4495 NORTH SERVICE ROAD – BLDG A & BLDG B

City of Burlington's Sustainable Building and Development Guidelines

Please find enclosed the completed Sustainable Development Guidelines Checklist prepared in support of the proposed development at 4495 North Service Road – Bldg A & Bldg B.

The proposed development has been designed with consideration for the sustainable development objectives established by the City of Burlington. The enclosed checklist outlines the sustainable design measures incorporated into the site design and identifies how the development responds to the "required" sustainability criteria relevant to the Zoning By-Law Amendment (ZBLA) stage of the planning process for this site. Collectively, the measures proposed support sustainability, encourage active transportation, alternative modes of travel, and enhance the site design.

References to the supporting plans have been noted throughout the checklist, where applicable.

List of Attachments

Attachment 01 – CityOfBurlington SBDG Checklist 4495 NSR
Attachment 02 – Architectural Drawings
Attachment 03 – Stormwater Management Plan

City of Burlington | Sustainable Building and Development Guidelines - Checklist

Project	4495 North Service Road, Burlington, ON. - Bldg A & Bldg B

Site Design

#	Guideline	Requirements	Stage	Comments
1.1	Augment Topsoil	- Maintain a minimum 15 cm/6" quality topsoil in landscape areas	SPA	N/A to the ZBLA stage.
1.2	Snow Management	- For sites with surface parking, identify a designated snow storage area in an area that will reduce salt and contaminant impacts to vegetation, groundwater and surface water. - Appropriate on-site snow storage is preferable to off-site snow removal.	SPA	N/A to the ZBLA stage.

Transportation

#	Guideline	Requirements	Stage	Comments
2.1	Site Connections	- Provide pedestrian and cycling connections from on-site buildings to off-site public sidewalks, pedestrian paths, trails, open space, active transportation pathways, transit stops and adjacent buildings and sites in accordance with Official Plan policies.	ZBLA and SPA	Pedestrian pathways are provided throughout the site to connect with off-site public sidewalks along North Service Road and Appleby Line, where access to public transit and existing bicycle lanes is available. On-site bicycle storage facilities further support and encourage the use of active transportation and alternative modes of travel, helping to reduce reliance on automobiles. Please refer to the south-east end of Building B (Attachment 02 - Architectural Drawings).
2.2	Accessibility	- Design on-site sidewalks, crosswalks and walkways to be continuous, universally accessible, barrier-free and clearly delineated in accordance with Official Plan Policies, Accessibility for Ontarians with Disabilities Act & City of Burlington Accessibility Design Standards.	SPA	N/A to the ZBLA stage.
2.3	Bicycle Storage	- Provide bicycle parking spaces in accordance with the Zoning Bylaw and Official Plan Policies.	ZBLA	Industrial buildings require bicycle parking at a rate of 2.0 plus 0.5 spaces per 1,000 m² GFA, in accordance with the applicable zoning by-law. A total of 12 bicycle parking spaces are required, and 12 spaces are provided (3 for each building where there are 2 spaces per bicycle ring). Bicycle storage areas are located in close proximity to the main entrances of each building, encouraging the use of active transportation and supporting connectivity to the existing bicycle network along Appleby Line. Please refer to the Site Plan and Site Statistics Table (Attachment 02 – Architectural Drawings).

Natural Environment

#	Guideline	Requirements	Stage	Comments
3.1	Light Pollution	- Minimization of light pollution in accordance with the city's Guidelines for Outdoor Lighting and Official Plan Policies.	SPA	N/A to the ZBLA stage.
3.2	Native Species (NHS)	- As per Official Plan policy, use native, non-invasive species within the Natural Heritage System and related buffers, and use non-invasive species in all other areas.	SPA	N/A to the ZBLA stage.

Water Conservation and Quality

#	Guideline	Requirements	Stage	Comments
4.1	Stormwater Quality	- Achievement of a level one/enhanced stormwater treatment for all stormwater runoff. Stormwater quality treatment reduces the total suspended solids in runoff to ensure the protection of receiving watercourses and Lake Ontario.	ZBLA and SPA	Stormwater management measures have been undertaken to address water quality and quantity on site. Water quality controls are planned to be provided to remove TSS to meet the treatment requirements. Please refer to Attachment 03: Stormwater Management Plan.

Energy and Emissions

#	Guideline	Requirements	Stage	Comments
5.1	Urban Heat Island	- Provide vegetated landscape areas in hard surface areas as per the Zoning By-law.	ZBLA and SPA	19,479.65 m2 (21.13%) landscape areas provided to help reduce the urban heat island effect. Please refer to the site plan and site statistics table (Attachment 02- Architectural Drawings).

Waste and Building Materials

#	Guideline	Requirements	Stage	Comments
6.1	Waste Management Plan	- Provide and implement a waste management plan in accordance with Regional requirements.	ZBLA and SPA	To divert waste generated on site from landfills, recycling areas/bins will provided at both buildings. As industrial developments are not eligible for waste collection provided by Halton Region, these storage bins will be stored internally and removed off-site by private contractor. Please refer to the site plan and symbol legend (Attachment 02 - Architectural Drawings).

No.	ISSUED	DATE
1	ISSUED FOR COORDINATION	JUN. 11, 2026

No.	REVISION	DATE

BALDASSARRA Architects Inc.

30 Great Gulf Drive, Unit 20 | Concord ON | L4K 0K7
T. 905.660.0722 | **www.baldassarra.ca**

OWNERS INFORMATION:

4495 NORTH SERVICE ROAD

4495 NORTH SERVICE ROAD
BURLINGTON, ON

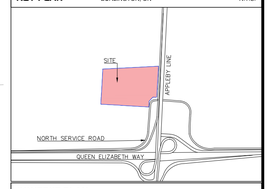
SITE PLAN

DATE:	DRAWN BY:	CHECKED:	SCALE:
MAY 2026	HP		1:1000

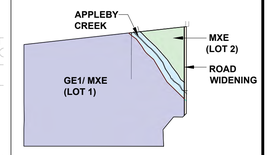
PROJECT No. P-24038

DRAWING No. A-1.0

KEY PLAN BURLINGTON, ON N.T.S.



CONTEXT PLAN



LEGAL DESCRIPTION

PART OF LOT 6, CONCESSION 2
SOUTH OF DUNDAS STREET
CITY OF BURLINGTON
(FORMALLY THE TOWNSHIP OF NELSON)
REGIONAL MUNICIPALITY OF HALTON

AS PREPARED BY:
R. AVIS SURVEYORS INC.

TRUE NORTH

PROJECT NORTH

SITE STATISTICS

SITE AREA	105,429.80 m2	or	26.05 acres
ROAD WIDENING	1,126.92 m2	or	0.28 acres
APPLEBY CREEK	5,154.19 m2	or	1.27 acres
GE1/ MXE (LOT 1)	92,196.03 m2	or	22.78 acres
MXE (LOT 2)	6,985.66 m2	or	1.72 acres
TOTAL DEVELOPABLE AREA (LOT 1 & LOT 2)	99,181.69 m2	or	24.50 acres

ZONING
GE1- EMPLOYMENT ZONE
MXE -MIXED-USE EMPLOYMENT CORRIDOR ZONE

		REQUIRED	PROVIDED
	LOT FRONTAGE		±213.92 m
SETBACKS	FRONT YARD (EAST)	GE1- 9.00 m MXE- 3.00 m- 4.5 m	101.38 m
	REAR YARD (WEST)	GE1- 9.00 m MXE- 3.00 m	19.52 m
	INTERIOR SIDE YARD (NORTH)	GE1- 3.00 m MXE-N/A	21.38 m
	INTERIOR SIDE YARD (SOUTH)	GE1- 3.00 m MXE- N/A	25.02 m
GFA	BUILDING 'A'	17,452.50 m2 or	187,857 sf
	BUILDING 'B'	21,998.13 m2 or	236,736 sf
	TOTAL GFA	39,450.63 m2 or	424,643 sf
SITE COVERAGE (LOT 1 SITE AREA)		39,450.63 m2 or	42.79 %
LANDSCAPED AREA		19,479.65 m2 or	21.13 %
PAVED AREA		33,265.75 m2 or	36.08 %

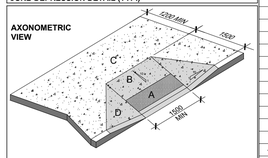
		REQUIRED	PROVIDED
LANDSCAPE BUFFER ABUTTING LANDS TO THE NORTH		3.00 m	±20.51m
BUILDING HEIGHT		GE1- N/A MXE- 2 Storeys MAX	14.48m
PARKING	INDUSTRIAL RATE BUILDING A: 17,452.50 m2 x 1/100 + 61.2 BUILDING B: 21,998.13 m2 x 1/100 + 61.2	175 spaces 220 spaces	211 spaces 288 spaces
	TOTAL PARKING SPACES	395 spaces	499 spaces
	ACCESSIBLE PARKING Over 90 spaces 3% of required parking spaces	12 spaces	12 spaces
	BICYCLE SPACES (2 spaces/ ring) INDUSTRIAL - 2 + 0.25 spaces / 1,000 m2 GFA = 12 OFFICE - 2 + 1 space / 1,000 m2 GFA = 4	12 spaces 4 spaces 16 spaces	8 rings/ 16 spaces
DESIGN LOADING DOCKS	BUILDING A BUILDING B TOTAL LOADING DOORS		50 loading doors 50 loading doors 100 loading doors
DESIGN DRIVE-IN DOORS	BUILDING A BUILDING B TOTAL DRIVE-IN DOORS		4 drive-in doors 4 drive-in doors 8 drive-in doors
SNOW STORAGE			2% OF PAVED AREA OR 663.32 M2. PLEASE SEE SNOW STORAGE OFF- SITE BY PRIVATE CONTRACTOR

SYMBOL LEGEND

	MAN DOOR
	LOADING DOCK DOOR
	DRIVE-IN / OVERHEAD DOOR
FH	HYDRANT + VALVE
	FIRE DEPARTMENT CONNECTION / SIAMESE
CB	CATCH BASIN
DCB	DOUBLE CATCH BASIN
SANMH	SANITARY MAN HOLE
CB/MH	CATCH BASIN / MAN HOLE
SMH	STORM MAN HOLE
HP	HYDRO POLE STANDARD / UTILITY POLE
BR	BIKE RING (0.6m x 1.8m x 1.9m H.
HT	HYDRO TRANSFORMER
	ACCESSIBLE PARKING SPACE
	ACCESSIBLE PARKING SPACE SIGNAGE
SNW	SNOW STORAGE AREA
	LIGHT STANDARD, REFER TO ELECTRICAL DRAWINGS
B	CONC. FILLED STEEL BOLLARDS
FR	FIRE ROUTE SIGN
SS	STOP SIGN
	SHADED DENOTES HEAVY DUTY ASPHALT
	MTO SETBACK LINE
	BOUNDARY LINE
M	GAS METERS
	REFUSE / RECYCLE STORAGE BINS TO BE STORED INTERNALLY AND REMOVED OFF-SITE BY PRIVATE CONTRACTORS.

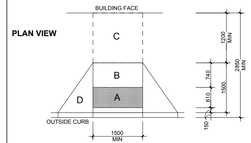
CURB DEPRESSION DETAIL (TYP.)

AXONOMETRIC VIEW



- CURB RAMP MUST HAVE A MINIMUM CLEAR WIDTH OF 1500mm, EXCLUSIVE OF ANY FLARED SIDES.
- THE RUNNING SLOPE OF THE CURB MUST,
  i. BE A MAX OF 1:8, WHERE ELEVATION IS LESS THAN 75mm, AND
  ii. BE A MAX OF 1:10, WHERE ELEVATION IS LESS 75mm OR GREATER AND 200mm OR LESS.
- THE MAX SLOPE ON THE FLARED SIDE OF THE CURB RAMP MUST BE NO MORE THAN 1:10.
- CURB RAMP MUST HAVE A TACTILE WALKING SURFACE INDICATOR THAT,
  - HAVE RAISED TACTILE PROFILES COMPOSED OF TRUNCATED DOMES.,
  - HAVE A HIGH TONAL CONTRAST WITH THE ADJACENT SURFACE,
  - ARE LOCATED AT THE BOTTOM OF THE CURB RAMP,
  - ARE SET BACK BETWEEN 150mm AND 200mm FROM THE CURB EDGE,
  - EXTEND THE FULL WIDTH OF THE CURB RAMP,
  - ARE A MIN OF 610mm IN DEPTH, AND
  - BE SLIP-RESISTANT.

PLAN VIEW



A TACTILE SURFACE / DETECTABLE HAZARD INDICATOR 150mm FROM EDGE OF CURB AND 610mm IN DEPTH

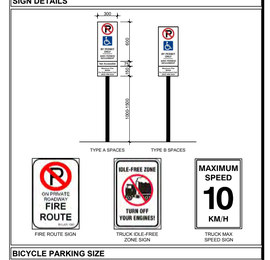
B SLOPE SURFACE @ 1:10 (max)

C LANDING / UNINTERRUPTED SPACE OF NOT LESS THAN 1200mm

D FLARED SIDES WITH MAX SLOPE OF 1:10

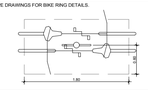
THE INFORMATION PROVIDED HERE WAS ASSEMBLED FROM **OBC 3.8.3.2.** AND **O. REG. 191/11**, INTEGRATED ACCESSIBILITY STANDARDS under the ACCESSIBILITY FOR ONTARIANS WITH DISABILITIES ACT, 2005 updated JUL 2016.

SIGN DETAILS



BICYCLE PARKING SIZE

- SEE LANDSCAPE DRAWINGS FOR BIKE RING DETAILS.



P-24038 4495 North Service Road\Drawings\05 Current Drawings\P-24038 A-1.0.dwg

ENGINEERING + MANAGEMENT

HUSSON



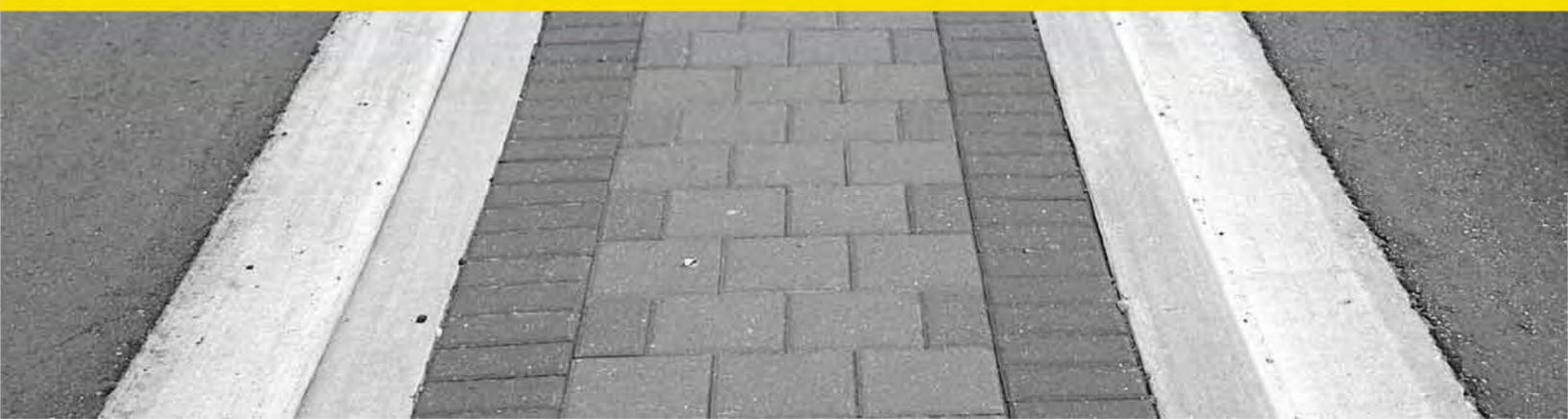
FUNCTIONAL SERVICING AND STORMWATER MANAGEMENT REPORT

4495 NORTH SERVICE ROAD
CITY OF BURLINGTON

PREPARED FOR:
DREAM SUMMIT (1250 APPLEBY LINE) LP
30 ADELAIDE STREET EAST
SUITE 301
TORONTO, ON M5C 3H1

DATE: JUNE 2026

PROJECT: 221385



FUNCTIONAL SERVICING AND STORMWATER MANAGEMENT REPORT

4495 NORTH SERVICE ROAD
CITY OF BURLINGTON

PREPARED FOR:
DREAM SUMMIT (1250 APPLEBY LINE) LP
30 ADELAIDE STREET EAST
SUITE 301
TORONTO, ON M5C 3H1

DATE: JUNE 2026

PROJECT NO. 221385

PREPARED BY HUSSON
200 CACHET WOODS COURT, SUITE 204
MARKHAM, ON L6C 0Z8
GENERAL@HUSSON.CA

TABLE OF CONTENTS

1.0		Introduction	3
1.1		Site Description	3
1.2		Background	3
2.0		Design Criteria	4
3.0		Site Drainage	4
3.1		Existing Drainage	4
3.2		Major and Minor System Drainage	4
4.0		Stormwater Management Plan	5
4.1		Water Balance	5
	4.1.1	Groundwater Elevations	6
	4.1.2	Infiltration Rates and Drawdown Time	7
4.2		Quality Control	7
4.3		Quantity Control	8
	4.3.1	Target Release Rate	8
	4.3.2	Quantity Control Measures	8
4.4		Hydrology Modelling	10
4.5		Maintenance	11
5.0		Erosion and Sediment Control	11
5.1		Existing Site Condition	11
5.2		Erosion and Sediment Control Plan	12
6.0		Wastewater	12
7.0		Water Distribution	13
8.0		Conclusions	14

LIST OF FIGURES

Figure 1. Site Location Plan

Figure 2. Existing Drainage Plan

Figure 3. Proposed Drainage Plan

LIST OF TABLES

Table 1.	Infiltration Summary	6
Table 2.	Infiltration Rates	7
Table 3.	Drawdown Times	7
Table 4.	Target Flow to North Service Road	8
Table 5.	Available Storage – Northern Catchment	9
Table 6.	Available Storage – Central Catchment	9
Table 7.	Available Storage – Southern Catchment	10
Table 8.	Proposed Release Rates	10
Table 9.	Proposed Storage Summary	11
Table 10.	Water Demand Summary	14

LIST OF APPENDICES

Appendix A – Background Information

Appendix B – Storm Sewer Design Sheet

Appendix C – Hydrogeological Assessment

Appendix D – Details of Quality Control Measures

Appendix E – Stormwater Management Calculations

Appendix F – Hydrologic Modelling

LIST OF DRAWINGS

SW1	Grading Plan
SW2	Servicing Plan
SW3	Erosion and Sediment Control Plan
SW4	Storm Drainage Plan

1.0 INTRODUCTION

The purpose of this report is to provide detailed design information for the storm drainage and stormwater management (SWM) plan, and for sanitary and water servicing, for the proposed industrial development building at 4495 North Service Road, west of Appleby Line in Burlington.

It will demonstrate the stormwater management measures to be undertaken to address water quantity and quality, and outline the proposed servicing design to meet the Region's requirements.

The report focuses primarily on the main site, with the small developable area to the northeast to be outlined further in a subsequent report when it is proposed for development.

1.1 Site Description

The site is located on the north side of North Service Road, west of Appleby Line. The total site area is 10.54ha, with a tributary of Appleby Creek along the eastern portion. There are two developable portions of the site – approximately 8.74ha on the main portion and approximately 0.70ha at the northeastern portion adjacent to Appleby Line. The existing condition of the site is undeveloped, with existing trailer parking on the main portion. Refer to **Figure 1** for the site location.

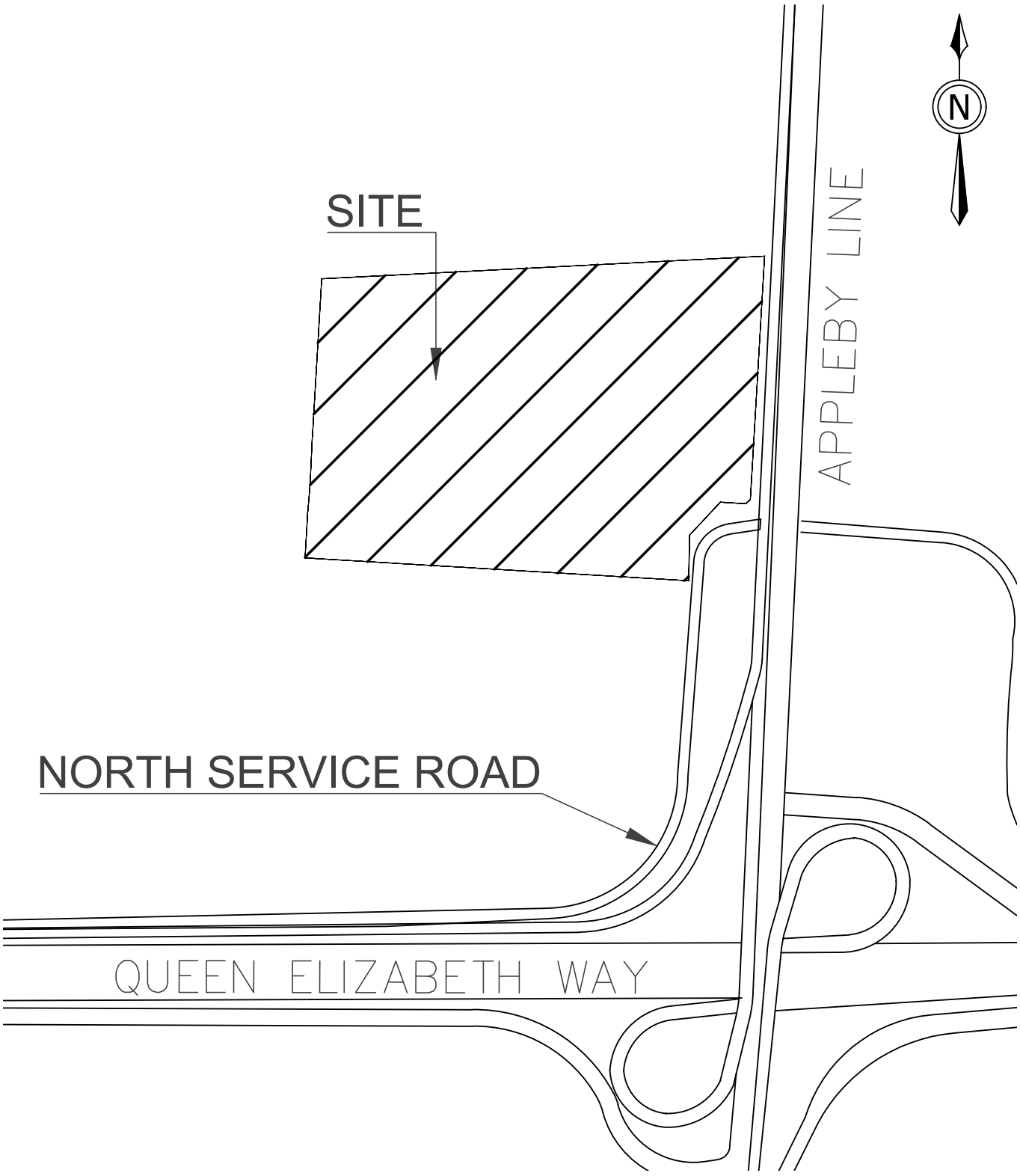
Two buildings with associated parking areas are proposed within the development area. Building A is 17,453m^2 (187,857ft^2) and Building B is 21,998m^2 (236,786ft^2)

1.2 Background

Water and sanitary connections have been designed to meet the functional needs of the site and to meet the requirements of the Region of Halton. The SWM plan has been designed to meet the requirements of the City of Burlington (The City), the Ministry of Transportation (MTO) and Conservation Halton (CH). The following materials were referenced in the preparation of this report.

- The Stormwater Management Planning and Design Manual (MECP Guidelines), prepared by the Ministry of the Environment, March 2003.
- The Erosion & Sediment Control Guideline for Urban Construction, prepared by the Greater Golden Horseshoe Area Conservation Authorities (GGHA CA), December 2006
- City of Burlington Council Approved Stormwater Management Design Guidelines (COB SWM) dated May 21, 2020.
- The Updated Preliminary Hydrogeological Assessment – Proposed Commercial Development, 4495 North Service Road (HA), dated June 25, 2026, prepared by Pinchin.
- Ministry of Transportation Drainage Directives; and
- Plan and Profile drawings for North Service Road and Appleby Line (see **Appendix A**).

The site is within Conservation Halton's jurisdiction, and will require control of the post development flows to meet the existing condition. This is consistent with the MTO's requirement of post-to-pre controls. The proposed SWM scheme has been prepared to meet CH and MTO requirements.



HUSSON
ENGINEERING + MANAGEMENT
P 905.709.5825
1725 16TH AVENUE, SUITE 103
RICHMOND HILL, ON L4B 4C6
HUSSON.CA

FIGURE 1

4495 NORTH SERVICE ROAD
SITE LOCATION PLAN

DATE: JUNE 2016 SCALE: NTS PROJECT: 221385

2.0 DESIGN CRITERIA

The following design criteria have been followed in the preparation of the SWM plan.

- Water quality controls are to be provided to remove 80% of TSS to meet the requirements of the City.
- Provide retention of runoff from a 5mm 24-hour storm on-site.
- Water quantity controls are required on site to meet the flows in the existing condition.

A SWM plan has been prepared to meet the criteria as outlined.

3.0 SITE DRAINAGE

3.1 Existing Drainage

The site is currently undeveloped, with trailer parking. The majority of the site (Catchment 100) generally drains towards the North Service Road to the southeast of the site. The northeastern portion (Catchment 200) drains towards Appleby Line, while the area of the creek is contained within its general boundaries. There is a portion of the site in the southwestern part (Catchment 300) that drains south towards the existing development. The pre-development drainage pattern can be seen on **Figure 2**. The site does not receive any external flow from adjacent lands. The target flow for the proposed development is based on the pre-development peak flows, as outlined in **Section 4.3**.

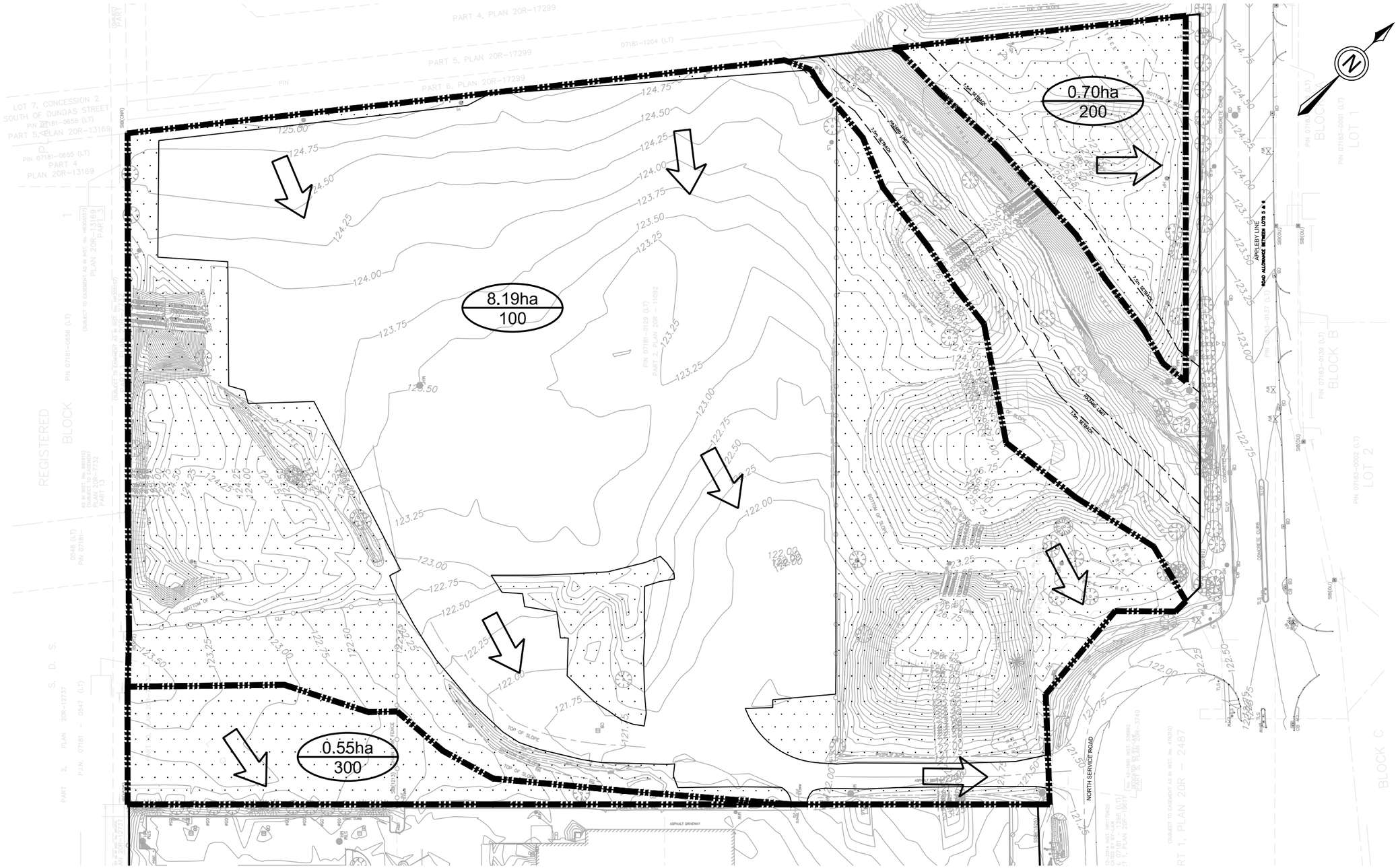
3.2 Major and Minor System Drainage

A storm sewer system is proposed to convey the minor system runoff from the subject lands to the site outlets. The proposed drainage catchments can be referenced on **Figure 3**.

The minor system within the site has been designed to convey up to the 5-year flows. The flows from the site will be controlled to pre-development levels and conveyed to the North Service Road to the southeast of the site. An emergency overland flow route has been incorporated to direct runoff from the subject lands towards North Service Road at the southeast corner of the site in the case of pipe blockage or other unforeseen events. Refer to **Drawing SW1** for details.

The maximum depth of ponding in the parking lot will be 0.30m above the catchbasin grates. This temporary surface ponding will allow the major system flow to be captured by the proposed catchbasins and slowly released to the downstream storm sewer system. The inlet capacity of the proposed catchbasins has been calculated based on the maximum ponding depth, using Design Chart 4.19 of the MTO Drainage Management Manual.

The proposed storm sewer system can be generally divided into three sections, Catchment 101, 102 and 103, based on the maximum ponding depth at the catchbasin grates. The capacity of each storm sewer system has been assessed using an orifice flow calculation to confirm that the proposed storm sewer can convey the flow from each sub-catchment, under the maximum ponding elevation, to meet the target flows. The extent of the maximum ponding is shown on **Drawing SW1**.



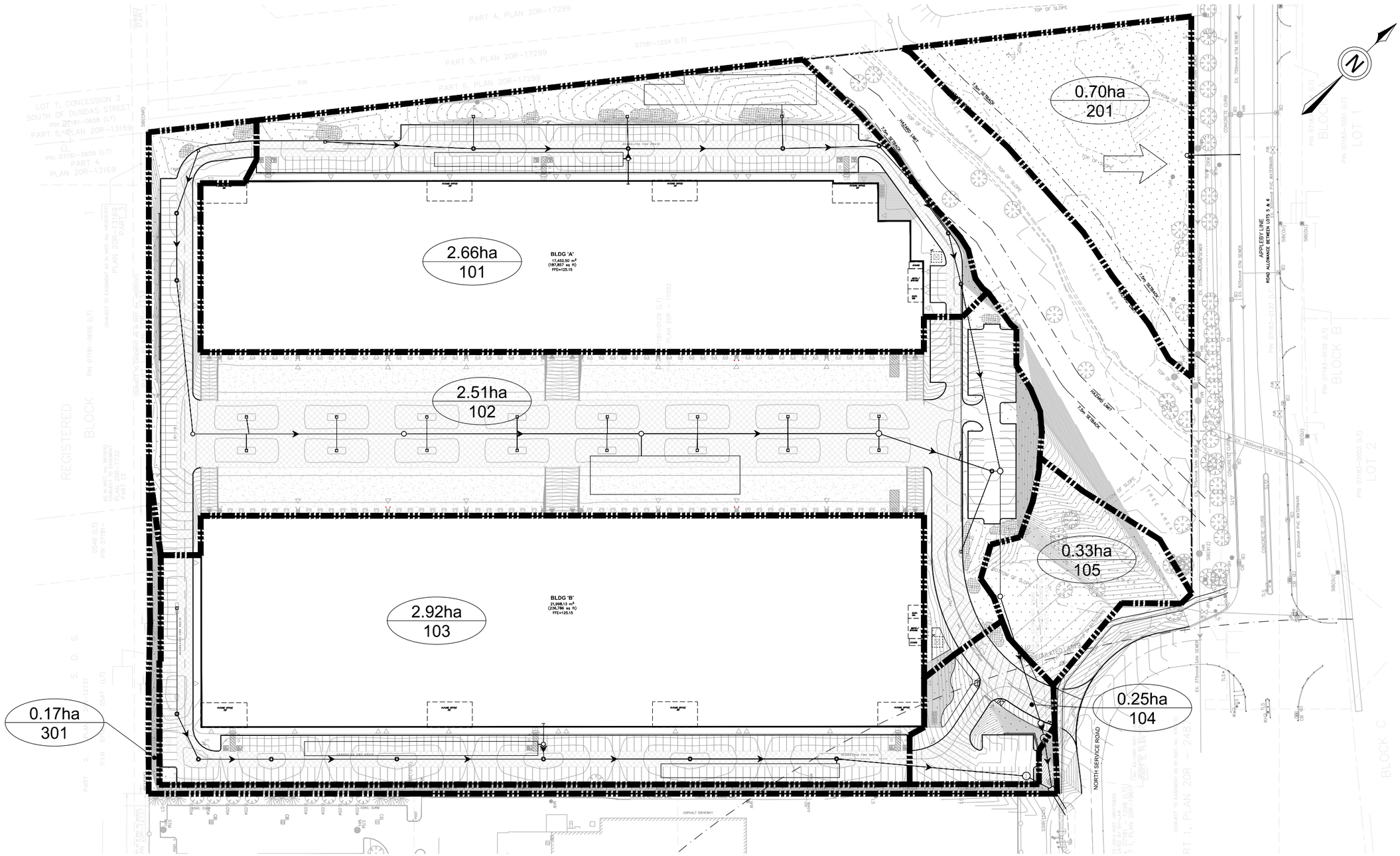
HUSSON
ENGINEERING + MANAGEMENT
P 905.709.5825
200 CACHET WOODS COURT, SUITE 204
MARKHAM, ON L6C 0Z8
HUSSON.CA

LEGEND

- DRAINAGE BOUNDARY
- DIRECTION OF OVERLAND FLOW
- 8.74ha / 100 — CATCHMENT AREA (m²) / CATCHMENT ID
- PERVIOUS AREA

FIGURE 2
4495 NORTH SERVICE ROAD
EXISTING DRAINAGE PLAN

DATE: JUNE 2026 SCALE: N.T.S. PROJECT: 221385



HUSSON

ENGINEERING + MANAGEMENT

P 905.709.5626
200 CACHET WOODS COURT, SUITE 204
MARKHAM, ON L6C 0Z8
HUSSON.CA

LEGEND

- DRAINAGE BOUNDARY
- DIRECTION OF OVERLAND FLOW
- 8.30ha / 20 — CATCHMENT AREA (m²) / CATCHMENT ID
- PERVIOUS AREA

FIGURE 3
4495 NORTH SERVICE ROAD
PROPOSED SWM PLAN

DATE: JUNE 2026 SCALE: N.T.S. PROJECT: 221385

The flows from the entrance and driveway (Catchment 104) to the site from North Service Road will drain uncontrolled based on grading constraints. A portion of the landscaped area at the southeastern portion of the site (Catchment 105) will sheet drain to North Service Road uncontrolled. The northeastern portion (Catchment 201) and the area of the creek will remain as existing condition. There is also a small landscaped portion along the southern boundary (Catchment 301) that will drain to the south, consistent with the existing drainage patterns. Drainage from the rest of the site will be controlled to account for this uncontrolled runoff, so that all targets are met.

The proposed servicing can be referenced on **Drawing SW2**, and the storm design sheet can be referenced in **Appendix B**. The grading design and emergency overland flow route is shown on **Drawing SW1**.

4.0 STORMWATER MANAGEMENT PLAN

A stormwater management plan has been prepared for the site, following the MECP Guidelines, to meet the stormwater management criteria for the site. Low-Impact Development (LID) techniques were investigated for the site, including the use of infiltration measures, as recommended by the City and CH.

4.1 Water Balance

As per the water balance criteria, retention of runoff from a 5mm design storm on-site is required.

Based on the area of 8.74ha for the main development area, the required retention volume is 437m^3 (87,379m^2 x 5mm).

A variety of options were considered that could potentially be used to meet the target storage volume, as outlined following.

Bioretention – This is a facility that temporarily stores and infiltrates water. Quality treatment is provided by plant material and by filtration through the bed material which consists of a mixture of sand, fines and organic material. The roof drainage could outlet to a bioretention swale and stormwater from frequent storms could be infiltrated. However, this was not proposed for this project.

Underground Storage – Storage would be provided in a perforated pipe system surrounded by clear stone. Storage is provided in both the pipes and in the voids within the clear stone.

Green Roof/Landscaping – A green roof is an area above a man-made structure with a growing medium to permit the growth of vegetation. This has the benefits of reduced runoff, reduced heat island effect and thermal insulation for the building. However, in this case, the building roof is not considered for a green roof.

Based on the above review, underground storage can provide the required retention volume. The preferred option is that water from the building rooftops is infiltrated. The roof represents a large portion of hard surface area, and runoff from roof areas is generally cleaner than surface runoff; therefore, the need for pre-treatment is reduced.

A Preliminary Hydrogeological Assessment (HA) has been completed by Pinchin. As outlined in the HA, groundwater levels are relatively high throughout the majority of the site. As shown on Figure 4B in the HA (included in **Appendix C** for reference), the groundwater elevations vary from 121.70 at the western portion of the site to 119.3 at the eastern portion of the site. As outlined on the servicing plans, the proposed storm sewer network is at an elevation of between approximately 121.75 and 120.50 on the site. Therefore, there is no opportunity to infiltrate flows from the surface.

Based on the proposed elevation of the parking area north of Building A and the parking area south of Building B, there is an opportunity to infiltrate flow from the proposed rooftops. Therefore, infiltration chambers are proposed with a minimum bottom elevation of 122.70 to provide the required 1.0m separation between the bottom of the chambers and the groundwater.

The minimum required volume provided in the underground infiltration system is 236m^3 for Building A and 297m^3 for Building B. This is equivalent to the available runoff from the proposed building during a 15mm storm event. The volume provided will be slightly higher than the required storage to provide extra infiltration volume and allow for minor volume discrepancies during construction. Any flows from the rooftop in excess of this volume will be directed to the downstream storm sewer system. Detailed calculations for the water balance can be referenced in **Appendix E**. Groundwater levels and infiltration rates are discussed in **Section 4.1.1 and Section 4.1.2**.

As noted, other options were reviewed for the site; however, the high groundwater levels and minimal landscape areas do not make them realistic.

The proposed storage volume for water balance is outlined in **Table 1** for the proposed buildings.

Table 1. Infiltration Summary

Land Use	Estimated Area (ha)	Provided Storage Volume (m^3)	15mm Storm Runoff Volume (m^3)	Target Volume (m^3)
Building A Roof	1.75	241	236	
Building B Roof	2.20	298	297	
Total		539	533	437

As discussed, the storage volume provided is the maximum feasible with the constraints on the site. The volume ultimately provided will be confirmed as part of the detailed design of the project. The design will be further reviewed as part of the future detailed design stage of the project.

4.1.1 Groundwater Elevations

As outlined in the HA, the groundwater elevation on site ranges from 121.70 at the western portion of the site to 119.30 at the eastern portion of the site. The proposed chambers will be located to the north of Building A and south of Building B, at a minimum of 1.0m above the groundwater level at that portion of the site, as required. Details of the proposed chamber systems will be provided as part of the detailed design stage of the project. Refer to **Appendix C** for the Preliminary Hydrogeological Assessment.

4.1.2 Infiltration Rates and Drawdown Time

Infiltration tests were undertaken to determine the hydraulic conductivity of the underlying soils, as part of the HA. As per Appendix C of the Low Impact Development SWM Planning and Design Guide, a factor of safety was applied to the measured infiltration rate to determine a design infiltration rate. **Table 2** summarizes the estimated infiltration rates.

Table 2. Infiltration Rates

Hydraulic Conductivity (cm/s)	Infiltration Rate (mm/hr)	Factor of Safety	Design Infiltration Rate (mm/hr)
3.6×10^{-3}	148	2.5	59

Based on the low infiltration rate of 59mm/hr, underground storage and infiltration will be provided for the proposed buildings. The drawdown time for water balance is summarized in **Table 3**.

Table 3. Drawdown Times

	Provided Infiltration Volume (m^3)	Infiltration Depth (mm)	Retention Drawdown Time (hours)
Infiltration for Building A	241	660	11
Infiltration for Building B	298	660	11

As shown above in **Table 3**, the required volume for water balance will be drawn down within 48 hours. Therefore, all drawdown requirements are satisfied. Hydrogeological Investigations can be referenced in **Appendix C**.

4.2 Quality Control

As shown in **Figure 3**, the drainage for the site has been split into three separate catchment areas, based on grading constraints. The water quality criteria for this site is 80 percent average annual TSS removal from runoff originating onsite.

Overall TSS removal calculations are based on the following assumptions:

- Rooftop runoff is generally clean; runoff from the rooftop will be routed to the underground storage facility. Rooftop runoff is credited with 80 percent TSS removal.
- The remaining site surface is a combination of landscape, parking and driveway, which is credited with 0 percent TSS removal. Therefore, runoff from this area is proposed to be treated by a filter system.

Runoff from the driveway and parking area will be captured by the proposed storm sewer system, drain by gravity to the Filter units.

An Atlan Flow Filter unit will provide treatment for the northern and central portion of the site (Catchment 101 and 102) as well as the driveway entrance (Catchment 104), downstream of the confluence for the northern and central storm sewer system. An Atlan Flow Filter unit will provide treatment for the southern portion of the site (Catchment 103), at the downstream of southern storm sewer. The Filter units will be sized to achieve 80% TSS removal for their corresponding catchment areas.

Therefore, with the proposed Atlan Flow Filter units in place, all runoff originating on site will be treated to the minimum requirement of 80 percent TSS removal. The ETV certification of the proposed filter units are included in **Appendix D**, with additional details to be provided as part of the future Site Plan application stage.

4.3 Quantity Control

4.3.1 Target Release Rate

As noted, the target flows for the site are based on the pre-development peak flows. A Visual OTTHYMO 6 (VO6) model was created for the pre-development based on the existing topography and site conditions. Target flows are summarized in **Table 4**.

Table 4. Target Flow to North Service Road

Description	Drainage Area (ha)	%Imp.	2Yr (m^3/s)	5Yr (m^3/s)	10Yr (m^3/s)	25Yr (m^3/s)	50Yr (m^3/s)	100Yr (m^3/s)
Existing Site (Catchment 100)	8.19	43%	0.766	1.089	1.292	1.560	1.762	1.965

*Note: Target flows are calculated using the VO6 hydrologic model, using the Chicago 4-hour design storm and City of Burlington IDF curve

4.3.2 Quantity Control Measures

Quantity control for the site will be provided to meet the design criteria provided by the City and to meet MTO requirements. The following options were considered for quantity control on site:

- **Rooftop Storage** – Controlled flow roof drains could be installed on the rooftop, and water could be stored on the rooftops to attenuate peak flows. With a typical flat rooftop design, flows can generally be limited to approximately 42L/s/ha. However, as this site drains towards an MTO highway, rooftop storage is not considered in the control measures for the site.

- **Underground Storage** – A restrictor pipe could be provided at the site outlets, with surplus storage provided in the pipes or in storage tanks.

- **Parking Lot Surface Storage** – A restriction could be installed on the storm sewer system to control the release rate. Storage would be provided in depressions in the parking lots to attenuate the flow.

In order to meet the allowable release rates for the site, it was determined that underground storage and parking lot surface storage will be utilized. As per MTO requirements, rooftop storage is not considered in the modelling of the proposed quantity controls for the site.

Underground storage of stormwater from the proposed development will be provided in Stormtrap underground detention tanks, or an approved equivalent. The MTO does not allow plastic chambers, so concrete systems are proposed. Inspection ports can be provided to facilitate inspection and cleaning, as needed. This will be further detailed as part of the Site Plan application stage.

The release rate from the storage chambers will be controlled by orifice tubes at the outlet of the proposed drainage catchments, in order to achieve the target release rates for the development. All proposed underground storage will be connected to the storm sewer and directed to the site outlet, as shown on **Drawing SW2**. The proposed flow for the outlet has been included in the storm sewer design sheet. The proposed catchment plan can be referenced on **Figure 3**. The storm drainage plan and storm sewer design sheet can be referenced in **Appendix B**.

Northern Catchment – Available Storage Volume

Flow from the rooftop of proposed Building A and the surface area to the north of the proposed building (Catchment 101) will be controlled by a 100mm pipe at the downstream invert of CBMH412.

Storage of the stormwater will be provided by a combination of underground pipes and structures, surface storage at the northern landscape area of the site, as well as ponding above the catchbasins. The proposed storage volume is summarized in **Table 5**.

Table 5. Available Storage – Northern Catchment

	Elevation (m)	Storage Volume (m^3)
Pipes and Structures	121.29 – 124.60	81
Quantity Storage Chamber 1	122.24 – 123.44	700
Storage in Landscape below 124.60	124.30 – 124.60	68
Surface Storage above 124.60	124.60 – 124.90	778
Total		1,627

A portion of the surface ponding in the landscape area is included in the overall 778m^3 of surface storage provided in the catchment.

Central Catchment – Available Storage Volume

Flow from the loading area between the proposed buildings (Catchment 102) will be controlled by a 100mm orifice pipe at the downstream invert of CBMH306. Storage of the stormwater will be provided by a combination of underground pipes and structures, as well as ponding above the catchbasins. The proposed storage volume is summarized in **Table 6**.

Table 6. Available Storage – Central Catchment

	Elevation (m)	Storage Volume (m^3)
Pipes and Structures	121.02 – 123.56	128
Quantity Storage Chamber 2	121.78 – 122.78	700
Parking Lot Surface	123.56 – 123.86	1,625
Total		2,453

Southern Catchment – Available Storage Volume

Flow from the rooftop of proposed Building B and the surface area to the south of the proposed building (Catchment 103) will be controlled by a 200mm pipe at the downstream invert of CBMH208. Storage of the stormwater will be provided in combination of underground pipes and structures, as well as ponding above the catchbasins. The proposed storage volume is summarized in **Table 7**.

Table 7. Available Storage – Southern Catchment

	Elevation (m)	Storage Volume (m^3)
Pipes and Structures	120.88 – 124.58	62
Quantity Storage Chamber 3	120.97 – 122.97	600
Parking Lot Surface	124.58 – 124.78	124
Total		786

Uncontrolled Area

As shown on **Figure 3**, flows from the entrance and driveway (Catchment 104) and the landscape area adjacent to the North Service Road (Catchment 105) will drain uncontrolled based on grading constraints associated with the existing entrance to the site. Runoff from the driveway will be collected by the storm sewer system and directed to the site outlet.

Details of the proposed underground storage chambers will be provided as part of the Site Plan application stage.

4.4 Hydrology Modelling

Visual OTTHYMO 6 (VO6) was used to establish the pre-development target flows and assess the proposed control measures. VO6 is a single-event hydrologic model that is based on unit hydrograph theory. The simulation for this site uses the Nash unit hydrograph (NASHYD) method for simulating the pre-development runoff. For the post development scenario, the StandHyd method is used to simulate runoff based on the higher imperviousness. VO6 simulations were prepared for both the existing and post development scenarios, based on the 4-hour Chicago storm and the City of Burlington IDF Curve.

The target release rates for the proposed development were based on the pre-development peak flows in **Table 2**. CN values were selected for the existing condition based on the materials on site. The pre-development model was prepared based on the catchments shown in **Figure 2**. VO6 outputs can be referenced in **Appendix F**.

The post development model was created based on the proposed conceptual plan. The Route Reservoir command is used to simulate underground storage flow controls. **Figure 3** shows the post development drainage areas. Calculations for the percent impervious and storage-discharge relationships can be seen in **Appendix E**. **Table 8** summarizes the post development discharge rates and required storage for the site.

Table 8. Proposed Release Rates

Return Period	Target Flow (m^3/s)	Proposed Flow* (m^3/s)
2 Year	0.7660	0.2419
5 Year	1.0890	0.3171
10 Year	1.2924	0.3551
25 Year	1.5601	0.6843
50 Year	1.7615	0.6716
100 Year	1.9654	0.9777

* Proposed flow includes uncontrolled areas, as outlined in the VO6 modelling (refer to **Appendix F**).

As shown above, the proposed release rates can be controlled to meet the target release. **Table 9** provides a summary of the required storage.

Table 9. Proposed Storage Summary

Catchment	5-year Required Storage (m^3)	5-year Provided Storage (m^3)	100-year Required Storage (m^3)	100-year Provided Storage (m^3)
101	830	849	1,490	1,672
102	811	828	1,443	2,453
103	638	662	786	786

Based on the storage provided in each catchment on the site, the 100-year water elevation is 124.87 in the northern catchment, 123.77 in the central catchment and 124.78 in the southern catchment. The ponding limits during the 100-year event are shown on **Drawing SW1**. Therefore, the total release rate for the site in the post development scenario will meet the required release rates. The hydrologic modelling output is presented in **Appendix F**.

4.5 Maintenance

Effective maintenance is required to ensure the proper operation of the SWM facility on the site. Over time, blockage of outlet structures and sediment loading can potentially decrease the effectiveness of the system. The following are recommendations for the maintenance of the orifice tube and outlet structure:

- Trash cleanup will help prevent blockage of outlet structures. Annual trash cleanup should be completed, preferably after the spring runoff.
- The outlet structures should be inspected regularly over the first two years (preferably after significant rainfall events) to establish potential for blockage.

The maintenance frequencies above are only estimates based on typical developments. The MECP guidelines recommend inspections after each significant storm (approximately 4 per year) for the first 2 years of operation. Based on these inspections, actual maintenance frequency can be determined.

Inspection ports for the Stormtrap detention system will be installed to facilitate inspection and cleaning. The system should be inspected every 6 months for the first two years and annually after that, once the sediment loading rate is determined. The system should be cleaned out when sediment reaches a depth of 0.05m.

5.0 EROSION AND SEDIMENT CONTROL

An erosion and sediment control plan, shown on **Drawing SW3** has been prepared for the site. The plan has been prepared following the Erosion and Sediment Control Guidelines for Urban Construction (ESC Guidelines), prepared by The Greater Golden Horseshoe Area Conservation Authorities, December 2006. The plan has been designed to limit sediment and debris from leaving the site during all stages of construction.

5.1 Existing Site Condition

The existing site is relatively flat, draining to the southeast, with existing gravel parking on the main portion. Based on the soils and gentle slopes across the site, there is a moderate potential for erosion from the site.

5.2 Erosion and Sediment Control Plan

The sediment control plan for this site consists of the following:

- A sediment control fence will be installed along the perimeter of the site where the grade will direct flows off-site.
- Site access will be limited to one entrance per phase of construction. A gravel access pad will be installed for staging of construction material and vehicles.
- Any mud tracked from the site should be swept immediately and a sweeper truck should be used as necessary to remove any additional debris.
- Trucks leaving the site should be covered with a tarpaulin.
- During dry weather, above freezing construction periods, dust control measures including wetting the site and egress points should be implemented on an as needed basis.
- Once the storm sewer system has been constructed, catchbasin sediment control and protection devices will be installed and maintained until the site is ready to be paved.

Erosion measures will be in place prior to any grading on the site. A program will be in place to monitor and maintain the erosion and sediment controls. The sediment controls will be inspected by the Site Engineer and contractor every two weeks and after each significant rainfall event.

- Once every 7 days and/or
- Within 24 hours following any significant rainfall event or snowmelt.
- Following an unpredicted rainfall event.
- Daily, during extended duration rainfall events.
- After significant snow melt events.

The inspection frequency can be extended to monthly inspections if there is no construction activity on-site.

Erosion and sediment controls shall be maintained in proper working order at all times. Damaged or clogged devices shall be repaired within 48 hours.

Existing storm sewer and drainage ditches adjacent to the works shall be protected at all times from the entry of sediment/silt that may migrate from the site. For storm sewers: all inlets (rear lot catchbasins, road catchbasins, pipe inlets, etc.) must be secured/fitted with siltation control measures. For drainage ditches: the installation of rock check dams, siltation fence, sediment containment devices must be installed to trap and contain sediment.

6.0 WASTEWATER

According to the information provided by the Region, there is a 375mm diameter sanitary sewer installed along the west side of Appleby Road. The proposed development will drain to this sanitary sewer.

The anticipated flows from the proposed development have been estimated based on the proposed design, for use by the Region to review the receiving system. As the development is split into two development blocks by the existing creek, the site will connect to the existing sewer at two locations with a 200mm diameter sanitary sewer for each connection, as shown on **Drawing SW2**.

Based on Section 3 from the Region of Halton Water and Wastewater Linear Design manual, the sanitary flow from the site is to be estimated based on the following parameters:

- Average Daily Flow = 185 Litres/employee/day;
- Population Density = 1 employee per 129m^2 of building area (Table 3-2) or 145 employees/hectare if building area is unknown (Table 3-4);
- Peak Wastewater Flow Factor to be calculated using the modified Harmon Formula;
- Infiltration Allowance = 0.28 L/s/ha

Based on these parameters, the estimated population for the development is 306 employees (39450.6m2 of GFA ÷ 129m^2 of GFA) for the lands west of the creek plus 85 employees (0.58ha x 185) for the lands along Appleby Line for a total population of 391 for the 9.92ha of developable area. Based on this population the average daily sanitary flow from the property is estimated to be 0.84L/s. Adjusting the flow to include infiltration based on the Region standards as well as a peaking factor of 4.0 based, the total sanitary discharge from the site will be approximately 6.14L/s. The Region will use this flow in its models to confirm capacity for the development.

7.0 WATER DISTRIBUTION

According to the information provided by the Region, there is a 300mm diameter watermain within the North Service Road right of way.

A fire flow test will be completed for the second submission of this report, to confirm the available flows; however, it is anticipated that sufficient flow pressure will be provided.

The following water usage parameters were used to determine the daily water demands for each of the proposed buildings as per Region Standards.

- Water Demand = 190 Litres/employee/day (Section 2.3 of Region LDM)
- Peak Hour Peaking Factor = 3.0
- Maximum Day Peaking Factor = 1.9
- Required fire flow = Estimated using Fire Underwriters Survey 2020

Using the water usage parameters mentioned above and the estimated populations from Section 5.0, we determined the maximum daily flows and peak hourly flows for each proposed building which are shown in **Table 10**.

Table 10. Water Demand Summary

Scenario	Bldg. A&B Demand (L/s)	Lot 2 Demand (L/s)
Average Day	0.67	0.19
Max Day	1.27	0.36
Peak Hour	2.01	0.57
Max Day with Fire Flow	234.6	83.69

As noted, a hydrant flow test will be completed to confirm the pressures and flows for the next submission. Based on the initial assumptions, sufficient capacity is anticipated in the existing watermain to service the development.

8.0 CONCLUSIONS

The stormwater management design for the site has been designed to meet the criteria outlined by the City, CH, MTO and the MECP Guidelines. The plan will consist of the following:

- Water quality controls are provided by the proposed filter units on site to meet the required TSS removal targets. This will be further detailed as part of the Site Plan application work.
- Peak flows will be controlled on site for the 2-100 Year storm events, to meet the requirements. Orifice tubes are proposed in order to achieve the target release rates for the development, to be further detailed as part of the future Site Plan application.
- Best efforts have been made to achieve the requirement to retain the runoff from a 5mm 24-hour storm on-site, by the use of infiltration facilities that capture rooftop flows. Flows in excess of the infiltration volume will be directed to the site outlet.
- Sanitary drainage will be conveyed to the existing 250mm diameter sanitary sewer on North Service Road to the east of the site, as per the Region of Halton requirements.
- Internal water distribution mains will be connected to the existing watermains located on North Service Road.

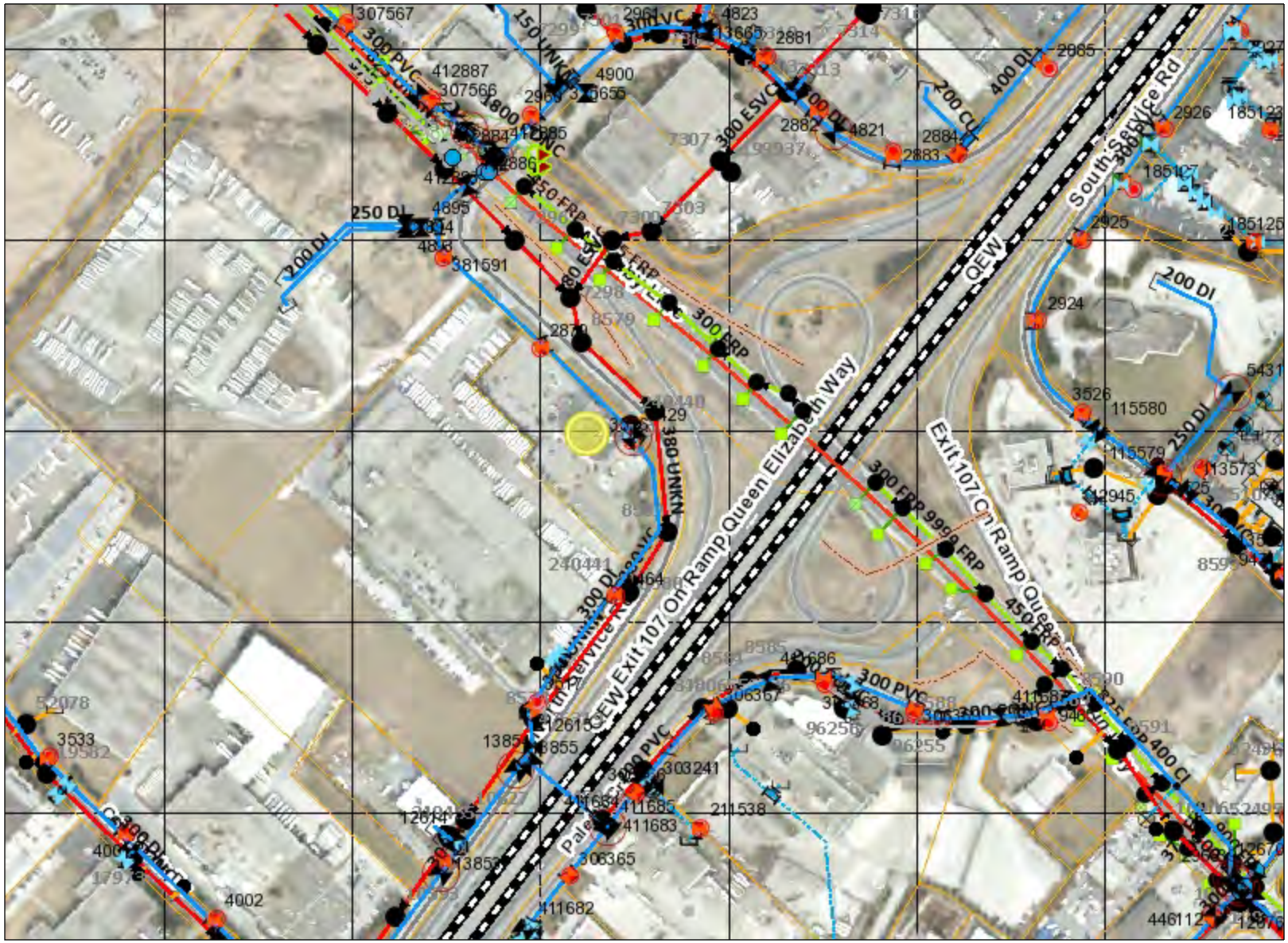
Therefore, based on the information provided herein, the Zoning By-Law amendment application is appropriate in respect of these matters.



APPENDIX A

BACKGROUND INFORMATION

4475 N Service Road, Burlington



Legend

Water Control Valve
- System
- SystemDP
- Zone
- ZoneDP

Water Service Valve
- CurbStop
- PropertyLine
- Secondary
- TappingValve

Water Hydrant

Water Fitting
- Cap
- Cross
- HBend
- MainStop
- Reducer
- Sleeve
- TappingSleeve
- Tee
- VBend

Water Chamber
- Chamber

Notes:

266.1 0 133.04 266.1 Metres

1: 5,322

THIS MAP IS NOT TO BE USED FOR NAVIGATION

Information Valid as of: 12/8/2022

REGIONAL MUNICIPALIY OF HALTON, ITS EMPLOYEES, OFFICERS AND AGENTS ARE NOT REPONSIBLE FOR ANY ERRORS, OMISSIONS OR INACCURACIES, WHETHER DUE TO THEIR NEGLIGENCE OR OTHERWISE. ALL INFORMATION SHOULD BE VERIFIED.

Produced by Regional Municipality of Halton under License with the Ontario Ministry of Natural Resources @ Queen's Printer for Ontario 2012. © Teranet Enterprise Inc. and its suppliers. All rights reserved. NOT A PLAN OF SURVEY.

4475 N Service Road, Burlington



Legend

Water Control Valve
- System
- SystemDP
- Zone
- ZoneDP

Water Service Valve
- CurbStop
- PropertyLine
- Secondary
- TappingValve

Water Hydrant

Water Fitting
- Cap
- Cross
- HBend
- MainStop
- Reducer
- Sleeve
- TappingSleeve
- Tee
- VBend

Water Chamber
- Chamber

Notes:

THIS MAP IS NOT TO BE USED FOR NAVIGATION

Information Valid as of: 12/8/2022

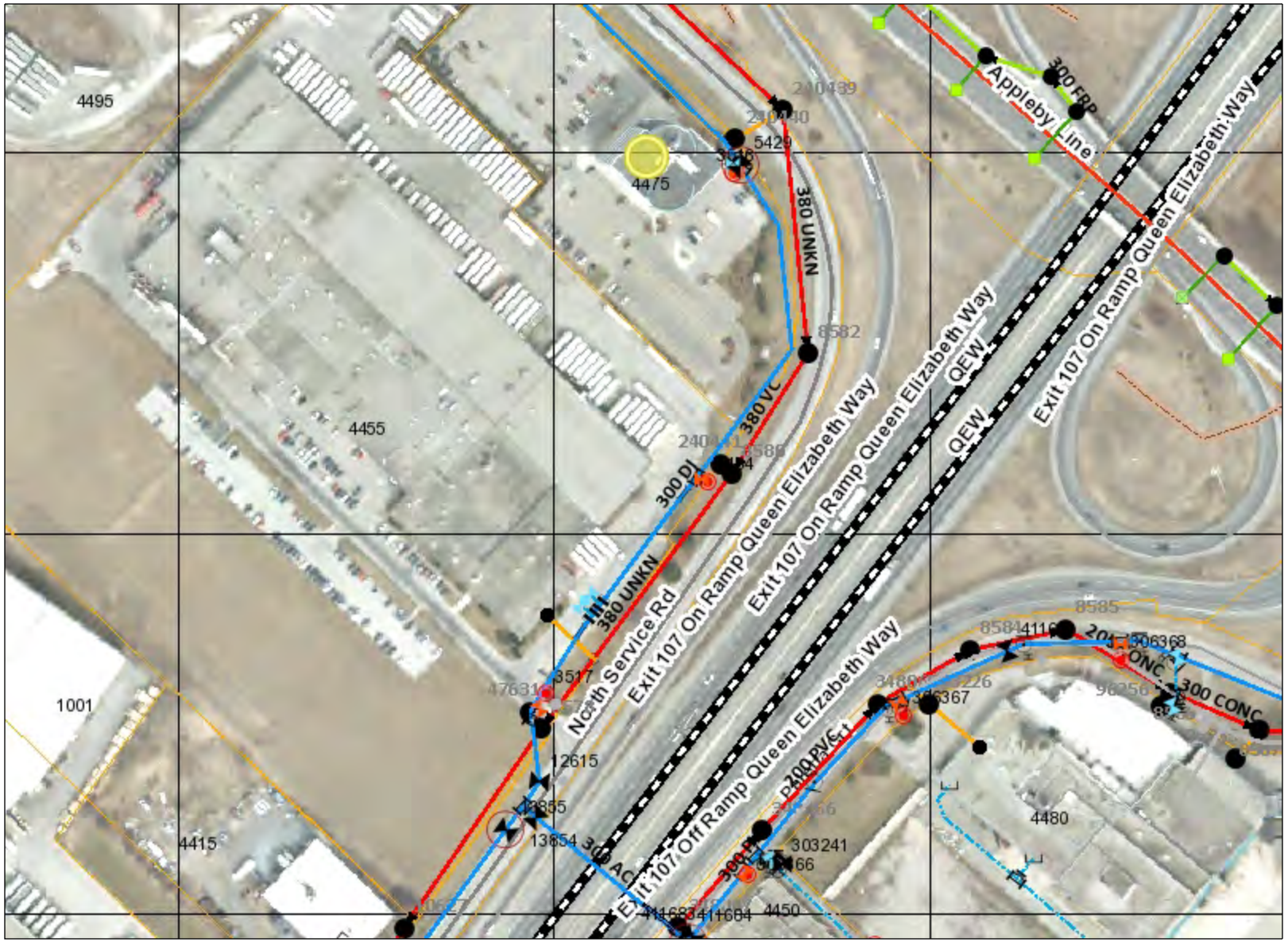
133.0 0 66.52 133.0 Metres

1: 2,661

REGIONAL MUNICIPALIY OF HALTON, ITS EMPLOYEES, OFFICERS AND AGENTS ARE NOT REPONSIBLE FOR ANY ERRORS, OMISSIONS OR INACCURACIES, WHETHER DUE TO THEIR NEGLIGENCE OR OTHERWISE. ALL INFORMATION SHOULD BE VERIFIED.

Produced by Regional Municipality of Halton under License with the Ontario Ministry of Natural Resources @ Queen's Printer for Ontario 2012. © Teranet Enterprise Inc. and its suppliers. All rights reserved. NOT A PLAN OF SURVEY.

4475 N Service Road, Burlington



Legend

Water Control Valve
- System
- SystemDP
- Zone
- ZoneDP

Water Service Valve
- CurbStop
- PropertyLine
- Secondary
- TappingValve

Water Hydrant

Water Fitting
- Cap
- Cross
- HBend
- MainStop
- Reducer
- Sleeve
- TappingSleeve
- Tee
- VBend

Water Chamber
- Chamber

Notes:

133.0 0 66.52 133.0 Metres

1: 2,661

THIS MAP IS NOT TO BE USED FOR NAVIGATION

Information Valid as of: 12/8/2022

REGIONAL MUNICIPALIY OF HALTON, ITS EMPLOYEES, OFFICERS AND AGENTS ARE NOT REPONSIBLE FOR ANY ERRORS, OMISSIONS OR INACCURACIES, WHETHER DUE TO THEIR NEGLIGENCE OR OTHERWISE. ALL INFORMATION SHOULD BE VERIFIED.

Produced by Regional Municipality of Halton under License with the Ontario Ministry of Natural Resources @ Queen's Printer for Ontario 2012. © Teranet Enterprise Inc. and its suppliers. All rights reserved. NOT A PLAN OF SURVEY.

PROPOSED 120' ROAD ALLOWANCE

450.0'

450.0'

IN LARGE CHAMBER
16" FL. x M.J. GATE VALVE
16" x 4" FL. TEE
16" FL. x M.J. ADAPTOR
4" FL. x M.J. GATE VALVE

IN LARGE CHAMBER
16" FL. x M.J. ADAPTOR
16" x 10" FL. TEE
16" FL. x M.J. VALVE
10" FL. x M.J. VALVE

10" G.V. & BOX

4" G.V. & BOX

16" M.J. PLUG

311.90'

60.37'

389.60

16" D.I. CL. 2 C.L. WATERMAIN

APPLEBY LINE

450.0'

2 - 16" M.J. VALVES IN CH's.
16" M.J. 'Y' PLUGGED SOUTH
16" x 12" M.J. REDUCER
12" M.J. G. VALVE IN CH.
16" M.J. 'Y'

FUTURE 16" WATERMAIN

303.46'

21+04 45° M.J. BEND

10" G.V. & BOX

20' EASEMENT

12" D.I. CL. 2 C.L. WATERMAIN

8" G.V. & BOX

275.0'

12" VALVE (M.J.) IN CHAMBER

250.05'

(2) 22½° BENDS (M.J.)

45° (MJ) BEND 8+09

203.16'

235.51'

88.86'

5+85

400.0'

450.0'

370.0'

20' EASEMENT

15"

SERVICE ROAD

NORTH

Q.E.W.

660.0'

1+74

45° M.J. BEND 1+63

12" M.J. VALVE IN CHAMBER 0+47

PROPOSED INTERCHANGE BY THE DEPARTMENT OF TRANSPORT & COMMUNICATIONS.

0+06 45° BEND (M.J.)

0+00

0+05

18" x 22.75 x 0.312 STEEL CASING

12" x 12" TEE

EX. 12" A.C. CL 150

4+45

13'

1350.30'

LOT 6

PART 1

1348.50'

1348.45'

C.N.R.

CON. 2 S.D.S.

PART 2

1204.2'

60.37'

146.70'

330.0'

330.0'

525'

1320.0'

2.50

NOTE : ALL HYDRANTS TO HAVE STEAMER CONNECTIONS

REGIONAL MUNICIPALITY OF HALTON, ITS EMPLOYEES, OFFICERS AND AGENTS ARE NOT RESPONSIBLE FOR ANY ERRORS, OMISSIONS OR INACCURACIES, WHETHER DUE TO THEIR NEGLIGENCE OR OTHERWISE. ALL INFORMATION SHOULD BE VERIFIED.

P.U.C. OF BURLINGTON

WATERMAIN LEGEND

EXISTING WATERMAIN

PROPOSED WATERMAIN

VALVE/S & V. CHAMBER — OR —

VALVE & V. BOX

FIRE HYDRANT & SEC. V.

NOTE: FOR VALVE CHAMBERS & OTHER DETAILS SEE P.U.C. DWG. NO. C-86

BEFORE DIGGING, CONTACT WATER AND HYDRO (ENG. DEPT.) 634-1851

DATE	REVISION	BY
4/3/74	'AS CONSTRUCTED'	W.F.

PUBLIC UTILITIES COMMISSION OF BURLINGTON
WATER DEPARTMENT

DISTRIBUTION SYSTEM

APPLEBY LINE & N. SERVICE RD. EXT.
PROP. 16" & 12" D.I. WATERMAIN

SCALE — 1" = 100'
DATE SEPT 26/73.
DRAWN — W. O'CONNOR C.E.T.
PRINT ISSUED
CHECKED — D.S.
APPROVED — [signature] COUNTY ENGINEER 26/10/73
DWG. NO. C-390

B-00700



APPENDIX B

STORM SEWER DESIGN SHEET

Design Storm = 5 YR.
A = 802.04
B = 5
c = 0.764
Starting T_c (min.) = 10

Rainfall Intensity = $\frac{A}{(T_c+B)^{\wedge}c}$

STORM SEWER DESIGN SHEET
4495 North Service Road

Muncipality: Burlington, Ontario
Project No: 221385
Date: 25-Jun-26
Designed by: EJM

HUSSON

STREET	FROM	TO	SITE FLOWS						EXTERNAL/CONTROL FLOW				TOTAL FLOW (m^3/s)	TIME OF CONCENTRATION			PIPE DATA						% FULL
			AREA (ha) "A"	RUN-OFF COEFF. "R"	A x R	ACCUM. A x R	RAINFALL INTENSITY (mm/hr)	ACCUM. FLOW (m^3/s)	EXT. AREA (ha)	EXT. FLOW RATE (L/s/ha)	EXT. FLOW (m^3/s)	ACC. EXT. FLOW (m^3/s)		U/S T_c (min.)	ACC. T_c (min.)	D/S T_c (min.)	PIPE LENGTH (m)	PIPE SLOPE (%)	PIPE SIZE (mm)	MANNINGS "n"	FULL FLOW CAPACITY (m^3/s)	FULL FLOW VELOCITY (m/s)	
	CB200	CBMH201	0.08	0.90	0.072	0.072	101.31	0.020					0.020	10.000	0.552	10.552	40.1	1.0	250	0.013	0.059	1.211	34%
	CBMH201	CBMH202	0.08	0.90	0.072	0.144	98.55	0.039					0.039	10.552	0.328	10.879	19.0	0.5	300	0.013	0.068	0.967	58%
	CBMH202	CBMH203	0.04	0.90	0.036	0.180	97.00	0.048					0.048	10.879	0.476	11.355	27.6	0.5	300	0.013	0.068	0.967	71%
	CBMH203	CBMH204	0.08	0.90	0.072	0.252	94.83	0.066					0.066	11.355	0.707	12.062	47.6	0.5	375	0.013	0.124	1.122	54%
	CBMH204	CBMH206	0.10	0.90	0.090	0.342	91.82	0.087					0.087	12.062	0.826	12.888	55.6	0.5	375	0.013	0.124	1.122	70%
	BLDG B	MH205							2.20	42.0	0.092	0.092	0.092	10.000	0.083	10.083	7.9	1.0	375	0.013	0.175	1.587	53%
	MH205	CBMH206										0.092	0.092	10.083	0.083	10.166	5.6	0.5	375	0.013	0.124	1.122	75%
	CBMH206	CBMH207	0.10	0.90	0.090	0.432	88.56	0.106				0.092	0.199	12.888	0.659	13.547	55.5	0.5	525	0.013	0.304	1.404	65%
	CBMH207	CBMH208	0.10	0.90	0.090	0.522	86.15	0.125				0.092	0.217	13.547	0.659	14.206	55.5	0.5	525	0.013	0.304	1.404	71%
Central Catchment	CB318	CBMH301	0.08	0.90	0.072	0.072	101.31	0.020					0.020	10.000	0.345	10.345	25.1	1.0	250	0.013	0.059	1.211	34%
Central Catchment	CBMH301	CBMH300	0.05	0.90	0.045	0.117	99.57	0.032					0.032	10.345	0.438	10.783	25.4	0.5	300	0.013	0.068	0.967	47%
Central Catchment	CBMH300	MH301	0.05	0.90	0.045	0.162	97.45	0.044					0.044	10.783	1.008	11.792	58.5	0.5	300	0.013	0.068	0.967	64%
Central Catchment	MH301	MH302	0.60	0.90	0.540	0.702	92.94	0.181					0.181	11.792	1.226	13.018	80.0	0.3	525	0.013	0.235	1.088	77%
Central Catchment	MH302	MH303	0.63	0.90	0.567	1.269	88.07	0.310					0.310	13.018	1.166	14.184	90.0	0.3	675	0.013	0.460	1.286	67%
Central Catchment	MH303	MH304	0.43	0.90	0.387	1.656	83.95	0.386					0.386	14.184	1.166	15.351	90.0	0.3	675	0.013	0.460	1.286	84%
Central Catchment	MH304	CBMH306	0.32	0.90	0.288	1.944	80.25	0.433					0.433	15.351	0.546	15.897	45.2	0.3	750	0.013	0.609	1.380	71%
Central Catchment	CB307	CBMH306	0.17	0.90	0.153	0.153	101.31	0.043					0.043	10.000	0.666	10.666	48.4	1.0	250	0.013	0.059	1.211	72%
	CB400	CBMH401	0.05	0.90	0.045	0.045	101.31	0.013					0.013	10.000	0.350	10.350	25.4	1.0	250	0.013	0.059	1.211	21%
	CBMH401	CBMH402	0.05	0.90	0.045	0.090	99.54	0.025					0.025	10.350	0.381	10.731	22.1	0.5	300	0.013	0.068	0.967	36%
	CBMH402	CBMH403	0.08	0.90	0.072	0.162	97.70	0.044					0.044	10.731	0.889	11.620	51.6	0.5	300	0.013	0.068	0.967	64%
	CBMH403	CBMH404	0.10	0.90	0.090	0.252	93.68	0.066					0.066	11.620	0.836	12.456	56.3	0.5	375	0.013	0.124	1.122	53%
	CBMH404	CBMH406	0.20	0.90	0.180	0.432	90.23	0.108					0.108	12.456	0.871	13.327	58.6	0.5	375	0.013	0.124	1.122	87%
	BLDG A	MH405							1.75	42.0	0.074	0.074	0.074	10.000	0.102	10.102	9.7	1.0	375	0.013	0.175	1.587	42%
	MH405	CBMH406										0.074	0.074	10.102	0.056	10.158	3.8	0.5	375	0.013	0.124	1.122	59%
	CBMH406	CBMH408	0.20	0.90	0.180	0.612	86.94	0.148				0.074	0.221	13.327	0.696	14.023	58.6	0.5	525	0.013	0.304	1.404	73%
	CB407	CBMH408												10.000	0.149	10.149	12.2	1.0	300	0.013	0.097	1.367	0%
	CBMH408	CBMH409	0.30	0.90	0.270	0.882	84.50	0.207				0.074	0.281	14.023	0.396	14.419	36.5	0.5	600	0.013	0.434	1.535	65%
	CBMH409	CBMH410	0.05	0.90	0.045	0.927	83.17	0.214				0.074	0.288	14.419	0.198	14.617	18.2	0.5	600	0.013	0.434	1.535	66%
	CBMH410	CBMH411	0.03	0.90	0.027	0.954	82.53	0.219				0.074	0.292	14.617	0.261	14.877	24.0	0.5	600	0.013	0.434	1.535	67%
	CBMH411	CBMH412	0.06	0.90	0.054	1.008	81.71	0.229				0.074	0.302	14.877	0.216	15.093	19.9	0.5	600	0.013	0.434	1.535	70%
North Catchment	CTRL 1	MH103							1.00	52.000	0.052	0.052	0.052	10.000	0.011	10.011	1.0	1.0	375	0.013	0.175	1.587	30%
	MH103	MH102										0.052	0.052	10.011	1.726	11.737	90.0	0.3	375	0.013	0.096	0.869	54%
Central Catchment	CTRL 2	MH102							1.00	46.0	0.046	0.046	0.046	10.000	0.014	10.014	1.0	1.0	250	0.013	0.059	1.211	77%
	DCB100	MH101	0.19	0.90	0.171	0.171	101.31	0.048					0.048	10.000	0.252	10.252	18.3	1.0	250	0.013	0.059	1.211	81%
	MH102	MH101										0.098	0.098	11.737	0.873	12.610	57.0	0.3	525	0.013	0.235	1.088	42%
	MH101	OGS1				0.171	89.63	0.043				0.098	0.141	12.610	0.089	12.699	5.8	0.3	525	0.013	0.235	1.088	60%
	OGS1	MH100				0.171	89.28	0.042				0.098	0.140	12.699	0.302	13.001	19.7	0.3	525	0.013	0.235	1.088	60%
South Cathcmnet	CTRL 3	OGS2							1.00	217.0	0.217	0.217	0.217	10.000	0.857	10.857	72.2	0.5	525	0.013	0.304	1.404	71%
	OGS2	MH100										0.217	0.217	10.857	0.130	10.987	11.0	0.5	525	0.013	0.304	1.404	71%
North Service Road - Two 525mm dia. Pipe	MH100	HW100			0.000	0.171	88.14	0.042			0.000	0.315	0.357	13.001	0.139	13.140	9.1	0.3	525	0.013	0.235	1.088	152%

APPENDIX C

HYDROGEOLOGICAL ASSESSMENT

Please refer to the Hydrogeological Assessment prepared by Pinchin, submitted in conjunction with this report.



APPENDIX D

DETAILS OF QUALITY CONTROL MEASURES

◆ Verification Statement ◆ Verification Statement ◆ Verification Statement ◆

VERIFICATION STATEMENT

GLOBE Performance Solutions

Verifies the performance of

Atlan FlowFilter

Developed by Atlan Stormwater
Augustine Heights, Queensland, Australia

Registration: GPS-ETV_VR2026-05-12

In accordance with

ISO 14034:2016

Environmental Management —
Environmental Technology Verification (ETV)

Yogendra Chaudhry, PhD
CEO
GLOBE Performance Solutions

May 12, 2026
Calgary, AB, Canada

GLOBE PERFORMANCE SOLUTIONS

Verification Body
GLOBE Performance Solutions
Suite 400, 105 12 Ave SE | Calgary, AB| Canada | T2G 1A1

Verification Overview

This Environmental Technology Verification (ETV) of the Atlan FlowFilter® stormwater treatment system was conducted by Globe Performance Solutions (GPS) in alignment with the principles and framework of ISO 14034:2016 - Environmental Management - Environmental Technology Verification (ETV).

The verification involved an independent assessment of the available evidence supporting the performance of the FlowFilter system for the treatment of urban stormwater runoff. The assessment focused on the system's ability to reduce suspended solids, nutrients, metals, and gross pollutants under defined operating conditions.

The verification was based on the review and evaluation of multiple independent datasets and supporting technical documents, including field monitoring data, laboratory analytical results, SQIDEP evaluation reports, supporting Body of Evidence (BOE) documentation, controlled laboratory testing conducted by the Water Research Laboratory (WRL), rainfall and event monitoring records, and manufacturer technical documentation.

The field monitoring datasets included multiple storm events collected under real operating conditions and represented a range of influent water quality characteristics, hydraulic loading conditions, and environmental variability. These datasets were supplemented by controlled laboratory testing to support interpretation of treatment performance under defined conditions. The verification process included independent review of the available datasets and supporting documentation, assessment of data quality, traceability, and relevance, evaluation of pollutant removal performance across multiple datasets, cross-validation of observed performance trends, and independent interpretation of the findings in accordance with ISO 14034 verification principles.

The verification was conducted using existing evidence and did not involve generation of primary testing data by GPS. Verification conclusions presented in this statement are based solely on the independent evaluation of the available information and supporting datasets. This verification was not conducted under the Canadian Procedure for Field Testing of Stormwater Filtration Manufactured Treatment Devices (PAS), the Washington State Technology Assessment Protocol Ecology (TAPE), or any jurisdiction-specific approval or certification program. However, the verification report includes a comparative alignment assessment between the ISO 14034-based verification methodology applied in this verification and relevant PAS framework elements. The verified performance presented in this Verification Statement applies only within the defined operating conditions, hydraulic design envelope, and conditions of applicability described in the associated ETV Technical Report.

Technology Description and Application

The Atlan FlowFilter® is a proprietary cartridge-based stormwater treatment system designed to improve the quality of urban stormwater runoff prior to discharge into receiving waterways or stormwater infrastructure systems. The technology is intended for the treatment of runoff generated from impervious surfaces associated with commercial, industrial, transportation, and urban development applications.

The system operates as an offline stormwater treatment device and is typically installed within underground concrete or prefabricated vault structures connected to stormwater drainage networks. Under normal operating conditions, a portion of the stormwater flow is diverted into the treatment system, where sedimentation and filtration processes are used to remove pollutants from the runoff

stream. Flows exceeding the defined treatment capacity may bypass the treatment unit depending on the system configuration and hydraulic conditions.

The FlowFilter incorporates a sedimentation sump and multiple replaceable filter cartridges configured within the treatment chamber. Incoming stormwater first enters the sump zone, where coarse sediments and gross pollutants are captured through gravitational settling and flow reduction. Water then passes through the filtration cartridges, where suspended solids and associated pollutants are removed through physical and physicochemical treatment mechanisms. The treatment processes associated with the FlowFilter include sedimentation, depth filtration, adsorption, and precipitation mechanisms. These processes collectively contribute to the removal of suspended solids, particulate-bound nutrients, metals, and gross pollutants from stormwater runoff. Removal performance is influenced by factors including influent water quality characteristics, hydraulic loading conditions, filter media condition, and system maintenance practices.

The FlowFilter is designed to operate within a defined hydraulic envelope. Typical operating conditions include a nominal treatment flow rate of approximately 4 L/s per filter cartridge and a minimum hydraulic head requirement of approximately 250 mm to maintain effective flow through the filtration media. System treatment capacity is scalable depending on the number and configuration of cartridges installed within the treatment structure.



Figure 1. Atlan FlowFilter Schematic Cross-section

The technology is intended for long-term operation with periodic maintenance. Routine maintenance activities include inspection of the treatment chamber, removal of accumulated sediment and debris, and cleaning or replacement of filter cartridges as required. Full cartridge replacement is typically performed at intervals dependent on site-specific loading conditions and operational requirements.

The verification presented in this statement is based on evaluation of the FlowFilter under conditions generally representative of urban stormwater runoff from impervious surfaces. Verified performance applies only under the defined operating conditions and conditions of applicability described in the associated ETV Technical Report.

Performance Conditions

The verified performance presented in this Verification Statement is applicable under defined operating and environmental conditions representative of the datasets evaluated during the Environmental Technology Verification (ETV) process.

The Atlan FlowFilter® is designed to operate within a defined hydraulic envelope and treatment capacity. Verified performance is applicable when the system is installed and operated in accordance with the manufacturer's specifications and recommended operating conditions. This includes operation within the defined treatment flow ranges, provision of adequate hydraulic head to maintain flow through the filtration media, and proper configuration of inlet, outlet, bypass, and treatment flow control components.

The system is typically configured as an offline stormwater treatment device in which a portion of stormwater runoff is diverted through the treatment chamber while flows exceeding the design treatment capacity may bypass the system. Verified performance therefore applies only to flows treated within the defined hydraulic design capacity and does not represent performance under bypass or exceedance conditions.

The performance evaluation is based on field monitoring data collected under real stormwater conditions, supplemented by laboratory testing conducted under controlled conditions. The evaluated datasets include multiple rainfall events representing variability in storm intensity, duration, influent pollutant concentrations, hydraulic loading conditions, and environmental factors typical of urban runoff from impervious surfaces. Performance is influenced by several factors, including influent water quality characteristics, suspended solids concentration, particle size distribution, the proportion of particulate-bound versus dissolved pollutants, hydraulic loading conditions, residence time within the system, and filter media condition. Variability in treatment performance across different storm events and operating conditions is inherent to stormwater treatment systems and has been considered in the interpretation of verified performance.

Sustained treatment performance is dependent on appropriate installation, routine inspection, sediment and debris removal, and periodic maintenance or replacement of filtration cartridges in accordance with manufacturer recommendations. Failure to maintain the system under the specified operating conditions may result in reduced treatment effectiveness. The verified performance presented in this Verification Statement applies only under conditions broadly consistent with those represented in the evaluated datasets and supporting technical documentation. Application of the results to substantially different hydraulic, environmental, or influent conditions should be undertaken with consideration of site-specific factors and engineering judgment.

Performance Claims

Performance Claim 1 - Total Suspended Solids (TSS)

Based on the independent evaluation of field monitoring data, laboratory testing results, SQIDEP evaluation documentation, and supporting technical evidence, the Atlan FlowFilter® demonstrated Total Suspended Solids (TSS) removal typically in the range of approximately 90% to 98% under defined operating conditions.

The verified performance reflects multiple monitored storm events and varying influent conditions representative of urban stormwater runoff from impervious surfaces. The observed TSS reduction is

associated primarily with sedimentation and depth filtration processes within the treatment system. Performance variability across datasets reflects differences in influent sediment concentration, particle size distribution, hydraulic loading conditions, and event-specific environmental factors. Verified performance applies only within the defined hydraulic design envelope and operating conditions described in this Verification Statement and the associated ETV Technical Report.

Performance Claim 2 - Total Phosphorus (TP)

Based on the independent evaluation of available evidence, the Atlan FlowFilter® demonstrated Total Phosphorus (TP) removal typically in the range of approximately 70% to 90% under defined operating conditions.

The verified performance is supported by field monitoring data, SQIDEP evaluation results, laboratory analytical data, and controlled laboratory testing. Phosphorus removal is associated primarily with the capture of particulate-bound phosphorus fractions through sedimentation and filtration processes, together with adsorption and physicochemical interactions within the filter media. Observed variability in TP removal performance reflects differences in influent phosphorus concentrations, particulate versus dissolved phosphorus fractions, hydraulic conditions, and event-specific stormwater characteristics.

Performance Claim 3 - Total Nitrogen (TN)

Based on the independent evaluation of available evidence, the Atlan FlowFilter® demonstrated Total Nitrogen (TN) removal typically in the range of approximately 40% to 50% under defined operating conditions.

The verified performance is supported by field monitoring data, laboratory testing, SQIDEP evaluation documentation, and supporting technical evidence. Nitrogen removal performance is influenced by the proportion of particulate-bound versus dissolved nitrogen fractions present in the influent stormwater. The evaluated datasets demonstrated variability in TN removal across sampling events, including occasional event-specific increases in outlet TN concentrations. This variability is consistent with the behavior of filtration-based stormwater treatment systems operating under variable environmental and hydraulic conditions.

Performance Claim 4 - Metals Removal

Based on the independent evaluation of field monitoring data, laboratory testing results, SQIDEP evaluation documentation, and supporting technical evidence, the Atlan FlowFilter® demonstrated removal of particulate-associated metals under defined operating conditions. Verified performance includes lead removal typically in the range of approximately 80% to 90% and zinc removal typically in the range of approximately 40% to 60%.

Metals removal performance is associated primarily with the capture of particulate-bound metals through sedimentation and filtration processes. Observed variability in removal efficiency reflects differences in influent concentrations, the proportion of dissolved versus particulate-bound metals, hydraulic conditions, and event-specific stormwater characteristics.

Performance Claim 5 - Gross Pollutant Removal

Based on the independent evaluation of available evidence, the Atlan FlowFilter® demonstrated effective removal of gross pollutants through physical capture and sedimentation mechanisms under defined operating conditions.

The system incorporates a sedimentation sump and inlet configuration designed to facilitate the retention of coarse debris and gross pollutants prior to filtration. Field observations, operational documentation, and supporting evaluation data indicate effective retention of gross pollutants within the treatment chamber under normal operating conditions. Gross pollutant removal performance is influenced by hydraulic loading conditions, maintenance frequency, and overall system configuration. Under conditions exceeding the defined treatment capacity, bypass of untreated flows may occur depending on the hydraulic design and installation configuration.

Performance Results

The performance results presented in this Verification Statement are based on the independent evaluation of multiple datasets, including SQIDEP evaluation reports, supporting Body of Evidence (BOE) documentation, field monitoring data collected under operational stormwater conditions, accredited laboratory analytical results, controlled laboratory testing conducted by the Water Research Laboratory (WRL), and supporting technical documentation. The evaluated field monitoring datasets included multiple rainfall events representing a range of hydraulic loading conditions, influent pollutant concentrations, storm durations, and environmental conditions typical of urban stormwater runoff from impervious surfaces. These field datasets were supplemented by controlled laboratory testing to support interpretation of treatment performance under defined operating conditions.

Across the evaluated datasets, the Atlan FlowFilter® demonstrated consistently high removal of Total Suspended Solids (TSS), with outlet concentrations significantly reduced relative to influent conditions across most monitored events. The data also demonstrated measurable reductions in nutrients, including Total Phosphorus (TP) and Total Nitrogen (TN), together with removal of particulate-associated metals such as lead and zinc. Gross pollutant capture performance was supported through field observations, system configuration, and SQIDEP evaluation findings.

The evaluated datasets demonstrated variability in treatment performance across individual storm events and monitored parameters. This variability is consistent with real-world stormwater treatment conditions and reflects differences in influent water quality, pollutant loading, rainfall intensity, hydraulic conditions, residence time, and the proportion of particulate-bound versus dissolved pollutant fractions. Laboratory testing results generally supported the performance trends observed during field monitoring activities. Controlled laboratory testing provided additional validation of treatment mechanisms and performance behavior under defined hydraulic and pollutant loading conditions, while field monitoring reflected actual operational variability encountered under real stormwater conditions.

Independent review of data quality documentation, including laboratory accreditation, analytical methodologies, QA/QC procedures, chain-of-custody records, event qualification criteria, and sampling documentation, indicated that the datasets were of sufficient quality and traceability to support independent verification of the performance claims presented in this Verification Statement. The collective body of evidence demonstrates that the Atlan FlowFilter® is effective in reducing suspended solids and associated pollutants from urban stormwater runoff when operated within the defined hydraulic design envelope and maintained in accordance with manufacturer recommendations.

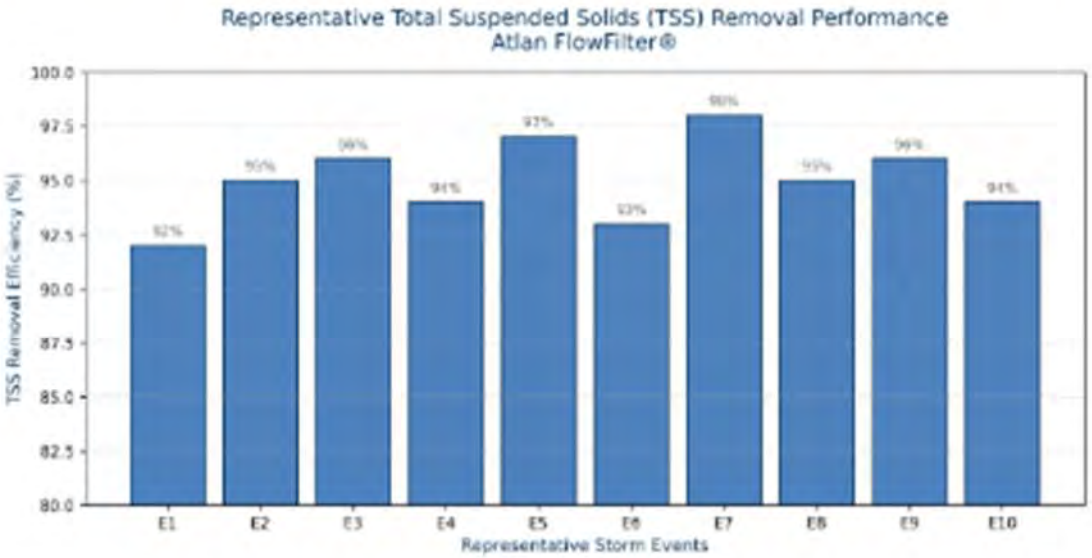


Figure 2. Representative TSS removal efficiencies based on evaluated field monitoring datasets and supporting evidence reviewed during the ISO 14034-aligned ETV process.

Verification

This Environmental Technology Verification (ETV) was conducted by Globe Performance Solutions (GPS) in accordance with the principles and framework of ISO 14034:2016 - Environmental Management - Environmental Technology Verification (ETV). The verification was based on the independent assessment of available evidence supporting the performance of the Atlan FlowFilter® stormwater treatment system. The objective of the verification was to evaluate the validity and reliability of the performance claims associated with the technology under defined operating conditions.

The verification process included review and evaluation of SQIDEP evaluation reports and supporting Body of Evidence (BOE) documentation, field monitoring datasets collected under operational stormwater conditions, accredited laboratory analytical results, controlled laboratory testing conducted by the Water Research Laboratory (WRL), University of New South Wales, rainfall and event monitoring records, quality assurance and quality control (QA/QC) documentation, and supporting technical documentation provided by the technology developer.

GPS conducted an independent review of the available datasets to assess data quality, traceability, relevance, completeness, and consistency across multiple evidence sources. The verification included evaluation of pollutant removal performance for Total Suspended Solids (TSS), nutrients, metals, and gross pollutants under the operating conditions represented within the evaluated datasets.

The field monitoring datasets included multiple rainfall events collected under real stormwater operating conditions and represented variability in hydraulic loading, influent pollutant concentrations, storm intensity, and environmental conditions typical of urban runoff from impervious surfaces. Controlled laboratory testing was additionally reviewed to support interpretation of treatment mechanisms and performance trends under defined hydraulic and loading conditions.

GPS did not generate or modify primary testing data as part of this verification. Verification conclusions presented in this Verification Statement are based solely on the independent evaluation and interpretation of the available evidence and supporting documentation. This verification was not conducted under the

Canadian Procedure for Field Testing of Stormwater Filtration Manufactured Treatment Devices (PAS), the Washington State Technology Assessment Protocol Ecology (TAPE), or any jurisdiction-specific regulatory approval or certification program. Rather, the verification was conducted using an ISO 14034-aligned evidence-based verification methodology incorporating field monitoring data, laboratory testing data, SQIDEP evaluation documentation, and supporting technical evidence from independent and identified sources.

To provide additional transparency and technical context, the associated ETV Technical Report includes an annex describing the alignment between the verification methodology applied in this assessment and relevant PAS framework elements. The verified performance presented in this Verification Statement applies only under the defined operating conditions, hydraulic design parameters, maintenance conditions, and conditions of applicability described in this document and the associated ETV Technical Report.

What is ISO14034:2016 Environmental management – Environmental technology verification (ETV)?

ISO 14034:2016 specifies principles, procedures and requirements for environmental technology verification (ETV) and was developed and published by the International Organization for Standardization (ISO). The objective of ETV is to provide credible, reliable and independent verification of the performance of environmental technologies. An environmental technology is a technology that either results in an environmental added value or measures parameters that indicate an environmental impact. Such technologies have an increasingly important role in addressing environmental challenges and achieving sustainable development.

Verification

Globe Performance Solutions (GPS) provides Environmental Technology Verification (ETV) services based solely on the information, datasets, technical documents, and supporting evidence made available by the technology developer and other identified sources at the time of verification. Responsibility for the accuracy, completeness, and authenticity of the submitted information remains solely with the technology developer and original data sources.

The verification conclusions presented in this Verification Statement are based on independent evaluation of the available evidence in accordance with the principles and framework of ISO 14034:2016 - Environmental Management - Environmental Technology Verification (ETV). GPS did not generate primary testing data, conduct independent field sampling, or perform laboratory analyses as part of this verification unless specifically stated otherwise in the associated ETV Technical Report. The verification results were independently validated by two independent industry experts.

The verified performance presented in this Verification Statement applies only under the defined operating conditions, hydraulic design parameters, influent characteristics, maintenance conditions, and conditions of applicability described in this document and the associated ETV Technical Report. Performance may vary under different environmental, hydraulic, operational, or site-specific conditions. This verification does not constitute regulatory approval or certification under any jurisdiction-specific program, or approval by any regulatory authority, municipality, or permitting agency.

This verification is limited to the technical performance assessment of the Atlan FlowFilter® based on the evaluated datasets and supporting evidence available at the time of verification. GPS assumes no liability for the purchase, design, installation, operation, maintenance, or performance of the technology beyond the scope of the verification described herein. Liability associated with the application, use, interpretation,

or reliance upon the verified performance remains solely with the technology owner, system designer, installer, operator, purchaser, or end user.

The verification shall not be reproduced selectively or presented in a manner that misrepresents the scope, limitations, conditions of applicability, or conclusions of the verification.

For more information on Atlan Stormwater Atlan FlowFilter please contact:

Atlan Stormwater
30 Technology Drive
Augustine Heights QLD
4300, Australia
Tel: 1300 773 500
Andy.Hornbuckle@atlan.com.au
www.atlanstormwater.com/au/

For more information on ISO 14034:2016 / ETV please contact:

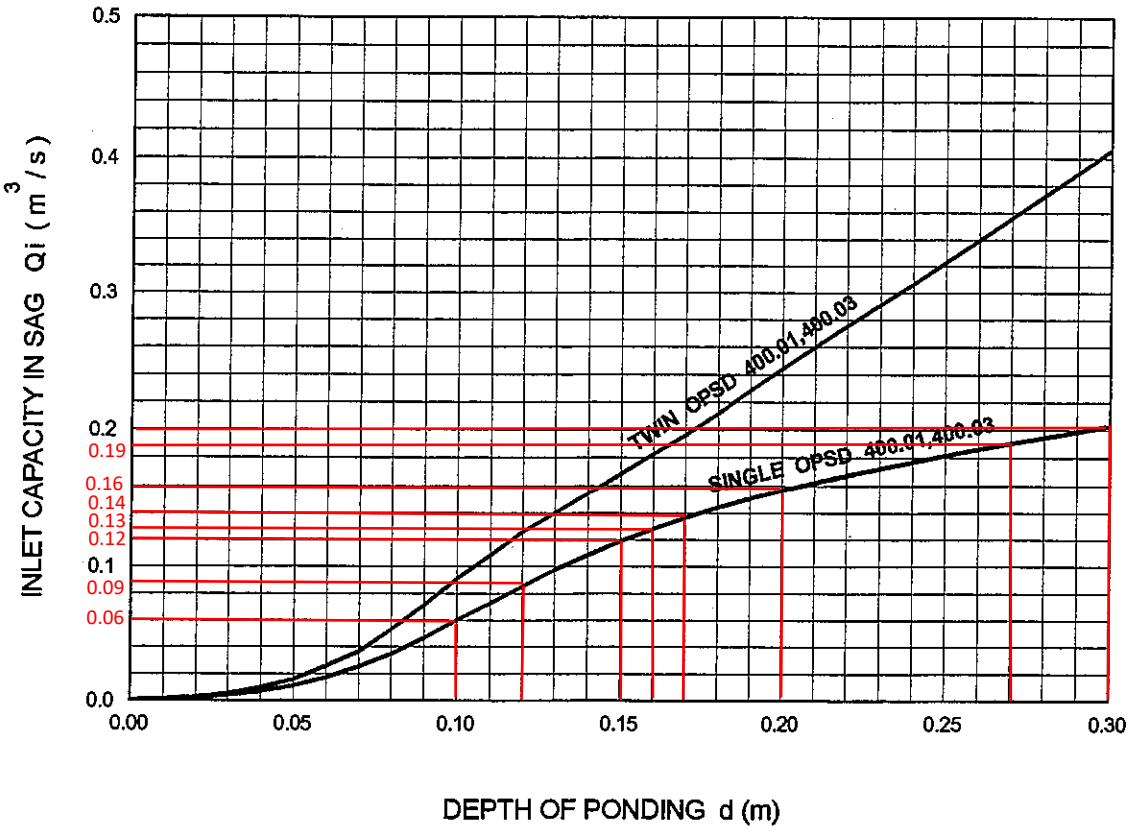
Globe Performance Solutions
Suite 400, 105 12 Ave SE
Calgary, AB
T2G 1A1, Canada
Tel: (403) 906- 3178 | C: 7804467033
ychaudhry@globeperformance.com
www.globeperformance.com



APPENDIX E

STORMWATER MANAGEMENT CALCULATIONS

Design Chart 4.19: Inlet Capacity at Road Sag



Inlet Capacity Calculation

Project: 4216 South Service Road
Project No.: 191028
Catchment: Driveway North of Building A

100 Year Flow	CB402	CBMH403	CBMH406	CBMH408	CBMH410	CBMH411	CBMH412
Runoff Coefficient =	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Area (ha) =	0.100	0.200	0.200	0.300	0.050	0.030	0.060
A:	1281.34	1281.34	1281.34	1281.34	1281.34	1281.34	1281.34
B:	5.00	5.00	5.00	5.00	5.00	5.00	5.00
C:	0.761	0.761	0.761	0.761	0.761	0.761	0.761
Tc:	10.000	10.000	10.000	10.000	10.000	10.000	10.000
Intensity (I) mm/hr =	163.2	163.2	163.2	163.2	163.2	163.2	163.2
Peak Flow (Q) L/s =	40.8	81.6	81.6	122.4	20.4	12.2	24.5
Peak Flow (Q) m^3/s =	**0.041**	**0.082**	**0.082**	**0.122**	**0.020**	**0.012**	**0.024**

Inlet Capacity							
Max. Ponding Elevation (m) =	124.90	124.90	124.90	124.90	124.90	124.90	124.90
Inlet Elevation (m) =	124.60	124.60	124.60	124.60	124.75	124.75	124.75
Maximum Ponding Depth (m) =	0.30	0.30	0.30	0.30	0.15	0.15	0.15
Inlet Capacity based on MTO Chart 4.19 (m3/s) =	0.20	0.20	0.20	0.20	0.12	0.12	0.12
Actual Capacity assumed 50% Blockage(m^3/s) =	**0.100**	**0.100**	**0.100**	**0.100**	**0.060**	**0.060**	**0.060**
Number of Inlet =	2	2	2	2	2	1	1
Inlet Capacity (m3/s) =	0.200	0.200	0.200	0.200	0.120	0.060	0.060

Inlet Capacity Calculation

Project: 4216 South Service Road
Project No.: 191028
Catchment: Loading Area

100 Year Flow	CB318	CBMH300	CBMH301	CB300	CB302	CB304	CB306	CB309	CB311	CB313	CB315	CB317	CB307	CBMH306
Runoff Coefficient =	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Area (ha) =	0.080	0.050	0.050	0.300	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.150	0.170	0.150
A:	1281.34	1281.34	1281.34	1281.34	1281.34	1281.34	1281.34	1281.34	1281.34	1281.34	1281.34	1281.34	1281.34	1281.34
B:	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
C:	0.761	0.761	0.761	0.761	0.761	0.761	0.761	0.761	0.761	0.761	0.761	0.761	0.761	0.761
Tc:	10.000	10.000	10.000	10.000	10.000	10.000	10.000	10.000	10.000	10.000	10.000	10.000	10.000	10.000
Intensity (I) mm/hr =	163.2	163.2	163.2	163.2	163.2	163.2	163.2	163.2	163.2	163.2	163.2	163.2	163.2	163.2
Peak Flow (Q) L/s =	32.6	20.4	20.4	122.4	81.6	81.6	81.6	81.6	81.6	81.6	81.6	61.2	69.4	61.2
Peak Flow (Q) m^3/s =	**0.033**	**0.020**	**0.020**	**0.122**	**0.082**	**0.082**	**0.082**	**0.082**	**0.082**	**0.082**	**0.082**	**0.061**	**0.069**	**0.061**

Inlet Capacity

Max. Ponding Elevation (m) =	124.72	124.73	124.73	123.76	123.76	123.76	123.76	123.76	123.76	123.76	123.76	123.76	123.76	123.76
Inlet Elevation (m) =	124.60	124.63	124.63	123.56	123.56	123.56	123.56	123.56	123.56	123.56	123.56	123.56	123.56	123.56
Maximum Ponding Depth (m) =	0.12	0.10	0.10	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
Inlet Capacity based on MTO Chart 4.19 (m^3/s) =	0.09	0.06	0.06	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16
Actual Capacity assumed 50% Blockage(m^3/s) =	**0.045**	**0.030**	**0.030**	**0.080**	**0.080**	**0.080**	**0.080**	**0.080**	**0.080**	**0.080**	**0.080**	**0.080**	**0.080**	**0.080**
Number of Inlet =	1	1	1	2	2	2	2	2	2	2	2	1	1	1
Inlet Capacity (m3/s) =	0.045	0.030	0.030	0.160	0.160	0.160	0.160	0.160	0.160	0.160	0.160	0.080	0.080	0.080

Inlet Capacity Calculation

Project: 4216 South Service Road
Project No.: 191028
Catchment: Loading Area

100 Year Flow	CB200	CBMH201	CBMH202	CBMH203	CBMH204	CBMH205	CBMH206	CBMH207	CBMH208
Runoff Coefficient =	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Area (ha) =	0.080	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100
A:	1281.34	1281.34	1281.34	1281.34	1281.34	1281.34	1281.34	1281.34	1281.34
B:	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
C:	0.761	0.761	0.761	0.761	0.761	0.761	0.761	0.761	0.761
Tc:	10.000	10.000	10.000	10.000	10.000	10.000	10.000	10.000	10.000
Intensity (I) mm/hr =	163.2	163.2	163.2	163.2	163.2	163.2	163.2	163.2	163.2
Peak Flow (Q) L/s =	32.6	40.8	40.8	40.8	40.8	40.8	40.8	40.8	40.8
Peak Flow (Q) m^3/s =	**0.033**	**0.041**	**0.041**	**0.041**	**0.041**	**0.041**	**0.041**	**0.041**	**0.041**

Inlet Capacity

Max. Ponding Elevation (m) =	124.78	124.78	124.90	124.90	124.90	124.90	124.90	124.90	124.90
Inlet Elevation (m) =	124.58	124.58	124.73	124.63	124.63	124.63	124.63	124.63	124.63
Maximum Ponding Depth (m) =	0.16	0.20	0.17	0.27	0.27	0.27	0.27	0.27	0.27
Inlet Capacity based on MTO Chart 4.19 (m3/s) =	0.13	0.16	0.14	0.19	0.19	0.19	0.19	0.19	0.19
Actual Capacity assumed 50% Blockage(m^3/s) =	**0.065**	**0.080**	**0.070**	**0.095**	**0.095**	**0.095**	**0.095**	**0.095**	**0.095**
Number of Inlet =	1	1	1	2	2	2	2	2	2
Inlet Capacity (m3/s) =	0.065	0.080	0.070	0.190	0.190	0.190	0.190	0.190	0.190

Rational Method Calc.

Project:	4495 NSR
Project No.:	221385
Municipality:	Burlington
Catchment:	Pre-Development

Catchment 100

	Area (m2)	C	C x A	%Imp
Landscape	34581	0.25	8645.2	0%
Rooftop	0	0.95	0.0	100%
Gravel	47329	0.60	28397.4	75%
	81910	0.45	37042.5	43%

	C
2yr - 10yr	0.45
25yr	0.50
50yr	0.50
100yr	0.50

Catchment 300

	Area (m2)	C	C x A	%Imp
Landscape	5470	0.25	1367.4	0%
Rooftop	0	0.95	0.0	100%
Pavement	0	0.95	0.0	100%
	5470	0.25	1367.4	0%

	C
2yr - 10yr	0.25
25yr	0.28
50yr	0.30
100yr	0.31

Catchment 200

	Area (m2)	C	C x A	%Imp
Landscape	6986	0.25	1746.4	0%
Rooftop	0	0.95	0.0	100%
Pavement	0	0.95	0.0	100%
	6986	0.25	1746.4	0%

	C
2yr - 10yr	0.25
25yr	0.28
50yr	0.30
100yr	0.31

Rational Method Calc.

Project:	4495 NSR
Project No.:	221385
Municipality:	Burlington
Catchment:	Proposed Development

Catchment 101

	Area (m2)	C	C x A	%Imp
Landscape	3369	0.25	842.3	0%
Rooftop	17453	0.95	16580.4	100%
Pavement	5777	0.95	5488.2	100%
	26599	0.86	22910.8	87%

	C
2yr - 10yr	0.86
25yr	0.95
50yr	1.00
100yr	1.00

Catchment 102

	Area (m2)	C	C x A	%Imp
Landscape	2595	0.25	648.8	0%
Rooftop	0	0.95	0.0	100%
Pavement	22481	0.95	21357.0	100%
	25076	0.88	22005.7	90%

	C
2yr - 10yr	0.88
25yr	0.97
50yr	1.00
100yr	1.00

Catchment 103

	Area (m2)	C	C x A	%Imp
Landscape	37	0.25	9.3	0%
Rooftop	21998	0.95	20898.1	100%
Pavement	7127	0.95	6770.7	100%
	29162	0.95	27678.0	100%

	C
2yr - 10yr	0.95
25yr	1.00
50yr	1.00
100yr	1.00

Catchment 104

	Area (m2)	C	C x A	%Imp
Landscape	563	0.25	140.8	0%
Rooftop	0	0.95	0.0	100%
Pavement	1908	0.95	1812.6	100%
	2471	0.79	1953.4	77%

	C
2yr - 10yr	0.79
25yr	0.87
50yr	0.95
100yr	0.99

Catchment 105

	Area (m2)	C	C x A	%Imp
Landscape	3306	0.25	826.5	0%
Rooftop	0	0.95	0.0	100%
Pavement	0	0.95	0.0	100%
	3306	0.25	826.5	0%

	C
2yr - 10yr	0.25
25yr	0.28
50yr	0.30
100yr	0.31

Catchment 201

	Area (m2)	C	C x A	%Imp
Landscape	6986	0.25	1746.4	0%
Rooftop	0	0.95	0.0	100%
Pavement	0	0.95	0.0	100%
	6986	0.25	1746.4	0%

	C
2yr - 10yr	0.25
25yr	0.28
50yr	0.30
100yr	0.31

Catchment 301

	Area (m2)	C	C x A	%Imp
Landscape	1729	0.25	432.3	0%
Rooftop	0	0.95	0.0	100%
Pavement	0	0.95	0.0	100%
	1729	0.25	432.3	0%

	C
2yr - 10yr	0.25
25yr	0.28
50yr	0.30
100yr	0.31

OSD Storage-Discharge

Project: 4495 NSR
Project No.: 221385
Catchment: 101

Orifice Tube	CBMH412		
Invert		121.29	m
Size		100	mm
Co-efficient		0.80	
Area		0.0079	m^2

STAGE-STORAGE	Elevation	Area (m2)	Incremental Storage (m^3)	Total Storage (ha-m)	Head on Orifice 1 (m)	Orifice 1 Flow (m^3/s)
	121.29	0	0.00	0.0000	0.00	0.0000
Bottom of Dry Pond	124.30	0	781.07	0.0781	2.96	0.0479
	124.35	15.1	0.38	0.0781	3.01	0.0483
	124.40	70.5	2.14	0.0784	3.06	0.0487
	124.45	169.2	5.99	0.0790	3.11	0.0491
	124.50	303.1	11.81	0.0801	3.16	0.0495
	124.55	468.8	19.30	0.0821	3.21	0.0499
Top of CB in Parking	124.60	657.0	28.14	0.0849	3.26	0.0503
	124.65	958.3	40.38	0.0889	3.31	0.0506
	124.70	1462.9	60.53	0.0950	3.36	0.0510
	124.75	2170.9	90.84	0.1041	3.41	0.0514
	124.80	3163.1	133.35	0.1174	3.46	0.0518
	124.85	4491.5	191.36	0.1365	3.51	0.0521
	124.90	5994.2	262.14	0.1627	3.56	0.0525

Pipe/Structure Storage Volumes

Project: 4495 NSR
Project No.: 221385
Catchment: 101

Pipe Storage

Diameter	Length	Storage Volume
150	0	0.00
200	0	0.00
250	25.41	1.25
300	85.8	6.06
375	114.9	12.69
450	0	0.00
525	58.6	12.69
600	98.6	27.88
675	0	0.00
750	0	0.00
825	0	0.00
900	0	0.00
975	0	0.00
1050	0	0.00
1200	0	0.00
1350	0	0.00
1500	0	0.00
1800	0	0.00
Total		60.6 m^3

Manhole Storage

Diameter	Quantity	Avg. Depth (inv. to top)	Storage Volume
1200	10.00	1.75	19.84
1500	0.00	0.00	0.00
1800	0.00	0.00	0.00
Total			19.8 m^3

Underground Storage Chambers 700.0 m^3

CB Storage

Quantity	Avg. Depth	Vol
2.00	0.92	0.66
Total		0.7 m^3

Total Storage 781 m^3

OSD Storage-Discharge

Project: 4495 NSR
Project No.: 221385
Catchment: 102

Orifice Tube	CBMH306		
Invert		121.02	m
Size		100	mm
Co-efficient		0.80	
Area		0.0079	m^2

STAGE-STORAGE	Elevation	Area (m2)	Incremental Storage (m^3)	Total Storage (ha-m)	Head on Orifice 1 (m)	Orifice 1 Flow (m^3/s)
	121.02	0	0.00	0.0000	0.00	0.0000
Top of CB in Parking	123.56	0	828.06	0.0828	2.49	0.0439
	123.61	519.0	12.97	0.0841	2.54	0.0444
	123.66	2055.5	64.36	0.0905	2.59	0.0448
	123.71	4507.5	164.07	0.1069	2.64	0.0452
	123.76	7802.6	307.75	0.1377	2.69	0.0456
	123.81	10771.0	464.34	0.1842	2.74	0.0461
	123.86	13676.2	611.18	0.2453	2.79	0.0465

Pipe/Structure Storage Volumes

Project: 4495 NSR
Project No.: 221385
Catchment: 102

Pipe Storage

Diameter	Length	Storage Volume
150	0	0.00
200	0	0.00
250	117.6	5.77
300	48.4	3.42
375	0	0.00
450	0	0.00
525	0	0.00
600	0	0.00
675	227	81.23
750	45.2	19.97
825	0	0.00
900	0	0.00
975	0	0.00
1050	0	0.00
1200	0	0.00
1350	0	0.00
1500	0	0.00
1800	0	0.00

Total 110.39 m^3

Manhole Storage

Diameter	Quantity	Avg. Depth (inv. to top)	Storage Volume
1200	5.00	1.87	10.57
1500	0.00	0.00	0.00
1800	0.00	0.00	0.00

Total 10.57 m^3

Quantity Storage Chambers 700.0 m^3

CB Storage

Quantity	Avg. Depth	Vol
18.00	1.10	7.0956

Total 7.0956 m^3

Total Storage 828 m^3

OSD Storage-Discharge

Project: 4495 NSR
Project No.: 221385
Catchment: 103

Orifice Tube	CBMH208		
Invert		120.88	m
Size		200	mm
Co-efficient		0.80	
Area		0.0314	m^2

STAGE-STORAGE	Elevation	Area (m2)	Incremental Storage (m^3)	Total Storage (ha-m)	Head on Orifice 1 (m)	Orifice 1 Flow (m^3/s)
	120.88	0	0.00	0.0000	0.00	0.0000
Top of CB in Parking	124.58	0	661.56	0.0662	3.60	0.2112
	124.63	42.5	1.06	0.0663	3.65	0.2127
	124.68	344.8	9.68	0.0672	3.70	0.2141
	124.73	1032.9	34.44	0.0707	3.75	0.2156
	124.78	2129.1	79.05	0.0786	3.80	0.2170

Pipe/Structure Storage Volumes

Project: 4495 NSR
Project No.: 221385
Catchment: 103

Pipe Storage

Diameter	Length	Storage Volume
150	0	0.00
200	0	0.00
250	40.1	1.97
300	46.6	3.29
375	103.2	11.40
450	0	0.00
525	111	24.03
600	0	0.00
675	0	0.00
750	0	0.00
825	0	0.00
900	0	0.00
975	0	0.00
1050	0	0.00
1200	0	0.00
1350	0	0.00
1500	0	0.00
1800	0	0.00
Total		40.69 m^3

Manhole Storage

Diameter	Quantity	Avg. Depth (inv. to top)	Storage Volume
1200	7.00	2.58	20.41
1500	0.00	0.00	0.00
1800	0.00	0.00	0.00
Total			20.41 m^3

Quantity Storage Chambers	600.0	m^3

CB Storage

Quantity	Avg. Depth	Vol
1.00	1.26	0.4536
Total		0.4536 m^3

Total Storage	662	m^3

Stormwater Infiltration Drawdown Time

Project: 4495 North Service Road
Project No.: 221385
Municipality: City of Burlington

Infiltration rate =	148	mm/hour

Infiltration Chamber A

Required Space for the System =	380	m2
Infiltration Depth =	660	mm
Retention Volume Provided =	241	m3

Drawdown Time

Required Retention Volume =	236	m3
Design Infiltration Rate = (with 2.5 factor of safety)	59	mm/hr
Retention Drawdown Time =	11	hr

Infiltration Chamber B

Required Space for the System =	470	m2
Infiltration Depth =	660	mm
Retention Volume Provided =	298	m3

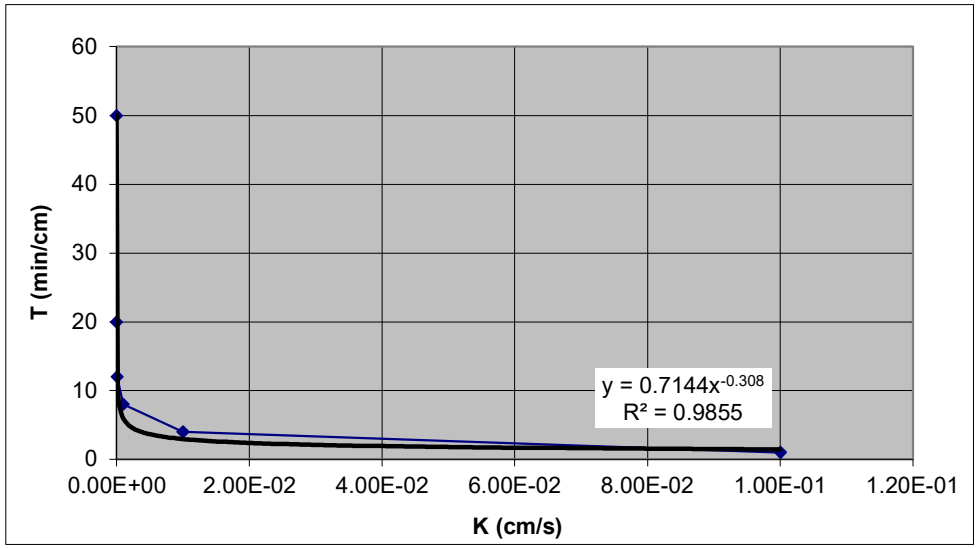
Drawdown Time

Required Retention Volume =	297	m3
Design Infiltration Rate = (with 2.5 factor of safety)	59	mm/hr
Retention Drawdown Time =	11	hr

Relationship between Permeability and Percolation Time

K (cm/s)	T (min/cm)	T (mm/hour)
1.00E-01	1	600
1.00E-02	4	150
1.00E-03	8	75
1.00E-04	12	50
1.00E-05	20	30
1.00E-06	50	12
1.00E-07	102	5.9

	K(cm/s)	T (min/cm)	T (mm/hour)	with 2.5 factor of Safety
BH201	8.10E-04	6	94	38
BH204	9.30E-03	3	199	80
BH217	8.80E-03	3	195	78
BH220	2.50E-03	5	133	53
Geometric Mean	**3.60E-03**	**4**	**148**	**59**





APPENDIX F

HYDROLOGIC MODELLING



HUSSON
ENGINEERING + MANAGEMENT
P 905.709.5825
200 CACHET WOODS COURT, SUITE 204
MARKHAM, ON L6C 0Z8
HUSSON.CA

FIGURE F1

4495 NORTH SERVICE ROAD
PRE-DEVELOPMENT VO SCHEMATIC

DATE: JUNE 2026 SCALE: NTS PROJECT: 221277

```
       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\VO2\voin.dat
Output filename: C:\Users\workstation\AppData\Local\Civica\VH5\481a4287-7c85-406f-9d86-88ed6da58e85\66620f3d-dfd9-4c47-a058-1cec8a819c36\
Summary filename: C:\Users\workstation\AppData\Local\Civica\VH5\481a4287-7c85-406f-9d86-88ed6da58e85\66620f3d-dfd9-4c47-a058-1cec8a819c36\

DATE: 05-28-2026 TIME: 10:45:55

USER:

COMMENTS: _____

****
** SIMULATION : Rain 01 - 2yr **
****

| CHICAGO STORM |
| Ptotal= 37.19 mm |

IDF curve parameters: A= 681.520
B= 6.000
C= 0.780
used in: INTENSITY = A / (t + B)^C

Duration of storm = 4.00 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	2.54	1.00	19.72	2.00	5.98	3.00	3.02
0.17	2.91	1.17	78.39	2.17	5.09	3.17	2.81
0.33	3.42	1.33	25.74	2.33	4.45	3.33	2.62
0.50	4.20	1.50	13.74	2.50	3.96	3.50	2.46
0.67	5.53	1.67	9.48	2.67	3.58	3.67	2.33
0.83	8.38	1.83	7.31	2.83	3.27	3.83	2.21

| CALIB |
| STANDHYD (0100)| Area (ha)= 8.19
|ID= 1 DT= 5.0 min | Total Imp(%)= 43.00 Dir. Conn.(%)= 43.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	3.52	4.67
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	233.68	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	2.54	1.083	19.72	2.083	5.98	3.08	3.02
0.167	2.54	1.167	19.72	2.167	5.98	3.17	3.02
0.250	2.91	1.250	78.39	2.250	5.09	3.25	2.81
0.333	2.91	1.333	78.39	2.333	5.09	3.33	2.81
0.417	3.42	1.417	25.74	2.417	4.45	3.42	2.62
0.500	3.42	1.500	25.74	2.500	4.45	3.50	2.62
0.583	4.20	1.583	13.74	2.583	3.96	3.58	2.46
0.667	4.20	1.667	13.74	2.667	3.96	3.67	2.46
0.750	5.53	1.750	9.48	2.750	3.58	3.75	2.33
0.833	5.53	1.833	9.48	2.833	3.58	3.83	2.33
0.917	8.38	1.917	7.31	2.917	3.27	3.92	2.21
1.000	8.38	2.000	7.31	3.000	3.27	4.00	2.21

Max.Eff.Inten.(mm/hr)=	78.39	24.78		
over (min)	5.00	20.00		
Storage Coeff. (min)=	4.69 (ii)	17.02 (ii)		
Unit Hyd. Tpeak (min)=	5.00	20.00		
Unit Hyd. peak (cms)=	0.22	0.06		
			TOTALS	
PEAK FLOW (cms)=	0.70	0.19	0.766 (iii)	
TIME TO PEAK (hrs)=	1.33	1.58	1.33	
RUNOFF VOLUME (mm)=	36.19	15.82	24.58	
TOTAL RAINFALL (mm)=	37.19	37.19	37.19	
RUNOFF COEFFICIENT =	0.97	0.43	0.66	

***** 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 (0300)	Area (ha)=	0.55	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 hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	2.54	1.083	19.72	2.083	5.98	3.08	3.02
0.167	2.54	1.167	19.72	2.167	5.98	3.17	3.02
0.250	2.91	1.250	78.39	2.250	5.09	3.25	2.81
0.333	2.91	1.333	78.39	2.333	5.09	3.33	2.81
0.417	3.42	1.417	25.74	2.417	4.45	3.42	2.62
0.500	3.42	1.500	25.74	2.500	4.45	3.50	2.62
0.583	4.20	1.583	13.74	2.583	3.96	3.58	2.46
0.667	4.20	1.667	13.74	2.667	3.96	3.67	2.46
0.750	5.53	1.750	9.48	2.750	3.58	3.75	2.33
0.833	5.53	1.833	9.48	2.833	3.58	3.83	2.33
0.917	8.38	1.917	7.31	2.917	3.27	3.92	2.21
1.000	8.38	2.000	7.31	3.000	3.27	4.00	2.21

Unit Hyd Qpeak (cms)=	0.104	
PEAK FLOW (cms)=	0.016 (i)	
TIME TO PEAK (hrs)=	1.500	
RUNOFF VOLUME (mm)=	10.809	
TOTAL RAINFALL (mm)=	37.193	
RUNOFF COEFFICIENT =	0.291	

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

CALIB			
NASHYD (0200)	Area (ha)=	0.70	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 hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	2.54	1.083	19.72	2.083	5.98	3.08	3.02
0.167	2.54	1.167	19.72	2.167	5.98	3.17	3.02
0.250	2.91	1.250	78.39	2.250	5.09	3.25	2.81
0.333	2.91	1.333	78.39	2.333	5.09	3.33	2.81
0.417	3.42	1.417	25.74	2.417	4.45	3.42	2.62
0.500	3.42	1.500	25.74	2.500	4.45	3.50	2.62
0.583	4.20	1.583	13.74	2.583	3.96	3.58	2.46
0.667	4.20	1.667	13.74	2.667	3.96	3.67	2.46
0.750	5.53	1.750	9.48	2.750	3.58	3.75	2.33
0.833	5.53	1.833	9.48	2.833	3.58	3.83	2.33
0.917	8.38	1.917	7.31	2.917	3.27	3.92	2.21
1.000	8.38	2.000	7.31	3.000	3.27	4.00	2.21

Unit Hyd Qpeak (cms)= 0.133

PEAK FLOW (cms)= 0.021 (i)
TIME TO PEAK (hrs)= 1.500
RUNOFF VOLUME (mm)= 10.809
TOTAL RAINFALL (mm)= 37.193
RUNOFF COEFFICIENT = 0.291

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW 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\VO2\voin.dat
Output filename: C:\Users\workstation\AppData\Local\Civica\VH5\481a4287-7c85-406f-9d86-88ed6da58e85\96020afb-6f1a-4770-978f-b56ab6fcd3de\
Summary filename: C:\Users\workstation\AppData\Local\Civica\VH5\481a4287-7c85-406f-9d86-88ed6da58e85\96020afb-6f1a-4770-978f-b56ab6fcd3de\

DATE: 05-28-2026 TIME: 10:45:56

USER:

COMMENTS: _____

```
**********************************************
** SIMULATION : Rain 02 - 5yr                **
**********************************************
```

CHICAGO STORM
Ptotal= 47.95 mm

IDF curve parameters: A= 802.040
B= 5.000
C= 0.764
used in: INTENSITY = A / (t + B)^C

Duration of storm = 4.00 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	3.43	1.00	24.57	2.00	7.80	3.00	4.05
0.17	3.91	1.17	101.31	2.17	6.69	3.17	3.77
0.33	4.57	1.33	31.90	2.33	5.88	3.33	3.54
0.50	5.56	1.50	17.28	2.50	5.26	3.50	3.33
0.67	7.23	1.67	12.11	2.67	4.77	3.67	3.15
0.83	10.76	1.83	9.44	2.83	4.38	3.83	2.99

CALIB	
STANDHYD (0100)	Area (ha)= 8.19
ID= 1 DT= 5.0 min	Total Imp(%)= 43.00 Dir. Conn.(%)= 43.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	3.52	4.67
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	233.68	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	3.43	1.083	24.57	2.083	7.80	3.08	4.05
0.167	3.43	1.167	24.57	2.167	7.80	3.17	4.05
0.250	3.91	1.250	101.31	2.250	6.69	3.25	3.77
0.333	3.91	1.333	101.31	2.333	6.69	3.33	3.77
0.417	4.57	1.417	31.90	2.417	5.88	3.42	3.54
0.500	4.57	1.500	31.90	2.500	5.88	3.50	3.54
0.583	5.56	1.583	17.28	2.583	5.26	3.58	3.33
0.667	5.56	1.667	17.28	2.667	5.26	3.67	3.33
0.750	7.23	1.750	12.11	2.750	4.77	3.75	3.15
0.833	7.23	1.833	12.11	2.833	4.77	3.83	3.15
0.917	10.76	1.917	9.44	2.917	4.38	3.92	2.99
1.000	10.76	2.000	9.44	3.000	4.38	4.00	2.99

				TOTALS
Max.Eff.Inten.	(mm/hr)=	101.31	46.95	
over	(min)	5.00	15.00	
Storage Coeff.	(min)=	4.23 (ii)	13.78 (ii)	
Unit Hyd. Tpeak	(min)=	5.00	15.00	
Unit Hyd. peak	(cms)=	0.24	0.08	
PEAK FLOW	(cms)=	0.92	0.32	1.089 (iii)
TIME TO PEAK	(hrs)=	1.33	1.50	1.33
RUNOFF VOLUME	(mm)=	46.95	23.64	33.66
TOTAL RAINFALL	(mm)=	47.95	47.95	47.95
RUNOFF COEFFICIENT	=	0.98	0.49	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 (0300)	Area (ha)= 0.55 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 hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	3.43	1.083	24.57	2.083	7.80	3.08	4.05
0.167	3.43	1.167	24.57	2.167	7.80	3.17	4.05
0.250	3.91	1.250	101.31	2.250	6.69	3.25	3.77
0.333	3.91	1.333	101.31	2.333	6.69	3.33	3.77

0.417	4.57	1.417	31.90	2.417	5.88	3.42	3.54
0.500	4.57	1.500	31.90	2.500	5.88	3.50	3.54
0.583	5.56	1.583	17.28	2.583	5.26	3.58	3.33
0.667	5.56	1.667	17.28	2.667	5.26	3.67	3.33
0.750	7.23	1.750	12.11	2.750	4.77	3.75	3.15
0.833	7.23	1.833	12.11	2.833	4.77	3.83	3.15
0.917	10.76	1.917	9.44	2.917	4.38	3.92	2.99
1.000	10.76	2.000	9.44	3.000	4.38	4.00	2.99

Unit Hyd Qpeak (cms)= 0.104

PEAK FLOW (cms)= 0.027 (i)
TIME TO PEAK (hrs)= 1.500
RUNOFF VOLUME (mm)= 17.295
TOTAL RAINFALL (mm)= 47.949
RUNOFF COEFFICIENT = 0.361

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

CALIB			
NASHYD (0200)	Area (ha)= 0.70	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 hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	3.43	1.083	24.57	2.083	7.80	3.08	4.05
0.167	3.43	1.167	24.57	2.167	7.80	3.17	4.05
0.250	3.91	1.250	101.31	2.250	6.69	3.25	3.77
0.333	3.91	1.333	101.31	2.333	6.69	3.33	3.77
0.417	4.57	1.417	31.90	2.417	5.88	3.42	3.54
0.500	4.57	1.500	31.90	2.500	5.88	3.50	3.54
0.583	5.56	1.583	17.28	2.583	5.26	3.58	3.33
0.667	5.56	1.667	17.28	2.667	5.26	3.67	3.33
0.750	7.23	1.750	12.11	2.750	4.77	3.75	3.15
0.833	7.23	1.833	12.11	2.833	4.77	3.83	3.15
0.917	10.76	1.917	9.44	2.917	4.38	3.92	2.99
1.000	10.76	2.000	9.44	3.000	4.38	4.00	2.99

Unit Hyd Qpeak (cms)= 0.133

PEAK FLOW (cms)= 0.035 (i)
TIME TO PEAK (hrs)= 1.500
RUNOFF VOLUME (mm)= 17.295
TOTAL RAINFALL (mm)= 47.949
RUNOFF COEFFICIENT = 0.361

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW 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\VO2\voin.dat
Output filename: C:\Users\workstation\AppData\Local\Civica\VH5\481a4287-7c85-406f-9d86-88ed6da58e85\c6b63e27-d66a-4a58-8bc1-9832324d4627\

Summary filename: C:\Users\workstation\AppData\Local\Civica\VH5\481a4287-7c85-406f-9d86-88ed6da58e85\c6b63e27-d66a-4a58-8bc1-9832324d4627\

DATE: 05-28-2026 TIME: 10:45:56

USER:

COMMENTS: _____

****
** SIMULATION : Rain 03 - 10yr **
****

| CHICAGO STORM |
| Ptotal= 55.20 mm |

IDF curve parameters: A= 918.280
B= 5.000
C= 0.763
used in: INTENSITY = A / (t + B)^C

Duration of storm = 4.00 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	3.96	1.00	28.29	2.00	9.00	3.00	4.68
0.17	4.51	1.17	116.31	2.17	7.72	3.17	4.36
0.33	5.28	1.33	36.70	2.33	6.78	3.33	4.09
0.50	6.42	1.50	19.91	2.50	6.07	3.50	3.85
0.67	8.35	1.67	13.96	2.67	5.51	3.67	3.64
0.83	12.41	1.83	10.89	2.83	5.06	3.83	3.46

| CALIB |
| STANDHYD (0100) |
|ID= 1 DT= 5.0 min |

Area (ha)= 8.19
Total Imp(%)= 43.00 Dir. Conn.(%)= 43.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	3.52	4.67
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	233.68	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	3.96	1.083	28.29	2.083	9.00	3.08	4.68
0.167	3.96	1.167	28.29	2.167	9.00	3.17	4.68
0.250	4.51	1.250	116.31	2.250	7.72	3.25	4.36
0.333	4.51	1.333	116.31	2.333	7.72	3.33	4.36
0.417	5.28	1.417	36.70	2.417	6.78	3.42	4.09
0.500	5.28	1.500	36.70	2.500	6.78	3.50	4.09
0.583	6.42	1.583	19.91	2.583	6.07	3.58	3.85
0.667	6.42	1.667	19.91	2.667	6.07	3.67	3.85
0.750	8.35	1.750	13.96	2.750	5.51	3.75	3.64
0.833	8.35	1.833	13.96	2.833	5.51	3.83	3.64
0.917	12.41	1.917	10.89	2.917	5.06	3.92	3.46
1.000	12.41	2.000	10.89	3.000	5.06	4.00	3.46

				TOTALS
Max.Eff.Inten.	(mm/hr)=	116.31	58.94	
over	(min)	5.00	15.00	
Storage Coeff.	(min)=	4.00 (ii)	12.72 (ii)	
Unit Hyd. Tpeak	(min)=	5.00	15.00	
Unit Hyd. peak	(cms)=	0.24	0.08	
PEAK FLOW	(cms)=	1.07	0.42	1.292 (iii)
TIME TO PEAK	(hrs)=	1.33	1.50	1.33
RUNOFF VOLUME	(mm)=	54.20	29.27	39.99

```
     TOTAL RAINFALL   (mm)=      55.20        55.20          55.20
     RUNOFF COEFFICIENT   =       0.98         0.53           0.72

***** 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   (  0300)|   Area    (ha)=   0.55   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    3.96 | 1.083   28.29 | 2.083    9.00 |  3.08    4.68
              0.167    3.96 | 1.167   28.29 | 2.167    9.00 |  3.17    4.68
              0.250    4.51 | 1.250  116.31 | 2.250    7.72 |  3.25    4.36
              0.333    4.51 | 1.333  116.31 | 2.333    7.72 |  3.33    4.36
              0.417    5.28 | 1.417   36.70 | 2.417    6.78 |  3.42    4.09
              0.500    5.28 | 1.500   36.70 | 2.500    6.78 |  3.50    4.09
              0.583    6.42 | 1.583   19.91 | 2.583    6.07 |  3.58    3.85
              0.667    6.42 | 1.667   19.91 | 2.667    6.07 |  3.67    3.85
              0.750    8.35 | 1.750   13.96 | 2.750    5.51 |  3.75    3.64
              0.833    8.35 | 1.833   13.96 | 2.833    5.51 |  3.83    3.64
              0.917   12.41 | 1.917   10.89 | 2.917    5.06 |  3.92    3.46
              1.000   12.41 | 2.000   10.89 | 3.000    5.06 |  4.00    3.46

     Unit Hyd Qpeak  (cms)=   0.104

     PEAK FLOW       (cms)=   0.036 (i)
     TIME TO PEAK    (hrs)=   1.500
     RUNOFF VOLUME    (mm)=  22.122
     TOTAL RAINFALL   (mm)=  55.201
     RUNOFF COEFFICIENT   =   0.401

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0200)|   Area    (ha)=   0.70   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    3.96 | 1.083   28.29 | 2.083    9.00 |  3.08    4.68
              0.167    3.96 | 1.167   28.29 | 2.167    9.00 |  3.17    4.68
              0.250    4.51 | 1.250  116.31 | 2.250    7.72 |  3.25    4.36
              0.333    4.51 | 1.333  116.31 | 2.333    7.72 |  3.33    4.36
              0.417    5.28 | 1.417   36.70 | 2.417    6.78 |  3.42    4.09
              0.500    5.28 | 1.500   36.70 | 2.500    6.78 |  3.50    4.09
              0.583    6.42 | 1.583   19.91 | 2.583    6.07 |  3.58    3.85
              0.667    6.42 | 1.667   19.91 | 2.667    6.07 |  3.67    3.85
              0.750    8.35 | 1.750   13.96 | 2.750    5.51 |  3.75    3.64
              0.833    8.35 | 1.833   13.96 | 2.833    5.51 |  3.83    3.64
              0.917   12.41 | 1.917   10.89 | 2.917    5.06 |  3.92    3.46
              1.000   12.41 | 2.000   10.89 | 3.000    5.06 |  4.00    3.46

     Unit Hyd Qpeak  (cms)=   0.133

     PEAK FLOW       (cms)=   0.045 (i)
     TIME TO PEAK    (hrs)=   1.500
     RUNOFF VOLUME    (mm)=  22.122
     TOTAL RAINFALL   (mm)=  55.201
```

RUNOFF COEFFICIENT = 0.401

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW 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\VO2\voin.dat
Output filename: C:\Users\workstation\AppData\Local\Civica\VH5\481a4287-7c85-406f-9d86-88ed6da58e85\844ecd21-c4ea-4679-9606-0087bb050601\
Summary filename: C:\Users\workstation\AppData\Local\Civica\VH5\481a4287-7c85-406f-9d86-88ed6da58e85\844ecd21-c4ea-4679-9606-0087bb050601\

DATE: 05-28-2026 TIME: 10:45:56

USER:

COMMENTS: _____

```
  ********************************************
  ** SIMULATION : Rain 04 - 25yr              **
  ********************************************
```

CHICAGO STORM	Ptotal= 64.43 mm

IDF curve parameters: A=1065.950
B= 5.000
C= 0.762
used in: INTENSITY = A / (t + B)^C

Duration of storm = 4.00 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	4.64	1.00	33.01	2.00	10.53	3.00	5.48
0.17	5.29	1.17	135.38	2.17	9.03	3.17	5.11
0.33	6.18	1.33	42.80	2.33	7.94	3.33	4.79
0.50	7.52	1.50	23.26	2.50	7.11	3.50	4.51
0.67	9.77	1.67	16.31	2.67	6.45	3.67	4.27
0.83	14.51	1.83	12.73	2.83	5.92	3.83	4.05

CALIB	STANDHYD (0100)	ID= 1 DT= 5.0 min

Area (ha)= 8.19
Total Imp(%)= 43.00 Dir. Conn.(%)= 43.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	3.52	4.67
Dep. Storage	(mm)=	1.00	1.50

Average Slope	(%)=	1.00	2.00
Length	(m)=	233.68	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	4.64	1.083	33.01	2.083	10.53	3.08	5.48
0.167	4.64	1.167	33.01	2.167	10.53	3.17	5.48
0.250	5.29	1.250	135.38	2.250	9.03	3.25	5.11
0.333	5.29	1.333	135.38	2.333	9.03	3.33	5.11
0.417	6.18	1.417	42.80	2.417	7.94	3.42	4.79
0.500	6.18	1.500	42.80	2.500	7.94	3.50	4.79
0.583	7.52	1.583	23.26	2.583	7.11	3.58	4.51
0.667	7.52	1.667	23.26	2.667	7.11	3.67	4.51
0.750	9.77	1.750	16.31	2.750	6.45	3.75	4.27
0.833	9.77	1.833	16.31	2.833	6.45	3.83	4.27
0.917	14.50	1.917	12.73	2.917	5.92	3.92	4.05
1.000	14.51	2.000	12.73	3.000	5.92	4.00	4.05

Max.Eff.Inten.(mm/hr)=		135.38	75.06	
over (min)		5.00	15.00	
Storage Coeff. (min)=		3.77 (ii)	11.68 (ii)	
Unit Hyd. Tpeak (min)=		5.00	15.00	
Unit Hyd. peak (cms)=		0.25	0.09	
				TOTALS
PEAK FLOW	(cms)=	1.25	0.56	1.560 (iii)
TIME TO PEAK	(hrs)=	1.33	1.50	1.33
RUNOFF VOLUME	(mm)=	63.43	36.75	48.22
TOTAL RAINFALL	(mm)=	64.43	64.43	64.43
RUNOFF COEFFICIENT	=	0.98	0.57	0.75

***** 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 (0300)	Area (ha)=	0.55	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 hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	4.64	1.083	33.01	2.083	10.53	3.08	5.48
0.167	4.64	1.167	33.01	2.167	10.53	3.17	5.48
0.250	5.29	1.250	135.38	2.250	9.03	3.25	5.11
0.333	5.29	1.333	135.38	2.333	9.03	3.33	5.11
0.417	6.18	1.417	42.80	2.417	7.94	3.42	4.79
0.500	6.18	1.500	42.80	2.500	7.94	3.50	4.79
0.583	7.52	1.583	23.26	2.583	7.11	3.58	4.51
0.667	7.52	1.667	23.26	2.667	7.11	3.67	4.51
0.750	9.77	1.750	16.31	2.750	6.45	3.75	4.27
0.833	9.77	1.833	16.31	2.833	6.45	3.83	4.27
0.917	14.50	1.917	12.73	2.917	5.92	3.92	4.05
1.000	14.51	2.000	12.73	3.000	5.92	4.00	4.05

Unit Hyd Qpeak (cms)=		0.104
PEAK FLOW	(cms)=	0.047 (i)
TIME TO PEAK	(hrs)=	1.500
RUNOFF VOLUME	(mm)=	28.677
TOTAL RAINFALL	(mm)=	64.431
RUNOFF COEFFICIENT	=	0.445

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

```
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0200)|   Area    (ha)=   0.70   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    4.64 | 1.083   33.01 | 2.083   10.53 |  3.08    5.48
              0.167    4.64 | 1.167   33.01 | 2.167   10.53 |  3.17    5.48
              0.250    5.29 | 1.250  135.38 | 2.250    9.03 |  3.25    5.11
              0.333    5.29 | 1.333  135.38 | 2.333    9.03 |  3.33    5.11
              0.417    6.18 | 1.417   42.80 | 2.417    7.94 |  3.42    4.79
              0.500    6.18 | 1.500   42.80 | 2.500    7.94 |  3.50    4.79
              0.583    7.52 | 1.583   23.26 | 2.583    7.11 |  3.58    4.51
              0.667    7.52 | 1.667   23.26 | 2.667    7.11 |  3.67    4.51
              0.750    9.77 | 1.750   16.31 | 2.750    6.45 |  3.75    4.27
              0.833    9.77 | 1.833   16.31 | 2.833    6.45 |  3.83    4.27
              0.917   14.50 | 1.917   12.73 | 2.917    5.92 |  3.92    4.05
              1.000   14.51 | 2.000   12.73 | 3.000    5.92 |  4.00    4.05

     Unit Hyd Qpeak  (cms)=   0.133

     PEAK FLOW       (cms)=   0.060 (i)
     TIME TO PEAK    (hrs)=   1.500
     RUNOFF VOLUME    (mm)=  28.677
     TOTAL RAINFALL   (mm)=  64.431
     RUNOFF COEFFICIENT   =   0.445

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW 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\VO2\voin.dat
  Output  filename: C:\Users\workstation\AppData\Local\Civica\VH5\481a4287-7c85-406f-9d86-88ed6da58e85\2ca0c2e8-
7379-4968-816d-edafd6abf7d1\
  Summary filename: C:\Users\workstation\AppData\Local\Civica\VH5\481a4287-7c85-406f-9d86-88ed6da58e85\2ca0c2e8-
7379-4968-816d-edafd6abf7d1\


DATE: 05-28-2026                          TIME: 10:45:55

USER:


COMMENTS: _____

--------------------------------------------------------------------------------------------------------------------
  ********************************************
  ** SIMULATION : Rain 05 - 50yr               **
  ********************************************

--------------------
```

| CHICAGO STORM | IDF curve parameters: A=1172.340
| Ptotal= 71.25 mm | B= 5.000
C= 0.761
used in: INTENSITY = A / (t + B)^C

Duration of storm = 4.00 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	TIME hrs	RAIN mm/hr
0.00	5.16	1.00	36.50	2.00	11.67	3.00	6.08
0.17	5.87	1.17	149.30	2.17	10.01	3.17	5.67
0.33	6.86	1.33	47.31	2.33	8.81	3.33	5.31
0.50	8.34	1.50	25.73	2.50	7.89	3.50	5.01
0.67	10.83	1.67	18.06	2.67	7.16	3.67	4.74
0.83	16.07	1.83	14.10	2.83	6.57	3.83	4.50

| CALIB |
| STANDHYD (0100) | Area (ha)= 8.19
|ID= 1 DT= 5.0 min | Total Imp(%)= 43.00 Dir. Conn.(%)= 43.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	3.52	4.67
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	233.68	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	TIME hrs	RAIN mm/hr
0.083	5.16	1.083	36.50	2.083	11.67	3.08	6.08
0.167	5.16	1.167	36.50	2.167	11.67	3.17	6.08
0.250	5.87	1.250	149.30	2.250	10.01	3.25	5.67
0.333	5.87	1.333	149.30	2.333	10.01	3.33	5.67
0.417	6.86	1.417	47.31	2.417	8.81	3.42	5.31
0.500	6.86	1.500	47.31	2.500	8.81	3.50	5.31
0.583	8.34	1.583	25.73	2.583	7.89	3.58	5.01
0.667	8.34	1.667	25.73	2.667	7.89	3.67	5.01
0.750	10.83	1.750	18.06	2.750	7.16	3.75	4.74
0.833	10.83	1.833	18.06	2.833	7.16	3.83	4.74
0.917	16.07	1.917	14.10	2.917	6.57	3.92	4.50
1.000	16.07	2.000	14.10	3.000	6.57	4.00	4.50

Max.Eff.Inten.(mm/hr)=		149.30	87.37	
over (min)		5.00	15.00	
Storage Coeff. (min)=		3.62 (ii)	11.07 (ii)	
Unit Hyd. Tpeak (min)=		5.00	15.00	
Unit Hyd. peak (cms)=		0.25	0.09	
				TOTALS
PEAK FLOW	(cms)=	1.39	0.66	1.761 (iii)
TIME TO PEAK	(hrs)=	1.33	1.50	1.33
RUNOFF VOLUME	(mm)=	70.25	42.46	54.41
TOTAL RAINFALL	(mm)=	71.25	71.25	71.25
RUNOFF COEFFICIENT	=	0.99	0.60	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 (0300) | Area (ha)= 0.55 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 hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	5.16	1.083	36.50	2.083	11.67	3.08	6.08
0.167	5.16	1.167	36.50	2.167	11.67	3.17	6.08
0.250	5.87	1.250	149.30	2.250	10.01	3.25	5.67
0.333	5.87	1.333	149.30	2.333	10.01	3.33	5.67
0.417	6.86	1.417	47.31	2.417	8.81	3.42	5.31
0.500	6.86	1.500	47.31	2.500	8.81	3.50	5.31
0.583	8.34	1.583	25.73	2.583	7.89	3.58	5.01
0.667	8.34	1.667	25.73	2.667	7.89	3.67	5.01
0.750	10.83	1.750	18.06	2.750	7.16	3.75	4.74
0.833	10.83	1.833	18.06	2.833	7.16	3.83	4.74
0.917	16.07	1.917	14.10	2.917	6.57	3.92	4.50
1.000	16.07	2.000	14.10	3.000	6.57	4.00	4.50

Unit Hyd Qpeak (cms)= 0.104

PEAK FLOW (cms)= 0.056 (i)
TIME TO PEAK (hrs)= 1.500
RUNOFF VOLUME (mm)= 33.764
TOTAL RAINFALL (mm)= 71.253
RUNOFF COEFFICIENT = 0.474

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

CALIB			
NASHYD (0200)	Area (ha)=	0.70	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 hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	5.16	1.083	36.50	2.083	11.67	3.08	6.08
0.167	5.16	1.167	36.50	2.167	11.67	3.17	6.08
0.250	5.87	1.250	149.30	2.250	10.01	3.25	5.67
0.333	5.87	1.333	149.30	2.333	10.01	3.33	5.67
0.417	6.86	1.417	47.31	2.417	8.81	3.42	5.31
0.500	6.86	1.500	47.31	2.500	8.81	3.50	5.31
0.583	8.34	1.583	25.73	2.583	7.89	3.58	5.01
0.667	8.34	1.667	25.73	2.667	7.89	3.67	5.01
0.750	10.83	1.750	18.06	2.750	7.16	3.75	4.74
0.833	10.83	1.833	18.06	2.833	7.16	3.83	4.74
0.917	16.07	1.917	14.10	2.917	6.57	3.92	4.50
1.000	16.07	2.000	14.10	3.000	6.57	4.00	4.50

Unit Hyd Qpeak (cms)= 0.133

PEAK FLOW (cms)= 0.072 (i)
TIME TO PEAK (hrs)= 1.500
RUNOFF VOLUME (mm)= 33.764
TOTAL RAINFALL (mm)= 71.253
RUNOFF COEFFICIENT = 0.474

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW 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\VO2\voin.dat
Output filename: C:\Users\workstation\AppData\Local\Civica\VH5\481a4287-7c85-406f-9d86-88ed6da58e85\6925559d-de24-4de7-b0d2-53a4f5dcbe4c\
Summary filename: C:\Users\workstation\AppData\Local\Civica\VH5\481a4287-7c85-406f-9d86-88ed6da58e85\6925559d-de24-4de7-b0d2-53a4f5dcbe4c\

DATE: 05-28-2026 TIME: 10:45:55

USER:

COMMENTS: _____

** SIMULATION : Rain 06 - 100yr **

| CHICAGO STORM |
| Ptotal= 77.88 mm |

IDF curve parameters: A=1281.340
B= 5.000
C= 0.761
used in: INTENSITY = A / (t + B)^C

Duration of storm = 4.00 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	5.63	1.00	39.89	2.00	12.75	3.00	6.65
0.17	6.41	1.17	163.18	2.17	10.94	3.17	6.20
0.33	7.49	1.33	51.70	2.33	9.62	3.33	5.81
0.50	9.11	1.50	28.13	2.50	8.62	3.50	5.47
0.67	11.83	1.67	19.74	2.67	7.83	3.67	5.18
0.83	17.56	1.83	15.41	2.83	7.18	3.83	4.92

| CALIB |
| STANDHYD (0100) |
| ID= 1 DT= 5.0 min |

Area (ha)= 8.19
Total Imp(%)= 43.00 Dir. Conn.(%)= 43.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	3.52	4.67
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	233.68	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	5.63	1.083	39.89	2.083	12.75	3.08	6.65
0.167	5.63	1.167	39.89	2.167	12.75	3.17	6.65
0.250	6.41	1.250	163.18	2.250	10.94	3.25	6.20
0.333	6.41	1.333	163.18	2.333	10.94	3.33	6.20
0.417	7.49	1.417	51.70	2.417	9.62	3.42	5.81
0.500	7.49	1.500	51.70	2.500	9.62	3.50	5.81
0.583	9.11	1.583	28.13	2.583	8.62	3.58	5.47
0.667	9.11	1.667	28.13	2.667	8.62	3.67	5.47
0.750	11.83	1.750	19.74	2.750	7.83	3.75	5.18
0.833	11.83	1.833	19.74	2.833	7.83	3.83	5.18
0.917	17.56	1.917	15.41	2.917	7.18	3.92	4.92
1.000	17.56	2.000	15.41	3.000	7.18	4.00	4.92

Max.Eff.Inten.(mm/hr)=	163.18	99.88	
over (min)	5.00	15.00	
Storage Coeff. (min)=	3.50 (ii)	10.56 (ii)	
Unit Hyd. Tpeak (min)=	5.00	15.00	
Unit Hyd. peak (cms)=	0.26	0.09	
			TOTALS
PEAK FLOW (cms)=	1.53	0.77	1.965 (iii)
TIME TO PEAK (hrs)=	1.33	1.50	1.33
RUNOFF VOLUME (mm)=	76.88	48.13	60.49
TOTAL RAINFALL (mm)=	77.88	77.88	77.88
RUNOFF COEFFICIENT =	0.99	0.62	0.78

***** 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 (0300)	Area (ha)=	0.55	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 hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	5.63	1.083	39.89	2.083	12.75	3.08	6.65
0.167	5.63	1.167	39.89	2.167	12.75	3.17	6.65
0.250	6.41	1.250	163.18	2.250	10.94	3.25	6.20
0.333	6.41	1.333	163.18	2.333	10.94	3.33	6.20
0.417	7.49	1.417	51.70	2.417	9.62	3.42	5.81
0.500	7.49	1.500	51.70	2.500	9.62	3.50	5.81
0.583	9.11	1.583	28.13	2.583	8.62	3.58	5.47
0.667	9.11	1.667	28.13	2.667	8.62	3.67	5.47
0.750	11.83	1.750	19.74	2.750	7.83	3.75	5.18
0.833	11.83	1.833	19.74	2.833	7.83	3.83	5.18
0.917	17.56	1.917	15.41	2.917	7.18	3.92	4.92
1.000	17.56	2.000	15.41	3.000	7.18	4.00	4.92

Unit Hyd Qpeak (cms)=	0.104	
PEAK FLOW (cms)=	0.065 (i)	
TIME TO PEAK (hrs)=	1.500	
RUNOFF VOLUME (mm)=	38.870	
TOTAL RAINFALL (mm)=	77.878	
RUNOFF COEFFICIENT =	0.499	

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

CALIB			
NASHYD (0200)	Area (ha)=	0.70	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 hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	5.63	1.083	39.89	2.083	12.75	3.08	6.65
0.167	5.63	1.167	39.89	2.167	12.75	3.17	6.65
0.250	6.41	1.250	163.18	2.250	10.94	3.25	6.20
0.333	6.41	1.333	163.18	2.333	10.94	3.33	6.20
0.417	7.49	1.417	51.70	2.417	9.62	3.42	5.81
0.500	7.49	1.500	51.70	2.500	9.62	3.50	5.81
0.583	9.11	1.583	28.13	2.583	8.62	3.58	5.47
0.667	9.11	1.667	28.13	2.667	8.62	3.67	5.47
0.750	11.83	1.750	19.74	2.750	7.83	3.75	5.18
0.833	11.83	1.833	19.74	2.833	7.83	3.83	5.18

```
               0.917   17.56 | 1.917   15.41 | 2.917    7.18 |  3.92    4.92
               1.000   17.56 | 2.000   15.41 | 3.000    7.18 |  4.00    4.92

     Unit Hyd Qpeak  (cms)=   0.133

     PEAK FLOW       (cms)=   0.083 (i)
     TIME TO PEAK    (hrs)=   1.500
     RUNOFF VOLUME    (mm)=  38.870
     TOTAL RAINFALL   (mm)=  77.878
     RUNOFF COEFFICIENT   =   0.499

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW 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\VO2\voin.dat
  Output  filename: C:\Users\workstation\AppData\Local\Civica\VH5\481a4287-7c85-406f-9d86-88ed6da58e85\8a938aab-
19e0-4f89-9392-5a6931514a93\
  Summary filename: C:\Users\workstation\AppData\Local\Civica\VH5\481a4287-7c85-406f-9d86-88ed6da58e85\8a938aab-
19e0-4f89-9392-5a6931514a93\


DATE: 05-28-2026                          TIME: 10:45:56

USER:


COMMENTS: _____________________________________________________


-------------------------------------------------------------------------------------------------------------
  ***********************************************
  ** SIMULATION : Rain 07 - 25mm               **
  ***********************************************


--------------------
|    READ STORM    |    Filename: C:\Users\workstation\AppD
|                  |              ata\Local\Temp\
|                  |              833c07e1-3be0-4916-a342-a3197f05b8de\008cc308
| Ptotal= 25.00 mm |    Comments: Twenty five mm Four Hour Chicago Storm
--------------------
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.00    2.07 |  1.00    5.70 |  2.00    5.19 |  3.00    2.80
                0.17    2.27 |  1.17   10.78 |  2.17    4.47 |  3.17    2.62
                0.33    2.52 |  1.33   50.21 |  2.33    3.95 |  3.33    2.48
                0.50    2.88 |  1.50   13.37 |  2.50    3.56 |  3.50    2.35
                0.67    3.38 |  1.67    8.29 |  2.67    3.25 |  3.67    2.23
                0.83    4.18 |  1.83    6.30 |  2.83    3.01 |  3.83    2.14

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

--------------------
| CALIB            |
| STANDHYD (  0100)|   Area    (ha)=   8.19
|ID= 1 DT= 5.0 min |   Total Imp(%)=  43.00   Dir. Conn.(%)=  43.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
```

Surface Area	(ha)=	3.52	4.67
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	233.68	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	2.07	1.083	5.70	2.083	5.19	3.08	2.80
0.167	2.07	1.167	5.70	2.167	5.19	3.17	2.80
0.250	2.27	1.250	10.78	2.250	4.47	3.25	2.62
0.333	2.27	1.333	10.78	2.333	4.47	3.33	2.62
0.417	2.52	1.417	50.21	2.417	3.95	3.42	2.48
0.500	2.52	1.500	50.21	2.500	3.95	3.50	2.48
0.583	2.88	1.583	13.37	2.583	3.56	3.58	2.35
0.667	2.88	1.667	13.37	2.667	3.56	3.67	2.35
0.750	3.38	1.750	8.29	2.750	3.25	3.75	2.23
0.833	3.38	1.833	8.29	2.833	3.25	3.83	2.23
0.917	4.18	1.917	6.30	2.917	3.01	3.92	2.14
1.000	4.18	2.000	6.30	3.000	3.01	4.00	2.14

Max.Eff.Inten.(mm/hr)=	50.21	9.88		
over (min)	5.00	25.00		
Storage Coeff. (min)=	5.60 (ii)	23.41 (ii)		
Unit Hyd. Tpeak (min)=	5.00	25.00		
Unit Hyd. peak (cms)=	0.20	0.05		
			TOTALS	
PEAK FLOW (cms)=	0.43	0.07	0.445 (iii)	
TIME TO PEAK (hrs)=	1.50	1.83	1.50	
RUNOFF VOLUME (mm)=	24.00	8.08	14.92	
TOTAL RAINFALL (mm)=	25.00	25.00	25.00	
RUNOFF COEFFICIENT =	0.96	0.32	0.60	

(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 (0300)	Area (ha)=	0.55	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 hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	2.07	1.083	5.70	2.083	5.19	3.08	2.80
0.167	2.07	1.167	5.70	2.167	5.19	3.17	2.80
0.250	2.27	1.250	10.78	2.250	4.47	3.25	2.62
0.333	2.27	1.333	10.78	2.333	4.47	3.33	2.62
0.417	2.52	1.417	50.21	2.417	3.95	3.42	2.48
0.500	2.52	1.500	50.21	2.500	3.95	3.50	2.48
0.583	2.88	1.583	13.37	2.583	3.56	3.58	2.35
0.667	2.88	1.667	13.37	2.667	3.56	3.67	2.35
0.750	3.38	1.750	8.29	2.750	3.25	3.75	2.23
0.833	3.38	1.833	8.29	2.833	3.25	3.83	2.23
0.917	4.18	1.917	6.30	2.917	3.01	3.92	2.14
1.000	4.18	2.000	6.30	3.000	3.01	4.00	2.14

Unit Hyd Qpeak (cms)=	0.104	
PEAK FLOW (cms)=	0.006 (i)	
TIME TO PEAK (hrs)=	1.667	
RUNOFF VOLUME (mm)=	4.779	
TOTAL RAINFALL (mm)=	24.997	
RUNOFF COEFFICIENT =	0.191	

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

```
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0200)|   Area    (ha)=   0.70   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.

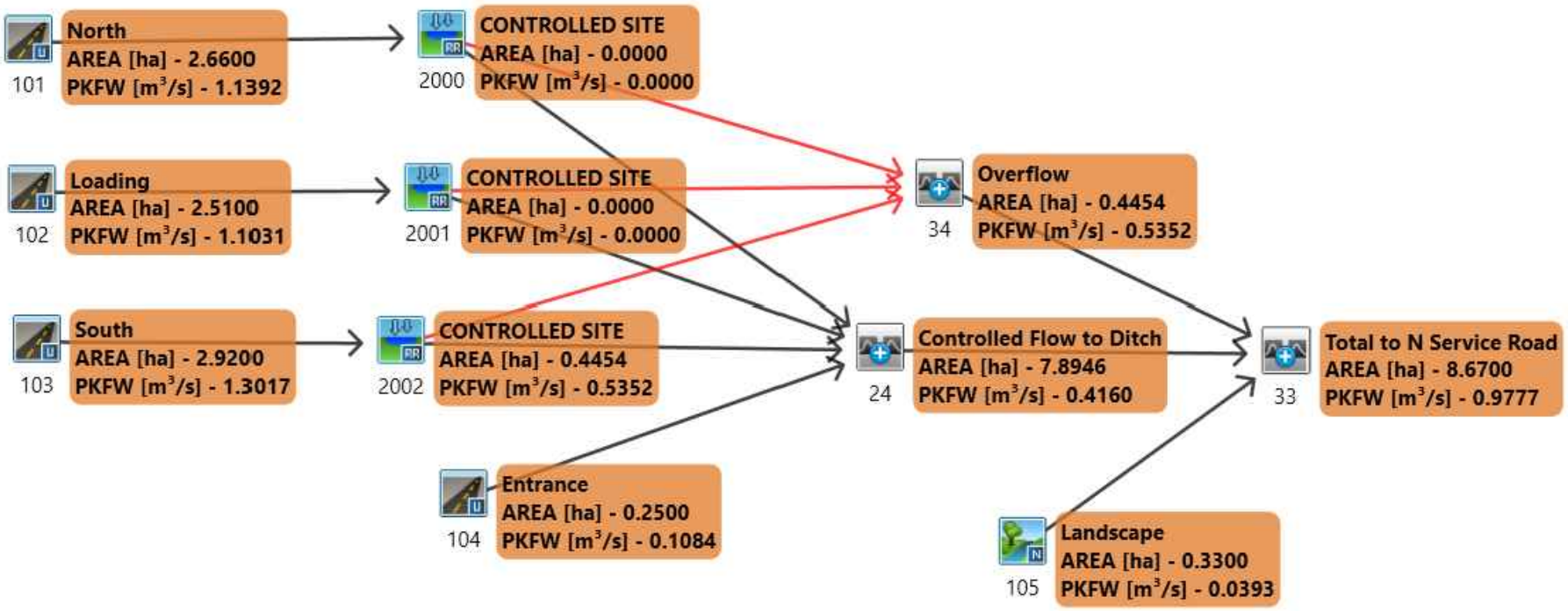

                              ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
              0.083    2.07 | 1.083    5.70 | 2.083    5.19 |  3.08    2.80
              0.167    2.07 | 1.167    5.70 | 2.167    5.19 |  3.17    2.80
              0.250    2.27 | 1.250   10.78 | 2.250    4.47 |  3.25    2.62
              0.333    2.27 | 1.333   10.78 | 2.333    4.47 |  3.33    2.62
              0.417    2.52 | 1.417   50.21 | 2.417    3.95 |  3.42    2.48
              0.500    2.52 | 1.500   50.21 | 2.500    3.95 |  3.50    2.48
              0.583    2.88 | 1.583   13.37 | 2.583    3.56 |  3.58    2.35
              0.667    2.88 | 1.667   13.37 | 2.667    3.56 |  3.67    2.35
              0.750    3.38 | 1.750    8.29 | 2.750    3.25 |  3.75    2.23
              0.833    3.38 | 1.833    8.29 | 2.833    3.25 |  3.83    2.23
              0.917    4.18 | 1.917    6.30 | 2.917    3.01 |  3.92    2.14
              1.000    4.18 | 2.000    6.30 | 3.000    3.01 |  4.00    2.14

     Unit Hyd Qpeak  (cms)=   0.133

     PEAK FLOW       (cms)=   0.007 (i)
     TIME TO PEAK    (hrs)=   1.667
     RUNOFF VOLUME    (mm)=   4.779
     TOTAL RAINFALL   (mm)=  24.997
     RUNOFF COEFFICIENT   =   0.191

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

--------------------------------------------------------------------------------
```



HUSSON
ENGINEERING + MANAGEMENT
P 905.709.5825
200 CACHET WOODS COURT, SUITE 204
MARKHAM, ON L6C 0Z8
HUSSON.CA

FIGURE F2

4495 NORTH SERVICE ROAD
PROPOSED DEVELOPMENT VO SCHEMATIC

DATE: JUNE 2026 SCALE: NTS PROJECT: 221277

```
       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\VO2\voin.dat
Output filename: C:\Users\workstation\AppData\Local\Civica\VH5\481a4287-7c85-406f-9d86-88ed6da58e85\6162454b-efc3-43e1-a21e-2056564f1c3c\
Summary filename: C:\Users\workstation\AppData\Local\Civica\VH5\481a4287-7c85-406f-9d86-88ed6da58e85\6162454b-efc3-43e1-a21e-2056564f1c3c\

DATE: 06-02-2026 TIME: 11:24:14

USER:

COMMENTS: _____

****
** SIMULATION : Rain 01 - 2yr **
****

| CHICAGO STORM |
| Ptotal= 37.19 mm |

IDF curve parameters: A= 681.520
B= 6.000
C= 0.780
used in: INTENSITY = A / (t + B)^C

Duration of storm = 4.00 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	2.54	1.00	19.72	2.00	5.98	3.00	3.02
0.17	2.91	1.17	78.39	2.17	5.09	3.17	2.81
0.33	3.42	1.33	25.74	2.33	4.45	3.33	2.62
0.50	4.20	1.50	13.74	2.50	3.96	3.50	2.46
0.67	5.53	1.67	9.48	2.67	3.58	3.67	2.33
0.83	8.38	1.83	7.31	2.83	3.27	3.83	2.21

| CALIB |
| NASHYD (0105)| Area (ha)= 0.33 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 hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	2.54	1.083	19.72	2.083	5.98	3.08	3.02
0.167	2.54	1.167	19.72	2.167	5.98	3.17	3.02
0.250	2.91	1.250	78.39	2.250	5.09	3.25	2.81
0.333	2.91	1.333	78.39	2.333	5.09	3.33	2.81
0.417	3.42	1.417	25.74	2.417	4.45	3.42	2.62

0.500	3.42	1.500	25.74	2.500	4.45	3.50	2.62
0.583	4.20	1.583	13.74	2.583	3.96	3.58	2.46
0.667	4.20	1.667	13.74	2.667	3.96	3.67	2.46
0.750	5.53	1.750	9.48	2.750	3.58	3.75	2.33
0.833	5.53	1.833	9.48	2.833	3.58	3.83	2.33
0.917	8.38	1.917	7.31	2.917	3.27	3.92	2.21
1.000	8.38	2.000	7.31	3.000	3.27	4.00	2.21

Unit Hyd Qpeak (cms)= 0.063

PEAK FLOW (cms)= 0.010 (i)
TIME TO PEAK (hrs)= 1.500
RUNOFF VOLUME (mm)= 10.808
TOTAL RAINFALL (mm)= 37.193
RUNOFF COEFFICIENT = 0.291

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

CALIB
STANDHYD (0101)
ID= 1 DT= 5.0 min

Area (ha)= 2.66
Total Imp(%)= 87.00 Dir. Conn.(%)= 87.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	2.31	0.35
Dep. Storage	(mm)=	1.00	1.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	133.17	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	2.54	1.083	19.72	2.083	5.98	3.08	3.02
0.167	2.54	1.167	19.72	2.167	5.98	3.17	3.02
0.250	2.91	1.250	78.39	2.250	5.09	3.25	2.81
0.333	2.91	1.333	78.39	2.333	5.09	3.33	2.81
0.417	3.42	1.417	25.74	2.417	4.45	3.42	2.62
0.500	3.42	1.500	25.74	2.500	4.45	3.50	2.62
0.583	4.20	1.583	13.74	2.583	3.96	3.58	2.46
0.667	4.20	1.667	13.74	2.667	3.96	3.67	2.46
0.750	5.53	1.750	9.48	2.750	3.58	3.75	2.33
0.833	5.53	1.833	9.48	2.833	3.58	3.83	2.33
0.917	8.38	1.917	7.31	2.917	3.27	3.92	2.21
1.000	8.38	2.000	7.31	3.000	3.27	4.00	2.21

Max.Eff.Inten.(mm/hr)=	78.39	57.47		
over (min)	5.00	10.00		
Storage Coeff. (min)=	3.34 (ii)	6.98 (ii)		
Unit Hyd. Tpeak (min)=	5.00	10.00		
Unit Hyd. peak (cms)=	0.26	0.14		
			TOTALS	
PEAK FLOW (cms)=	0.48	0.04	0.520 (iii)	
TIME TO PEAK (hrs)=	1.33	1.42	1.33	
RUNOFF VOLUME (mm)=	36.19	26.43	34.92	
TOTAL RAINFALL (mm)=	37.19	37.19	37.19	
RUNOFF COEFFICIENT =	0.97	0.71	0.94	

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 95.0 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(2000)
IN= 2---> OUT= 1
DT= 5.0 min

OVERFLOW IS ON

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.0503	0.0849
0.0479	0.0781	0.0506	0.0889
0.0483	0.0781	0.0510	0.0950

0.0487	0.0784	|	0.0514	0.1041
0.0491	0.0790	|	0.0518	0.1174
0.0495	0.0801	|	0.0521	0.1365
0.0499	0.0821	|	0.0525	0.1627

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0101)	2.660	0.520	1.33	34.92
OUTFLOW: ID= 1 (2000)	2.660	0.039	2.25	34.77
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](%)= 7.53
TIME SHIFT OF PEAK FLOW (min)= 55.00
MAXIMUM STORAGE USED (ha.m.)= 0.0639

CALIB
STANDHYD (0102)
ID= 1 DT= 5.0 min

Area (ha)= 2.51
Total Imp(%)= 90.00 Dir. Conn.(%)= 90.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	2.26	0.25
Dep. Storage	(mm)=	1.00	1.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	129.36	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	2.54	1.083	19.72	2.083	5.98	3.08	3.02
0.167	2.54	1.167	19.72	2.167	5.98	3.17	3.02
0.250	2.91	1.250	78.39	2.250	5.09	3.25	2.81
0.333	2.91	1.333	78.39	2.333	5.09	3.33	2.81
0.417	3.42	1.417	25.74	2.417	4.45	3.42	2.62
0.500	3.42	1.500	25.74	2.500	4.45	3.50	2.62
0.583	4.20	1.583	13.74	2.583	3.96	3.58	2.46
0.667	4.20	1.667	13.74	2.667	3.96	3.67	2.46
0.750	5.53	1.750	9.48	2.750	3.58	3.75	2.33
0.833	5.53	1.833	9.48	2.833	3.58	3.83	2.33
0.917	8.38	1.917	7.31	2.917	3.27	3.92	2.21
1.000	8.38	2.000	7.31	3.000	3.27	4.00	2.21

Max.Eff.Inten.(mm/hr)=		78.39	57.47	
over (min)		5.00	10.00	
Storage Coeff. (min)=		3.29 (ii)	6.52 (ii)	
Unit Hyd. Tpeak (min)=		5.00	10.00	
Unit Hyd. peak (cms)=		0.27	0.14	
				TOTALS
PEAK FLOW	(cms)=	0.47	0.03	0.501 (iii)
TIME TO PEAK	(hrs)=	1.33	1.42	1.33
RUNOFF VOLUME	(mm)=	36.19	26.43	35.22
TOTAL RAINFALL	(mm)=	37.19	37.19	37.19
RUNOFF COEFFICIENT	=	0.97	0.71	0.95

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 95.0 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(2001)
IN= 2---> OUT= 1
DT= 5.0 min

OVERFLOW IS ON

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.0452	0.1069
0.0439	0.0828	0.0456	0.1377

0.0444	0.0841	0.0461	0.1842
0.0448	0.0905	0.0465	0.2453

		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2	(0102)	2.510	0.501	1.33	35.22
OUTFLOW: ID= 1	(2001)	2.510	0.033	2.42	35.03
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](%)= 6.63
TIME SHIFT OF PEAK FLOW (min)= 65.00
MAXIMUM STORAGE USED (ha.m.)= 0.0626

CALIB
STANDHYD (0103)
ID= 1 DT= 5.0 min

Area (ha)= 2.92
Total Imp(%)= 99.00 Dir. Conn.(%)= 99.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	2.89	0.03
Dep. Storage	(mm)=	1.00	1.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	139.52	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	2.54	1.083	19.72	2.083	5.98	3.08	3.02
0.167	2.54	1.167	19.72	2.167	5.98	3.17	3.02
0.250	2.91	1.250	78.39	2.250	5.09	3.25	2.81
0.333	2.91	1.333	78.39	2.333	5.09	3.33	2.81
0.417	3.42	1.417	25.74	2.417	4.45	3.42	2.62
0.500	3.42	1.500	25.74	2.500	4.45	3.50	2.62
0.583	4.20	1.583	13.74	2.583	3.96	3.58	2.46
0.667	4.20	1.667	13.74	2.667	3.96	3.67	2.46
0.750	5.53	1.750	9.48	2.750	3.58	3.75	2.33
0.833	5.53	1.833	9.48	2.833	3.58	3.83	2.33
0.917	8.38	1.917	7.31	2.917	3.27	3.92	2.21
1.000	8.38	2.000	7.31	3.000	3.27	4.00	2.21

Max.Eff.Inten.(mm/hr)=	78.39	57.47		
over (min)	5.00	5.00		
Storage Coeff. (min)=	3.44 (ii)	4.68 (ii)		
Unit Hyd. Tpeak (min)=	5.00	5.00		
Unit Hyd. peak (cms)=	0.26	0.22		
				TOTALS
PEAK FLOW (cms)=	0.60	0.00		0.608 (iii)
TIME TO PEAK (hrs)=	1.33	1.33		1.33
RUNOFF VOLUME (mm)=	36.19	26.43		36.09
TOTAL RAINFALL (mm)=	37.19	37.19		37.19
RUNOFF COEFFICIENT =	0.97	0.71		0.97

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 95.0 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(2002)
IN= 2---> OUT= 1
DT= 5.0 min

OVERFLOW IS ON

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.2141	0.0672
0.2112	0.0662	0.2156	0.0707
0.2127	0.0663	0.2170	0.0786

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0103)	2.920	0.608	1.33	36.09
OUTFLOW: ID= 1 (2002)	2.920	0.157	1.58	36.07
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](%)= 25.86
TIME SHIFT OF PEAK FLOW (min)= 15.00
MAXIMUM STORAGE USED (ha.m.)= 0.0495

CALIB
STANDHYD (0104)
ID= 1 DT= 5.0 min

Area (ha)= 0.25
Total Imp(%)= 77.00 Dir. Conn.(%)= 77.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.19	0.06
Dep. Storage	(mm)=	1.00	1.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	40.82	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	2.54	1.083	19.72	2.083	5.98	3.08	3.02
0.167	2.54	1.167	19.72	2.167	5.98	3.17	3.02
0.250	2.91	1.250	78.39	2.250	5.09	3.25	2.81
0.333	2.91	1.333	78.39	2.333	5.09	3.33	2.81
0.417	3.42	1.417	25.74	2.417	4.45	3.42	2.62
0.500	3.42	1.500	25.74	2.500	4.45	3.50	2.62
0.583	4.20	1.583	13.74	2.583	3.96	3.58	2.46
0.667	4.20	1.667	13.74	2.667	3.96	3.67	2.46
0.750	5.53	1.750	9.48	2.750	3.58	3.75	2.33
0.833	5.53	1.833	9.48	2.833	3.58	3.83	2.33
0.917	8.38	1.917	7.31	2.917	3.27	3.92	2.21
1.000	8.38	2.000	7.31	3.000	3.27	4.00	2.21

Max.Eff.Inten.(mm/hr)=	78.39	57.47		
over (min)	5.00	10.00		
Storage Coeff. (min)=	1.64 (ii)	6.44 (ii)		
Unit Hyd. Tpeak (min)=	5.00	10.00		
Unit Hyd. peak (cms)=	0.32	0.14		
				TOTALS
PEAK FLOW (cms)=	0.04	0.01		0.048 (iii)
TIME TO PEAK (hrs)=	1.33	1.42		1.33
RUNOFF VOLUME (mm)=	36.19	26.43		33.94
TOTAL RAINFALL (mm)=	37.19	37.19		37.19
RUNOFF COEFFICIENT =	0.97	0.71		0.91

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 95.0 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 (0024)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0104):	0.25	0.048	1.33	33.94
+ ID2= 2 (2000):	2.66	0.039	2.25	34.77
ID = 3 (0024):	2.91	0.069	1.33	34.70

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```
--------------------
| ADD HYD  (  0024)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0024):     2.91   0.069     1.33    34.70
      + ID2= 2 (  2001):     2.51   0.033     2.42    35.03
        ================================================
        ID = 1 (  0024):     5.42   0.087     1.33    34.85

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

--------------------
| ADD HYD  (  0024)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0024):     5.42   0.087     1.33    34.85
      + ID2= 2 (  2002):     2.92   0.157     1.58    36.07
        ================================================
        ID = 3 (  0024):     8.34   0.232     1.58    35.28

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

--------------------
| ADD HYD  (  0034)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
*** W A R N I N G :  HYDROGRAPH   2000 <ID= 1> IS DRY.
*** W A R N I N G :  HYDROGRAPH   2001 <ID= 2> IS DRY.
*** W A R N I N G :  HYDROGRAPH   0034 <ID= 3> IS ALSO DRY
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0034)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
*** W A R N I N G :  HYDROGRAPH   0034 <ID= 3> IS DRY.
*** W A R N I N G :  HYDROGRAPH   2002 <ID= 2> IS DRY.
*** W A R N I N G :  HYDROGRAPH   0034 <ID= 1> IS ALSO DRY
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0033)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0105):     0.33   0.010     1.50    10.81
      + ID2= 2 (  0024):     8.34   0.232     1.58    35.28
        ================================================
        ID = 3 (  0033):     8.67   0.242     1.50    34.34

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

--------------------
| ADD HYD  (  0033)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
*** W A R N I N G :  HYDROGRAPH   0034 <ID= 2> IS DRY.
*** W A R N I N G :  HYDROGRAPH   0001 = HYDROGRAPH 0003
        ID1= 3 (  0033):     8.67   0.242     1.50    34.34
      + ID2= 2 (  0034):     0.00   0.000     0.00     0.00
        ================================================
        ID = 1 (  0033):     8.67   0.242     1.50    34.34

     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\VO2\voin.dat
  Output  filename: C:\Users\workstation\AppData\Local\Civica\VH5\481a4287-7c85-406f-9d86-88ed6da58e85\0b8e5305-
e358-41e0-871b-3f169cdfd115\
  Summary filename: C:\Users\workstation\AppData\Local\Civica\VH5\481a4287-7c85-406f-9d86-88ed6da58e85\0b8e5305-
e358-41e0-871b-3f169cdfd115\


DATE: 06-02-2026                          TIME: 11:24:13

USER:


COMMENTS: _____________________________________________________________

-------------------------------------------------------------------------------------------------------------------
  ***********************************************
  ** SIMULATION : Rain 02 - 5yr                **
  ***********************************************

--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 802.040
| Ptotal= 47.95 mm |                          B=   5.000
--------------------                          C=   0.764
                       used in:   INTENSITY =  A / (t + B)^C

                       Duration of storm  =  4.00 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    3.43 |  1.00   24.57 |  2.00    7.80 |  3.00    4.05
                0.17    3.91 |  1.17  101.31 |  2.17    6.69 |  3.17    3.77
                0.33    4.57 |  1.33   31.90 |  2.33    5.88 |  3.33    3.54
                0.50    5.56 |  1.50   17.28 |  2.50    5.26 |  3.50    3.33
                0.67    7.23 |  1.67   12.11 |  2.67    4.77 |  3.67    3.15
                0.83   10.76 |  1.83    9.44 |  2.83    4.38 |  3.83    2.99


-------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0105)|   Area    (ha)=   0.33   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    3.43 | 1.083   24.57 | 2.083    7.80 |  3.08    4.05
                0.167    3.43 | 1.167   24.57 | 2.167    7.80 |  3.17    4.05
                0.250    3.91 | 1.250  101.31 | 2.250    6.69 |  3.25    3.77
                0.333    3.91 | 1.333  101.31 | 2.333    6.69 |  3.33    3.77
                0.417    4.57 | 1.417   31.90 | 2.417    5.88 |  3.42    3.54
                0.500    4.57 | 1.500   31.90 | 2.500    5.88 |  3.50    3.54
                0.583    5.56 | 1.583   17.28 | 2.583    5.26 |  3.58    3.33
                0.667    5.56 | 1.667   17.28 | 2.667    5.26 |  3.67    3.33
                0.750    7.23 | 1.750   12.11 | 2.750    4.77 |  3.75    3.15
                0.833    7.23 | 1.833   12.11 | 2.833    4.77 |  3.83    3.15
                0.917   10.76 | 1.917    9.44 | 2.917    4.38 |  3.92    2.99
                1.000   10.76 | 2.000    9.44 | 3.000    4.38 |  4.00    2.99

     Unit Hyd Qpeak  (cms)=   0.063

     PEAK FLOW       (cms)=   0.016 (i)
```

```
     TIME TO PEAK    (hrs)=   1.500
     RUNOFF VOLUME    (mm)=  17.294
     TOTAL RAINFALL   (mm)=  47.949
     RUNOFF COEFFICIENT   =   0.361

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0101)|   Area    (ha)=   2.66
|ID= 1 DT= 5.0 min |   Total Imp(%)=  87.00   Dir. Conn.(%)=  87.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.31         0.35
     Dep. Storage     (mm)=       1.00         1.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     133.17        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    3.43 | 1.083   24.57 | 2.083    7.80 |  3.08    4.05
               0.167    3.43 | 1.167   24.57 | 2.167    7.80 |  3.17    4.05
               0.250    3.91 | 1.250  101.31 | 2.250    6.69 |  3.25    3.77
               0.333    3.91 | 1.333  101.31 | 2.333    6.69 |  3.33    3.77
               0.417    4.57 | 1.417   31.90 | 2.417    5.88 |  3.42    3.54
               0.500    4.57 | 1.500   31.90 | 2.500    5.88 |  3.50    3.54
               0.583    5.56 | 1.583   17.28 | 2.583    5.26 |  3.58    3.33
               0.667    5.56 | 1.667   17.28 | 2.667    5.26 |  3.67    3.33
               0.750    7.23 | 1.750   12.11 | 2.750    4.77 |  3.75    3.15
               0.833    7.23 | 1.833   12.11 | 2.833    4.77 |  3.83    3.15
               0.917   10.76 | 1.917    9.44 | 2.917    4.38 |  3.92    2.99
               1.000   10.76 | 2.000    9.44 | 3.000    4.38 |  4.00    2.99

     Max.Eff.Inten.(mm/hr)=     101.31        80.70
                over (min)        5.00        10.00
     Storage Coeff.  (min)=       3.02 (ii)    6.30 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.27         0.15
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.63         0.06          0.686 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.42           1.33
     RUNOFF VOLUME    (mm)=      46.95        36.54          45.59
     TOTAL RAINFALL   (mm)=      47.95        47.95          47.95
     RUNOFF COEFFICIENT   =       0.98         0.76           0.95

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  95.0    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(  2000)|     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   |   0.0503      0.0849
                         0.0479     0.0781   |   0.0506      0.0889
                         0.0483     0.0781   |   0.0510      0.0950
                         0.0487     0.0784   |   0.0514      0.1041
                         0.0491     0.0790   |   0.0518      0.1174
                         0.0495     0.0801   |   0.0521      0.1365
                         0.0499     0.0821   |   0.0525      0.1627

                                  AREA     QPEAK     TPEAK       R.V.
                                  (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0101)       2.660     0.686      1.33       45.59
   OUTFLOW: ID= 1 (  2000)       2.660     0.050      2.33       45.44
   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](%)=  7.29
                    TIME SHIFT OF PEAK FLOW         (min)= 60.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=  0.0830

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0102)|   Area    (ha)=   2.51
|ID= 1 DT= 5.0 min |   Total Imp(%)=  90.00   Dir. Conn.(%)=  90.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.26         0.25
     Dep. Storage     (mm)=       1.00         1.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     129.36        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    3.43 | 1.083   24.57 | 2.083    7.80 |  3.08    4.05
                0.167    3.43 | 1.167   24.57 | 2.167    7.80 |  3.17    4.05
                0.250    3.91 | 1.250  101.31 | 2.250    6.69 |  3.25    3.77
                0.333    3.91 | 1.333  101.31 | 2.333    6.69 |  3.33    3.77
                0.417    4.57 | 1.417   31.90 | 2.417    5.88 |  3.42    3.54
                0.500    4.57 | 1.500   31.90 | 2.500    5.88 |  3.50    3.54
                0.583    5.56 | 1.583   17.28 | 2.583    5.26 |  3.58    3.33
                0.667    5.56 | 1.667   17.28 | 2.667    5.26 |  3.67    3.33
                0.750    7.23 | 1.750   12.11 | 2.750    4.77 |  3.75    3.15
                0.833    7.23 | 1.833   12.11 | 2.833    4.77 |  3.83    3.15
                0.917   10.76 | 1.917    9.44 | 2.917    4.38 |  3.92    2.99
                1.000   10.76 | 2.000    9.44 | 3.000    4.38 |  4.00    2.99

     Max.Eff.Inten.(mm/hr)=     101.31        80.70
               over (min)        5.00        10.00
     Storage Coeff.  (min)=       2.97 (ii)    5.88 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.28         0.15
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.62         0.04          0.659 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.42           1.33
     RUNOFF VOLUME    (mm)=      46.95        36.54          45.91
     TOTAL RAINFALL   (mm)=      47.95        47.95          47.95
     RUNOFF COEFFICIENT   =       0.98         0.76           0.96

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  95.0    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(  2001)|     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   |   0.0452      0.1069
                         0.0439     0.0828   |   0.0456      0.1377
                         0.0444     0.0841   |   0.0461      0.1842
                         0.0448     0.0905   |   0.0465      0.2453

                                  AREA     QPEAK     TPEAK       R.V.
                                  (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0102)       2.510     0.659      1.33       45.91
   OUTFLOW: ID= 1 (  2001)       2.510     0.043      2.42       45.72
   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](%)=  6.53
                    TIME SHIFT OF PEAK FLOW         (min)= 65.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=  0.0811

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0103)|   Area    (ha)=   2.92
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.89         0.03
     Dep. Storage     (mm)=       1.00         1.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     139.52        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    3.43 | 1.083   24.57 | 2.083    7.80 |  3.08    4.05
               0.167    3.43 | 1.167   24.57 | 2.167    7.80 |  3.17    4.05
               0.250    3.91 | 1.250  101.31 | 2.250    6.69 |  3.25    3.77
               0.333    3.91 | 1.333  101.31 | 2.333    6.69 |  3.33    3.77
               0.417    4.57 | 1.417   31.90 | 2.417    5.88 |  3.42    3.54
               0.500    4.57 | 1.500   31.90 | 2.500    5.88 |  3.50    3.54
               0.583    5.56 | 1.583   17.28 | 2.583    5.26 |  3.58    3.33
               0.667    5.56 | 1.667   17.28 | 2.667    5.26 |  3.67    3.33
               0.750    7.23 | 1.750   12.11 | 2.750    4.77 |  3.75    3.15
               0.833    7.23 | 1.833   12.11 | 2.833    4.77 |  3.83    3.15
               0.917   10.76 | 1.917    9.44 | 2.917    4.38 |  3.92    2.99
               1.000   10.76 | 2.000    9.44 | 3.000    4.38 |  4.00    2.99

     Max.Eff.Inten.(mm/hr)=     101.31        80.70
                over (min)        5.00         5.00
     Storage Coeff.  (min)=       3.10 (ii)    4.22 (ii)
     Unit Hyd. Tpeak (min)=       5.00         5.00
     Unit Hyd. peak  (cms)=       0.27         0.24
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.79         0.01          0.795 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.33           1.33
     RUNOFF VOLUME    (mm)=      46.95        36.54          46.84
     TOTAL RAINFALL   (mm)=      47.95        47.95          47.95
     RUNOFF COEFFICIENT   =       0.98         0.76           0.98

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  95.0    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(  2002)|     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   |   0.2141      0.0672
                           0.2112     0.0662   |   0.2156      0.0707
                           0.2127     0.0663   |   0.2170      0.0786

                                 AREA     QPEAK     TPEAK       R.V.
                                 (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0103)      2.920     0.795      1.33       46.84
   OUTFLOW: ID= 1 (  2002)      2.920     0.202      1.58       46.82
   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](%)= 25.40
```

```
                  TIME SHIFT OF PEAK FLOW         (min)= 15.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0638

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0104)|   Area    (ha)=   0.25
|ID= 1 DT= 5.0 min |   Total Imp(%)=  77.00   Dir. Conn.(%)=  77.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.19         0.06
     Dep. Storage     (mm)=       1.00         1.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      40.82        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    3.43 | 1.083   24.57 | 2.083    7.80 |  3.08    4.05
               0.167    3.43 | 1.167   24.57 | 2.167    7.80 |  3.17    4.05
               0.250    3.91 | 1.250  101.31 | 2.250    6.69 |  3.25    3.77
               0.333    3.91 | 1.333  101.31 | 2.333    6.69 |  3.33    3.77
               0.417    4.57 | 1.417   31.90 | 2.417    5.88 |  3.42    3.54
               0.500    4.57 | 1.500   31.90 | 2.500    5.88 |  3.50    3.54
               0.583    5.56 | 1.583   17.28 | 2.583    5.26 |  3.58    3.33
               0.667    5.56 | 1.667   17.28 | 2.667    5.26 |  3.67    3.33
               0.750    7.23 | 1.750   12.11 | 2.750    4.77 |  3.75    3.15
               0.833    7.23 | 1.833   12.11 | 2.833    4.77 |  3.83    3.15
               0.917   10.76 | 1.917    9.44 | 2.917    4.38 |  3.92    2.99
               1.000   10.76 | 2.000    9.44 | 3.000    4.38 |  4.00    2.99

     Max.Eff.Inten.(mm/hr)=     101.31        80.70
               over (min)         5.00        10.00
     Storage Coeff.  (min)=       1.48 (ii)    5.81 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.33         0.15
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.05         0.01          0.063 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.42           1.33
     RUNOFF VOLUME    (mm)=      46.95        36.54          44.54
     TOTAL RAINFALL   (mm)=      47.95        47.95          47.95
     RUNOFF COEFFICIENT   =       0.98         0.76           0.93

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  95.0    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  (  0024)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)      (mm)
        ID1= 1 (  0104):     0.25   0.063     1.33    44.54
      + ID2= 2 (  2000):     2.66   0.050     2.33    45.44
        ==================================================
        ID = 3 (  0024):     2.91   0.091     1.33    45.36

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

--------------------
| ADD HYD  (  0024)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)      (mm)
        ID1= 3 (  0024):     2.91   0.091     1.33    45.36
      + ID2= 2 (  2001):     2.51   0.043     2.42    45.72
        ==================================================
        ID = 1 (  0024):     5.42   0.115     1.33    45.53

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

```
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0024)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)      (mm)
        ID1= 1 (  0024):     5.42   0.115     1.33    45.53
      + ID2= 2 (  2002):     2.92   0.202     1.58    46.82
        ================================================
        ID = 3 (  0024):     8.34   0.301     1.50    45.98

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

--------------------
| ADD HYD  (  0034)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)      (mm)
*** W A R N I N G :  HYDROGRAPH   2000 <ID= 1> IS DRY.
*** W A R N I N G :  HYDROGRAPH   2001 <ID= 2> IS DRY.
*** W A R N I N G :  HYDROGRAPH   0034 <ID= 3> IS ALSO DRY
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0034)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)      (mm)
*** W A R N I N G :  HYDROGRAPH   0034 <ID= 3> IS DRY.
*** W A R N I N G :  HYDROGRAPH   2002 <ID= 2> IS DRY.
*** W A R N I N G :  HYDROGRAPH   0034 <ID= 1> IS ALSO DRY
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0033)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)      (mm)
        ID1= 1 (  0105):     0.33   0.016     1.50    17.29
      + ID2= 2 (  0024):     8.34   0.301     1.50    45.98
        ================================================
        ID = 3 (  0033):     8.67   0.317     1.50    44.89

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

--------------------
| ADD HYD  (  0033)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)      (mm)
*** W A R N I N G :  HYDROGRAPH   0034 <ID= 2> IS DRY.
*** W A R N I N G :  HYDROGRAPH   0001 = HYDROGRAPH 0003
        ID1= 3 (  0033):     8.67   0.317     1.50    44.89
      + ID2= 2 (  0034):     0.00   0.000     0.00     0.00
        ================================================
        ID = 1 (  0033):     8.67   0.317     1.50    44.89

     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\VO2\voin.dat
```

Output filename: C:\Users\workstation\AppData\Local\Civica\VH5\481a4287-7c85-406f-9d86-88ed6da58e85\6dde766a-feb7-4df2-88e8-7a7b398e7157\
Summary filename: C:\Users\workstation\AppData\Local\Civica\VH5\481a4287-7c85-406f-9d86-88ed6da58e85\6dde766a-feb7-4df2-88e8-7a7b398e7157\

DATE: 06-02-2026 TIME: 11:24:15

USER:

COMMENTS: _____

****
** SIMULATION : Rain 03 - 10yr **
****

| CHICAGO STORM | Ptotal= 55.20 mm |

IDF curve parameters: A= 918.280
B= 5.000
C= 0.763
used in: INTENSITY = A / (t + B)^C

Duration of storm = 4.00 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	3.96	1.00	28.29	2.00	9.00	3.00	4.68
0.17	4.51	1.17	116.31	2.17	7.72	3.17	4.36
0.33	5.28	1.33	36.70	2.33	6.78	3.33	4.09
0.50	6.42	1.50	19.91	2.50	6.07	3.50	3.85
0.67	8.35	1.67	13.96	2.67	5.51	3.67	3.64
0.83	12.41	1.83	10.89	2.83	5.06	3.83	3.46

| CALIB | NASHYD (0105) | ID= 1 DT= 5.0 min |

Area (ha)= 0.33 Curve Number (CN)= 80.0
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	3.96	1.083	28.29	2.083	9.00	3.08	4.68
0.167	3.96	1.167	28.29	2.167	9.00	3.17	4.68
0.250	4.51	1.250	116.31	2.250	7.72	3.25	4.36
0.333	4.51	1.333	116.31	2.333	7.72	3.33	4.36
0.417	5.28	1.417	36.70	2.417	6.78	3.42	4.09
0.500	5.28	1.500	36.70	2.500	6.78	3.50	4.09
0.583	6.42	1.583	19.91	2.583	6.07	3.58	3.85
0.667	6.42	1.667	19.91	2.667	6.07	3.67	3.85
0.750	8.35	1.750	13.96	2.750	5.51	3.75	3.64
0.833	8.35	1.833	13.96	2.833	5.51	3.83	3.64
0.917	12.41	1.917	10.89	2.917	5.06	3.92	3.46
1.000	12.41	2.000	10.89	3.000	5.06	4.00	3.46

Unit Hyd Qpeak (cms)= 0.063

PEAK FLOW (cms)= 0.021 (i)
TIME TO PEAK (hrs)= 1.500
RUNOFF VOLUME (mm)= 22.121
TOTAL RAINFALL (mm)= 55.201
RUNOFF COEFFICIENT = 0.401

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

| CALIB |

```
| STANDHYD (  0101)|   Area    (ha)=   2.66
|ID= 1 DT= 5.0 min |   Total Imp(%)=  87.00   Dir. Conn.(%)=  87.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.31         0.35
     Dep. Storage     (mm)=       1.00         1.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     133.17        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    3.96 | 1.083   28.29 | 2.083    9.00 |  3.08    4.68
               0.167    3.96 | 1.167   28.29 | 2.167    9.00 |  3.17    4.68
               0.250    4.51 | 1.250  116.31 | 2.250    7.72 |  3.25    4.36
               0.333    4.51 | 1.333  116.31 | 2.333    7.72 |  3.33    4.36
               0.417    5.28 | 1.417   36.70 | 2.417    6.78 |  3.42    4.09
               0.500    5.28 | 1.500   36.70 | 2.500    6.78 |  3.50    4.09
               0.583    6.42 | 1.583   19.91 | 2.583    6.07 |  3.58    3.85
               0.667    6.42 | 1.667   19.91 | 2.667    6.07 |  3.67    3.85
               0.750    8.35 | 1.750   13.96 | 2.750    5.51 |  3.75    3.64
               0.833    8.35 | 1.833   13.96 | 2.833    5.51 |  3.83    3.64
               0.917   12.41 | 1.917   10.89 | 2.917    5.06 |  3.92    3.46
               1.000   12.41 | 2.000   10.89 | 3.000    5.06 |  4.00    3.46

     Max.Eff.Inten.(mm/hr)=     116.31        96.22
                over (min)        5.00        10.00
     Storage Coeff.  (min)=       2.86 (ii)    5.96 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.28         0.15
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.73         0.07          0.796 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.42           1.33
     RUNOFF VOLUME    (mm)=      54.20        43.48          52.81
     TOTAL RAINFALL   (mm)=      55.20        55.20          55.20
     RUNOFF COEFFICIENT   =       0.98         0.79           0.96

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  95.0    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(  2000)|     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   |   0.0503      0.0849
                          0.0479     0.0781   |   0.0506      0.0889
                          0.0483     0.0781   |   0.0510      0.0950
                          0.0487     0.0784   |   0.0514      0.1041
                          0.0491     0.0790   |   0.0518      0.1174
                          0.0495     0.0801   |   0.0521      0.1365
                          0.0499     0.0821   |   0.0525      0.1627

                                  AREA     QPEAK     TPEAK       R.V.
                                  (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0101)       2.660     0.796      1.33       52.81
   OUTFLOW: ID= 1 (  2000)       2.660     0.051      2.42       52.65
   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](%)=  6.43
                    TIME SHIFT OF PEAK FLOW         (min)= 65.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=  0.0978

--------------------------------------------------------------------------------
--------------------
```

```
| CALIB            |
| STANDHYD (  0102)|   Area    (ha)=   2.51
|ID= 1 DT= 5.0 min |   Total Imp(%)=  90.00   Dir. Conn.(%)=  90.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.26         0.25
     Dep. Storage     (mm)=       1.00         1.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     129.36        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    3.96 | 1.083   28.29 | 2.083    9.00 |  3.08    4.68
              0.167    3.96 | 1.167   28.29 | 2.167    9.00 |  3.17    4.68
              0.250    4.51 | 1.250  116.31 | 2.250    7.72 |  3.25    4.36
              0.333    4.51 | 1.333  116.31 | 2.333    7.72 |  3.33    4.36
              0.417    5.28 | 1.417   36.70 | 2.417    6.78 |  3.42    4.09
              0.500    5.28 | 1.500   36.70 | 2.500    6.78 |  3.50    4.09
              0.583    6.42 | 1.583   19.91 | 2.583    6.07 |  3.58    3.85
              0.667    6.42 | 1.667   19.91 | 2.667    6.07 |  3.67    3.85
              0.750    8.35 | 1.750   13.96 | 2.750    5.51 |  3.75    3.64
              0.833    8.35 | 1.833   13.96 | 2.833    5.51 |  3.83    3.64
              0.917   12.41 | 1.917   10.89 | 2.917    5.06 |  3.92    3.46
              1.000   12.41 | 2.000   10.89 | 3.000    5.06 |  4.00    3.46

     Max.Eff.Inten.(mm/hr)=     116.31        96.22
                 over (min)        5.00        10.00
     Storage Coeff.  (min)=       2.81 (ii)    5.57 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.28         0.16
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.71         0.05          0.763 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.42           1.33
     RUNOFF VOLUME    (mm)=      54.20        43.48          53.13
     TOTAL RAINFALL   (mm)=      55.20        55.20          55.20
     RUNOFF COEFFICIENT   =       0.98         0.79           0.96

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  95.0    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(  2001)|     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   |   0.0452      0.1069
                          0.0439     0.0828   |   0.0456      0.1377
                          0.0444     0.0841   |   0.0461      0.1842
                          0.0448     0.0905   |   0.0465      0.2453

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0102)      2.510     0.763      1.33      53.13
   OUTFLOW: ID= 1 (  2001)      2.510     0.045      2.58      52.94
   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](%)=  5.89
                    TIME SHIFT OF PEAK FLOW         (min)= 75.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=  0.0949

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0103)|   Area    (ha)=   2.92
```

|ID= 1 DT= 5.0 min | Total Imp(%)= 99.00 Dir. Conn.(%)= 99.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	2.89	0.03
Dep. Storage	(mm)=	1.00	1.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	139.52	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	3.96	1.083	28.29	2.083	9.00	3.08	4.68
0.167	3.96	1.167	28.29	2.167	9.00	3.17	4.68
0.250	4.51	1.250	116.31	2.250	7.72	3.25	4.36
0.333	4.51	1.333	116.31	2.333	7.72	3.33	4.36
0.417	5.28	1.417	36.70	2.417	6.78	3.42	4.09
0.500	5.28	1.500	36.70	2.500	6.78	3.50	4.09
0.583	6.42	1.583	19.91	2.583	6.07	3.58	3.85
0.667	6.42	1.667	19.91	2.667	6.07	3.67	3.85
0.750	8.35	1.750	13.96	2.750	5.51	3.75	3.64
0.833	8.35	1.833	13.96	2.833	5.51	3.83	3.64
0.917	12.41	1.917	10.89	2.917	5.06	3.92	3.46
1.000	12.41	2.000	10.89	3.000	5.06	4.00	3.46

Max.Eff.Inten.(mm/hr)=		116.31	96.22	
over (min)		5.00	5.00	
Storage Coeff. (min)=		2.94 (ii)	3.99 (ii)	
Unit Hyd. Tpeak (min)=		5.00	5.00	
Unit Hyd. peak (cms)=		0.28	0.24	
				TOTALS
PEAK FLOW	(cms)=	0.91	0.01	0.918 (iii)
TIME TO PEAK	(hrs)=	1.33	1.33	1.33
RUNOFF VOLUME	(mm)=	54.20	43.48	54.09
TOTAL RAINFALL	(mm)=	55.20	55.20	55.20
RUNOFF COEFFICIENT	=	0.98	0.79	0.98

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 95.0 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(2002)| IN= 2---> OUT= 1 | DT= 5.0 min |

OVERFLOW IS ON

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.2141	0.0672
0.2112	0.0662	0.2156	0.0707
0.2127	0.0663	0.2170	0.0786

		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0103)		2.920	0.918	1.33	54.09
OUTFLOW: ID= 1 (2002)		2.920	0.216	1.58	54.07
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](%)= 23.55
TIME SHIFT OF PEAK FLOW (min)= 15.00
MAXIMUM STORAGE USED (ha.m.)= 0.0741

| CALIB | STANDHYD (0104)|

Area (ha)= 0.25
|ID= 1 DT= 5.0 min | Total Imp(%)= 77.00 Dir. Conn.(%)= 77.00

		IMPERVIOUS	PERVIOUS (i)

Surface Area	(ha)=	0.19	0.06
Dep. Storage	(mm)=	1.00	1.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	40.82	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	3.96	1.083	28.29	2.083	9.00	3.08	4.68
0.167	3.96	1.167	28.29	2.167	9.00	3.17	4.68
0.250	4.51	1.250	116.31	2.250	7.72	3.25	4.36
0.333	4.51	1.333	116.31	2.333	7.72	3.33	4.36
0.417	5.28	1.417	36.70	2.417	6.78	3.42	4.09
0.500	5.28	1.500	36.70	2.500	6.78	3.50	4.09
0.583	6.42	1.583	19.91	2.583	6.07	3.58	3.85
0.667	6.42	1.667	19.91	2.667	6.07	3.67	3.85
0.750	8.35	1.750	13.96	2.750	5.51	3.75	3.64
0.833	8.35	1.833	13.96	2.833	5.51	3.83	3.64
0.917	12.41	1.917	10.89	2.917	5.06	3.92	3.46
1.000	12.41	2.000	10.89	3.000	5.06	4.00	3.46

Max.Eff.Inten.(mm/hr)=	116.31	96.22		
over (min)	5.00	10.00		
Storage Coeff. (min)=	1.40 (ii)	5.50 (ii)		
Unit Hyd. Tpeak (min)=	5.00	10.00		
Unit Hyd. peak (cms)=	0.33	0.16		
			TOTALS	
PEAK FLOW (cms)=	0.06	0.01	0.073 (iii)	
TIME TO PEAK (hrs)=	1.33	1.42	1.33	
RUNOFF VOLUME (mm)=	54.20	43.48	51.72	
TOTAL RAINFALL (mm)=	55.20	55.20	55.20	
RUNOFF COEFFICIENT =	0.98	0.79	0.94	

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 95.0 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 (0024)					
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0104):	0.25	0.073	1.33	51.72
+ ID2= 2 (2000):	2.66	0.051	2.42	52.65
ID = 3 (0024):	2.91	0.106	1.33	52.57

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0024)					
3 + 2 = 1	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 3 (0024):	2.91	0.106	1.33	52.57
+ ID2= 2 (2001):	2.51	0.045	2.58	52.94
ID = 1 (0024):	5.42	0.134	1.33	52.74

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0024)					
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0024):	5.42	0.134	1.33	52.74
+ ID2= 2 (2002):	2.92	0.216	1.58	54.07
ID = 3 (0024):	8.34	0.334	1.50	53.21

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

--------------------
| ADD HYD  (  0034)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
*** W A R N I N G :  HYDROGRAPH   2000 <ID= 1> IS DRY.
*** W A R N I N G :  HYDROGRAPH   2001 <ID= 2> IS DRY.
*** W A R N I N G :  HYDROGRAPH   0034 <ID= 3> IS ALSO DRY
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0034)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
*** W A R N I N G :  HYDROGRAPH   0034 <ID= 3> IS DRY.
*** W A R N I N G :  HYDROGRAPH   2002 <ID= 2> IS DRY.
*** W A R N I N G :  HYDROGRAPH   0034 <ID= 1> IS ALSO DRY
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0033)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0105):     0.33   0.021     1.50    22.12
     + ID2= 2 (  0024):     8.34   0.334     1.50    53.21
       ================================================
       ID = 3 (  0033):     8.67   0.355     1.50    52.02

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

--------------------
| ADD HYD  (  0033)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
*** W A R N I N G :  HYDROGRAPH   0034 <ID= 2> IS DRY.
*** W A R N I N G :  HYDROGRAPH   0001 = HYDROGRAPH 0003
       ID1= 3 (  0033):     8.67   0.355     1.50    52.02
     + ID2= 2 (  0034):     0.00   0.000     0.00     0.00
       ================================================
       ID = 1 (  0033):     8.67   0.355     1.50    52.02

     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\VO2\voin.dat
  Output  filename: C:\Users\workstation\AppData\Local\Civica\VH5\481a4287-7c85-406f-9d86-88ed6da58e85\c0822c18-
541b-414b-8f66-e5323ad259ea\
  Summary filename: C:\Users\workstation\AppData\Local\Civica\VH5\481a4287-7c85-406f-9d86-88ed6da58e85\c0822c18-
541b-414b-8f66-e5323ad259ea\


DATE: 06-02-2026                          TIME: 11:24:15

USER:
```

COMMENTS: _____

```
  ********************************************
  ** SIMULATION : Rain 04 - 25yr              **
  ********************************************

--------------------
| CHICAGO STORM    |    IDF curve parameters: A=1065.950
| Ptotal= 64.43 mm |                          B=   5.000
--------------------                          C=   0.762
                       used in:   INTENSITY =  A / (t + B)^C

                       Duration of storm  =  4.00 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	4.64	1.00	33.01	2.00	10.53	3.00	5.48
0.17	5.29	1.17	135.38	2.17	9.03	3.17	5.11
0.33	6.18	1.33	42.80	2.33	7.94	3.33	4.79
0.50	7.52	1.50	23.26	2.50	7.11	3.50	4.51
0.67	9.77	1.67	16.31	2.67	6.45	3.67	4.27
0.83	14.51	1.83	12.73	2.83	5.92	3.83	4.05

```
--------------------
| CALIB            |
| NASHYD   (  0105)|   Area    (ha)=   0.33   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 hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	4.64	1.083	33.01	2.083	10.53	3.08	5.48
0.167	4.64	1.167	33.01	2.167	10.53	3.17	5.48
0.250	5.29	1.250	135.38	2.250	9.03	3.25	5.11
0.333	5.29	1.333	135.38	2.333	9.03	3.33	5.11
0.417	6.18	1.417	42.80	2.417	7.94	3.42	4.79
0.500	6.18	1.500	42.80	2.500	7.94	3.50	4.79
0.583	7.52	1.583	23.26	2.583	7.11	3.58	4.51
0.667	7.52	1.667	23.26	2.667	7.11	3.67	4.51
0.750	9.77	1.750	16.31	2.750	6.45	3.75	4.27
0.833	9.77	1.833	16.31	2.833	6.45	3.83	4.27
0.917	14.50	1.917	12.73	2.917	5.92	3.92	4.05
1.000	14.51	2.000	12.73	3.000	5.92	4.00	4.05

```
     Unit Hyd Qpeak  (cms)=   0.063

     PEAK FLOW       (cms)=   0.028 (i)
     TIME TO PEAK    (hrs)=   1.500
     RUNOFF VOLUME    (mm)=  28.676
     TOTAL RAINFALL   (mm)=  64.431
     RUNOFF COEFFICIENT   =   0.445

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

```
--------------------
| CALIB            |
| STANDHYD (  0101)|   Area    (ha)=   2.66
|ID= 1 DT= 5.0 min |   Total Imp(%)=  87.00   Dir. Conn.(%)=  87.00
--------------------
```

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	2.31	0.35
Dep. Storage	(mm)=	1.00	1.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	133.17	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	4.64	1.083	33.01	2.083	10.53	3.08	5.48
0.167	4.64	1.167	33.01	2.167	10.53	3.17	5.48
0.250	5.29	1.250	135.38	2.250	9.03	3.25	5.11
0.333	5.29	1.333	135.38	2.333	9.03	3.33	5.11
0.417	6.18	1.417	42.80	2.417	7.94	3.42	4.79
0.500	6.18	1.500	42.80	2.500	7.94	3.50	4.79
0.583	7.52	1.583	23.26	2.583	7.11	3.58	4.51
0.667	7.52	1.667	23.26	2.667	7.11	3.67	4.51
0.750	9.77	1.750	16.31	2.750	6.45	3.75	4.27
0.833	9.77	1.833	16.31	2.833	6.45	3.83	4.27
0.917	14.50	1.917	12.73	2.917	5.92	3.92	4.05
1.000	14.51	2.000	12.73	3.000	5.92	4.00	4.05

Max.Eff.Inten.(mm/hr)=		135.38	116.05	
over (min)		5.00	10.00	
Storage Coeff. (min)=		2.69 (ii)	5.61 (ii)	
Unit Hyd. Tpeak (min)=		5.00	10.00	
Unit Hyd. peak (cms)=		0.29	0.15	
				TOTALS
PEAK FLOW	(cms)=	0.85	0.08	0.935 (iii)
TIME TO PEAK	(hrs)=	1.33	1.42	1.33
RUNOFF VOLUME	(mm)=	63.43	52.39	61.99
TOTAL RAINFALL	(mm)=	64.43	64.43	64.43
RUNOFF COEFFICIENT	=	0.98	0.81	0.96

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 95.0 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(2000)	OVERFLOW IS ON			
IN= 2---> OUT= 1				
DT= 5.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.0503	0.0849
	0.0479	0.0781	0.0506	0.0889
	0.0483	0.0781	0.0510	0.0950
	0.0487	0.0784	0.0514	0.1041
	0.0491	0.0790	0.0518	0.1174
	0.0495	0.0801	0.0521	0.1365
	0.0499	0.0821	0.0525	0.1627

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0101)	2.660	0.935	1.33	61.99
OUTFLOW: ID= 1 (2000)	2.660	0.052	2.67	61.84
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](%)= 5.54
TIME SHIFT OF PEAK FLOW (min)= 80.00
MAXIMUM STORAGE USED (ha.m.)= 0.1180

CALIB	
STANDHYD (0102)	Area (ha)= 2.51
ID= 1 DT= 5.0 min	Total Imp(%)= 90.00 Dir. Conn.(%)= 90.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	2.26	0.25
Dep. Storage	(mm)=	1.00	1.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	129.36	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	4.64	1.083	33.01	2.083	10.53	3.08	5.48
0.167	4.64	1.167	33.01	2.167	10.53	3.17	5.48
0.250	5.29	1.250	135.38	2.250	9.03	3.25	5.11
0.333	5.29	1.333	135.38	2.333	9.03	3.33	5.11
0.417	6.18	1.417	42.80	2.417	7.94	3.42	4.79
0.500	6.18	1.500	42.80	2.500	7.94	3.50	4.79
0.583	7.52	1.583	23.26	2.583	7.11	3.58	4.51
0.667	7.52	1.667	23.26	2.667	7.11	3.67	4.51
0.750	9.77	1.750	16.31	2.750	6.45	3.75	4.27
0.833	9.77	1.833	16.31	2.833	6.45	3.83	4.27
0.917	14.50	1.917	12.73	2.917	5.92	3.92	4.05
1.000	14.51	2.000	12.73	3.000	5.92	4.00	4.05

			TOTALS
Max.Eff.Inten.(mm/hr)=	135.38	116.05	
over (min)	5.00	10.00	
Storage Coeff. (min)=	2.64 (ii)	5.24 (ii)	
Unit Hyd. Tpeak (min)=	5.00	10.00	
Unit Hyd. peak (cms)=	0.29	0.16	
PEAK FLOW (cms)=	0.83	0.06	0.895 (iii)
TIME TO PEAK (hrs)=	1.33	1.42	1.33
RUNOFF VOLUME (mm)=	63.43	52.39	62.33
TOTAL RAINFALL (mm)=	64.43	64.43	64.43
RUNOFF COEFFICIENT =	0.98	0.81	0.97

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 95.0 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(2001) IN= 2---> OUT= 1 DT= 5.0 min	OVERFLOW IS ON			
	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.0452	0.1069
	0.0439	0.0828	0.0456	0.1377
	0.0444	0.0841	0.0461	0.1842
	0.0448	0.0905	0.0465	0.2453

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0102)	2.510	0.895	1.33	62.33
OUTFLOW: ID= 1 (2001)	2.510	0.045	2.83	62.14
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](%)= 5.06
TIME SHIFT OF PEAK FLOW (min)= 90.00
MAXIMUM STORAGE USED (ha.m.)= 0.1144

CALIB STANDHYD (0103) ID= 1 DT= 5.0 min	Area (ha)= 2.92 Total Imp(%)= 99.00 Dir. Conn.(%)= 99.00	
	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	2.89	0.03
Dep. Storage (mm)=	1.00	1.00
Average Slope (%)=	1.00	2.00
Length (m)=	139.52	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	4.64	1.083	33.01	2.083	10.53	3.08	5.48
0.167	4.64	1.167	33.01	2.167	10.53	3.17	5.48
0.250	5.29	1.250	135.38	2.250	9.03	3.25	5.11
0.333	5.29	1.333	135.38	2.333	9.03	3.33	5.11
0.417	6.18	1.417	42.80	2.417	7.94	3.42	4.79
0.500	6.18	1.500	42.80	2.500	7.94	3.50	4.79
0.583	7.52	1.583	23.26	2.583	7.11	3.58	4.51
0.667	7.52	1.667	23.26	2.667	7.11	3.67	4.51
0.750	9.77	1.750	16.31	2.750	6.45	3.75	4.27
0.833	9.77	1.833	16.31	2.833	6.45	3.83	4.27
0.917	14.50	1.917	12.73	2.917	5.92	3.92	4.05
1.000	14.51	2.000	12.73	3.000	5.92	4.00	4.05

Max.Eff.Inten.(mm/hr)=	135.38	116.05	
over (min)	5.00	5.00	
Storage Coeff. (min)=	2.76 (ii)	3.76 (ii)	
Unit Hyd. Tpeak (min)=	5.00	5.00	
Unit Hyd. peak (cms)=	0.28	0.25	
			TOTALS
PEAK FLOW (cms)=	1.06	0.01	1.074 (iii)
TIME TO PEAK (hrs)=	1.33	1.33	1.33
RUNOFF VOLUME (mm)=	63.43	52.39	63.32
TOTAL RAINFALL (mm)=	64.43	64.43	64.43
RUNOFF COEFFICIENT =	0.98	0.81	0.98

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 95.0 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(2002) | IN= 2---> OUT= 1 | DT= 5.0 min	OVERFLOW IS ON			
	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.2141	0.0672
	0.2112	0.0662	0.2156	0.0707
	0.2127	0.0663	0.2170	0.0786

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0103)	2.920	1.074	1.33	63.32
OUTFLOW: ID= 1 (2002)	2.706	0.217	1.42	64.52
OVERFLOW:ID= 3 (0003)	0.214	0.310	1.42	64.52

TOTAL NUMBER OF SIMULATION OVERFLOW = 3
CUMULATIVE TIME OF OVERFLOW (HOURS) = 0.25
PERCENTAGE OF TIME OVERFLOWING (%) = 2.80

PEAK FLOW REDUCTION [Qout/Qin](%)= 20.20
TIME SHIFT OF PEAK FLOW (min)= 5.00
MAXIMUM STORAGE USED (ha.m.)= 0.0786

CALIB STANDHYD (0104) |ID= 1 DT= 5.0 min	Area (ha)= 0.25 Total Imp(%)= 77.00 Dir. Conn.(%)= 77.00		
		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.19	0.06
Dep. Storage	(mm)=	1.00	1.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	40.82	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	4.64	1.083	33.01	2.083	10.53	3.08	5.48
0.167	4.64	1.167	33.01	2.167	10.53	3.17	5.48
0.250	5.29	1.250	135.38	2.250	9.03	3.25	5.11
0.333	5.29	1.333	135.38	2.333	9.03	3.33	5.11
0.417	6.18	1.417	42.80	2.417	7.94	3.42	4.79
0.500	6.18	1.500	42.80	2.500	7.94	3.50	4.79
0.583	7.52	1.583	23.26	2.583	7.11	3.58	4.51
0.667	7.52	1.667	23.26	2.667	7.11	3.67	4.51
0.750	9.77	1.750	16.31	2.750	6.45	3.75	4.27
0.833	9.77	1.833	16.31	2.833	6.45	3.83	4.27
0.917	14.50	1.917	12.73	2.917	5.92	3.92	4.05
1.000	14.51	2.000	12.73	3.000	5.92	4.00	4.05

Max.Eff.Inten.(mm/hr)=	135.38	116.05	
over (min)	5.00	10.00	
Storage Coeff. (min)=	1.32 (ii)	5.18 (ii)	
Unit Hyd. Tpeak (min)=	5.00	10.00	
Unit Hyd. peak (cms)=	0.33	0.16	
			TOTALS
PEAK FLOW (cms)=	0.07	0.01	0.086 (iii)
TIME TO PEAK (hrs)=	1.33	1.42	1.33
RUNOFF VOLUME (mm)=	63.43	52.39	60.88
TOTAL RAINFALL (mm)=	64.43	64.43	64.43
RUNOFF COEFFICIENT =	0.98	0.81	0.94

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 95.0 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 (0024)					
1 + 2 = 3	AREA	QPEAK	TPEAK	R.V.
	(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0104):	0.25	0.086	1.33	60.88
+ ID2= 2 (2000):	2.66	0.052	2.67	61.84
ID = 3 (0024):	2.91	0.126	1.33	61.76

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0024)					
3 + 2 = 1	AREA	QPEAK	TPEAK	R.V.
	(ha)	(cms)	(hrs)	(mm)
ID1= 3 (0024):	2.91	0.126	1.33	61.76
+ ID2= 2 (2001):	2.51	0.045	2.83	62.14
ID = 1 (0024):	5.42	0.159	1.33	61.93

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0024)					
1 + 2 = 3	AREA	QPEAK	TPEAK	R.V.
	(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0024):	5.42	0.159	1.33	61.93
+ ID2= 2 (2002):	2.71	0.217	1.42	64.52
ID = 3 (0024):	8.13	0.362	1.33	62.79

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0034)					
1 + 2 = 3	AREA	QPEAK	TPEAK	R.V.
	(ha)	(cms)	(hrs)	(mm)

*** W A R N I N G : HYDROGRAPH 2000 <ID= 1> IS DRY.
*** W A R N I N G : HYDROGRAPH 2001 <ID= 2> IS DRY.
*** W A R N I N G : HYDROGRAPH 0034 <ID= 3> IS ALSO DRY

```
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0034)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)      (mm)
*** W A R N I N G :  HYDROGRAPH   0034 <ID= 3> IS DRY.
*** W A R N I N G :  HYDROGRAPH   0034 = HYDROGRAPH 2002
        ID1= 3 (  0034):     0.00   0.000     0.00    62.79
      + ID2= 2 (  2002):     0.21   0.310     1.42    64.52
        ================================================
        ID = 1 (  0034):     0.21   0.310     1.42    64.52

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

--------------------
| ADD HYD  (  0033)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)      (mm)
        ID1= 1 (  0105):     0.33   0.028     1.50    28.68
      + ID2= 2 (  0024):     8.13   0.362     1.33    62.79
        ================================================
        ID = 3 (  0033):     8.46   0.380     1.33    61.46

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

--------------------
| ADD HYD  (  0033)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)      (mm)
        ID1= 3 (  0033):     8.46   0.380     1.33    61.46
      + ID2= 2 (  0034):     0.21   0.310     1.42    64.52
        ================================================
        ID = 1 (  0033):     8.67   0.684     1.42    61.54

     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\VO2\voin.dat
  Output  filename: C:\Users\workstation\AppData\Local\Civica\VH5\481a4287-7c85-406f-9d86-88ed6da58e85\88183786-
ad1e-4895-9a54-1b4746acf72f\
  Summary filename: C:\Users\workstation\AppData\Local\Civica\VH5\481a4287-7c85-406f-9d86-88ed6da58e85\88183786-
ad1e-4895-9a54-1b4746acf72f\


DATE: 06-02-2026                          TIME: 11:24:15

USER:


COMMENTS: _____________________________________________________________
```

```
  ********************************************
  ** SIMULATION : Rain 05 - 50yr              **
  ********************************************

--------------------
| CHICAGO STORM    |    IDF curve parameters: A=1172.340
| Ptotal= 71.25 mm |                          B=   5.000
--------------------                          C=   0.761
                       used in:   INTENSITY =  A / (t + B)^C

                       Duration of storm  =  4.00 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	5.16	1.00	36.50	2.00	11.67	3.00	6.08
0.17	5.87	1.17	149.30	2.17	10.01	3.17	5.67
0.33	6.86	1.33	47.31	2.33	8.81	3.33	5.31
0.50	8.34	1.50	25.73	2.50	7.89	3.50	5.01
0.67	10.83	1.67	18.06	2.67	7.16	3.67	4.74
0.83	16.07	1.83	14.10	2.83	6.57	3.83	4.50

```
--------------------
| CALIB            |
| NASHYD   (  0105)|   Area    (ha)=   0.33   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 hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	5.16	1.083	36.50	2.083	11.67	3.08	6.08
0.167	5.16	1.167	36.50	2.167	11.67	3.17	6.08
0.250	5.87	1.250	149.30	2.250	10.01	3.25	5.67
0.333	5.87	1.333	149.30	2.333	10.01	3.33	5.67
0.417	6.86	1.417	47.31	2.417	8.81	3.42	5.31
0.500	6.86	1.500	47.31	2.500	8.81	3.50	5.31
0.583	8.34	1.583	25.73	2.583	7.89	3.58	5.01
0.667	8.34	1.667	25.73	2.667	7.89	3.67	5.01
0.750	10.83	1.750	18.06	2.750	7.16	3.75	4.74
0.833	10.83	1.833	18.06	2.833	7.16	3.83	4.74
0.917	16.07	1.917	14.10	2.917	6.57	3.92	4.50
1.000	16.07	2.000	14.10	3.000	6.57	4.00	4.50

```
     Unit Hyd Qpeak  (cms)=   0.063

     PEAK FLOW       (cms)=   0.034 (i)
     TIME TO PEAK    (hrs)=   1.500
     RUNOFF VOLUME    (mm)=  33.764
     TOTAL RAINFALL   (mm)=  71.253
     RUNOFF COEFFICIENT   =   0.474

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

--------------------
| CALIB            |
| STANDHYD (  0101)|   Area    (ha)=   2.66
|ID= 1 DT= 5.0 min |   Total Imp(%)=  87.00   Dir. Conn.(%)=  87.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.31         0.35
     Dep. Storage     (mm)=       1.00         1.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     133.17        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	5.16	1.083	36.50	2.083	11.67	3.08	6.08
0.167	5.16	1.167	36.50	2.167	11.67	3.17	6.08
0.250	5.87	1.250	149.30	2.250	10.01	3.25	5.67
0.333	5.87	1.333	149.30	2.333	10.01	3.33	5.67
0.417	6.86	1.417	47.31	2.417	8.81	3.42	5.31
0.500	6.86	1.500	47.31	2.500	8.81	3.50	5.31
0.583	8.34	1.583	25.73	2.583	7.89	3.58	5.01
0.667	8.34	1.667	25.73	2.667	7.89	3.67	5.01
0.750	10.83	1.750	18.06	2.750	7.16	3.75	4.74
0.833	10.83	1.833	18.06	2.833	7.16	3.83	4.74
0.917	16.07	1.917	14.10	2.917	6.57	3.92	4.50
1.000	16.07	2.000	14.10	3.000	6.57	4.00	4.50

Max.Eff.Inten.(mm/hr)=	149.30	130.57		
over (min)	5.00	10.00		
Storage Coeff. (min)=	2.58 (ii)	5.40 (ii)		
Unit Hyd. Tpeak (min)=	5.00	10.00		
Unit Hyd. peak (cms)=	0.29	0.16		
			TOTALS	
PEAK FLOW (cms)=	0.94	0.10	1.037 (iii)	
TIME TO PEAK (hrs)=	1.33	1.42	1.33	
RUNOFF VOLUME (mm)=	70.25	59.02	68.79	
TOTAL RAINFALL (mm)=	71.25	71.25	71.25	
RUNOFF COEFFICIENT =	0.99	0.83	0.97	

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 95.0 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(2000)| IN= 2---> OUT= 1 | DT= 5.0 min	OVERFLOW IS ON			
	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.0503	0.0849
	0.0479	0.0781	0.0506	0.0889
	0.0483	0.0781	0.0510	0.0950
	0.0487	0.0784	0.0514	0.1041
	0.0491	0.0790	0.0518	0.1174
	0.0495	0.0801	0.0521	0.1365
	0.0499	0.0821	0.0525	0.1627

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0101)	2.660	1.037	1.33	68.79
OUTFLOW: ID= 1 (2000)	2.660	0.052	2.83	68.64
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](%)= 5.02
TIME SHIFT OF PEAK FLOW (min)= 90.00
MAXIMUM STORAGE USED (ha.m.)= 0.1335

CALIB | STANDHYD (0102)| ID= 1 DT= 5.0 min |	Area (ha)= 2.51		
	Total Imp(%)= 90.00	Dir. Conn.(%)= 90.00	
	IMPERVIOUS	PERVIOUS (i)	
Surface Area (ha)=	2.26	0.25	
Dep. Storage (mm)=	1.00	1.00	
Average Slope (%)=	1.00	2.00	
Length (m)=	129.36	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	5.16	1.083	36.50	2.083	11.67	3.08	6.08
0.167	5.16	1.167	36.50	2.167	11.67	3.17	6.08
0.250	5.87	1.250	149.30	2.250	10.01	3.25	5.67
0.333	5.87	1.333	149.30	2.333	10.01	3.33	5.67
0.417	6.86	1.417	47.31	2.417	8.81	3.42	5.31
0.500	6.86	1.500	47.31	2.500	8.81	3.50	5.31
0.583	8.34	1.583	25.73	2.583	7.89	3.58	5.01
0.667	8.34	1.667	25.73	2.667	7.89	3.67	5.01
0.750	10.83	1.750	18.06	2.750	7.16	3.75	4.74
0.833	10.83	1.833	18.06	2.833	7.16	3.83	4.74
0.917	16.07	1.917	14.10	2.917	6.57	3.92	4.50
1.000	16.07	2.000	14.10	3.000	6.57	4.00	4.50

Max.Eff.Inten.(mm/hr)=	149.30	130.57		
over (min)	5.00	10.00		
Storage Coeff. (min)=	2.54 (ii)	5.04 (ii)		
Unit Hyd. Tpeak (min)=	5.00	10.00		
Unit Hyd. peak (cms)=	0.29	0.16		
			TOTALS	
PEAK FLOW (cms)=	0.92	0.07	0.992 (iii)	
TIME TO PEAK (hrs)=	1.33	1.42	1.33	
RUNOFF VOLUME (mm)=	70.25	59.02	69.13	
TOTAL RAINFALL (mm)=	71.25	71.25	71.25	
RUNOFF COEFFICIENT =	0.99	0.83	0.97	

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 95.0 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(2001)	OVERFLOW IS ON			
IN= 2---> OUT= 1				
DT= 5.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.0452	0.1069
	0.0439	0.0828	0.0456	0.1377
	0.0444	0.0841	0.0461	0.1842
	0.0448	0.0905	0.0465	0.2453

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0102)	2.510	0.992	1.33	69.13
OUTFLOW: ID= 1 (2001)	2.510	0.045	3.00	68.94
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](%)= 4.59
TIME SHIFT OF PEAK FLOW (min)=100.00
MAXIMUM STORAGE USED (ha.m.)= 0.1293

CALIB		
STANDHYD (0103)	Area (ha)= 2.92	
ID= 1 DT= 5.0 min	Total Imp(%)= 99.00	Dir. Conn.(%)= 99.00

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	2.89	0.03
Dep. Storage (mm)=	1.00	1.00
Average Slope (%)=	1.00	2.00
Length (m)=	139.52	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	5.16	1.083	36.50	2.083	11.67	3.08	6.08
0.167	5.16	1.167	36.50	2.167	11.67	3.17	6.08
0.250	5.87	1.250	149.30	2.250	10.01	3.25	5.67
0.333	5.87	1.333	149.30	2.333	10.01	3.33	5.67
0.417	6.86	1.417	47.31	2.417	8.81	3.42	5.31
0.500	6.86	1.500	47.31	2.500	8.81	3.50	5.31
0.583	8.34	1.583	25.73	2.583	7.89	3.58	5.01
0.667	8.34	1.667	25.73	2.667	7.89	3.67	5.01
0.750	10.83	1.750	18.06	2.750	7.16	3.75	4.74
0.833	10.83	1.833	18.06	2.833	7.16	3.83	4.74
0.917	16.07	1.917	14.10	2.917	6.57	3.92	4.50
1.000	16.07	2.000	14.10	3.000	6.57	4.00	4.50

			TOTALS
Max.Eff.Inten.(mm/hr)=	149.30	130.57	
over (min)	5.00	5.00	
Storage Coeff. (min)=	2.66 (ii)	3.61 (ii)	
Unit Hyd. Tpeak (min)=	5.00	5.00	
Unit Hyd. peak (cms)=	0.29	0.25	
PEAK FLOW (cms)=	1.18	0.01	1.188 (iii)
TIME TO PEAK (hrs)=	1.33	1.33	1.33
RUNOFF VOLUME (mm)=	70.25	59.02	70.14
TOTAL RAINFALL (mm)=	71.25	71.25	71.25
RUNOFF COEFFICIENT =	0.99	0.83	0.98

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 95.0 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(2002)	OVERFLOW IS ON			
IN= 2---> OUT= 1				
DT= 5.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.2141	0.0672
	0.2112	0.0662	0.2156	0.0707
	0.2127	0.0663	0.2170	0.0786

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0103)	2.920	1.188	1.33	70.14
OUTFLOW: ID= 1 (2002)	2.608	0.217	1.42	70.11
OVERFLOW:ID= 3 (0003)	0.312	0.290	1.42	70.11

TOTAL NUMBER OF SIMULATION OVERFLOW = 3
CUMULATIVE TIME OF OVERFLOW (HOURS) = 0.25
PERCENTAGE OF TIME OVERFLOWING (%) = 2.78

PEAK FLOW REDUCTION [Qout/Qin](%)= 18.27
TIME SHIFT OF PEAK FLOW (min)= 5.00
MAXIMUM STORAGE USED (ha.m.)= 0.0786

CALIB	
STANDHYD (0104)	Area (ha)= 0.25
ID= 1 DT= 5.0 min	Total Imp(%)= 77.00 Dir. Conn.(%)= 77.00

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	0.19	0.06
Dep. Storage (mm)=	1.00	1.00
Average Slope (%)=	1.00	2.00
Length (m)=	40.82	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	5.16	1.083	36.50	2.083	11.67	3.08	6.08
0.167	5.16	1.167	36.50	2.167	11.67	3.17	6.08
0.250	5.87	1.250	149.30	2.250	10.01	3.25	5.67

0.333	5.87	1.333	149.30	2.333	10.01	3.33	5.67
0.417	6.86	1.417	47.31	2.417	8.81	3.42	5.31
0.500	6.86	1.500	47.31	2.500	8.81	3.50	5.31
0.583	8.34	1.583	25.73	2.583	7.89	3.58	5.01
0.667	8.34	1.667	25.73	2.667	7.89	3.67	5.01
0.750	10.83	1.750	18.06	2.750	7.16	3.75	4.74
0.833	10.83	1.833	18.06	2.833	7.16	3.83	4.74
0.917	16.07	1.917	14.10	2.917	6.57	3.92	4.50
1.000	16.07	2.000	14.10	3.000	6.57	4.00	4.50

			TOTALS
Max.Eff.Inten.(mm/hr)=	149.30	130.57	
over (min)	5.00	5.00	
Storage Coeff. (min)=	1.27 (ii)	4.98 (ii)	
Unit Hyd. Tpeak (min)=	5.00	5.00	
Unit Hyd. peak (cms)=	0.33	0.22	
PEAK FLOW (cms)=	0.08	0.02	0.099 (iii)
TIME TO PEAK (hrs)=	1.33	1.33	1.33
RUNOFF VOLUME (mm)=	70.25	59.02	67.65
TOTAL RAINFALL (mm)=	71.25	71.25	71.25
RUNOFF COEFFICIENT =	0.99	0.83	0.95

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 95.0 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 (0024)|	AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0104):		0.25	0.099	1.33	67.65
+ ID2= 2 (2000):		2.66	0.052	2.83	68.64
ID = 3 (0024):		2.91	0.143	1.33	68.55

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0024)|	AREA	QPEAK	TPEAK	R.V.
3 + 2 = 1		(ha)	(cms)	(hrs)	(mm)
ID1= 3 (0024):		2.91	0.143	1.33	68.55
+ ID2= 2 (2001):		2.51	0.045	3.00	68.94
ID = 1 (0024):		5.42	0.180	1.33	68.73

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0024)|	AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0024):		5.42	0.180	1.33	68.73
+ ID2= 2 (2002):		2.61	0.217	1.42	70.11
ID = 3 (0024):		8.03	0.395	1.33	69.18

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0034)|	AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)

*** W A R N I N G : HYDROGRAPH 2000 <ID= 1> IS DRY.
*** W A R N I N G : HYDROGRAPH 2001 <ID= 2> IS DRY.
*** W A R N I N G : HYDROGRAPH 0034 <ID= 3> IS ALSO DRY

ADD HYD (0034)	

```
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)    (cms)    (hrs)     (mm)
*** W A R N I N G :  HYDROGRAPH   0034 <ID= 3> IS DRY.
*** W A R N I N G :  HYDROGRAPH   0034 = HYDROGRAPH 2002
        ID1= 3 (  0034):     0.00   0.000     0.00    69.18
      + ID2= 2 (  2002):     0.31   0.290     1.42    70.11
        ==================================================
        ID = 1 (  0034):     0.31   0.290     1.42    70.11

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

--------------------
| ADD HYD  (  0033)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0105):     0.33   0.034     1.50    33.76
      + ID2= 2 (  0024):     8.03   0.395     1.33    69.18
        ==================================================
        ID = 3 (  0033):     8.36   0.418     1.33    67.78

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

--------------------
| ADD HYD  (  0033)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0033):     8.36   0.418     1.33    67.78
      + ID2= 2 (  0034):     0.31   0.290     1.42    70.11
        ==================================================
        ID = 1 (  0033):     8.67   0.672     1.42    67.87

     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\VO2\voin.dat
  Output  filename: C:\Users\workstation\AppData\Local\Civica\VH5\481a4287-7c85-406f-9d86-88ed6da58e85\35e4414f-
2260-4b74-9921-00dda22163da\
  Summary filename: C:\Users\workstation\AppData\Local\Civica\VH5\481a4287-7c85-406f-9d86-88ed6da58e85\35e4414f-
2260-4b74-9921-00dda22163da\


DATE: 06-02-2026                          TIME: 11:24:14

USER:



COMMENTS: _____________________________________________________


--------------------------------------------------------------------------------------------------------------------------------
  ********************************************
  ** SIMULATION : Rain 06 - 100yr               **
  ********************************************

--------------------
| CHICAGO STORM    |    IDF curve parameters: A=1281.340
| Ptotal= 77.88 mm |                          B=   5.000
```

---------- C= 0.761
used in: INTENSITY = A / (t + B)^C

Duration of storm = 4.00 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	5.63	1.00	39.89	2.00	12.75	3.00	6.65
0.17	6.41	1.17	163.18	2.17	10.94	3.17	6.20
0.33	7.49	1.33	51.70	2.33	9.62	3.33	5.81
0.50	9.11	1.50	28.13	2.50	8.62	3.50	5.47
0.67	11.83	1.67	19.74	2.67	7.83	3.67	5.18
0.83	17.56	1.83	15.41	2.83	7.18	3.83	4.92

CALIB			
NASHYD (0105)	Area (ha)=	0.33	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 hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	5.63	1.083	39.89	2.083	12.75	3.08	6.65
0.167	5.63	1.167	39.89	2.167	12.75	3.17	6.65
0.250	6.41	1.250	163.18	2.250	10.94	3.25	6.20
0.333	6.41	1.333	163.18	2.333	10.94	3.33	6.20
0.417	7.49	1.417	51.70	2.417	9.62	3.42	5.81
0.500	7.49	1.500	51.70	2.500	9.62	3.50	5.81
0.583	9.11	1.583	28.13	2.583	8.62	3.58	5.47
0.667	9.11	1.667	28.13	2.667	8.62	3.67	5.47
0.750	11.83	1.750	19.74	2.750	7.83	3.75	5.18
0.833	11.83	1.833	19.74	2.833	7.83	3.83	5.18
0.917	17.56	1.917	15.41	2.917	7.18	3.92	4.92
1.000	17.56	2.000	15.41	3.000	7.18	4.00	4.92

Unit Hyd Qpeak (cms)= 0.063

PEAK FLOW (cms)= 0.039 (i)
TIME TO PEAK (hrs)= 1.500
RUNOFF VOLUME (mm)= 38.869
TOTAL RAINFALL (mm)= 77.878
RUNOFF COEFFICIENT = 0.499

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

CALIB			
STANDHYD (0101)	Area (ha)=	2.66	
ID= 1 DT= 5.0 min	Total Imp(%)=	87.00	Dir. Conn.(%)= 87.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	2.31	0.35
Dep. Storage	(mm)=	1.00	1.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	133.17	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	5.63	1.083	39.89	2.083	12.75	3.08	6.65
0.167	5.63	1.167	39.89	2.167	12.75	3.17	6.65
0.250	6.41	1.250	163.18	2.250	10.94	3.25	6.20
0.333	6.41	1.333	163.18	2.333	10.94	3.33	6.20
0.417	7.49	1.417	51.70	2.417	9.62	3.42	5.81
0.500	7.49	1.500	51.70	2.500	9.62	3.50	5.81
0.583	9.11	1.583	28.13	2.583	8.62	3.58	5.47

0.667	9.11	1.667	28.13	2.667	8.62	3.67	5.47
0.750	11.83	1.750	19.74	2.750	7.83	3.75	5.18
0.833	11.83	1.833	19.74	2.833	7.83	3.83	5.18
0.917	17.56	1.917	15.41	2.917	7.18	3.92	4.92
1.000	17.56	2.000	15.41	3.000	7.18	4.00	4.92

Max.Eff.Inten.(mm/hr)=	163.18	144.99	
over (min)	5.00	10.00	
Storage Coeff. (min)=	2.49 (ii)	5.21 (ii)	
Unit Hyd. Tpeak (min)=	5.00	10.00	
Unit Hyd. peak (cms)=	0.29	0.16	
			TOTALS
PEAK FLOW (cms)=	1.03	0.11	1.139 (iii)
TIME TO PEAK (hrs)=	1.33	1.42	1.33
RUNOFF VOLUME (mm)=	76.88	65.49	75.40
TOTAL RAINFALL (mm)=	77.88	77.88	77.88
RUNOFF COEFFICIENT =	0.99	0.84	0.97

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 95.0 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(2000) IN= 2---> OUT= 1 DT= 5.0 min	OVERFLOW IS ON			
	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.0503	0.0849
	0.0479	0.0781	0.0506	0.0889
	0.0483	0.0781	0.0510	0.0950
	0.0487	0.0784	0.0514	0.1041
	0.0491	0.0790	0.0518	0.1174
	0.0495	0.0801	0.0521	0.1365
	0.0499	0.0821	0.0525	0.1627

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0101)	2.660	1.139	1.33	75.40
OUTFLOW: ID= 1 (2000)	2.660	0.052	3.00	75.24
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](%)= 4.59
TIME SHIFT OF PEAK FLOW (min)=100.00
MAXIMUM STORAGE USED (ha.m.)= 0.1490

CALIB STANDHYD (0102) ID= 1 DT= 5.0 min	Area (ha)= 2.51 Total Imp(%)= 90.00 Dir. Conn.(%)= 90.00	
	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	2.26	0.25
Dep. Storage (mm)=	1.00	1.00
Average Slope (%)=	1.00	2.00
Length (m)=	129.36	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	5.63	1.083	39.89	2.083	12.75	3.08	6.65
0.167	5.63	1.167	39.89	2.167	12.75	3.17	6.65
0.250	6.41	1.250	163.18	2.250	10.94	3.25	6.20
0.333	6.41	1.333	163.18	2.333	10.94	3.33	6.20
0.417	7.49	1.417	51.70	2.417	9.62	3.42	5.81
0.500	7.49	1.500	51.70	2.500	9.62	3.50	5.81

0.583	9.11	1.583	28.13	2.583	8.62	3.58	5.47
0.667	9.11	1.667	28.13	2.667	8.62	3.67	5.47
0.750	11.83	1.750	19.74	2.750	7.83	3.75	5.18
0.833	11.83	1.833	19.74	2.833	7.83	3.83	5.18
0.917	17.56	1.917	15.41	2.917	7.18	3.92	4.92
1.000	17.56	2.000	15.41	3.000	7.18	4.00	4.92

Max.Eff.Inten.(mm/hr)=	163.18	144.99	
over (min)	5.00	5.00	
Storage Coeff. (min)=	2.45 (ii)	4.86 (ii)	
Unit Hyd. Tpeak (min)=	5.00	5.00	
Unit Hyd. peak (cms)=	0.30	0.22	
			TOTALS
PEAK FLOW (cms)=	1.01	0.09	1.103 (iii)
TIME TO PEAK (hrs)=	1.33	1.33	1.33
RUNOFF VOLUME (mm)=	76.88	65.49	75.74
TOTAL RAINFALL (mm)=	77.88	77.88	77.88
RUNOFF COEFFICIENT =	0.99	0.84	0.97

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 95.0 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(2001)	OVERFLOW IS ON			
IN= 2---> OUT= 1				
DT= 5.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.0452	0.1069
	0.0439	0.0828	0.0456	0.1377
	0.0444	0.0841	0.0461	0.1842
	0.0448	0.0905	0.0465	0.2453

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0102)	2.510	1.103	1.33	75.74
OUTFLOW: ID= 1 (2001)	2.510	0.046	3.17	75.55
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](%)= 4.14
TIME SHIFT OF PEAK FLOW (min)=110.00
MAXIMUM STORAGE USED (ha.m.)= 0.1443

CALIB		
STANDHYD (0103)	Area (ha)= 2.92	
ID= 1 DT= 5.0 min	Total Imp(%)= 99.00	Dir. Conn.(%)= 99.00

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	2.89	0.03
Dep. Storage (mm)=	1.00	1.00
Average Slope (%)=	1.00	2.00
Length (m)=	139.52	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	5.63	1.083	39.89	2.083	12.75	3.08	6.65
0.167	5.63	1.167	39.89	2.167	12.75	3.17	6.65
0.250	6.41	1.250	163.18	2.250	10.94	3.25	6.20
0.333	6.41	1.333	163.18	2.333	10.94	3.33	6.20
0.417	7.49	1.417	51.70	2.417	9.62	3.42	5.81
0.500	7.49	1.500	51.70	2.500	9.62	3.50	5.81
0.583	9.11	1.583	28.13	2.583	8.62	3.58	5.47
0.667	9.11	1.667	28.13	2.667	8.62	3.67	5.47

0.750	11.83	1.750	19.74	2.750	7.83	3.75	5.18
0.833	11.83	1.833	19.74	2.833	7.83	3.83	5.18
0.917	17.56	1.917	15.41	2.917	7.18	3.92	4.92
1.000	17.56	2.000	15.41	3.000	7.18	4.00	4.92

Max.Eff.Inten.(mm/hr)=	163.18	144.99	
over (min)	5.00	5.00	
Storage Coeff. (min)=	2.56 (ii)	3.49 (ii)	
Unit Hyd. Tpeak (min)=	5.00	5.00	
Unit Hyd. peak (cms)=	0.29	0.26	
			TOTALS
PEAK FLOW (cms)=	1.29	0.01	1.302 (iii)
TIME TO PEAK (hrs)=	1.33	1.33	1.33
RUNOFF VOLUME (mm)=	76.88	65.49	76.76
TOTAL RAINFALL (mm)=	77.88	77.88	77.88
RUNOFF COEFFICIENT =	0.99	0.84	0.99

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 95.0 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(2002) IN= 2---> OUT= 1 DT= 5.0 min	OVERFLOW IS ON			
	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.2141	0.0672
	0.2112	0.0662	0.2156	0.0707
	0.2127	0.0663	0.2170	0.0786

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0103)	2.920	1.302	1.33	76.76
OUTFLOW: ID= 1 (2002)	2.475	0.217	1.42	76.82
OVERFLOW:ID= 3 (0003)	0.445	0.535	1.33	76.82

TOTAL NUMBER OF SIMULATION OVERFLOW = 4
CUMULATIVE TIME OF OVERFLOW (HOURS) = 0.33
PERCENTAGE OF TIME OVERFLOWING (%) = 3.67

PEAK FLOW REDUCTION [Qout/Qin](%)= 16.67
TIME SHIFT OF PEAK FLOW (min)= 5.00
MAXIMUM STORAGE USED (ha.m.)= 0.0786

CALIB STANDHYD (0104) ID= 1 DT= 5.0 min	Area (ha)= 0.25 Total Imp(%)= 77.00 Dir. Conn.(%)= 77.00		
		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.19	0.06
Dep. Storage	(mm)=	1.00	1.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	40.82	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	5.63	1.083	39.89	2.083	12.75	3.08	6.65
0.167	5.63	1.167	39.89	2.167	12.75	3.17	6.65
0.250	6.41	1.250	163.18	2.250	10.94	3.25	6.20
0.333	6.41	1.333	163.18	2.333	10.94	3.33	6.20
0.417	7.49	1.417	51.70	2.417	9.62	3.42	5.81
0.500	7.49	1.500	51.70	2.500	9.62	3.50	5.81
0.583	9.11	1.583	28.13	2.583	8.62	3.58	5.47
0.667	9.11	1.667	28.13	2.667	8.62	3.67	5.47
0.750	11.83	1.750	19.74	2.750	7.83	3.75	5.18
0.833	11.83	1.833	19.74	2.833	7.83	3.83	5.18
0.917	17.56	1.917	15.41	2.917	7.18	3.92	4.92

```
              1.000   17.56 | 2.000   15.41 | 3.000    7.18 |  4.00    4.92

     Max.Eff.Inten.(mm/hr)=     163.18       144.99
               over (min)         5.00         5.00
     Storage Coeff.  (min)=       1.23 (ii)    4.81 (ii)
     Unit Hyd. Tpeak (min)=       5.00         5.00
     Unit Hyd. peak  (cms)=       0.33         0.22
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.09         0.02          0.108 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.33           1.33
     RUNOFF VOLUME    (mm)=      76.88        65.49          74.24
     TOTAL RAINFALL   (mm)=      77.88        77.88          77.88
     RUNOFF COEFFICIENT   =       0.99         0.84           0.95

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  95.0    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  (  0024)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0104):     0.25   0.108     1.33    74.24
      + ID2= 2 (  2000):     2.66   0.052     3.00    75.24
        ================================================
        ID = 3 (  0024):     2.91   0.158     1.33    75.16

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

--------------------
| ADD HYD  (  0024)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0024):     2.91   0.158     1.33    75.16
      + ID2= 2 (  2001):     2.51   0.046     3.17    75.55
        ================================================
        ID = 1 (  0024):     5.42   0.199     1.33    75.34

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

--------------------
| ADD HYD  (  0024)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0024):     5.42   0.199     1.33    75.34
      + ID2= 2 (  2002):     2.47   0.217     1.42    76.82
        ================================================
        ID = 3 (  0024):     7.89   0.416     1.33    75.80

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

--------------------
| ADD HYD  (  0034)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
*** W A R N I N G :  HYDROGRAPH   2000 <ID= 1> IS DRY.
*** W A R N I N G :  HYDROGRAPH   2001 <ID= 2> IS DRY.
*** W A R N I N G :  HYDROGRAPH   0034 <ID= 3> IS ALSO DRY
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0034)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
*** W A R N I N G :  HYDROGRAPH   0034 <ID= 3> IS DRY.
*** W A R N I N G :  HYDROGRAPH   0034 = HYDROGRAPH 2002
        ID1= 3 (  0034):     0.00   0.000     0.00    75.80
      + ID2= 2 (  2002):     0.45   0.535     1.33    76.82
        ================================================
        ID = 1 (  0034):     0.45   0.535     1.33    76.82
```

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0033)					
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0105):	0.33	0.039	1.50	38.87
+ ID2= 2 (0024):	7.89	0.416	1.33	75.80
ID = 3 (0033):	8.22	0.442	1.33	74.32

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0033)					
3 + 2 = 1	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 3 (0033):	8.22	0.442	1.33	74.32
+ ID2= 2 (0034):	0.45	0.535	1.33	76.82
ID = 1 (0033):	8.67	0.978	1.33	74.45

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\VO2\voin.dat
Output filename: C:\Users\workstation\AppData\Local\Civica\VH5\481a4287-7c85-406f-9d86-88ed6da58e85\3d366d9f-1def-49ab-96fb-e38caee66406\
Summary filename: C:\Users\workstation\AppData\Local\Civica\VH5\481a4287-7c85-406f-9d86-88ed6da58e85\3d366d9f-1def-49ab-96fb-e38caee66406\

DATE: 06-02-2026 TIME: 11:24:14

USER:

COMMENTS: _____

****
** SIMULATION : Rain 07 - 25mm **
****

READ STORM	Filename: C:\Users\workstation\AppData\Local\Temp\27aae28f-c29e-4a52-802e-03b5ecd4a562\008cc308
Ptotal= 25.00 mm	Comments: Twenty five mm Four Hour Chicago Storm

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	2.07	1.00	5.70	2.00	5.19	3.00	2.80
0.17	2.27	1.17	10.78	2.17	4.47	3.17	2.62

0.33	2.52	1.33	50.21	2.33	3.95	3.33	2.48
0.50	2.88	1.50	13.37	2.50	3.56	3.50	2.35
0.67	3.38	1.67	8.29	2.67	3.25	3.67	2.23
0.83	4.18	1.83	6.30	2.83	3.01	3.83	2.14

CALIB			
NASHYD (0105)	Area (ha)= 0.33	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 hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	2.07	1.083	5.70	2.083	5.19	3.08	2.80
0.167	2.07	1.167	5.70	2.167	5.19	3.17	2.80
0.250	2.27	1.250	10.78	2.250	4.47	3.25	2.62
0.333	2.27	1.333	10.78	2.333	4.47	3.33	2.62
0.417	2.52	1.417	50.21	2.417	3.95	3.42	2.48
0.500	2.52	1.500	50.21	2.500	3.95	3.50	2.48
0.583	2.88	1.583	13.37	2.583	3.56	3.58	2.35
0.667	2.88	1.667	13.37	2.667	3.56	3.67	2.35
0.750	3.38	1.750	8.29	2.750	3.25	3.75	2.23
0.833	3.38	1.833	8.29	2.833	3.25	3.83	2.23
0.917	4.18	1.917	6.30	2.917	3.01	3.92	2.14
1.000	4.18	2.000	6.30	3.000	3.01	4.00	2.14

Unit Hyd Qpeak (cms)= 0.063

PEAK FLOW (cms)= 0.004 (i)
TIME TO PEAK (hrs)= 1.667
RUNOFF VOLUME (mm)= 4.779
TOTAL RAINFALL (mm)= 24.997
RUNOFF COEFFICIENT = 0.191

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

CALIB			
STANDHYD (0101)	Area (ha)= 2.66		
ID= 1 DT= 5.0 min	Total Imp(%)= 87.00	Dir. Conn.(%)= 87.00	

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	2.31	0.35
Dep. Storage (mm)=	1.00	1.00
Average Slope (%)=	1.00	2.00
Length (m)=	133.17	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	2.07	1.083	5.70	2.083	5.19	3.08	2.80
0.167	2.07	1.167	5.70	2.167	5.19	3.17	2.80
0.250	2.27	1.250	10.78	2.250	4.47	3.25	2.62
0.333	2.27	1.333	10.78	2.333	4.47	3.33	2.62
0.417	2.52	1.417	50.21	2.417	3.95	3.42	2.48
0.500	2.52	1.500	50.21	2.500	3.95	3.50	2.48
0.583	2.88	1.583	13.37	2.583	3.56	3.58	2.35
0.667	2.88	1.667	13.37	2.667	3.56	3.67	2.35
0.750	3.38	1.750	8.29	2.750	3.25	3.75	2.23
0.833	3.38	1.833	8.29	2.833	3.25	3.83	2.23
0.917	4.18	1.917	6.30	2.917	3.01	3.92	2.14
1.000	4.18	2.000	6.30	3.000	3.01	4.00	2.14

Max.Eff.Inten.(mm/hr)=	50.21	31.30
over (min)	5.00	10.00
Storage Coeff. (min)=	4.00 (ii)	8.34 (ii)
Unit Hyd. Tpeak (min)=	5.00	10.00
Unit Hyd. peak (cms)=	0.24	0.13

				TOTALS
PEAK FLOW	(cms)=	0.30	0.02	0.319 (iii)
TIME TO PEAK	(hrs)=	1.50	1.58	1.50
RUNOFF VOLUME	(mm)=	24.00	15.41	22.88
TOTAL RAINFALL	(mm)=	25.00	25.00	25.00
RUNOFF COEFFICIENT	=	0.96	0.62	0.92

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 95.0 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(2000)	OVERFLOW IS ON			
IN= 2---> OUT= 1				
DT= 5.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.0503	0.0849
	0.0479	0.0781	0.0506	0.0889
	0.0483	0.0781	0.0510	0.0950
	0.0487	0.0784	0.0514	0.1041
	0.0491	0.0790	0.0518	0.1174
	0.0495	0.0801	0.0521	0.1365
	0.0499	0.0821	0.0525	0.1627

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0101)	2.660	0.319	1.50	22.88
OUTFLOW: ID= 1 (2000)	2.660	0.025	2.75	22.73
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](%)= 7.76
TIME SHIFT OF PEAK FLOW (min)= 75.00
MAXIMUM STORAGE USED (ha.m.)= 0.0404

CALIB		
STANDHYD (0102)	Area (ha)=	2.51
ID= 1 DT= 5.0 min	Total Imp(%)=	90.00 Dir. Conn.(%)= 90.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	2.26	0.25
Dep. Storage	(mm)=	1.00	1.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	129.36	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	2.07	1.083	5.70	2.083	5.19	3.08	2.80
0.167	2.07	1.167	5.70	2.167	5.19	3.17	2.80
0.250	2.27	1.250	10.78	2.250	4.47	3.25	2.62
0.333	2.27	1.333	10.78	2.333	4.47	3.33	2.62
0.417	2.52	1.417	50.21	2.417	3.95	3.42	2.48
0.500	2.52	1.500	50.21	2.500	3.95	3.50	2.48
0.583	2.88	1.583	13.37	2.583	3.56	3.58	2.35
0.667	2.88	1.667	13.37	2.667	3.56	3.67	2.35
0.750	3.38	1.750	8.29	2.750	3.25	3.75	2.23
0.833	3.38	1.833	8.29	2.833	3.25	3.83	2.23
0.917	4.18	1.917	6.30	2.917	3.01	3.92	2.14
1.000	4.18	2.000	6.30	3.000	3.01	4.00	2.14

Max.Eff.Inten.(mm/hr)=		50.21	31.30
over (min)		5.00	10.00
Storage Coeff. (min)=		3.93 (ii)	7.79 (ii)
Unit Hyd. Tpeak (min)=		5.00	10.00

```
     Unit Hyd. peak  (cms)=       0.24         0.13
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.30         0.02          0.309 (iii)
     TIME TO PEAK    (hrs)=       1.50         1.58           1.50
     RUNOFF VOLUME    (mm)=      24.00        15.41          23.14
     TOTAL RAINFALL   (mm)=      25.00        25.00          25.00
     RUNOFF COEFFICIENT   =       0.96         0.62           0.93

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  95.0    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(  2001)|     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   |   0.0452      0.1069
                          0.0439     0.0828   |   0.0456      0.1377
                          0.0444     0.0841   |   0.0461      0.1842
                          0.0448     0.0905   |   0.0465      0.2453

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0102)      2.510      0.309      1.50      23.14
   OUTFLOW: ID= 1 (  2001)      2.510      0.021      2.92      22.95
   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](%)=  6.86
                  TIME SHIFT OF PEAK FLOW         (min)= 85.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0399

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0103)|   Area    (ha)=   2.92
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.89         0.03
     Dep. Storage     (mm)=       1.00         1.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     139.52        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    2.07 | 1.083    5.70 | 2.083    5.19 |  3.08    2.80
              0.167    2.07 | 1.167    5.70 | 2.167    5.19 |  3.17    2.80
              0.250    2.27 | 1.250   10.78 | 2.250    4.47 |  3.25    2.62
              0.333    2.27 | 1.333   10.78 | 2.333    4.47 |  3.33    2.62
              0.417    2.52 | 1.417   50.21 | 2.417    3.95 |  3.42    2.48
              0.500    2.52 | 1.500   50.21 | 2.500    3.95 |  3.50    2.48
              0.583    2.88 | 1.583   13.37 | 2.583    3.56 |  3.58    2.35
              0.667    2.88 | 1.667   13.37 | 2.667    3.56 |  3.67    2.35
              0.750    3.38 | 1.750    8.29 | 2.750    3.25 |  3.75    2.23
              0.833    3.38 | 1.833    8.29 | 2.833    3.25 |  3.83    2.23
              0.917    4.18 | 1.917    6.30 | 2.917    3.01 |  3.92    2.14
              1.000    4.18 | 2.000    6.30 | 3.000    3.01 |  4.00    2.14

     Max.Eff.Inten.(mm/hr)=      50.21        31.30
                over (min)        5.00        10.00
     Storage Coeff.  (min)=       4.11 (ii)    5.59 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.24         0.16
                                                          *TOTALS*
```

PEAK FLOW (cms)=	0.38	0.00	0.377 (iii)
TIME TO PEAK (hrs)=	1.50	1.58	1.50
RUNOFF VOLUME (mm)=	24.00	15.41	23.91
TOTAL RAINFALL (mm)=	25.00	25.00	25.00
RUNOFF COEFFICIENT =	0.96	0.62	0.96

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 95.0 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(2002)	OVERFLOW IS ON			
IN= 2---> OUT= 1				
DT= 5.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.2141	0.0672
	0.2112	0.0662	0.2156	0.0707
	0.2127	0.0663	0.2170	0.0786

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0103)	2.920	0.377	1.50	23.91
OUTFLOW: ID= 1 (2002)	2.920	0.096	1.75	23.89
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](%)= 25.54
TIME SHIFT OF PEAK FLOW (min)= 15.00
MAXIMUM STORAGE USED (ha.m.)= 0.0303

CALIB		
STANDHYD (0104)	Area (ha)= 0.25	
ID= 1 DT= 5.0 min	Total Imp(%)= 77.00	Dir. Conn.(%)= 77.00

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	0.19	0.06
Dep. Storage (mm)=	1.00	1.00
Average Slope (%)=	1.00	2.00
Length (m)=	40.82	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	2.07	1.083	5.70	2.083	5.19	3.08	2.80
0.167	2.07	1.167	5.70	2.167	5.19	3.17	2.80
0.250	2.27	1.250	10.78	2.250	4.47	3.25	2.62
0.333	2.27	1.333	10.78	2.333	4.47	3.33	2.62
0.417	2.52	1.417	50.21	2.417	3.95	3.42	2.48
0.500	2.52	1.500	50.21	2.500	3.95	3.50	2.48
0.583	2.88	1.583	13.37	2.583	3.56	3.58	2.35
0.667	2.88	1.667	13.37	2.667	3.56	3.67	2.35
0.750	3.38	1.750	8.29	2.750	3.25	3.75	2.23
0.833	3.38	1.833	8.29	2.833	3.25	3.83	2.23
0.917	4.18	1.917	6.30	2.917	3.01	3.92	2.14
1.000	4.18	2.000	6.30	3.000	3.01	4.00	2.14

Max.Eff.Inten.(mm/hr)=	50.21	24.22	
over (min)	5.00	15.00	
Storage Coeff. (min)=	1.97 (ii)	14.41 (ii)	
Unit Hyd. Tpeak (min)=	5.00	15.00	
Unit Hyd. peak (cms)=	0.31	0.08	
			TOTALS
PEAK FLOW (cms)=	0.03	0.00	0.028 (iii)
TIME TO PEAK (hrs)=	1.50	1.67	1.50
RUNOFF VOLUME (mm)=	24.00	15.41	21.99

```
     TOTAL RAINFALL   (mm)=      25.00        25.00          25.00
     RUNOFF COEFFICIENT   =       0.96         0.62           0.88

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  95.0    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  (  0024)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0104):     0.25   0.028     1.50    21.99
      + ID2= 2 (  2000):     2.66   0.025     2.75    22.73
        ================================================
        ID = 3 (  0024):     2.91   0.041     1.50    22.66

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

--------------------
| ADD HYD  (  0024)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0024):     2.91   0.041     1.50    22.66
      + ID2= 2 (  2001):     2.51   0.021     2.92    22.95
        ================================================
        ID = 1 (  0024):     5.42   0.053     1.50    22.80

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

--------------------
| ADD HYD  (  0024)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0024):     5.42   0.053     1.50    22.80
      + ID2= 2 (  2002):     2.92   0.096     1.75    23.89
        ================================================
        ID = 3 (  0024):     8.34   0.142     1.75    23.18

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

--------------------
| ADD HYD  (  0034)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
*** W A R N I N G :  HYDROGRAPH   2000 <ID= 1> IS DRY.
*** W A R N I N G :  HYDROGRAPH   2001 <ID= 2> IS DRY.
*** W A R N I N G :  HYDROGRAPH   0034 <ID= 3> IS ALSO DRY
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0034)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
*** W A R N I N G :  HYDROGRAPH   0034 <ID= 3> IS DRY.
*** W A R N I N G :  HYDROGRAPH   2002 <ID= 2> IS DRY.
*** W A R N I N G :  HYDROGRAPH   0034 <ID= 1> IS ALSO DRY
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0033)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0105):     0.33   0.004     1.67     4.78
      + ID2= 2 (  0024):     8.34   0.142     1.75    23.18
        ================================================
        ID = 3 (  0033):     8.67   0.146     1.75    22.48

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

```
--------------------
| ADD HYD  (  0033)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
*** W A R N I N G :  HYDROGRAPH   0034 <ID= 2> IS DRY.
*** W A R N I N G :  HYDROGRAPH   0001 = HYDROGRAPH 0003
        ID1= 3 (  0033):     8.67   0.146     1.75    22.48
      + ID2= 2 (  0034):     0.00   0.000     0.00     0.00
        ================================================
        ID = 1 (  0033):     8.67   0.146     1.75    22.48

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



DRAWINGS

HUSSON

ENGINEERING + MANAGEMENT

200 CACHET WOODS COURT, SUITE 204
MARKHAM, ON L6C 0Z8
HUSSON.CA