 1.167   11.35 |  1.67    3.85
              0.250    9.35 | 0.750   42.32 | 1.250    7.39 |  1.75    2.97
              0.333    9.35 | 0.833   42.32 | 1.333    7.39 |  1.83    2.97
              0.417   30.96 | 0.917   19.65 | 1.417    5.20 |  1.92    2.36
              0.500   30.96 | 1.000   19.65 | 1.500    5.20 |  2.00    2.36

     Max.Eff.Inten.(mm/hr)=     108.42        46.15
               over (min)          5.00         5.00
     Storage Coeff.  (min)=        1.06 (ii)    3.89 (ii)
     Unit Hyd. Tpeak (min)=        5.00         5.00
     Unit Hyd. peak  (cms)=        0.34         0.25
                                                          *TOTALS*
     PEAK FLOW       (cms)=        0.02         0.00          0.025 (iii)
     TIME TO PEAK    (hrs)=        0.67         0.67           0.67
     RUNOFF VOLUME    (mm)=       40.39        18.78          38.22
     TOTAL RAINFALL   (mm)=       41.39        41.39          41.39
     RUNOFF COEFFICIENT   =        0.98         0.45           0.92

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  85.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0008)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
```

```
                        0.0000     0.0000   |   0.0063      0.0033
                        0.0032     0.0008   |   0.0000      0.0000

                                  AREA     QPEAK     TPEAK       R.V.
                                  (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0001)      0.088     0.025      0.67      38.22
   OUTFLOW: ID= 1 (  0008)      0.088     0.005      1.00      37.52

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)= 18.81
                    TIME SHIFT OF PEAK FLOW          (min)= 20.00
                    MAXIMUM  STORAGE   USED        (ha.m.)=  0.0021

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0003)|   Area    (ha)=   0.80
|ID= 1 DT= 5.0 min |   Total Imp(%)=  90.00   Dir. Conn.(%)=  90.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.72         0.08
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      73.03        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                              ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    4.51 | 0.583  108.42 | 1.083   11.35 |  1.58    3.85
               0.167    4.51 | 0.667  108.42 | 1.167   11.35 |  1.67    3.85
               0.250    9.35 | 0.750   42.32 | 1.250    7.39 |  1.75    2.97
               0.333    9.35 | 0.833   42.32 | 1.333    7.39 |  1.83    2.97
               0.417   30.96 | 0.917   19.65 | 1.417    5.20 |  1.92    2.36
               0.500   30.96 | 1.000   19.65 | 1.500    5.20 |  2.00    2.36

     Max.Eff.Inten.(mm/hr)=     108.42        25.19
                over (min)        5.00         5.00
     Storage Coeff.  (min)=       2.05 (ii)    4.89 (ii)
     Unit Hyd. Tpeak (min)=       5.00         5.00
     Unit Hyd. peak  (cms)=       0.31         0.22
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.22         0.01          0.221 (iii)
     TIME TO PEAK    (hrs)=       0.67         0.67          0.67
     RUNOFF VOLUME    (mm)=      40.39        11.08         37.46
     TOTAL RAINFALL   (mm)=      41.39        41.39         41.39
     RUNOFF COEFFICIENT   =       0.98         0.27          0.90

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0009)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK      R.V.
-------------------           (ha)    (cms)    (hrs)      (mm)
       ID1= 1 (  0002):      0.07    0.021     0.67     38.22
     + ID2= 2 (  0003):      0.80    0.221     0.67     37.46
       ================================================
       ID = 3 (  0009):      0.87    0.242     0.67     37.52

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0009)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK      R.V.
-------------------           (ha)    (cms)    (hrs)      (mm)
       ID1= 3 (  0009):      0.87    0.242     0.67     37.52
     + ID2= 2 (  0004):      0.12    0.005     0.92      9.43
       ================================================
       ID = 1 (  0009):      1.00    0.244     0.67     34.03

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0009)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK      R.V.
-------------------           (ha)    (cms)    (hrs)      (mm)
       ID1= 1 (  0009):      1.00    0.244     0.67     34.03
     + ID2= 2 (  0005):      0.46    0.017     0.92      9.43
       ================================================
       ID = 3 (  0009):      1.46    0.253     0.67     26.22

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0009)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK      R.V.
-------------------           (ha)    (cms)    (hrs)      (mm)
       ID1= 3 (  0009):      1.46    0.253     0.67     26.22
     + ID2= 2 (  0008):      0.09    0.005     1.00     37.52
       ================================================
       ID = 1 (  0009):      1.55    0.257     0.67     26.86

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0010)|     OVERFLOW IS ON
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE    |  OUTFLOW    STORAGE
-------------------       (cms)     (ha.m.)    |    (cms)     (ha.m.)
                         0.0000     0.0000     |   0.1120      0.0200
                         0.0718     0.0039     |   0.1128      0.0200
                         0.0853     0.0125     |   0.1142      0.0204
                         0.0969     0.0173     |   0.1155      0.0212
                         0.1073     0.0200     |   0.0000      0.0000

                                   AREA     QPEAK     TPEAK       R.V.
                                   (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0009)        1.550     0.257      0.67      26.86
   OUTFLOW: ID= 1 (  0010)        1.550     0.091      0.92      26.86
   OVERFLOW:ID= 3 (  0003)        0.000     0.000      0.00       0.00

                    TOTAL NUMBER OF SIMULATION OVERFLOW  =      0
                    CUMULATIVE TIME OF OVERFLOW  (HOURS) =  0.00
                    PERCENTAGE OF TIME OVERFLOWING   (%) =  0.00

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)= 35.40
                    TIME SHIFT OF PEAK FLOW          (min)= 15.00
                    MAXIMUM  STORAGE   USED        (ha.m.)=  0.0150

--------------------------------------------------------------------------------

  --------------------------
  | Junction Command(0011) |
  --------------------------

                             AREA     QPEAK    TPEAK     R.V.
                             (ha)     (cms)    (hrs)     (mm)
   INFLOW : ID= 3(  0010)     0.00      0.00     0.00      0.00
   OUTFLOW: ID= 2(  0011)     0.00      0.00     0.00      0.00

  --------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0006)|   Area    (ha)=   0.25
|ID= 1 DT= 5.0 min |   Total Imp(%)=  90.00   Dir. Conn.(%)=  90.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.22         0.02
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      40.66        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                              ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    4.51 | 0.583  108.42 | 1.083   11.35 |  1.58    3.85
               0.167    4.51 | 0.667  108.42 | 1.167   11.35 |  1.67    3.85
               0.250    9.35 | 0.750   42.32 | 1.250    7.39 |  1.75    2.97
               0.333    9.35 | 0.833   42.32 | 1.333    7.39 |  1.83    2.97
               0.417   30.96 | 0.917   19.65 | 1.417    5.20 |  1.92    2.36
               0.500   30.96 | 1.000   19.65 | 1.500    5.20 |  2.00    2.36
```

```
     Max.Eff.Inten.(mm/hr)=     108.42        46.15
                 over (min)       5.00         5.00
     Storage Coeff.  (min)=       1.44 (ii)    4.28 (ii)
     Unit Hyd. Tpeak (min)=       5.00         5.00
     Unit Hyd. peak  (cms)=       0.33         0.23
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.07         0.00          0.070 (iii)
     TIME TO PEAK    (hrs)=       0.67         0.67          0.67
     RUNOFF VOLUME    (mm)=      40.39        18.78         38.22
     TOTAL RAINFALL   (mm)=      41.39        41.39         41.39
     RUNOFF COEFFICIENT   =       0.98         0.45          0.92

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  85.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0012)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)     (cms)    (hrs)     (mm)
*** W A R N I N G :  HYDROGRAPH   0011 <ID= 1> IS DRY.
*** W A R N I N G :  HYDROGRAPH   0012 = HYDROGRAPH 0006
       ID1= 1 (  0011):     0.00   0.000     0.00     0.00
     + ID2= 2 (  0006):     0.25   0.070     0.67    38.22
       ====================================================
       ID = 3 (  0012):     0.25   0.070     0.67    38.22

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0013)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0218     0.0006
                          0.0078     0.0006   |   0.0221     0.0007
                          0.0110     0.0006   |   0.0224     0.0013
                          0.0135     0.0006   |   0.0228     0.0033
                          0.0156     0.0006   |   0.0231     0.0071
                          0.0175     0.0006   |   0.0996     0.0124
                          0.0191     0.0006   |   0.1498     0.0148
                          0.0207     0.0006   |   0.0000     0.0000

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0012)     0.248     0.070      0.67      38.22
   OUTFLOW: ID= 1 (  0013)     0.248     0.023      0.83      38.22

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 32.44
                  TIME SHIFT OF PEAK FLOW         (min)= 10.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0038

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0007)|   Area    (ha)=   0.02   Curve Number   (CN)= 80.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.

                            ---- TRANSFORMED HYETOGRAPH ----
              TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
               hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
             0.083    4.51 | 0.583  108.42 | 1.083   11.35 |  1.58    3.85
             0.167    4.51 | 0.667  108.42 | 1.167   11.35 |  1.67    3.85
             0.250    9.35 | 0.750   42.32 | 1.250    7.39 |  1.75    2.97
             0.333    9.35 | 0.833   42.32 | 1.333    7.39 |  1.83    2.97
             0.417   30.96 | 0.917   19.65 | 1.417    5.20 |  1.92    2.36
             0.500   30.96 | 1.000   19.65 | 1.500    5.20 |  2.00    2.36

     Unit Hyd Qpeak  (cms)=   0.003

     PEAK FLOW       (cms)=   0.001 (i)
     TIME TO PEAK    (hrs)=   0.917
     RUNOFF VOLUME    (mm)=  13.160

     TOTAL RAINFALL   (mm)=  41.391
     RUNOFF COEFFICIENT   =   0.318

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0014)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)     (cms)    (hrs)     (mm)
       ID1= 1 (  0010):     1.55   0.091     0.92    26.86
     + ID2= 2 (  0013):     0.25   0.023     0.83    38.22
       ====================================================
       ID = 3 (  0014):     1.80   0.114     0.92    28.43

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0014)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)     (cms)    (hrs)     (mm)
       ID1= 3 (  0014):     1.80   0.114     0.92    28.43
     + ID2= 2 (  0007):     0.02   0.001     0.92    13.16
       ====================================================
       ID = 1 (  0014):     1.81   0.114     0.92    28.29

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

 FINISH
================================================================================================================================

================================================================================================================================

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
Developed and Distributed by Smart City Water Inc
Copyright 2007 - 2022 Smart City Water Inc
All rights reserved.

                  *****  D E T A I L E D   O U T P U T *****

  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2.2015\VO2\voin.dat
  Output  filename: C:\Users\Colin\AppData\Local\Civica\VH5\e72d54cd-959d-4ec8-9200-c0e4f41d014c\9d284304-8a94
  Summary filename: C:\Users\Colin\AppData\Local\Civica\VH5\e72d54cd-959d-4ec8-9200-c0e4f41d014c\9d284304-8a94


DATE: 10-29-2026                          TIME: 09:05:51

USER:


COMMENTS: _____________________________________________________

--------------------------------------------------------------------------------------------------------------------------------
  ************************************************
  ** SIMULATION : 4 - 25 Year                   **
  ************************************************

--------------------
| CHICAGO STORM    |    IDF curve parameters: A=4318.000
| Ptotal= 58.62 mm |                          B=  27.000
--------------------                          C=   1.000
                         used in:   INTENSITY =  A / (t + B)^C

                         Duration of storm  =  2.00 hrs
                         Storm time step    = 10.00 min
                         Time to peak ratio =  0.33

                    TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
```

hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.00	9.45	0.50	116.70	1.00	21.23	1.50	8.20
0.17	17.92	0.67	60.60	1.17	14.67	1.67	6.47
0.33	47.01	0.83	33.48	1.33	10.74	1.83	5.23

CALIB	STANDHYD (0015)	ID= 1 DT= 5.0 min

Area (ha)= 0.25
Total Imp(%)= 57.90 Dir. Conn.(%)= 57.90

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.14	0.10
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	40.41	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	9.45	0.583	116.70	1.083	21.23	1.58	8.20
0.167	9.45	0.667	116.70	1.167	21.23	1.67	8.20
0.250	17.92	0.750	60.60	1.250	14.67	1.75	6.47
0.333	17.92	0.833	60.60	1.333	14.67	1.83	6.47
0.417	47.01	0.917	33.48	1.417	10.74	1.92	5.23
0.500	47.01	1.000	33.48	1.500	10.74	2.00	5.23

				TOTALS
Max.Eff.Inten.(mm/hr)=		116.70	60.72	
over (min)		5.00	15.00	
Storage Coeff. (min)=		1.39 (ii)	10.01 (ii)	
Unit Hyd. Tpeak (min)=		5.00	15.00	
Unit Hyd. peak (cms)=		0.33	0.10	
PEAK FLOW	(cms)=	0.05	0.01	0.052 (iii)
TIME TO PEAK	(hrs)=	0.67	0.83	0.67
RUNOFF VOLUME	(mm)=	57.62	32.00	46.81
TOTAL RAINFALL	(mm)=	58.62	58.62	58.62
RUNOFF COEFFICIENT	=	0.98	0.55	0.80

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 85.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB	NASHYD (0005)	ID= 1 DT= 5.0 min

Area (ha)= 0.46 Curve Number (CN)= 71.0
Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.20

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	9.45	0.583	116.70	1.083	21.23	1.58	8.20
0.167	9.45	0.667	116.70	1.167	21.23	1.67	8.20
0.250	17.92	0.750	60.60	1.250	14.67	1.75	6.47
0.333	17.92	0.833	60.60	1.333	14.67	1.83	6.47
0.417	47.01	0.917	33.48	1.417	10.74	1.92	5.23
0.500	47.01	1.000	33.48	1.500	10.74	2.00	5.23

Unit Hyd Qpeak (cms)= 0.089

PEAK FLOW (cms)= 0.028 (i)
TIME TO PEAK (hrs)= 0.917
RUNOFF VOLUME (mm)= 18.233
TOTAL RAINFALL (mm)= 58.617
RUNOFF COEFFICIENT = 0.311

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB	NASHYD (0004)	ID= 1 DT= 5.0 min

Area (ha)= 0.12 Curve Number (CN)= 71.0
Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.20

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	9.45	0.583	116.70	1.083	21.23	1.58	8.20
0.167	9.45	0.667	116.70	1.167	21.23	1.67	8.20
0.250	17.92	0.750	60.60	1.250	14.67	1.75	6.47
0.333	17.92	0.833	60.60	1.333	14.67	1.83	6.47
0.417	47.01	0.917	33.48	1.417	10.74	1.92	5.23
0.500	47.01	1.000	33.48	1.500	10.74	2.00	5.23

Unit Hyd Qpeak (cms)= 0.024

PEAK FLOW (cms)= 0.008 (i)
TIME TO PEAK (hrs)= 0.917
RUNOFF VOLUME (mm)= 18.229
TOTAL RAINFALL (mm)= 58.617
RUNOFF COEFFICIENT = 0.311

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB	STANDHYD (0002)	ID= 1 DT= 5.0 min

Area (ha)= 0.07
Total Imp(%)= 90.00 Dir. Conn.(%)= 90.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.07	0.01
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	22.21	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	9.45	0.583	116.70	1.083	21.23	1.58	8.20
0.167	9.45	0.667	116.70	1.167	21.23	1.67	8.20
0.250	17.92	0.750	60.60	1.250	14.67	1.75	6.47
0.333	17.92	0.833	60.60	1.333	14.67	1.83	6.47
0.417	47.01	0.917	33.48	1.417	10.74	1.92	5.23
0.500	47.01	1.000	33.48	1.500	10.74	2.00	5.23

				TOTALS
Max.Eff.Inten.(mm/hr)=		116.70	60.72	
over (min)		5.00	5.00	
Storage Coeff. (min)=		0.97 (ii)	3.73 (ii)	
Unit Hyd. Tpeak (min)=		5.00	5.00	
Unit Hyd. peak (cms)=		0.34	0.25	
PEAK FLOW	(cms)=	0.02	0.00	0.023 (iii)
TIME TO PEAK	(hrs)=	0.67	0.67	0.67
RUNOFF VOLUME	(mm)=	57.62	32.00	55.04
TOTAL RAINFALL	(mm)=	58.62	58.62	58.62
RUNOFF COEFFICIENT	=	0.98	0.55	0.94

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 85.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB	STANDHYD (0001)	ID= 1 DT= 5.0 min

Area (ha)= 0.09
Total Imp(%)= 90.00 Dir. Conn.(%)= 90.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.08	0.01
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00

```
     Length            (m)=      24.22         40.00
     Mannings n          =       0.013         0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                              ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    9.45 | 0.583  116.70 | 1.083   21.23 |  1.58    8.20
               0.167    9.45 | 0.667  116.70 | 1.167   21.23 |  1.67    8.20
               0.250   17.92 | 0.750   60.60 | 1.250   14.67 |  1.75    6.47
               0.333   17.92 | 0.833   60.60 | 1.333   14.67 |  1.83    6.47
               0.417   47.01 | 0.917   33.48 | 1.417   10.74 |  1.92    5.23
               0.500   47.01 | 1.000   33.48 | 1.500   10.74 |  2.00    5.23

     Max.Eff.Inten.(mm/hr)=     116.70         60.72
               over (min)        5.00          5.00
     Storage Coeff.  (min)=       1.03 (ii)     3.78 (ii)
     Unit Hyd. Tpeak (min)=       5.00          5.00
     Unit Hyd. peak  (cms)=       0.34          0.25
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.03          0.00          0.027 (iii)
     TIME TO PEAK    (hrs)=       0.67          0.67           0.67
     RUNOFF VOLUME    (mm)=      57.62         32.00          55.04
     TOTAL RAINFALL   (mm)=      58.62         58.62          58.62
     RUNOFF COEFFICIENT   =       0.98          0.55           0.94

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  85.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0008)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0063     0.0033
                          0.0032     0.0008   |   0.0000     0.0000

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0001)     0.088     0.027      0.67      55.04
   OUTFLOW: ID= 1 (  0008)     0.088     0.006      1.08      54.39

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 20.94
                  TIME SHIFT OF PEAK FLOW         (min)= 25.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0028

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0003)|   Area    (ha)=   0.80
|ID= 1 DT= 5.0 min |   Total Imp(%)=  90.00   Dir. Conn.(%)=  90.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.72          0.08
     Dep. Storage     (mm)=       1.00          1.50
     Average Slope     (%)=       1.00          2.00
     Length            (m)=      73.03         40.00
     Mannings n          =       0.013         0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                              ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    9.45 | 0.583  116.70 | 1.083   21.23 |  1.58    8.20
               0.167    9.45 | 0.667  116.70 | 1.167   21.23 |  1.67    8.20
               0.250   17.92 | 0.750   60.60 | 1.250   14.67 |  1.75    6.47
               0.333   17.92 | 0.833   60.60 | 1.333   14.67 |  1.83    6.47
               0.417   47.01 | 0.917   33.48 | 1.417   10.74 |  1.92    5.23
               0.500   47.01 | 1.000   33.48 | 1.500   10.74 |  2.00    5.23

     Max.Eff.Inten.(mm/hr)=     116.70         34.99
               over (min)        5.00          5.00
     Storage Coeff.  (min)=       1.99 (ii)     4.74 (ii)
     Unit Hyd. Tpeak (min)=       5.00          5.00
     Unit Hyd. peak  (cms)=       0.31          0.22
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.23          0.01          0.240 (iii)
     TIME TO PEAK    (hrs)=       0.67          0.67           0.67
     RUNOFF VOLUME    (mm)=      57.62         20.28          53.88
     TOTAL RAINFALL   (mm)=      58.62         58.62          58.62
     RUNOFF COEFFICIENT   =       0.98          0.35           0.92

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0009)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0002):     0.07    0.023     0.67    55.04
     + ID2= 2 (  0003):     0.80    0.240     0.67    53.88
       ==========================================================
       ID = 3 (  0009):     0.87    0.263     0.67    53.98

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0009)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0009):     0.87    0.263     0.67    53.98
     + ID2= 2 (  0004):     0.12    0.008     0.92    18.23
       ==========================================================
       ID = 1 (  0009):     1.00    0.267     0.67    49.54

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0009)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0009):     1.00    0.267     0.67    49.54
     + ID2= 2 (  0005):     0.46    0.028     0.92    18.23
       ==========================================================
       ID = 3 (  0009):     1.46    0.281     0.67    39.60

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0009)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0009):     1.46    0.281     0.67    39.60
     + ID2= 2 (  0008):     0.09    0.006     1.08    54.39
       ==========================================================
       ID = 1 (  0009):     1.55    0.285     0.67    40.44

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0010)|     OVERFLOW IS ON
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.1120     0.0200
                          0.0718     0.0039   |   0.1128     0.0200
                          0.0853     0.0125   |   0.1142     0.0204
                          0.0969     0.0173   |   0.1155     0.0212
                          0.1073     0.0200   |   0.0000     0.0000

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0009)     1.550     0.285      0.67      40.44
   OUTFLOW: ID= 1 (  0010)     1.550     0.115      1.00      40.44
   OVERFLOW:ID= 3 (  0003)     0.000     0.000      0.00       0.00

                  TOTAL NUMBER OF SIMULATION OVERFLOW  =     0
                  CUMULATIVE TIME OF OVERFLOW  (HOURS) =  0.00
```

```
                    PERCENTAGE OF TIME OVERFLOWING   (%) =  0.00

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)= 40.34
                    TIME SHIFT OF PEAK FLOW         (min)= 20.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=  0.0210

--------------------------------------------------------------------------------

  --------------------------
  | Junction Command(0011) |
  --------------------------

                           AREA     QPEAK   TPEAK     R.V.
                           (ha)     (cms)    (hrs)    (mm)
  INFLOW : ID= 3(  0010)    0.00     0.00    0.00     0.00
  OUTFLOW: ID= 2(  0011)    0.00     0.00    0.00     0.00

  ------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0006)|   Area    (ha)=   0.25
|ID= 1 DT= 5.0 min |   Total Imp(%)=  90.00   Dir. Conn.(%)=  90.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.22         0.02
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      40.66        40.00
     Mannings n           =      0.013        0.250

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                          ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    9.45 | 0.583  116.70 | 1.083   21.23 |  1.58    8.20
               0.167    9.45 | 0.667  116.70 | 1.167   21.23 |  1.67    8.20
               0.250   17.92 | 0.750   60.60 | 1.250   14.67 |  1.75    6.47
               0.333   17.92 | 0.833   60.60 | 1.333   14.67 |  1.83    6.47
               0.417   47.01 | 0.917   33.48 | 1.417   10.74 |  1.92    5.23
               0.500   47.01 | 1.000   33.48 | 1.500   10.74 |  2.00    5.23

     Max.Eff.Inten.(mm/hr)=     116.70        60.72
               over (min)        5.00         5.00
     Storage Coeff.  (min)=      1.40 (ii)    4.15 (ii)
     Unit Hyd. Tpeak (min)=      5.00         5.00
     Unit Hyd. peak  (cms)=      0.33         0.24
                                                  *TOTALS*
     PEAK FLOW       (cms)=      0.07         0.00          0.076 (iii)
     TIME TO PEAK    (hrs)=      0.67         0.67          0.67
     RUNOFF VOLUME    (mm)=     57.62        32.00         55.05
     TOTAL RAINFALL   (mm)=     58.62        58.62         58.62
     RUNOFF COEFFICIENT   =      0.98         0.55          0.94

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  85.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0012)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
*** W A R N I N G :  HYDROGRAPH   0011 <ID= 1> IS DRY.
*** W A R N I N G :  HYDROGRAPH   0012 = HYDROGRAPH 0006
       ID1= 1 (  0011):     0.00   0.000     0.00     0.00
     + ID2= 2 (  0006):     0.25   0.076     0.67    55.05
       ================================================
       ID = 3 (  0012):     0.25   0.076     0.67    55.05

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0013)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------       (cms)     (ha.m.)   |   (cms)     (ha.m.)
                           0.0000     0.0000   |   0.0218     0.0006
                           0.0078     0.0006   |   0.0221     0.0007
                           0.0110     0.0006   |   0.0224     0.0013
                           0.0135     0.0006   |   0.0228     0.0033
                           0.0156     0.0006   |   0.0231     0.0071
                           0.0175     0.0006   |   0.0996     0.0124
                           0.0191     0.0006   |   0.1498     0.0148
                           0.0207     0.0006   |   0.0000     0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
     INFLOW : ID= 2 (  0012)    0.248     0.076      0.67      55.05
     OUTFLOW: ID= 1 (  0013)    0.248     0.023      1.00      55.05

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)= 30.01
                    TIME SHIFT OF PEAK FLOW         (min)= 20.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=  0.0052

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0007)|   Area    (ha)=   0.02   Curve Number   (CN)= 80.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                          ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    9.45 | 0.583  116.70 | 1.083   21.23 |  1.58    8.20
               0.167    9.45 | 0.667  116.70 | 1.167   21.23 |  1.67    8.20
               0.250   17.92 | 0.750   60.60 | 1.250   14.67 |  1.75    6.47
               0.333   17.92 | 0.833   60.60 | 1.333   14.67 |  1.83    6.47
               0.417   47.01 | 0.917   33.48 | 1.417   10.74 |  1.92    5.23
               0.500   47.01 | 1.000   33.48 | 1.500   10.74 |  2.00    5.23

     Unit Hyd Qpeak  (cms)=   0.003

     PEAK FLOW       (cms)=   0.001 (i)
     TIME TO PEAK    (hrs)=   0.917
     RUNOFF VOLUME    (mm)=  24.379
     TOTAL RAINFALL   (mm)=  58.617
     RUNOFF COEFFICIENT   =   0.416

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0014)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0010):     1.55   0.115     1.00    40.44
     + ID2= 2 (  0013):     0.25   0.023     1.00    55.05
       ================================================
       ID = 3 (  0014):     1.80   0.138     1.00    42.45

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0014)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0014):     1.80   0.138     1.00    42.45
     + ID2= 2 (  0007):     0.02   0.001     0.92    24.38
       ================================================
       ID = 1 (  0014):     1.81   0.139     1.00    42.29

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
================================================================================================================================


       V    V   I    SSSSS  U   U    A    L                (v 6.2.2015)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
```

Developed and Distributed by Smart City Water Inc
Copyright 2007 - 2022 Smart City Water Inc
All rights reserved.

***** D E T A I L E D O U T P U T *****

Input filename: C:\Program Files (x86)\Visual OTTHYMO 6.2.2015\VO2\voin.dat
Output filename: C:\Users\Colin\AppData\Local\Civica\VH5\e72d54cd-959d-4ec8-9200-c0e4f41d014c\1c8de0c3-8aaa
Summary filename: C:\Users\Colin\AppData\Local\Civica\VH5\e72d54cd-959d-4ec8-9200-c0e4f41d014c\1c8de0c3-8aaa

DATE: 10-29-2026 TIME: 09:05:50

USER:

COMMENTS: _____

** SIMULATION : 5 - 50 Year **

| CHICAGO STORM |
| Ptotal= 65.84 mm |

IDF curve parameters: A=4750.000
B= 24.000
C= 1.000
used in: INTENSITY = A / (t + B)^C

Duration of storm = 2.00 hrs
Storm time step = 10.00 min
Time to peak ratio = 0.33

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	9.77	0.50	139.71	1.00	22.56	1.50	8.44
0.17	18.93	0.67	68.44	1.17	15.36	1.67	6.62
0.33	52.37	0.83	36.37	1.33	11.13	1.83	5.33

| CALIB |
| STANDHYD (0015) |
|ID= 1 DT= 5.0 min |

Area (ha)= 0.25
Total Imp(%)= 57.90 Dir. Conn.(%)= 57.90

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.14	0.10
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	40.41	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	9.77	0.583	139.71	1.083	22.56	1.58	8.44
0.167	9.77	0.667	139.71	1.167	22.56	1.67	8.44
0.250	18.93	0.750	68.44	1.250	15.36	1.75	6.62
0.333	18.93	0.833	68.44	1.333	15.36	1.83	6.62
0.417	52.37	0.917	36.37	1.417	11.13	1.92	5.33
0.500	52.37	1.000	36.37	1.500	11.13	2.00	5.33

				TOTALS
Max.Eff.Inten.(mm/hr)=		139.71	78.06	
over (min)		5.00	10.00	
Storage Coeff. (min)=		1.30 (ii)	9.09 (ii)	
Unit Hyd. Tpeak (min)=		5.00	10.00	
Unit Hyd. peak (cms)=		0.33	0.12	
PEAK FLOW	(cms)=	0.06	0.02	0.068 (iii)
TIME TO PEAK	(hrs)=	0.67	0.75	0.67
RUNOFF VOLUME	(mm)=	64.84	37.92	53.48
TOTAL RAINFALL	(mm)=	65.84	65.84	65.84
RUNOFF COEFFICIENT	=	0.98	0.58	0.81

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 85.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

| CALIB |
| NASHYD (0005) |
|ID= 1 DT= 5.0 min |

Area (ha)= 0.46 Curve Number (CN)= 71.0
Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.20

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	9.77	0.583	139.71	1.083	22.56	1.58	8.44
0.167	9.77	0.667	139.71	1.167	22.56	1.67	8.44
0.250	18.93	0.750	68.44	1.250	15.36	1.75	6.62
0.333	18.93	0.833	68.44	1.333	15.36	1.83	6.62
0.417	52.37	0.917	36.37	1.417	11.13	1.92	5.33
0.500	52.37	1.000	36.37	1.500	11.13	2.00	5.33

Unit Hyd Qpeak (cms)= 0.089

PEAK FLOW (cms)= 0.036 (i)
TIME TO PEAK (hrs)= 0.917
RUNOFF VOLUME (mm)= 22.443
TOTAL RAINFALL (mm)= 65.836
RUNOFF COEFFICIENT = 0.341

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

| CALIB |
| NASHYD (0004) |
|ID= 1 DT= 5.0 min |

Area (ha)= 0.12 Curve Number (CN)= 71.0
Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.20

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	9.77	0.583	139.71	1.083	22.56	1.58	8.44
0.167	9.77	0.667	139.71	1.167	22.56	1.67	8.44
0.250	18.93	0.750	68.44	1.250	15.36	1.75	6.62
0.333	18.93	0.833	68.44	1.333	15.36	1.83	6.62
0.417	52.37	0.917	36.37	1.417	11.13	1.92	5.33
0.500	52.37	1.000	36.37	1.500	11.13	2.00	5.33

Unit Hyd Qpeak (cms)= 0.024

PEAK FLOW (cms)= 0.010 (i)
TIME TO PEAK (hrs)= 0.917
RUNOFF VOLUME (mm)= 22.439
TOTAL RAINFALL (mm)= 65.836
RUNOFF COEFFICIENT = 0.341

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

| CALIB |
| STANDHYD (0002) |
|ID= 1 DT= 5.0 min |

Area (ha)= 0.07
Total Imp(%)= 90.00 Dir. Conn.(%)= 90.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.07	0.01
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	22.21	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN

```
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
              0.083    9.77 | 0.583  139.71 | 1.083   22.56 |  1.58    8.44
              0.167    9.77 | 0.667  139.71 | 1.167   22.56 |  1.67    8.44
              0.250   18.93 | 0.750   68.44 | 1.250   15.36 |  1.75    6.62
              0.333   18.93 | 0.833   68.44 | 1.333   15.36 |  1.83    6.62
              0.417   52.37 | 0.917   36.37 | 1.417   11.13 |  1.92    5.33
              0.500   52.37 | 1.000   36.37 | 1.500   11.13 |  2.00    5.33

     Max.Eff.Inten.(mm/hr)=     139.71        78.06
               over (min)        5.00         5.00
     Storage Coeff.  (min)=      0.91 (ii)    3.47 (ii)
     Unit Hyd. Tpeak (min)=      5.00         5.00
     Unit Hyd. peak  (cms)=      0.34         0.26
                                                    *TOTALS*
     PEAK FLOW       (cms)=      0.03         0.00          0.028 (iii)
     TIME TO PEAK    (hrs)=      0.67         0.67          0.67
     RUNOFF VOLUME    (mm)=     64.84        37.92         62.13
     TOTAL RAINFALL   (mm)=     65.84        65.84         65.84
     RUNOFF COEFFICIENT   =      0.98         0.58          0.94

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =  85.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0001)|   Area    (ha)=   0.09
|ID= 1 DT= 5.0 min |   Total Imp(%)=  90.00   Dir. Conn.(%)=  90.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.08         0.01
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      24.22        40.00
     Mannings n             =    0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                          ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    9.77 | 0.583  139.71 | 1.083   22.56 |  1.58    8.44
               0.167    9.77 | 0.667  139.71 | 1.167   22.56 |  1.67    8.44
               0.250   18.93 | 0.750   68.44 | 1.250   15.36 |  1.75    6.62
               0.333   18.93 | 0.833   68.44 | 1.333   15.36 |  1.83    6.62
               0.417   52.37 | 0.917   36.37 | 1.417   11.13 |  1.92    5.33
               0.500   52.37 | 1.000   36.37 | 1.500   11.13 |  2.00    5.33

     Max.Eff.Inten.(mm/hr)=     139.71        78.06
               over (min)        5.00         5.00
     Storage Coeff.  (min)=      0.95 (ii)    3.52 (ii)
     Unit Hyd. Tpeak (min)=      5.00         5.00
     Unit Hyd. peak  (cms)=      0.34         0.26
                                                    *TOTALS*
     PEAK FLOW       (cms)=      0.03         0.00          0.033 (iii)
     TIME TO PEAK    (hrs)=      0.67         0.67          0.67
     RUNOFF VOLUME    (mm)=     64.84        37.92         62.13
     TOTAL RAINFALL   (mm)=     65.84        65.84         65.84
     RUNOFF COEFFICIENT   =      0.98         0.58          0.94

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =  85.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0008)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                         0.0000     0.0000    |   0.0063     0.0033
                         0.0032     0.0008    |   0.0000     0.0000

                               AREA     QPEAK     TPEAK       R.V.
                                              (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0001)      0.088     0.033      0.67      62.13
   OUTFLOW: ID= 1 (  0008)      0.088     0.006      1.08      61.45

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 19.25
                  TIME SHIFT OF PEAK FLOW         (min)= 25.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0033

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0003)|   Area    (ha)=   0.80
|ID= 1 DT= 5.0 min |   Total Imp(%)=  90.00   Dir. Conn.(%)=  90.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.72         0.08
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      73.03        40.00
     Mannings n             =    0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                          ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    9.77 | 0.583  139.71 | 1.083   22.56 |  1.58    8.44
               0.167    9.77 | 0.667  139.71 | 1.167   22.56 |  1.67    8.44
               0.250   18.93 | 0.750   68.44 | 1.250   15.36 |  1.75    6.62
               0.333   18.93 | 0.833   68.44 | 1.333   15.36 |  1.83    6.62
               0.417   52.37 | 0.917   36.37 | 1.417   11.13 |  1.92    5.33
               0.500   52.37 | 1.000   36.37 | 1.500   11.13 |  2.00    5.33

     Max.Eff.Inten.(mm/hr)=     139.71        46.28
               over (min)        5.00         5.00
     Storage Coeff.  (min)=      1.85 (ii)    4.41 (ii)
     Unit Hyd. Tpeak (min)=      5.00         5.00
     Unit Hyd. peak  (cms)=      0.32         0.23
                                                    *TOTALS*
     PEAK FLOW       (cms)=      0.28         0.01          0.289 (iii)
     TIME TO PEAK    (hrs)=      0.67         0.67          0.67
     RUNOFF VOLUME    (mm)=     64.84        24.63         60.81
     TOTAL RAINFALL   (mm)=     65.84        65.84         65.84
     RUNOFF COEFFICIENT   =      0.98         0.37          0.92

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| ADD HYD  (  0009)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0002):      0.07    0.028     0.67    62.13
     + ID2= 2 (  0003):      0.80    0.289     0.67    60.81
       ==========================================================
       ID = 3 (  0009):      0.87    0.316     0.67    60.92

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0009)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0009):      0.87    0.316     0.67    60.92
     + ID2= 2 (  0004):      0.12    0.010     0.92    22.44
       ==========================================================
       ID = 1 (  0009):      1.00    0.321     0.67    56.14

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0009)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
```

```
       ID1= 1 (  0009):     1.00   0.321     0.67    56.14
     + ID2= 2 (  0005):     0.46   0.036     0.92    22.44
       ================================================
       ID = 3 (  0009):     1.46   0.341     0.67    45.45

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
```

```
--------------------
| ADD HYD  (  0009)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0009):     1.46   0.341     0.67    45.45
     + ID2= 2 (  0008):     0.09   0.006     1.08    61.45
       ================================================
       ID = 1 (  0009):     1.55   0.345     0.67    46.36

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
```

```
--------------------
| RESERVOIR(  0010)|     OVERFLOW IS ON
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.1120     0.0200
                          0.0718     0.0039   |   0.1128     0.0200
                          0.0853     0.0125   |   0.1142     0.0204
                          0.0969     0.0173   |   0.1155     0.0212
                          0.1073     0.0200   |   0.0000     0.0000

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
  INFLOW : ID= 2 (  0009)     1.550     0.345      0.67      46.36
  OUTFLOW: ID= 1 (  0010)     1.431     0.116      0.83      46.29
  OVERFLOW:ID= 3 (  0003)     0.119     0.094      0.83      46.29

                TOTAL NUMBER OF SIMULATION OVERFLOW  =     3
                CUMULATIVE TIME OF OVERFLOW  (HOURS) =  0.25
                PERCENTAGE OF TIME OVERFLOWING   (%) =  4.92

                PEAK   FLOW   REDUCTION [Qout/Qin](%)= 33.45
                TIME SHIFT OF PEAK FLOW         (min)= 10.00
                MAXIMUM  STORAGE   USED       (ha.m.)=  0.0212
```

```
  --------------------------
  | Junction Command(0011) |
  --------------------------

                          AREA     QPEAK   TPEAK     R.V.
                          (ha)     (cms)    (hrs)    (mm)
  INFLOW : ID= 3(  0010)    0.12     0.09    0.83    46.29
  OUTFLOW: ID= 2(  0011)    0.12     0.09    0.83    46.29
```

```
--------------------
| CALIB            |
| STANDHYD (  0006)|   Area    (ha)=   0.25
|ID= 1 DT= 5.0 min |   Total Imp(%)=  90.00   Dir. Conn.(%)=  90.00
--------------------

                         IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=       0.22         0.02
    Dep. Storage     (mm)=       1.00         1.50
    Average Slope     (%)=       1.00         2.00
    Length            (m)=      40.66        40.00
    Mannings n           =      0.013        0.250

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                        ---- TRANSFORMED HYETOGRAPH ----
          TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
           hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
         0.083    9.77 | 0.583  139.71 | 1.083   22.56 |  1.58    8.44
         0.167    9.77 | 0.667  139.71 | 1.167   22.56 |  1.67    8.44
         0.250   18.93 | 0.750   68.44 | 1.250   15.36 |  1.75    6.62
         0.333   18.93 | 0.833   68.44 | 1.333   15.36 |  1.83    6.62
         0.417   52.37 | 0.917   36.37 | 1.417   11.13 |  1.92    5.33
         0.500   52.37 | 1.000   36.37 | 1.500   11.13 |  2.00    5.33

    Max.Eff.Inten.(mm/hr)=     139.71        78.06
              over (min)          5.00         5.00
    Storage Coeff.  (min)=       1.30 (ii)    3.87 (ii)
    Unit Hyd. Tpeak (min)=       5.00         5.00
    Unit Hyd. peak  (cms)=       0.33         0.25
                                                      *TOTALS*
    PEAK FLOW       (cms)=       0.09         0.01       0.092 (iii)
    TIME TO PEAK    (hrs)=       0.67         0.67        0.67
    RUNOFF VOLUME    (mm)=      64.84        37.92       62.14
    TOTAL RAINFALL   (mm)=      65.84        65.84       65.84
    RUNOFF COEFFICIENT   =       0.98         0.58        0.94

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN*  =  85.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
```

```
--------------------
| ADD HYD  (  0012)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0011):     0.12   0.094     0.83    46.29
     + ID2= 2 (  0006):     0.25   0.092     0.67    62.14
       ================================================
       ID = 3 (  0012):     0.37   0.140     0.83    57.00

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
```

```
--------------------
| RESERVOIR(  0013)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0218     0.0006
                          0.0078     0.0006   |   0.0221     0.0007
                          0.0110     0.0006   |   0.0224     0.0013
                          0.0135     0.0006   |   0.0228     0.0033
                          0.0156     0.0006   |   0.0231     0.0071
                          0.0175     0.0006   |   0.0996     0.0124
                          0.0191     0.0006   |   0.1498     0.0148
                          0.0207     0.0006   |   0.0000     0.0000

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
  INFLOW : ID= 2 (  0012)     0.367     0.140      0.83      57.00
  OUTFLOW: ID= 1 (  0013)     0.367     0.064      0.92      57.00

                PEAK   FLOW   REDUCTION [Qout/Qin](%)= 45.65
                TIME SHIFT OF PEAK FLOW         (min)=  5.00
                MAXIMUM  STORAGE   USED       (ha.m.)=  0.0101
```

```
--------------------
| CALIB            |
| NASHYD   (  0007)|   Area    (ha)=   0.02   Curve Number   (CN)= 80.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                        ---- TRANSFORMED HYETOGRAPH ----
          TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
           hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
         0.083    9.77 | 0.583  139.71 | 1.083   22.56 |  1.58    8.44
         0.167    9.77 | 0.667  139.71 | 1.167   22.56 |  1.67    8.44
         0.250   18.93 | 0.750   68.44 | 1.250   15.36 |  1.75    6.62
         0.333   18.93 | 0.833   68.44 | 1.333   15.36 |  1.83    6.62
         0.417   52.37 | 0.917   36.37 | 1.417   11.13 |  1.92    5.33
         0.500   52.37 | 1.000   36.37 | 1.500   11.13 |  2.00    5.33

    Unit Hyd Qpeak  (cms)=   0.003

    PEAK FLOW       (cms)=   0.002 (i)
    TIME TO PEAK    (hrs)=   0.917
    RUNOFF VOLUME    (mm)=  29.619
    TOTAL RAINFALL   (mm)=  65.836
    RUNOFF COEFFICIENT   =   0.450

    (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
```

```
--------------------
| ADD HYD  (  0014)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0010):     1.43   0.116     0.83    46.29
     + ID2= 2 (  0013):     0.37   0.064     0.92    57.00
       ================================================
       ID = 3 (  0014):     1.80   0.180     0.92    48.48

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0014)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0014):     1.80   0.180     0.92    48.48
     + ID2= 2 (  0007):     0.02   0.002     0.92    29.62
       ================================================
       ID = 1 (  0014):     1.81   0.181     0.92    48.31

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
===============================================================================================================

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
Developed and Distributed by Smart City Water Inc
Copyright 2007 - 2022 Smart City Water Inc
All rights reserved.


                  *****  D E T A I L E D   O U T P U T *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2.2015\VO2\voin.dat
  Output  filename: C:\Users\Colin\AppData\Local\Civica\VH5\e72d54cd-959d-4ec8-9200-c0e4f41d014c\8e0d1b26-f9e3
  Summary filename: C:\Users\Colin\AppData\Local\Civica\VH5\e72d54cd-959d-4ec8-9200-c0e4f41d014c\8e0d1b26-f9e3


DATE: 10-29-2026                          TIME: 09:05:50

USER:


COMMENTS: _____________________________________________________


-------------------------------------------------------------------------------------------------------------------
  ************************************************
  ** SIMULATION : 6 - 100 Year                  **
  ************************************************

--------------------
| CHICAGO STORM    |    IDF curve parameters: A=1770.000
| Ptotal= 67.89 mm |                          B=   4.000
--------------------                          C=   0.820
                       used in:   INTENSITY =  A / (t + B)^C

                       Duration of storm  =  2.00 hrs
                       Storm time step    = 10.00 min
                       Time to peak ratio =  0.33

                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.00    9.77 |  0.50  203.31 |  1.00   17.18 |  1.50    8.96
                0.17   15.10 |  0.67   50.96 |  1.17   13.06 |  1.67    7.78
                0.33   38.21 |  0.83   25.51 |  1.33   10.60 |  1.83    6.90


-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0015)|   Area    (ha)=   0.25
```

```
|ID= 1 DT= 5.0 min |   Total Imp(%)=  57.90   Dir. Conn.(%)=  57.90
--------------------

                                IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.14          0.10
     Dep. Storage     (mm)=       1.00          1.50
     Average Slope     (%)=       1.00          2.00
     Length            (m)=      40.41         40.00
     Mannings n             =     0.013         0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                          ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083   9.77 | 0.583  203.31 | 1.083   17.18 |  1.58    8.96
               0.167   9.77 | 0.667  203.31 | 1.167   17.18 |  1.67    8.96
               0.250  15.10 | 0.750   50.96 | 1.250   13.06 |  1.75    7.78
               0.333  15.10 | 0.833   50.96 | 1.333   13.06 |  1.83    7.78
               0.417  38.21 | 0.917   25.51 | 1.417   10.60 |  1.92    6.90
               0.500  38.21 | 1.000   25.51 | 1.500   10.60 |  2.00    6.90

     Max.Eff.Inten.(mm/hr)=     203.31       116.81
           over (min)          5.00         10.00
     Storage Coeff.  (min)=    1.12 (ii)    5.79 (ii)
     Unit Hyd. Tpeak (min)=    5.00         10.00
     Unit Hyd. peak  (cms)=    0.34          0.15
                                                    *TOTALS*
     PEAK FLOW       (cms)=    0.08          0.03      0.102 (iii)
     TIME TO PEAK    (hrs)=    0.67          0.75       0.67
     RUNOFF VOLUME    (mm)=   66.89         39.63      55.39
     TOTAL RAINFALL   (mm)=   67.89         67.89      67.89
     RUNOFF COEFFICIENT   =    0.99          0.58       0.82

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =  85.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0005)|   Area    (ha)=   0.46   Curve Number    (CN)= 71.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                          ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083   9.77 | 0.583  203.31 | 1.083   17.18 |  1.58    8.96
               0.167   9.77 | 0.667  203.31 | 1.167   17.18 |  1.67    8.96
               0.250  15.10 | 0.750   50.96 | 1.250   13.06 |  1.75    7.78
               0.333  15.10 | 0.833   50.96 | 1.333   13.06 |  1.83    7.78
               0.417  38.21 | 0.917   25.51 | 1.417   10.60 |  1.92    6.90
               0.500  38.21 | 1.000   25.51 | 1.500   10.60 |  2.00    6.90

     Unit Hyd Qpeak  (cms)=   0.089

     PEAK FLOW       (cms)=   0.044 (i)
     TIME TO PEAK    (hrs)=   0.833
     RUNOFF VOLUME    (mm)=  23.688
     TOTAL RAINFALL   (mm)=  67.888
     RUNOFF COEFFICIENT   =   0.349

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0004)|   Area    (ha)=   0.12   Curve Number    (CN)= 71.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                          ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
```

```
              hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
            0.083    9.77 | 0.583  203.31 | 1.083   17.18 |  1.58    8.96
            0.167    9.77 | 0.667  203.31 | 1.167   17.18 |  1.67    8.96
            0.250   15.10 | 0.750   50.96 | 1.250   13.06 |  1.75    7.78
            0.333   15.10 | 0.833   50.96 | 1.333   13.06 |  1.83    7.78
            0.417   38.21 | 0.917   25.51 | 1.417   10.60 |  1.92    6.90
            0.500   38.21 | 1.000   25.51 | 1.500   10.60 |  2.00    6.90

     Unit Hyd Qpeak  (cms)=   0.024

     PEAK FLOW       (cms)=   0.012 (i)
     TIME TO PEAK    (hrs)=   0.833
     RUNOFF VOLUME    (mm)=  23.686
     TOTAL RAINFALL   (mm)=  67.888
     RUNOFF COEFFICIENT   =   0.349

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB             |
| STANDHYD (  0002)|   Area    (ha)=   0.07
|ID= 1 DT= 5.0 min |   Total Imp(%)=  90.00   Dir. Conn.(%)=  90.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      0.07         0.01
     Dep. Storage     (mm)=      1.00         1.50
     Average Slope     (%)=      1.00         2.00
     Length            (m)=     22.21        40.00
     Mannings n             =    0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                          ---- TRANSFORMED HYETOGRAPH ----
              TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
               hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
            0.083    9.77 | 0.583  203.31 | 1.083   17.18 |  1.58    8.96
            0.167    9.77 | 0.667  203.31 | 1.167   17.18 |  1.67    8.96
            0.250   15.10 | 0.750   50.96 | 1.250   13.06 |  1.75    7.78
            0.333   15.10 | 0.833   50.96 | 1.333   13.06 |  1.83    7.78
            0.417   38.21 | 0.917   25.51 | 1.417   10.60 |  1.92    6.90
            0.500   38.21 | 1.000   25.51 | 1.500   10.60 |  2.00    6.90

     Max.Eff.Inten.(mm/hr)=     203.31       116.81
               over (min)        5.00         5.00
     Storage Coeff.  (min)=     0.78 (ii)    2.99 (ii)
     Unit Hyd. Tpeak (min)=     5.00         5.00
     Unit Hyd. peak  (cms)=     0.34         0.28
                                                    *TOTALS*
     PEAK FLOW       (cms)=     0.04         0.00          0.040 (iii)
     TIME TO PEAK    (hrs)=     0.67         0.67          0.67
     RUNOFF VOLUME    (mm)=    66.89        39.63         64.15
     TOTAL RAINFALL   (mm)=    67.89        67.89         67.89
     RUNOFF COEFFICIENT   =     0.99         0.58          0.94

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  85.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB             |
| STANDHYD (  0001)|   Area    (ha)=   0.09
|ID= 1 DT= 5.0 min |   Total Imp(%)=  90.00   Dir. Conn.(%)=  90.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      0.08         0.01
     Dep. Storage     (mm)=      1.00         1.50
     Average Slope     (%)=      1.00         2.00
     Length            (m)=     24.22        40.00
     Mannings n             =    0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                          ---- TRANSFORMED HYETOGRAPH ----
              TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
               hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
            0.083    9.77 | 0.583  203.31 | 1.083   17.18 |  1.58    8.96
            0.167    9.77 | 0.667  203.31 | 1.167   17.18 |  1.67    8.96
            0.250   15.10 | 0.750   50.96 | 1.250   13.06 |  1.75    7.78
            0.333   15.10 | 0.833   50.96 | 1.333   13.06 |  1.83    7.78
            0.417   38.21 | 0.917   25.51 | 1.417   10.60 |  1.92    6.90
            0.500   38.21 | 1.000   25.51 | 1.500   10.60 |  2.00    6.90

     Max.Eff.Inten.(mm/hr)=     203.31       116.81
               over (min)        5.00         5.00
     Storage Coeff.  (min)=     0.82 (ii)    3.03 (ii)
     Unit Hyd. Tpeak (min)=     5.00         5.00
     Unit Hyd. peak  (cms)=     0.34         0.27
                                                    *TOTALS*
     PEAK FLOW       (cms)=     0.04         0.00          0.048 (iii)
     TIME TO PEAK    (hrs)=     0.67         0.67          0.67
     RUNOFF VOLUME    (mm)=    66.89        39.63         64.15
     TOTAL RAINFALL   (mm)=    67.89        67.89         67.89
     RUNOFF COEFFICIENT   =     0.99         0.58          0.94

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  85.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0008)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                         0.0000     0.0000    |   0.0063     0.0033
                         0.0032     0.0008    |   0.0000     0.0000

                              AREA     QPEAK     TPEAK      R.V.
                              (ha)     (cms)     (hrs)      (mm)
   INFLOW : ID= 2 (  0001)    0.088     0.048      0.67      64.15
   OUTFLOW: ID= 1 (  0008)    0.088     0.007      0.92      63.50

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 13.79
                  TIME SHIFT OF PEAK FLOW         (min)= 15.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0036

--------------------------------------------------------------------------------
--------------------
| CALIB             |
| STANDHYD (  0003)|   Area    (ha)=   0.80
|ID= 1 DT= 5.0 min |   Total Imp(%)=  90.00   Dir. Conn.(%)=  90.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      0.72         0.08
     Dep. Storage     (mm)=      1.00         1.50
     Average Slope     (%)=      1.00         2.00
     Length            (m)=     73.03        40.00
     Mannings n             =    0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                          ---- TRANSFORMED HYETOGRAPH ----
              TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
               hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
            0.083    9.77 | 0.583  203.31 | 1.083   17.18 |  1.58    8.96
            0.167    9.77 | 0.667  203.31 | 1.167   17.18 |  1.67    8.96
            0.250   15.10 | 0.750   50.96 | 1.250   13.06 |  1.75    7.78
            0.333   15.10 | 0.833   50.96 | 1.333   13.06 |  1.83    7.78
            0.417   38.21 | 0.917   25.51 | 1.417   10.60 |  1.92    6.90
            0.500   38.21 | 1.000   25.51 | 1.500   10.60 |  2.00    6.90

     Max.Eff.Inten.(mm/hr)=     203.31        70.97
               over (min)        5.00         5.00
     Storage Coeff.  (min)=     1.59 (ii)    3.80 (ii)
     Unit Hyd. Tpeak (min)=     5.00         5.00
     Unit Hyd. peak  (cms)=     0.33         0.25
                                                    *TOTALS*
     PEAK FLOW       (cms)=     0.41         0.02          0.423 (iii)
     TIME TO PEAK    (hrs)=     0.67         0.67          0.67
     RUNOFF VOLUME    (mm)=    66.89        25.91         62.79
     TOTAL RAINFALL   (mm)=    67.89        67.89         67.89
     RUNOFF COEFFICIENT   =     0.99         0.38          0.92

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
```

```
       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0009)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)     (cms)    (hrs)     (mm)
       ID1= 1 (  0002):      0.07   0.040     0.67     64.15
     + ID2= 2 (  0003):      0.80   0.423     0.67     62.79
       ================================================
       ID = 3 (  0009):      0.87   0.463     0.67     62.90

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0009)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)     (cms)    (hrs)     (mm)
       ID1= 3 (  0009):      0.87   0.463     0.67     62.90
     + ID2= 2 (  0004):      0.12   0.012     0.83     23.69
       ================================================
       ID = 1 (  0009):      1.00   0.470     0.67     58.03

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0009)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)     (cms)    (hrs)     (mm)
       ID1= 1 (  0009):      1.00   0.470     0.67     58.03
     + ID2= 2 (  0005):      0.46   0.044     0.83     23.69
       ================================================
       ID = 3 (  0009):      1.46   0.497     0.67     47.13

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0009)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)     (cms)    (hrs)     (mm)
       ID1= 3 (  0009):      1.46   0.497     0.67     47.13
     + ID2= 2 (  0008):      0.09   0.007     0.92     63.50
       ================================================
       ID = 1 (  0009):      1.55   0.502     0.67     48.06

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0010)|     OVERFLOW IS ON
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE    |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)    |   (cms)     (ha.m.)
                          0.0000     0.0000    |   0.1120     0.0200
                          0.0718     0.0039    |   0.1128     0.0200
                          0.0853     0.0125    |   0.1142     0.0204
                          0.0969     0.0173    |   0.1155     0.0212
                          0.1073     0.0200    |   0.0000     0.0000

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0009)    1.550     0.502      0.67       48.06
   OUTFLOW: ID= 1 (  0010)    1.347     0.116      0.75       47.88
   OVERFLOW:ID= 3 (  0003)    0.203     0.176      0.67       47.88

                  TOTAL NUMBER OF SIMULATION OVERFLOW  =     3
                  CUMULATIVE TIME OF OVERFLOW  (HOURS) =  0.25
                  PERCENTAGE OF TIME OVERFLOWING   (%) =  4.84

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 23.00
                  TIME SHIFT OF PEAK FLOW         (min)=  5.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0212

--------------------------------------------------------------------------------

  --------------------------
  | Junction Command(0011) |
```

```
  --------------------------

                           AREA     QPEAK    TPEAK     R.V.
                           (ha)     (cms)    (hrs)     (mm)
  INFLOW : ID= 3(  0010)    0.20     0.18     0.67     47.88
  OUTFLOW: ID= 2(  0011)    0.20     0.18     0.67     47.88

  --------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0006)|   Area    (ha)=   0.25
|ID= 1 DT= 5.0 min |   Total Imp(%)=  90.00   Dir. Conn.(%)=  90.00
--------------------
                                IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        0.22          0.02
     Dep. Storage     (mm)=        1.00          1.50
     Average Slope     (%)=        1.00          2.00
     Length            (m)=       40.66         40.00
     Mannings n           =       0.013         0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                          ---- TRANSFORMED HYETOGRAPH ----
               TIME     RAIN |  TIME     RAIN |'  TIME     RAIN |  TIME     RAIN
                hrs    mm/hr |   hrs    mm/hr |'   hrs    mm/hr |   hrs    mm/hr
               0.083    9.77 | 0.583  203.31 | 1.083   17.18 |  1.58    8.96
               0.167    9.77 | 0.667  203.31 | 1.167   17.18 |  1.67    8.96
               0.250   15.10 | 0.750   50.96 | 1.250   13.06 |  1.75    7.78
               0.333   15.10 | 0.833   50.96 | 1.333   13.06 |  1.83    7.78
               0.417   38.21 | 0.917   25.51 | 1.417   10.60 |  1.92    6.90
               0.500   38.21 | 1.000   25.51 | 1.500   10.60 |  2.00    6.90

     Max.Eff.Inten.(mm/hr)=     203.31       116.81
               over (min)          5.00         5.00
     Storage Coeff.  (min)=        1.12 (ii)    3.33 (ii)
     Unit Hyd. Tpeak (min)=        5.00         5.00
     Unit Hyd. peak  (cms)=        0.34         0.26
                                                          *TOTALS*
     PEAK FLOW       (cms)=        0.13         0.01          0.135 (iii)
     TIME TO PEAK    (hrs)=        0.67         0.67           0.67
     RUNOFF VOLUME    (mm)=       66.89        39.63          64.16
     TOTAL RAINFALL   (mm)=       67.89        67.89          67.89
     RUNOFF COEFFICIENT   =        0.99         0.58           0.95

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =  85.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0012)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)     (cms)    (hrs)     (mm)
       ID1= 1 (  0011):      0.20   0.176     0.67     47.88
     + ID2= 2 (  0006):      0.25   0.135     0.67     64.16
       ================================================
       ID = 3 (  0012):      0.45   0.310     0.67     56.84

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0013)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE    |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)    |   (cms)     (ha.m.)
                          0.0000     0.0000    |   0.0218     0.0006
                          0.0078     0.0006    |   0.0221     0.0007
                          0.0110     0.0006    |   0.0224     0.0013
                          0.0135     0.0006    |   0.0228     0.0033
                          0.0156     0.0006    |   0.0231     0.0071
                          0.0175     0.0006    |   0.0996     0.0124
                          0.0191     0.0006    |   0.1498     0.0148
                          0.0207     0.0006    |   0.0000     0.0000

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0012)    0.451     0.310      0.67       56.84
   OUTFLOW: ID= 1 (  0013)    0.451     0.103      0.83       56.84
```

```
                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 33.24
                  TIME SHIFT OF PEAK FLOW         (min)= 10.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0126

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0007)|   Area    (ha)=   0.02   Curve Number   (CN)= 80.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                              ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
              0.083    9.77 | 0.583  203.31 | 1.083   17.18 |  1.58    8.96
              0.167    9.77 | 0.667  203.31 | 1.167   17.18 |  1.67    8.96
              0.250   15.10 | 0.750   50.96 | 1.250   13.06 |  1.75    7.78
              0.333   15.10 | 0.833   50.96 | 1.333   13.06 |  1.83    7.78
              0.417   38.21 | 0.917   25.51 | 1.417   10.60 |  1.92    6.90
              0.500   38.21 | 1.000   25.51 | 1.500   10.60 |  2.00    6.90

     Unit Hyd Qpeak  (cms)=   0.003

     PEAK FLOW       (cms)=   0.002 (i)
     TIME TO PEAK    (hrs)=   0.833
     RUNOFF VOLUME    (mm)=  31.152
     TOTAL RAINFALL   (mm)=  67.888
     RUNOFF COEFFICIENT   =   0.459

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0014)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0010):     1.35   0.116     0.75    47.88
      + ID2= 2 (  0013):     0.45   0.103     0.83    56.84
        ================================================
        ID = 3 (  0014):     1.80   0.219     0.83    50.13

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0014)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0014):     1.80   0.219     0.83    50.13
      + ID2= 2 (  0007):     0.02   0.002     0.83    31.15
        ================================================
        ID = 1 (  0014):     1.81   0.221     0.83    49.96

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
```

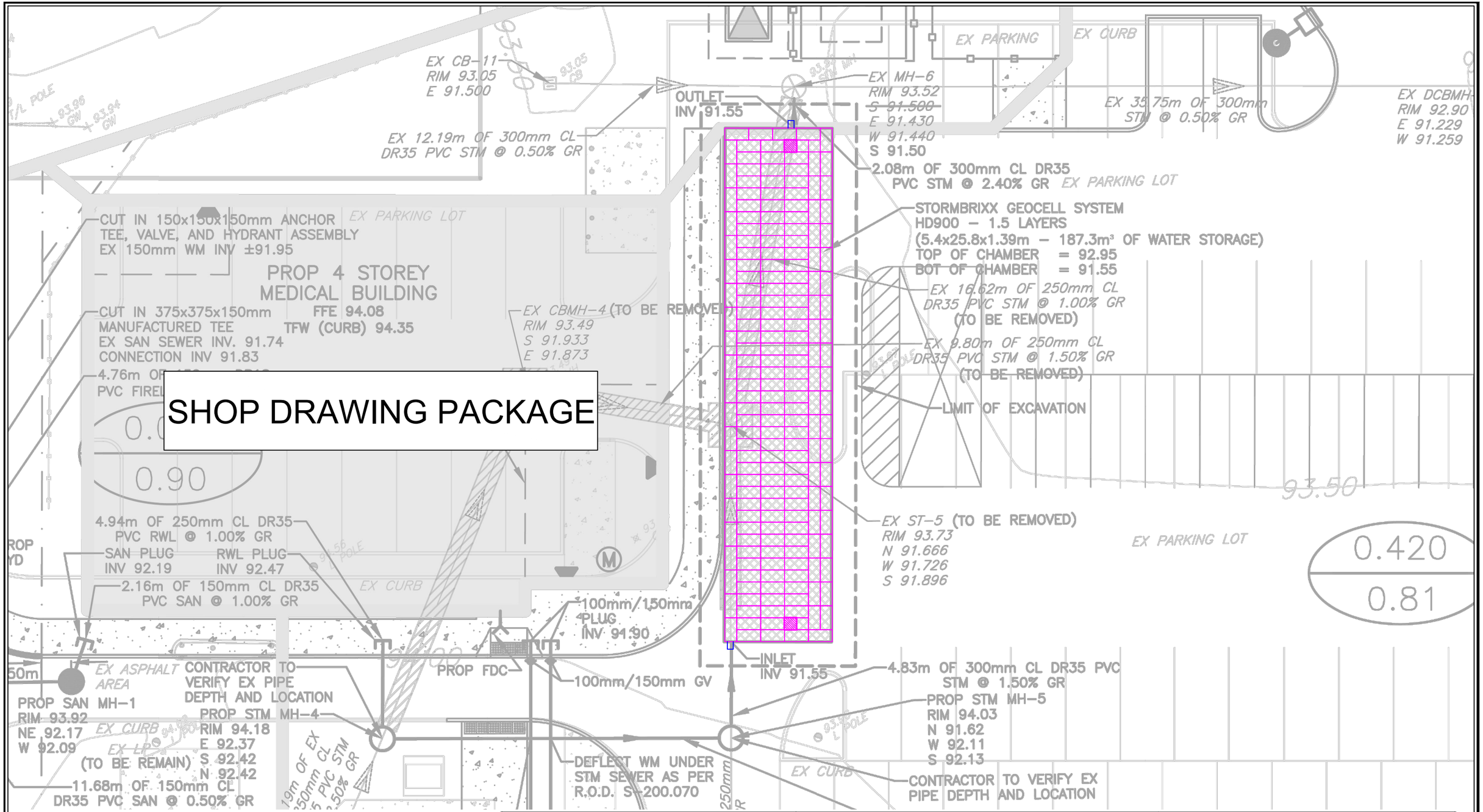
OSHAWA
200-481 Taunton Road West
Oshawa, ON L1J 0G3
905-576-8500

PETERBOROUGH
402-150 King Street
Peterborough, ON K9J 2R9
705-201-0272

dgbiddle.com

SCHEDULE 4

StormBrixx SD900 Project Submission Package



WARNING: VEHICLE TRAFFIC DURING CONSTRUCTION STAGE SHALL NOT BE ALOWED ON TOP OF THE TANK

WARNING: GROUNDWATER MAY CAUSE TANK FLOTATION. THIS RISK EXISTS EVEN WITH STRUCTURALLY SOUND TANKS, AS GEOTECHNICAL DATA MAY NOT REFLECT MAXIMUM WATER LEVELS.

PROJECT NAME		
222 Kiing Street East, Bowmanville-ON-SB		
SYSTEM(S) - STORMBRIXX SD		
DATE - 28-10-2026	CHECKED BY - ----	
SHEET NO. 1 of 5	DESIGN SERV. NO. 926-793	REV. A

STORMBRIXX LAYOUT

NO.	REVISIONS DESCRIPTION	DATE	BY
A	CHANGE IN TANK VOLUME	30-10-26	KP
B	----	----	----
C	----	----	----
D	----	----	----
E	----	----	----

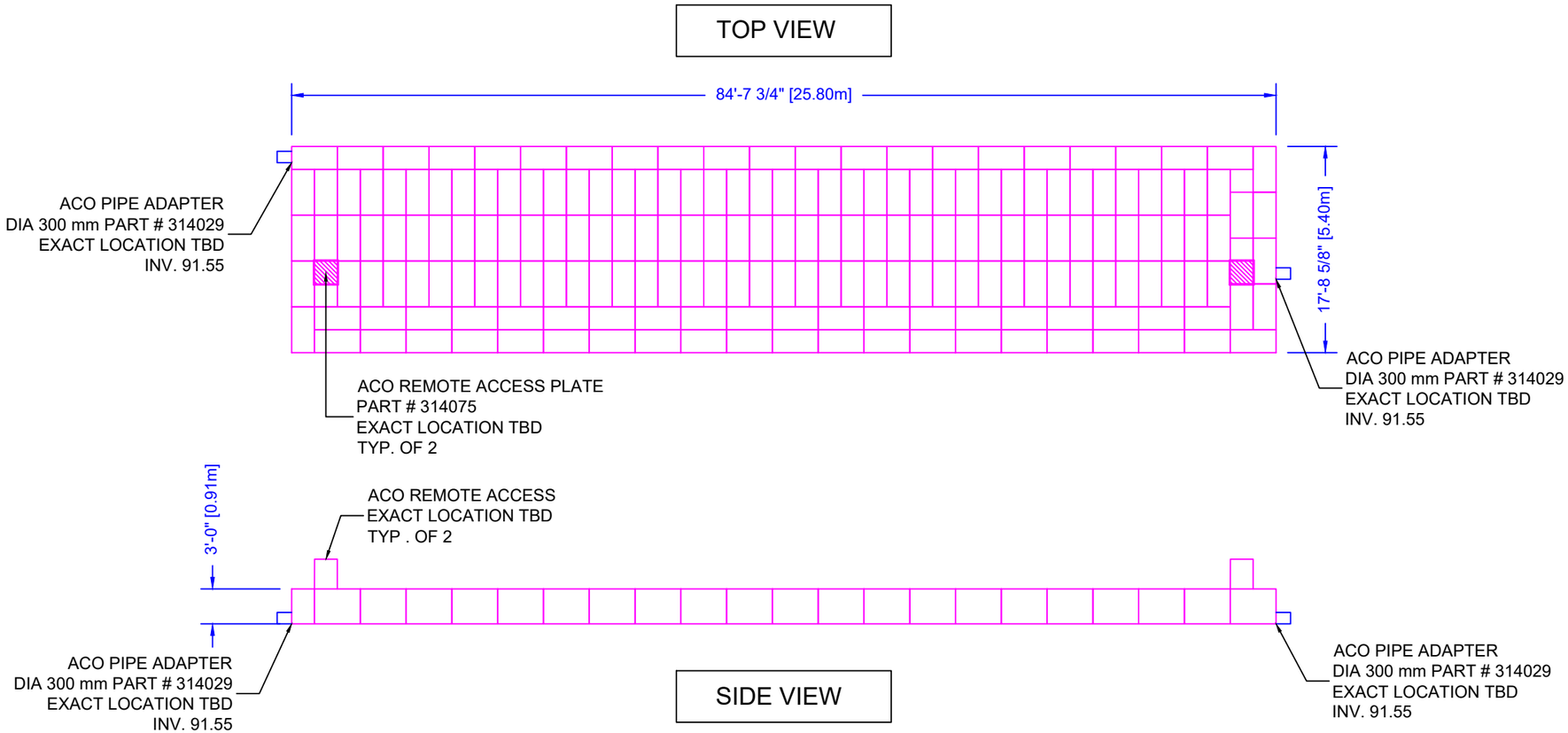
ACO SYSTEMS LTD.
2910 BRIGHTON RD
OAKVILLE, ON
L6H 5S3
TEL: (905)-829-0665
FAX: (905)-829-2908
EMAIL: info@acocan.ca
WEB: www.acocan.ca

CANADA

ACO

CANADIAN

DRAWN BY - KP	EMAIL - KALPIT.PARMAR@ACO.COM



Tank 1 Configuration - SD

Tank Function	Detention
Product	ACO Stormbrixx [1][2] SD
Number of Layer(s)	1.0
Tank Height (m)	0.91
Tank Footprint (m^2)	139.32
Tank Gross Volume (m^3)	127.34
Tank Net Volume (m^3)	122.88
Estimated Backfill Volume (m^3)	65.00
Backfill Type	Medium ϕ 34°
Traffic Load Expected	Cars
Elevations	
Top of Stone	92.564
Top of Tank	92.414
Tank Invert	91.500
Bottom of Stone	91.350
Finished Ground Highest Elevation	93.800
Finished Ground Lowest Elevation	93.520
Maximum Ground Water Elevation	91.840

NOTES :
[1] Design Life of ACO Stormbrixx SD is 50 years.
[2] ACO Stormbrixx SD can meet AASHTO H-20 and HS-20 loading conditions.

WARNING: VEHICLE TRAFFIC DURING CONSTRUCTION STAGE SHALL NOT BE ALOWED ON TOP OF THE TANK

WARNING: GROUNDWATER MAY CAUSE TANK FLOTATION. THIS RISK EXISTS EVEN WITH STRUCTURALLY SOUND TANKS, AS GEOTECHNICAL DATA MAY NOT REFLECT MAXIMUM WATER LEVELS.

PROJECT NAME		
222 Kiing Street East, Bowmanville-ON-SB		
SYSTEM(S) - STORMBRIXX SD		
DATE - 28-10-2026	CHECKED BY - ----	
SHEET NO. 2 of 5	DESIGN SERV. NO. 926-793	REV. A

STORMBRIXX LAYOUT

NO.	REVISIONS DESCRIPTION	DATE	BY
A	CHANGE IN TANK VOLUME	30-10-26	KP
B	----	----	----
C	----	----	----
D	----	----	----
E	----	----	----

ACO SYSTEMS LTD.
2910 BRIGHTON RD
OAKVILLE, ON
L6H 5S3
TEL: (905)-829-0665
FAX: (905)-829-2908
EMAIL: info@acocan.ca
WEB: www.acocan.ca

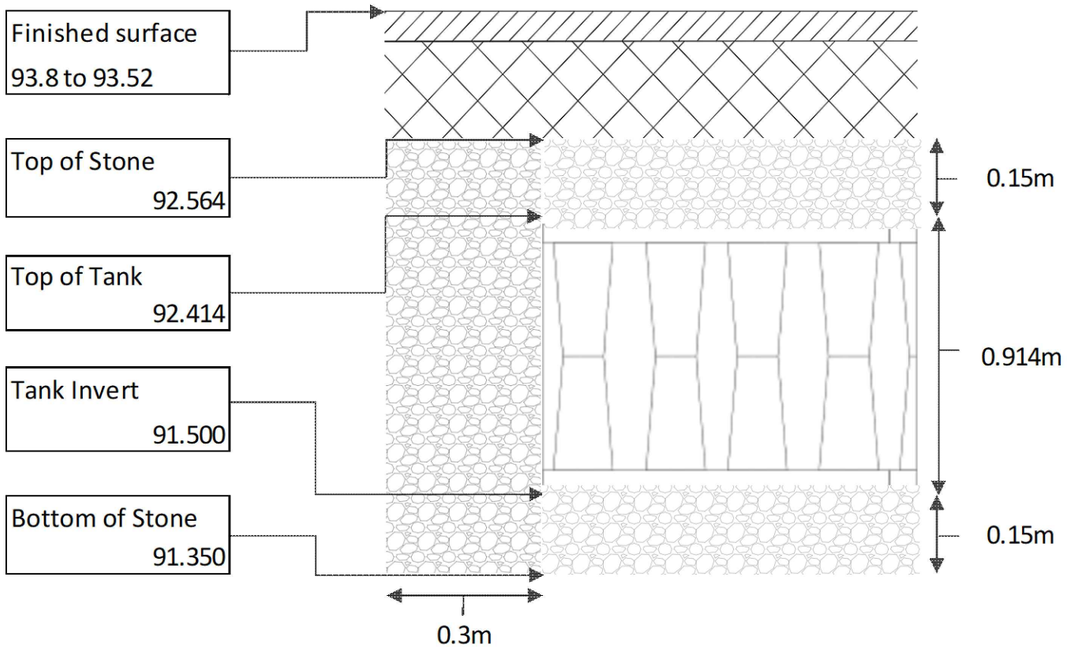
CANADA

DRAWN BY - KP	EMAIL - KALPIT.PARMAR@ACO.COM

ACO CAN Stage Storage Table

926-723 - 222 King Street East, Bowmanville - ON - SB

Tank Type:	**SD**
Tank Void Ratio:	96.5%
Tank Height (m):	0.914
Number of Layers:	1
Stage Height Increment (cm):	4.0
Tank Perimeter (m):	62.40
Tank Footprint (m^2):	139.32
Tank Net Volume (m^3):	122.88
Tank Gross Volume (m^3):	127.34



Elevations (m)	Depth (m)	Net Volume Tank (m^3)	Cumulative storage Volume (m^3)
92.414	**0.91**	**1.88**	122.88
92.400	0.90	5.38	121.00
92.360	0.86	5.38	115.62
92.320	0.82	5.38	110.24
92.280	0.78	5.38	104.87
92.240	0.74	5.38	99.49
92.200	0.70	5.38	94.11
92.160	0.66	5.38	88.73
92.120	0.62	5.38	83.36
92.080	0.58	5.38	77.98
92.04	0.54	5.38	72.60
92.00	0.50	5.38	67.22
91.96	0.46	5.38	61.84
91.92	0.42	5.38	56.47
91.88	0.38	5.38	51.09
91.84	0.34	5.38	45.71
91.80	0.30	5.38	40.33
91.76	0.26	5.38	34.96
91.72	0.22	5.38	29.58
91.68	0.18	5.38	24.20
91.64	0.14	5.38	18.82
91.60	0.1	5.38	13.44
91.56	0.06	8.07	8.07

WARNING: VEHICLE TRAFFIC DURING CONSTRUCTION STAGE SHALL NOT BE ALOWED ON TOP OF THE TANK

WARNING: GROUNDWATER MAY CAUSE TANK FLOTATION. THIS RISK EXISTS EVEN WITH STRUCTURALLY SOUND TANKS, AS GEOTECHNICAL DATA MAY NOT REFLECT MAXIMUM WATER LEVELS.

PROJECT NAME		
222 Kiing Street East, Bowmanville-ON-SB		
SYSTEM(S) - STORMBRIXX SD		
DATE - 28-10-2026	CHECKED BY - ----	
SHEET NO. 3 of 5	DESIGN SERV. NO. 926-793	REV. A

STORMBRIXX LAYOUT

NO.	REVISIONS DESCRIPTION	DATE	BY
A	CHANGE IN TANK VOLUME	30-10-26	KP
B	----	----	----
C	----	----	----
D	----	----	----
E	----	----	----

ACO SYSTEMS LTD.
2910 BRIGHTON RD
OAKVILLE, ON
L6H 5S3
TEL: (905)-829-0665
FAX: (905)-829-2908
EMAIL: info@acocan.ca
WEB: www.acocan.ca

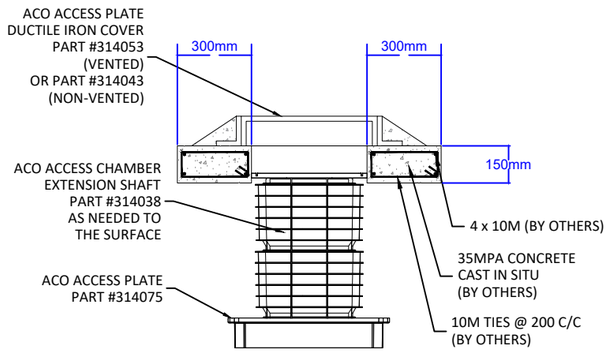
CANADA

CANADIAN

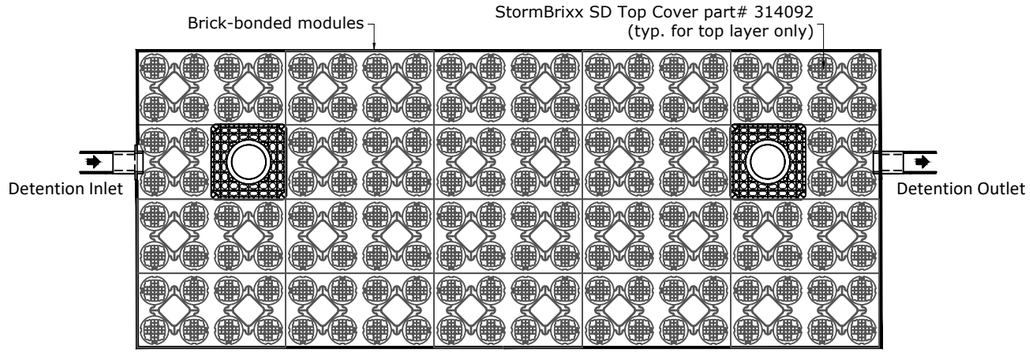
DRAWN BY - KP

EMAIL - KALPIT.PARMAR@ACO.COM

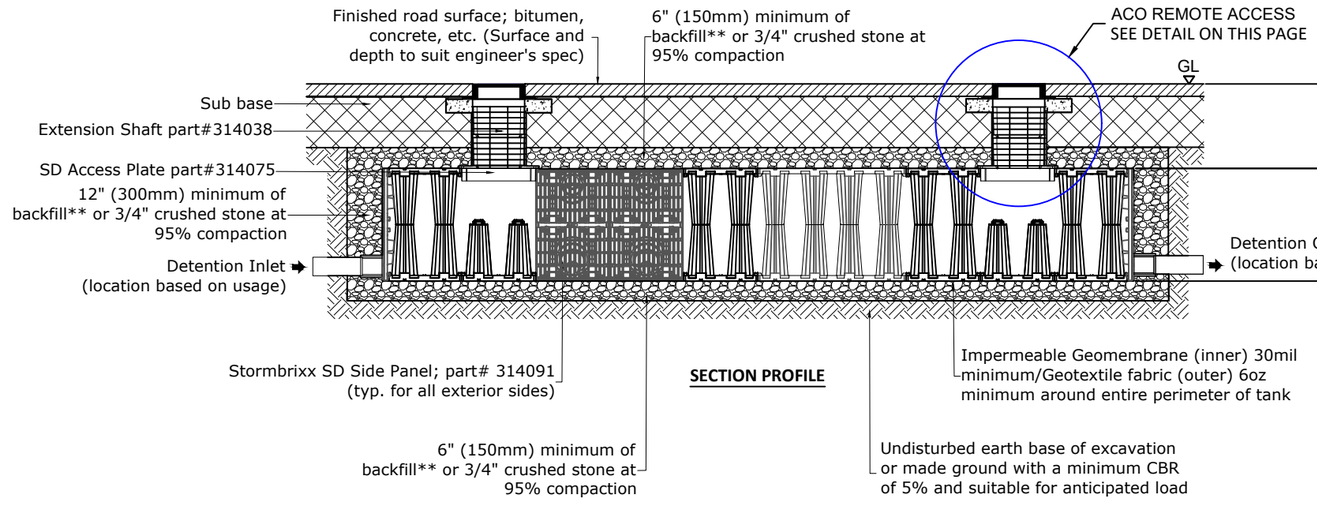
ACO REMOTE ACCESS DETAIL



1 LAYER STORMBRIXX SD DETENTION TYPICAL SECTION PROFILE



PLAN



SECTION PROFILE

Installation depths of ACO StormBrixx SD	
Installation Location	Minimum cover depth[4] ft (m)
Non-trafficked areas i.e. landscaping [2]	1.65 (0.5)
Parking lots, vehicles up to 5,512lbs gross mass [1]	1.8 (0.55)
Parking lots, occasional vehicles greater than 5,512lbs gross mass [3]	2.0 (0.6)
Occasional heavy truck traffic up to HS-20 loading	Please consult with ACO
Maximum cover depth of ACO StormBrixx SD	6.5 (2)
Maximum depth to invert of ACO StormBrixx SD one layer system	9.56 (2.9)

Notes

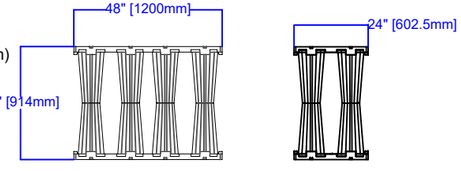
(1) Assumes 27 degree load distribution through fill material and overlaying surface asphalt or block paving

(2) Minimum cover depth to avoid accidental damage from gardening/landscaping work

(3) Occasional sanitation trucks or similar vehicles (typically one per week)

(4) Please check minimum frost cover depths and water table heights for geographical location

ACO StormBrixx SD Module
48"x24"x36" [1200x602.5x914mm (H)]
22.54cuft net volume per completed module
Brick or Cross Bonded (where applicable)
part# 314090



*All systems must be designed and installed to meet or exceed ACO StormBrixx minimum requirements. Although ACO StormBrixx offers support during the design, review, and construction phases of the module system, it is the ultimate responsibility of the Engineer of Record to design the system in full compliance with all applicable engineering practices, laws, and regulations.

**Backfill must be free of organic material and have minimum angle friction of 34 degrees.

***The water table level is assumed to be below the invert of the tank.

WARNING: VEHICLE TRAFFIC DURING CONSTRUCTION STAGE SHALL NOT BE ALOWED ON TOP OF THE TANK

WARNING: GROUNDWATER MAY CAUSE TANK FLOTATION. THIS RISK EXISTS EVEN WITH STRUCTURALLY SOUND TANKS, AS GEOTECHNICAL DATA MAY NOT REFLECT MAXIMUM WATER LEVELS.

PROJECT NAME		
222 Kiing Street East, Bowmanville-ON-SB		
SYSTEM(S) - STORMBRIXX SD		
DATE - 28-10-2026	CHECKED BY - ----	
SHEET NO. 4 of 5	DESIGN SERV. NO. 926-793	REV. A

STORMBRIXX LAYOUT

NO.	REVISIONS DESCRIPTION	DATE	BY
A	CHANGE IN TANK VOLUME	30-10-26	KP
B	----	----	----
C	----	----	----
D	----	----	----
E	----	----	----

ACO SYSTEMS LTD.
2910 BRIGHTON RD
OAKVILLE, ON
L6H 5S3
TEL: (905)-829-0665
FAX: (905)-829-2908
EMAIL: info@acocan.ca
WEB: www.acocan.ca

CANADA

DRAWN BY - KP	EMAIL - KALPIT.PARMAR@ACO.COM

Brick-bonding structures

Triple module unit



Quadruple module unit



Completing a brick-bonded structure

To finish the brick-bonded tank, one module will need to be cut in half in certain layouts. The images below detail and display the ease of creating the final piece.







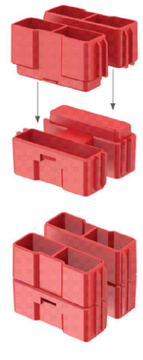
LAYER CONNECTORS

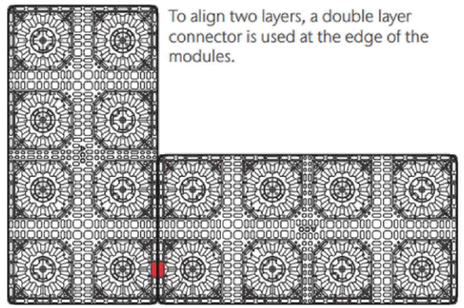
When assembling multiple layers of ACO StormBrixx SD, the layers are aligned and secured by means of two layer connectors clicked together. The exact positions of the modules and layer connectors within the overall infiltration system are shown in the installation diagram.

The layer connectors must each be mounted in the top of the module and positioned into the molded socket next to the column on the edge of the module.

Multiple layers

Connectors are used if two or more layers of ACO StormBrixx SD are installed: **Two individual layer connectors** are pushed together to form one and are inserted between the individual layers as positional fixing. This helps achieve precise alignment of the columns within several layers.





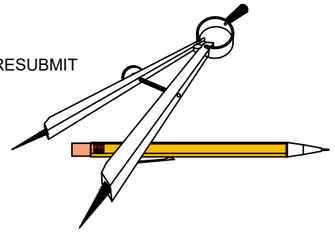
To align two layers, a double layer connector is used at the edge of the modules.

GENERAL NOTES

1. IT IS THE CUSTOMER'S RESPONSIBILITY TO ENSURE THAT EACH PRODUCT IS FIT FOR ITS INTENDED PURPOSE AND THAT THE ACTUAL CONDITIONS ARE SUITABLE.
2. IT IS THE CUSTOMER'S RESPONSIBILITY TO FOLLOW ACO SYSTEMS LTD. INSTALLATION INSTRUCTIONS FOR EACH PRODUCT. SEEK ENGINEERING ADVICE FOR INSTALLATIONS NOT ILLUSTRATED IN THE INSTALLATION GUIDELINES.
3. FOR FURTHER PRODUCT INFORMATION, CUT SHEETS, SPECIFICATIONS AND INSTALLATION INSTRUCTIONS, PLEASE VISIT US AT OUR WEBSITE: WWW.ACOCAN.CA.
4. IS HIGHLY RECOMMENDED TO USE A GRIT INTERCEPTOR BEFORE THE WATER ENTERS THE TANK, TO AVOID DEBRIS ACCUMULATION IN THE UNIT AND ENSURE ITS DURABLE PERFORMANCE.

ALL DRAWINGS ARE AS ACCURATE AS THE INFORMATION SUPPLIED. ALL REASONABLE CARE HAS BEEN TAKEN IN COMPILING THE INFORMATION WITHIN. PLEASE REVIEW THIS INFORMATION FOR ACCURACY.

☐ APPROVED ☐ REVISE AND RESUBMIT
☐ APPROVED AS NOTED ☐ REJECTED



SIGNED: _____

DATE: _____

COMMENTS:

WARNING: VEHICLE TRAFFIC DURING CONSTRUCTION STAGE SHALL NOT BE ALOWED ON TOP OF THE TANK

WARNING: GROUNDWATER MAY CAUSE TANK FLOTATION. THIS RISK EXISTS EVEN WITH STRUCTURALLY SOUND TANKS, AS GEOTECHNICAL DATA MAY NOT REFLECT MAXIMUM WATER LEVELS.

PROJECT NAME 222 Kiing Street East, Bowmanville-ON-SB		
SYSTEM(S) - STORMBRIXX SD		
DATE - 28-10-2026	CHECKED BY - ----	
SHEET NO. 5 of 5	DESIGN SERV. NO. 926-793	REV. A

STORMBRIXX LAYOUT

NO.	REVISIONS DESCRIPTION	DATE	BY
A	CHANGE IN TANK VOLUME	30-10-26	KP
B	----	----	----
C	----	----	----
D	----	----	----
E	----	----	----

ACO SYSTEMS LTD.
2910 BRIGHTON RD
OAKVILLE, ON
L6H 5S3
TEL: (905)-829-0665
FAX: (905)-829-2908
EMAIL: info@acocan.ca
WEB: www.acocan.ca

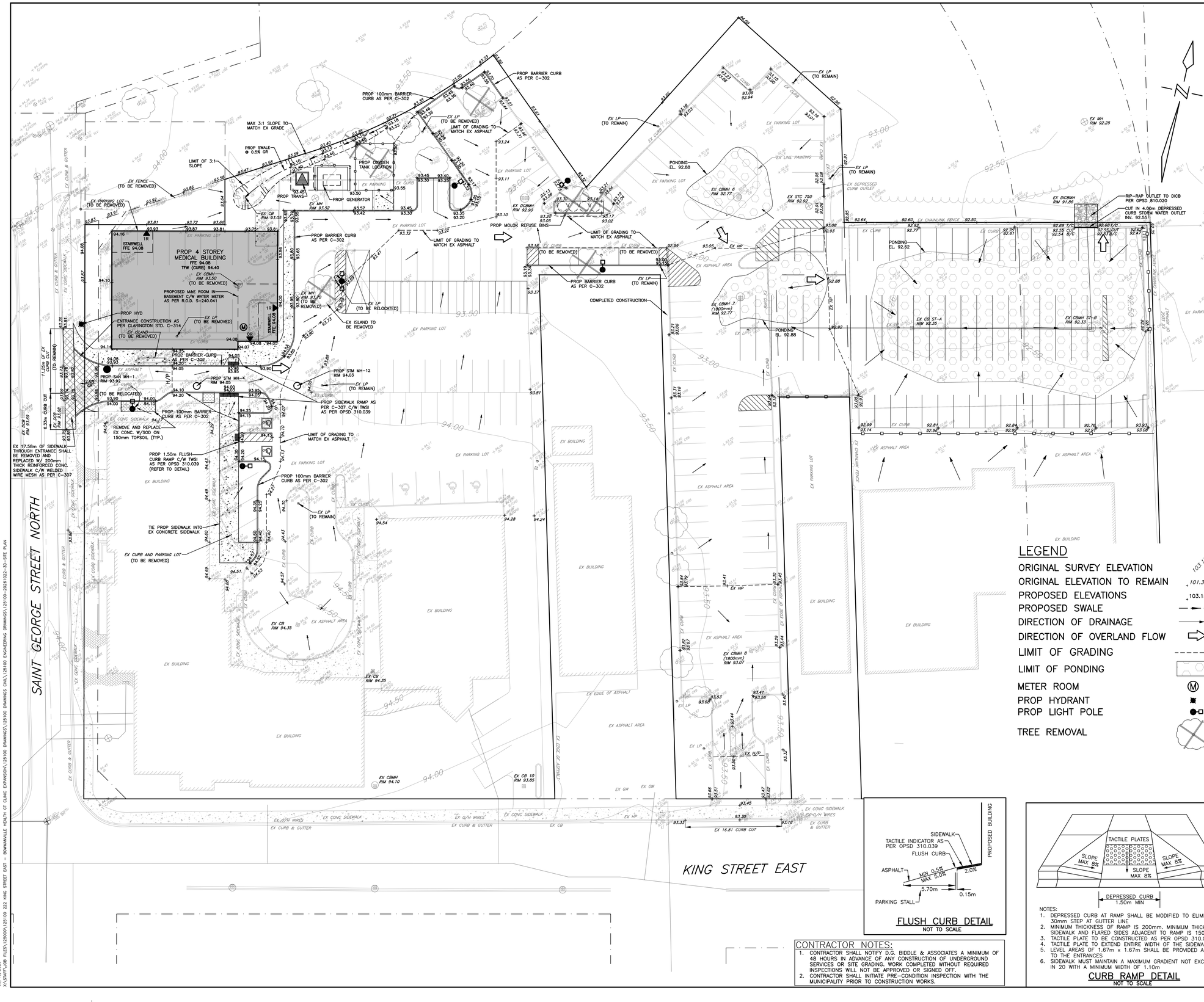
CANADA

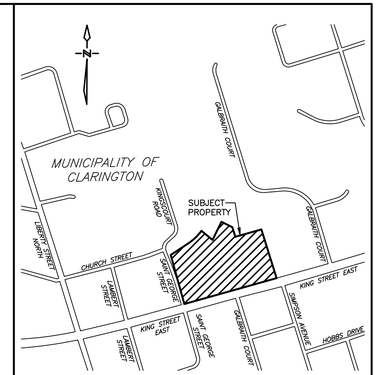
ACO

CANADIAN

DRAWN BY - KP

EMAIL - KALPIT.PARMAR@ACO.COM





BENCH MARK

TOPOGRAPHIC SURVEY PREPARED BY D.G. BIDDLE & ASSOCIATES. BENCHMARK: BOWMANVILLE – VINCENT MASSEY SCHOOL AT NORTH SIDE OF CHURCH STREET, 0.8km EAST OF POST OFFICE, 60m WEST OF KINGSCOURT ROAD, TABLET IN EAST CONCRETE FOUNDATION WALL, 91cm FROM SOUTHEAST FRONT CORNER, 10cm BELOW BRICK. ELEVATION=95.166m (BENCHMARK #67U032)

SITE GRADING NOTES

1. A ROAD OCCUPANCY PERMIT WILL BE REQUIRED FOR ANY WORKS WITHIN THE MUNICIPAL RIGHT OF WAY.
2. ALL WORKS OR RESTORATION WITHIN THE MUNICIPAL RIGHT OF WAY SHALL BE COMPLETED AS PER THE MUNICIPAL'S FIELD STAFF DIRECTION.
3. THE LOCATION AND ELEVATION OF ALL EXISTING UTILITIES AND SERVICES TO BE VERIFIED BY THE CONTRACTOR PRIOR TO COMMENCING CONSTRUCTION. CONCERNED UTILITIES TO BE GIVEN ADVANCED NOTICE FOR STAKE OUT. THE CONSULTANT ASSUMES NO RESPONSIBILITY FOR THE ACCURACY OF THE UTILITIES SHOWN ON THE DRAWINGS.
4. QUANTITIES, DIMENSIONS AND ELEVATIONS TO BE VERIFIED BY THE CONTRACTOR PRIOR TO ORDERING MATERIALS OR COMMENCING CONSTRUCTION.
5. ALL SLOPES SHALL BE CONSTRUCTED AT 3:1 (MAXIMUM) UNLESS OTHERWISE NOTED ON THE DRAWINGS.
6. ALL SWALES SHALL BE CONSTRUCTED WITH 2% MINIMUM GRADE UNLESS OTHERWISE NOTED ON THE DRAWINGS.
7. ALL SLOPES, SWALES AND OPEN SPACE AREAS SHALL BE SODDED ON A MINIMUM OF 300mm OF TOPSOIL.
8. ALL DISTURBED AREAS WITHIN ABUTTING MUNICIPAL RIGHT OF WAYS SHALL BE SODDED ON A MINIMUM OF 150mm OF TOPSOIL.
9. THE PROPOSED ENTRANCE ON KING STREET EAST MUST COMPLY WITH THE MUNICIPALITY OF CLARINGTON STANDARDS AS OUTLINED BELOW.
   - SURFACE ASPHALT – 40mm HL3
   - BASE ASPHALT – 50mm HL8
   - 150mm GRANULAR A
   - 300mm GRANULAR B
   - ENTRANCE WIDTH: 6.0 – 9.0 METRES
   - ENTRANCE RADIUS: 9.0 – 12.0 METRES
   - BARRIER CURB AS PER C–302
10. HEAVY DUTY FIRE ROUTE SHALL CONSIST OF THE FOLLOWING (MINIMUM) UNLESS OTHERWISE APPROVED BY THE ENGINEER:
    - 40mm HL3 (OR APPROVED EQUIVALENT)
    - 60mm HL8 (OR APPROVED EQUIVALENT)
    - 150mm GRANULAR A (OR 20mm CRUSHER–RUN)
    - 300mm GRANULAR B (OR 50mm CRUSHER–RUN)
11. LIGHT DUTY PARKING SHALL CONSIST OF THE FOLLOWING (MINIMUM) UNLESS OTHERWISE APPROVED BY THE ENGINEER:
    - 65mm HL3 (OR APPROVED EQUIVALENT)
    - 150mm GRANULAR A (OR 20mm CRUSHER–RUN)
    - 200mm GRANULAR B (OR 50mm CRUSHER–RUN)

LEGEND

- ORIGINAL SURVEY ELEVATION 103.15
- ORIGINAL ELEVATION TO REMAIN +101.35
- PROPOSED ELEVATIONS +103.15
- PROPOSED SWALE
- DIRECTION OF DRAINAGE
- DIRECTION OF OVERLAND FLOW
- LIMIT OF GRADING
- LIMIT OF PONDING
- METER ROOM (M)
- PROP HYDRANT
- PROP LIGHT POLE
- TREE REMOVAL

NO.	SUBMISSION	DATE
5.	ISSUED FOR FIFTH SUBMISSION	OCT/2026
4.	ISSUED FOR FOURTH SUBMISSION	JULY/2026
3.	ISSUED FOR THIRD SUBMISSION	JUNE/2025
2.	ISSUED FOR SECOND SUBMISSION	MAR/2025
1.	ISSUED FOR FIRST SUBMISSION	OCT/2024

222 KING STREET EAST, BOWMANVILLE

FLUSH CURB DETAIL
NOT TO SCALE

CONTRACTOR NOTES:
1. CONTRACTOR SHALL NOTIFY D.G. BIDDLE & ASSOCIATES A MINIMUM OF 48 HOURS IN ADVANCE OF ANY CONSTRUCTION OF UNDERGROUND SERVICES OR SITE GRADING. WORK COMPLETED WITHOUT REQUIRED INSPECTIONS WILL NOT BE APPROVED OR SIGNED OFF.
2. CONTRACTOR SHALL INITIATE PRE–CONDITION INSPECTION WITH THE MUNICIPALITY PRIOR TO CONSTRUCTION WORKS.

NOTES:
1. DEPRESSED CURB AT RAMP SHALL BE MODIFIED TO ELIMINATED 30mm STEP AT GUTTER LINE
2. MINIMUM THICKNESS OF RAMP IS 200mm. MINIMUM THICKNESS OF SIDEWALK AND FLARED SIDES ADJACENT TO RAMP IS 150mm
3. TACTILE PLATE TO BE CONSTRUCTED AS PER OPSD 310.039
4. TACTILE PLATE TO EXTEND ENTIRE WIDTH OF THE SIDEWALK RAMP
5. LEVEL AREAS OF 1.67m x 1.67m SHALL BE PROVIDED ADJACENT TO THE ENTRANCES
6. SIDEWALK MUST MAINTAIN A MAXIMUM GRADIENT NOT EXCEEDING 1 IN 20 WITH A MINIMUM WIDTH OF 1.10m

CURB RAMP DETAIL
NOT TO SCALE

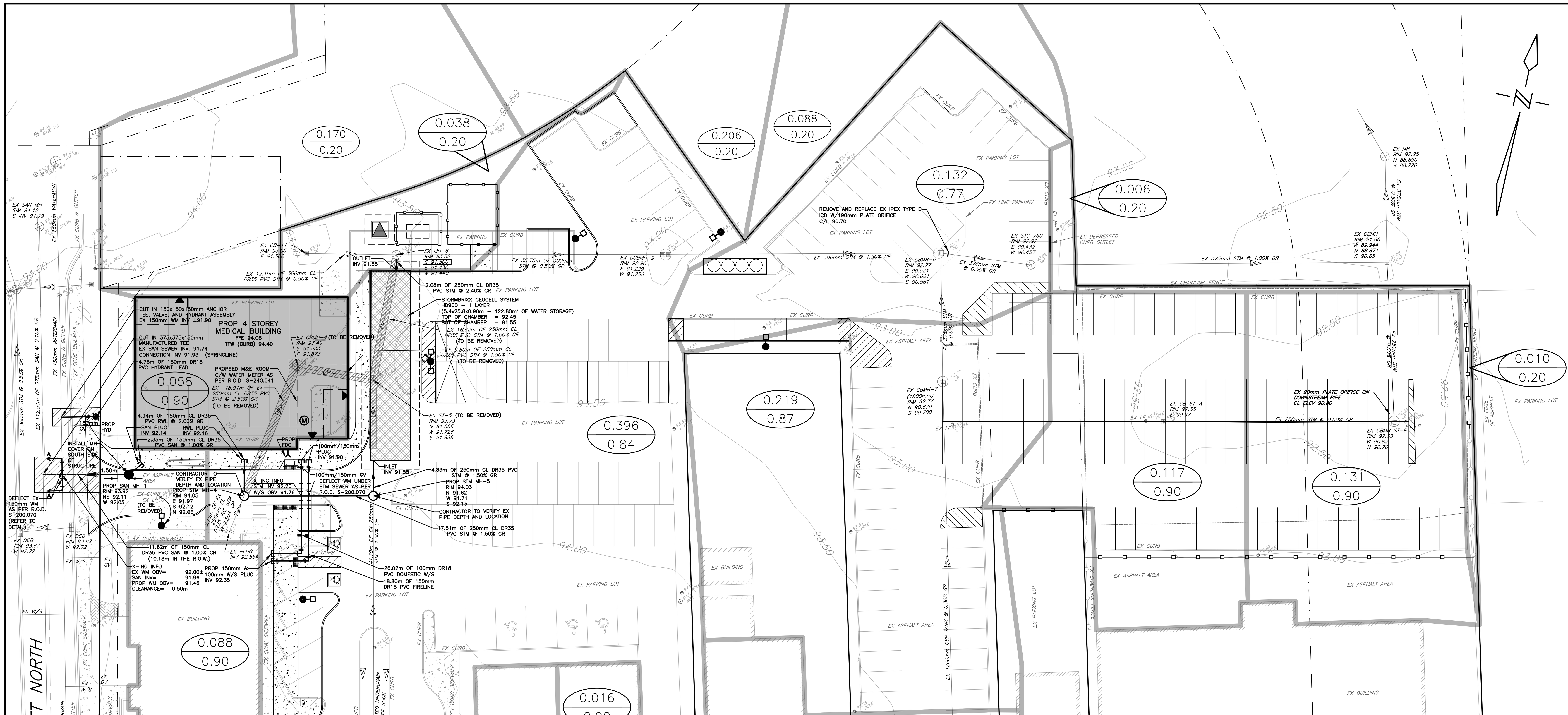
SITE GRADING PLAN

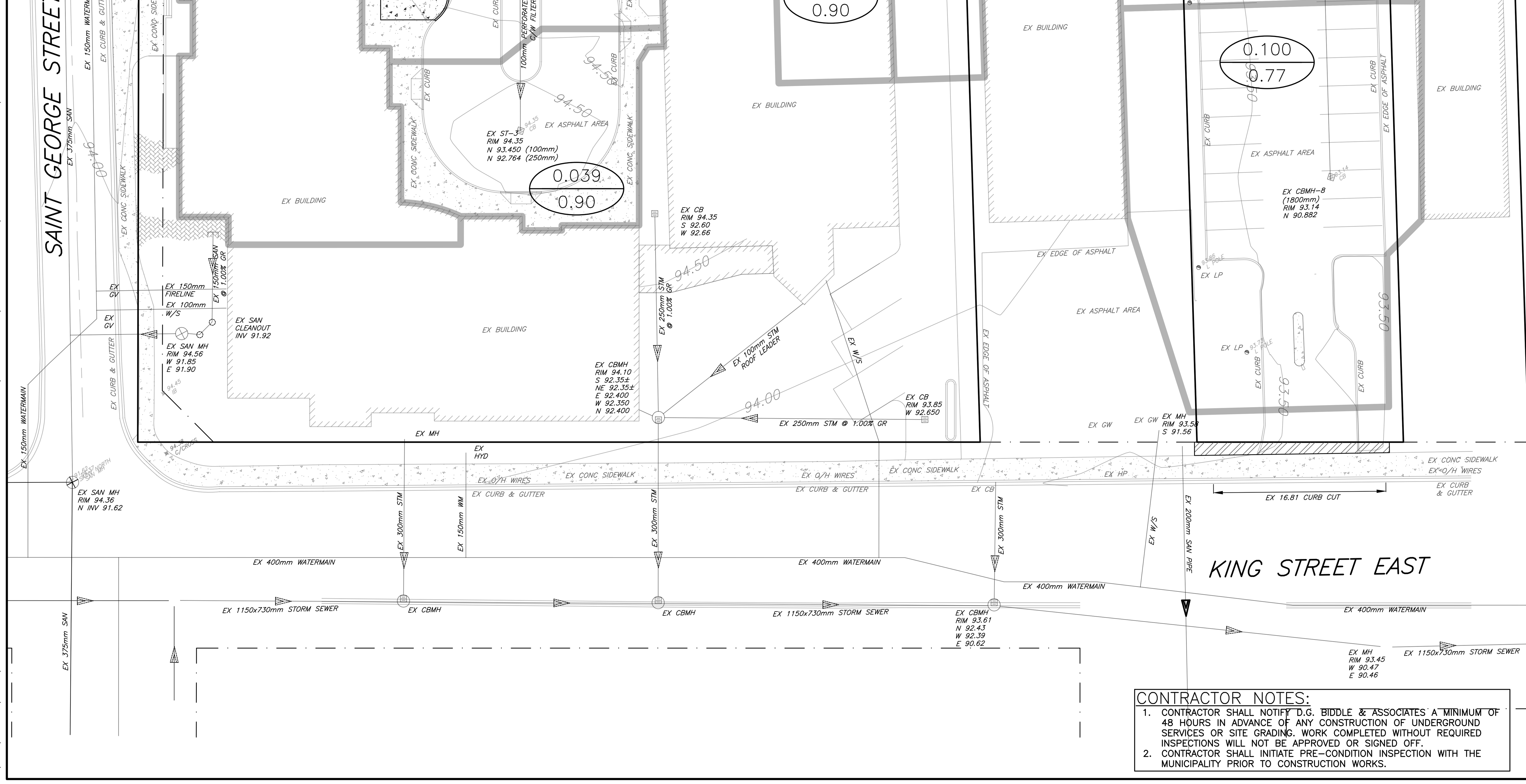
D.G. BIDDLE & ASSOCIATES
CONSULTING ENGINEERS & PLANNERS
96 King Street East
Oshawa, Ontario, L1H 1B6
Phone: 905-576-8500
info@dgbiddle.com
dgbiddle.com

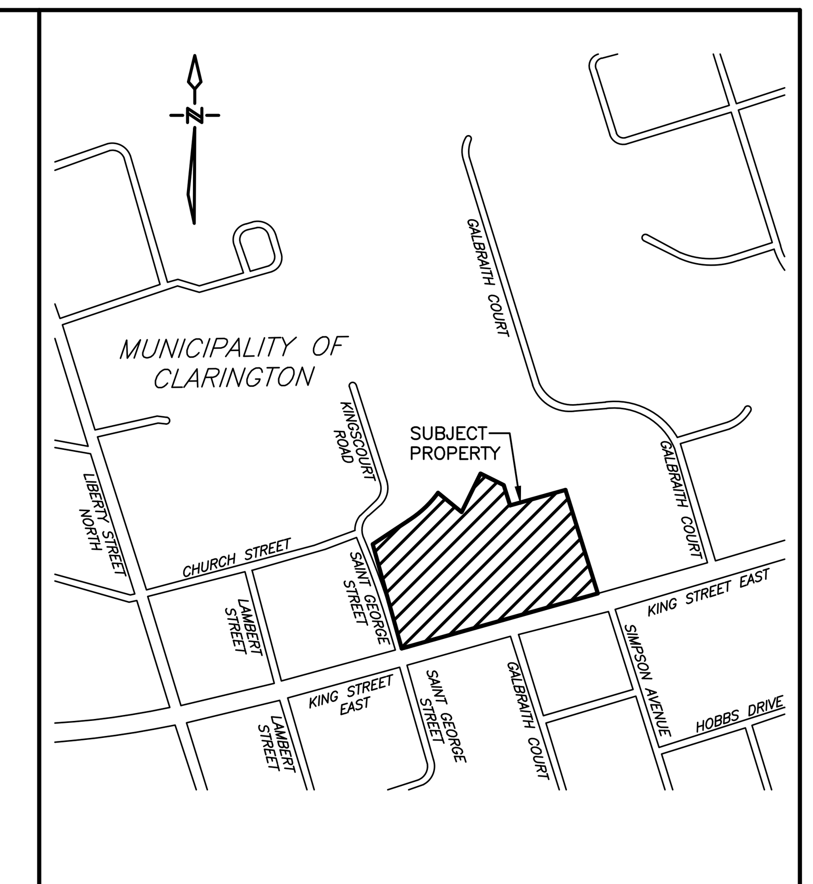
LICENSED PROFESSIONAL ENGINEER
C. J. FLAMMINIO
100544401
OCT 30/2026
PROVINCE OF ONTARIO

SCALE:	1:300
DESIGNED BY:	B.K.Y.
CHECKED BY:	C.J.F.
PROJECT NO.:	125807
DRAWING NO.:	SG–1

30/10/2026
X:\STAFF\DB FILES\125000\125100 222 KING STREET EAST – BOWMANVILLE HEALTH CT CLINIC EXPANSION\125100 DRAWINGS\125100 ENGINEERING DRAWINGS\CIVIL\125100 DRAWINGS CIVIL\125100–2026\1022–3D–SITE PLAN





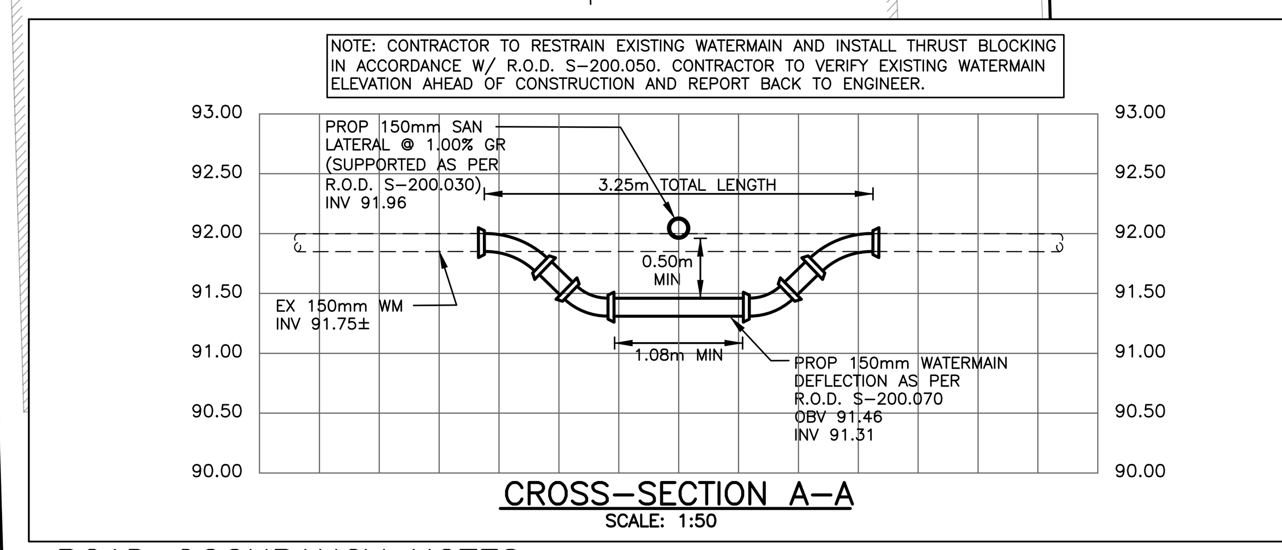


BENCH MARK

TOPOGRAPHIC SURVEY PREPARED BY D.G. BIDDLE & ASSOCIATES. BENCHMARK: BOWMANVILLE – VINCENT MASSEY SCHOOL AT NORTH SIDE OF CHURCH STREET, 0.8km EAST OF POST OFFICE, 60m WEST OF KINGSCOURT ROAD, TABLET IN EAST CONCRETE FOUNDATION WALL, 91cm FROM SOUTHEAST FRONT CORNER, 10cm BELOW BRICK. ELEVATION=95.166m (BENCHMARK #67U032)

SITE SERVICING NOTES

1. A ROAD OCCUPANCY PERMIT WILL BE REQUIRED FOR ANY WORKS WITHIN THE MUNICIPAL RIGHT OF WAY.
2. ALL WORKS OR RESTORATION WITHIN THE MUNICIPAL RIGHT OF WAY SHALL BE COMPLETED AS PER MUNICIPALITY'S FIELD STAFF DIRECTION.
3. THE LOCATION AND ELEVATION OF ALL EXISTING UTILITIES AND SERVICES TO BE VERIFIED BY THE CONTRACTOR PRIOR TO COMMENCING CONSTRUCTION. CONCERNED UTILITIES TO BE GIVEN ADVANCED NOTICE FOR STAKE OUT. THE CONSULTANT ASSUMES NO RESPONSIBILITY FOR THE ACCURACY OF THE UTILITIES SHOWN ON THE DRAWINGS.
4. QUANTITIES, DIMENSIONS AND ELEVATIONS TO BE VERIFIED BY THE CONTRACTOR PRIOR TO ORDERING MATERIALS OR COMMENCING CONSTRUCTION.
5. ALL SANITARY SEWER AND APPURTENANCES SHALL COMPLY WITH THE REGION OF DURHAM STANDARDS AND THE ONTARIO PLUMBING CODE.
   –SANITARY SEWER SERVICE PIPES, 150mm TO BE CL DR28 PVC PIPE, CL P BEDDING,
   –SANITARY MANHOLES AS PER OPSD 701.010 C/W GRATE AS PER OPSD 401.010
   –ALL TRENCHES SHALL BE BACKFILLED AND COMPACTED IN ACCORDANCE WITH REGION OF DURHAM STANDARDS.
6. ALL WATER MAINS AND APPURTENANCES SHALL COMPLY WITH THE REGION OF DURHAM STANDARDS AND THE ONTARIO PLUMBING CODE.
   –ALL WATER MAINS SHALL BE CONSTRUCTED A MINIMUM OF 1.80m BELOW FINISHED GRADE
   –ALL TRENCHES SHALL BE BACKFILLED AND COMPACTED IN ACCORDANCE WITH REGION OF DURHAM STANDARDS
   – 100mm WATER SERVICE PIPE TO BE DR18 PVC PIPE, CL P BEDDING
7. ALL STORM SEWERS AND APPURTENANCES SHALL COMPLY WITH THE MUNICIPALITY OF CLARINGTON STANDARDS AND THE ONTARIO PLUMBING CODE.
   –STORM SEWER PIPE 450mm AND SMALLER SHALL BE DR35 PVC PIPE, CL P BEDDING
   –STORM SEWER PIPES LARGER THAN 450mm SHALL BE CL 65D CONCRETE PIPES, CL B BEDDING
   –STORM SEWER MANHOLES AND CATCH BASIN MANHOLES SHALL BE AS PER OPSD 701.010
   –CATCH BASINS SHALL BE AS PER OPSD 705.010
   –MANHOLE GRATES SHALL BE AS PER OPSD 401.010
   –CATCH BASIN GRATES SHALL BE AS PER OPSD 400.020
   –ALL TRENCHES SHALL BE BACKFILLED AND COMPACTED IN ACCORDANCE WITH OPSD STANDARDS
8. GENERALLY, A MINIMUM OF 0.25m SHALL BE PROVIDED BETWEEN THE OUTSIDE OF PIPE BARRELS AT THE POINT OF CROSSING FOR STORM AND SANITARY SEWERS. A MINIMUM OF 0.50m SHALL BE PROVIDED BETWEEN THE OUTSIDE OF PIPE BARRELS AT THE POINT OF CROSSING FOR ALL SEWERS CROSSING OVER WATER MAINS.
9. THE PROPOSED ENTRANCE ON KING STREET EAST MUST COMPLY WITH THE MUNICIPALITY OF CLARINGTON STANDARDS AS OUTLINED BELOW.
   – SURFACE ASPHALT – 40mm HL3
   – BASE ASPHALT – 50mm HL8
   – 150mm GRANULAR A
   – 300mm GRANULAR B
   – ENTRANCE WIDTH: 6.0 – 9.0 METRES
   – ENTRANCE RADIUS: 9.0 – 12.0 METRES
   – BARRIER CURB AS PER C–302



CROSS–SECTION A–A
SCALE: 1:50

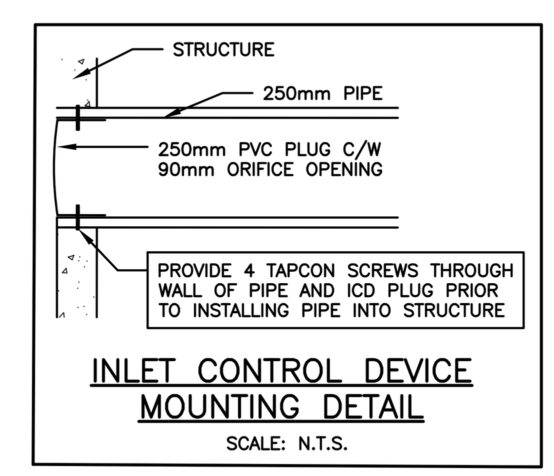
ROAD OCCUPANCY NOTES:

- RESPECTING ALL WORK IN THE MUNICIPAL RIGHT–OF–WAY, THE CONTRACTOR IS TO PROVIDE AT LEAST 48 HOURS PRIOR NOTICE TO THE PUBLIC WORKS DEPARTMENT STAFF AT (905)–263–2291
- A ROAD OCCUPANCY PERMIT WILL BE REQUIRED FOR ANY WORK DONE IN THE MUNICIPAL ROAD ALLOWANCE. EXCAVATION OF THE ROAD SURFACE IS NOT PERMITTED BETWEEN DECEMBER 1ST AND APRIL 30TH
- ALL RESTORATION OR WORK DONE IN THE ROAD ALLOWANCE MUST BE COMPLETED AS PER MUNICIPAL FIELD STAFF DIRECTION
- THE PERFORMANCE GUARANTEE WILL NOT BE REFUNDED BY THE MUNICIPALITY OF CLARINGTON UNLESS THE WORKS HAVE BEEN INSPECTED BY MUNICIPAL REPRESENTATIVES AND DEEMED TO BE COMPLETE AND SATISFACTORY

RESTORATION NOTES:

KING STREET EAST TO BE RESTORED AS FOLLOWS:

- [hatched] – ASPHALT AND ROAD SUBGRADE TO MATCH EXISTING CONDITIONS
- CONCRETE CURB AND GUTTER SHALL BE RESTORED AS PER CLARINGTON STD C–302 OR MATCH EXISTING
- CONCRETE SIDEWALK SHALL BE RESTORED AS PER MUNICIPALITY OF CLARINGTON STANDARD (C–307)
- BOULEVARDS SHALL BE RESTORED WITH SOD ON MIN 150mm OF TOPSOIL



INLET CONTROL DEVICE MOUNTING DETAIL
SCALE: N.T.S.

PLUMBING NOTES:

- PRIVATE WATER SUPPLY PIPES ARE DESIGNED IN ACCORDANCE TO THE MINISTRY OF THE ENVIRONMENT PIBS 6881e, "DESIGN GUIDELINES FOR DRINKING–WATER SYSTEMS"
- PRIVATE SEWERS ARE DESIGNED IN ACCORDANCE WITH THE MINISTRY OF ENVIRONMENT PIBS 6879, "DESIGN GUIDELINES FOR SEWAGE WORKS"

LEGEND

COMPLETED CONSTRUCTION (124004 AS PER JUNE 2025, D.G. BIDDLE)	[dotted box]
METER ROOM	Ⓜ
PROP HYDRANT	[symbol]
DRAINAGE BOUNDARY	[grey line]
DRAINAGE AREA / RUNOFF COEFFICIENT	0.25 / 0.90

CONTRACTOR NOTES:

1. CONTRACTOR SHALL NOTIFY D.G. BIDDLE & ASSOCIATES A MINIMUM OF 48 HOURS IN ADVANCE OF ANY CONSTRUCTION OF UNDERGROUND SERVICES OR SITE GRADING. WORK COMPLETED WITHOUT REQUIRED INSPECTIONS WILL NOT BE APPROVED OR SIGNED OFF.
2. CONTRACTOR SHALL INITIATE PRE–CONDITION INSPECTION WITH THE MUNICIPALITY PRIOR TO CONSTRUCTION WORKS.

NO.	SUBMISSION	DATE
5.	ISSUED FOR FIFTH SUBMISSION	OCT/2026
4.	ISSUED FOR FOURTH SUBMISSION	JULY/2026
3.	ISSUED FOR THIRD SUBMISSION	JUNE/2025
2.	ISSUED FOR SECOND SUBMISSION	MAR/2025
1.	ISSUED FOR FIRST SUBMISSION	OCT/2024

222 KING STREET EAST, BOWMANVILLE

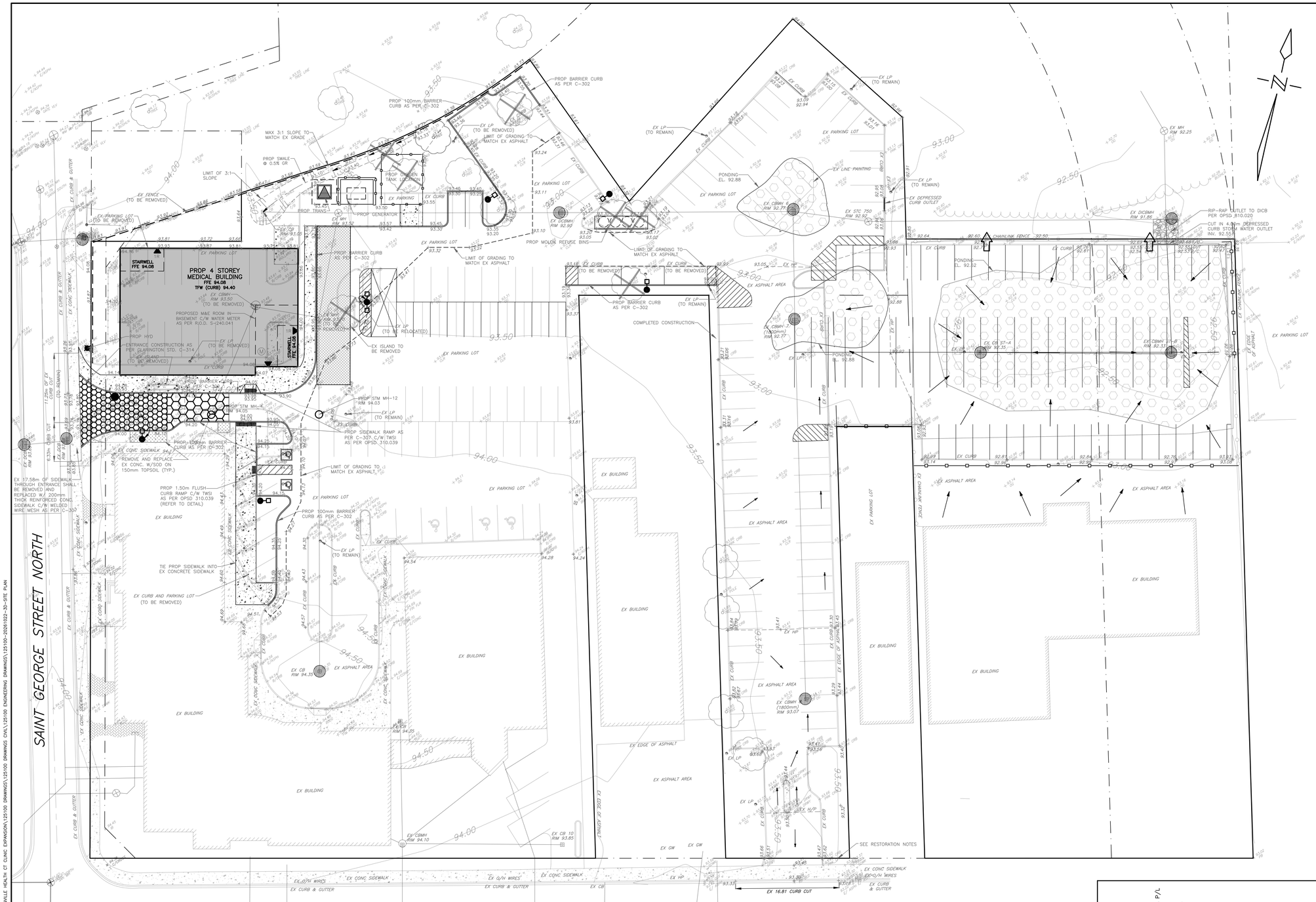
SITE SERVICING PLAN

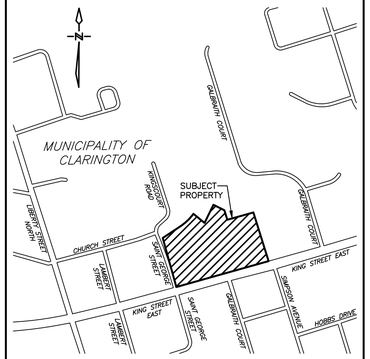
D.G. BIDDLE & ASSOCIATES
CONSULTING ENGINEERS & PLANNERS
96 King Street East
Oshawa, Ontario, L1H 1B6
Phone: 905-576-8500
info@dgbiddle.com
dgbiddle.com

LICENSED PROFESSIONAL ENGINEER
C. J. FLAMMINIO
100544401
OCT 30/2026
PROVINCE OF ONTARIO

SCALE:	1:300
DESIGNED BY:	B.K.Y.
CHECKED BY:	C.J.F.
PROJECT NO.:	125807
DRAWING NO.:	SS–1

30/10/2026
X:\STAFF\JOB FILES\125000\125100 222 KING STREET EAST – BOWMANVILLE HEALTH CT CLINIC EXPANSION\125100 DRAWINGS CIVIL\125100 ENGINEERING DRAWINGS\125100-20261022-3D-SITE PLAN





BENCH MARK

TOPOGRAPHIC SURVEY PREPARED BY D.G. BIDDLE & ASSOCIATES. BENCHMARK: BOWMANVILLE – VINCENT MASSEY SCHOOL AT NORTH SIDE OF CHURCH STREET, 0.8km EAST OF POST OFFICE, 60m WEST OF KINGSCOURT ROAD, TABLET IN EAST CONCRETE FOUNDATION WALL, 91cm FROM SOUTHEAST FRONT CORNER, 10cm BELOW BRICK. ELEVATION=95.166m (BENCHMARK #67U032)

DUST CONTROL MEASURES:

A. PRE-GRADING PLANNING

1. THE SITE SERVICING FOR THE SITE SHALL BE SCHEDULED SUCH THAT THE OVERALL TIME THE AREAS ARE LEFT OPEN TO WIND THAT CREATE BLOWING DUST FROM THE EARTHWORK OPERATIONS IS MINIMIZED.
2. THE TOPSOIL STOCKPILE (IF APPLICABLE) SHALL BE STABILIZED WITHIN 30 DAYS OF STOCKPILING MATERIALS IN ACCORDANCE WITH CITY'S CRITERIA. ALL DISTURBED LANDS OUTSIDE THE PHASE OF WORK SHALL BE STABILIZED/VEGETATED.
3. THE CONTRACTOR SHALL APPLY WATER TO HAUL ROADS AND STOCKPILES (IF APPLICABLE) BY WAY OF WATER TRUCK.

B. WATERING (POST GRADING)

4. WITHIN AREAS WHERE EARTHWORKS AND OR UNDERGROUND MUNICIPAL SERVICING IS ON-GOING, WATER IS TO BE UTILIZED AT SUFFICIENT QUANTITY TO PREVENT VISIBLE EMISSIONS FROM EXTENDING MORE THAN 30m FROM THE POINT OF ORIGIN.

C. REDUCE VEHICLE SPEED

5. THE ON-SITE SPEED LIMIT FOR CONSTRUCTION VEHICLES SHALL BE MINIMIZED AND TO BE USED IN CONJUNCTION WITH WATERING TO PREVENT VISIBLE DUST EMISSIONS.

D. RESTRICT ACTIVITIES DURING HIGH WIND PERIODS

6. THE HIGH VISIBILITY OF CERTAIN WORKS AND THE CLOSE PROXIMITY AND POPULATION IMPACT SHOULD BE TAKEN INTO CONSIDERATION WHEN SCHEDULING DUST-PRODUCING WORK. APPROPRIATE DUST CONTROL MEASURES SHALL BE IN PLACE IN SUCH SITUATIONS.

E. ROAD CLEANING

7. SPILLAGE, EROSION OR MATERIALS "TRACKED OUT" ON A ROAD TO BE CLEANED USING MECHANICAL STREET SWEEPERS OR FLUSHER TRUCK AT LEAST BY THE END OF THE WORK DAY. HOWEVER, IF SPILLAGE EXTENDS MORE THAN 15m ALONG A PAVED PUBLIC ROADWAY, IT MUST BE CLEANED UP IMMEDIATELY.
8. IMPORTING AND EXPORTING OF MATERIALS ON AND OFF-SITE WILL BE SHUT DOWN DURING AND FOLLOWING INCLEMENT WEATHER UNTIL THE ROAD SURFACES HAVE BEEN CLEANED.

LEGEND

SILT FENCE

DIRECTION OF OVERLAND FLOW

CATCHBASIN FILTRATION

CONSTRUCTION VEHICLE ACCESS

SEDIMENT CONTROL CONSTRUCTION SCHEDULE

1. INSTALL SILT FENCE AND CONSTRUCTION VEHICLE ACCESS.
2. EXCAVATE PERIMETER SWALES AND SEDIMENT PONDS AS REQUIRED.
3. STRIP SITE OF TOPSOIL AND REMOVE OFF SITE OR STOCK PILE AND PROVIDE ENVIRO FENCE AROUND BOTTOM OF PILE.
4. INSTALL MINOR STORM SEWER SYSTEM ALONG WITH OTHER SERVICES.
5. INSTALL CATCHBASIN FILTRATION ON ALL CATCHBASINS AND CATCHBASIN.
6. SEDIMENT CONTROL MEASURES ARE TO BE MAINTAINED UNTIL ALL AREAS OF THE SITE HAVE BEEN STABILIZED WITH SOD OR ASPHALT.

NO.	SUBMISSION	DATE
5.	ISSUED FOR FIFTH SUBMISSION	OCT/2026
4.	ISSUED FOR FOURTH SUBMISSION	JULY/2026
3.	ISSUED FOR THIRD SUBMISSION	JUNE/2025
2.	ISSUED FOR SECOND SUBMISSION	MAR/2025
1.	ISSUED FOR FIRST SUBMISSION	OCT/2024

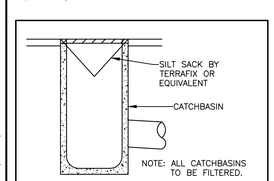
222 KING STREET EAST, BOWMANVILLE

EROSION AND SEDIMENT CONTROL PLAN

D.G. BIDDLE & ASSOCIATES
CONSULTING ENGINEERS & PLANNERS
96 King Street East
Oshawa, Ontario, L1H 1B6
Phone: 905-576-8500
info@dgbiddle.com
dgbiddle.com

LICENSED PROFESSIONAL ENGINEER
C. J. FLAMMINIO
100544401
OCT 30/2026
PROVINCE OF ONTARIO

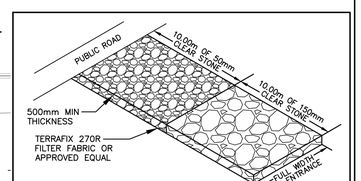
SCALE:	1:300
DESIGNED BY:	B.K.Y.
CHECKED BY:	C.J.F.
PROJECT NO.:	125807
DRAWING NO.:	ES-1



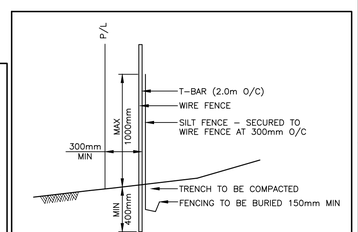
CATCHBASIN FILTRATION DETAIL
NOT TO SCALE

CONTRACTOR NOTES:

1. CONTRACTOR SHALL NOTIFY D.G. BIDDLE & ASSOCIATES A MINIMUM OF 48 HOURS IN ADVANCE OF ANY CONSTRUCTION OF UNDERGROUND SERVICES OR SITE GRADING. WORK COMPLETED WITHOUT REQUIRED INSPECTIONS WILL NOT BE APPROVED OR SIGNED OFF.
2. CONTRACTOR SHALL INITIATE PRE-CONDITION INSPECTION WITH THE MUNICIPALITY PRIOR TO CONSTRUCTION WORKS.



CONSTRUCTION VEHICLE ACCESS DETAIL
NOT TO SCALE



SILT FENCE DETAIL
NOT TO SCALE

KING STREET EAST

30/10/2026
X:\STAFF_JOB FILES\125001\125100 222 KING STREET EAST - BOWMANVILLE HEALTH CT CLINIC EXPANSION\125100 DRAWINGS\125100 DRAWINGS CIVIL\125100 ENGINEERING DRAWINGS\125100-20261022-3D-SITE PLAN