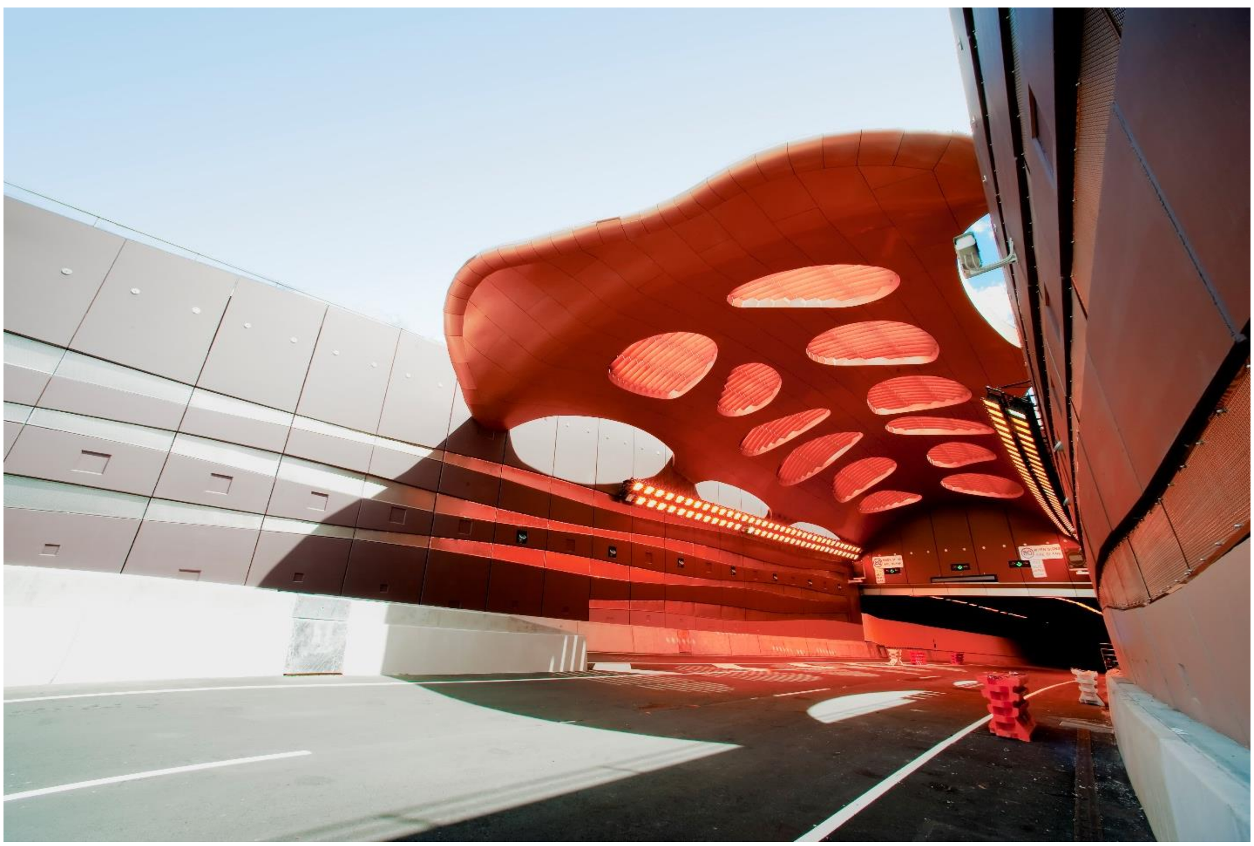
AIRFIELD DEVELOPMENTS INC. & AIRFIELD II DEVELOPMENTS INC.
C/O SMARTCENTRES REIT

6034 MAYFIELD ROAD INDUSTRIAL DEVELOPMENT

FUNCTIONAL SERVICING AND STORMWATER MANAGEMENT REPORT

JULY 22, 2021



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SIGNATURES

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Municipal Services Design

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TABLE OF CONTENTS

TABLE OF CONTENTS

FIGURES

APPENDICES

1 INTRODUCTION

WSP Canada Inc. (WSP) has been retained to prepare a Functional Servicing and Stormwater Management Report to assess the servicing requirements relating to the proposed 6034 Mayfield Road Industrial Development located at Mayfield Road and Airport Road, Caledon. This report provides the conceptual framework for water distribution, sanitary sewage and storm drainage, quality and quantity for the development of this site.

1.1 SITE DESCRIPTION

The proposed site is located northwest of Mayfield Road and northeast of Airport in the Town of Caledon. The subject property consists of approximately 9.43 hectares of land. The site is currently vacant land.

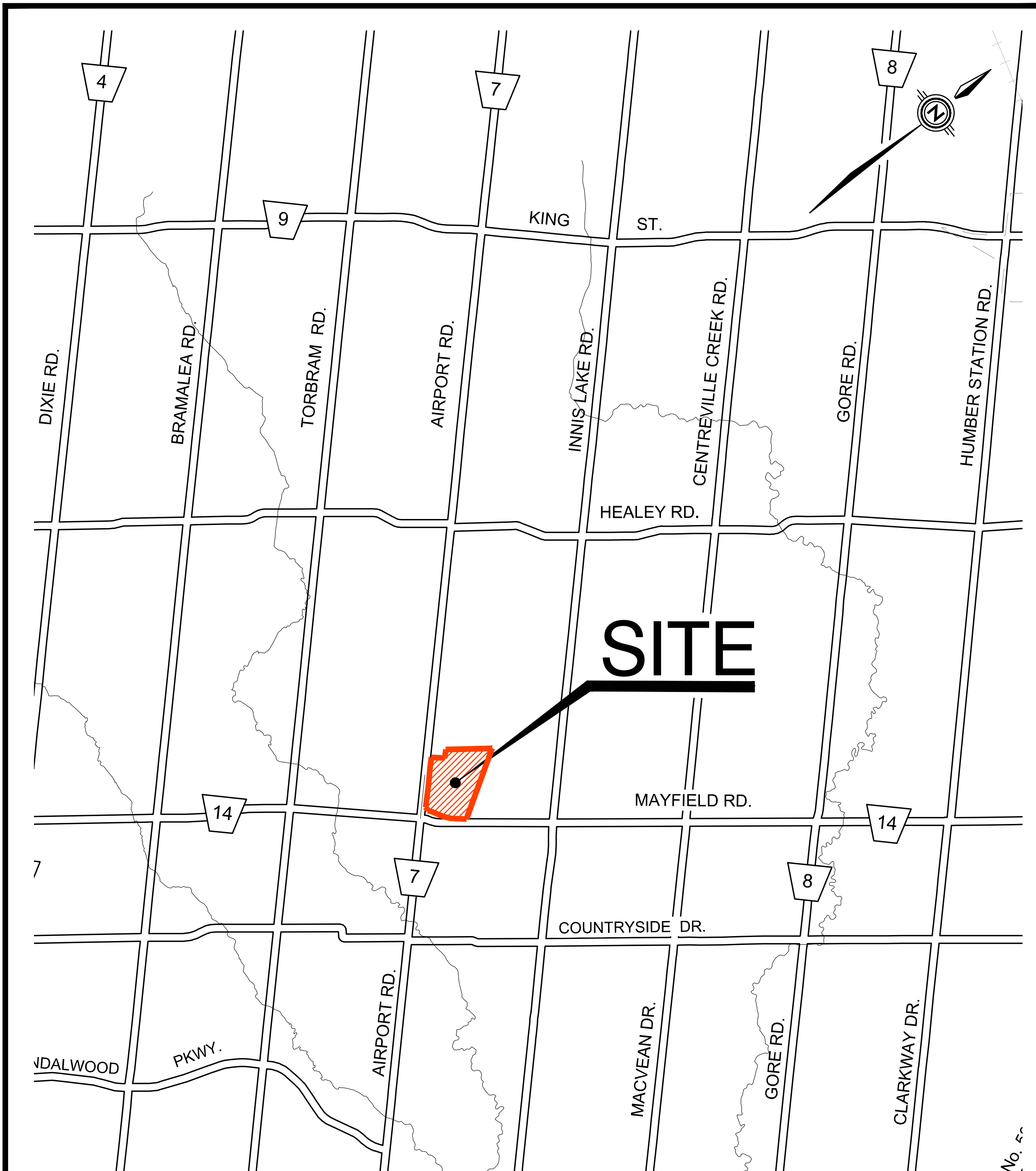
Airfield Developments Inc. c/o SmartCentres REIT proposes to develop the property with two industrial buildings and associated parking. The Site Plan for the proposed development was prepared by Ware Malcomb dated July 21, 2021 and the survey was prepared by David J. Pesce Surveying dated July 2011. The proposed works are to be completed as a single phase of construction.

The site will be serviced by existing local sewers and watermains Service connections will be extended into the proposed site and coordinated with the building design team. New water, sanitary and storm service connections are to be installed to service the proposed development. Please refer to **Figure 1** for the Site Location Plan, **Figure 2** for the Existing Condition Plan and **Figure 3** for the Proposed Development Plan.

1.2 DESIGN GUIDELINES AND BACKGROUND DOCUMENTATION

The following documents were consulted and the guidelines therein followed in the preparation of this report:

- Town of Caledon Development Standard Manual (2019);
- Region of Peel Design, Standards Specification and Procedures (March 2017);
- Airport Road and Mayfield Road Functional Servicing and Stormwater Management Report prepared by Cole Engineering dated (January 2014);
- Tullamore Secondary Plan Mater Environmental Servicing Plan (January 2000); and
- Various historical plans provided by the SmartCentres.



CLIENT	AIRFIELD DEVELOPMENTS INC. & AIRFIELD II DEVELOPMENTS INC.
TITLE	6034 MAYFIELD ROAD
	LOCATION PLAN

wsp

100 Commerce Valley Dr. West, Thornhill, ON Canada L3T 0A1
t: 905.882.1100 f: 905.882.0055 www.wsp.com

Checked	G.C.	Drawn	10/12 Cad
Date	JULY 2021	Proj. No.	211-07736
Scale	NTS	Figure No.	1

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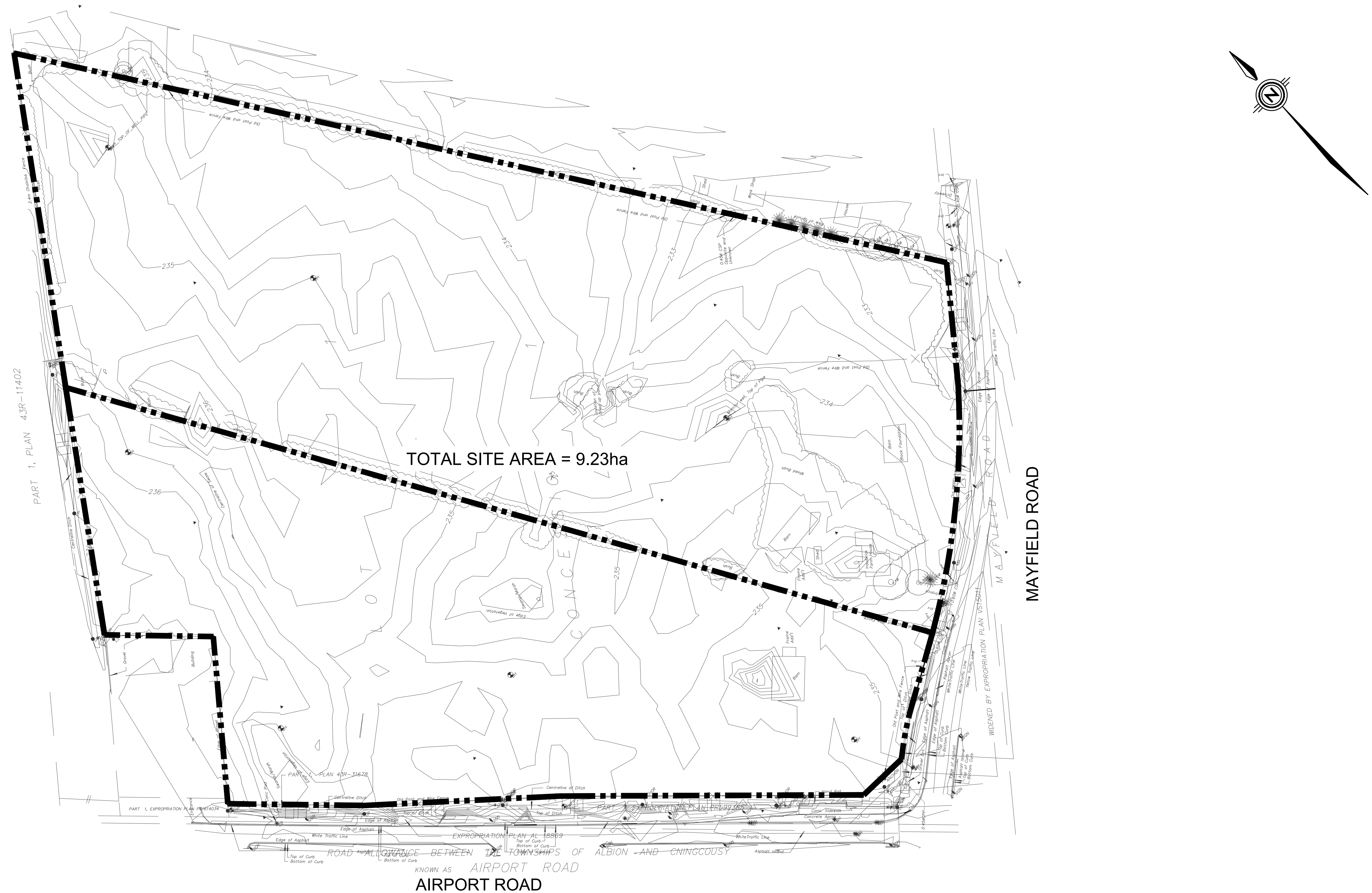

LEGEND

LIMIT OF PROPERTY

CLIENT	AIRFIELD DEVELOPMENTS INC. & AIRFIELD II DEVELOPMENTS INC.
TITLE	6034 MAYFIELD ROAD
	PRE- DEVELOPMENT PLAN

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Date	JULY 2021	Proj. No.	211-07736
Scale	1: 1750	Figure No.	2

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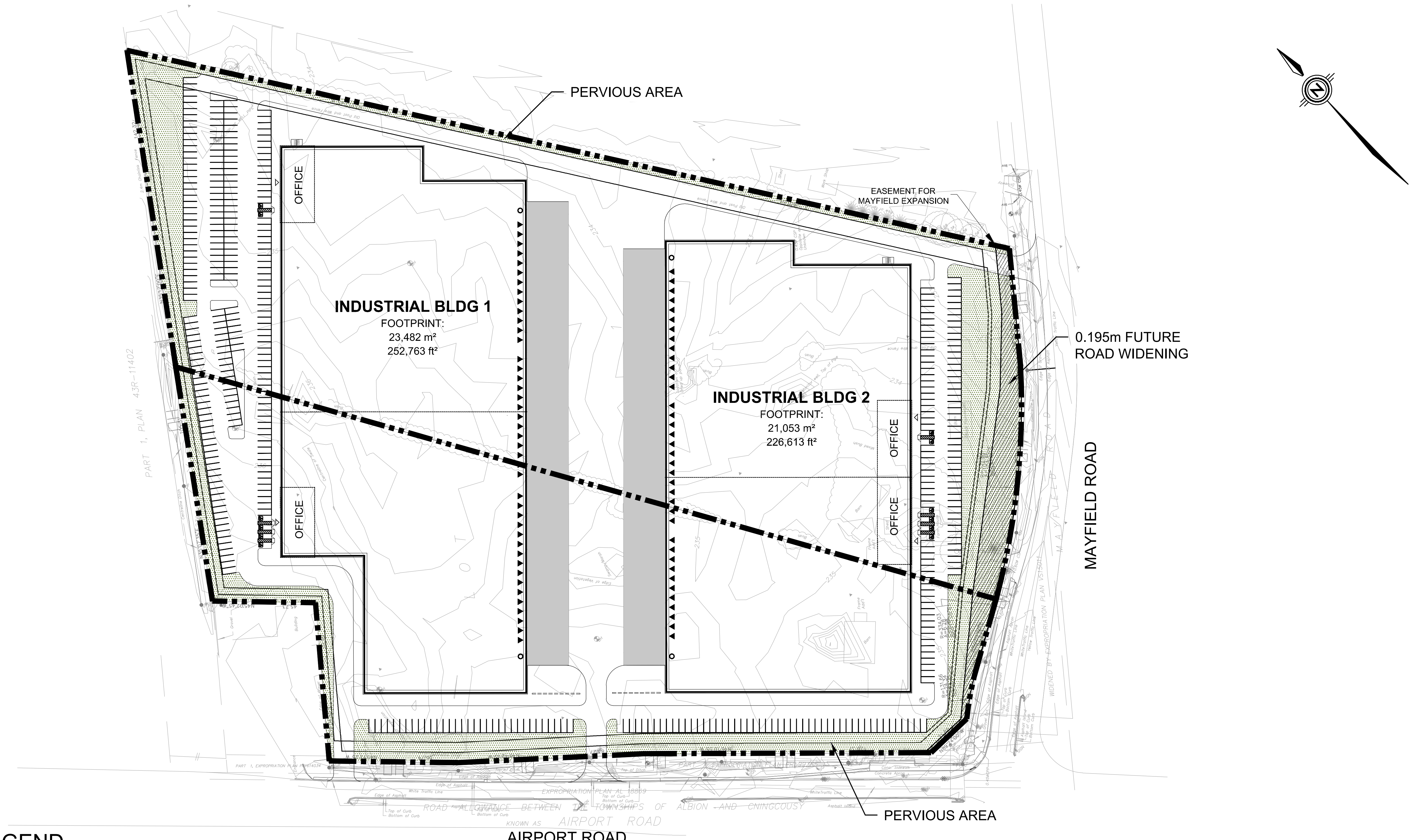

LEGEND

▬ ▪ ▪ ▬	LIMIT OF PROPERTY
▨	ROAD WIDENING

CLIENT	AIRFIELD DEVELOPMENTS INC. & AIRFIELD II DEVELOPMENTS INC.
TITLE	6034 MAYFIELD ROAD
	PROPOSED DEVELOPMENT PLAN

wsp

Checked	A.D.R	Drawn	10/12 Cad
Date	JULY 2021	Proj. No.	211-07736
Scale	1: 1750	Figure No.	3

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2 WATER SUPPLY

2.1 EXISTING CONDITIONS

Water supply for the proposed development is available from the Region's existing water distribution system. The existing municipal watermains adjacent to the site includes a 300mm within the east boulevard on Airport Road and a 300mm within the north boulevard of Mayfield Road.

2.2 WATER DEMANDS

Per Region of Peel requirements, an 'h-style' connection consisting of a 150mm domestic and 200mm fire water service will be extended to each building (Industrial building 1 and Industrial building 2) from the existing watermain on Airport Road and Mayfield Road, respectively. In addition, the fire service connection is to be equipped with a double detector check valve, and the domestic service connection is to be equipped with a water meter and a backflow preventer installed in the mechanical room within the building in accordance with the Town standards.

2.2.1 FIRE WATER DEMANDS

The estimated fire flow has been calculated using the recommendations of the Fire Underwriters Survey. The fire flow calculation indicates that the recommended fire flow for Industrial Building 1 is 20,019 L/min (4,222 US GPM) and Industrial Building 2 is 15,369 L/min (3,958 US GPM). The results of these calculations are included in **Appendix A**.

There are currently 2 existing hydrants located on the southwest boulevard of Airport Road, located just outside the property lines near the west corner and midway along Airport Road of the proposed development. There is also an existing hydrant located on the northwest boulevard of Mayfield Road, near the east corner of the proposed development. The Siamese connection to the Industrial building 1 will be located so that it is a maximum of 45 m away from either hydrant on Airport Road. The Siamese connection to the Industrial Building 2 will also be located so that it is a maximum of 45m away from the hydrant on Mayfield Road. The proposed water servicing and the hydrants locations are shown on **Figure 4 in Appendix H**.

2.2.2 DOMESTIC WATER DEMANDS

Based on the unit count and the Region of Peel's population equivalents the proposed development will generate an equivalent population of 660 people. Applying a per capita flow of 300 l/cap/day and a peaking factor per the Town's criteria, the site generates an average day demand of 2.29 L/s and a peak hour demand of 6.88 L/s as shown on the table below.

Table 1: Domestic Water Demand

Building	**Industrial Buildings**
Employment Water Demand Rate	300 Litres/Person/Day
Population Density	70 Person/ha
Site Area	9.43 ha
Equivalent Population	660 Persons
Average Water Demand	2.29 L/s
Peaking Factor	Peak Hour: 3.00 and Maximum Day: 2.00
Total Peak Water Demand from Site	**Peak Hour: 6.88 L/s** **Maximum Day: 4.58 L/s** **Mx Day + Fire: 338.26 L/s**

2.3 HYDRANT FLOW TEST

Pressure and flow tests on the existing municipal watermains fronting the site were performed by Cole Engineering on October 8, 2013. The test results are included in **Appendix B**. The flow tests on the existing 300mm watermain on Airport Road indicate that a flow of ~2,250 USGPM (142 L/s) and ~2,400 USGPM (151 L/s) could be achieved while maintaining a water pressure of 20 psi (140 kPa). Similarly, the flow test on the existing 300mm watermain on Mayfield Road indicates that a flow of ~2,650 USGPM (167 L/s).

From the test results, the available fire flow is less than the expected fire flow plus maximum day demand. Therefore, the existing watermain not sufficient to service the proposed development. A booster pump is proposed within the building to ensure that the proposed watermain located around the vicinity of the building will have an available fire flow greater than the proposed fire flow. The booster pump will be designed by the mechanical consultant and coordinated at detailed design.

Additionally, due to the hydrant flow tests being outdated, it is recommended to conduct new hydrant flow tests during detailed design (through the Site Plan Approval process) to confirm the findings and to proceed accordingly. Results from the updated hydrant flow tests will be posted in this section once they are conducted.

3 SANITARY SEWAGE SYSTEM

3.1 EXISTING SEWER SYSTEM

There is currently a 750mm sanitary sewer along the centre of Airport Road.

3.2 EXISTING AND PROPOSED SEWAGE FLOWS

As mentioned in the previous sections, the site is currently vacant therefore no sewage flow is expected from the site. The FSR for a previous development application submission by Cole Engineering (noted in Section 1.2) referenced correspondence with Orest Jacyla of the Region of Peel, requesting that this development connects to the existing 750mm diameter trunk sewer on Airport Road, and confirming available capacity for the development. This correspondence can be found in **Appendix C.** Therefore, under post-development condition, the proposed buildings will connect to the 750mm trunk sewer on Airport Road.

In order to calculate the peak sanitary flows to the sanitary sewer system, the following design criteria have been utilized, as advised by the Town of Caledon Engineering Design Criteria & Standard Drawings:

Table 2: Sanitary flows (Post-Development Condition)

Building	**Industrial Building**
Average Residential Sewage Flow	302.8 Litres/Person/Day
Population Density	70 Person/ha
Site Area	9.43 ha
Equivalent Population	660 Persons
Average Sewage Flow	2.31 L/s
Harmon Peaking Factor (Min = 2.0 and Max = 4.0) M = $1+14/(4+p^{0.5})$ where p = population in thousands	3.91
Peak Sanitary Flow	9.03 L/s
Infiltration Flow (based on infiltration rate of 0.28 L/s/ha)	2.64 L/s
Total Sanitary Flow	**11.67 L/s**

3.3 PROPOSED SANITARY SERVICES

As per Region of Peel requirements, a control manhole is proposed to be placed immediately inside the property line for the service connection. From there, proposed sanitary sewers within the proposed development will service both buildings and will be designed by the site mechanical consultant to meet Ontario Plumbing Code Standards. As noted above, the site will drain to the 750mm diameter trunk sewer on Airport Road. Please Refer to **Figure 4 in Appendix F** for the servicing plan which shows the existing and proposed sanitary sewers.

4 STORMWATER MANAGEMENT

4.1 EXISTING CONDITIONS

The total site area consists of 9.43 ha; however, a portion of this land shall be dedicated to the Mayfield Road widening and shall be excluded from analysis. As such, the proposed development shall consist of 9.24 ha. The existing surface consists entirely of pervious surfaces made up of scattered trees, fallow land, and sodded areas. The existing condition for the site is illustrated in **Figure 2**.

The site is overall relatively shallow, with gentle sloping from the northwest towards the southeast. Current drainage patterns drain towards the ditch along Mayfield Road and are conveyed downstream to a branch of Salt Creek, a tributary of the Humber River.

The site currently lies within the Chinguacousy soil series as defined by the Ontario Soil Survey Report #18. This soil type consists mainly of clay loam with imperfect drainage. As such, it is estimated that the hydrologic soil group is type C with a SCS type II curve number of 91 as defined by Design Chart 1.08 and 1.09 from the MTO Drainage Manual (1997).

4.2 PROPOSED STORM SERVICING

The Tullamore MESP (June 2000) proposes a future road network east of the subject site. A communal SWM facility is proposed in the ultimate conditions to provide controls for the private lands east of the subject site and adjacent to Salt Creek. This communal facility shall ultimately service the lands north and east of the subject site in conformance with the SWM strategy outlined in the Tullamore MESP. At the time of preparation of this report, there are no known landowners group, and as such, this site shall provide its own alternative, independent SWM strategy. This alternative strategy, outlined in this report, shall conform to the Tullamore MESP strategy, along with the TRCA and Town of Caledon Guidelines. All stormwater runoff from the propose site will be managed on site. The stormwater management strategy will ensure no runoff shall impact adjacent properties.

The majority of the Site's at-grade runoff will be captured by proposed catchbasins and catchbasin manholes and directed to the proposed subsurface stormwater cisterns located on the west and south sides of the site which will outlet to the existing ditch on the north side of Mayfield Road, at the allowable release rate. Controlled flow roof drains and rooftop storage are proposed on the roof of the proposed buildings. Runoff from the roof will be attenuated and discharged to the proposed internal storm sewer network and will by-pass through the subsurface cisterns. Please refer to the sub-sections below for more information regarding the subsurface stormwater chamber and rooftop storage and **Figure 4 in Appendix H** for the preliminary servicing plan.

4.3 MINOR STORM DRAINAGE SYSTEM

The onsite storm drainage system will be designed to convey the runoff from the 100-year storm event. This will ensure runoff from the controlled areas of the Site for all storm events up to and including the 100-year storm event will be conveyed to proposed subsurface stormwater chambers. Rooftop drains shall be sized by the mechanical consultant to capture the 100-year flow with a 50% blockage factor and convey the flows to the internal mechanical storm plumbing system and ultimately to the existing ditch on the north side of Mayfield Road. The subsurface stormwater chambers will an access hatch accessible at grade and will act as emergency overflow to ensure flows will not back up into the proposed storm sewers.

4.4 MAJOR STORM DRAINAGE SYSTEM

The major storm system is a conveyance system for flows in excess of the minor system flows. Stormwater runoff for the at-grade area from events up to and including the 100-year storm event will be contained on-site and directed to the subsurface stormwater chamber. While stormwater runoff from the roof up to and including the 100-year storm event will contained and attenuated on the roof prior to outletting. Since all storm flows, up to 100-year storm events, will be reduced to the allowable release rate, the existing Mayfield Road ditch will have reduced flows under the post-development condition. Please refer to the sub-sections below for more information.

An emergency overflow will be provided at the top of the subsurface stormwater chamber with discharge to grade and ultimately to the municipal rights-of-way. The roof of the building should have emergency overflow scuppers to ensure ponding on the roof does not exceeds the 150 mm ponding depth limit as stated in the Ontario Building Code. Additionally, overland flow routes are provided around the building to ensure runoff will flow away from the proposed building and entrances.

4.5 STORMWATER MANAGEMENT CRITERIA

The following Stormwater Management (SWM) analysis examines the impacts of the proposed development against the corresponding SWM criteria. The site falls under the jurisdiction of the Town of Caledon and the Toronto and Region Conservation Authority (TRCA). As such, it is subject to the Town of Caledon's Development Standards Manual, TRCA's 2012 Stormwater Management Criteria, and the Ministry of Environment, Conservation and Parks (MECP) 2003 Stormwater Management Planning and Design Manual. The site lies within the Humber River watershed, thus under the jurisdiction of the TRCA. The proposed development will adhere to the following criteria:

- Water Balance: The TRCA indicates that the area is located in the Low Volume Recharge Area (LGRA), "Site specific water balance not required provided the site does not impact a sensitive ecological feature".
- Erosion Control: As indicated in the Town of Caledon's Development Standards Manual, the site shall provide extended detention storage for the 25 mm rainfall event and release over a minimum of 24 hours.
- Water Quality: Water quality treatment methods must conform to provincial standards as defined by the MECP's Stormwater Planning and Design Manual. Stormwater quality control must be implemented to 'Enhanced Protection' levels. The treatment must provide a long-term removal of 80% of total suspended solids (TSS) on an average annual basis.
- Water Quantity: The site is governed by the unit flow rates (UFR) set out by the TRCA for the Humber watershed. The peak flows generated from the 6-hour and 12-hour AES storms must be controlled below the unit flow rates defined by the TRCA. The equation that governs this site is Equation F for sub-basin 36.

4.5.1 ALLOWABLE RELEASE RATE

As mentioned previously, the site lies within the Humber river watershed. A hydrologic analysis of the pre-development conditions has been completed in the Humber River Hydrology Update (2015) to establish unit flow rate targets for quantity control (2-year through 100-year storm flow). Further modelling of pre-development conditions is not required.

The unit flow rates are governed by the equation:

$$Q = \alpha - \beta * \ln(A)$$

Where; Q = Unit Flow (L/s/ha)
A = Development Area (ha)
α, β = Coefficients

A summary of the unit flow rate (Q) and allowable flow rates (Qa) are summarized below:

Table 3 Allowable Release Rate

RETURN PERIOD	EQUATION F – SUB BASIN 36 $Q = \alpha - \beta * \text{LN}(A)$			ALLOWABLE FLOW RATES (M^3/S) (9.24 HA)
	α	β	UFR (L/s/ha)	
2	9.506	0.719	7.908	**0.073**
5	14.652	1.136	12.126	**0.112**
10	17.957	1.373	14.905	**0.138**
25	22.639	1.741	18.768	**0.173**
50	26.566	2.082	21.937	**0.203**
100	29.912	2.316	24.763	**0.229**

4.6 PROPOSED DEVELOPMENT

The subject site's stormwater management will comply with the Town of Caledon, TRCA, and MOE criteria related to water quantity, quality, water balance, and erosion control. The proposed development consists of the construction of two industrial buildings, their associated surface parking areas, and access driveways. The site is 9.24 ha in area with a composite runoff coefficient of 0.82. Please refer to **Figure 3** for a layout of the post-development conditions.

4.6.1 WATER BALANCE

The site lies within a Low Volume Recharge Area (LGRA) as defined by the TRCA. As such, site specific water balance is not required. Best efforts to maintain recharge rates will be provided.

An underground chamber is proposed as part of the quantity control for this site. This underground chamber shall have an open bottom to allow for infiltration. A retention volume of 497.9 m^3, consisting of the void space of the base stone layer, shall be provided for infiltration.

A geotechnical report was prepared by EXP Services Inc. dated 2021-07-21 to investigate the subsurface conditions. The subsurface soil conditions consistent of topsoil, silt till, clayey silt till, and silty clay. The groundwater conditions were observed in the boreholes and short-term groundwater levels were 3.8 – 4.32 meters below ground surface (mbgs). This indicates that the groundwater level should not be a limiting factor and that the proposed infiltration system should be feasible.

4.6.2 WATER QUALITY

The site must provide Enhanced Level Protection or 80% total suspended solids (TSS) removal as per the MOECC SWMPDM. This site is composed of two main surface types, rooftop and at-grade areas.

Rooftop areas are free of typical sediment-generating activities (e.g. vehicle traffic). Runoff from roof areas will leave effectively unchanged and will be considered clean for the purposes of water quality assessment.

The at-grade areas shall be collected by on-site storm sewer infrastructure and directed to the isolator row of the underground storage tank. This isolator row is designed by ADS StormTech and is ETV verified to provide over 81% TSS removal. The isolator row shall provide the required TSS removal prior to releasing to the active storage portion of the underground chamber.

With the above strategies, the site achieves the required TSS removal, no further measures are recommended.

4.6.3 EROSION & SEDIMENT CONTROL

This site must provide extended detention of runoff from a 25 mm rainfall event and release over a minimum period of 24 hours. This extended detention is provided by the underground storage which is further discussed in Section 1.3.4 Water Quantity.

4.6.4 WATER QUANTITY

The discharge from site shall be controlled to the release rates set out in Section 4.2.1 Allowable Release Rates for the 6-hr and 12-hr AES storms. To achieve the required flow rates, the site proposes to use roof top storage and an underground chamber system to provide the necessary storage volumes.

The roof top storage will utilize a triangular ponding depth with a roof drain at each local low point. A Zurn Control-Flo roof drain has been used to design roof top system. There are two industrial buildings, building 1 has a total roof area of 23,482 m^2 while building 2 has a total roof area of 21,053 m^2. It is estimated that 85% of the roof area will be used for storage. The maximum ponding depth will be 0.15 m. This provides a total storage volume of 998 m^3 for building 1 and 895 m^3 for building 2. Building 1 is proposed to have 42 roof drains, while building 2 is proposed to have 38 roof drains. Each roof drain shall be capable of providing 4.02 L/s of drainage. The roof drains shall discharge to the underground storage. Further details of the roof drains can be found in **Appendix F**.

The underground storage shall consist of ADS MC-3500 modules. The modules shall also be equipped with an isolator row to provide the required water quality treatment. The modules shall have 300 mm of base stone and 305 mm of stone cover and opened bottom to promote infiltration. The total height of the system is 1.75 m including the stone. The footprint of the chambers is 4,149 m^2 with a total storage volume of 4,524 m^3. The outlet is comprised of two orifice plates stacked vertically. The 200 mm diameter low flow orifice plate shall be located with an invert 0.30 m above the bottom of stone, while the 250 mm diameter high flow orifice plate shall be located with an invert 0.85 m above the bottom of stone. This system provides 0.30 m of clear stone storage for infiltration with a total sump volume is 497.9 m^3. The underground storage shall connect and discharge to the ditch located along Mayfield Road.

A model of the site was constructed in Visual OTTHYMO 6.0 (VO6) and used to determine the required storage volume in the underground chamber and to calculate the discharge rates achieved by the proposed flow controls under all storm events. The software uses storm hydrographs to model the events. The sump volume was modelled to be full at the onset of each storm event.

A summary of the modelling results is provided below. Full VO6 modelling output is provided in **Appendix E.** Details of the roof drains and underground storage can be found in **Appendix F** and **Appendix G** respectively.

Table 3 Summary of Modelling Results

RETURN PERIOD	TOTAL FLOW FROM CHAMBER				MAX PEAK FLOW FROM SITE	ALLOWABLE FLOW RATES (L/S)
	6-hr AES		12-hr AES			
	Flow Rate (L/s)	Storage (m^3)	Flow Rate (L/s)	Storage (m^3)	Flow Rate * (L/s)	
25 mm	38	1,542	38	1,542	38	-
2	55	2,214	60	2,458	**60**	**73**
5	91	2,909	106	3,054	**106**	**112**
10	125	3,278	135	3,400	**135**	**138**
25	162	3,754	170	3,843	**170**	**173**
50	191	4,103	196	4,168	**196**	**203**
100	218	4,452	222	4,499	**222**	**229**

*The higher value of the 6-hour and 12-hour AES storm flow rates.

As shown, the modelling results demonstrate that the post-development peak flow rates for all events up to the 100-year storm are lower than the target release rate established in accordance with the Town of Caledon, TRCA, and MOE guidelines. The maximum required storage volume to control the 100-year post-development runoff is 4,499 m^3, less than the provided 4,524 m^3. The sump has been modelled as full at the beginning of each storm event.

5 SITE GRADING

The grading design will comply with Town of Caledon Standards and will be designed to achieve the following:

- Maintain existing overland flow routes through the site;
- Maintain perimeter grades;
- Optimize earthworks i.e minimize the quantity of surplus materials to be exported;
- Minimize impact on building construction;
- Provide adequate cover for underground services;
- Accommodate stormwater management requirements;

The proposed grading will, where possible, generally follow the existing grades to maintain drainage patterns. Minor storm drainage is to be conveyed towards catchbasins that convey flows to the on-site underground stormwater cisterns. Major storm drainage (greater than the 100-year storm event) is provided to direct drainage away from proposed and existing structures to approved outlet points. Please refer to **Figure 5 in Appendix H** for preliminary grading design for the proposed development.

During detailed design, further coordination with the stormwater management consultant, landscape consultant and mechanical consultant will be necessary to ensure grading initiatives support stormwater management and landscape objectives.

6 CONCLUSION

6.1 WATER DISTRIBUTION

The proposed development will be serviced from the Region's existing 300mm diameter watermain on Airport Road and Mayfield Road. FUS calculations and a domestic and fire flow calculation for the proposed development has been completed and is included in **Appendix A**. Hydrant flow tests were completed by Core Engineering on October 8, 2013 and results are included in **Appendix B**. Sizing and location of the proposed water services to the proposed building will be coordinated with the mechanical consultant at the detailed design stage. Please refer to **Figure 4 in Appendix H** for preliminary servicing design for the proposed development.

6.2 SANITARY SEWAGE

The proposed development sanitary sewage will be conveyed to the existing 750 mm diameter sanitary sewer on Airport Road. Sanitary services will be designed to meet the standards and specification of the Region of Peel, while services within the building are to be designed by the mechanical consultant per OBC, and coordinated with WSP. Please refer to **Figure 4 in Appendix H** for preliminary servicing design for the proposed development.

6.3 STORM SEWAGE

As noted in Section 4 of this report, there are no landowners group formed for the Tullamore secondary plan area, and as such, this site shall provide its own alternative, independent SWM strategy. This alternative strategy, outlined in this report, shall conform to the Tullamore MESP strategy, along with the TRCA and Town of Caledon Guidelines. All stormwater runoff from the propose site will be managed on site. The stormwater management strategy will ensure no runoff shall impact adjacent properties.

Storm drainage (100-year storm event or smaller) will be collected on-site and controlled to the allowable release rate as noted in the stormwater management section of this report and discharged to the existing ditch on Mayfield Road. Emergency storm flows (greater than the 100-year storm event, or due to blockage) will be directed away from the proposed building and discharged to an approved outlet.

6.4 SITE GRADING

The grading design of the proposed development will generally follow existing drainage patterns. Minor storm drainage is to be conveyed towards area drains. Major storm drainage (greater than the 100-year storm event) is provided to direct drainage away from proposed and existing structures to approved outlet points. Please refer to **Figure 5 in Appendix H** for preliminary grading design for the proposed development.

APPENDIX

A

FIRE FLOW CALCULATIONS

APPENDIX A

FIRE FLOW CALCULATIONS

Project: **6034 Mayfield Road - Industrial Building 1**
Job No.: **211-07736**

Fire Flow Calculation Procedure per Water Supply for Public Fire Protection, 1999 by Fire Underwriter Survey, p 20.

$$F = 220\ C\sqrt{A}$$

where

F = Fire flow in Litres per minute (Lpm)
C = coefficient related to the type of construction
A = total floor area in square metres

A. **Determine Type of Construction**
=> Fire-resistive construction (fully protected frame, floors, roof)
Therefore C = 0.6

B. **Determine Ground Floor Area**
=> Fire-resistive building with vertical openings and exterior vertical communications properly protected
A = 23,400 m2

C. **Determine Height in Storeys**
=> 1 Storey

D. **Determine the Fire Flow**
F = 220 x 0.6 x √23400
F = 20,192 Lpm

E. **Determine Increase or Decrease for Occupancy**
=> Apartments are considered "Combustible"
Therefore 0% reduction
0% reduction of 20192 Lpm = - Lpm
20192 - 0 = 20,192 Lpm

F. **Determine Decrease for Automatic Sprinkler Protection**
=> Has Automatic Sprinkler Protection (Per NFPA 13 Standards)
Therefore 30% reduction
30% reduction of 20192 Lpm = 6,058 Lpm

G. **Determine the Total Increase For Exposures**

Face	Distance (m)	Charge				
Northwest Side	21	10%				
Northeast Side	-	0%				
Southwest Side	-	0%				
Southeast Side	61	0%				
	Total	10%	of	20,192	=	2,019 Lpm

H. **Req'd Fire Flow = D - F + G**
F = 16,153 Lpm 269 L/s
F = 16,000 Lpm (4,800 Lpm < F < 45,000 Lpm; OK)
F = 4,222 US GPM

APPENDIX A

FIRE FLOW CALCULATIONS

Project: **6034 Mayfield Road - Industrial Building 2**
Job No.: **211-07736**

Fire Flow Calculation Procedure per Water Supply for Public Fire Protection, 1999 by Fire Underwriter Survey, p 20.

$$F = 220\ C\sqrt{A}$$

where

F = Fire flow in Litres per minute (Lpm)
C = coefficient related to the type of construction
A = total floor area in square metres

A. **Determine Type of Construction**
=> Fire-resistive construction (fully protected frame, floors, roof)
Therefore C = 0.6

B. **Determine Ground Floor Area**
=> Fire-resistive building with vertical openings and exterior vertical communications properly protected
A = 21,183 m2

C. **Determine Height in Storeys**
=> 1 Storey

D. **Determine the Fire Flow**
F = 220 x 0.6 x √21183
F = 19,212 Lpm

E. **Determine Increase or Decrease for Occupancy**
=> Apartments are considered "Combustible"
Therefore 0% reduction
0% reduction of 19212 Lpm = - Lpm
19212 - 0 = 19,212 Lpm

F. **Determine Decrease for Automatic Sprinkler Protection**
=> Has Automatic Sprinkler Protection (Per NFPA 13 Standards)
Therefore 30% reduction
30% reduction of 19212 Lpm = 5,764 Lpm

G. **Determine the Total Increase For Exposures**

Face	Distance (m)	Charge				
Northwest Side	61	0%				
Northeast Side	24	10%				
Southwest Side	77	0%				
Southeast Side	-	0%				
	Total	10%	of	19,212	=	1,921 Lpm

H. **Req'd Fire Flow = D - F + G**
F = 15,369 Lpm 256 L/s
F = 15,000 Lpm (4,800 Lpm < F < 45,000 Lpm; OK)
F = 3,958 US GPM

APPENDIX

B

HYDRANT FLOW TEST

7.0 Water Supply System

7.1. Existing Water Supply and Distribution System

The Tullamore Industrial Area is located within Pressure Zone 6 (PZ6). North Brampton Pumping Station provides water to nearby PZ6 area and feeds the existing Bolton Elevated Tank via water pipelines along Mayfield Road. The existing Bolton Elevated Tank provides water storage and maintains system pressure for the PZ6 system. The water level for the elevated tank is between top water level of 297.40 m and low water level of 290.0 m. The water supply to the subject site is via the North Brampton Pumping Station and Bolton Elevated Tank.

In 2009, the Region awarded the construction of the Tullamore Reservoir and Pumping Station. This will be the primary source of water for this development upon completion and will provide a more consistent supply of water that will further improve the system pressure to the area.

7.1.1. Existing Watermains in the Vicinity of Subject Site

There are existing 300 mm pipelines along Airport Road and Mayfield Road. It should be noted that currently a section of the watermain on Mayfield Road from Innis Lake Road to Maisonneuve Boulevard is 200 mm in diameter. The region has requested that this section of the pipe be upsized to 300 mm diameter to satisfy the Region’s design criteria; however, hydrant tests indicate that sufficient flow can be supplied to the subject site without upgrading this section of 200 mm pipeline (see Section 7.2 for details). The existing water pipeline systems adjacent to the site are shown in **Appendix D**.

7.1.2. Existing System Pressure

To confirm the available system pressure in the vicinity of the watermain within PZ6 and demonstrate adequate flows for fire protection can be provided, three (3) hydrant flow tests were conducted by Cole Engineering. The subject hydrants are connected to the existing water pipelines within PZ6 in the vicinity of the proposed watermain connections. The hydrant tests took place on October 8, 2013 and the respective locations and results for PZ6 are shown in **Appendix D**, and are detailed below.

Test 1 on Airport Road north of Perdue Ct: The static pressure was approximately 78 psi (corresponding to a system head of 292 m). The pressure dropped by approximately 11 psi (8 m with a corresponding system head of 284 m) when the hydrant was flowing at 142 L/s (2,250 USGPM).

Test 2 on Airport Road between Perdue Ct and Mayfield Road: The static pressure was approximately 87 psi (corresponding to a system head of 296 m). The pressure dropped by approximately 17 psi (12 m with a corresponding system head of 284 m) when the hydrant was flowing at 151 L/s (2,400 USGPM).

Test 3 on Mayfield Road and East / West of Airport Road: The static pressure was approximately 88 psi (corresponding to a system head of 296 m). The pressure dropped by approximately 11 psi (8 m with a corresponding system head of 288 m) when the hydrant was flowing at 167 L/s (2,650 USGPM).

Based on the results from the hydrant flow tests for the existing watermain configuration, it was observed that there was no significant decrease in system pressure when the flow exceeded 140 L/s. For a conservative design, hydrant Test 1 was used as the boundary condition for the water model to estimate the anticipated system pressure within the subject site development.

HYDRANT FLOW TEST FORM **Test 1**

COLE ENGINEERING
Experience Enhancing Excellence

Project No: ______________ Date: [illegible]

Site Location: [illegible] Hydrants Opened by: [illegible]

[illegible] Tested By: [illegible]

1) Required photos:

☐ Site Id & Date ☐ Condition of Flow Hydrant

☐ Location Overview ☐ Condition of Residual Hydrant

☐ Other

2) Test Data

Time of Test: [illegible]

Location of Test: (Flow) [illegible]

(Residual) [illegible]

Main Size: [illegible]

Static Pressure: [illegible]

	Number of Outlets & Orifice Size	Pitot Pressure	Flow (USGPM)	Residual Pressure
1	1 x 2.5"	[illegible]	[illegible]	[illegible]
2	[illegible]	[illegible]	[illegible]	[illegible]
3				
4				

3) Calculations

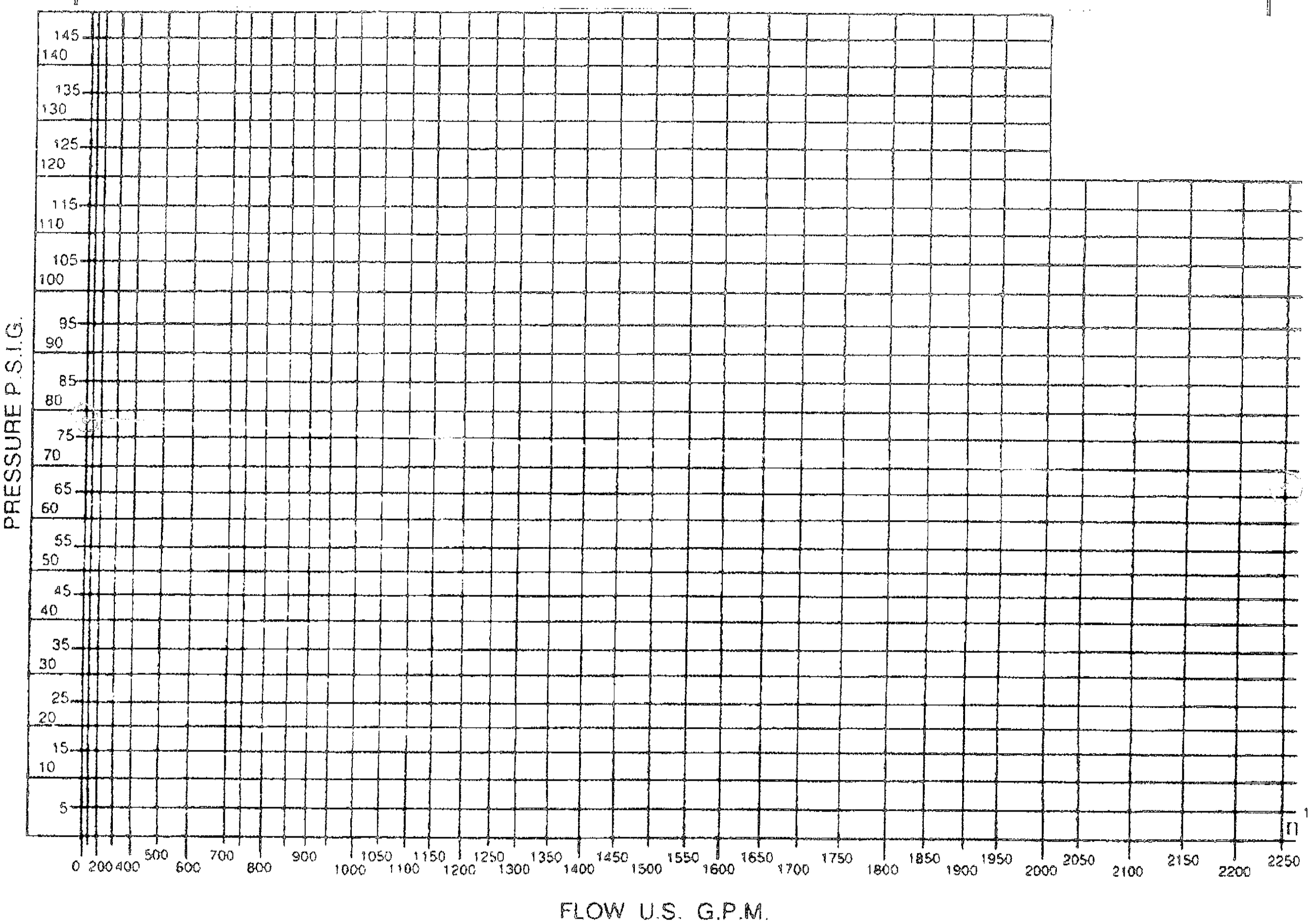
$Q = 29.83\, cd^2\sqrt{p}$

Where c- cofficient of discharge (1 in smooth pipe)
d- pipe diameter (inches)
p- pitot reading (psi)
Q- flow (USGPM)

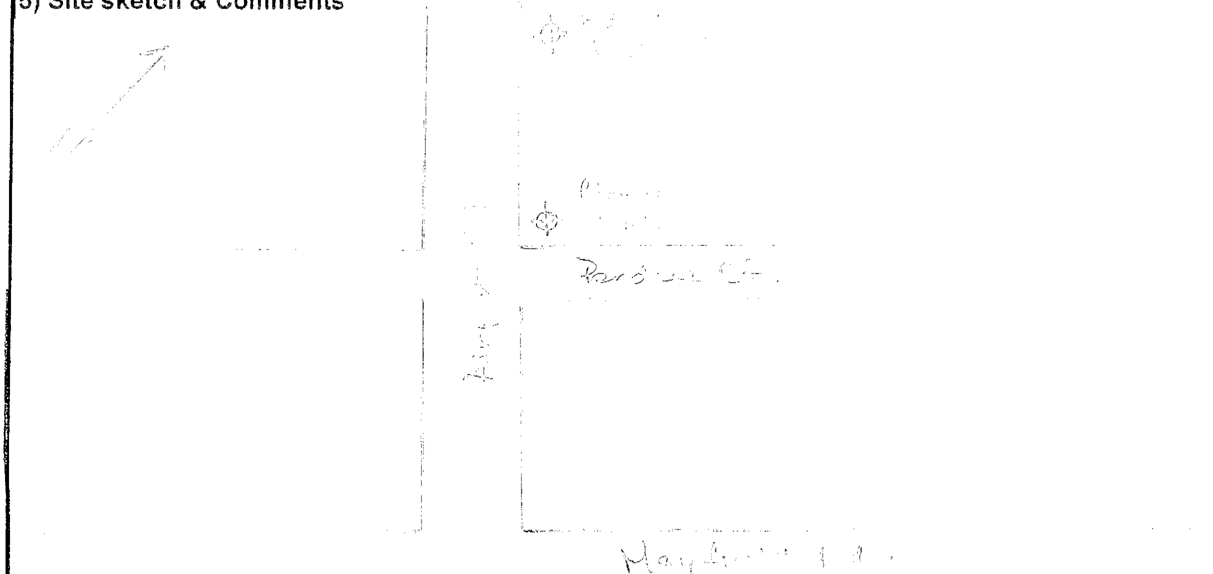
[illegible]

Appendix D-2 Hydrant Flow Test (Page 3 of 7)

4) Plot



5) Site sketch & Comments



HYDRANT FLOW TEST FORM Test 2

COLE ENGINEERING
Experience Enhancing Excellence

Project No: [illegible] Date: [illegible]

Site Location: [illegible] Hydrants Opened by: [illegible]

Tested By: [illegible]

1) Required photos:

- [ ] Site Id & Date
- [ ] Condition of Flow Hydrant
- [ ] Location Overview
- [ ] Condition of Residual Hydrant
- [ ] Other

2) Test Data

Time of Test: [illegible]

Location of Test: (Flow) [illegible]

(Residual) [illegible]

Main Size: [illegible]

Static Pressure: [illegible]

	Number of Outlets & Orifice Size	Pitot Pressure	Flow (USGPM)	Residual Pressure
1		62	1200	74
2		50	[illegible]	70
3				
4				

3) Calculations

$Q = 29.83\, cd^2\sqrt{p}$

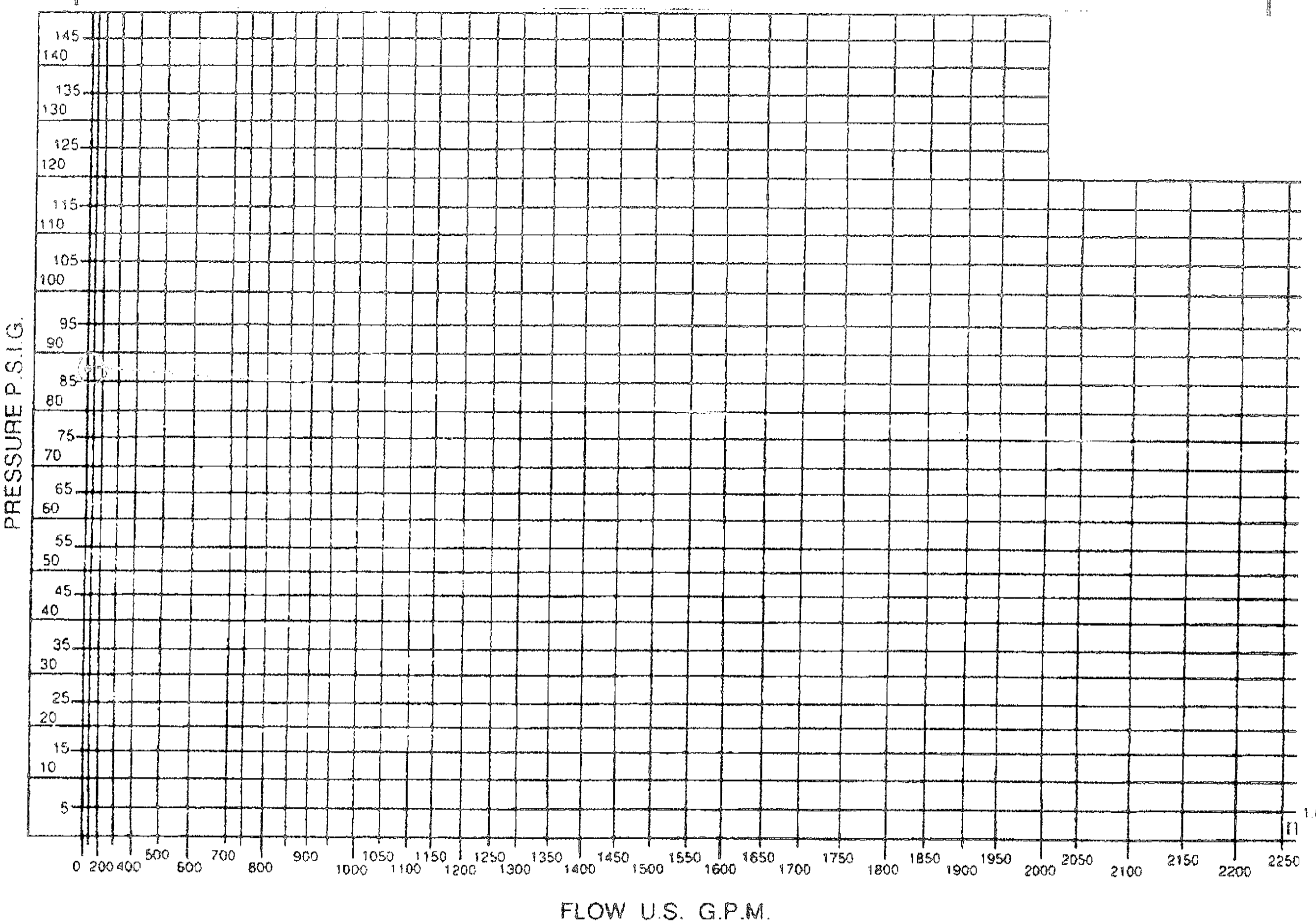
Where c- cofficient of discharge (1 in smooth pipe)
d- pipe diameter (inches)
p- pitot reading (psi)
Q- flow (USGPM)

1321.2

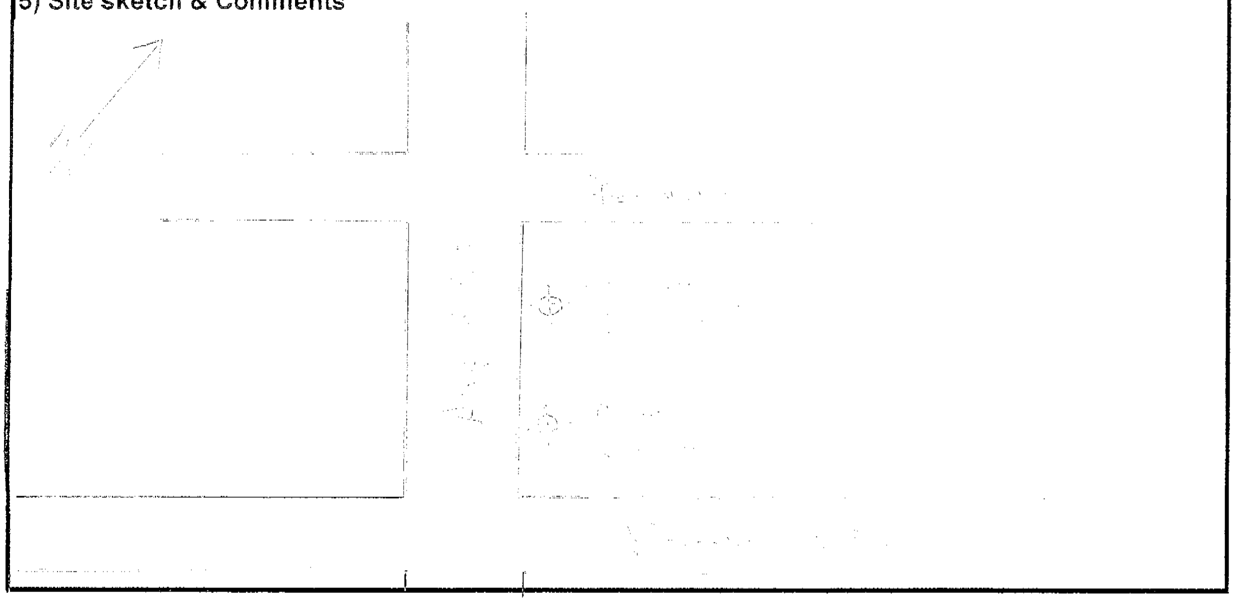
2386.32

Appendix D-2 Hydrant Flow Test (Page 5 of 7)

4) Plot



5) Site sketch & Comments



HYDRANT FLOW TEST FORM **Test 3**

COLE ENGINEERING
Experience Enhancing Excellence

Project No: [illegible] **Date:** [illegible]

Site Location: [illegible] **Hydrants Opened by:** [illegible]

Tested By: [illegible]

1) Required photos:

- [ ] Site Id & Date
- [ ] Condition of Flow Hydrant
- [ ] Location Overview
- [ ] Condition of Residual Hydrant
- [ ] Other

2) Test Data

Time of Test: [illegible]

Location of Test: (Flow) [illegible]

(Residual) [illegible]

Main Size: [illegible]

Static Pressure: 88 [illegible]

	Number of Outlets & Orifice Size	Pitot Pressure	Flow (USGPM)	Residual Pressure
1	[illegible]	[illegible]	1400	[illegible]
2	[illegible]	[illegible]	[illegible]	
3				
4				

3) Calculations

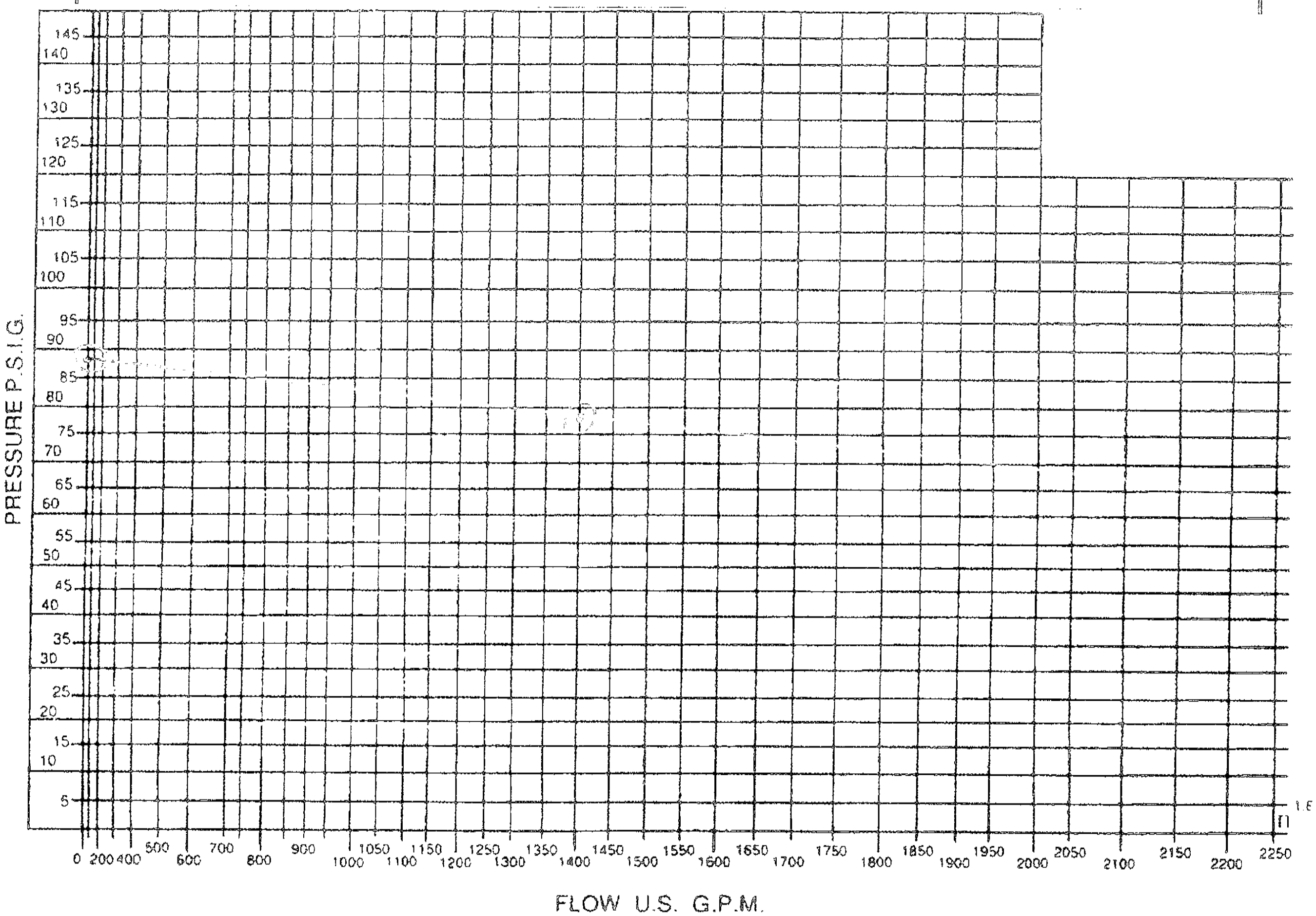
$Q = 29.83\, cd^2\sqrt{p}$

Where c- cofficient of discharge (1 in smooth pipe)
d- pipe diameter (inches)
p- pitot reading (psi)
Q- flow (USGPM)

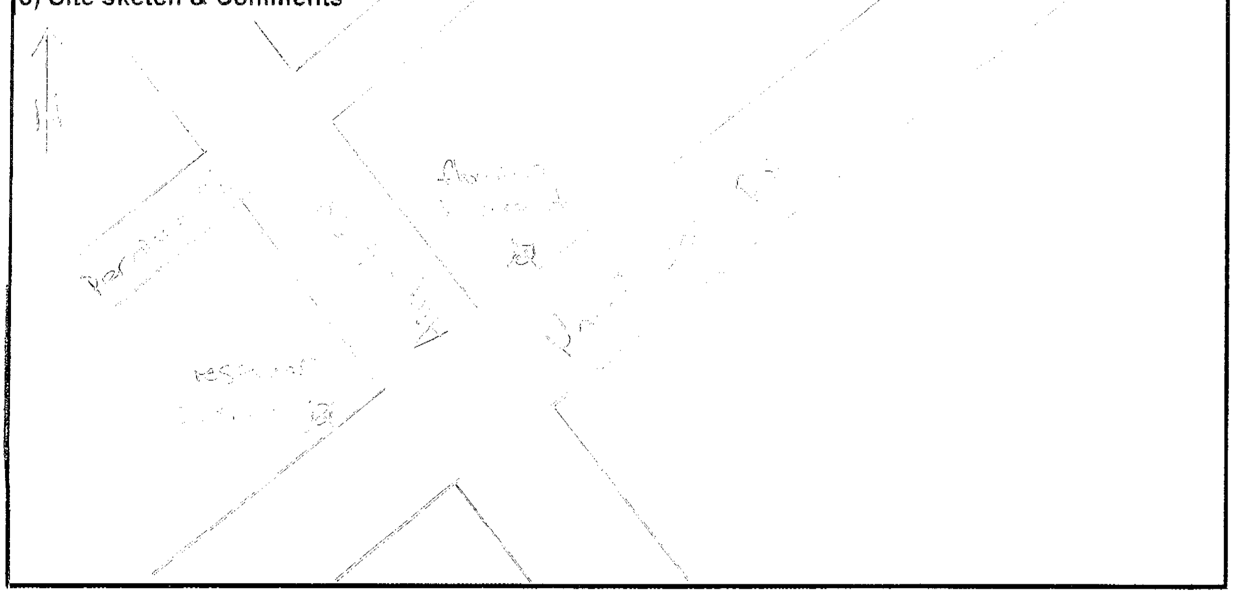
[illegible]

Appendix D-2 Hydrant Flow Test (Page 7 of 7)

4) Plot



5) Site sketch & Comments



APPENDIX

C

REGION CORRESPONDENCE

Region of Peel
Working for you

300 water on NS road
and East/West road

Engineering and Construction
Public Works

To:	**Tom Slomke**	**Date:**	**November 20, 2006**
From:	**Orest Jacyla**	**Subject:**	**Functional Servicing Report Tullamore Industrial Area. Town of Caledon**
ct:		**Our File:**	**C-4**

We acknowledge receipt of the above Functional Servicing Report from your Department and confirm that we have no objections to same, subject to the following comments:

Watermain

IBI Group was retained by Centurion Homes Ltd. and Vac Developments Ltd. (the proponents) to investigate water and sanitary servicing for the Tullamore Industrial Area in the Town of Caledon, Ward 4. This memorandum provides the Region's comments with regards to water servicing for the proposed development.

The Tullamore Industrial Area, which is part of the Tullamore Secondary Plan Area, is located on the north side of Mayfield Road east of Airport Road. The total area of the site, which is zoned for industrial development, is 19 ha of which the development blocks total an area of 11.9 ha.

Water Demand

Based on a population density of 70 persons/ha and Region of Peel design criteria, the average day, maximum day, and peak hour demands for the development are as follows:

- Average day demand = 11.9 ha x 70 persons/ha x 300 L/cap.d = 2.9 L/s
- Maximum day demand = 2.9 L/s x 2.0 = 5.8 L/s
- Peak hour demand = 2.9 L/s x 3.0 = 8.7 L/s

Using MOE design guidelines (i.e., average day demand of 302.8 L/cap.d and a peaking factor of 4.13) the consultant arrived at an average day demand of 2.9 L/s and a peak hour demand of 12.1 L/s. To be conservative, Region staff has used the consultant's estimation of water demand.

Existing Water Infrastructure

The Tullamore Industrial Area is located near the bottom of Pressure Zone 6 with elevations between 227 and 235 metres. Existing water infrastructure includes a 200-mm/300-mm water main on the north side of Mayfield Road, a 750-mm transmission main on the south side of Mayfield Road, and a 300-mm water main on the east side of Airport Road. As per Region of Peel design criteria, industrial developments must be serviced by 300-mm water mains or larger.

It should be noted that the Region has recently completed the construction of 200-mm water mains on Healey Road, The Gore Road and Humber Station Road and a 300-mm water main on Mayfield Road between Coleraine Drive and Humber Station Road. These new water mains will provide a feed from the Bolton Elevated Tank to areas of Zone 6 west of Bolton and will mitigate existing low pressure problems.

The residual pressure in the 200-mm/300-mm water main at Mayfield Road and Maisoneuve Boulevard is 103, 96 and 85 psi under average day, maximum day and peak hour demands, respectively. Applying the water demands for the Tullamore Industrial Area reveals that the residual pressure at this intersection would be 102, 94 and 81 psi under average day, maximum day and peak hour conditions, respectively. The lowest pressure in Zone 6 would be 36 psi under peak hour conditions on Airport Road north of Healey Road. It should be noted that this area currently experiences low pressures.

It is expected that the HGL across Zone 6 will be further improved after the Tullamore Reservoir and Pumping Station is commissioned in 2010.

Interim and Ultimate Servicing

Water servicing for the Tullamore Industrial Area would be provided primarily from the 200-mm/300-mm water main on Mayfield Road. However, to provide security of supply the internal water mains would need to be looped to the 300-mm water main on Airport Road. At present the primary sources of water for this development would be the North Brampton Reservoir and Pumping Station and the Bolton Elevated Tank.

In 2008, the Region plans to begin construction of a new reservoir and pumping station at Mayfield Road and Innis Lake Road that will provide additional pumping capacity for Zone 5 and Zone 6. The Tullamore Reservoir and Pumping Station would be the primary source of water for this development once it is commissioned in 2010.

The water main on Mayfield Road between Innis Lake Road and Maisoneuve Boulevard, which would be the primary feed to the development, only has a diameter of 200 mm. To satisfy the Region of Peel design criteria specifying a minimum pipe diameter of 300 mm for industrial developments, the proponent would be required to replace this water main with a 300-mm water main. The length of the water main that would need to be replaced is 704 metres.

Water Servicing Internal to the Site

Based on the proposed road patterns within the Tullamore Secondary Plan Area, there is access to the 300-mm water main on Airport Road and to the 200-mm/300-mm water main on Mayfield Road. However, access to Airport Road requires crossing lands outside of the Tullamore Industrial Area (i.e., the neighbouring development to the west). This situation may make looping of water mains difficult in the interim and may require delaying the development until the neighbouring developments are ready to proceed. It should be noted that all internal water mains must have a diameter of 300 mm or larger to satisfy Region of Peel design criteria.

Conclusions

Based on a desktop analysis, Region staff has concluded that there is available capacity in the Zone 6 distribution system to provide water servicing to the Tullamore Industrial Area. In the interim, this development would be supplied from the North Brampton Reservoir and Pumping Station and the Bolton Elevated Tank. Ultimately, this development would be serviced from the Tullamore Reservoir and Pumping Station, which is scheduled to be commissioned in 2010.

To satisfy the Region of Peel design criteria specifying a minimum pipe diameter of 300 mm for industrial developments, the proponent would be required to replace the 200-mm water main on Mayfield Road between Innis Lake Road and Maisoneuve Boulevard with a 300-mm water main. The length of the water main that would need to be replaced is 704 metres.

Sanitary Sewer

Background

The IBI Group have proposed development block over 19 ha. Area, for their clients VAC Developments and Centurion Homes, with peak sanitary flows of 13 l/s.

Results

The proposed lands have been included in the drainage area for sewer along Maisonneuve Blvd. and flows were included in the design of the sanitary drainage system south of Mayfield Road.

I trust the above to be satisfactory. If you require clarification or additional information, please don't hesitate to contact me at extension 7809.

Orest Jacyla, P. Eng.
Project Manager
Engineering and Infrastructure Planning
Engineering and Construction

APPENDIX

D

STORMWATER MANAGEMENT CALCULATIONS

0.0 SWM Design Criteria

0.1 Jurisdictions

1. Town of Caledon
2. Toronto and Region Convservation Authority
3. Subwatershed - Humber River (Sub-Basin 36)
4. Ministry of Environment, Conservation and Parks (MECP)

0.2 SWM Design Criteria

0.2.1 Water Quality

Provide an Enhance Level of Protection or 80% TSS removal, as per MOECC SWMPDM (2003)

0.2.2 Water Balance

Area is located in a Low Volume Recharge Area (LGRA), site specific water balance not required provided the site does not impact a sensitive ecological feature.

0.2.3 Erosion Control

Provide extended detention of runoff from 25 mm rainfall event and release within a minimum 24 hour period.

0.2.4 Quantity Control

1) Runoff from the 2 to 100-year storm events must be controlled to the UFR as defined by Equation F for the Humber River Watershed.
2) The post-development peak flow rates generated from 6 and 12 hour AES storm shall be controlled to the UFR as simulated with Visual OTTHYMO model.
3) The 4-hour Chicago storm shall be used the further evaluate the quantity and quality control measures in the proposed conditions.

Drainage	Sub-watershed (CA)	Quantity Control Criteria			Reference & Notes		
		Town	CA	MTO	Hydrologic Model	Design Storm	Background Documents
Site	Humber River	Post to 5-yr Pre to STM sewer	Unit Flow Rate (UFR) to watercourse	Post to Pre	Visual OTTHYMO Model	6 hour & 12 hour AES Storms	Unit Flow Rates from Sub-Basin 36 Equation F

1.0 Design Rainfall Event

1.1 Design Storm

6 hour AES Storm (Toronto Bloor)	*Humber River/TRCA*	quantity control (UFR)
12 hour AES Storm (Toronto Bloor)	*Humber River/TRCA*	quantity control (UFR)
4 hour Chicago Storm (Erosion Control)	*MECP*	25mm
4 hour Chicago Storm (check)		system response under urban rainfall

1.2 IDF Curves

Source of IDF: Town of Caledon Development Standards Manual (2012)

Equation:

$$I = A / (T + C)^B$$

Where, I = Rainfall Intensity (mm/hr)
T = Time of Concentration (hours)
A, B, C = Constant Values for Storms with Various Return Period.

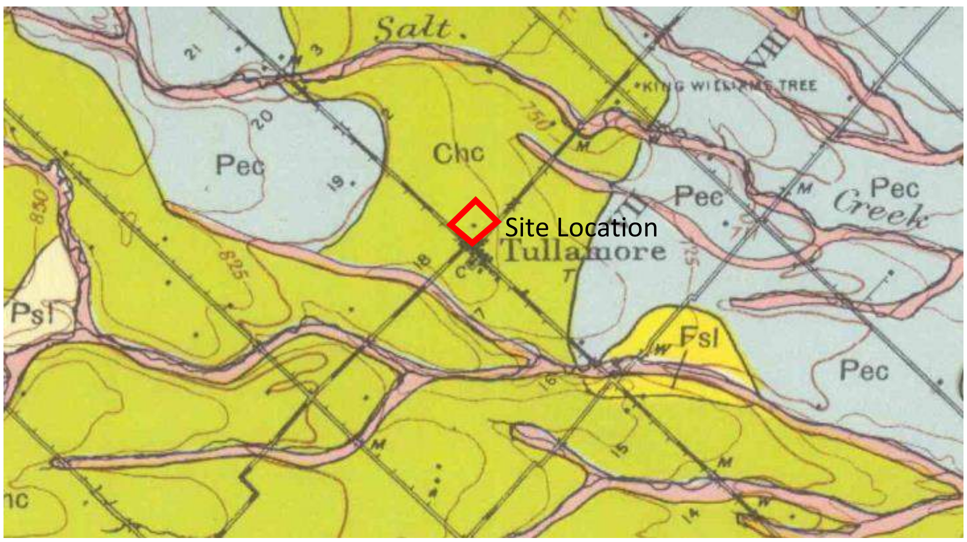
Return Period (Years)	A	B	C	Caledon		
				Rainfall Amount (mm)		Intensity (mm/hr)
				6 hour	12 hour	10 min
2	1070	0.8759	7.85	36.3	40.0	85.7
5	1593	0.8789	11.00	52.7	58.1	109.7
10	2221	0.9080	12.00	61.8	66.8	134.2
25	3158	0.9335	15.00	74.9	80.0	156.5
50	3886	0.9495	16.00	83.7	88.4	176.2
100	4688	0.9624	17.00	93.3	97.8	196.5

Note:
1) The minimum initial time of concentration is to be 10 minutes
2) The current subject land is undeveloped area.
3) The 6 and 12 hour AES design storm shall be used in sizing SWM facilities.
4) The 4 hour Chicago Storm shall be used to further evaluate the quantity control performance of the SWM facilities.

2.0 Soil Information

2.1 SCS Curve Number

Site Location	6304 Mayfield Road	
Soil Symbol:	Chc	Soil Survey Report #18 - Soil Map of Ontario County
Soil Type:	Clay Loam	(National Soil DataBase, NSDB)
Hydrologic Soil Group (HSG)	C	(Design Chart 1.08, MTO Drainage Manual, 1997)
SCS Curve Number, CN (II)	91	(Design Chart 1.09, MTO Drainage Manual, 1997)
Soil Storage, S	25.1	S=(25400/CN)-254
Initial Abstraction, IA (mm)	5.02	IA=0.20*S



Soil Survey Report #18 - Soil Map of Ontario (National Soil DataBase, NSDB)

3.0 Pre-Development Conditions

3.1 Pre-Development Condition and Allowable Release Rate

The hydrologic analysis of pre-development conditions has been completed in Humber River Hydrology Update (2015) to establish unit flow rate targets for quantity control (2-year through 100-year Storm flow).
Further modelling of pre-development conditions is not required.

3.1.1 Total Developable Areas

Catchment ID	Area (ha)	TIMP (%)	CN* (II)	IA (mm)	Command	Notes
101	9.24	0.0%	91	5.02	NASHYD	Site Area
Total	**9.24**					

3.1.2 Imperviousness

Catchment 101 is an open space of row crops with a runoff coefficient of 0.20 and an imperviousness of 0.0%

3.1.3 SCS Curve Number (CN)

A CN value of 91 shall be used.

3.1.4 Initial Abstraction for Pervious Area

A typical IA of 5 mm is assumed for all pervious areas.

3.2 Unit Flow Rate

Return Period (Years)	Equation F - Sub Basin 36 $Q = \alpha - \beta \cdot \ln(A)$		
	α	β	UFR (L/s/ha)
2	9.506	0.719	7.908
5	14.652	1.136	12.126
10	17.957	1.373	14.905
25	22.639	1.741	18.768
50	26.566	2.082	21.937
100	29.912	2.316	24.763

3.3 Allowable Release Rate

Return Period (Years)	Allowable Flow Rates (m^3/s)
	Area 1 (9.24 ha)
2	**0.073**
5	**0.112**
10	**0.138**
25	**0.173**
50	**0.203**
100	**0.229**

4.0 Proposed Development

4.1 Hydrologic Parameters

Catchment ID	Area (ha)	TIMP (%)	CN* (II)	IA (mm)	Command	Description
1001	2.35	100.0%	91	5.0	STANDHYD	Building 1
1002	2.11	100.0%	91	5.0	STANDHYD	Building 2
1003	4.78	79.1%	91	5.0	STANDHYD	At-Grade Areas

4.1.1 Imperviousness

Imperviousness for each catchment is calculated as per proposed land use. See previous page

Catchment ID	Roof	At-Grade Pervious	At-Grade Impervious	Vehicular	Gravel	Total Area (ha)	TIMP (%)
	100%	0	100%	100%	100%		
1001	2.35	0.00	0.00	0.00	0.00	**2.35**	**100.0%**
1002	2.11	0.00	0.00	0.00	0.00	**2.11**	**100.0%**
1003	0.000	1.00	3.78	0.00	0.00	**4.78**	**79.1%**

4.1.2 SCS Curve Number (CN)

CN value of 91 is applied to the site.

4.1.3 Initial Abstraction for Pervious Area

A typical IA of 5 mm is assumed for all pervious areas.

	Project	6034 Mayfield Road, Caledon	No.	211-07736-00-SWM		
wsp	By	IM	Date	2021-07-09		Page
	Checked	AMB	Date			6
Subject	Proposed Development					

5.3 Roof Top Storage

Zurn Control-Flo Roof drainage systems were used to size the roof drains for the proposed canopies.
The proposed canopies are assumed to have an active storage depth of 150 mm.
Maximum area / drain for sloped roof is 930.25 m² or 30.5 m x 30.5 m

Step 1) Determine total roof area
Step 2) Divide roof area by Zurn Notch Rating
Step 3) Determine total number of drains required by not exceeding maximum spacing dimensions.

	A	B	C	D	E	F	G
Roof Area	Total Roof Area (m²)	Notch Area Rating (Sloped)	Total # Notches	Min # of Drains	Min # of Notch / Drain	Flow / Drain (L/s)	Provided Storage (m³)
Building 1	23,482	697	34	25	2	4.0167	998
Building 2	21,053	697	31	23	2	4.0167	895
Total	**44,535**						

A) Total Roof area
B) Zurn notch area raing selected for Toronto = 697 m² from "Selecta-Drain Chart"
C) (A)/(B)
D) Number of drains required deteremined from Diagram "B" for roof drain placement. (A) / 930.25 m².
E) Flow rate required is 120.5 L/min. Size leaders for 2 notch weir flow rate of 136 L/min. 75 mm pipe size vertical leaders required.
Maximum water depth and scupper height is 134.5 mm
F) Design flow of 120.5 L/min/notch * (E) converted to L/s
G) Storage provided = (A)*85% * 0.15m / 3 (equation for square based pyramid)

Stage-Storage Table

Building 1		
Depth (m)	Controlled Flow (m^3/s)	Total Storage (ha.m)
0.00	0.000	0.0000
0.05	0.056	0.0333
0.10	0.112	0.0665
0.15	0.169	0.0998

Number of drains used: 42

Building 2		
Depth (m)	Controlled Flow (m^3/s)	Total Storage (ha.m)
0.00	0.000	0.0000
0.05	0.051	0.0298
0.10	0.102	0.0597
0.15	0.153	0.0895

Number of drains used: 38

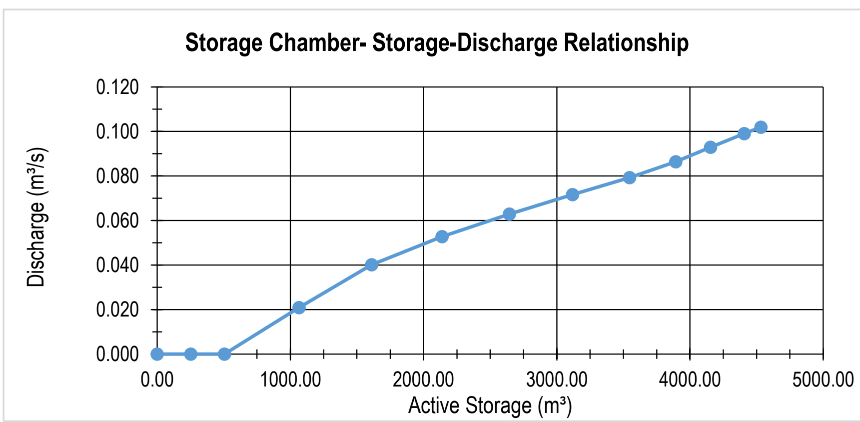
5.3 Underground Chamber Storage-Discharge Relationship

Description	Depth (mm)	Total Storage (m^3)	Low Flow (m^3/s)	High Flow Flow (m^3/s)	Total Flow (m^3/s)
Bottom of Stone	0.00	0	0.000	0.000	0.000
	0.15	253	0.000	0.000	0.000
Bottom of Chamber = 0.3	0.31	506	0.000	0.000	0.000
	0.46	1065	0.021	0.000	0.021
	0.61	1610	0.040	0.000	0.040
	0.76	2139	0.053	0.000	0.053
	0.91	2644	0.063	0.000	0.063
	1.07	3117	0.072	0.042	0.113
	1.22	3545	0.079	0.068	0.147
	1.37	3892	0.086	0.086	0.173
Top of Chamber = 1.45	1.52	4153	0.093	0.101	0.194
	1.68	4406	0.099	0.115	0.214
Top of Stone = 1.75	1.75	4532	0.102	0.121	0.223

Orifice Discharge Equation is used to calculate the release rate $Q = CA\sqrt{2gh}$

Where,

	LOW FLOW		HIGH FLOW	
Q = Orifice Plate Flow Rate (m^3/s)	0.113	m^3/s	0.175	m^3/s
C = Flow Coefficient for Orifice Tube	0.63		0.63	
d = Diameter of orifice (mm)	200	mm	250	mm
A = Cross-section Area of Orifice Tube (m^2)	0.0314	m^2	0.0491	m^2
g = Gravity Acceleration (m/s^2)	9.81	m/s^2	9.81	m/s^2
h = Head above Centerline of Orifice Tube (m)	1.65	m	1.63	m
Invert of the orifice is set at depth:	0.30	m	0.85	m



5.4 Quantity Control Volume - Total Site

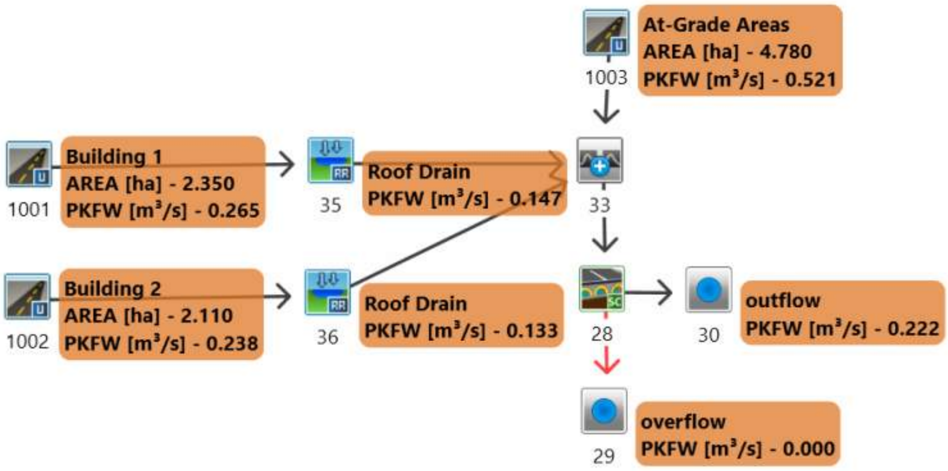
Rainfall Event (Years)	Total From Chamber* 6 hr AES Flow rate (L/s)	Total From Chamber* 6 hr AES Storage (m³)	Total From Chamber* 12 hr AES Flow rate (L/s)	Total From Chamber* 12 hr AES Storage (m³)	Total Peak From Site Flow rate (L/s)	Allowable Flow Rate from Site (L/s)
25 mm	38	1542	38	1542	38.0	-
2	55	2214	60	2458	**60.0**	**73.0**
5	91	2909	106	3054	**106.0**	**112.0**
10	125	3278	135	3400	**135.0**	**137.7**
25	162	3754	170	3843	**170.0**	**173.4**
50	191	4103	196	4168	**196.0**	**202.6**
100	218	4452	222	4499	**222.0**	**228.7**

*Sump was modelled to be full at the onset of each storm event

APPENDIX

E

MODEL OUTPUT DATA


At-Grade Areas
AREA [ha] - 4.780
PKFW [m³/s] - 0.521
1003
Building 1
AREA [ha] - 2.350
PKFW [m³/s] - 0.265
1001
35
Roof Drain
PKFW [m³/s] - 0.147
33
Building 2
AREA [ha] - 2.110
PKFW [m³/s] - 0.238
1002
36
Roof Drain
PKFW [m³/s] - 0.133
28
30
outflow
PKFW [m³/s] - 0.222
29
overflow
PKFW [m³/s] - 0.000

```
*******************************
** SIMULATION:1.1 2yr 6hr AES **
*******************************

--------------------
|   READ STORM    |    Filename: C:\Users\caim069305\AppD
|                 |              ata\Local\Temp\
|                 |              42e5834f-7301-492c-9bf7-628b9be09e0d\368031ff
| Ptotal= 36.00 mm |    Comments: 2 Year 6 Hour AES (Bloor, TRCA)
--------------------
           TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
            hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
           0.25    0.00 |  2.00   12.24 |  3.75    5.04 |  5.50    0.72
           0.50    0.72 |  2.25   12.24 |  4.00    2.88 |  5.75    0.72
           0.75    0.72 |  2.50   33.12 |  4.25    2.88 |  6.00    0.72
           1.00    0.72 |  2.75   33.12 |  4.50    1.44 |  6.25    0.72
           1.25    0.72 |  3.00    9.36 |  4.75    1.44 |
           1.50    4.32 |  3.25    9.36 |  5.00    0.72 |
           1.75    4.32 |  3.50    5.04 |  5.25    0.72 |

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

--------------------
| CALIB            |
| STANDHYD ( 1001)|   Area    (ha)=   2.35
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                        IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=     2.33          0.02
    Dep. Storage     (mm)=     1.00          5.00
    Average Slope     (%)=     1.00          2.00
    Length            (m)=   125.17         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    0.00 | 1.667    4.32 | 3.250    9.36 |  4.83    0.72
          0.167    0.00 | 1.750    4.32 | 3.333    5.04 |  4.92    0.72
          0.250    0.00 | 1.833   12.24 | 3.417    5.04 |  5.00    0.72
          0.333    0.72 | 1.917   12.24 | 3.500    5.04 |  5.08    0.72
          0.417    0.72 | 2.000   12.24 | 3.583    5.04 |  5.17    0.72
          0.500    0.72 | 2.083   12.24 | 3.667    5.04 |  5.25    0.72
          0.583    0.72 | 2.167   12.24 | 3.750    5.04 |  5.33    0.72
          0.667    0.72 | 2.250   12.24 | 3.833    2.88 |  5.42    0.72
          0.750    0.72 | 2.333   33.12 | 3.917    2.88 |  5.50    0.72
          0.833    0.72 | 2.417   33.12 | 4.000    2.88 |  5.58    0.72
          0.917    0.72 | 2.500   33.12 | 4.083    2.88 |  5.67    0.72
          1.000    0.72 | 2.583   33.12 | 4.167    2.88 |  5.75    0.72
          1.083    0.72 | 2.667   33.12 | 4.250    2.88 |  5.83    0.72
          1.167    0.72 | 2.750   33.12 | 4.333    1.44 |  5.92    0.72
          1.250    0.72 | 2.833    9.36 | 4.417    1.44 |  6.00    0.72
          1.333    4.32 | 2.917    9.36 | 4.500    1.44 |  6.08    0.72
          1.417    4.32 | 3.000    9.36 | 4.583    1.44 |  6.17    0.72
          1.500    4.32 | 3.083    9.36 | 4.667    1.44 |  6.25    0.72
          1.583    4.32 | 3.167    9.36 | 4.750    1.44 |

    Max.Eff.Inten.(mm/hr)=       33.12         21.73
               over (min)        5.00         10.00
    Storage Coeff.  (min)=        4.55 (ii)     6.30 (ii)
    Unit Hyd. Tpeak (min)=        5.00         10.00
    Unit Hyd. peak  (cms)=        0.23          0.15
                                                          *TOTALS*
    PEAK FLOW       (cms)=        0.21          0.00        0.215 (iii)
    TIME TO PEAK    (hrs)=        2.75          2.75         2.75
    RUNOFF VOLUME    (mm)=       35.00         17.12        34.82
    TOTAL RAINFALL   (mm)=       36.00         36.00        36.00
    RUNOFF COEFFICIENT   =        0.97          0.48         0.97

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

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN* =  91.0    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( 0035)|      OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------       (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.1120     0.0665
                          0.0560     0.0333   |   0.1690     0.0998

                             AREA     QPEAK      TPEAK        R.V.
                             (ha)     (cms)      (hrs)        (mm)
  INFLOW : ID= 2 (  1001)    2.350     0.215       2.75        34.82
  OUTFLOW: ID= 1 (  0035)    2.350     0.073       2.92        34.76

              PEAK   FLOW   REDUCTION [Qout/Qin](%)= 34.14
              TIME SHIFT OF PEAK FLOW         (min)= 10.00
              MAXIMUM  STORAGE   USED       (ha.m.)=  0.0437

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

--------------------
| CALIB            |
| STANDHYD ( 1002)|   Area    (ha)=   2.11
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                        IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=     2.09          0.02
    Dep. Storage     (mm)=     1.00          5.00
    Average Slope     (%)=     1.00          2.00
    Length            (m)=   118.60         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    0.00 | 1.667    4.32 | 3.250    9.36 |  4.83    0.72
          0.167    0.00 | 1.750    4.32 | 3.333    5.04 |  4.92    0.72
          0.250    0.00 | 1.833   12.24 | 3.417    5.04 |  5.00    0.72
          0.333    0.72 | 1.917   12.24 | 3.500    5.04 |  5.08    0.72
          0.417    0.72 | 2.000   12.24 | 3.583    5.04 |  5.17    0.72
          0.500    0.72 | 2.083   12.24 | 3.667    5.04 |  5.25    0.72
          0.583    0.72 | 2.167   12.24 | 3.750    5.04 |  5.33    0.72
          0.667    0.72 | 2.250   12.24 | 3.833    2.88 |  5.42    0.72
          0.750    0.72 | 2.333   33.12 | 3.917    2.88 |  5.50    0.72
          0.833    0.72 | 2.417   33.12 | 4.000    2.88 |  5.58    0.72
          0.917    0.72 | 2.500   33.12 | 4.083    2.88 |  5.67    0.72
          1.000    0.72 | 2.583   33.12 | 4.167    2.88 |  5.75    0.72
          1.083    0.72 | 2.667   33.12 | 4.250    2.88 |  5.83    0.72
          1.167    0.72 | 2.750   33.12 | 4.333    1.44 |  5.92    0.72
          1.250    0.72 | 2.833    9.36 | 4.417    1.44 |  6.00    0.72
          1.333    4.32 | 2.917    9.36 | 4.500    1.44 |  6.08    0.72
          1.417    4.32 | 3.000    9.36 | 4.583    1.44 |  6.17    0.72
          1.500    4.32 | 3.083    9.36 | 4.667    1.44 |  6.25    0.72
          1.583    4.32 | 3.167    9.36 | 4.750    1.44 |

    Max.Eff.Inten.(mm/hr)=       33.12         21.73
               over (min)        5.00         10.00
    Storage Coeff.  (min)=        4.40 (ii)     6.15 (ii)
    Unit Hyd. Tpeak (min)=        5.00         10.00
    Unit Hyd. peak  (cms)=        0.23          0.15
                                                          *TOTALS*
    PEAK FLOW       (cms)=        0.19          0.00        0.193 (iii)
    TIME TO PEAK    (hrs)=        2.75          2.75         2.75
    RUNOFF VOLUME    (mm)=       35.00         17.12        34.82
    TOTAL RAINFALL   (mm)=       36.00         36.00        36.00
    RUNOFF COEFFICIENT   =        0.97          0.48         0.97

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

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN* =  91.0    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( 0036)|      OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------       (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.1020     0.0597
                          0.0510     0.0298   |   0.1530     0.0895

                             AREA     QPEAK      TPEAK        R.V.
                             (ha)     (cms)      (hrs)        (mm)
  INFLOW : ID= 2 (  1002)    2.110     0.193       2.75        34.82
  OUTFLOW: ID= 1 (  0036)    2.110     0.067       2.92        34.75

              PEAK   FLOW   REDUCTION [Qout/Qin](%)= 34.56
              TIME SHIFT OF PEAK FLOW         (min)= 10.00
              MAXIMUM  STORAGE   USED       (ha.m.)=  0.0391

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

--------------------
| CALIB            |
| STANDHYD ( 1003)|   Area    (ha)=   4.78
|ID= 1 DT= 5.0 min |   Total Imp(%)=  79.10   Dir. Conn.(%)=  79.10
--------------------
                        IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=     3.78          1.00
    Dep. Storage     (mm)=     1.00          5.00
    Average Slope     (%)=     1.00          2.00
    Length            (m)=   178.51         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    0.00 | 1.667    4.32 | 3.250    9.36 |  4.83    0.72
          0.167    0.00 | 1.750    4.32 | 3.333    5.04 |  4.92    0.72
          0.250    0.00 | 1.833   12.24 | 3.417    5.04 |  5.00    0.72
          0.333    0.72 | 1.917   12.24 | 3.500    5.04 |  5.08    0.72
          0.417    0.72 | 2.000   12.24 | 3.583    5.04 |  5.17    0.72
          0.500    0.72 | 2.083   12.24 | 3.667    5.04 |  5.25    0.72
          0.583    0.72 | 2.167   12.24 | 3.750    5.04 |  5.33    0.72
          0.667    0.72 | 2.250   12.24 | 3.833    2.88 |  5.42    0.72
          0.750    0.72 | 2.333   33.12 | 3.917    2.88 |  5.50    0.72
          0.833    0.72 | 2.417   33.12 | 4.000    2.88 |  5.58    0.72
          0.917    0.72 | 2.500   33.12 | 4.083    2.88 |  5.67    0.72
          1.000    0.72 | 2.583   33.12 | 4.167    2.88 |  5.75    0.72
          1.083    0.72 | 2.667   33.12 | 4.250    2.88 |  5.83    0.72
          1.167    0.72 | 2.750   33.12 | 4.333    1.44 |  5.92    0.72
          1.250    0.72 | 2.833    9.36 | 4.417    1.44 |  6.00    0.72
          1.333    4.32 | 2.917    9.36 | 4.500    1.44 |  6.08    0.72
          1.417    4.32 | 3.000    9.36 | 4.583    1.44 |  6.17    0.72
          1.500    4.32 | 3.083    9.36 | 4.667    1.44 |  6.25    0.72
          1.583    4.32 | 3.167    9.36 | 4.750    1.44 |

    Max.Eff.Inten.(mm/hr)=       33.12         20.89
               over (min)        5.00         20.00
    Storage Coeff.  (min)=        5.63 (ii)    18.83 (ii)
    Unit Hyd. Tpeak (min)=        5.00         20.00
    Unit Hyd. peak  (cms)=        0.20          0.06
                                                          *TOTALS*
    PEAK FLOW       (cms)=        0.35          0.04        0.379 (iii)
    TIME TO PEAK    (hrs)=        2.75          2.92         2.75
    RUNOFF VOLUME    (mm)=       35.00         17.12        31.26
    TOTAL RAINFALL   (mm)=       36.00         36.00        36.00
    RUNOFF COEFFICIENT   =        0.97          0.48         0.87


      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN* =  91.0    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  ( 0033)|
|   1 + 2 = 3     |       AREA    QPEAK     TPEAK      R.V.
--------------------      (ha)    (cms)     (hrs)      (mm)
       ID1= 1 ( 1003):     4.78    0.379      2.75     31.26
     + ID2= 2 ( 0035):     2.35    0.073      2.92     34.76
       ==================================================
       ID = 3 ( 0033):     7.13    0.446      2.75     32.41

    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):     7.13    0.446      2.75     32.41
     + ID2= 2 ( 0036):     2.11    0.067      2.92     34.75
       ==================================================
       ID = 1 ( 0033):     9.24    0.508      2.75     32.95

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

--------------------
| CHAMBER( 0028)|   OUTFLOW: ON,   UNDERDRAIN: OFF,  INFIL: OFF
|IN= 2--> OUT= 3 |   CHAMBER:
| DT=  1.0 min   |   MAX STO VOL (cu.m.)= 4532.43  Bottom Area(m2)  = 4149.20
--------------------
              DEPTH        STORAGE        |    DEPTH       STORAGE
              (mm)         (cu.m.)        |    (mm)        (cu.m.)
               0.00           0.00        |    889.00      2561.91
              25.00          42.15        |    914.00      2644.15
              51.00          84.29        |    940.00      2725.52
              76.00         126.44        |    965.00      2805.96
             102.00         168.58        |    991.00      2885.44
             127.00         210.73        |   1016.00      2963.89
             152.00         252.88        |   1041.00      3041.23
             178.00         295.02        |   1067.00      3117.43
             203.00         337.17        |   1092.00      3192.40
             229.00         379.32        |   1118.00      3266.04
             254.00         421.46        |   1143.00      3338.30
             279.00         463.61        |   1168.00      3409.03
             305.00         505.75        |   1194.00      3478.15
             330.00         599.76        |   1219.00      3545.47
             356.00         693.36        |   1245.00      3610.81
             381.00         786.64        |   1270.00      3673.92
             406.00         879.62        |   1295.00      3734.48
             432.00         972.26        |   1321.00      3791.79
             457.00        1064.57        |   1346.00      3844.07
             483.00        1156.53        |   1372.00      3892.17
             508.00        1248.12        |   1397.00      3938.66
             533.00        1339.32        |   1422.00      3983.67
             559.00        1430.11        |   1448.00      4026.67
             584.00        1520.47        |   1473.00      4068.82
             610.00        1610.38        |   1499.00      4110.96
             635.00        1699.82        |   1524.00      4153.11
             660.00        1788.76        |   1549.00      4195.26
             686.00        1877.17        |   1575.00      4237.40
             711.00        1965.05        |   1600.00      4279.55
             737.00        2052.31        |   1626.00      4321.70
             762.00        2138.97        |   1651.00      4363.84
             787.00        2224.99        |   1676.00      4405.99
             813.00        2310.34        |   1702.00      4448.13
             838.00        2394.96        |   1727.00      4490.28
             864.00        2478.83        |   1753.00      4532.43

             DEPTH       DISCHARGE       |   DEPTH      DISCHARGE
              (m)          (cms)         |    (m)         (cms)
             0.010         0.000         |   0.920        0.147
             0.160         0.021         |   1.070        0.173
             0.310         0.040         |   1.220        0.194
             0.460         0.053         |   1.380        0.214
             0.610         0.063         |   1.450        0.223
             0.770         0.113         |   0.000        0.000

                      AREA          QPEAK              TPEAK          R.V.
                      (ha)          (cms)              (hrs)          (mm)
     INFLOW:ID= 2     9.24          0.508               2.75          32.95
    OUTFLOW:ID= 1     9.24          0.055               5.80          27.27
   OVERFLOW:ID= 3     0.00          0.000               0.00           0.00

            Volume Reduction Rate[(RVin-RVout)/RVin](%)=       17.23
            Time to reach Max storage               (Hr)=       5.80
            Volume of water for drawdown in LID (cu.m.)=     1300.33
            Volume of maximum water storage     (cu.m.)=     2213.66
            ***** After simulation, water volume is not zero.

 --------------------------
 | Junction Command(0029) |
 --------------------------

                      AREA      QPEAK   TPEAK      R.V.
                      (ha)      (cms)    (hrs)      (mm)
 INFLOW : ID= 3(  0028)    0.00      0.00    0.00      0.00
 OUTFLOW: ID= 2(  0029)    0.00      0.00    0.00      0.00

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

 --------------------------
 | Junction Command(0030) |
 --------------------------
```

```
                          AREA     QPEAK   TPEAK     R.V.
                          (ha)     (cms)    (hrs)    (mm)
 INFLOW : ID= 1(  0028)    9.24     0.05     5.80    27.27
 OUTFLOW: ID= 2(  0030)    9.24     0.05     5.80    27.27

 ---------------------------------------------------------------------------------
*******************************
** SIMULATION:1.2 5yr 6hr AES **
*******************************

 --------------------
 |   READ STORM     |    Filename: C:\Users\caim069305\AppD
 |                  |              ata\Local\Temp\
 |                  |              42e5834f-7301-492c-9bf7-628b9be09e0d\4cea3a9d
 | Ptotal= 47.81 mm |    Comments: 5 Year 6 Hour AES (Bloor, TRCA)
 --------------------
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.25    0.00 |  2.00   16.25 |  3.75    6.69 |  5.50    0.96
                0.50    0.96 |  2.25   16.25 |  4.00    3.82 |  5.75    0.96
                0.75    0.96 |  2.50   43.98 |  4.25    3.82 |  6.00    0.96
                1.00    0.96 |  2.75   43.98 |  4.50    1.91 |  6.25    0.96
                1.25    0.96 |  3.00   12.43 |  4.75    1.91 |
                1.50    5.74 |  3.25   12.43 |  5.00    0.96 |
                1.75    5.74 |  3.50    6.69 |  5.25    0.96 |

 -------------------------------------------------------------------------------
 --------------------
 | CALIB            |
 | STANDHYD (  1001)|   Area    (ha)=   2.35
 |ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
 --------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=     2.33          0.02
     Dep. Storage     (mm)=     1.00          5.00
     Average Slope     (%)=     1.00          2.00
     Length            (m)=   125.17         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    0.00 | 1.667    5.74 | 3.250   12.43 |  4.83    0.96
               0.167    0.00 | 1.750    5.74 | 3.333    6.69 |  4.92    0.96
               0.250    0.00 | 1.833   16.25 | 3.417    6.69 |  5.00    0.96
               0.333    0.96 | 1.917   16.25 | 3.500    6.69 |  5.08    0.96
               0.417    0.96 | 2.000   16.25 | 3.583    6.69 |  5.17    0.96
               0.500    0.96 | 2.083   16.25 | 3.667    6.69 |  5.25    0.96
               0.583    0.96 | 2.167   16.25 | 3.750    6.69 |  5.33    0.96
               0.667    0.96 | 2.250   16.25 | 3.833    3.82 |  5.42    0.96
               0.750    0.96 | 2.333   43.98 | 3.917    3.82 |  5.50    0.96
               0.833    0.96 | 2.417   43.98 | 4.000    3.82 |  5.58    0.96
               0.917    0.96 | 2.500   43.98 | 4.083    3.82 |  5.67    0.96
               1.000    0.96 | 2.583   43.98 | 4.167    3.82 |  5.75    0.96
               1.083    0.96 | 2.667   43.98 | 4.250    3.82 |  5.83    0.96
               1.167    0.96 | 2.750   43.98 | 4.333    1.91 |  5.92    0.96
               1.250    0.96 | 2.833   12.43 | 4.417    1.91 |  6.00    0.96
               1.333    5.74 | 2.917   12.43 | 4.500    1.91 |  6.08    0.96
               1.417    5.74 | 3.000   12.43 | 4.583    1.91 |  6.17    0.96
               1.500    5.74 | 3.083   12.43 | 4.667    1.91 |  6.25    0.96
               1.583    5.74 | 3.167   12.43 | 4.750    1.91 |

     Max.Eff.Inten.(mm/hr)=       43.98         33.00
                over (min)         5.00         10.00
     Storage Coeff.  (min)=        4.06 (ii)     5.62 (ii)
     Unit Hyd. Tpeak (min)=        5.00         10.00
     Unit Hyd. peak  (cms)=        0.24          0.15
                                                            *TOTALS*
     PEAK FLOW       (cms)=        0.28          0.00          0.286 (iii)
     TIME TO PEAK    (hrs)=        2.75          2.75           2.75
     RUNOFF VOLUME    (mm)=       46.81         26.98          46.61
     TOTAL RAINFALL   (mm)=       47.81         47.81          47.81
     RUNOFF COEFFICIENT   =        0.98          0.56           0.97

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  91.0    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( 0035)|     OVERFLOW IS OFF
 | IN= 2---> OUT= 1 |
 | DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
 --------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000    |   0.1120     0.0665
                          0.0560     0.0333    |   0.1690     0.0998

                             AREA      QPEAK      TPEAK       R.V.
                             (ha)      (cms)      (hrs)       (mm)
  INFLOW : ID= 2 (  1001)    2.350      0.286      2.75       46.61
  OUTFLOW: ID= 1 (  0035)    2.350      0.098      2.92       46.55

                PEAK   FLOW   REDUCTION [Qout/Qin](%)= 34.42
                TIME SHIFT OF PEAK FLOW         (min)= 10.00
                MAXIMUM  STORAGE   USED       (ha.m.)=  0.0585

 -------------------------------------------------------------------------------
 --------------------
 | CALIB            |
 | STANDHYD (  1002)|   Area    (ha)=   2.11
 |ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
 --------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=     2.09          0.02
     Dep. Storage     (mm)=     1.00          5.00
     Average Slope     (%)=     1.00          2.00
     Length            (m)=   118.60         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    0.00 | 1.667    5.74 | 3.250   12.43 |  4.83    0.96
               0.167    0.00 | 1.750    5.74 | 3.333    6.69 |  4.92    0.96
               0.250    0.00 | 1.833   16.25 | 3.417    6.69 |  5.00    0.96
               0.333    0.96 | 1.917   16.25 | 3.500    6.69 |  5.08    0.96
               0.417    0.96 | 2.000   16.25 | 3.583    6.69 |  5.17    0.96
               0.500    0.96 | 2.083   16.25 | 3.667    6.69 |  5.25    0.96
               0.583    0.96 | 2.167   16.25 | 3.750    6.69 |  5.33    0.96
               0.667    0.96 | 2.250   16.25 | 3.833    3.82 |  5.42    0.96
               0.750    0.96 | 2.333   43.98 | 3.917    3.82 |  5.50    0.96
               0.833    0.96 | 2.417   43.98 | 4.000    3.82 |  5.58    0.96
               0.917    0.96 | 2.500   43.98 | 4.083    3.82 |  5.67    0.96
               1.000    0.96 | 2.583   43.98 | 4.167    3.82 |  5.75    0.96
               1.083    0.96 | 2.667   43.98 | 4.250    3.82 |  5.83    0.96
               1.167    0.96 | 2.750   43.98 | 4.333    1.91 |  5.92    0.96
               1.250    0.96 | 2.833   12.43 | 4.417    1.91 |  6.00    0.96
               1.333    5.74 | 2.917   12.43 | 4.500    1.91 |  6.08    0.96
               1.417    5.74 | 3.000   12.43 | 4.583    1.91 |  6.17    0.96
               1.500    5.74 | 3.083   12.43 | 4.667    1.91 |  6.25    0.96
               1.583    5.74 | 3.167   12.43 | 4.750    1.91 |

     Max.Eff.Inten.(mm/hr)=       43.98         33.00
                over (min)         5.00         10.00
     Storage Coeff.  (min)=        3.93 (ii)     5.49 (ii)
     Unit Hyd. Tpeak (min)=        5.00         10.00
     Unit Hyd. peak  (cms)=        0.24          0.16
                                                            *TOTALS*
     PEAK FLOW       (cms)=        0.26          0.00          0.257 (iii)
     TIME TO PEAK    (hrs)=        2.75          2.75           2.75
     RUNOFF VOLUME    (mm)=       46.81         26.98          46.61
     TOTAL RAINFALL   (mm)=       47.81         47.81          47.81
     RUNOFF COEFFICIENT   =        0.98          0.56           0.97

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  91.0    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.

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 --------------------
 | RESERVOIR( 0036)|     OVERFLOW IS OFF
 | IN= 2---> OUT= 1 |
```

```
 | DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
 --------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000    |   0.1020     0.0597
                          0.0510     0.0298    |   0.1530     0.0895

                             AREA      QPEAK      TPEAK       R.V.
                             (ha)      (cms)      (hrs)       (mm)
  INFLOW : ID= 2 (  1002)    2.110      0.257      2.75       46.61
  OUTFLOW: ID= 1 (  0036)    2.110      0.089      2.92       46.54

                PEAK   FLOW   REDUCTION [Qout/Qin](%)= 34.79
                TIME SHIFT OF PEAK FLOW         (min)= 10.00
                MAXIMUM  STORAGE   USED       (ha.m.)=  0.0523

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 --------------------
 | CALIB            |
 | STANDHYD (  1003)|   Area    (ha)=   4.78
 |ID= 1 DT= 5.0 min |   Total Imp(%)=  79.10   Dir. Conn.(%)=  79.10
 --------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=     3.78          1.00
     Dep. Storage     (mm)=     1.00          5.00
     Average Slope     (%)=     1.00          2.00
     Length            (m)=   178.51         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    0.00 | 1.667    5.74 | 3.250   12.43 |  4.83    0.96
               0.167    0.00 | 1.750    5.74 | 3.333    6.69 |  4.92    0.96
               0.250    0.00 | 1.833   16.25 | 3.417    6.69 |  5.00    0.96
               0.333    0.96 | 1.917   16.25 | 3.500    6.69 |  5.08    0.96
               0.417    0.96 | 2.000   16.25 | 3.583    6.69 |  5.17    0.96
               0.500    0.96 | 2.083   16.25 | 3.667    6.69 |  5.25    0.96
               0.583    0.96 | 2.167   16.25 | 3.750    6.69 |  5.33    0.96
               0.667    0.96 | 2.250   16.25 | 3.833    3.82 |  5.42    0.96
               0.750    0.96 | 2.333   43.98 | 3.917    3.82 |  5.50    0.96
               0.833    0.96 | 2.417   43.98 | 4.000    3.82 |  5.58    0.96
               0.917    0.96 | 2.500   43.98 | 4.083    3.82 |  5.67    0.96
               1.000    0.96 | 2.583   43.98 | 4.167    3.82 |  5.75    0.96
               1.083    0.96 | 2.667   43.98 | 4.250    3.82 |  5.83    0.96
               1.167    0.96 | 2.750   43.98 | 4.333    1.91 |  5.92    0.96
               1.250    0.96 | 2.833   12.43 | 4.417    1.91 |  6.00    0.96
               1.333    5.74 | 2.917   12.43 | 4.500    1.91 |  6.08    0.96
               1.417    5.74 | 3.000   12.43 | 4.583    1.91 |  6.17    0.96
               1.500    5.74 | 3.083   12.43 | 4.667    1.91 |  6.25    0.96
               1.583    5.74 | 3.167   12.43 | 4.750    1.91 |

     Max.Eff.Inten.(mm/hr)=       43.98         32.06
                over (min)         5.00         20.00
     Storage Coeff.  (min)=        5.02 (ii)    16.15 (ii)
     Unit Hyd. Tpeak (min)=        5.00         20.00
     Unit Hyd. peak  (cms)=        0.21          0.06
                                                            *TOTALS*
     PEAK FLOW       (cms)=        0.46          0.06          0.518 (iii)
     TIME TO PEAK    (hrs)=        2.75          2.92           2.75
     RUNOFF VOLUME    (mm)=       46.81         26.98          42.66
     TOTAL RAINFALL   (mm)=       47.81         47.81          47.81
     RUNOFF COEFFICIENT   =        0.98          0.56           0.89


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  91.0    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  (  0033)|
 |   1 + 2 = 3      |        AREA    QPEAK    TPEAK      R.V.
 --------------------        (ha)    (cms)    (hrs)      (mm)
        ID1= 1 (  1003):     4.78    0.518     2.75     42.66
      + ID2= 2 (  0035):     2.35    0.098     2.92     46.55
        ==================================================
        ID = 3 (  0033):     7.13    0.610     2.75     43.94

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

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 -------------------------------------------------------------------------------
 --------------------
 | ADD HYD  (  0033)|
 |   3 + 2 = 1      |        AREA    QPEAK    TPEAK      R.V.
 --------------------        (ha)    (cms)    (hrs)      (mm)
        ID1= 3 (  0033):     7.13    0.610     2.75     43.94
      + ID2= 2 (  0036):     2.11    0.089     2.92     46.54
        ==================================================
        ID = 1 (  0033):     9.24    0.693     2.75     44.54

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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 --------------------
 | CHAMBER(  0028)|   OUTFLOW: ON,   UNDERDRAIN: OFF,  INFIL: OFF
 |IN= 2--> OUT= 3 |   CHAMBER:
 | DT=  1.0 min   |   MAX STO VOL (cu.m.)= 4532.43  Bottom Area(m2)   = 4149.20
 ------------------
                 DEPTH        STORAGE           |     DEPTH       STORAGE
                 (mm)         (cu.m.)           |     (mm)        (cu.m.)
                   0.00          0.00           |     889.00      2561.91
                  25.00         42.15           |     914.00      2644.15
                  51.00         84.29           |     940.00      2725.52
                  76.00        126.44           |     965.00      2805.96
                 102.00        168.58           |     991.00      2885.44
                 127.00        210.73           |    1016.00      2963.89
                 152.00        252.88           |    1041.00      3041.23
                 178.00        295.02           |    1067.00      3117.43
                 203.00        337.17           |    1092.00      3192.40
                 229.00        379.32           |    1118.00      3266.04
                 254.00        421.46           |    1143.00      3338.30
                 279.00        463.61           |    1168.00      3409.03
                 305.00        505.75           |    1194.00      3478.15
                 330.00        599.76           |    1219.00      3545.47
                 356.00        693.36           |    1245.00      3610.81
                 381.00        786.64           |    1270.00      3673.92
                 406.00        879.62           |    1295.00      3734.48
                 432.00        972.26           |    1321.00      3791.79
                 457.00       1064.57           |    1346.00      3844.07
                 483.00       1156.53           |    1372.00      3892.17
                 508.00       1248.12           |    1397.00      3938.66
                 533.00       1339.32           |    1422.00      3983.67
                 559.00       1430.11           |    1448.00      4026.67
                 584.00       1520.47           |    1473.00      4068.82
                 610.00       1610.38           |    1499.00      4110.96
                 635.00       1699.82           |    1524.00      4153.11
                 660.00       1788.76           |    1549.00      4195.26
                 686.00       1877.17           |    1575.00      4237.40
                 711.00       1965.05           |    1600.00      4279.55
                 737.00       2052.31           |    1626.00      4321.70
                 762.00       2138.97           |    1651.00      4363.84
                 787.00       2224.99           |    1676.00      4405.99
                 813.00       2310.34           |    1702.00      4448.13
                 838.00       2394.96           |    1727.00      4490.28
                 864.00       2478.83           |    1753.00      4532.43

                DEPTH        DISCHARGE        |    DEPTH       DISCHARGE
                 (m)           (cms)          |     (m)          (cms)
                0.010          0.000          |    0.920        0.147
                0.160          0.021          |    1.070        0.173
                0.310          0.040          |    1.220        0.194
                0.460          0.053          |    1.380        0.214
                0.610          0.063          |    1.450        0.223
                0.770          0.113          |    0.000        0.000

                       AREA         QPEAK                TPEAK          R.V.
                       (ha)         (cms)                (hrs)          (mm)
       INFLOW:ID= 2    9.24         0.693                 2.75         44.54
      OUTFLOW:ID= 1    9.24         0.091                 5.28         38.86
     OVERFLOW:ID= 3    0.00         0.000                 0.00          0.00

            Volume Reduction Rate[(RVin-RVout)/RVin](%)=        12.75
            Time to reach Max storage                (Hr)=       5.28
            Volume of water for drawdown in LID (cu.m.)=      1596.56
            Volume of maximum water storage      (cu.m.)=      2909.30
            ***** After simulation, water volume is not zero.

  -------------------------
  | Junction Command(0029) |
  -------------------------

                    AREA     QPEAK   TPEAK     R.V.
                    (ha)     (cms)    (hrs)    (mm)
 INFLOW : ID= 3(  0028)    0.00     0.00     0.00     0.00
```

```
  OUTFLOW: ID= 2( 0029)    0.00     0.00    0.00     0.00

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

  --------------------------
  | Junction Command(0030) |
  --------------------------
                        AREA     QPEAK   TPEAK     R.V.
                        (ha)     (cms)    (hrs)    (mm)
  INFLOW : ID= 1( 0028)    9.24     0.09    5.28    38.86
  OUTFLOW: ID= 2( 0030)    9.24     0.09    5.28    38.86

  ----------------------------------------------------------------------------
*********************************
** SIMULATION:1.3 10yr 6hr AES **
*********************************

 --------------------
|   READ STORM      |    Filename: C:\Users\caim069305\AppD
|                   |              ata\Local\Temp\
|                   |              42e5834f-7301-492c-9bf7-628b9be09e0d\83ad6e23
| Ptotal= 55.69 mm |    Comments: 10 Year 6 Hour AES (Bloor, TRCA)
 --------------------
              TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
               hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
              0.25    0.00 |  2.00   18.94 |  3.75    7.80 |  5.50    1.11
              0.50    1.11 |  2.25   18.94 |  4.00    4.46 |  5.75    1.11
              0.75    1.11 |  2.50   51.24 |  4.25    4.46 |  6.00    1.11
              1.00    1.11 |  2.75   51.24 |  4.50    2.23 |  6.25    1.11
              1.25    1.11 |  3.00   14.48 |  4.75    2.23 |
              1.50    6.68 |  3.25   14.48 |  5.00    1.11 |
              1.75    6.68 |  3.50    7.80 |  5.25    1.11 |

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

 --------------------
| CALIB             |
| STANDHYD ( 1001)|   Area    (ha)=   2.35
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
 --------------------
                        IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=      2.33          0.02
    Dep. Storage     (mm)=      1.00          5.00
    Average Slope     (%)=      1.00          2.00
    Length            (m)=    125.17         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    0.00 | 1.667    6.68 | 3.250   14.48 |  4.83    1.11
             0.167    0.00 | 1.750    6.68 | 3.333    7.80 |  4.92    1.11
             0.250    0.00 | 1.833   18.94 | 3.417    7.80 |  5.00    1.11
             0.333    1.11 | 1.917   18.94 | 3.500    7.80 |  5.08    1.11
             0.417    1.11 | 2.000   18.94 | 3.583    7.80 |  5.17    1.11
             0.500    1.11 | 2.083   18.94 | 3.667    7.80 |  5.25    1.11
             0.583    1.11 | 2.167   18.94 | 3.750    7.80 |  5.33    1.11
             0.667    1.11 | 2.250   18.94 | 3.833    4.46 |  5.42    1.11
             0.750    1.11 | 2.333   51.24 | 3.917    4.46 |  5.50    1.11
             0.833    1.11 | 2.417   51.24 | 4.000    4.46 |  5.58    1.11
             0.917    1.11 | 2.500   51.24 | 4.083    4.46 |  5.67    1.11
             1.000    1.11 | 2.583   51.24 | 4.167    4.46 |  5.75    1.11
             1.083    1.11 | 2.667   51.24 | 4.250    4.46 |  5.83    1.11
             1.167    1.11 | 2.750   51.24 | 4.333    2.23 |  5.92    1.11
             1.250    1.11 | 2.833   14.48 | 4.417    2.23 |  6.00    1.11
             1.333    6.68 | 2.917   14.48 | 4.500    2.23 |  6.08    1.11
             1.417    6.68 | 3.000   14.48 | 4.583    2.23 |  6.17    1.11
             1.500    6.68 | 3.083   14.48 | 4.667    2.23 |  6.25    1.11
             1.583    6.68 | 3.167   14.48 | 4.750    2.23 |

    Max.Eff.Inten.(mm/hr)=       51.24         40.64
              over (min)         5.00         10.00
    Storage Coeff.  (min)=       3.82 (ii)     5.29 (ii)
    Unit Hyd. Tpeak (min)=       5.00         10.00
    Unit Hyd. peak  (cms)=       0.25          0.16
                                                          *TOTALS*
    PEAK FLOW       (cms)=       0.33          0.00          0.334 (iii)
    TIME TO PEAK    (hrs)=       2.75          2.75          2.75
    RUNOFF VOLUME    (mm)=      54.69         33.89         54.48
    TOTAL RAINFALL   (mm)=      55.69         55.69         55.69
    RUNOFF COEFFICIENT   =       0.98          0.61          0.98

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

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN*  =  91.0    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.

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 --------------------
| RESERVOIR( 0035)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
 --------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000      0.0000   |  0.1120      0.0665
                          0.0560      0.0333   |  0.1690      0.0998

                              AREA     QPEAK      TPEAK       R.V.
                              (ha)     (cms)      (hrs)       (mm)
   INFLOW : ID= 2 (  1001)     2.350     0.334       2.75      54.48
   OUTFLOW: ID= 1 (  0035)     2.350     0.115       2.92      54.42

              PEAK   FLOW   REDUCTION [Qout/Qin](%)= 34.54
              TIME SHIFT OF PEAK FLOW         (min)= 10.00
              MAXIMUM  STORAGE   USED       (ha.m.)=  0.0684

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

 --------------------
| CALIB             |
| STANDHYD ( 1002)|   Area    (ha)=   2.11
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
 --------------------
                        IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=      2.09          0.02
    Dep. Storage     (mm)=      1.00          5.00
    Average Slope     (%)=      1.00          2.00
    Length            (m)=    118.60         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    0.00 | 1.667    6.68 | 3.250   14.48 |  4.83    1.11
             0.167    0.00 | 1.750    6.68 | 3.333    7.80 |  4.92    1.11
             0.250    0.00 | 1.833   18.94 | 3.417    7.80 |  5.00    1.11
             0.333    1.11 | 1.917   18.94 | 3.500    7.80 |  5.08    1.11
             0.417    1.11 | 2.000   18.94 | 3.583    7.80 |  5.17    1.11
             0.500    1.11 | 2.083   18.94 | 3.667    7.80 |  5.25    1.11
             0.583    1.11 | 2.167   18.94 | 3.750    7.80 |  5.33    1.11
             0.667    1.11 | 2.250   18.94 | 3.833    4.46 |  5.42    1.11
             0.750    1.11 | 2.333   51.24 | 3.917    4.46 |  5.50    1.11
             0.833    1.11 | 2.417   51.24 | 4.000    4.46 |  5.58    1.11
             0.917    1.11 | 2.500   51.24 | 4.083    4.46 |  5.67    1.11
             1.000    1.11 | 2.583   51.24 | 4.167    4.46 |  5.75    1.11
             1.083    1.11 | 2.667   51.24 | 4.250    4.46 |  5.83    1.11
             1.167    1.11 | 2.750   51.24 | 4.333    2.23 |  5.92    1.11
             1.250    1.11 | 2.833   14.48 | 4.417    2.23 |  6.00    1.11
             1.333    6.68 | 2.917   14.48 | 4.500    2.23 |  6.08    1.11
             1.417    6.68 | 3.000   14.48 | 4.583    2.23 |  6.17    1.11
             1.500    6.68 | 3.083   14.48 | 4.667    2.23 |  6.25    1.11
             1.583    6.68 | 3.167   14.48 | 4.750    2.23 |

    Max.Eff.Inten.(mm/hr)=       51.24         40.64
              over (min)         5.00         10.00
    Storage Coeff.  (min)=       3.70 (ii)     5.17 (ii)
    Unit Hyd. Tpeak (min)=       5.00         10.00
    Unit Hyd. peak  (cms)=       0.25          0.16
                                                          *TOTALS*
    PEAK FLOW       (cms)=       0.30          0.00          0.300 (iii)
    TIME TO PEAK    (hrs)=       2.75          2.75          2.75
    RUNOFF VOLUME    (mm)=      54.69         33.89         54.48
    TOTAL RAINFALL   (mm)=      55.69         55.69         55.69
    RUNOFF COEFFICIENT   =       0.98          0.61          0.98

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

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN*  =  91.0    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( 0036)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
 --------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000      0.0000   |  0.1020      0.0597
                          0.0510      0.0298   |  0.1530      0.0895

                              AREA     QPEAK      TPEAK       R.V.
                              (ha)     (cms)      (hrs)       (mm)
   INFLOW : ID= 2 (  1002)     2.110     0.300       2.75      54.48
   OUTFLOW: ID= 1 (  0036)     2.110     0.105       2.92      54.41

              PEAK   FLOW   REDUCTION [Qout/Qin](%)= 34.89
              TIME SHIFT OF PEAK FLOW         (min)= 10.00
              MAXIMUM  STORAGE   USED       (ha.m.)=  0.0612

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

 --------------------
| CALIB             |
| STANDHYD ( 1003)|   Area    (ha)=   4.78
|ID= 1 DT= 5.0 min |   Total Imp(%)=  79.10   Dir. Conn.(%)=  79.10
 --------------------
                        IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=      3.78          1.00
    Dep. Storage     (mm)=      1.00          5.00
    Average Slope     (%)=      1.00          2.00
    Length            (m)=    178.51         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    0.00 | 1.667    6.68 | 3.250   14.48 |  4.83    1.11
             0.167    0.00 | 1.750    6.68 | 3.333    7.80 |  4.92    1.11
             0.250    0.00 | 1.833   18.94 | 3.417    7.80 |  5.00    1.11
             0.333    1.11 | 1.917   18.94 | 3.500    7.80 |  5.08    1.11
             0.417    1.11 | 2.000   18.94 | 3.583    7.80 |  5.17    1.11
             0.500    1.11 | 2.083   18.94 | 3.667    7.80 |  5.25    1.11
             0.583    1.11 | 2.167   18.94 | 3.750    7.80 |  5.33    1.11
             0.667    1.11 | 2.250   18.94 | 3.833    4.46 |  5.42    1.11
             0.750    1.11 | 2.333   51.24 | 3.917    4.46 |  5.50    1.11
             0.833    1.11 | 2.417   51.24 | 4.000    4.46 |  5.58    1.11
             0.917    1.11 | 2.500   51.24 | 4.083    4.46 |  5.67    1.11
             1.000    1.11 | 2.583   51.24 | 4.167    4.46 |  5.75    1.11
             1.083    1.11 | 2.667   51.24 | 4.250    4.46 |  5.83    1.11
             1.167    1.11 | 2.750   51.24 | 4.333    2.23 |  5.92    1.11
             1.250    1.11 | 2.833   14.48 | 4.417    2.23 |  6.00    1.11
             1.333    6.68 | 2.917   14.48 | 4.500    2.23 |  6.08    1.11
             1.417    6.68 | 3.000   14.48 | 4.583    2.23 |  6.17    1.11
             1.500    6.68 | 3.083   14.48 | 4.667    2.23 |  6.25    1.11
             1.583    6.68 | 3.167   14.48 | 4.750    2.23 |

    Max.Eff.Inten.(mm/hr)=       51.24         39.67
              over (min)         5.00         15.00
    Storage Coeff.  (min)=       4.73 (ii)    14.94 (ii)
    Unit Hyd. Tpeak (min)=       5.00         15.00
    Unit Hyd. peak  (cms)=       0.22          0.08
                                                          *TOTALS*
    PEAK FLOW       (cms)=       0.54          0.08          0.620 (iii)
    TIME TO PEAK    (hrs)=       2.75          2.83          2.75
    RUNOFF VOLUME    (mm)=      54.69         33.89         50.34
    TOTAL RAINFALL   (mm)=      55.69         55.69         55.69
    RUNOFF COEFFICIENT   =       0.98          0.61          0.90

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

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN*  =  91.0    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  (  0033)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK      R.V.
 --------------------          (ha)    (cms)    (hrs)      (mm)
        ID1= 1 (  1003):       4.78    0.620     2.75     50.34
      + ID2= 2 (  0035):       2.35    0.115     2.92     54.42
        ===============================================
        ID = 3 (  0033):       7.13    0.727     2.75     51.69

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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 --------------------
| ADD HYD  (  0033)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK      R.V.
 --------------------          (ha)    (cms)    (hrs)      (mm)
        ID1= 3 (  0033):       7.13    0.727     2.75     51.69
      + ID2= 2 (  0036):       2.11    0.105     2.92     54.41
        ===============================================
        ID = 1 (  0033):       9.24    0.825     2.75     52.31

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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 ------------------
| CHAMBER( 0028)|   OUTFLOW: ON,   UNDERDRAIN: OFF,   INFIL: OFF
|IN= 2--> OUT= 3 |   CHAMBER:
| DT=  1.0 min   |   MAX STO VOL (cu.m.)= 4532.43  Bottom Area(m2)   = 4149.20
 ------------------
                    DEPTH       STORAGE         |   DEPTH      STORAGE
                     (mm)       (cu.m.)         |    (mm)      (cu.m.)
                     0.00          0.00         |   889.00     2561.91
                    25.00         42.15         |   914.00     2644.15
                    51.00         84.29         |   940.00     2725.52
                    76.00        126.44         |   965.00     2805.96
                   102.00        168.58         |   991.00     2885.44
                   127.00        210.73         |  1016.00     2963.89
                   152.00        252.88         |  1041.00     3041.23
                   178.00        295.02         |  1067.00     3117.43
                   203.00        337.17         |  1092.00     3192.40
                   229.00        379.32         |  1118.00     3266.04
                   254.00        421.46         |  1143.00     3338.30
                   279.00        463.61         |  1168.00     3409.03
                   305.00        505.75         |  1194.00     3478.15
                   330.00        599.76         |  1219.00     3545.47
                   356.00        693.36         |  1245.00     3610.81
                   381.00        786.64         |  1270.00     3673.92
                   406.00        879.62         |  1295.00     3734.48
                   432.00        972.26         |  1321.00     3791.79
                   457.00       1064.57         |  1346.00     3844.07
                   483.00       1156.53         |  1372.00     3892.17
                   508.00       1248.12         |  1397.00     3938.66
                   533.00       1339.32         |  1422.00     3983.67
                   559.00       1430.11         |  1448.00     4026.67
                   584.00       1520.47         |  1473.00     4068.82
                   610.00       1610.38         |  1499.00     4110.96
                   635.00       1699.82         |  1524.00     4153.11
                   660.00       1788.76         |  1549.00     4195.26
                   686.00       1877.17         |  1575.00     4237.40
                   711.00       1965.05         |  1600.00     4279.55
                   737.00       2052.31         |  1626.00     4321.70
                   762.00       2138.97         |  1651.00     4363.84
                   787.00       2224.99         |  1676.00     4405.99
                   813.00       2310.34         |  1702.00     4448.13
                   838.00       2394.96         |  1727.00     4490.28
                   864.00       2478.83         |  1753.00     4532.43

                  DEPTH       DISCHARGE        |   DEPTH      DISCHARGE
                   (m)          (cms)          |    (m)         (cms)
                  0.010         0.000          |   0.920        0.147
                  0.160         0.021          |   1.070        0.173
                  0.310         0.040          |   1.220        0.194
                  0.460         0.053          |   1.380        0.214
                  0.610         0.063          |   1.450        0.223
                  0.770         0.113          |   0.000        0.000

                  AREA          QPEAK              TPEAK           R.V.
                  (ha)          (cms)              (hrs)           (mm)
    INFLOW:ID= 2   9.24          0.825              2.75           52.31
   OUTFLOW:ID= 1   9.24          0.125              4.97           46.63
  OVERFLOW:ID= 3   0.00          0.000              0.00            0.00

         Volume Reduction Rate[(RVin-RVout)/RVin](%)=       10.85
         Time to reach Max storage                (Hr)=      4.97
         Volume of water for drawdown in LID  (cu.m.)=    1671.10
         Volume of maximum water storage      (cu.m.)=    3277.72
         ***** After simulation, water volume is not zero.
```

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 --------------------------
 | Junction Command(0029) |
 --------------------------

                         AREA     QPEAK    TPEAK      R.V.
                         (ha)     (cms)    (hrs)      (mm)
 INFLOW : ID= 3(  0028)   0.00     0.00     0.00      0.00
 OUTFLOW: ID= 2(  0029)   0.00     0.00     0.00      0.00

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 --------------------------
 | Junction Command(0030) |
 --------------------------

                         AREA     QPEAK    TPEAK      R.V.
                         (ha)     (cms)    (hrs)      (mm)
 INFLOW : ID= 1(  0028)   9.24     0.13     4.97     46.63
 OUTFLOW: ID= 2(  0030)   9.24     0.13     4.97     46.63

 ---------------------------------------------------------------------------------
**********************************
** SIMULATION:1.4 25yr 6hr AES **
**********************************

--------------------
|    READ STORM    |    Filename: C:\Users\caim069305\AppD
|                  |              ata\Local\Temp\
|                  |              42e5834f-7301-492c-9bf7-628b9be09e0d\90e8aaac
| Ptotal= 65.59 mm |    Comments: 25 Year 6 Hour AES (Bloor, TRCA)
--------------------
                TIME     RAIN |  TIME     RAIN |' TIME     RAIN |  TIME     RAIN
                 hrs    mm/hr |   hrs    mm/hr |'  hrs    mm/hr |   hrs    mm/hr
                0.25     0.00 | 2.00     22.30 | 3.75     9.18 | 5.50     1.31
                0.50     1.31 | 2.25     22.30 | 4.00     5.25 | 5.75     1.31
                0.75     1.31 | 2.50     60.35 | 4.25     5.25 | 6.00     1.31
                1.00     1.31 | 2.75     60.35 | 4.50     2.62 | 6.25     1.31
                1.25     1.31 | 3.00     17.06 | 4.75     2.62 |
                1.50     7.87 | 3.25     17.06 | 5.00     1.31 |
                1.75     7.87 | 3.50      9.18 | 5.25     1.31 |

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

--------------------
| CALIB            |
| STANDHYD ( 1001)|   Area    (ha)=   2.35
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      2.33          0.02
     Dep. Storage     (mm)=      1.00          5.00
     Average Slope     (%)=      1.00          2.00
     Length            (m)=    125.17         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     0.00 | 1.667     7.87 | 3.250   17.06 | 4.83     1.31
               0.167     0.00 | 1.750     7.87 | 3.333    9.18 | 4.92     1.31
               0.250     0.00 | 1.833    22.30 | 3.417    9.18 | 5.00     1.31
               0.333     1.31 | 1.917    22.30 | 3.500    9.18 | 5.08     1.31
               0.417     1.31 | 2.000    22.30 | 3.583    9.18 | 5.17     1.31
               0.500     1.31 | 2.083    22.30 | 3.667    9.18 | 5.25     1.31
               0.583     1.31 | 2.167    22.30 | 3.750    9.18 | 5.33     1.31
               0.667     1.31 | 2.250    22.30 | 3.833    5.25 | 5.42     1.31
               0.750     1.31 | 2.333    60.35 | 3.917    5.25 | 5.50     1.31
               0.833     1.31 | 2.417    60.35 | 4.000    5.25 | 5.58     1.31
               0.917     1.31 | 2.500    60.35 | 4.083    5.25 | 5.67     1.31
               1.000     1.31 | 2.583    60.35 | 4.167    5.25 | 5.75     1.31
               1.083     1.31 | 2.667    60.35 | 4.250    5.25 | 5.83     1.31
               1.167     1.31 | 2.750    60.35 | 4.333    2.62 | 5.92     1.31
               1.250     1.31 | 2.833    17.06 | 4.417    2.62 | 6.00     1.31
               1.333     7.87 | 2.917    17.06 | 4.500    2.62 | 6.08     1.31
               1.417     7.87 | 3.000    17.06 | 4.583    2.62 | 6.17     1.31
               1.500     7.87 | 3.083    17.06 | 4.667    2.62 | 6.25     1.31
               1.583     7.87 | 3.167    17.06 | 4.750    2.62 |

     Max.Eff.Inten.(mm/hr)=        60.35          50.27
               over (min)          5.00           5.00
```

```
     Storage Coeff.  (min)=        3.58 (ii)      4.95 (ii)
     Unit Hyd. Tpeak (min)=        5.00           5.00
     Unit Hyd. peak  (cms)=        0.26           0.22
                                                              *TOTALS*
     PEAK FLOW       (cms)=        0.39           0.00          0.393 (iii)
     TIME TO PEAK    (hrs)=        2.75           2.75           2.75
     RUNOFF VOLUME    (mm)=       64.59          42.83          64.37
     TOTAL RAINFALL   (mm)=       65.59          65.59          65.59
     RUNOFF COEFFICIENT   =        0.98           0.65           0.98

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  91.0    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.

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--------------------
| RESERVOIR( 0035)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------     (cms)     (ha.m.)   |   (cms)     (ha.m.)
                         0.0000     0.0000   |   0.1120     0.0665
                         0.0560     0.0333   |   0.1690     0.0998

                             AREA      QPEAK       TPEAK        R.V.
                             (ha)      (cms)       (hrs)        (mm)
   INFLOW : ID= 2 (  1001)     2.350      0.393       2.75       64.37
   OUTFLOW: ID= 1 (  0035)     2.350      0.136       2.92       64.31

                  PEAK   FLOW    REDUCTION [Qout/Qin](%)= 34.71
                  TIME SHIFT OF PEAK FLOW          (min)= 10.00
                  MAXIMUM  STORAGE   USED        (ha.m.)=  0.0809

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--------------------
| CALIB            |
| STANDHYD ( 1002)|   Area    (ha)=   2.11
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      2.09          0.02
     Dep. Storage     (mm)=      1.00          5.00
     Average Slope     (%)=      1.00          2.00
     Length            (m)=    118.60         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     0.00 | 1.667     7.87 | 3.250   17.06 | 4.83     1.31
               0.167     0.00 | 1.750     7.87 | 3.333    9.18 | 4.92     1.31
               0.250     0.00 | 1.833    22.30 | 3.417    9.18 | 5.00     1.31
               0.333     1.31 | 1.917    22.30 | 3.500    9.18 | 5.08     1.31
               0.417     1.31 | 2.000    22.30 | 3.583    9.18 | 5.17     1.31
               0.500     1.31 | 2.083    22.30 | 3.667    9.18 | 5.25     1.31
               0.583     1.31 | 2.167    22.30 | 3.750    9.18 | 5.33     1.31
               0.667     1.31 | 2.250    22.30 | 3.833    5.25 | 5.42     1.31
               0.750     1.31 | 2.333    60.35 | 3.917    5.25 | 5.50     1.31
               0.833     1.31 | 2.417    60.35 | 4.000    5.25 | 5.58     1.31
               0.917     1.31 | 2.500    60.35 | 4.083    5.25 | 5.67     1.31
               1.000     1.31 | 2.583    60.35 | 4.167    5.25 | 5.75     1.31
               1.083     1.31 | 2.667    60.35 | 4.250    5.25 | 5.83     1.31
               1.167     1.31 | 2.750    60.35 | 4.333    2.62 | 5.92     1.31
               1.250     1.31 | 2.833    17.06 | 4.417    2.62 | 6.00     1.31
               1.333     7.87 | 2.917    17.06 | 4.500    2.62 | 6.08     1.31
               1.417     7.87 | 3.000    17.06 | 4.583    2.62 | 6.17     1.31
               1.500     7.87 | 3.083    17.06 | 4.667    2.62 | 6.25     1.31
               1.583     7.87 | 3.167    17.06 | 4.750    2.62 |

     Max.Eff.Inten.(mm/hr)=        60.35          50.27
               over (min)          5.00           5.00
     Storage Coeff.  (min)=        3.46 (ii)      4.84 (ii)
     Unit Hyd. Tpeak (min)=        5.00           5.00
     Unit Hyd. peak  (cms)=        0.26           0.22
                                                              *TOTALS*
     PEAK FLOW       (cms)=        0.35           0.00          0.353 (iii)
     TIME TO PEAK    (hrs)=        2.75           2.75           2.75
     RUNOFF VOLUME    (mm)=       64.59          42.83          64.37
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     TOTAL RAINFALL   (mm)=       65.59          65.59          65.59
     RUNOFF COEFFICIENT   =        0.98           0.65           0.98

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  91.0    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.

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--------------------
| RESERVOIR( 0036)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------     (cms)     (ha.m.)   |   (cms)     (ha.m.)
                         0.0000     0.0000   |   0.1020     0.0597
                         0.0510     0.0298   |   0.1530     0.0895

                             AREA      QPEAK       TPEAK        R.V.
                             (ha)      (cms)       (hrs)        (mm)
   INFLOW : ID= 2 (  1002)     2.110      0.353       2.75       64.37
   OUTFLOW: ID= 1 (  0036)     2.110      0.124       2.92       64.30

                  PEAK   FLOW    REDUCTION [Qout/Qin](%)= 34.99
                  TIME SHIFT OF PEAK FLOW          (min)= 10.00
                  MAXIMUM  STORAGE   USED        (ha.m.)=  0.0724

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--------------------
| CALIB            |
| STANDHYD ( 1003)|   Area    (ha)=   4.78
|ID= 1 DT= 5.0 min |   Total Imp(%)=  79.10   Dir. Conn.(%)=  79.10
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      3.78          1.00
     Dep. Storage     (mm)=      1.00          5.00
     Average Slope     (%)=      1.00          2.00
     Length            (m)=    178.51         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     0.00 | 1.667     7.87 | 3.250   17.06 | 4.83     1.31
               0.167     0.00 | 1.750     7.87 | 3.333    9.18 | 4.92     1.31
               0.250     0.00 | 1.833    22.30 | 3.417    9.18 | 5.00     1.31
               0.333     1.31 | 1.917    22.30 | 3.500    9.18 | 5.08     1.31
               0.417     1.31 | 2.000    22.30 | 3.583    9.18 | 5.17     1.31
               0.500     1.31 | 2.083    22.30 | 3.667    9.18 | 5.25     1.31
               0.583     1.31 | 2.167    22.30 | 3.750    9.18 | 5.33     1.31
               0.667     1.31 | 2.250    22.30 | 3.833    5.25 | 5.42     1.31
               0.750     1.31 | 2.333    60.35 | 3.917    5.25 | 5.50     1.31
               0.833     1.31 | 2.417    60.35 | 4.000    5.25 | 5.58     1.31
               0.917     1.31 | 2.500    60.35 | 4.083    5.25 | 5.67     1.31
               1.000     1.31 | 2.583    60.35 | 4.167    5.25 | 5.75     1.31
               1.083     1.31 | 2.667    60.35 | 4.250    5.25 | 5.83     1.31
               1.167     1.31 | 2.750    60.35 | 4.333    2.62 | 5.92     1.31
               1.250     1.31 | 2.833    17.06 | 4.417    2.62 | 6.00     1.31
               1.333     7.87 | 2.917    17.06 | 4.500    2.62 | 6.08     1.31
               1.417     7.87 | 3.000    17.06 | 4.583    2.62 | 6.17     1.31
               1.500     7.87 | 3.083    17.06 | 4.667    2.62 | 6.25     1.31
               1.583     7.87 | 3.167    17.06 | 4.750    2.62 |

     Max.Eff.Inten.(mm/hr)=        60.35          50.27
               over (min)          5.00          15.00
     Storage Coeff.  (min)=        4.43 (ii)     13.72 (ii)
     Unit Hyd. Tpeak (min)=        5.00          15.00
     Unit Hyd. peak  (cms)=        0.23           0.08
                                                              *TOTALS*
     PEAK FLOW       (cms)=        0.63           0.11          0.741 (iii)
     TIME TO PEAK    (hrs)=        2.75           2.83           2.75
     RUNOFF VOLUME    (mm)=       64.59          42.83          60.04
     TOTAL RAINFALL   (mm)=       65.59          65.59          65.59
     RUNOFF COEFFICIENT   =        0.98           0.65           0.92

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  91.0    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  (  0033)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK      R.V.
--------------------         (ha)    (cms)    (hrs)      (mm)
        ID1= 1 (  1003):     4.78    0.741     2.75     60.04
      + ID2= 2 (  0035):     2.35    0.136     2.92     64.31
         ==================================================
        ID = 3 (  0033):     7.13    0.868     2.75     61.45

     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):     7.13    0.868     2.75     61.45
      + ID2= 2 (  0036):     2.11    0.124     2.92     64.30
         ==================================================
        ID = 1 (  0033):     9.24    0.984     2.75     62.10

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

------------------
| CHAMBER( 0028)|   OUTFLOW: ON,   UNDERDRAIN: OFF,  INFIL: OFF
|IN= 2--> OUT= 3 |   CHAMBER:
| DT=  1.0 min   |   MAX STO VOL (cu.m.)= 4532.43  Bottom Area(m2)  = 4149.20
------------------
                    DEPTH        STORAGE         |    DEPTH       STORAGE
                    (mm)         (cu.m.)         |    (mm)        (cu.m.)
                     0.00           0.00         |    889.00      2561.91
                    25.00          42.15         |    914.00      2644.15
                    51.00          84.29         |    940.00      2725.52
                    76.00         126.44         |    965.00      2805.96
                   102.00         168.58         |    991.00      2885.44
                   127.00         210.73         |   1016.00      2963.89
                   152.00         252.88         |   1041.00      3041.23
                   178.00         295.02         |   1067.00      3117.43
                   203.00         337.17         |   1092.00      3192.40
                   229.00         379.32         |   1118.00      3266.04
                   254.00         421.46         |   1143.00      3338.30
                   279.00         463.61         |   1168.00      3409.03
                   305.00         505.75         |   1194.00      3478.15
                   330.00         599.76         |   1219.00      3545.47
                   356.00         693.36         |   1245.00      3610.81
                   381.00         786.64         |   1270.00      3673.92
                   406.00         879.62         |   1295.00      3734.48
                   432.00         972.26         |   1321.00      3791.79
                   457.00        1064.57         |   1346.00      3844.07
                   483.00        1156.53         |   1372.00      3892.17
                   508.00        1248.12         |   1397.00      3938.66
                   533.00        1339.32         |   1422.00      3983.67
                   559.00        1430.11         |   1448.00      4026.67
                   584.00        1520.47         |   1473.00      4068.82
                   610.00        1610.38         |   1499.00      4110.96
                   635.00        1699.82         |   1524.00      4153.11
                   660.00        1788.76         |   1549.00      4195.26
                   686.00        1877.17         |   1575.00      4237.40
                   711.00        1965.05         |   1600.00      4279.55
                   737.00        2052.31         |   1626.00      4321.70
                   762.00        2138.97         |   1651.00      4363.84
                   787.00        2224.99         |   1676.00      4405.99
                   813.00        2310.34         |   1702.00      4448.13
                   838.00        2394.96         |   1727.00      4490.28
                   864.00        2478.83         |   1753.00      4532.43

                    DEPTH       DISCHARGE        |   DEPTH       DISCHARGE
                     (m)          (cms)          |    (m)          (cms)
                    0.010         0.000          |   0.920         0.147
                    0.160         0.021          |   1.070         0.173
                    0.310         0.040          |   1.220         0.194
                    0.460         0.053          |   1.380         0.214
                    0.610         0.063          |   1.450         0.223
                    0.770         0.113          |   0.000         0.000

                     AREA           QPEAK              TPEAK          R.V.
                     (ha)           (cms)              (hrs)          (mm)
     INFLOW:ID= 2    9.24           0.984               2.75          62.10
```

```
   OUTFLOW:ID= 1      9.24         0.162              4.82        56.42
  OVERFLOW:ID= 3      0.00         0.000              0.00         0.00

          Volume Reduction Rate[(RVin-RVout)/RVin](%)=          9.14
          Time to reach Max storage            (Hr)=            4.82
          Volume of water for drawdown in LID (cu.m.)=       1752.46
          Volume of maximum water storage     (cu.m.)=       3754.02
          ***** After simulation, water volume is not zero.

 --------------------------
 | Junction Command(0029) |
 --------------------------

                        AREA     QPEAK    TPEAK      R.V.
                        (ha)     (cms)    (hrs)      (mm)
 INFLOW : ID= 3(  0028)    0.00      0.00     0.00      0.00
 OUTFLOW: ID= 2(  0029)    0.00      0.00     0.00      0.00

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 | Junction Command(0030) |
 --------------------------

                        AREA     QPEAK    TPEAK      R.V.
                        (ha)     (cms)    (hrs)      (mm)
 INFLOW : ID= 1(  0028)    9.24      0.16     4.82     56.42
 OUTFLOW: ID= 2(  0030)    9.24      0.16     4.82     56.42

 ---------------------------------------------------------------------------
********************************
** SIMULATION:1.5 50yr 6hr AES **
********************************

--------------------
|    READ STORM    |    Filename: C:\Users\caim069305\AppD
|                  |              ata\Local\Temp\
|                  |              42e5834f-7301-492c-9bf7-628b9be09e0d\73590f30
| Ptotal= 73.00 mm |    Comments: 50 Year 6 Hour AES (Bloor, TRCA)
--------------------
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.25    0.00 |  2.00   24.82 |  3.75   10.22 |  5.50    1.46
               0.50    1.46 |  2.25   24.82 |  4.00    5.84 |  5.75    1.46
               0.75    1.46 |  2.50   67.16 |  4.25    5.84 |  6.00    1.46
               1.00    1.46 |  2.75   67.16 |  4.50    2.92 |  6.25    1.46
               1.25    1.46 |  3.00   18.98 |  4.75    2.92 |
               1.50    8.76 |  3.25   18.98 |  5.00    1.46 |
               1.75    8.76 |  3.50   10.22 |  5.25    1.46 |

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

--------------------
| CALIB            |
| STANDHYD (  1001)|   Area    (ha)=   2.35
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=        2.33          0.02
    Dep. Storage     (mm)=        1.00          5.00
    Average Slope     (%)=        1.00          2.00
    Length            (m)=      125.17         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    0.00 | 1.667    8.76 | 3.250   18.98 |  4.83    1.46
              0.167    0.00 | 1.750    8.76 | 3.333   10.22 |  4.92    1.46
              0.250    0.00 | 1.833   24.82 | 3.417   10.22 |  5.00    1.46
              0.333    1.46 | 1.917   24.82 | 3.500   10.22 |  5.08    1.46
              0.417    1.46 | 2.000   24.82 | 3.583   10.22 |  5.17    1.46
              0.500    1.46 | 2.083   24.82 | 3.667   10.22 |  5.25    1.46
              0.583    1.46 | 2.167   24.82 | 3.750   10.22 |  5.33    1.46
              0.667    1.46 | 2.250   24.82 | 3.833    5.84 |  5.42    1.46
              0.750    1.46 | 2.333   67.16 | 3.917    5.84 |  5.50    1.46
              0.833    1.46 | 2.417   67.16 | 4.000    5.84 |  5.58    1.46
              0.917    1.46 | 2.500   67.16 | 4.083    5.84 |  5.67    1.46
              1.000    1.46 | 2.583   67.16 | 4.167    5.84 |  5.75    1.46
              1.083    1.46 | 2.667   67.16 | 4.250    5.84 |  5.83    1.46
              1.167    1.46 | 2.750   67.16 | 4.333    2.92 |  5.92    1.46
```

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              1.250    1.46 | 2.833   18.98 | 4.417    2.92 |  6.00    1.46
              1.333    8.76 | 2.917   18.98 | 4.500    2.92 |  6.08    1.46
              1.417    8.76 | 3.000   18.98 | 4.583    2.92 |  6.17    1.46
              1.500    8.76 | 3.083   18.98 | 4.667    2.92 |  6.25    1.46
              1.583    8.76 | 3.167   18.98 | 4.750    2.92 |

    Max.Eff.Inten.(mm/hr)=       67.16         57.47
               over (min)         5.00          5.00
    Storage Coeff.  (min)=        3.43 (ii)     4.74 (ii)
    Unit Hyd. Tpeak (min)=        5.00          5.00
    Unit Hyd. peak  (cms)=        0.26          0.22
                                                          *TOTALS*
    PEAK FLOW       (cms)=        0.43          0.00        0.438 (iii)
    TIME TO PEAK    (hrs)=        2.75          2.75         2.75
    RUNOFF VOLUME    (mm)=       72.00         49.66        71.78
    TOTAL RAINFALL   (mm)=       73.00         73.00        73.00
    RUNOFF COEFFICIENT   =        0.99          0.68         0.98

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  91.0    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(  0035)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                         0.0000      0.0000   |  0.1120      0.0665
                         0.0560      0.0333   |  0.1690      0.0998

                            AREA      QPEAK      TPEAK       R.V.
                            (ha)      (cms)      (hrs)       (mm)
  INFLOW : ID= 2 (  1001)    2.350       0.438       2.75       71.78
  OUTFLOW: ID= 1 (  0035)    2.350       0.152       2.92       71.72

              PEAK   FLOW   REDUCTION [Qout/Qin](%)= 34.80
              TIME SHIFT OF PEAK FLOW        (min)= 10.00
              MAXIMUM  STORAGE   USED       (ha.m.)=  0.0902

---------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  1002)|   Area    (ha)=   2.11
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=        2.09          0.02
    Dep. Storage     (mm)=        1.00          5.00
    Average Slope     (%)=        1.00          2.00
    Length            (m)=      118.60         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    0.00 | 1.667    8.76 | 3.250   18.98 |  4.83    1.46
              0.167    0.00 | 1.750    8.76 | 3.333   10.22 |  4.92    1.46
              0.250    0.00 | 1.833   24.82 | 3.417   10.22 |  5.00    1.46
              0.333    1.46 | 1.917   24.82 | 3.500   10.22 |  5.08    1.46
              0.417    1.46 | 2.000   24.82 | 3.583   10.22 |  5.17    1.46
              0.500    1.46 | 2.083   24.82 | 3.667   10.22 |  5.25    1.46
              0.583    1.46 | 2.167   24.82 | 3.750   10.22 |  5.33    1.46
              0.667    1.46 | 2.250   24.82 | 3.833    5.84 |  5.42    1.46
              0.750    1.46 | 2.333   67.16 | 3.917    5.84 |  5.50    1.46
              0.833    1.46 | 2.417   67.16 | 4.000    5.84 |  5.58    1.46
              0.917    1.46 | 2.500   67.16 | 4.083    5.84 |  5.67    1.46
              1.000    1.46 | 2.583   67.16 | 4.167    5.84 |  5.75    1.46
              1.083    1.46 | 2.667   67.16 | 4.250    5.84 |  5.83    1.46
              1.167    1.46 | 2.750   67.16 | 4.333    2.92 |  5.92    1.46
              1.250    1.46 | 2.833   18.98 | 4.417    2.92 |  6.00    1.46
              1.333    8.76 | 2.917   18.98 | 4.500    2.92 |  6.08    1.46
              1.417    8.76 | 3.000   18.98 | 4.583    2.92 |  6.17    1.46
              1.500    8.76 | 3.083   18.98 | 4.667    2.92 |  6.25    1.46
              1.583    8.76 | 3.167   18.98 | 4.750    2.92 |

    Max.Eff.Inten.(mm/hr)=       67.16         57.47
```

```
               over (min)         5.00          5.00
    Storage Coeff.  (min)=        3.32 (ii)     4.64 (ii)
    Unit Hyd. Tpeak (min)=        5.00          5.00
    Unit Hyd. peak  (cms)=        0.26          0.22
                                                          *TOTALS*
    PEAK FLOW       (cms)=        0.39          0.00        0.393 (iii)
    TIME TO PEAK    (hrs)=        2.75          2.75         2.75
    RUNOFF VOLUME    (mm)=       72.00         49.66        71.77
    TOTAL RAINFALL   (mm)=       73.00         73.00        73.00
    RUNOFF COEFFICIENT   =        0.99          0.68         0.98

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  91.0    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(  0036)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                         0.0000      0.0000   |  0.1020      0.0597
                         0.0510      0.0298   |  0.1530      0.0895

                            AREA      QPEAK      TPEAK       R.V.
                            (ha)      (cms)      (hrs)       (mm)
  INFLOW : ID= 2 (  1002)    2.110       0.393       2.75       71.77
  OUTFLOW: ID= 1 (  0036)    2.110       0.138       2.92       71.71

              PEAK   FLOW   REDUCTION [Qout/Qin](%)= 35.04
              TIME SHIFT OF PEAK FLOW        (min)= 10.00
              MAXIMUM  STORAGE   USED       (ha.m.)=  0.0808

---------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  1003)|   Area    (ha)=   4.78
|ID= 1 DT= 5.0 min |   Total Imp(%)=  79.10   Dir. Conn.(%)=  79.10
--------------------
                            IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=        3.78          1.00
    Dep. Storage     (mm)=        1.00          5.00
    Average Slope     (%)=        1.00          2.00
    Length            (m)=      178.51         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    0.00 | 1.667    8.76 | 3.250   18.98 |  4.83    1.46
              0.167    0.00 | 1.750    8.76 | 3.333   10.22 |  4.92    1.46
              0.250    0.00 | 1.833   24.82 | 3.417   10.22 |  5.00    1.46
              0.333    1.46 | 1.917   24.82 | 3.500   10.22 |  5.08    1.46
              0.417    1.46 | 2.000   24.82 | 3.583   10.22 |  5.17    1.46
              0.500    1.46 | 2.083   24.82 | 3.667   10.22 |  5.25    1.46
              0.583    1.46 | 2.167   24.82 | 3.750   10.22 |  5.33    1.46
              0.667    1.46 | 2.250   24.82 | 3.833    5.84 |  5.42    1.46
              0.750    1.46 | 2.333   67.16 | 3.917    5.84 |  5.50    1.46
              0.833    1.46 | 2.417   67.16 | 4.000    5.84 |  5.58    1.46
              0.917    1.46 | 2.500   67.16 | 4.083    5.84 |  5.67    1.46
              1.000    1.46 | 2.583   67.16 | 4.167    5.84 |  5.75    1.46
              1.083    1.46 | 2.667   67.16 | 4.250    5.84 |  5.83    1.46
              1.167    1.46 | 2.750   67.16 | 4.333    2.92 |  5.92    1.46
              1.250    1.46 | 2.833   18.98 | 4.417    2.92 |  6.00    1.46
              1.333    8.76 | 2.917   18.98 | 4.500    2.92 |  6.08    1.46
              1.417    8.76 | 3.000   18.98 | 4.583    2.92 |  6.17    1.46
              1.500    8.76 | 3.083   18.98 | 4.667    2.92 |  6.25    1.46
              1.583    8.76 | 3.167   18.98 | 4.750    2.92 |

    Max.Eff.Inten.(mm/hr)=       67.16         57.47
               over (min)         5.00         10.00
    Storage Coeff.  (min)=        4.24 (ii)     9.10 (ii)
    Unit Hyd. Tpeak (min)=        5.00         10.00
    Unit Hyd. peak  (cms)=        0.24          0.12
                                                          *TOTALS*
    PEAK FLOW       (cms)=        0.70          0.15        0.850 (iii)
    TIME TO PEAK    (hrs)=        2.75          2.75         2.75
```

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    RUNOFF VOLUME    (mm)=       72.00         49.66        67.33
    TOTAL RAINFALL   (mm)=       73.00         73.00        73.00
    RUNOFF COEFFICIENT   =        0.99          0.68         0.92

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  91.0    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  (  0033)|
|   1 +  2 =  3    |         AREA    QPEAK     TPEAK      R.V.
--------------------         (ha)    (cms)     (hrs)      (mm)
        ID1= 1 (  1003):     4.78   0.850      2.75     67.33
      + ID2= 2 (  0035):     2.35   0.152      2.92     71.72
        ==================================================
        ID = 3 (  0033):     7.13   0.993      2.75     68.78

    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):     7.13   0.993      2.75     68.78
      + ID2= 2 (  0036):     2.11   0.138      2.92     71.71
        ==================================================
        ID = 1 (  0033):     9.24   1.122      2.75     69.45

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
---------------------------------------------------------------------------
------------------
| CHAMBER(  0028)|  OUTFLOW: ON,   UNDERDRAIN: OFF,  INFIL: OFF
|IN= 2--> OUT= 3 |  CHAMBER:
| DT=  1.0 min   |  MAX STO VOL (cu.m.)= 4532.43  Bottom Area(m2)   = 4149.20
------------------
                   DEPTH        STORAGE          |   DEPTH       STORAGE
                   (mm)         (cu.m.)          |   (mm)        (cu.m.)
                     0.00           0.00         |    889.00      2561.91
                    25.00          42.15         |    914.00      2644.15
                    51.00          84.29         |    940.00      2725.52
                    76.00         126.44         |    965.00      2805.96
                   102.00         168.58         |    991.00      2885.44
                   127.00         210.73         |   1016.00      2963.89
                   152.00         252.88         |   1041.00      3041.23
                   178.00         295.02         |   1067.00      3117.43
                   203.00         337.17         |   1092.00      3192.40
                   229.00         379.32         |   1118.00      3266.04
                   254.00         421.46         |   1143.00      3338.30
                   279.00         463.61         |   1168.00      3409.03
                   305.00         505.75         |   1194.00      3478.15
                   330.00         599.76         |   1219.00      3545.47
                   356.00         693.36         |   1245.00      3610.81
                   381.00         786.64         |   1270.00      3673.92
                   406.00         879.62         |   1295.00      3734.48
                   432.00         972.26         |   1321.00      3791.79
                   457.00        1064.57         |   1346.00      3844.07
                   483.00        1156.53         |   1372.00      3892.17
                   508.00        1248.12         |   1397.00      3938.66
                   533.00        1339.32         |   1422.00      3983.67
                   559.00        1430.11         |   1448.00      4026.67
                   584.00        1520.47         |   1473.00      4068.82
                   610.00        1610.38         |   1499.00      4110.96
                   635.00        1699.82         |   1524.00      4153.11
                   660.00        1788.76         |   1549.00      4195.26
                   686.00        1877.17         |   1575.00      4237.40
                   711.00        1965.05         |   1600.00      4279.55
                   737.00        2052.31         |   1626.00      4321.70
                   762.00        2138.97         |   1651.00      4363.84
                   787.00        2224.99         |   1676.00      4405.99
                   813.00        2310.34         |   1702.00      4448.13
                   838.00        2394.96         |   1727.00      4490.28
                   864.00        2478.83         |   1753.00      4532.43

                  DEPTH        DISCHARGE       |   DEPTH       DISCHARGE
                   (m)           (cms)         |    (m)          (cms)
                  0.010          0.000         |   0.920         0.147
                  0.160          0.021         |   1.070         0.173
```

```
                0.310          0.040          |  1.220        0.194
                0.460          0.053          |  1.380        0.214
                0.610          0.063          |  1.450        0.223
                0.770          0.113          |  0.000        0.000

                  AREA         QPEAK              TPEAK          R.V.
                  (ha)         (cms)              (hrs)          (mm)
    INFLOW:ID= 2   9.24         1.122               2.75         69.44
   OUTFLOW:ID= 1   9.24         0.191               4.77         63.77
  OVERFLOW:ID= 3   0.00         0.000               0.00          0.00

            Volume Reduction Rate[(RVin-RVout)/RVin](%)=        8.18
            Time to reach Max storage              (Hr)=        4.77
            Volume of water for drawdown in LID (cu.m.)=     1788.36
            Volume of maximum water storage      (cu.m.)=    4103.32
            ***** After simulation, water volume is not zero.

  --------------------------
  | Junction Command(0029) |
  --------------------------

                         AREA     QPEAK    TPEAK     R.V.
                         (ha)     (cms)    (hrs)     (mm)
  INFLOW : ID= 3(  0028)   0.00     0.00    0.00     0.00
  OUTFLOW: ID= 2(  0029)   0.00     0.00    0.00     0.00

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

  --------------------------
  | Junction Command(0030) |
  --------------------------

                         AREA     QPEAK    TPEAK     R.V.
                         (ha)     (cms)    (hrs)     (mm)
  INFLOW : ID= 1(  0028)   9.24     0.19    4.77    63.77
  OUTFLOW: ID= 2(  0030)   9.24     0.19    4.77    63.77

  ---------------------------------------------------------------------------
********************************
** SIMULATION:1.6 100yr 6hr AES **
********************************

--------------------
|    READ STORM    |     Filename: C:\Users\caim069305\AppD
|                  |               ata\Local\Temp\
|                  |               42e5834f-7301-492c-9bf7-628b9be09e0d\a7afe20d
| Ptotal= 80.31 mm |     Comments: 100 Year 6 Hour AES (Bloor, TRCA)
--------------------
               TIME     RAIN |  TIME     RAIN |'  TIME     RAIN |  TIME     RAIN
                hrs    mm/hr |   hrs    mm/hr |'   hrs    mm/hr |   hrs    mm/hr
               0.25     0.00 |  2.00    27.30 |  3.75    11.24 |  5.50     1.61
               0.50     1.61 |  2.25    27.30 |  4.00     6.42 |  5.75     1.61
               0.75     1.61 |  2.50    73.88 |  4.25     6.42 |  6.00     1.61
               1.00     1.61 |  2.75    73.88 |  4.50     3.21 |  6.25     1.61
               1.25     1.61 |  3.00    20.88 |  4.75     3.21 |
               1.50     9.64 |  3.25    20.88 |  5.00     1.61 |
               1.75     9.64 |  3.50    11.24 |  5.25     1.61 |

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

--------------------
| CALIB            |
| STANDHYD ( 1001)|   Area    (ha)=   2.35
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                         IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=     2.33          0.02
     Dep. Storage     (mm)=     1.00          5.00
     Average Slope     (%)=     1.00          2.00
     Length            (m)=   125.17         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     0.00 | 1.667     9.64 | 3.250    20.88 | 4.83     1.61
              0.167     0.00 | 1.750     9.64 | 3.333    11.24 | 4.92     1.61
              0.250     0.00 | 1.833    27.30 | 3.417    11.24 | 5.00     1.61
              0.333     1.61 | 1.917    27.30 | 3.500    11.24 | 5.08     1.61
              0.417     1.61 | 2.000    27.30 | 3.583    11.24 | 5.17     1.61
              0.500     1.61 | 2.083    27.30 | 3.667    11.24 | 5.25     1.61
              0.583     1.61 | 2.167    27.30 | 3.750    11.24 | 5.33     1.61
              0.667     1.61 | 2.250    27.30 | 3.833     6.42 | 5.42     1.61
              0.750     1.61 | 2.333    73.88 | 3.917     6.42 | 5.50     1.61
              0.833     1.61 | 2.417    73.88 | 4.000     6.42 | 5.58     1.61
              0.917     1.61 | 2.500    73.88 | 4.083     6.42 | 5.67     1.61
              1.000     1.61 | 2.583    73.88 | 4.167     6.42 | 5.75     1.61
              1.083     1.61 | 2.667    73.88 | 4.250     6.42 | 5.83     1.61
              1.167     1.61 | 2.750    73.88 | 4.333     3.21 | 5.92     1.61
              1.250     1.61 | 2.833    20.88 | 4.417     3.21 | 6.00     1.61
              1.333     9.64 | 2.917    20.88 | 4.500     3.21 | 6.08     1.61
              1.417     9.64 | 3.000    20.88 | 4.583     3.21 | 6.17     1.61
              1.500     9.64 | 3.083    20.88 | 4.667     3.21 | 6.25     1.61
              1.583     9.64 | 3.167    20.88 | 4.750     3.21 |

     Max.Eff.Inten.(mm/hr)=       73.88         64.56
                over (min)         5.00          5.00
     Storage Coeff.  (min)=        3.30 (ii)     4.57 (ii)
     Unit Hyd. Tpeak (min)=        5.00          5.00
     Unit Hyd. peak  (cms)=        0.27          0.23
                                                           *TOTALS*
     PEAK FLOW       (cms)=        0.48          0.00          0.482 (iii)
     TIME TO PEAK    (hrs)=        2.75          2.75           2.75
     RUNOFF VOLUME    (mm)=       79.31         56.47          79.08
     TOTAL RAINFALL   (mm)=       80.31         80.31          80.31
     RUNOFF COEFFICIENT   =        0.99          0.70           0.98

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

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN* =  91.0    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( 0035)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------     (cms)     (ha.m.)   |   (cms)     (ha.m.)
                        0.0000     0.0000    |   0.1120     0.0665
                        0.0560     0.0333    |   0.1690     0.0998

                             AREA     QPEAK      TPEAK        R.V.
                             (ha)     (cms)      (hrs)        (mm)
   INFLOW : ID= 2 (  1001)   2.350     0.482       2.75       79.08
   OUTFLOW: ID= 1 (  0035)   2.350     0.168       2.92       79.02

               PEAK   FLOW    REDUCTION [Qout/Qin](%)= 34.88
               TIME SHIFT OF PEAK FLOW          (min)= 10.00
               MAXIMUM  STORAGE   USED        (ha.m.)=  0.0994

---------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD ( 1002)|   Area    (ha)=   2.11
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                         IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=     2.09          0.02
     Dep. Storage     (mm)=     1.00          5.00
     Average Slope     (%)=     1.00          2.00
     Length            (m)=   118.60         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     0.00 | 1.667     9.64 | 3.250    20.88 | 4.83     1.61
              0.167     0.00 | 1.750     9.64 | 3.333    11.24 | 4.92     1.61
              0.250     0.00 | 1.833    27.30 | 3.417    11.24 | 5.00     1.61
              0.333     1.61 | 1.917    27.30 | 3.500    11.24 | 5.08     1.61
              0.417     1.61 | 2.000    27.30 | 3.583    11.24 | 5.17     1.61
              0.500     1.61 | 2.083    27.30 | 3.667    11.24 | 5.25     1.61
              0.583     1.61 | 2.167    27.30 | 3.750    11.24 | 5.33     1.61
              0.667     1.61 | 2.250    27.30 | 3.833     6.42 | 5.42     1.61
              0.750     1.61 | 2.333    73.88 | 3.917     6.42 | 5.50     1.61
              0.833     1.61 | 2.417    73.88 | 4.000     6.42 | 5.58     1.61
              0.917     1.61 | 2.500    73.88 | 4.083     6.42 | 5.67     1.61
              1.000     1.61 | 2.583    73.88 | 4.167     6.42 | 5.75     1.61
              1.083     1.61 | 2.667    73.88 | 4.250     6.42 | 5.83     1.61
              1.167     1.61 | 2.750    73.88 | 4.333     3.21 | 5.92     1.61
              1.250     1.61 | 2.833    20.88 | 4.417     3.21 | 6.00     1.61
              1.333     9.64 | 2.917    20.88 | 4.500     3.21 | 6.08     1.61
              1.417     9.64 | 3.000    20.88 | 4.583     3.21 | 6.17     1.61
              1.500     9.64 | 3.083    20.88 | 4.667     3.21 | 6.25     1.61
              1.583     9.64 | 3.167    20.88 | 4.750     3.21 |

     Max.Eff.Inten.(mm/hr)=       73.88         64.56
                over (min)         5.00          5.00
     Storage Coeff.  (min)=        3.19 (ii)     4.46 (ii)
     Unit Hyd. Tpeak (min)=        5.00          5.00
     Unit Hyd. peak  (cms)=        0.27          0.23
                                                           *TOTALS*
     PEAK FLOW       (cms)=        0.43          0.00          0.432 (iii)
     TIME TO PEAK    (hrs)=        2.75          2.75           2.75
     RUNOFF VOLUME    (mm)=       79.31         56.47          79.08
     TOTAL RAINFALL   (mm)=       80.31         80.31          80.31
     RUNOFF COEFFICIENT   =        0.99          0.70           0.98

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

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN* =  91.0    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( 0036)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------     (cms)     (ha.m.)   |   (cms)     (ha.m.)
                        0.0000     0.0000    |   0.1020     0.0597
                        0.0510     0.0298    |   0.1530     0.0895

                             AREA     QPEAK      TPEAK        R.V.
                             (ha)     (cms)      (hrs)        (mm)
   INFLOW : ID= 2 (  1002)   2.110     0.432       2.75       79.08
   OUTFLOW: ID= 1 (  0036)   2.110     0.152       2.92       79.01

               PEAK   FLOW    REDUCTION [Qout/Qin](%)= 35.09
               TIME SHIFT OF PEAK FLOW          (min)= 10.00
               MAXIMUM  STORAGE   USED        (ha.m.)=  0.0890

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--------------------
| CALIB            |
| STANDHYD ( 1003)|   Area    (ha)=   4.78
|ID= 1 DT= 5.0 min |   Total Imp(%)=  79.10   Dir. Conn.(%)=  79.10
--------------------
                         IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=     3.78          1.00
     Dep. Storage     (mm)=     1.00          5.00
     Average Slope     (%)=     1.00          2.00
     Length            (m)=   178.51         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     0.00 | 1.667     9.64 | 3.250    20.88 | 4.83     1.61
              0.167     0.00 | 1.750     9.64 | 3.333    11.24 | 4.92     1.61
              0.250     0.00 | 1.833    27.30 | 3.417    11.24 | 5.00     1.61
              0.333     1.61 | 1.917    27.30 | 3.500    11.24 | 5.08     1.61
              0.417     1.61 | 2.000    27.30 | 3.583    11.24 | 5.17     1.61
              0.500     1.61 | 2.083    27.30 | 3.667    11.24 | 5.25     1.61
              0.583     1.61 | 2.167    27.30 | 3.750    11.24 | 5.33     1.61
              0.667     1.61 | 2.250    27.30 | 3.833     6.42 | 5.42     1.61
              0.750     1.61 | 2.333    73.88 | 3.917     6.42 | 5.50     1.61
              0.833     1.61 | 2.417    73.88 | 4.000     6.42 | 5.58     1.61
              0.917     1.61 | 2.500    73.88 | 4.083     6.42 | 5.67     1.61
              1.000     1.61 | 2.583    73.88 | 4.167     6.42 | 5.75     1.61
              1.083     1.61 | 2.667    73.88 | 4.250     6.42 | 5.83     1.61
              1.167     1.61 | 2.750    73.88 | 4.333     3.21 | 5.92     1.61
              1.250     1.61 | 2.833    20.88 | 4.417     3.21 | 6.00     1.61
              1.333     9.64 | 2.917    20.88 | 4.500     3.21 | 6.08     1.61
              1.417     9.64 | 3.000    20.88 | 4.583     3.21 | 6.17     1.61
              1.500     9.64 | 3.083    20.88 | 4.667     3.21 | 6.25     1.61
              1.583     9.64 | 3.167    20.88 | 4.750     3.21 |

     Max.Eff.Inten.(mm/hr)=       73.88         64.56
                over (min)         5.00         10.00
     Storage Coeff.  (min)=        4.08 (ii)     8.76 (ii)
     Unit Hyd. Tpeak (min)=        5.00         10.00
     Unit Hyd. peak  (cms)=        0.24          0.12
                                                           *TOTALS*
     PEAK FLOW       (cms)=        0.78          0.17          0.941 (iii)
     TIME TO PEAK    (hrs)=        2.75          2.75           2.75
     RUNOFF VOLUME    (mm)=       79.31         56.47          74.54
     TOTAL RAINFALL   (mm)=       80.31         80.31          80.31
     RUNOFF COEFFICIENT   =        0.99          0.70           0.93

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

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN* =  91.0    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  ( 0033)|
|   1 + 2 = 3      |        AREA    QPEAK    TPEAK      R.V.
--------------------        (ha)    (cms)    (hrs)      (mm)
        ID1= 1 (  1003):    4.78    0.941     2.75     74.54
      + ID2= 2 (  0035):    2.35    0.168     2.92     79.02
        ===============================================
        ID = 3 (  0033):    7.13    1.099     2.75     76.01

     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):    7.13    1.099     2.75     76.01
      + ID2= 2 (  0036):    2.11    0.152     2.92     79.01
        ===============================================
        ID = 1 (  0033):    9.24    1.241     2.75     76.70

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
---------------------------------------------------------------------------
------------------
| CHAMBER( 0028)|   OUTFLOW: ON,   UNDERDRAIN: OFF,  INFIL: OFF
|IN= 2---> OUT= 3 |  CHAMBER:
| DT=  1.0 min   |   MAX STO VOL (cu.m.)= 4532.43  Bottom Area(m2)   = 4149.20
------------------
                  DEPTH        STORAGE            |   DEPTH       STORAGE
                  (mm)         (cu.m.)            |   (mm)        (cu.m.)
                   0.00           0.00            |   889.00      2561.91
                  25.00          42.15            |   914.00      2644.15
                  51.00          84.29            |   940.00      2725.52
                  76.00         126.44            |   965.00      2805.96
                 102.00         168.58            |   991.00      2885.44
                 127.00         210.73            |  1016.00      2963.89
                 152.00         252.88            |  1041.00      3041.23
                 178.00         295.02            |  1067.00      3117.43
                 203.00         337.17            |  1092.00      3192.40
                 229.00         379.32            |  1118.00      3266.04
                 254.00         421.46            |  1143.00      3338.30
                 279.00         463.61            |  1168.00      3409.03
                 305.00         505.75            |  1194.00      3478.15
                 330.00         599.76            |  1219.00      3545.47
                 356.00         693.36            |  1245.00      3610.81
                 381.00         786.64            |  1270.00      3673.92
                 406.00         879.62            |  1295.00      3734.48
                 432.00         972.26            |  1321.00      3791.79
                 457.00        1064.57            |  1346.00      3844.07
                 483.00        1156.53            |  1372.00      3892.17
                 508.00        1248.12            |  1397.00      3938.66
                 533.00        1339.32            |  1422.00      3983.67
                 559.00        1430.11            |  1448.00      4026.67
                 584.00        1520.47            |  1473.00      4068.82
                 610.00        1610.38            |  1499.00      4110.96
                 635.00        1699.82            |  1524.00      4153.11
                 660.00        1788.76            |  1549.00      4195.26
                 686.00        1877.17            |  1575.00      4237.40
                 711.00        1965.05            |  1600.00      4279.55
                 737.00        2052.31            |  1626.00      4321.70
                 762.00        2138.97            |  1651.00      4363.84
                 787.00        2224.99            |  1676.00      4405.99
```

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              813.00       2310.34        |   1702.00      4448.13
              838.00       2394.96        |   1727.00      4490.28
              864.00       2478.83        |   1753.00      4532.43

           DEPTH       DISCHARGE          |    DEPTH       DISCHARGE
            (m)          (cms)            |     (m)          (cms)
           0.010         0.000            |    0.920         0.147
           0.160         0.021            |    1.070         0.173
           0.310         0.040            |    1.220         0.194
           0.460         0.053            |    1.380         0.214
           0.610         0.063            |    1.450         0.223
           0.770         0.113            |    0.000         0.000

                AREA          QPEAK              TPEAK          R.V.
                (ha)          (cms)              (hrs)          (mm)
  INFLOW:ID= 2   9.24          1.241               2.75         76.70
  OUTFLOW:ID= 1  9.24          0.218               4.72         71.02
 OVERFLOW:ID= 3  0.00          0.000               0.00          0.00

        Volume Reduction Rate[(RVin-RVout)/RVin](%)=        7.40
        Time to reach Max storage              (Hr)=        4.72
        Volume of water for drawdown in LID (cu.m.)=     1842.68
        Volume of maximum water storage     (cu.m.)=     4452.49
        ***** After simulation, water volume is not zero.

 --------------------------
 | Junction Command(0029) |
 --------------------------

                      AREA      QPEAK    TPEAK      R.V.
                      (ha)      (cms)    (hrs)      (mm)
 INFLOW : ID= 3(  0028)   0.00      0.00     0.00      0.00
 OUTFLOW: ID= 2(  0029)   0.00      0.00     0.00      0.00

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 | Junction Command(0030) |
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                      AREA      QPEAK    TPEAK      R.V.
                      (ha)      (cms)    (hrs)      (mm)
 INFLOW : ID= 1(  0028)   9.24      0.22     4.72     71.02
 OUTFLOW: ID= 2(  0030)   9.24      0.22     4.72     71.02

 ---------------------------------------------------------------------------------
**********************************
** SIMULATION:2.1 2yr 12hr AES **
**********************************

 --------------------
 |    READ STORM    |    Filename: C:\Users\caim069305\AppD
 |                  |              ata\Local\Temp\
 |                  |              42e5834f-7301-492c-9bf7-628b9be09e0d\ef3b5f55
 | Ptotal= 42.00 mm |    Comments: 2 Year 12 Hour AES (Bloor, TRCA)
 --------------------
               TIME     RAIN |  TIME     RAIN |'  TIME     RAIN |  TIME     RAIN
                hrs    mm/hr |   hrs    mm/hr |'   hrs    mm/hr |   hrs    mm/hr
               0.25     0.00 |  3.50     7.14 |  6.75     2.94 | 10.00     0.42
               0.50     0.42 |  3.75     7.14 |  7.00     2.94 | 10.25     0.42
               0.75     0.42 |  4.00     7.14 |  7.25     2.94 | 10.50     0.42
               1.00     0.42 |  4.25     7.14 |  7.50     1.68 | 10.75     0.42
               1.25     0.42 |  4.50    19.32 |  7.75     1.68 | 11.00     0.42
               1.50     0.42 |  4.75    19.32 |  8.00     1.68 | 11.25     0.42
               1.75     0.42 |  5.00    19.32 |  8.25     1.68 | 11.50     0.42
               2.00     0.42 |  5.25    19.32 |  8.50     0.84 | 11.75     0.42
               2.25     0.42 |  5.50     5.46 |  8.75     0.84 | 12.00     0.42
               2.50     2.52 |  5.75     5.46 |  9.00     0.84 | 12.25     0.42
               2.75     2.52 |  6.00     5.46 |  9.25     0.84 |
               3.00     2.52 |  6.25     5.46 |  9.50     0.42 |
               3.25     2.52 |  6.50     2.94 |  9.75     0.42 |

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 --------------------
 | CALIB            |
 | STANDHYD (  1001)|   Area    (ha)=    2.35
 |ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
 --------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=     2.33          0.02
     Dep. Storage     (mm)=     1.00          5.00
     Average Slope     (%)=     1.00          2.00
     Length            (m)=   125.17         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     0.00 | 3.167     2.52 | 6.250     5.46 |  9.33     0.42
              0.167     0.00 | 3.250     2.52 | 6.333     2.94 |  9.42     0.42
              0.250     0.00 | 3.333     7.14 | 6.417     2.94 |  9.50     0.42
              0.333     0.42 | 3.417     7.14 | 6.500     2.94 |  9.58     0.42
              0.417     0.42 | 3.500     7.14 | 6.583     2.94 |  9.67     0.42
              0.500     0.42 | 3.583     7.14 | 6.667     2.94 |  9.75     0.42
              0.583     0.42 | 3.667     7.14 | 6.750     2.94 |  9.83     0.42
              0.667     0.42 | 3.750     7.14 | 6.833     2.94 |  9.92     0.42
              0.750     0.42 | 3.833     7.14 | 6.917     2.94 | 10.00     0.42
              0.833     0.42 | 3.917     7.14 | 7.000     2.94 | 10.08     0.42
              0.917     0.42 | 4.000     7.14 | 7.083     2.94 | 10.17     0.42
              1.000     0.42 | 4.083     7.14 | 7.167     2.94 | 10.25     0.42
              1.083     0.42 | 4.167     7.14 | 7.250     2.94 | 10.33     0.42
              1.167     0.42 | 4.250     7.14 | 7.333     1.68 | 10.42     0.42
              1.250     0.42 | 4.333    19.32 | 7.417     1.68 | 10.50     0.42
              1.333     0.42 | 4.417    19.32 | 7.500     1.68 | 10.58     0.42
              1.417     0.42 | 4.500    19.32 | 7.583     1.68 | 10.67     0.42
              1.500     0.42 | 4.583    19.32 | 7.667     1.68 | 10.75     0.42
              1.583     0.42 | 4.667    19.32 | 7.750     1.68 | 10.83     0.42
              1.667     0.42 | 4.750    19.32 | 7.833     1.68 | 10.92     0.42
              1.750     0.42 | 4.833    19.32 | 7.917     1.68 | 11.00     0.42
              1.833     0.42 | 4.917    19.32 | 8.000     1.68 | 11.08     0.42
              1.917     0.42 | 5.000    19.32 | 8.083     1.68 | 11.17     0.42
              2.000     0.42 | 5.083    19.32 | 8.167     1.68 | 11.25     0.42
              2.083     0.42 | 5.167    19.32 | 8.250     1.68 | 11.33     0.42
              2.167     0.42 | 5.250    19.32 | 8.333     0.84 | 11.42     0.42
              2.250     0.42 | 5.333     5.46 | 8.417     0.84 | 11.50     0.42
              2.333     2.52 | 5.417     5.46 | 8.500     0.84 | 11.58     0.42
              2.417     2.52 | 5.500     5.46 | 8.583     0.84 | 11.67     0.42
              2.500     2.52 | 5.583     5.46 | 8.667     0.84 | 11.75     0.42
              2.583     2.52 | 5.667     5.46 | 8.750     0.84 | 11.83     0.42
              2.667     2.52 | 5.750     5.46 | 8.833     0.84 | 11.92     0.42
              2.750     2.52 | 5.833     5.46 | 8.917     0.84 | 12.00     0.42
              2.833     2.52 | 5.917     5.46 | 9.000     0.84 | 12.08     0.42
              2.917     2.52 | 6.000     5.46 | 9.083     0.84 | 12.17     0.42
              3.000     2.52 | 6.083     5.46 | 9.167     0.84 | 12.25     0.42
              3.083     2.52 | 6.167     5.46 | 9.250     0.84 |

     Max.Eff.Inten.(mm/hr)=       19.32         14.09
                over (min)        5.00         10.00
     Storage Coeff.  (min)=        5.64 (ii)     7.81 (ii)
     Unit Hyd. Tpeak (min)=        5.00         10.00
     Unit Hyd. peak  (cms)=        0.20          0.13
                                                          *TOTALS*
     PEAK FLOW       (cms)=        0.12          0.00         0.126 (iii)
     TIME TO PEAK    (hrs)=        5.25          5.25          5.25
     RUNOFF VOLUME    (mm)=       41.00         22.04         40.81
     TOTAL RAINFALL   (mm)=       42.00         42.00         42.00
     RUNOFF COEFFICIENT   =        0.98          0.52          0.97

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN* =  91.0    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.

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 --------------------
 | RESERVOIR(  0035)|     OVERFLOW IS OFF
 | IN= 2---> OUT= 1 |
 | DT=  5.0 min     |     OUTFLOW     STORAGE    |   OUTFLOW    STORAGE
 --------------------      (cms)      (ha.m.)    |    (cms)     (ha.m.)
                          0.0000      0.0000     |   0.1120      0.0665
                          0.0560      0.0333     |   0.1690      0.0998

                             AREA      QPEAK       TPEAK         R.V.
                             (ha)      (cms)       (hrs)         (mm)
    INFLOW : ID= 2 (  1001)    2.350      0.126        5.25         40.81
    OUTFLOW: ID= 1 (  0035)    2.350      0.069        5.33         40.75

              PEAK   FLOW   REDUCTION [Qout/Qin](%)= 54.60
              TIME SHIFT OF PEAK FLOW         (min)=  5.00
              MAXIMUM  STORAGE   USED        (ha.m.)=  0.0409

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 --------------------
 | CALIB            |
 | STANDHYD (  1002)|   Area    (ha)=    2.11
 |ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
 --------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=     2.09          0.02
     Dep. Storage     (mm)=     1.00          5.00
     Average Slope     (%)=     1.00          2.00
     Length            (m)=   118.60         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     0.00 | 3.167     2.52 | 6.250     5.46 |  9.33     0.42
              0.167     0.00 | 3.250     2.52 | 6.333     2.94 |  9.42     0.42
              0.250     0.00 | 3.333     7.14 | 6.417     2.94 |  9.50     0.42
              0.333     0.42 | 3.417     7.14 | 6.500     2.94 |  9.58     0.42
              0.417     0.42 | 3.500     7.14 | 6.583     2.94 |  9.67     0.42
              0.500     0.42 | 3.583     7.14 | 6.667     2.94 |  9.75     0.42
              0.583     0.42 | 3.667     7.14 | 6.750     2.94 |  9.83     0.42
              0.667     0.42 | 3.750     7.14 | 6.833     2.94 |  9.92     0.42
              0.750     0.42 | 3.833     7.14 | 6.917     2.94 | 10.00     0.42
              0.833     0.42 | 3.917     7.14 | 7.000     2.94 | 10.08     0.42
              0.917     0.42 | 4.000     7.14 | 7.083     2.94 | 10.17     0.42
              1.000     0.42 | 4.083     7.14 | 7.167     2.94 | 10.25     0.42
              1.083     0.42 | 4.167     7.14 | 7.250     2.94 | 10.33     0.42
              1.167     0.42 | 4.250     7.14 | 7.333     1.68 | 10.42     0.42
              1.250     0.42 | 4.333    19.32 | 7.417     1.68 | 10.50     0.42
              1.333     0.42 | 4.417    19.32 | 7.500     1.68 | 10.58     0.42
              1.417     0.42 | 4.500    19.32 | 7.583     1.68 | 10.67     0.42
              1.500     0.42 | 4.583    19.32 | 7.667     1.68 | 10.75     0.42
              1.583     0.42 | 4.667    19.32 | 7.750     1.68 | 10.83     0.42
              1.667     0.42 | 4.750    19.32 | 7.833     1.68 | 10.92     0.42
              1.750     0.42 | 4.833    19.32 | 7.917     1.68 | 11.00     0.42
              1.833     0.42 | 4.917    19.32 | 8.000     1.68 | 11.08     0.42
              1.917     0.42 | 5.000    19.32 | 8.083     1.68 | 11.17     0.42
              2.000     0.42 | 5.083    19.32 | 8.167     1.68 | 11.25     0.42
              2.083     0.42 | 5.167    19.32 | 8.250     1.68 | 11.33     0.42
              2.167     0.42 | 5.250    19.32 | 8.333     0.84 | 11.42     0.42
              2.250     0.42 | 5.333     5.46 | 8.417     0.84 | 11.50     0.42
              2.333     2.52 | 5.417     5.46 | 8.500     0.84 | 11.58     0.42
              2.417     2.52 | 5.500     5.46 | 8.583     0.84 | 11.67     0.42
              2.500     2.52 | 5.583     5.46 | 8.667     0.84 | 11.75     0.42
              2.583     2.52 | 5.667     5.46 | 8.750     0.84 | 11.83     0.42
              2.667     2.52 | 5.750     5.46 | 8.833     0.84 | 11.92     0.42
              2.750     2.52 | 5.833     5.46 | 8.917     0.84 | 12.00     0.42
              2.833     2.52 | 5.917     5.46 | 9.000     0.84 | 12.08     0.42
              2.917     2.52 | 6.000     5.46 | 9.083     0.84 | 12.17     0.42
              3.000     2.52 | 6.083     5.46 | 9.167     0.84 | 12.25     0.42
              3.083     2.52 | 6.167     5.46 | 9.250     0.84 |

     Max.Eff.Inten.(mm/hr)=       19.32         14.09
                over (min)        5.00         10.00
     Storage Coeff.  (min)=        5.46 (ii)     7.63 (ii)
     Unit Hyd. Tpeak (min)=        5.00         10.00
     Unit Hyd. peak  (cms)=        0.20          0.13
                                                          *TOTALS*
     PEAK FLOW       (cms)=        0.11          0.00         0.113 (iii)
     TIME TO PEAK    (hrs)=        5.25          5.25          5.25
     RUNOFF VOLUME    (mm)=       41.00         22.04         40.81
     TOTAL RAINFALL   (mm)=       42.00         42.00         42.00
     RUNOFF COEFFICIENT   =        0.98          0.52          0.97

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN* =  91.0    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.

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 --------------------
 | RESERVOIR(  0036)|     OVERFLOW IS OFF
 | IN= 2---> OUT= 1 |
 | DT=  5.0 min     |     OUTFLOW     STORAGE    |   OUTFLOW    STORAGE
 --------------------      (cms)      (ha.m.)    |    (cms)     (ha.m.)
                          0.0000      0.0000     |   0.1020      0.0597
                          0.0510      0.0298     |   0.1530      0.0895
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                             AREA      QPEAK       TPEAK         R.V.
                             (ha)      (cms)       (hrs)         (mm)
    INFLOW : ID= 2 (  1002)    2.110      0.113        5.25         40.81
    OUTFLOW: ID= 1 (  0036)    2.110      0.062        5.33         40.74

              PEAK   FLOW   REDUCTION [Qout/Qin](%)= 55.16
              TIME SHIFT OF PEAK FLOW         (min)=  5.00
              MAXIMUM  STORAGE   USED        (ha.m.)=  0.0364

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 --------------------
 | CALIB            |
 | STANDHYD (  1003)|   Area    (ha)=    4.78
 |ID= 1 DT= 5.0 min |   Total Imp(%)=  79.10   Dir. Conn.(%)=  79.10
 --------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=     3.78          1.00
     Dep. Storage     (mm)=     1.00          5.00
     Average Slope     (%)=     1.00          2.00
     Length            (m)=   178.51         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     0.00 | 3.167     2.52 | 6.250     5.46 |  9.33     0.42
              0.167     0.00 | 3.250     2.52 | 6.333     2.94 |  9.42     0.42
              0.250     0.00 | 3.333     7.14 | 6.417     2.94 |  9.50     0.42
              0.333     0.42 | 3.417     7.14 | 6.500     2.94 |  9.58     0.42
              0.417     0.42 | 3.500     7.14 | 6.583     2.94 |  9.67     0.42
              0.500     0.42 | 3.583     7.14 | 6.667     2.94 |  9.75     0.42
              0.583     0.42 | 3.667     7.14 | 6.750     2.94 |  9.83     0.42
              0.667     0.42 | 3.750     7.14 | 6.833     2.94 |  9.92     0.42
              0.750     0.42 | 3.833     7.14 | 6.917     2.94 | 10.00     0.42
              0.833     0.42 | 3.917     7.14 | 7.000     2.94 | 10.08     0.42
              0.917     0.42 | 4.000     7.14 | 7.083     2.94 | 10.17     0.42
              1.000     0.42 | 4.083     7.14 | 7.167     2.94 | 10.25     0.42
              1.083     0.42 | 4.167     7.14 | 7.250     2.94 | 10.33     0.42
              1.167     0.42 | 4.250     7.14 | 7.333     1.68 | 10.42     0.42
              1.250     0.42 | 4.333    19.32 | 7.417     1.68 | 10.50     0.42
              1.333     0.42 | 4.417    19.32 | 7.500     1.68 | 10.58     0.42
              1.417     0.42 | 4.500    19.32 | 7.583     1.68 | 10.67     0.42
              1.500     0.42 | 4.583    19.32 | 7.667     1.68 | 10.75     0.42
              1.583     0.42 | 4.667    19.32 | 7.750     1.68 | 10.83     0.42
              1.667     0.42 | 4.750    19.32 | 7.833     1.68 | 10.92     0.42
              1.750     0.42 | 4.833    19.32 | 7.917     1.68 | 11.00     0.42
              1.833     0.42 | 4.917    19.32 | 8.000     1.68 | 11.08     0.42
              1.917     0.42 | 5.000    19.32 | 8.083     1.68 | 11.17     0.42
              2.000     0.42 | 5.083    19.32 | 8.167     1.68 | 11.25     0.42
              2.083     0.42 | 5.167    19.32 | 8.250     1.68 | 11.33     0.42
              2.167     0.42 | 5.250    19.32 | 8.333     0.84 | 11.42     0.42
              2.250     0.42 | 5.333     5.46 | 8.417     0.84 | 11.50     0.42
              2.333     2.52 | 5.417     5.46 | 8.500     0.84 | 11.58     0.42
              2.417     2.52 | 5.500     5.46 | 8.583     0.84 | 11.67     0.42
              2.500     2.52 | 5.583     5.46 | 8.667     0.84 | 11.75     0.42
              2.583     2.52 | 5.667     5.46 | 8.750     0.84 | 11.83     0.42
              2.667     2.52 | 5.750     5.46 | 8.833     0.84 | 11.92     0.42
              2.750     2.52 | 5.833     5.46 | 8.917     0.84 | 12.00     0.42
              2.833     2.52 | 5.917     5.46 | 9.000     0.84 | 12.08     0.42
              2.917     2.52 | 6.000     5.46 | 9.083     0.84 | 12.17     0.42
              3.000     2.52 | 6.083     5.46 | 9.167     0.84 | 12.25     0.42
              3.083     2.52 | 6.167     5.46 | 9.250     0.84 |

     Max.Eff.Inten.(mm/hr)=       19.32         13.71
                over (min)        5.00         25.00
     Storage Coeff.  (min)=        6.98 (ii)    22.61 (ii)
     Unit Hyd. Tpeak (min)=        5.00         25.00
     Unit Hyd. peak  (cms)=        0.17          0.05
                                                          *TOTALS*
     PEAK FLOW       (cms)=        0.20          0.03         0.232 (iii)
     TIME TO PEAK    (hrs)=        5.25          5.33          5.25
     RUNOFF VOLUME    (mm)=       41.00         22.04         37.03
     TOTAL RAINFALL   (mm)=       42.00         42.00         42.00
     RUNOFF COEFFICIENT   =        0.98          0.52          0.88

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN* =  91.0    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.
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--------------------
| ADD HYD  (  0033)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  1003):      4.78   0.232     5.25    37.03
     + ID2= 2 (  0035):      2.35   0.069     5.33    40.75
       ================================================
       ID = 3 (  0033):      7.13   0.299     5.25    38.26

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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--------------------
| ADD HYD  (  0033)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0033):      7.13   0.299     5.25    38.26
     + ID2= 2 (  0036):      2.11   0.062     5.33    40.74
       ================================================
       ID = 1 (  0033):      9.24   0.360     5.25    38.83

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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------------------
| CHAMBER(  0028)|  OUTFLOW: ON,   UNDERDRAIN: OFF,  INFIL: OFF
|IN= 2--> OUT= 3 |  CHAMBER:
| DT=  1.0 min   |  MAX STO VOL (cu.m.)= 4532.43  Bottom Area(m2)   = 4149.20
------------------
                        DEPTH       STORAGE          |    DEPTH      STORAGE
                        (mm)        (cu.m.)          |    (mm)       (cu.m.)
                          0.00          0.00         |    889.00     2561.91
                         25.00         42.15         |    914.00     2644.15
                         51.00         84.29         |    940.00     2725.52
                         76.00        126.44         |    965.00     2805.96
                        102.00        168.58         |    991.00     2885.44
                        127.00        210.73         |   1016.00     2963.89
                        152.00        252.88         |   1041.00     3041.23
                        178.00        295.02         |   1067.00     3117.43
                        203.00        337.17         |   1092.00     3192.40
                        229.00        379.32         |   1118.00     3266.04
                        254.00        421.46         |   1143.00     3338.30
                        279.00        463.61         |   1168.00     3409.03
                        305.00        505.75         |   1194.00     3478.15
                        330.00        599.76         |   1219.00     3545.47
                        356.00        693.36         |   1245.00     3610.81
                        381.00        786.64         |   1270.00     3673.92
                        406.00        879.62         |   1295.00     3734.48
                        432.00        972.26         |   1321.00     3791.79
                        457.00       1064.57         |   1346.00     3844.07
                        483.00       1156.53         |   1372.00     3892.17
                        508.00       1248.12         |   1397.00     3938.66
                        533.00       1339.32         |   1422.00     3983.67
                        559.00       1430.11         |   1448.00     4026.67
                        584.00       1520.47         |   1473.00     4068.82
                        610.00       1610.38         |   1499.00     4110.96
                        635.00       1699.82         |   1524.00     4153.11
                        660.00       1788.76         |   1549.00     4195.26
                        686.00       1877.17         |   1575.00     4237.40
                        711.00       1965.05         |   1600.00     4279.55
                        737.00       2052.31         |   1626.00     4321.70
                        762.00       2138.97         |   1651.00     4363.84
                        787.00       2224.99         |   1676.00     4405.99
                        813.00       2310.34         |   1702.00     4448.13
                        838.00       2394.96         |   1727.00     4490.28
                        864.00       2478.83         |   1753.00     4532.43

                       DEPTH       DISCHARGE       |    DEPTH      DISCHARGE
                        (m)          (cms)         |     (m)         (cms)
                       0.010         0.000         |    0.920        0.147
                       0.160         0.021         |    1.070        0.173
                       0.310         0.040         |    1.220        0.194
                       0.460         0.053         |    1.380        0.214
                       0.610         0.063         |    1.450        0.223
                       0.770         0.113         |    0.000        0.000

                         AREA          QPEAK             TPEAK           R.V.
                         (ha)          (cms)             (hrs)           (mm)
        INFLOW:ID= 2     9.24          0.360              5.25           38.82
       OUTFLOW:ID= 1     9.24          0.060              8.48           33.15
      OVERFLOW:ID= 3     0.00          0.000              0.00            0.00
```

```
              Volume Reduction Rate[(RVin-RVout)/RVin](%)=       14.62
              Time to reach Max storage               (Hr)=       8.48
              Volume of water for drawdown in LID (cu.m.)=    1373.49
              Volume of maximum water storage     (cu.m.)=    2458.07
              ***** After simulation, water volume is not zero.

   --------------------------
   | Junction Command(0029) |
   --------------------------

                        AREA      QPEAK    TPEAK      R.V.
                        (ha)      (cms)    (hrs)      (mm)
   INFLOW : ID= 3(  0028)   0.00      0.00     0.00     0.00
   OUTFLOW: ID= 2(  0029)   0.00      0.00     0.00     0.00

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

   --------------------------
   | Junction Command(0030) |
   --------------------------

                        AREA      QPEAK    TPEAK      R.V.
                        (ha)      (cms)    (hrs)      (mm)
   INFLOW : ID= 1(  0028)   9.24      0.06     8.48    33.15
   OUTFLOW: ID= 2(  0030)   9.24      0.06     8.48    33.15

   --------------------------------------------------------------------------------
*********************************
** SIMULATION:2.2 5yr 12hr AES **
*********************************

--------------------
|    READ STORM    |      Filename: C:\Users\caim069305\AppD
|                  |             ata\Local\Temp\
|                  |             42e5834f-7301-492c-9bf7-628b9be09e0d\9abfbcfa
| Ptotal= 54.38 mm |      Comments: 5 Year 12 Hour AES (Bloor, TRCA)
--------------------
              TIME     RAIN |  TIME    RAIN |'  TIME     RAIN |  TIME     RAIN
               hrs    mm/hr |   hrs   mm/hr |'   hrs    mm/hr |   hrs    mm/hr
              0.25     0.00 |  3.50    9.25 |  6.75     3.81 | 10.00     0.54
              0.50     0.54 |  3.75    9.25 |  7.00     3.81 | 10.25     0.54
              0.75     0.54 |  4.00    9.25 |  7.25     3.81 | 10.50     0.54
              1.00     0.54 |  4.25    9.25 |  7.50     2.18 | 10.75     0.54
              1.25     0.54 |  4.50   25.02 |  7.75     2.18 | 11.00     0.54
              1.50     0.54 |  4.75   25.02 |  8.00     2.18 | 11.25     0.54
              1.75     0.54 |  5.00   25.02 |  8.25     2.18 | 11.50     0.54
              2.00     0.54 |  5.25   25.02 |  8.50     1.09 | 11.75     0.54
              2.25     0.54 |  5.50    7.07 |  8.75     1.09 | 12.00     0.54
              2.50     3.26 |  5.75    7.07 |  9.00     1.09 | 12.25     0.54
              2.75     3.26 |  6.00    7.07 |  9.25     1.09 |
              3.00     3.26 |  6.25    7.07 |  9.50     0.54 |
              3.25     3.26 |  6.50    3.81 |  9.75     0.54 |

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--------------------
| CALIB            |
| STANDHYD (  1001)|   Area    (ha)=   2.35
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=      2.33          0.02
    Dep. Storage     (mm)=      1.00          5.00
    Average Slope     (%)=      1.00          2.00
    Length            (m)=    125.17         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     0.00 | 3.167    3.26 | 6.250     7.07 |  9.33     0.54
            0.167     0.00 | 3.250    3.26 | 6.333     3.81 |  9.42     0.54
            0.250     0.00 | 3.333    9.25 | 6.417     3.81 |  9.50     0.54
            0.333     0.54 | 3.417    9.25 | 6.500     3.81 |  9.58     0.54
            0.417     0.54 | 3.500    9.25 | 6.583     3.81 |  9.67     0.54
            0.500     0.54 | 3.583    9.25 | 6.667     3.81 |  9.75     0.54
            0.583     0.54 | 3.667    9.25 | 6.750     3.81 |  9.83     0.54
            0.667     0.54 | 3.750    9.25 | 6.833     3.81 |  9.92     0.54
            0.750     0.54 | 3.833    9.25 | 6.917     3.81 | 10.00     0.54
            0.833     0.54 | 3.917    9.25 | 7.000     3.81 | 10.08     0.54
            0.917     0.54 | 4.000    9.25 | 7.083     3.81 | 10.17     0.54
```

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            1.000     0.54 | 4.083    9.25 | 7.167     3.81 | 10.25     0.54
            1.083     0.54 | 4.167    9.25 | 7.250     3.81 | 10.33     0.54
            1.167     0.54 | 4.250    9.25 | 7.333     2.18 | 10.42     0.54
            1.250     0.54 | 4.333   25.02 | 7.417     2.18 | 10.50     0.54
            1.333     0.54 | 4.417   25.02 | 7.500     2.18 | 10.58     0.54
            1.417     0.54 | 4.500   25.02 | 7.583     2.18 | 10.67     0.54
            1.500     0.54 | 4.583   25.02 | 7.667     2.18 | 10.75     0.54
            1.583     0.54 | 4.667   25.02 | 7.750     2.18 | 10.83     0.54
            1.667     0.54 | 4.750   25.02 | 7.833     2.18 | 10.92     0.54
            1.750     0.54 | 4.833   25.02 | 7.917     2.18 | 11.00     0.54
            1.833     0.54 | 4.917   25.02 | 8.000     2.18 | 11.08     0.54
            1.917     0.54 | 5.000   25.02 | 8.083     2.18 | 11.17     0.54
            2.000     0.54 | 5.083   25.02 | 8.167     2.18 | 11.25     0.54
            2.083     0.54 | 5.167   25.02 | 8.250     2.18 | 11.33     0.54
            2.167     0.54 | 5.250   25.02 | 8.333     1.09 | 11.42     0.54
            2.250     0.54 | 5.333    7.07 | 8.417     1.09 | 11.50     0.54
            2.333     3.26 | 5.417    7.07 | 8.500     1.09 | 11.58     0.54
            2.417     3.26 | 5.500    7.07 | 8.583     1.09 | 11.67     0.54
            2.500     3.26 | 5.583    7.07 | 8.667     1.09 | 11.75     0.54
            2.583     3.26 | 5.667    7.07 | 8.750     1.09 | 11.83     0.54
            2.667     3.26 | 5.750    7.07 | 8.833     1.09 | 11.92     0.54
            2.750     3.26 | 5.833    7.07 | 8.917     1.09 | 12.00     0.54
            2.833     3.26 | 5.917    7.07 | 9.000     1.09 | 12.08     0.54
            2.917     3.26 | 6.000    7.07 | 9.083     1.09 | 12.17     0.54
            3.000     3.26 | 6.083    7.07 | 9.167     1.09 | 12.25     0.54
            3.083     3.26 | 6.167    7.07 | 9.250     1.09 |

    Max.Eff.Inten.(mm/hr)=       25.02         20.09
               over (min)          5.00         10.00
    Storage Coeff.  (min)=         5.09 (ii)     7.04 (ii)
    Unit Hyd. Tpeak (min)=         5.00         10.00
    Unit Hyd. peak  (cms)=         0.21          0.14
                                                          *TOTALS*
    PEAK FLOW       (cms)=         0.16          0.00          0.163 (iii)
    TIME TO PEAK    (hrs)=         5.25          5.25           5.25
    RUNOFF VOLUME    (mm)=        53.38         32.73          53.17
    TOTAL RAINFALL   (mm)=        54.38         54.38          54.38
    RUNOFF COEFFICIENT   =         0.98          0.60           0.98

         (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
              CN* =  91.0    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.

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--------------------
| RESERVOIR(  0035)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW     STORAGE    |   OUTFLOW     STORAGE
--------------------      (cms)      (ha.m.)    |    (cms)      (ha.m.)
                          0.0000      0.0000    |    0.1120      0.0665
                          0.0560      0.0333    |    0.1690      0.0998

                               AREA      QPEAK       TPEAK         R.V.
                               (ha)      (cms)       (hrs)         (mm)
   INFLOW : ID= 2 (  1001)     2.350      0.163        5.25         53.17
   OUTFLOW: ID= 1 (  0035)     2.350      0.090        5.33         53.11

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)= 54.92
                    TIME SHIFT OF PEAK FLOW         (min)=  5.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=  0.0532

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--------------------
| CALIB            |
| STANDHYD (  1002)|   Area    (ha)=   2.11
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=      2.09          0.02
    Dep. Storage     (mm)=      1.00          5.00
    Average Slope     (%)=      1.00          2.00
    Length            (m)=    118.60         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     0.00 | 3.167    3.26 | 6.250     7.07 |  9.33     0.54
```

```
            0.167     0.00 | 3.250    3.26 | 6.333     3.81 |  9.42     0.54
            0.250     0.00 | 3.333    9.25 | 6.417     3.81 |  9.50     0.54
            0.333     0.54 | 3.417    9.25 | 6.500     3.81 |  9.58     0.54
            0.417     0.54 | 3.500    9.25 | 6.583     3.81 |  9.67     0.54
            0.500     0.54 | 3.583    9.25 | 6.667     3.81 |  9.75     0.54
            0.583     0.54 | 3.667    9.25 | 6.750     3.81 |  9.83     0.54
            0.667     0.54 | 3.750    9.25 | 6.833     3.81 |  9.92     0.54
            0.750     0.54 | 3.833    9.25 | 6.917     3.81 | 10.00     0.54
            0.833     0.54 | 3.917    9.25 | 7.000     3.81 | 10.08     0.54
            0.917     0.54 | 4.000    9.25 | 7.083     3.81 | 10.17     0.54
            1.000     0.54 | 4.083    9.25 | 7.167     3.81 | 10.25     0.54
            1.083     0.54 | 4.167    9.25 | 7.250     3.81 | 10.33     0.54
            1.167     0.54 | 4.250    9.25 | 7.333     2.18 | 10.42     0.54
            1.250     0.54 | 4.333   25.02 | 7.417     2.18 | 10.50     0.54
            1.333     0.54 | 4.417   25.02 | 7.500     2.18 | 10.58     0.54
            1.417     0.54 | 4.500   25.02 | 7.583     2.18 | 10.67     0.54
            1.500     0.54 | 4.583   25.02 | 7.667     2.18 | 10.75     0.54
            1.583     0.54 | 4.667   25.02 | 7.750     2.18 | 10.83     0.54
            1.667     0.54 | 4.750   25.02 | 7.833     2.18 | 10.92     0.54
            1.750     0.54 | 4.833   25.02 | 7.917     2.18 | 11.00     0.54
            1.833     0.54 | 4.917   25.02 | 8.000     2.18 | 11.08     0.54
            1.917     0.54 | 5.000   25.02 | 8.083     2.18 | 11.17     0.54
            2.000     0.54 | 5.083   25.02 | 8.167     2.18 | 11.25     0.54
            2.083     0.54 | 5.167   25.02 | 8.250     2.18 | 11.33     0.54
            2.167     0.54 | 5.250   25.02 | 8.333     1.09 | 11.42     0.54
            2.250     0.54 | 5.333    7.07 | 8.417     1.09 | 11.50     0.54
            2.333     3.26 | 5.417    7.07 | 8.500     1.09 | 11.58     0.54
            2.417     3.26 | 5.500    7.07 | 8.583     1.09 | 11.67     0.54
            2.500     3.26 | 5.583    7.07 | 8.667     1.09 | 11.75     0.54
            2.583     3.26 | 5.667    7.07 | 8.750     1.09 | 11.83     0.54
            2.667     3.26 | 5.750    7.07 | 8.833     1.09 | 11.92     0.54
            2.750     3.26 | 5.833    7.07 | 8.917     1.09 | 12.00     0.54
            2.833     3.26 | 5.917    7.07 | 9.000     1.09 | 12.08     0.54
            2.917     3.26 | 6.000    7.07 | 9.083     1.09 | 12.17     0.54
            3.000     3.26 | 6.083    7.07 | 9.167     1.09 | 12.25     0.54
            3.083     3.26 | 6.167    7.07 | 9.250     1.09 |

    Max.Eff.Inten.(mm/hr)=       25.02         20.09
               over (min)          5.00         10.00
    Storage Coeff.  (min)=         4.93 (ii)     6.88 (ii)
    Unit Hyd. Tpeak (min)=         5.00         10.00
    Unit Hyd. peak  (cms)=         0.22          0.14
                                                          *TOTALS*
    PEAK FLOW       (cms)=         0.15          0.00          0.146 (iii)
    TIME TO PEAK    (hrs)=         5.25          5.25           5.25
    RUNOFF VOLUME    (mm)=        53.38         32.73          53.17
    TOTAL RAINFALL   (mm)=        54.38         54.38          54.38
    RUNOFF COEFFICIENT   =         0.98          0.60           0.98

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

         (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
              CN* =  91.0    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.

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--------------------
| RESERVOIR(  0036)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW     STORAGE    |   OUTFLOW     STORAGE
--------------------      (cms)      (ha.m.)    |    (cms)      (ha.m.)
                          0.0000      0.0000    |    0.1020      0.0597
                          0.0510      0.0298    |    0.1530      0.0895

                               AREA      QPEAK       TPEAK         R.V.
                               (ha)      (cms)       (hrs)         (mm)
   INFLOW : ID= 2 (  1002)     2.110      0.146        5.25         53.17
   OUTFLOW: ID= 1 (  0036)     2.110      0.081        5.33         53.10

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)= 55.43
                    TIME SHIFT OF PEAK FLOW         (min)=  5.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=  0.0475

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--------------------
| CALIB            |
| STANDHYD (  1003)|   Area    (ha)=   4.78
|ID= 1 DT= 5.0 min |   Total Imp(%)=  79.10   Dir. Conn.(%)=  79.10
--------------------
                          IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=      3.78          1.00
    Dep. Storage     (mm)=      1.00          5.00
```

```
     Average Slope     (%)=       1.00          2.00
     Length            (m)=     178.51         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    0.00 | 3.167    3.26 | 6.250    7.07 |  9.33    0.54
                 0.167    0.00 | 3.250    3.26 | 6.333    3.81 |  9.42    0.54
                 0.250    0.00 | 3.333    9.25 | 6.417    3.81 |  9.50    0.54
                 0.333    0.54 | 3.417    9.25 | 6.500    3.81 |  9.58    0.54
                 0.417    0.54 | 3.500    9.25 | 6.583    3.81 |  9.67    0.54
                 0.500    0.54 | 3.583    9.25 | 6.667    3.81 |  9.75    0.54
                 0.583    0.54 | 3.667    9.25 | 6.750    3.81 |  9.83    0.54
                 0.667    0.54 | 3.750    9.25 | 6.833    3.81 |  9.92    0.54
                 0.750    0.54 | 3.833    9.25 | 6.917    3.81 | 10.00    0.54
                 0.833    0.54 | 3.917    9.25 | 7.000    3.81 | 10.08    0.54
                 0.917    0.54 | 4.000    9.25 | 7.083    3.81 | 10.17    0.54
                 1.000    0.54 | 4.083    9.25 | 7.167    3.81 | 10.25    0.54
                 1.083    0.54 | 4.167    9.25 | 7.250    3.81 | 10.33    0.54
                 1.167    0.54 | 4.250    9.25 | 7.333    2.18 | 10.42    0.54
                 1.250    0.54 | 4.333   25.02 | 7.417    2.18 | 10.50    0.54
                 1.333    0.54 | 4.417   25.02 | 7.500    2.18 | 10.58    0.54
                 1.417    0.54 | 4.500   25.02 | 7.583    2.18 | 10.67    0.54
                 1.500    0.54 | 4.583   25.02 | 7.667    2.18 | 10.75    0.54
                 1.583    0.54 | 4.667   25.02 | 7.750    2.18 | 10.83    0.54
                 1.667    0.54 | 4.750   25.02 | 7.833    2.18 | 10.92    0.54
                 1.750    0.54 | 4.833   25.02 | 7.917    2.18 | 11.00    0.54
                 1.833    0.54 | 4.917   25.02 | 8.000    2.18 | 11.08    0.54
                 1.917    0.54 | 5.000   25.02 | 8.083    2.18 | 11.17    0.54
                 2.000    0.54 | 5.083   25.02 | 8.167    2.18 | 11.25    0.54
                 2.083    0.54 | 5.167   25.02 | 8.250    2.18 | 11.33    0.54
                 2.167    0.54 | 5.250   25.02 | 8.333    1.09 | 11.42    0.54
                 2.250    0.54 | 5.333    7.07 | 8.417    1.09 | 11.50    0.54
                 2.333    3.26 | 5.417    7.07 | 8.500    1.09 | 11.58    0.54
                 2.417    3.26 | 5.500    7.07 | 8.583    1.09 | 11.67    0.54
                 2.500    3.26 | 5.583    7.07 | 8.667    1.09 | 11.75    0.54
                 2.583    3.26 | 5.667    7.07 | 8.750    1.09 | 11.83    0.54
                 2.667    3.26 | 5.750    7.07 | 8.833    1.09 | 11.92    0.54
                 2.750    3.26 | 5.833    7.07 | 8.917    1.09 | 12.00    0.54
                 2.833    3.26 | 5.917    7.07 | 9.000    1.09 | 12.08    0.54
                 2.917    3.26 | 6.000    7.07 | 9.083    1.09 | 12.17    0.54
                 3.000    3.26 | 6.083    7.07 | 9.167    1.09 | 12.25    0.54
                 3.083    3.26 | 6.167    7.07 | 9.250    1.09 |

     Max.Eff.Inten.(mm/hr)=      25.02         19.90
                over (min)       5.00         20.00
     Storage Coeff.  (min)=      6.30 (ii)    19.76 (ii)
     Unit Hyd. Tpeak (min)=      5.00         20.00
     Unit Hyd. peak  (cms)=      0.19          0.06
                                                          *TOTALS*
     PEAK FLOW       (cms)=      0.26          0.05         0.310 (iii)
     TIME TO PEAK    (hrs)=      5.25          5.33          5.25
     RUNOFF VOLUME    (mm)=     53.38         32.73         49.06
     TOTAL RAINFALL   (mm)=     54.38         54.38         54.38
     RUNOFF COEFFICIENT   =      0.98          0.60          0.90

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN* =  91.0    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.

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--------------------
| ADD HYD  (  0033)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
         ID1= 1 (  1003):     4.78    0.310     5.25    49.06
       + ID2= 2 (  0035):     2.35    0.090     5.33    53.11
         ==================================================
         ID = 3 (  0033):     7.13    0.397     5.25    50.40

     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):     7.13    0.397     5.25    50.40
       + ID2= 2 (  0036):     2.11    0.081     5.33    53.10
         ==================================================
         ID = 1 (  0033):     9.24    0.477     5.25    51.02

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

------------------
| CHAMBER(  0028)|  OUTFLOW: ON,   UNDERDRAIN: OFF,  INFIL: OFF
|IN= 2--> OUT= 3 |  CHAMBER:
| DT=  1.0 min   |  MAX STO VOL (cu.m.)= 4532.43  Bottom Area(m2)  = 4149.20
------------------
                 DEPTH       STORAGE          |   DEPTH      STORAGE
                 (mm)        (cu.m.)          |   (mm)       (cu.m.)
                  0.00         0.00           |   889.00      2561.91
                 25.00        42.15           |   914.00      2644.15
                 51.00        84.29           |   940.00      2725.52
                 76.00       126.44           |   965.00      2805.96
                102.00       168.58           |   991.00      2885.44
                127.00       210.73           |  1016.00      2963.89
                152.00       252.88           |  1041.00      3041.23
                178.00       295.02           |  1067.00      3117.43
                203.00       337.17           |  1092.00      3192.40
                229.00       379.32           |  1118.00      3266.04
                254.00       421.46           |  1143.00      3338.30
                279.00       463.61           |  1168.00      3409.03
                305.00       505.75           |  1194.00      3478.15
                330.00       599.76           |  1219.00      3545.47
                356.00       693.36           |  1245.00      3610.81
                381.00       786.64           |  1270.00      3673.92
                406.00       879.62           |  1295.00      3734.48
                432.00       972.26           |  1321.00      3791.79
                457.00      1064.57           |  1346.00      3844.07
                483.00      1156.53           |  1372.00      3892.17
                508.00      1248.12           |  1397.00      3938.66
                533.00      1339.32           |  1422.00      3983.67
                559.00      1430.11           |  1448.00      4026.67
                584.00      1520.47           |  1473.00      4068.82
                610.00      1610.38           |  1499.00      4110.96
                635.00      1699.82           |  1524.00      4153.11
                660.00      1788.76           |  1549.00      4195.26
                686.00      1877.17           |  1575.00      4237.40
                711.00      1965.05           |  1600.00      4279.55
                737.00      2052.31           |  1626.00      4321.70
                762.00      2138.97           |  1651.00      4363.84
                787.00      2224.99           |  1676.00      4405.99
                813.00      2310.34           |  1702.00      4448.13
                838.00      2394.96           |  1727.00      4490.28
                864.00      2478.83           |  1753.00      4532.43

                DEPTH       DISCHARGE         |   DEPTH      DISCHARGE
                 (m)          (cms)           |    (m)         (cms)
                0.010         0.000           |   0.920        0.147
                0.160         0.021           |   1.070        0.173
                0.310         0.040           |   1.220        0.194
                0.460         0.053           |   1.380        0.214
                0.610         0.063           |   1.450        0.223
                0.770         0.113           |   0.000        0.000

                 AREA        QPEAK            TPEAK          R.V.
                 (ha)        (cms)            (hrs)          (mm)
  INFLOW:ID= 2   9.24        0.477             5.25          51.01
 OUTFLOW:ID= 1   9.24        0.106             7.85          45.34
OVERFLOW:ID= 3   0.00        0.000             0.00           0.00

          Volume Reduction Rate[(RVin-RVout)/RVin](%)=       11.13
          Time to reach Max storage               (Hr)=        7.85
          Volume of water for drawdown in LID (cu.m.)=     1573.50
          Volume of maximum water storage     (cu.m.)=     3053.76
          ***** After simulation, water volume is not zero.

  -------------------------
  | Junction Command(0029) |
  -------------------------

                         AREA     QPEAK   TPEAK      R.V.
                         (ha)     (cms)    (hrs)     (mm)
  INFLOW : ID= 3(  0028)   0.00     0.00    0.00      0.00
  OUTFLOW: ID= 2(  0029)   0.00     0.00    0.00      0.00

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

  -------------------------
  | Junction Command(0030) |
  -------------------------

                         AREA     QPEAK   TPEAK      R.V.
                         (ha)     (cms)    (hrs)     (mm)
  INFLOW : ID= 1(  0028)   9.24     0.11    7.85     45.34
  OUTFLOW: ID= 2(  0030)   9.24     0.11    7.85     45.34

  -----------------------------------------------------------------------------
**********************************
** SIMULATION:2.3 10yr 12hr AES **
**********************************

--------------------
|    READ STORM    |     Filename: C:\Users\caim069305\AppD
|                  |               ata\Local\Temp\
|                  |               42e5834f-7301-492c-9bf7-628b9be09e0d\99449df2
| Ptotal= 62.71 mm |     Comments: 10 Year 12 Hour AES (Bloor, TRCA)
--------------------
                  TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                   hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                  0.25    0.00 |  3.50   10.66 |  6.75    4.39 | 10.00    0.63
                  0.50    0.63 |  3.75   10.66 |  7.00    4.39 | 10.25    0.63
                  0.75    0.63 |  4.00   10.66 |  7.25    4.39 | 10.50    0.63
                  1.00    0.63 |  4.25   10.66 |  7.50    2.51 | 10.75    0.63
                  1.25    0.63 |  4.50   28.84 |  7.75    2.51 | 11.00    0.63
                  1.50    0.63 |  4.75   28.84 |  8.00    2.51 | 11.25    0.63
                  1.75    0.63 |  5.00   28.84 |  8.25    2.51 | 11.50    0.63
                  2.00    0.63 |  5.25   28.84 |  8.50    1.25 | 11.75    0.63
                  2.25    0.63 |  5.50    8.15 |  8.75    1.25 | 12.00    0.63
                  2.50    3.76 |  5.75    8.15 |  9.00    1.25 | 12.25    0.63
                  2.75    3.76 |  6.00    8.15 |  9.25    1.25 |
                  3.00    3.76 |  6.25    8.15 |  9.50    0.63 |
                  3.25    3.76 |  6.50    4.39 |  9.75    0.63 |

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--------------------
| CALIB            |
| STANDHYD (  1001)|   Area    (ha)=   2.35
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=       2.33          0.02
     Dep. Storage      (mm)=       1.00          5.00
     Average Slope      (%)=       1.00          2.00
     Length             (m)=     125.17         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    0.00 | 3.167    3.76 | 6.250    8.15 |  9.33    0.63
                 0.167    0.00 | 3.250    3.76 | 6.333    4.39 |  9.42    0.63
                 0.250    0.00 | 3.333   10.66 | 6.417    4.39 |  9.50    0.63
                 0.333    0.63 | 3.417   10.66 | 6.500    4.39 |  9.58    0.63
                 0.417    0.63 | 3.500   10.66 | 6.583    4.39 |  9.67    0.63
                 0.500    0.63 | 3.583   10.66 | 6.667    4.39 |  9.75    0.63
                 0.583    0.63 | 3.667   10.66 | 6.750    4.39 |  9.83    0.63
                 0.667    0.63 | 3.750   10.66 | 6.833    4.39 |  9.92    0.63
                 0.750    0.63 | 3.833   10.66 | 6.917    4.39 | 10.00    0.63
                 0.833    0.63 | 3.917   10.66 | 7.000    4.39 | 10.08    0.63
                 0.917    0.63 | 4.000   10.66 | 7.083    4.39 | 10.17    0.63
                 1.000    0.63 | 4.083   10.66 | 7.167    4.39 | 10.25    0.63
                 1.083    0.63 | 4.167   10.66 | 7.250    4.39 | 10.33    0.63
                 1.167    0.63 | 4.250   10.66 | 7.333    2.51 | 10.42    0.63
                 1.250    0.63 | 4.333   28.84 | 7.417    2.51 | 10.50    0.63
                 1.333    0.63 | 4.417   28.84 | 7.500    2.51 | 10.58    0.63
                 1.417    0.63 | 4.500   28.84 | 7.583    2.51 | 10.67    0.63
                 1.500    0.63 | 4.583   28.84 | 7.667    2.51 | 10.75    0.63
                 1.583    0.63 | 4.667   28.84 | 7.750    2.51 | 10.83    0.63
                 1.667    0.63 | 4.750   28.84 | 7.833    2.51 | 10.92    0.63
                 1.750    0.63 | 4.833   28.84 | 7.917    2.51 | 11.00    0.63
                 1.833    0.63 | 4.917   28.84 | 8.000    2.51 | 11.08    0.63
                 1.917    0.63 | 5.000   28.84 | 8.083    2.51 | 11.17    0.63
                 2.000    0.63 | 5.083   28.84 | 8.167    2.51 | 11.25    0.63
                 2.083    0.63 | 5.167   28.84 | 8.250    2.51 | 11.33    0.63
                 2.167    0.63 | 5.250   28.84 | 8.333    1.25 | 11.42    0.63
                 2.250    0.63 | 5.333    8.15 | 8.417    1.25 | 11.50    0.63
                 2.333    3.76 | 5.417    8.15 | 8.500    1.25 | 11.58    0.63
                 2.417    3.76 | 5.500    8.15 | 8.583    1.25 | 11.67    0.63
                 2.500    3.76 | 5.583    8.15 | 8.667    1.25 | 11.75    0.63
                 2.583    3.76 | 5.667    8.15 | 8.750    1.25 | 11.83    0.63
                 2.667    3.76 | 5.750    8.15 | 8.833    1.25 | 11.92    0.63
                 2.750    3.76 | 5.833    8.15 | 8.917    1.25 | 12.00    0.63
                 2.833    3.76 | 5.917    8.15 | 9.000    1.25 | 12.08    0.63
                 2.917    3.76 | 6.000    8.15 | 9.083    1.25 | 12.17    0.63
                 3.000    3.76 | 6.083    8.15 | 9.167    1.25 | 12.25    0.63
                 3.083    3.76 | 6.167    8.15 | 9.250    1.25 |

     Max.Eff.Inten.(mm/hr)=      28.84         24.13
                over (min)       5.00         10.00
     Storage Coeff.  (min)=      4.81 (ii)     6.65 (ii)
     Unit Hyd. Tpeak (min)=      5.00         10.00
     Unit Hyd. peak  (cms)=      0.22          0.14
                                                          *TOTALS*
     PEAK FLOW       (cms)=      0.19          0.00         0.188 (iii)
     TIME TO PEAK    (hrs)=      5.25          5.25          5.25
     RUNOFF VOLUME    (mm)=     61.71         40.21         61.49
     TOTAL RAINFALL   (mm)=     62.71         62.71         62.71
     RUNOFF COEFFICIENT   =      0.98          0.64          0.98

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

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN* =  91.0    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.

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--------------------
| RESERVOIR(  0035)|      OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |      OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------       (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000    |   0.1120     0.0665
                          0.0560     0.0333    |   0.1690     0.0998

                                 AREA     QPEAK       TPEAK        R.V.
                                 (ha)     (cms)       (hrs)        (mm)
    INFLOW : ID= 2 (  1001)     2.350     0.188        5.25        61.49
    OUTFLOW: ID= 1 (  0035)     2.350     0.103        5.33        61.43

                  PEAK   FLOW    REDUCTION [Qout/Qin](%)= 55.07
                  TIME SHIFT OF PEAK FLOW          (min)=  5.00
                  MAXIMUM  STORAGE   USED        (ha.m.)=  0.0615

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--------------------
| CALIB            |
| STANDHYD (  1002)|   Area    (ha)=   2.11
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=       2.09          0.02
     Dep. Storage      (mm)=       1.00          5.00
     Average Slope      (%)=       1.00          2.00
     Length             (m)=     118.60         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    0.00 | 3.167    3.76 | 6.250    8.15 |  9.33    0.63
                 0.167    0.00 | 3.250    3.76 | 6.333    4.39 |  9.42    0.63
                 0.250    0.00 | 3.333   10.66 | 6.417    4.39 |  9.50    0.63
                 0.333    0.63 | 3.417   10.66 | 6.500    4.39 |  9.58    0.63
                 0.417    0.63 | 3.500   10.66 | 6.583    4.39 |  9.67    0.63
                 0.500    0.63 | 3.583   10.66 | 6.667    4.39 |  9.75    0.63
                 0.583    0.63 | 3.667   10.66 | 6.750    4.39 |  9.83    0.63
                 0.667    0.63 | 3.750   10.66 | 6.833    4.39 |  9.92    0.63
                 0.750    0.63 | 3.833   10.66 | 6.917    4.39 | 10.00    0.63
                 0.833    0.63 | 3.917   10.66 | 7.000    4.39 | 10.08    0.63
                 0.917    0.63 | 4.000   10.66 | 7.083    4.39 | 10.17    0.63
                 1.000    0.63 | 4.083   10.66 | 7.167    4.39 | 10.25    0.63
                 1.083    0.63 | 4.167   10.66 | 7.250    4.39 | 10.33    0.63
                 1.167    0.63 | 4.250   10.66 | 7.333    2.51 | 10.42    0.63
                 1.250    0.63 | 4.333   28.84 | 7.417    2.51 | 10.50    0.63
                 1.333    0.63 | 4.417   28.84 | 7.500    2.51 | 10.58    0.63
                 1.417    0.63 | 4.500   28.84 | 7.583    2.51 | 10.67    0.63
                 1.500    0.63 | 4.583   28.84 | 7.667    2.51 | 10.75    0.63
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       1.583    0.63 | 4.667   28.84 | 7.750    2.51 | 10.83    0.63
       1.667    0.63 | 4.750   28.84 | 7.833    2.51 | 10.92    0.63
       1.750    0.63 | 4.833   28.84 | 7.917    2.51 | 11.00    0.63
       1.833    0.63 | 4.917   28.84 | 8.000    2.51 | 11.08    0.63
       1.917    0.63 | 5.000   28.84 | 8.083    2.51 | 11.17    0.63
       2.000    0.63 | 5.083   28.84 | 8.167    2.51 | 11.25    0.63
       2.083    0.63 | 5.167   28.84 | 8.250    2.51 | 11.33    0.63
       2.167    0.63 | 5.250   28.84 | 8.333    1.25 | 11.42    0.63
       2.250    0.63 | 5.333    8.15 | 8.417    1.25 | 11.50    0.63
       2.333    3.76 | 5.417    8.15 | 8.500    1.25 | 11.58    0.63
       2.417    3.76 | 5.500    8.15 | 8.583    1.25 | 11.67    0.63
       2.500    3.76 | 5.583    8.15 | 8.667    1.25 | 11.75    0.63
       2.583    3.76 | 5.667    8.15 | 8.750    1.25 | 11.83    0.63
       2.667    3.76 | 5.750    8.15 | 8.833    1.25 | 11.92    0.63
       2.750    3.76 | 5.833    8.15 | 8.917    1.25 | 12.00    0.63
       2.833    3.76 | 5.917    8.15 | 9.000    1.25 | 12.08    0.63
       2.917    3.76 | 6.000    8.15 | 9.083    1.25 | 12.17    0.63
       3.000    3.76 | 6.083    8.15 | 9.167    1.25 | 12.25    0.63
       3.083    3.76 | 6.167    8.15 | 9.250    1.25 |

    Max.Eff.Inten.(mm/hr)=      28.84        24.13
               over (min)        5.00        10.00
    Storage Coeff.  (min)=       4.65 (ii)    6.50 (ii)
    Unit Hyd. Tpeak (min)=       5.00        10.00
    Unit Hyd. peak  (cms)=       0.22         0.14
                                                        *TOTALS*
    PEAK FLOW       (cms)=       0.17         0.00        0.169 (iii)
    TIME TO PEAK    (hrs)=       5.25         5.25        5.25
    RUNOFF VOLUME    (mm)=      61.71        40.21       61.49
    TOTAL RAINFALL   (mm)=      62.71        62.71       62.71
    RUNOFF COEFFICIENT   =       0.98         0.64        0.98

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  91.0    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.

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--------------------
| RESERVOIR( 0036)|      OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min    |      OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000    0.0000    |   0.1020    0.0597
                          0.0510    0.0298    |   0.1530    0.0895

                           AREA     QPEAK      TPEAK       R.V.
                           (ha)     (cms)      (hrs)       (mm)
   INFLOW : ID= 2 (  1002)   2.110     0.169      5.25      61.49
   OUTFLOW: ID= 1 (  0036)   2.110     0.094      5.33      61.43

                 PEAK   FLOW   REDUCTION [Qout/Qin](%)= 55.55
                 TIME SHIFT OF PEAK FLOW          (min)=  5.00
                 MAXIMUM  STORAGE   USED        (ha.m.)=  0.0549

-----------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD ( 1003)|   Area    (ha)=   4.78
|ID= 1 DT= 5.0 min |   Total Imp(%)=  79.10   Dir. Conn.(%)=  79.10
--------------------
                           IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=     3.78          1.00
    Dep. Storage     (mm)=     1.00          5.00
    Average Slope     (%)=     1.00          2.00
    Length            (m)=   178.51         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   0.00 | 3.167    3.76 | 6.250    8.15 |  9.33    0.63
      0.167   0.00 | 3.250    3.76 | 6.333    4.39 |  9.42    0.63
      0.250   0.00 | 3.333   10.66 | 6.417    4.39 |  9.50    0.63
      0.333   0.63 | 3.417   10.66 | 6.500    4.39 |  9.58    0.63
      0.417   0.63 | 3.500   10.66 | 6.583    4.39 |  9.67    0.63
      0.500   0.63 | 3.583   10.66 | 6.667    4.39 |  9.75    0.63
      0.583   0.63 | 3.667   10.66 | 6.750    4.39 |  9.83    0.63
```

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       0.667    0.63 | 3.750   10.66 | 6.833    4.39 |  9.92    0.63
       0.750    0.63 | 3.833   10.66 | 6.917    4.39 | 10.00    0.63
       0.833    0.63 | 3.917   10.66 | 7.000    4.39 | 10.08    0.63
       0.917    0.63 | 4.000   10.66 | 7.083    4.39 | 10.17    0.63
       1.000    0.63 | 4.083   10.66 | 7.167    4.39 | 10.25    0.63
       1.083    0.63 | 4.167   10.66 | 7.250    4.39 | 10.33    0.63
       1.167    0.63 | 4.250   10.66 | 7.333    2.51 | 10.42    0.63
       1.250    0.63 | 4.333   28.84 | 7.417    2.51 | 10.50    0.63
       1.333    0.63 | 4.417   28.84 | 7.500    2.51 | 10.58    0.63
       1.417    0.63 | 4.500   28.84 | 7.583    2.51 | 10.67    0.63
       1.500    0.63 | 4.583   28.84 | 7.667    2.51 | 10.75    0.63
       1.583    0.63 | 4.667   28.84 | 7.750    2.51 | 10.83    0.63
       1.667    0.63 | 4.750   28.84 | 7.833    2.51 | 10.92    0.63
       1.750    0.63 | 4.833   28.84 | 7.917    2.51 | 11.00    0.63
       1.833    0.63 | 4.917   28.84 | 8.000    2.51 | 11.08    0.63
       1.917    0.63 | 5.000   28.84 | 8.083    2.51 | 11.17    0.63
       2.000    0.63 | 5.083   28.84 | 8.167    2.51 | 11.25    0.63
       2.083    0.63 | 5.167   28.84 | 8.250    2.51 | 11.33    0.63
       2.167    0.63 | 5.250   28.84 | 8.333    1.25 | 11.42    0.63
       2.250    0.63 | 5.333    8.15 | 8.417    1.25 | 11.50    0.63
       2.333    3.76 | 5.417    8.15 | 8.500    1.25 | 11.58    0.63
       2.417    3.76 | 5.500    8.15 | 8.583    1.25 | 11.67    0.63
       2.500    3.76 | 5.583    8.15 | 8.667    1.25 | 11.75    0.63
       2.583    3.76 | 5.667    8.15 | 8.750    1.25 | 11.83    0.63
       2.667    3.76 | 5.750    8.15 | 8.833    1.25 | 11.92    0.63
       2.750    3.76 | 5.833    8.15 | 8.917    1.25 | 12.00    0.63
       2.833    3.76 | 5.917    8.15 | 9.000    1.25 | 12.08    0.63
       2.917    3.76 | 6.000    8.15 | 9.083    1.25 | 12.17    0.63
       3.000    3.76 | 6.083    8.15 | 9.167    1.25 | 12.25    0.63
       3.083    3.76 | 6.167    8.15 | 9.250    1.25 |

    Max.Eff.Inten.(mm/hr)=      28.84        23.94
               over (min)        5.00        20.00
    Storage Coeff.  (min)=       5.95 (ii)   18.45 (ii)
    Unit Hyd. Tpeak (min)=       5.00        20.00
    Unit Hyd. peak  (cms)=       0.19         0.06
                                                        *TOTALS*
    PEAK FLOW       (cms)=       0.30         0.06        0.361 (iii)
    TIME TO PEAK    (hrs)=       5.25         5.25        5.25
    RUNOFF VOLUME    (mm)=      61.71        40.21       57.21
    TOTAL RAINFALL   (mm)=      62.71        62.71       62.71
    RUNOFF COEFFICIENT   =       0.98         0.64        0.91

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  91.0    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  ( 0033)|
|  1 + 2 = 3      |        AREA    QPEAK     TPEAK      R.V.
--------------------        (ha)    (cms)     (hrs)      (mm)
       ID1= 1 ( 1003):     4.78    0.361      5.25     57.21
     + ID2= 2 ( 0035):     2.35    0.103      5.33     61.43
       ================================================
       ID = 3 ( 0033):     7.13    0.462      5.25     58.60

     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):     7.13    0.462      5.25     58.60
     + ID2= 2 ( 0036):     2.11    0.094      5.33     61.43
       ================================================
       ID = 1 ( 0033):     9.24    0.554      5.25     59.25

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-----------------------------------------------------------------------------
------------------
| CHAMBER( 0028)|   OUTFLOW: ON,   UNDERDRAIN: OFF,  INFIL: OFF
|IN= 2--> OUT= 3 |   CHAMBER:
| DT=  1.0 min   |   MAX STO VOL (cu.m.)= 4532.43  Bottom Area(m2)  = 4149.20
------------------
                   DEPTH       STORAGE          |   DEPTH      STORAGE
                   (mm)        (cu.m.)          |   (mm)       (cu.m.)
                    0.00          0.00          |   889.00     2561.91
                   25.00         42.15          |   914.00     2644.15
```

```
             51.00          84.29          |      940.00       2725.52
             76.00         126.44          |      965.00       2805.96
            102.00         168.58          |      991.00       2885.44
            127.00         210.73          |     1016.00       2963.89
            152.00         252.88          |     1041.00       3041.23
            178.00         295.02          |     1067.00       3117.43
            203.00         337.17          |     1092.00       3192.40
            229.00         379.32          |     1118.00       3266.04
            254.00         421.46          |     1143.00       3338.30
            279.00         463.61          |     1168.00       3409.03
            305.00         505.75          |     1194.00       3478.15
            330.00         599.76          |     1219.00       3545.47
            356.00         693.36          |     1245.00       3610.81
            381.00         786.64          |     1270.00       3673.92
            406.00         879.62          |     1295.00       3734.48
            432.00         972.26          |     1321.00       3791.79
            457.00        1064.57          |     1346.00       3844.07
            483.00        1156.53          |     1372.00       3892.17
            508.00        1248.12          |     1397.00       3938.66
            533.00        1339.32          |     1422.00       3983.67
            559.00        1430.11          |     1448.00       4026.67
            584.00        1520.47          |     1473.00       4068.82
            610.00        1610.38          |     1499.00       4110.96
            635.00        1699.82          |     1524.00       4153.11
            660.00        1788.76          |     1549.00       4195.26
            686.00        1877.17          |     1575.00       4237.40
            711.00        1965.05          |     1600.00       4279.55
            737.00        2052.31          |     1626.00       4321.70
            762.00        2138.97          |     1651.00       4363.84
            787.00        2224.99          |     1676.00       4405.99
            813.00        2310.34          |     1702.00       4448.13
            838.00        2394.96          |     1727.00       4490.28
            864.00        2478.83          |     1753.00       4532.43

            DEPTH         DISCHARGE         |     DEPTH         DISCHARGE
             (m)            (cms)           |      (m)            (cms)
            0.010           0.000           |     0.920          0.147
            0.160           0.021           |     1.070          0.173
            0.310           0.040           |     1.220          0.194
            0.460           0.053           |     1.380          0.214
            0.610           0.063           |     1.450          0.223
            0.770           0.113           |     0.000          0.000

             AREA           QPEAK                  TPEAK             R.V.
             (ha)           (cms)                  (hrs)             (mm)
  INFLOW:ID= 2   9.24       0.554                   5.25            59.25
 OUTFLOW:ID= 1   9.24       0.135                   7.57            53.57
OVERFLOW:ID= 3   0.00       0.000                   0.00             0.00

        Volume Reduction Rate[(RVin-RVout)/RVin](%)=        9.58
        Time to reach Max storage            (Hr)=          7.57
        Volume of water for drawdown in LID (cu.m.)=     1632.37
        Volume of maximum water storage     (cu.m.)=     3399.65
        ***** After simulation, water volume is not zero.

  --------------------------
  | Junction Command(0029) |
  --------------------------

                       AREA     QPEAK    TPEAK      R.V.
                       (ha)     (cms)    (hrs)      (mm)
  INFLOW : ID= 3(  0028)   0.00     0.00     0.00      0.00
  OUTFLOW: ID= 2(  0029)   0.00     0.00     0.00      0.00

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

  --------------------------
  | Junction Command(0030) |
  --------------------------

                       AREA     QPEAK    TPEAK      R.V.
                       (ha)     (cms)    (hrs)      (mm)
  INFLOW : ID= 1(  0028)   9.24     0.14     7.57     53.57
  OUTFLOW: ID= 2(  0030)   9.24     0.14     7.57     53.57

  ---------------------------------------------------------------------------
**********************************
** SIMULATION:2.4 25yr 12hr AES **
**********************************

--------------------
|   READ STORM      |     Filename: C:\Users\caim069305\AppD
|                   |               ata\Local\Temp\
|                   |               42e5834f-7301-492c-9bf7-628b9be09e0d\69a6597d
```

```
| Ptotal= 73.10 mm |    Comments: 25 Year 12 Hour AES (Bloor, TRCA)
--------------------
              TIME     RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
               hrs    mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
              0.25    0.00 |  3.50   12.43 |  6.75    5.12 | 10.00    0.73
              0.50    0.73 |  3.75   12.43 |  7.00    5.12 | 10.25    0.73
              0.75    0.73 |  4.00   12.43 |  7.25    5.12 | 10.50    0.73
              1.00    0.73 |  4.25   12.43 |  7.50    2.92 | 10.75    0.73
              1.25    0.73 |  4.50   33.63 |  7.75    2.92 | 11.00    0.73
              1.50    0.73 |  4.75   33.63 |  8.00    2.92 | 11.25    0.73
              1.75    0.73 |  5.00   33.63 |  8.25    2.92 | 11.50    0.73
              2.00    0.73 |  5.25   33.63 |  8.50    1.46 | 11.75    0.73
              2.25    0.73 |  5.50    9.50 |  8.75    1.46 | 12.00    0.73
              2.50    4.39 |  5.75    9.50 |  9.00    1.46 | 12.25    0.73
              2.75    4.39 |  6.00    9.50 |  9.25    1.46 |
              3.00    4.39 |  6.25    9.50 |  9.50    0.73 |
              3.25    4.39 |  6.50    5.12 |  9.75    0.73 |

-----------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD ( 1001)|   Area    (ha)=   2.35
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=     2.33          0.02
    Dep. Storage     (mm)=     1.00          5.00
    Average Slope     (%)=     1.00          2.00
    Length            (m)=   125.17         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   0.00 | 3.167    4.39 | 6.250    9.50 |  9.33    0.73
      0.167   0.00 | 3.250    4.39 | 6.333    5.12 |  9.42    0.73
      0.250   0.00 | 3.333   12.43 | 6.417    5.12 |  9.50    0.73
      0.333   0.73 | 3.417   12.43 | 6.500    5.12 |  9.58    0.73
      0.417   0.73 | 3.500   12.43 | 6.583    5.12 |  9.67    0.73
      0.500   0.73 | 3.583   12.43 | 6.667    5.12 |  9.75    0.73
      0.583   0.73 | 3.667   12.43 | 6.750    5.12 |  9.83    0.73
      0.667   0.73 | 3.750   12.43 | 6.833    5.12 |  9.92    0.73
      0.750   0.73 | 3.833   12.43 | 6.917    5.12 | 10.00    0.73
      0.833   0.73 | 3.917   12.43 | 7.000    5.12 | 10.08    0.73
      0.917   0.73 | 4.000   12.43 | 7.083    5.12 | 10.17    0.73
      1.000   0.73 | 4.083   12.43 | 7.167    5.12 | 10.25    0.73
      1.083   0.73 | 4.167   12.43 | 7.250    5.12 | 10.33    0.73
      1.167   0.73 | 4.250   12.43 | 7.333    2.92 | 10.42    0.73
      1.250   0.73 | 4.333   33.63 | 7.417    2.92 | 10.50    0.73
      1.333   0.73 | 4.417   33.63 | 7.500    2.92 | 10.58    0.73
      1.417   0.73 | 4.500   33.63 | 7.583    2.92 | 10.67    0.73
      1.500   0.73 | 4.583   33.63 | 7.667    2.92 | 10.75    0.73
      1.583   0.73 | 4.667   33.63 | 7.750    2.92 | 10.83    0.73
      1.667   0.73 | 4.750   33.63 | 7.833    2.92 | 10.92    0.73
      1.750   0.73 | 4.833   33.63 | 7.917    2.92 | 11.00    0.73
      1.833   0.73 | 4.917   33.63 | 8.000    2.92 | 11.08    0.73
      1.917   0.73 | 5.000   33.63 | 8.083    2.92 | 11.17    0.73
      2.000   0.73 | 5.083   33.63 | 8.167    2.92 | 11.25    0.73
      2.083   0.73 | 5.167   33.63 | 8.250    2.92 | 11.33    0.73
      2.167   0.73 | 5.250   33.63 | 8.333    1.46 | 11.42    0.73
      2.250   0.73 | 5.333    9.50 | 8.417    1.46 | 11.50    0.73
      2.333   4.39 | 5.417    9.50 | 8.500    1.46 | 11.58    0.73
      2.417   4.39 | 5.500    9.50 | 8.583    1.46 | 11.67    0.73
      2.500   4.39 | 5.583    9.50 | 8.667    1.46 | 11.75    0.73
      2.583   4.39 | 5.667    9.50 | 8.750    1.46 | 11.83    0.73
      2.667   4.39 | 5.750    9.50 | 8.833    1.46 | 11.92    0.73
      2.750   4.39 | 5.833    9.50 | 8.917    1.46 | 12.00    0.73
      2.833   4.39 | 5.917    9.50 | 9.000    1.46 | 12.08    0.73
      2.917   4.39 | 6.000    9.50 | 9.083    1.46 | 12.17    0.73
      3.000   4.39 | 6.083    9.50 | 9.167    1.46 | 12.25    0.73
      3.083   4.39 | 6.167    9.50 | 9.250    1.46 |

    Max.Eff.Inten.(mm/hr)=      33.63        29.19
               over (min)        5.00        10.00
    Storage Coeff.  (min)=       4.52 (ii)    6.26 (ii)
    Unit Hyd. Tpeak (min)=       5.00        10.00
    Unit Hyd. peak  (cms)=       0.23         0.15
                                                        *TOTALS*
    PEAK FLOW       (cms)=       0.22         0.00        0.219 (iii)
    TIME TO PEAK    (hrs)=       5.25         5.25        5.25
```

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     RUNOFF VOLUME    (mm)=       72.10         49.75          71.88
     TOTAL RAINFALL   (mm)=       73.10         73.10          73.10
     RUNOFF COEFFICIENT   =        0.99          0.68           0.98

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  91.0    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.

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--------------------
| RESERVOIR( 0035)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.1120     0.0665
                          0.0560     0.0333   |   0.1690     0.0998

                              AREA      QPEAK      TPEAK        R.V.
                              (ha)      (cms)      (hrs)        (mm)
   INFLOW : ID= 2 (  1001)    2.350      0.219      5.25       71.88
   OUTFLOW: ID= 1 (  0035)    2.350      0.121      5.33       71.82

                PEAK   FLOW   REDUCTION [Qout/Qin](%)= 55.25
                TIME SHIFT OF PEAK FLOW          (min)=  5.00
                MAXIMUM  STORAGE   USED        (ha.m.)=  0.0719

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD ( 1002)|   Area    (ha)=   2.11
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=     2.09         0.02
     Dep. Storage     (mm)=     1.00         5.00
     Average Slope     (%)=     1.00         2.00
     Length            (m)=   118.60        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    0.00 | 3.167    4.39 | 6.250    9.50 |  9.33    0.73
              0.167    0.00 | 3.250    4.39 | 6.333    5.12 |  9.42    0.73
              0.250    0.00 | 3.333   12.43 | 6.417    5.12 |  9.50    0.73
              0.333    0.73 | 3.417   12.43 | 6.500    5.12 |  9.58    0.73
              0.417    0.73 | 3.500   12.43 | 6.583    5.12 |  9.67    0.73
              0.500    0.73 | 3.583   12.43 | 6.667    5.12 |  9.75    0.73
              0.583    0.73 | 3.667   12.43 | 6.750    5.12 |  9.83    0.73
              0.667    0.73 | 3.750   12.43 | 6.833    5.12 |  9.92    0.73
              0.750    0.73 | 3.833   12.43 | 6.917    5.12 | 10.00    0.73
              0.833    0.73 | 3.917   12.43 | 7.000    5.12 | 10.08    0.73
              0.917    0.73 | 4.000   12.43 | 7.083    5.12 | 10.17    0.73
              1.000    0.73 | 4.083   12.43 | 7.167    5.12 | 10.25    0.73
              1.083    0.73 | 4.167   12.43 | 7.250    5.12 | 10.33    0.73
              1.167    0.73 | 4.250   12.43 | 7.333    2.92 | 10.42    0.73
              1.250    0.73 | 4.333   33.63 | 7.417    2.92 | 10.50    0.73
              1.333    0.73 | 4.417   33.63 | 7.500    2.92 | 10.58    0.73
              1.417    0.73 | 4.500   33.63 | 7.583    2.92 | 10.67    0.73
              1.500    0.73 | 4.583   33.63 | 7.667    2.92 | 10.75    0.73
              1.583    0.73 | 4.667   33.63 | 7.750    2.92 | 10.83    0.73
              1.667    0.73 | 4.750   33.63 | 7.833    2.92 | 10.92    0.73
              1.750    0.73 | 4.833   33.63 | 7.917    2.92 | 11.00    0.73
              1.833    0.73 | 4.917   33.63 | 8.000    2.92 | 11.08    0.73
              1.917    0.73 | 5.000   33.63 | 8.083    2.92 | 11.17    0.73
              2.000    0.73 | 5.083   33.63 | 8.167    2.92 | 11.25    0.73
              2.083    0.73 | 5.167   33.63 | 8.250    2.92 | 11.33    0.73
              2.167    0.73 | 5.250   33.63 | 8.333    1.46 | 11.42    0.73
              2.250    0.73 | 5.333    9.50 | 8.417    1.46 | 11.50    0.73
              2.333    4.39 | 5.417    9.50 | 8.500    1.46 | 11.58    0.73
              2.417    4.39 | 5.500    9.50 | 8.583    1.46 | 11.67    0.73
              2.500    4.39 | 5.583    9.50 | 8.667    1.46 | 11.75    0.73
              2.583    4.39 | 5.667    9.50 | 8.750    1.46 | 11.83    0.73
              2.667    4.39 | 5.750    9.50 | 8.833    1.46 | 11.92    0.73
              2.750    4.39 | 5.833    9.50 | 8.917    1.46 | 12.00    0.73
              2.833    4.39 | 5.917    9.50 | 9.000    1.46 | 12.08    0.73
              2.917    4.39 | 6.000    9.50 | 9.083    1.46 | 12.17    0.73
```

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              3.000    4.39 | 6.083    9.50 | 9.167    1.46 | 12.25    0.73
              3.083    4.39 | 6.167    9.50 | 9.250    1.46 |

     Max.Eff.Inten.(mm/hr)=      33.63         29.19
                over (min)       5.00         10.00
     Storage Coeff.  (min)=       4.38 (ii)     6.11 (ii)
     Unit Hyd. Tpeak (min)=       5.00         10.00
     Unit Hyd. peak  (cms)=       0.23          0.15
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.20          0.00          0.197 (iii)
     TIME TO PEAK    (hrs)=       5.17          5.25           5.25
     RUNOFF VOLUME    (mm)=      72.10         49.75          71.88
     TOTAL RAINFALL   (mm)=      73.10         73.10          73.10
     RUNOFF COEFFICIENT   =       0.99          0.68           0.98

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  91.0    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.

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--------------------
| RESERVOIR( 0036)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.1020     0.0597
                          0.0510     0.0298   |   0.1530     0.0895

                              AREA      QPEAK      TPEAK        R.V.
                              (ha)      (cms)      (hrs)        (mm)
   INFLOW : ID= 2 (  1002)    2.110      0.197      5.25       71.88
   OUTFLOW: ID= 1 (  0036)    2.110      0.110      5.33       71.81

                PEAK   FLOW   REDUCTION [Qout/Qin](%)= 55.67
                TIME SHIFT OF PEAK FLOW          (min)=  5.00
                MAXIMUM  STORAGE   USED        (ha.m.)=  0.0642

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--------------------
| CALIB            |
| STANDHYD ( 1003)|   Area    (ha)=   4.78
|ID= 1 DT= 5.0 min |   Total Imp(%)=  79.10   Dir. Conn.(%)=  79.10
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=     3.78         1.00
     Dep. Storage     (mm)=     1.00         5.00
     Average Slope     (%)=     1.00         2.00
     Length            (m)=   178.51        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    0.00 | 3.167    4.39 | 6.250    9.50 |  9.33    0.73
              0.167    0.00 | 3.250    4.39 | 6.333    5.12 |  9.42    0.73
              0.250    0.00 | 3.333   12.43 | 6.417    5.12 |  9.50    0.73
              0.333    0.73 | 3.417   12.43 | 6.500    5.12 |  9.58    0.73
              0.417    0.73 | 3.500   12.43 | 6.583    5.12 |  9.67    0.73
              0.500    0.73 | 3.583   12.43 | 6.667    5.12 |  9.75    0.73
              0.583    0.73 | 3.667   12.43 | 6.750    5.12 |  9.83    0.73
              0.667    0.73 | 3.750   12.43 | 6.833    5.12 |  9.92    0.73
              0.750    0.73 | 3.833   12.43 | 6.917    5.12 | 10.00    0.73
              0.833    0.73 | 3.917   12.43 | 7.000    5.12 | 10.08    0.73
              0.917    0.73 | 4.000   12.43 | 7.083    5.12 | 10.17    0.73
              1.000    0.73 | 4.083   12.43 | 7.167    5.12 | 10.25    0.73
              1.083    0.73 | 4.167   12.43 | 7.250    5.12 | 10.33    0.73
              1.167    0.73 | 4.250   12.43 | 7.333    2.92 | 10.42    0.73
              1.250    0.73 | 4.333   33.63 | 7.417    2.92 | 10.50    0.73
              1.333    0.73 | 4.417   33.63 | 7.500    2.92 | 10.58    0.73
              1.417    0.73 | 4.500   33.63 | 7.583    2.92 | 10.67    0.73
              1.500    0.73 | 4.583   33.63 | 7.667    2.92 | 10.75    0.73
              1.583    0.73 | 4.667   33.63 | 7.750    2.92 | 10.83    0.73
              1.667    0.73 | 4.750   33.63 | 7.833    2.92 | 10.92    0.73
              1.750    0.73 | 4.833   33.63 | 7.917    2.92 | 11.00    0.73
              1.833    0.73 | 4.917   33.63 | 8.000    2.92 | 11.08    0.73
              1.917    0.73 | 5.000   33.63 | 8.083    2.92 | 11.17    0.73
              2.000    0.73 | 5.083   33.63 | 8.167    2.92 | 11.25    0.73
```

```
              2.083    0.73 | 5.167   33.63 | 8.250    2.92 | 11.33    0.73
              2.167    0.73 | 5.250   33.63 | 8.333    1.46 | 11.42    0.73
              2.250    0.73 | 5.333    9.50 | 8.417    1.46 | 11.50    0.73
              2.333    4.39 | 5.417    9.50 | 8.500    1.46 | 11.58    0.73
              2.417    4.39 | 5.500    9.50 | 8.583    1.46 | 11.67    0.73
              2.500    4.39 | 5.583    9.50 | 8.667    1.46 | 11.75    0.73
              2.583    4.39 | 5.667    9.50 | 8.750    1.46 | 11.83    0.73
              2.667    4.39 | 5.750    9.50 | 8.833    1.46 | 11.92    0.73
              2.750    4.39 | 5.833    9.50 | 8.917    1.46 | 12.00    0.73
              2.833    4.39 | 5.917    9.50 | 9.000    1.46 | 12.08    0.73
              2.917    4.39 | 6.000    9.50 | 9.083    1.46 | 12.17    0.73
              3.000    4.39 | 6.083    9.50 | 9.167    1.46 | 12.25    0.73
              3.083    4.39 | 6.167    9.50 | 9.250    1.46 |

     Max.Eff.Inten.(mm/hr)=      33.63         29.00
                over (min)       5.00         20.00
     Storage Coeff.  (min)=       5.59 (ii)    17.17 (ii)
     Unit Hyd. Tpeak (min)=       5.00         20.00
     Unit Hyd. peak  (cms)=       0.20          0.06
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.35          0.07          0.426 (iii)
     TIME TO PEAK    (hrs)=       5.25          5.25           5.25
     RUNOFF VOLUME    (mm)=      72.10         49.75          67.43
     TOTAL RAINFALL   (mm)=      73.10         73.10          73.10
     RUNOFF COEFFICIENT   =       0.99          0.68           0.92

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  91.0    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  ( 0033)|
|  1 +  2 =  3     |        AREA    QPEAK    TPEAK      R.V.
--------------------        (ha)    (cms)    (hrs)      (mm)
        ID1= 1 (  1003):    4.78   0.426     5.25     67.43
      + ID2= 2 (  0035):    2.35   0.121     5.33     71.82
        ===============================================
        ID = 3 (  0033):    7.13   0.544     5.25     68.87

     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):    7.13   0.544     5.25     68.87
      + ID2= 2 (  0036):    2.11   0.110     5.33     71.81
        ===============================================
        ID = 1 (  0033):    9.24   0.652     5.25     69.54

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
------------------
| CHAMBER( 0028)|  OUTFLOW: ON,   UNDERDRAIN: OFF,  INFIL: OFF
|IN= 2--> OUT= 3 |  CHAMBER:
| DT=  1.0 min   |  MAX STO VOL (cu.m.)= 4532.43  Bottom Area(m2)   = 4149.20
------------------
                      DEPTH        STORAGE          |    DEPTH       STORAGE
                      (mm)         (cu.m.)          |    (mm)        (cu.m.)
                       0.00           0.00          |    889.00      2561.91
                      25.00          42.15          |    914.00      2644.15
                      51.00          84.29          |    940.00      2725.52
                      76.00         126.44          |    965.00      2805.96
                     102.00         168.58          |    991.00      2885.44
                     127.00         210.73          |   1016.00      2963.89
                     152.00         252.88          |   1041.00      3041.23
                     178.00         295.02          |   1067.00      3117.43
                     203.00         337.17          |   1092.00      3192.40
                     229.00         379.32          |   1118.00      3266.04
                     254.00         421.46          |   1143.00      3338.30
                     279.00         463.61          |   1168.00      3409.03
                     305.00         505.75          |   1194.00      3478.15
                     330.00         599.76          |   1219.00      3545.47
                     356.00         693.36          |   1245.00      3610.81
                     381.00         786.64          |   1270.00      3673.92
                     406.00         879.62          |   1295.00      3734.48
                     432.00         972.26          |   1321.00      3791.79
                     457.00        1064.57          |   1346.00      3844.07
```

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                     483.00        1156.53          |   1372.00      3892.17
                     508.00        1248.12          |   1397.00      3938.66
                     533.00        1339.32          |   1422.00      3983.67
                     559.00        1430.11          |   1448.00      4026.67
                     584.00        1520.47          |   1473.00      4068.82
                     610.00        1610.38          |   1499.00      4110.96
                     635.00        1699.82          |   1524.00      4153.11
                     660.00        1788.76          |   1549.00      4195.26
                     686.00        1877.17          |   1575.00      4237.40
                     711.00        1965.05          |   1600.00      4279.55
                     737.00        2052.31          |   1626.00      4321.70
                     762.00        2138.97          |   1651.00      4363.84
                     787.00        2224.99          |   1676.00      4405.99
                     813.00        2310.34          |   1702.00      4448.13
                     838.00        2394.96          |   1727.00      4490.28
                     864.00        2478.83          |   1753.00      4532.43

                   DEPTH        DISCHARGE          |    DEPTH       DISCHARGE
                    (m)           (cms)            |     (m)          (cms)
                   0.010         0.000             |    0.920        0.147
                   0.160         0.021             |    1.070        0.173
                   0.310         0.040             |    1.220        0.194
                   0.460         0.053             |    1.380        0.214
                   0.610         0.063             |    1.450        0.223
                   0.770         0.113             |    0.000        0.000

                    AREA           QPEAK              TPEAK           R.V.
                    (ha)           (cms)              (hrs)           (mm)
     INFLOW:ID= 2   9.24           0.652               5.25          69.54
    OUTFLOW:ID= 1   9.24           0.170               7.42          63.87
   OVERFLOW:ID= 3   0.00           0.000               0.00           0.00

            Volume Reduction Rate[(RVin-RVout)/RVin](%)=         8.16
            Time to reach Max storage                (Hr)=       7.42
            Volume of water for drawdown in LID (cu.m.)=      1694.87
            Volume of maximum water storage     (cu.m.)=      3842.86
            ***** After simulation, water volume is not zero.

   -------------------------
   | Junction Command(0029) |
   -------------------------

                          AREA     QPEAK   TPEAK      R.V.
                          (ha)     (cms)    (hrs)      (mm)
   INFLOW : ID= 3(  0028)   0.00     0.00    0.00      0.00
   OUTFLOW: ID= 2(  0029)   0.00     0.00    0.00      0.00

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

   -------------------------
   | Junction Command(0030) |
   -------------------------

                          AREA     QPEAK   TPEAK      R.V.
                          (ha)     (cms)    (hrs)      (mm)
   INFLOW : ID= 1(  0028)   9.24     0.17    7.42     63.87
   OUTFLOW: ID= 2(  0030)   9.24     0.17    7.42     63.87

   -------------------------------------------------------------------------------
**********************************
** SIMULATION:2.5 50yr 12hr AES **
**********************************

--------------------
|    READ STORM    |    Filename: C:\Users\caim069305\AppD
|                  |              ata\Local\Temp\
|                  |              42e5834f-7301-492c-9bf7-628b9be09e0d\c54d09ca
| Ptotal= 80.82 mm |    Comments: 50 Year 12 Hour AES (Bloor, TRCA)
--------------------
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.25    0.00 |  3.50   13.74 |  6.75    5.66 | 10.00    0.81
               0.50    0.81 |  3.75   13.74 |  7.00    5.66 | 10.25    0.81
               0.75    0.81 |  4.00   13.74 |  7.25    5.66 | 10.50    0.81
               1.00    0.81 |  4.25   13.74 |  7.50    3.23 | 10.75    0.81
               1.25    0.81 |  4.50   37.17 |  7.75    3.23 | 11.00    0.81
               1.50    0.81 |  4.75   37.17 |  8.00    3.23 | 11.25    0.81
               1.75    0.81 |  5.00   37.17 |  8.25    3.23 | 11.50    0.81
               2.00    0.81 |  5.25   37.17 |  8.50    1.62 | 11.75    0.81
               2.25    0.81 |  5.50   10.50 |  8.75    1.62 | 12.00    0.81
               2.50    4.85 |  5.75   10.50 |  9.00    1.62 | 12.25    0.81
               2.75    4.85 |  6.00   10.50 |  9.25    1.62 |
               3.00    4.85 |  6.25   10.50 |  9.50    0.81 |
               3.25    4.85 |  6.50    5.66 |  9.75    0.81 |
```

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--------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD ( 1001)|   Area    (ha)=   2.35
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.33          0.02
     Dep. Storage     (mm)=       1.00          5.00
     Average Slope     (%)=       1.00          2.00
     Length            (m)=     125.17         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    0.00 | 3.167    4.85 | 6.250   10.50 |  9.33    0.81
              0.167    0.00 | 3.250    4.85 | 6.333    5.66 |  9.42    0.81
              0.250    0.00 | 3.333   13.74 | 6.417    5.66 |  9.50    0.81
              0.333    0.81 | 3.417   13.74 | 6.500    5.66 |  9.58    0.81
              0.417    0.81 | 3.500   13.74 | 6.583    5.66 |  9.67    0.81
              0.500    0.81 | 3.583   13.74 | 6.667    5.66 |  9.75    0.81
              0.583    0.81 | 3.667   13.74 | 6.750    5.66 |  9.83    0.81
              0.667    0.81 | 3.750   13.74 | 6.833    5.66 |  9.92    0.81
              0.750    0.81 | 3.833   13.74 | 6.917    5.66 | 10.00    0.81
              0.833    0.81 | 3.917   13.74 | 7.000    5.66 | 10.08    0.81
              0.917    0.81 | 4.000   13.74 | 7.083    5.66 | 10.17    0.81
              1.000    0.81 | 4.083   13.74 | 7.167    5.66 | 10.25    0.81
              1.083    0.81 | 4.167   13.74 | 7.250    5.66 | 10.33    0.81
              1.167    0.81 | 4.250   13.74 | 7.333    3.23 | 10.42    0.81
              1.250    0.81 | 4.333   37.17 | 7.417    3.23 | 10.50    0.81
              1.333    0.81 | 4.417   37.17 | 7.500    3.23 | 10.58    0.81
              1.417    0.81 | 4.500   37.17 | 7.583    3.23 | 10.67    0.81
              1.500    0.81 | 4.583   37.17 | 7.667    3.23 | 10.75    0.81
              1.583    0.81 | 4.667   37.17 | 7.750    3.23 | 10.83    0.81
              1.667    0.81 | 4.750   37.17 | 7.833    3.23 | 10.92    0.81
              1.750    0.81 | 4.833   37.17 | 7.917    3.23 | 11.00    0.81
              1.833    0.81 | 4.917   37.17 | 8.000    3.23 | 11.08    0.81
              1.917    0.81 | 5.000   37.17 | 8.083    3.23 | 11.17    0.81
              2.000    0.81 | 5.083   37.17 | 8.167    3.23 | 11.25    0.81
              2.083    0.81 | 5.167   37.17 | 8.250    3.23 | 11.33    0.81
              2.167    0.81 | 5.250   37.17 | 8.333    1.62 | 11.42    0.81
              2.250    0.81 | 5.333   10.50 | 8.417    1.62 | 11.50    0.81
              2.333    4.85 | 5.417   10.50 | 8.500    1.62 | 11.58    0.81
              2.417    4.85 | 5.500   10.50 | 8.583    1.62 | 11.67    0.81
              2.500    4.85 | 5.583   10.50 | 8.667    1.62 | 11.75    0.81
              2.583    4.85 | 5.667   10.50 | 8.750    1.62 | 11.83    0.81
              2.667    4.85 | 5.750   10.50 | 8.833    1.62 | 11.92    0.81
              2.750    4.85 | 5.833   10.50 | 8.917    1.62 | 12.00    0.81
              2.833    4.85 | 5.917   10.50 | 9.000    1.62 | 12.08    0.81
              2.917    4.85 | 6.000   10.50 | 9.083    1.62 | 12.17    0.81
              3.000    4.85 | 6.083   10.50 | 9.167    1.62 | 12.25    0.81
              3.083    4.85 | 6.167   10.50 | 9.250    1.62 |

     Max.Eff.Inten.(mm/hr)=      37.17         32.93
               over (min)         5.00         10.00
     Storage Coeff.  (min)=       4.34 (ii)     6.01 (ii)
     Unit Hyd. Tpeak (min)=       5.00         10.00
     Unit Hyd. peak  (cms)=       0.23          0.15
                                                            *TOTALS*
     PEAK FLOW       (cms)=       0.24          0.00          0.242 (iii)
     TIME TO PEAK    (hrs)=       5.17          5.25           5.25
     RUNOFF VOLUME    (mm)=      79.82         56.95          79.59
     TOTAL RAINFALL   (mm)=      80.82         80.82          80.82
     RUNOFF COEFFICIENT   =       0.99          0.70           0.98

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

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =  91.0    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.

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--------------------
| RESERVOIR( 0035)|      OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |      OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------       (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000    |   0.1120     0.0665
                          0.0560     0.0333    |   0.1690     0.0998

                             AREA     QPEAK      TPEAK        R.V.
                             (ha)     (cms)      (hrs)        (mm)
   INFLOW : ID= 2 (  1001)   2.350     0.242       5.25       79.59
   OUTFLOW: ID= 1 (  0035)   2.350     0.134       5.33       79.53

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 55.39
                  TIME SHIFT OF PEAK FLOW         (min)=  5.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0796

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--------------------
| CALIB              |
| STANDHYD ( 1002)|   Area    (ha)=   2.11
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.09          0.02
     Dep. Storage     (mm)=       1.00          5.00
     Average Slope     (%)=       1.00          2.00
     Length            (m)=     118.60         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    0.00 | 3.167    4.85 | 6.250   10.50 |  9.33    0.81
              0.167    0.00 | 3.250    4.85 | 6.333    5.66 |  9.42    0.81
              0.250    0.00 | 3.333   13.74 | 6.417    5.66 |  9.50    0.81
              0.333    0.81 | 3.417   13.74 | 6.500    5.66 |  9.58    0.81
              0.417    0.81 | 3.500   13.74 | 6.583    5.66 |  9.67    0.81
              0.500    0.81 | 3.583   13.74 | 6.667    5.66 |  9.75    0.81
              0.583    0.81 | 3.667   13.74 | 6.750    5.66 |  9.83    0.81
              0.667    0.81 | 3.750   13.74 | 6.833    5.66 |  9.92    0.81
              0.750    0.81 | 3.833   13.74 | 6.917    5.66 | 10.00    0.81
              0.833    0.81 | 3.917   13.74 | 7.000    5.66 | 10.08    0.81
              0.917    0.81 | 4.000   13.74 | 7.083    5.66 | 10.17    0.81
              1.000    0.81 | 4.083   13.74 | 7.167    5.66 | 10.25    0.81
              1.083    0.81 | 4.167   13.74 | 7.250    5.66 | 10.33    0.81
              1.167    0.81 | 4.250   13.74 | 7.333    3.23 | 10.42    0.81
              1.250    0.81 | 4.333   37.17 | 7.417    3.23 | 10.50    0.81
              1.333    0.81 | 4.417   37.17 | 7.500    3.23 | 10.58    0.81
              1.417    0.81 | 4.500   37.17 | 7.583    3.23 | 10.67    0.81
              1.500    0.81 | 4.583   37.17 | 7.667    3.23 | 10.75    0.81
              1.583    0.81 | 4.667   37.17 | 7.750    3.23 | 10.83    0.81
              1.667    0.81 | 4.750   37.17 | 7.833    3.23 | 10.92    0.81
              1.750    0.81 | 4.833   37.17 | 7.917    3.23 | 11.00    0.81
              1.833    0.81 | 4.917   37.17 | 8.000    3.23 | 11.08    0.81
              1.917    0.81 | 5.000   37.17 | 8.083    3.23 | 11.17    0.81
              2.000    0.81 | 5.083   37.17 | 8.167    3.23 | 11.25    0.81
              2.083    0.81 | 5.167   37.17 | 8.250    3.23 | 11.33    0.81
              2.167    0.81 | 5.250   37.17 | 8.333    1.62 | 11.42    0.81
              2.250    0.81 | 5.333   10.50 | 8.417    1.62 | 11.50    0.81
              2.333    4.85 | 5.417   10.50 | 8.500    1.62 | 11.58    0.81
              2.417    4.85 | 5.500   10.50 | 8.583    1.62 | 11.67    0.81
              2.500    4.85 | 5.583   10.50 | 8.667    1.62 | 11.75    0.81
              2.583    4.85 | 5.667   10.50 | 8.750    1.62 | 11.83    0.81
              2.667    4.85 | 5.750   10.50 | 8.833    1.62 | 11.92    0.81
              2.750    4.85 | 5.833   10.50 | 8.917    1.62 | 12.00    0.81
              2.833    4.85 | 5.917   10.50 | 9.000    1.62 | 12.08    0.81
              2.917    4.85 | 6.000   10.50 | 9.083    1.62 | 12.17    0.81
              3.000    4.85 | 6.083   10.50 | 9.167    1.62 | 12.25    0.81
              3.083    4.85 | 6.167   10.50 | 9.250    1.62 |

     Max.Eff.Inten.(mm/hr)=      37.17         32.93
               over (min)         5.00         10.00
     Storage Coeff.  (min)=       4.20 (ii)     5.87 (ii)
     Unit Hyd. Tpeak (min)=       5.00         10.00
     Unit Hyd. peak  (cms)=       0.24          0.15
                                                            *TOTALS*
     PEAK FLOW       (cms)=       0.22          0.00          0.218 (iii)
     TIME TO PEAK    (hrs)=       5.17          5.25           5.25
     RUNOFF VOLUME    (mm)=      79.82         56.95          79.59
     TOTAL RAINFALL   (mm)=      80.82         80.82          80.82
     RUNOFF COEFFICIENT   =       0.99          0.70           0.98

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

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =  91.0    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.

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--------------------
| RESERVOIR( 0036)|      OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |      OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------       (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000    |   0.1020     0.0597
                          0.0510     0.0298    |   0.1530     0.0895

                             AREA     QPEAK      TPEAK        R.V.
                             (ha)     (cms)      (hrs)        (mm)
   INFLOW : ID= 2 (  1002)   2.110     0.218       5.25       79.59
   OUTFLOW: ID= 1 (  0036)   2.110     0.121       5.33       79.52

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 55.75
                  TIME SHIFT OF PEAK FLOW         (min)=  5.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0712

--------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD ( 1003)|   Area    (ha)=   4.78
|ID= 1 DT= 5.0 min |   Total Imp(%)=  79.10   Dir. Conn.(%)=  79.10
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       3.78          1.00
     Dep. Storage     (mm)=       1.00          5.00
     Average Slope     (%)=       1.00          2.00
     Length            (m)=     178.51         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    0.00 | 3.167    4.85 | 6.250   10.50 |  9.33    0.81
              0.167    0.00 | 3.250    4.85 | 6.333    5.66 |  9.42    0.81
              0.250    0.00 | 3.333   13.74 | 6.417    5.66 |  9.50    0.81
              0.333    0.81 | 3.417   13.74 | 6.500    5.66 |  9.58    0.81
              0.417    0.81 | 3.500   13.74 | 6.583    5.66 |  9.67    0.81
              0.500    0.81 | 3.583   13.74 | 6.667    5.66 |  9.75    0.81
              0.583    0.81 | 3.667   13.74 | 6.750    5.66 |  9.83    0.81
              0.667    0.81 | 3.750   13.74 | 6.833    5.66 |  9.92    0.81
              0.750    0.81 | 3.833   13.74 | 6.917    5.66 | 10.00    0.81
              0.833    0.81 | 3.917   13.74 | 7.000    5.66 | 10.08    0.81
              0.917    0.81 | 4.000   13.74 | 7.083    5.66 | 10.17    0.81
              1.000    0.81 | 4.083   13.74 | 7.167    5.66 | 10.25    0.81
              1.083    0.81 | 4.167   13.74 | 7.250    5.66 | 10.33    0.81
              1.167    0.81 | 4.250   13.74 | 7.333    3.23 | 10.42    0.81
              1.250    0.81 | 4.333   37.17 | 7.417    3.23 | 10.50    0.81
              1.333    0.81 | 4.417   37.17 | 7.500    3.23 | 10.58    0.81
              1.417    0.81 | 4.500   37.17 | 7.583    3.23 | 10.67    0.81
              1.500    0.81 | 4.583   37.17 | 7.667    3.23 | 10.75    0.81
              1.583    0.81 | 4.667   37.17 | 7.750    3.23 | 10.83    0.81
              1.667    0.81 | 4.750   37.17 | 7.833    3.23 | 10.92    0.81
              1.750    0.81 | 4.833   37.17 | 7.917    3.23 | 11.00    0.81
              1.833    0.81 | 4.917   37.17 | 8.000    3.23 | 11.08    0.81
              1.917    0.81 | 5.000   37.17 | 8.083    3.23 | 11.17    0.81
              2.000    0.81 | 5.083   37.17 | 8.167    3.23 | 11.25    0.81
              2.083    0.81 | 5.167   37.17 | 8.250    3.23 | 11.33    0.81
              2.167    0.81 | 5.250   37.17 | 8.333    1.62 | 11.42    0.81
              2.250    0.81 | 5.333   10.50 | 8.417    1.62 | 11.50    0.81
              2.333    4.85 | 5.417   10.50 | 8.500    1.62 | 11.58    0.81
              2.417    4.85 | 5.500   10.50 | 8.583    1.62 | 11.67    0.81
              2.500    4.85 | 5.583   10.50 | 8.667    1.62 | 11.75    0.81
              2.583    4.85 | 5.667   10.50 | 8.750    1.62 | 11.83    0.81
              2.667    4.85 | 5.750   10.50 | 8.833    1.62 | 11.92    0.81
              2.750    4.85 | 5.833   10.50 | 8.917    1.62 | 12.00    0.81
              2.833    4.85 | 5.917   10.50 | 9.000    1.62 | 12.08    0.81
              2.917    4.85 | 6.000   10.50 | 9.083    1.62 | 12.17    0.81
              3.000    4.85 | 6.083   10.50 | 9.167    1.62 | 12.25    0.81
              3.083    4.85 | 6.167   10.50 | 9.250    1.62 |

     Max.Eff.Inten.(mm/hr)=      37.17         32.73
               over (min)         5.00         20.00
     Storage Coeff.  (min)=       5.37 (ii)    16.41 (ii)
     Unit Hyd. Tpeak (min)=       5.00         20.00
     Unit Hyd. peak  (cms)=       0.21          0.06
                                                            *TOTALS*
     PEAK FLOW       (cms)=       0.39          0.08          0.473 (iii)
     TIME TO PEAK    (hrs)=       5.25          5.25           5.25
     RUNOFF VOLUME    (mm)=      79.82         56.95          75.04
     TOTAL RAINFALL   (mm)=      80.82         80.82          80.82
     RUNOFF COEFFICIENT   =       0.99          0.70           0.93


        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =  91.0    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  (  0033)|
|   1 +  2 =  3     |         AREA    QPEAK    TPEAK      R.V.
--------------------          (ha)    (cms)    (hrs)      (mm)
        ID1= 1 (  1003):     4.78   0.473     5.25    75.04
      + ID2= 2 (  0035):     2.35   0.134     5.33    79.53
        ================================================
        ID = 3 (  0033):     7.13   0.605     5.25    76.52

     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):     7.13   0.605     5.25    76.52
      + ID2= 2 (  0036):     2.11   0.121     5.33    79.52
        ================================================
        ID = 1 (  0033):     9.24   0.724     5.25    77.20

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
------------------
| CHAMBER(  0028)|  OUTFLOW: ON,   UNDERDRAIN: OFF,  INFIL: OFF
|IN= 2--> OUT= 3 |  CHAMBER:
| DT=  1.0 min    |  MAX STO VOL (cu.m.)= 4532.43  Bottom Area(m2)   = 4149.20
------------------
                  DEPTH       STORAGE           |   DEPTH      STORAGE
                  (mm)        (cu.m.)           |   (mm)       (cu.m.)
                  0.00          0.00            |   889.00     2561.91
                 25.00         42.15            |   914.00     2644.15
                 51.00         84.29            |   940.00     2725.52
                 76.00        126.44            |   965.00     2805.96
                102.00        168.58            |   991.00     2885.44
                127.00        210.73            |  1016.00     2963.89
                152.00        252.88            |  1041.00     3041.23
                178.00        295.02            |  1067.00     3117.43
                203.00        337.17            |  1092.00     3192.40
                229.00        379.32            |  1118.00     3266.04
                254.00        421.46            |  1143.00     3338.30
                279.00        463.61            |  1168.00     3409.03
                305.00        505.75            |  1194.00     3478.15
                330.00        599.76            |  1219.00     3545.47
                356.00        693.36            |  1245.00     3610.81
                381.00        786.64            |  1270.00     3673.92
                406.00        879.62            |  1295.00     3734.48
                432.00        972.26            |  1321.00     3791.79
                457.00       1064.57            |  1346.00     3844.07
                483.00       1156.53            |  1372.00     3892.17
                508.00       1248.12            |  1397.00     3938.66
                533.00       1339.32            |  1422.00     3983.67
                559.00       1430.11            |  1448.00     4026.67
                584.00       1520.47            |  1473.00     4068.82
                610.00       1610.38            |  1499.00     4110.96
                635.00       1699.82            |  1524.00     4153.11
                660.00       1788.76            |  1549.00     4195.26
                686.00       1877.17            |  1575.00     4237.40
                711.00       1965.05            |  1600.00     4279.55
                737.00       2052.31            |  1626.00     4321.70
                762.00       2138.97            |  1651.00     4363.84
                787.00       2224.99            |  1676.00     4405.99
                813.00       2310.34            |  1702.00     4448.13
                838.00       2394.96            |  1727.00     4490.28
                864.00       2478.83            |  1753.00     4532.43
```

```
                  DEPTH       DISCHARGE       |   DEPTH      DISCHARGE
                   (m)          (cms)         |    (m)         (cms)
                  0.010         0.000         |   0.920        0.147
                  0.160         0.021         |   1.070        0.173
                  0.310         0.040         |   1.220        0.194
                  0.460         0.053         |   1.380        0.214
                  0.610         0.063         |   1.450        0.223
                  0.770         0.113         |   0.000        0.000

                   AREA         QPEAK            TPEAK          R.V.
                   (ha)         (cms)            (hrs)          (mm)
     INFLOW:ID= 2   9.24        0.724             5.25          77.20
    OUTFLOW:ID= 1   9.24        0.196             7.35          71.53
   OVERFLOW:ID= 3   0.00        0.000             0.00           0.00

             Volume Reduction Rate[(RVin-RVout)/RVin](%)=        7.35
             Time to reach Max storage              (Hr)=        7.35
             Volume of water for drawdown in LID (cu.m.)=     1733.91
             Volume of maximum water storage      (cu.m.)=     4168.19
             ***** After simulation, water volume is not zero.

  --------------------------
  | Junction Command(0029) |
  --------------------------

                          AREA     QPEAK    TPEAK      R.V.
                          (ha)     (cms)    (hrs)      (mm)
  INFLOW : ID= 3(  0028)   0.00     0.00     0.00      0.00
  OUTFLOW: ID= 2(  0029)   0.00     0.00     0.00      0.00

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

  --------------------------
  | Junction Command(0030) |
  --------------------------

                          AREA     QPEAK    TPEAK      R.V.
                          (ha)     (cms)    (hrs)      (mm)
  INFLOW : ID= 1(  0028)   9.24     0.20     7.35     71.53
  OUTFLOW: ID= 2(  0030)   9.24     0.20     7.35     71.53

  -------------------------------------------------------------------------------
**********************************
** SIMULATION:2.6 100yr 12hr AES **
**********************************

 --------------------
 |   READ STORM     |     Filename: C:\Users\caim069305\AppD
 |                  |               ata\Local\Temp\
 |                  |               42e5834f-7301-492c-9bf7-628b9be09e0d\07f15e75
 | Ptotal= 88.54 mm |     Comments: 100 Year 12 Hour AES (Bloor, TRCA)
 --------------------
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME     RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs    mm/hr
                 0.25    0.00 |  3.50   15.05 |   6.75    6.20 | 10.00    0.89
                 0.50    0.89 |  3.75   15.05 |   7.00    6.20 | 10.25    0.89
                 0.75    0.89 |  4.00   15.05 |   7.25    6.20 | 10.50    0.89
                 1.00    0.89 |  4.25   15.05 |   7.50    3.54 | 10.75    0.89
                 1.25    0.89 |  4.50   40.71 |   7.75    3.54 | 11.00    0.89
                 1.50    0.89 |  4.75   40.71 |   8.00    3.54 | 11.25    0.89
                 1.75    0.89 |  5.00   40.71 |   8.25    3.54 | 11.50    0.89
                 2.00    0.89 |  5.25   40.71 |   8.50    1.77 | 11.75    0.89
                 2.25    0.89 |  5.50   11.51 |   8.75    1.77 | 12.00    0.89
                 2.50    5.31 |  5.75   11.51 |   9.00    1.77 | 12.25    0.89
                 2.75    5.31 |  6.00   11.51 |   9.25    1.77 |
                 3.00    5.31 |  6.25   11.51 |   9.50    0.89 |
                 3.25    5.31 |  6.50    6.20 |   9.75    0.89 |

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 | CALIB            |
 | STANDHYD (  1001)|    Area    (ha)=    2.35
 |ID= 1 DT= 5.0 min |    Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
 --------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      2.33         0.02
     Dep. Storage     (mm)=      1.00         5.00
     Average Slope     (%)=      1.00         2.00
     Length            (m)=    125.17        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    0.00 | 3.167    5.31 | 6.250   11.51 |   9.33    0.89
             0.167    0.00 | 3.250    5.31 | 6.333    6.20 |   9.42    0.89
             0.250    0.00 | 3.333   15.05 | 6.417    6.20 |   9.50    0.89
             0.333    0.89 | 3.417   15.05 | 6.500    6.20 |   9.58    0.89
             0.417    0.89 | 3.500   15.05 | 6.583    6.20 |   9.67    0.89
             0.500    0.89 | 3.583   15.05 | 6.667    6.20 |   9.75    0.89
             0.583    0.89 | 3.667   15.05 | 6.750    6.20 |   9.83    0.89
             0.667    0.89 | 3.750   15.05 | 6.833    6.20 |   9.92    0.89
             0.750    0.89 | 3.833   15.05 | 6.917    6.20 |  10.00    0.89
             0.833    0.89 | 3.917   15.05 | 7.000    6.20 |  10.08    0.89
             0.917    0.89 | 4.000   15.05 | 7.083    6.20 |  10.17    0.89
             1.000    0.89 | 4.083   15.05 | 7.167    6.20 |  10.25    0.89
             1.083    0.89 | 4.167   15.05 | 7.250    6.20 |  10.33    0.89
             1.167    0.89 | 4.250   15.05 | 7.333    3.54 |  10.42    0.89
             1.250    0.89 | 4.333   40.71 | 7.417    3.54 |  10.50    0.89
             1.333    0.89 | 4.417   40.71 | 7.500    3.54 |  10.58    0.89
             1.417    0.89 | 4.500   40.71 | 7.583    3.54 |  10.67    0.89
             1.500    0.89 | 4.583   40.71 | 7.667    3.54 |  10.75    0.89
             1.583    0.89 | 4.667   40.71 | 7.750    3.54 |  10.83    0.89
             1.667    0.89 | 4.750   40.71 | 7.833    3.54 |  10.92    0.89
             1.750    0.89 | 4.833   40.71 | 7.917    3.54 |  11.00    0.89
             1.833    0.89 | 4.917   40.71 | 8.000    3.54 |  11.08    0.89
             1.917    0.89 | 5.000   40.71 | 8.083    3.54 |  11.17    0.89
             2.000    0.89 | 5.083   40.71 | 8.167    3.54 |  11.25    0.89
             2.083    0.89 | 5.167   40.71 | 8.250    3.54 |  11.33    0.89
             2.167    0.89 | 5.250   40.71 | 8.333    1.77 |  11.42    0.89
             2.250    0.89 | 5.333   11.51 | 8.417    1.77 |  11.50    0.89
             2.333    5.31 | 5.417   11.51 | 8.500    1.77 |  11.58    0.89
             2.417    5.31 | 5.500   11.51 | 8.583    1.77 |  11.67    0.89
             2.500    5.31 | 5.583   11.51 | 8.667    1.77 |  11.75    0.89
             2.583    5.31 | 5.667   11.51 | 8.750    1.77 |  11.83    0.89
             2.667    5.31 | 5.750   11.51 | 8.833    1.77 |  11.92    0.89
             2.750    5.31 | 5.833   11.51 | 8.917    1.77 |  12.00    0.89
             2.833    5.31 | 5.917   11.51 | 9.000    1.77 |  12.08    0.89
             2.917    5.31 | 6.000   11.51 | 9.083    1.77 |  12.17    0.89
             3.000    5.31 | 6.083   11.51 | 9.167    1.77 |  12.25    0.89
             3.083    5.31 | 6.167   11.51 | 9.250    1.77 |

     Max.Eff.Inten.(mm/hr)=       40.71        36.65
                over (min)        5.00        10.00
     Storage Coeff.  (min)=       4.19 (ii)    5.80 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.24         0.15
                                                           *TOTALS*
     PEAK FLOW       (cms)=       0.26         0.00          0.265 (iii)
     TIME TO PEAK    (hrs)=       5.17         5.25           5.25
     RUNOFF VOLUME    (mm)=      87.54        64.23          87.31
     TOTAL RAINFALL   (mm)=      88.54        88.54          88.54
     RUNOFF COEFFICIENT   =       0.99         0.73           0.99

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

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN* =  91.0    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.

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 --------------------
 | RESERVOIR(  0035)|     OVERFLOW IS OFF
 | IN= 2---> OUT= 1 |
 | DT=  5.0 min     |     OUTFLOW     STORAGE   |   OUTFLOW     STORAGE
 --------------------      (cms)      (ha.m.)   |    (cms)      (ha.m.)
                          0.0000      0.0000    |    0.1120      0.0665
                          0.0560      0.0333    |    0.1690      0.0998

                               AREA       QPEAK       TPEAK        R.V.
                               (ha)       (cms)       (hrs)        (mm)
    INFLOW : ID= 2 (  1001)    2.350      0.265        5.25        87.31
    OUTFLOW: ID= 1 (  0035)    2.350      0.147        5.33        87.24

                 PEAK    FLOW   REDUCTION [Qout/Qin](%)= 55.50
                 TIME SHIFT OF PEAK FLOW         (min)=  5.00
                 MAXIMUM  STORAGE   USED        (ha.m.)=  0.0874

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 --------------------
 | CALIB            |
 | STANDHYD (  1002)|    Area    (ha)=    2.11
```

```
 |ID= 1 DT= 5.0 min |    Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
 --------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      2.09         0.02
     Dep. Storage     (mm)=      1.00         5.00
     Average Slope     (%)=      1.00         2.00
     Length            (m)=    118.60        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    0.00 | 3.167    5.31 | 6.250   11.51 |   9.33    0.89
             0.167    0.00 | 3.250    5.31 | 6.333    6.20 |   9.42    0.89
             0.250    0.00 | 3.333   15.05 | 6.417    6.20 |   9.50    0.89
             0.333    0.89 | 3.417   15.05 | 6.500    6.20 |   9.58    0.89
             0.417    0.89 | 3.500   15.05 | 6.583    6.20 |   9.67    0.89
             0.500    0.89 | 3.583   15.05 | 6.667    6.20 |   9.75    0.89
             0.583    0.89 | 3.667   15.05 | 6.750    6.20 |   9.83    0.89
             0.667    0.89 | 3.750   15.05 | 6.833    6.20 |   9.92    0.89
             0.750    0.89 | 3.833   15.05 | 6.917    6.20 |  10.00    0.89
             0.833    0.89 | 3.917   15.05 | 7.000    6.20 |  10.08    0.89
             0.917    0.89 | 4.000   15.05 | 7.083    6.20 |  10.17    0.89
             1.000    0.89 | 4.083   15.05 | 7.167    6.20 |  10.25    0.89
             1.083    0.89 | 4.167   15.05 | 7.250    6.20 |  10.33    0.89
             1.167    0.89 | 4.250   15.05 | 7.333    3.54 |  10.42    0.89
             1.250    0.89 | 4.333   40.71 | 7.417    3.54 |  10.50    0.89
             1.333    0.89 | 4.417   40.71 | 7.500    3.54 |  10.58    0.89
             1.417    0.89 | 4.500   40.71 | 7.583    3.54 |  10.67    0.89
             1.500    0.89 | 4.583   40.71 | 7.667    3.54 |  10.75    0.89
             1.583    0.89 | 4.667   40.71 | 7.750    3.54 |  10.83    0.89
             1.667    0.89 | 4.750   40.71 | 7.833    3.54 |  10.92    0.89
             1.750    0.89 | 4.833   40.71 | 7.917    3.54 |  11.00    0.89
             1.833    0.89 | 4.917   40.71 | 8.000    3.54 |  11.08    0.89
             1.917    0.89 | 5.000   40.71 | 8.083    3.54 |  11.17    0.89
             2.000    0.89 | 5.083   40.71 | 8.167    3.54 |  11.25    0.89
             2.083    0.89 | 5.167   40.71 | 8.250    3.54 |  11.33    0.89
             2.167    0.89 | 5.250   40.71 | 8.333    1.77 |  11.42    0.89
             2.250    0.89 | 5.333   11.51 | 8.417    1.77 |  11.50    0.89
             2.333    5.31 | 5.417   11.51 | 8.500    1.77 |  11.58    0.89
             2.417    5.31 | 5.500   11.51 | 8.583    1.77 |  11.67    0.89
             2.500    5.31 | 5.583   11.51 | 8.667    1.77 |  11.75    0.89
             2.583    5.31 | 5.667   11.51 | 8.750    1.77 |  11.83    0.89
             2.667    5.31 | 5.750   11.51 | 8.833    1.77 |  11.92    0.89
             2.750    5.31 | 5.833   11.51 | 8.917    1.77 |  12.00    0.89
             2.833    5.31 | 5.917   11.51 | 9.000    1.77 |  12.08    0.89
             2.917    5.31 | 6.000   11.51 | 9.083    1.77 |  12.17    0.89
             3.000    5.31 | 6.083   11.51 | 9.167    1.77 |  12.25    0.89
             3.083    5.31 | 6.167   11.51 | 9.250    1.77 |

     Max.Eff.Inten.(mm/hr)=       40.71        36.65
                over (min)        5.00        10.00
     Storage Coeff.  (min)=       4.05 (ii)    5.66 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.24         0.15
                                                           *TOTALS*
     PEAK FLOW       (cms)=       0.24         0.00          0.238 (iii)
     TIME TO PEAK    (hrs)=       5.17         5.25           5.25
     RUNOFF VOLUME    (mm)=      87.54        64.23          87.31
     TOTAL RAINFALL   (mm)=      88.54        88.54          88.54
     RUNOFF COEFFICIENT   =       0.99         0.73           0.99

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

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN* =  91.0    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.

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 --------------------
 | RESERVOIR(  0036)|     OVERFLOW IS OFF
 | IN= 2---> OUT= 1 |
 | DT=  5.0 min     |     OUTFLOW     STORAGE   |   OUTFLOW     STORAGE
 --------------------      (cms)      (ha.m.)   |    (cms)      (ha.m.)
                          0.0000      0.0000    |    0.1020      0.0597
                          0.0510      0.0298    |    0.1530      0.0895

                               AREA       QPEAK       TPEAK        R.V.
                               (ha)       (cms)       (hrs)        (mm)
```

```
    INFLOW : ID= 2 (  1002)    2.110      0.238        5.25        87.31
    OUTFLOW: ID= 1 (  0036)    2.110      0.133        5.33        87.24

                 PEAK    FLOW   REDUCTION [Qout/Qin](%)= 55.81
                 TIME SHIFT OF PEAK FLOW         (min)=  5.00
                 MAXIMUM  STORAGE   USED        (ha.m.)=  0.0781

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 --------------------
 | CALIB            |
 | STANDHYD (  1003)|    Area    (ha)=    4.78
 |ID= 1 DT= 5.0 min |    Total Imp(%)=  79.10   Dir. Conn.(%)=  79.10
 --------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      3.78         1.00
     Dep. Storage     (mm)=      1.00         5.00
     Average Slope     (%)=      1.00         2.00
     Length            (m)=    178.51        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    0.00 | 3.167    5.31 | 6.250   11.51 |   9.33    0.89
             0.167    0.00 | 3.250    5.31 | 6.333    6.20 |   9.42    0.89
             0.250    0.00 | 3.333   15.05 | 6.417    6.20 |   9.50    0.89
             0.333    0.89 | 3.417   15.05 | 6.500    6.20 |   9.58    0.89
             0.417    0.89 | 3.500   15.05 | 6.583    6.20 |   9.67    0.89
             0.500    0.89 | 3.583   15.05 | 6.667    6.20 |   9.75    0.89
             0.583    0.89 | 3.667   15.05 | 6.750    6.20 |   9.83    0.89
             0.667    0.89 | 3.750   15.05 | 6.833    6.20 |   9.92    0.89
             0.750    0.89 | 3.833   15.05 | 6.917    6.20 |  10.00    0.89
             0.833    0.89 | 3.917   15.05 | 7.000    6.20 |  10.08    0.89
             0.917    0.89 | 4.000   15.05 | 7.083    6.20 |  10.17    0.89
             1.000    0.89 | 4.083   15.05 | 7.167    6.20 |  10.25    0.89
             1.083    0.89 | 4.167   15.05 | 7.250    6.20 |  10.33    0.89
             1.167    0.89 | 4.250   15.05 | 7.333    3.54 |  10.42    0.89
             1.250    0.89 | 4.333   40.71 | 7.417    3.54 |  10.50    0.89
             1.333    0.89 | 4.417   40.71 | 7.500    3.54 |  10.58    0.89
             1.417    0.89 | 4.500   40.71 | 7.583    3.54 |  10.67    0.89
             1.500    0.89 | 4.583   40.71 | 7.667    3.54 |  10.75    0.89
             1.583    0.89 | 4.667   40.71 | 7.750    3.54 |  10.83    0.89
             1.667    0.89 | 4.750   40.71 | 7.833    3.54 |  10.92    0.89
             1.750    0.89 | 4.833   40.71 | 7.917    3.54 |  11.00    0.89
             1.833    0.89 | 4.917   40.71 | 8.000    3.54 |  11.08    0.89
             1.917    0.89 | 5.000   40.71 | 8.083    3.54 |  11.17    0.89
             2.000    0.89 | 5.083   40.71 | 8.167    3.54 |  11.25    0.89
             2.083    0.89 | 5.167   40.71 | 8.250    3.54 |  11.33    0.89
             2.167    0.89 | 5.250   40.71 | 8.333    1.77 |  11.42    0.89
             2.250    0.89 | 5.333   11.51 | 8.417    1.77 |  11.50    0.89
             2.333    5.31 | 5.417   11.51 | 8.500    1.77 |  11.58    0.89
             2.417    5.31 | 5.500   11.51 | 8.583    1.77 |  11.67    0.89
             2.500    5.31 | 5.583   11.51 | 8.667    1.77 |  11.75    0.89
             2.583    5.31 | 5.667   11.51 | 8.750    1.77 |  11.83    0.89
             2.667    5.31 | 5.750   11.51 | 8.833    1.77 |  11.92    0.89
             2.750    5.31 | 5.833   11.51 | 8.917    1.77 |  12.00    0.89
             2.833    5.31 | 5.917   11.51 | 9.000    1.77 |  12.08    0.89
             2.917    5.31 | 6.000   11.51 | 9.083    1.77 |  12.17    0.89
             3.000    5.31 | 6.083   11.51 | 9.167    1.77 |  12.25    0.89
             3.083    5.31 | 6.167   11.51 | 9.250    1.77 |

     Max.Eff.Inten.(mm/hr)=       40.71        36.46
                over (min)        5.00        20.00
     Storage Coeff.  (min)=       5.18 (ii)   15.75 (ii)
     Unit Hyd. Tpeak (min)=       5.00        20.00
     Unit Hyd. peak  (cms)=       0.21         0.07
                                                           *TOTALS*
     PEAK FLOW       (cms)=       0.43         0.09          0.521 (iii)
     TIME TO PEAK    (hrs)=       5.25         5.25           5.25
     RUNOFF VOLUME    (mm)=      87.54        64.23          82.67
     TOTAL RAINFALL   (mm)=      88.54        88.54          88.54
     RUNOFF COEFFICIENT   =       0.99         0.73           0.93

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN* =  91.0    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.

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 --------------------
 | ADD HYD  (  0033)|
 |   1 +  2 =  3    |        AREA    QPEAK    TPEAK     R.V.
 --------------------        (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  1003):       4.78   0.521     5.25    82.67
     + ID2= 2 (  0035):       2.35   0.147     5.33    87.24
       ==================================================
       ID = 3 (  0033):       7.13   0.666     5.25    84.17

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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 --------------------
 | ADD HYD  (  0033)|
 |   3 +  2 =  1    |        AREA    QPEAK    TPEAK     R.V.
 --------------------        (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0033):       7.13   0.666     5.25    84.17
     + ID2= 2 (  0036):       2.11   0.133     5.33    87.24
       ==================================================
       ID = 1 (  0033):       9.24   0.796     5.25    84.87

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

 ------------------
 | CHAMBER(  0028)|  OUTFLOW: ON,   UNDERDRAIN: OFF,  INFIL: OFF
 |IN= 2--> OUT= 3 |  CHAMBER:
 | DT=  1.0 min   |  MAX STO VOL (cu.m.)= 4532.43  Bottom Area(m2)   = 4149.20
 ------------------
                   DEPTH        STORAGE          |   DEPTH        STORAGE
                   (mm)         (cu.m.)          |   (mm)         (cu.m.)
                    0.00           0.00          |    889.00      2561.91
                   25.00          42.15          |    914.00      2644.15
                   51.00          84.29          |    940.00      2725.52
                   76.00         126.44          |    965.00      2805.96
                  102.00         168.58          |    991.00      2885.44
                  127.00         210.73          |   1016.00      2963.89
                  152.00         252.88          |   1041.00      3041.23
                  178.00         295.02          |   1067.00      3117.43
                  203.00         337.17          |   1092.00      3192.40
                  229.00         379.32          |   1118.00      3266.04
                  254.00         421.46          |   1143.00      3338.30
                  279.00         463.61          |   1168.00      3409.03
                  305.00         505.75          |   1194.00      3478.15
                  330.00         599.76          |   1219.00      3545.47
                  356.00         693.36          |   1245.00      3610.81
                  381.00         786.64          |   1270.00      3673.92
                  406.00         879.62          |   1295.00      3734.48
                  432.00         972.26          |   1321.00      3791.79
                  457.00        1064.57          |   1346.00      3844.07
                  483.00        1156.53          |   1372.00      3892.17
                  508.00        1248.12          |   1397.00      3938.66
                  533.00        1339.32          |   1422.00      3983.67
                  559.00        1430.11          |   1448.00      4026.67
                  584.00        1520.47          |   1473.00      4068.82
                  610.00        1610.38          |   1499.00      4110.96
                  635.00        1699.82          |   1524.00      4153.11
                  660.00        1788.76          |   1549.00      4195.26
                  686.00        1877.17          |   1575.00      4237.40
                  711.00        1965.05          |   1600.00      4279.55
                  737.00        2052.31          |   1626.00      4321.70
                  762.00        2138.97          |   1651.00      4363.84
                  787.00        2224.99          |   1676.00      4405.99
                  813.00        2310.34          |   1702.00      4448.13
                  838.00        2394.96          |   1727.00      4490.28
                  864.00        2478.83          |   1753.00      4532.43

                 DEPTH       DISCHARGE       |   DEPTH       DISCHARGE
                  (m)          (cms)         |    (m)          (cms)
                 0.010         0.000         |   0.920         0.147
                 0.160         0.021         |   1.070         0.173
                 0.310         0.040         |   1.220         0.194
                 0.460         0.053         |   1.380         0.214
                 0.610         0.063         |   1.450         0.223
                 0.770         0.113         |   0.000         0.000

                  AREA            QPEAK             TPEAK           R.V.
                  (ha)            (cms)             (hrs)           (mm)
     INFLOW:ID= 2  9.24            0.796              5.25          84.87
    OUTFLOW:ID= 1  9.24            0.222              7.32          79.20
   OVERFLOW:ID= 3  0.00            0.000              0.00           0.00

          Volume Reduction Rate[(RVin-RVout)/RVin](%)=          6.69
          Time to reach Max storage               (Hr)=         7.32
```

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          Volume of water for drawdown in LID (cu.m.)=     1780.53
          Volume of maximum water storage     (cu.m.)=     4498.72
          ***** After simulation, water volume is not zero.

  --------------------------
  | Junction Command(0029) |
  --------------------------

                         AREA     QPEAK    TPEAK      R.V.
                         (ha)     (cms)     (hrs)     (mm)
  INFLOW : ID= 3(  0028)   0.00      0.00     0.00      0.00
  OUTFLOW: ID= 2(  0029)   0.00      0.00     0.00      0.00

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

  --------------------------
  | Junction Command(0030) |
  --------------------------

                         AREA     QPEAK    TPEAK      R.V.
                         (ha)     (cms)     (hrs)     (mm)
  INFLOW : ID= 1(  0028)   9.24      0.22     7.32     79.20
  OUTFLOW: ID= 2(  0030)   9.24      0.22     7.32     79.20

  ------------------------------------------------------------------------------
******************************
** SIMULATION:5.1 Hazel     **
******************************

--------------------
|    READ STORM    |     Filename: C:\Users\caim069305\AppD
|                  |               ata\Local\Temp\
|                  |               94eaeebc-4cd0-45bc-ae19-0b0ed00a5d4f\efb67d83
| Ptotal=212.00 mm |     Comments: Regional Storm (Hazel)
--------------------
             TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
              hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
             0.20    0.00 |  3.40   13.00 |  6.60   23.00 |  9.80   53.00
             0.40    6.00 |  3.60   13.00 |  6.80   23.00 | 10.00   53.00
             0.60    6.00 |  3.80   13.00 |  7.00   23.00 | 10.20   53.00
             0.80    6.00 |  4.00   13.00 |  7.20   23.00 | 10.40   38.00
             1.00    6.00 |  4.20   13.00 |  7.40   13.00 | 10.60   38.00
             1.20    6.00 |  4.40   17.00 |  7.60   13.00 | 10.80   38.00
             1.40    4.00 |  4.60   17.00 |  7.80   13.00 | 11.00   38.00
             1.60    4.00 |  4.80   17.00 |  8.00   13.00 | 11.20   38.00
             1.80    4.00 |  5.00   17.00 |  8.20   13.00 | 11.40   13.00
             2.00    4.00 |  5.20   17.00 |  8.40   13.00 | 11.60   13.00
             2.20    4.00 |  5.40   13.00 |  8.60   13.00 | 11.80   13.00
             2.40    6.00 |  5.60   13.00 |  8.80   13.00 | 12.00   13.00
             2.60    6.00 |  5.80   13.00 |  9.00   13.00 | 12.20   13.00
             2.80    6.00 |  6.00   13.00 |  9.20   13.00 |
             3.00    6.00 |  6.20   13.00 |  9.40   53.00 |
             3.20    6.00 |  6.40   23.00 |  9.60   53.00 |

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

--------------------
| CALIB            |
| STANDHYD (  1001)|    Area    (ha)=    2.35
|ID= 1 DT= 5.0 min |    Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                           IMPERVIOUS     PERVIOUS (i)
     Surface Area     (ha)=      2.33          0.02
     Dep. Storage     (mm)=      1.00          5.00
     Average Slope     (%)=      1.00          2.00
     Length            (m)=    125.17         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    0.00 | 3.167    6.00 | 6.250   19.00 |  9.33   53.00
            0.167    0.00 | 3.250   10.20 | 6.333   23.00 |  9.42   53.00
            0.250    3.60 | 3.333   13.00 | 6.417   23.00 |  9.50   53.00
            0.333    6.00 | 3.417   13.00 | 6.500   23.00 |  9.58   53.00
            0.417    6.00 | 3.500   13.00 | 6.583   23.00 |  9.67   53.00
            0.500    6.00 | 3.583   13.00 | 6.667   23.00 |  9.75   53.00
            0.583    6.00 | 3.667   13.00 | 6.750   23.00 |  9.83   53.00
            0.667    6.00 | 3.750   13.00 | 6.833   23.00 |  9.92   53.00
            0.750    6.00 | 3.833   13.00 | 6.917   23.00 | 10.00   53.00
            0.833    6.00 | 3.917   13.00 | 7.000   23.00 | 10.08   53.00
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            0.917    6.00 | 4.000   13.00 | 7.083   23.00 | 10.17   53.00
            1.000    6.00 | 4.083   13.00 | 7.167   23.00 | 10.25   44.00
            1.083    6.00 | 4.167   13.00 | 7.250   17.00 | 10.33   38.00
            1.167    6.00 | 4.250   15.40 | 7.333   13.00 | 10.42   38.00
            1.250    4.80 | 4.333   17.00 | 7.417   13.00 | 10.50   38.00
            1.333    4.00 | 4.417   17.00 | 7.500   13.00 | 10.58   38.00
            1.417    4.00 | 4.500   17.00 | 7.583   13.00 | 10.67   38.00
            1.500    4.00 | 4.583   17.00 | 7.667   13.00 | 10.75   38.00
            1.583    4.00 | 4.667   17.00 | 7.750   13.00 | 10.83   38.00
            1.667    4.00 | 4.750   17.00 | 7.833   13.00 | 10.92   38.00
            1.750    4.00 | 4.833   17.00 | 7.917   13.00 | 11.00   38.00
            1.833    4.00 | 4.917   17.00 | 8.000   13.00 | 11.08   38.00
            1.917    4.00 | 5.000   17.00 | 8.083   13.00 | 11.17   38.00
            2.000    4.00 | 5.083   17.00 | 8.167   13.00 | 11.25   23.00
            2.083    4.00 | 5.167   17.00 | 8.250   13.00 | 11.33   13.00
            2.167    4.00 | 5.250   14.60 | 8.333   13.00 | 11.42   13.00
            2.250    5.20 | 5.333   13.00 | 8.417   13.00 | 11.50   13.00
            2.333    6.00 | 5.417   13.00 | 8.500   13.00 | 11.58   13.00
            2.417    6.00 | 5.500   13.00 | 8.583   13.00 | 11.67   13.00
            2.500    6.00 | 5.583   13.00 | 8.667   13.00 | 11.75   13.00
            2.583    6.00 | 5.667   13.00 | 8.750   13.00 | 11.83   13.00
            2.667    6.00 | 5.750   13.00 | 8.833   13.00 | 11.92   13.00
            2.750    6.00 | 5.833   13.00 | 8.917   13.00 | 12.00   13.00
            2.833    6.00 | 5.917   13.00 | 9.000   13.00 | 12.08   13.00
            2.917    6.00 | 6.000   13.00 | 9.083   13.00 | 12.17   13.00
            3.000    6.00 | 6.083   13.00 | 9.167   13.00 |
            3.083    6.00 | 6.167   13.00 | 9.250   37.00 |

     Max.Eff.Inten.(mm/hr)=       53.00         51.91
                over (min)        5.00         10.00
     Storage Coeff.  (min)=        3.77 (ii)     5.22 (ii)
     Unit Hyd. Tpeak (min)=        5.00         10.00
     Unit Hyd. peak  (cms)=        0.25          0.16
                                                          *TOTALS*
     PEAK FLOW       (cms)=        0.34          0.00          0.346 (iii)
     TIME TO PEAK    (hrs)=       10.17         10.17         10.17
     RUNOFF VOLUME    (mm)=      210.57        184.17        210.30
     TOTAL RAINFALL   (mm)=      211.57        211.57        211.57
     RUNOFF COEFFICIENT   =        1.00          0.87          0.99

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

         (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =   91.0    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(  0035)|      OVERFLOW IS OFF
 | IN= 2---> OUT= 1 |
 | DT=  5.0 min     |      OUTFLOW     STORAGE   |  OUTFLOW     STORAGE
 --------------------       (cms)      (ha.m.)   |   (cms)      (ha.m.)
                            0.0000      0.0000   |   0.1120       0.0665
                            0.0560      0.0333   |   0.1690       0.0998

                            AREA       QPEAK       TPEAK         R.V.
                            (ha)       (cms)       (hrs)         (mm)
   INFLOW : ID= 2 (  1001)   2.350        0.346      10.17       210.30
   OUTFLOW: ID= 1 (  0035)   2.350        0.226      11.17       210.24

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 65.24
                  TIME SHIFT OF PEAK FLOW          (min)= 60.00
                  MAXIMUM  STORAGE   USED         (ha.m.)=  0.1332

 ------------------------------------------------------------------------------
 --------------------
 | CALIB            |
 | STANDHYD (  1002)|    Area    (ha)=    2.11
 |ID= 1 DT= 5.0 min |    Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
 --------------------
                             IMPERVIOUS     PERVIOUS (i)
     Surface Area     (ha)=      2.09          0.02
     Dep. Storage     (mm)=      1.00          5.00
     Average Slope     (%)=      1.00          2.00
     Length            (m)=    118.60         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    0.00 | 3.167    6.00 | 6.250   19.00 |  9.33   53.00
            0.167    0.00 | 3.250   10.20 | 6.333   23.00 |  9.42   53.00
            0.250    3.60 | 3.333   13.00 | 6.417   23.00 |  9.50   53.00
            0.333    6.00 | 3.417   13.00 | 6.500   23.00 |  9.58   53.00
            0.417    6.00 | 3.500   13.00 | 6.583   23.00 |  9.67   53.00
            0.500    6.00 | 3.583   13.00 | 6.667   23.00 |  9.75   53.00
            0.583    6.00 | 3.667   13.00 | 6.750   23.00 |  9.83   53.00
            0.667    6.00 | 3.750   13.00 | 6.833   23.00 |  9.92   53.00
            0.750    6.00 | 3.833   13.00 | 6.917   23.00 | 10.00   53.00
            0.833    6.00 | 3.917   13.00 | 7.000   23.00 | 10.08   53.00
            0.917    6.00 | 4.000   13.00 | 7.083   23.00 | 10.17   53.00
            1.000    6.00 | 4.083   13.00 | 7.167   23.00 | 10.25   44.00
            1.083    6.00 | 4.167   13.00 | 7.250   17.00 | 10.33   38.00
            1.167    6.00 | 4.250   15.40 | 7.333   13.00 | 10.42   38.00
            1.250    4.80 | 4.333   17.00 | 7.417   13.00 | 10.50   38.00
            1.333    4.00 | 4.417   17.00 | 7.500   13.00 | 10.58   38.00
            1.417    4.00 | 4.500   17.00 | 7.583   13.00 | 10.67   38.00
            1.500    4.00 | 4.583   17.00 | 7.667   13.00 | 10.75   38.00
            1.583    4.00 | 4.667   17.00 | 7.750   13.00 | 10.83   38.00
            1.667    4.00 | 4.750   17.00 | 7.833   13.00 | 10.92   38.00
            1.750    4.00 | 4.833   17.00 | 7.917   13.00 | 11.00   38.00
            1.833    4.00 | 4.917   17.00 | 8.000   13.00 | 11.08   38.00
            1.917    4.00 | 5.000   17.00 | 8.083   13.00 | 11.17   38.00
            2.000    4.00 | 5.083   17.00 | 8.167   13.00 | 11.25   23.00
            2.083    4.00 | 5.167   17.00 | 8.250   13.00 | 11.33   13.00
            2.167    4.00 | 5.250   14.60 | 8.333   13.00 | 11.42   13.00
            2.250    5.20 | 5.333   13.00 | 8.417   13.00 | 11.50   13.00
            2.333    6.00 | 5.417   13.00 | 8.500   13.00 | 11.58   13.00
            2.417    6.00 | 5.500   13.00 | 8.583   13.00 | 11.67   13.00
            2.500    6.00 | 5.583   13.00 | 8.667   13.00 | 11.75   13.00
            2.583    6.00 | 5.667   13.00 | 8.750   13.00 | 11.83   13.00
            2.667    6.00 | 5.750   13.00 | 8.833   13.00 | 11.92   13.00
            2.750    6.00 | 5.833   13.00 | 8.917   13.00 | 12.00   13.00
            2.833    6.00 | 5.917   13.00 | 9.000   13.00 | 12.08   13.00
            2.917    6.00 | 6.000   13.00 | 9.083   13.00 | 12.17   13.00
            3.000    6.00 | 6.083   13.00 | 9.167   13.00 |
            3.083    6.00 | 6.167   13.00 | 9.250   37.00 |

     Max.Eff.Inten.(mm/hr)=       53.00         51.91
                over (min)        5.00         10.00
     Storage Coeff.  (min)=        3.65 (ii)     5.10 (ii)
     Unit Hyd. Tpeak (min)=        5.00         10.00
     Unit Hyd. peak  (cms)=        0.25          0.16
                                                          *TOTALS*
     PEAK FLOW       (cms)=        0.31          0.00          0.311 (iii)
     TIME TO PEAK    (hrs)=       10.17         10.17         10.17
     RUNOFF VOLUME    (mm)=      210.57        184.17        210.30
     TOTAL RAINFALL   (mm)=      211.57        211.57        211.57
     RUNOFF COEFFICIENT   =        1.00          0.87          0.99

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

         (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =   91.0    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.

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--------------------
| RESERVOIR(  0036)|      OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |      OUTFLOW     STORAGE   |  OUTFLOW     STORAGE
--------------------       (cms)      (ha.m.)   |   (cms)      (ha.m.)
                           0.0000      0.0000   |   0.1020       0.0597
                           0.0510      0.0298   |   0.1530       0.0895

                           AREA       QPEAK       TPEAK         R.V.
                           (ha)       (cms)       (hrs)         (mm)
  INFLOW : ID= 2 (  1002)   2.110        0.311      10.17       210.30
  OUTFLOW: ID= 1 (  0036)   2.110        0.203      11.17       210.23

                 PEAK   FLOW   REDUCTION [Qout/Qin](%)= 65.27
                 TIME SHIFT OF PEAK FLOW          (min)= 60.00
                 MAXIMUM  STORAGE   USED         (ha.m.)=  0.1188

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--------------------
| CALIB            |
| STANDHYD (  1003)|    Area    (ha)=    4.78
|ID= 1 DT= 5.0 min |    Total Imp(%)=  79.10   Dir. Conn.(%)=  79.10
--------------------
                            IMPERVIOUS     PERVIOUS (i)
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     Surface Area     (ha)=       3.78         1.00
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     178.51        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    0.00 | 3.167    6.00 | 6.250   19.00 |  9.33   53.00
                0.167    0.00 | 3.250   10.20 | 6.333   23.00 |  9.42   53.00
                0.250    3.60 | 3.333   13.00 | 6.417   23.00 |  9.50   53.00
                0.333    6.00 | 3.417   13.00 | 6.500   23.00 |  9.58   53.00
                0.417    6.00 | 3.500   13.00 | 6.583   23.00 |  9.67   53.00
                0.500    6.00 | 3.583   13.00 | 6.667   23.00 |  9.75   53.00
                0.583    6.00 | 3.667   13.00 | 6.750   23.00 |  9.83   53.00
                0.667    6.00 | 3.750   13.00 | 6.833   23.00 |  9.92   53.00
                0.750    6.00 | 3.833   13.00 | 6.917   23.00 | 10.00   53.00
                0.833    6.00 | 3.917   13.00 | 7.000   23.00 | 10.08   53.00
                0.917    6.00 | 4.000   13.00 | 7.083   23.00 | 10.17   53.00
                1.000    6.00 | 4.083   13.00 | 7.167   23.00 | 10.25   44.00
                1.083    6.00 | 4.167   13.00 | 7.250   17.00 | 10.33   38.00
                1.167    6.00 | 4.250   15.40 | 7.333   13.00 | 10.42   38.00
                1.250    4.80 | 4.333   17.00 | 7.417   13.00 | 10.50   38.00
                1.333    4.00 | 4.417   17.00 | 7.500   13.00 | 10.58   38.00
                1.417    4.00 | 4.500   17.00 | 7.583   13.00 | 10.67   38.00
                1.500    4.00 | 4.583   17.00 | 7.667   13.00 | 10.75   38.00
                1.583    4.00 | 4.667   17.00 | 7.750   13.00 | 10.83   38.00
                1.667    4.00 | 4.750   17.00 | 7.833   13.00 | 10.92   38.00
                1.750    4.00 | 4.833   17.00 | 7.917   13.00 | 11.00   38.00
                1.833    4.00 | 4.917   17.00 | 8.000   13.00 | 11.08   38.00
                1.917    4.00 | 5.000   17.00 | 8.083   13.00 | 11.17   38.00
                2.000    4.00 | 5.083   17.00 | 8.167   13.00 | 11.25   23.00
                2.083    4.00 | 5.167   17.00 | 8.250   13.00 | 11.33   13.00
                2.167    4.00 | 5.250   14.60 | 8.333   13.00 | 11.42   13.00
                2.250    5.20 | 5.333   13.00 | 8.417   13.00 | 11.50   13.00
                2.333    6.00 | 5.417   13.00 | 8.500   13.00 | 11.58   13.00
                2.417    6.00 | 5.500   13.00 | 8.583   13.00 | 11.67   13.00
                2.500    6.00 | 5.583   13.00 | 8.667   13.00 | 11.75   13.00
                2.583    6.00 | 5.667   13.00 | 8.750   13.00 | 11.83   13.00
                2.667    6.00 | 5.750   13.00 | 8.833   13.00 | 11.92   13.00
                2.750    6.00 | 5.833   13.00 | 8.917   13.00 | 12.00   13.00
                2.833    6.00 | 5.917   13.00 | 9.000   13.00 | 12.08   13.00
                2.917    6.00 | 6.000   13.00 | 9.083   13.00 | 12.17   13.00
                3.000    6.00 | 6.083   13.00 | 9.167   13.00 |
                3.083    6.00 | 6.167   13.00 | 9.250   37.00 |

     Max.Eff.Inten.(mm/hr)=      53.00        51.91
                over (min)        5.00        15.00
     Storage Coeff.  (min)=       4.66 (ii)   13.84 (ii)
     Unit Hyd. Tpeak (min)=       5.00        15.00
     Unit Hyd. peak  (cms)=       0.22         0.08
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.56         0.14        0.698 (iii)
     TIME TO PEAK    (hrs)=      10.17        10.17        10.17
     RUNOFF VOLUME    (mm)=     210.57       184.17       205.05
     TOTAL RAINFALL   (mm)=     211.57       211.57       211.57
     RUNOFF COEFFICIENT   =       1.00         0.87         0.97

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

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN* =  91.0    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.

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--------------------
| ADD HYD  (  0033)|
|  1 +  2 =  3     |         AREA    QPEAK    TPEAK      R.V.
--------------------         (ha)    (cms)    (hrs)      (mm)
         ID1= 1 (  1003):    4.78    0.698    10.17    205.05
       + ID2= 2 (  0035):    2.35    0.226    11.17    210.24
         ================================================
         ID = 3 (  0033):    7.13    0.897    10.17    206.76

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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--------------------
| ADD HYD  (  0033)|
|  3 +  2 =  1     |         AREA    QPEAK    TPEAK      R.V.
--------------------         (ha)    (cms)    (hrs)      (mm)
         ID1= 3 (  0033):    7.13    0.897    10.17    206.76
       + ID2= 2 (  0036):    2.11    0.203    11.17    210.23
         ================================================
         ID = 1 (  0033):    9.24    1.077    10.17    207.55

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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------------------
| CHAMBER(  0028)|   OUTFLOW: ON,   UNDERDRAIN: OFF,  INFIL: OFF
|IN= 2--> OUT= 3 |   CHAMBER:
| DT=  1.0 min   |   MAX STO VOL (cu.m.)= 4532.43  Bottom Area(m2)   = 4149.20
------------------
                  DEPTH       STORAGE          |   DEPTH      STORAGE
                  (mm)        (cu.m.)          |   (mm)       (cu.m.)
                    0.00          0.00         |    889.00     2561.91
                   25.00         42.15         |    914.00     2644.15
                   51.00         84.29         |    940.00     2725.52
                   76.00        126.44         |    965.00     2805.96
                  102.00        168.58         |    991.00     2885.44
                  127.00        210.73         |   1016.00     2963.89
                  152.00        252.88         |   1041.00     3041.23
                  178.00        295.02         |   1067.00     3117.43
                  203.00        337.17         |   1092.00     3192.40
                  229.00        379.32         |   1118.00     3266.04
                  254.00        421.46         |   1143.00     3338.30
                  279.00        463.61         |   1168.00     3409.03
                  305.00        505.75         |   1194.00     3478.15
                  330.00        599.76         |   1219.00     3545.47
                  356.00        693.36         |   1245.00     3610.81
                  381.00        786.64         |   1270.00     3673.92
                  406.00        879.62         |   1295.00     3734.48
                  432.00        972.26         |   1321.00     3791.79
                  457.00       1064.57         |   1346.00     3844.07
                  483.00       1156.53         |   1372.00     3892.17
                  508.00       1248.12         |   1397.00     3938.66
                  533.00       1339.32         |   1422.00     3983.67
                  559.00       1430.11         |   1448.00     4026.67
                  584.00       1520.47         |   1473.00     4068.82
                  610.00       1610.38         |   1499.00     4110.96
                  635.00       1699.82         |   1524.00     4153.11
                  660.00       1788.76         |   1549.00     4195.26
                  686.00       1877.17         |   1575.00     4237.40
                  711.00       1965.05         |   1600.00     4279.55
                  737.00       2052.31         |   1626.00     4321.70
                  762.00       2138.97         |   1651.00     4363.84
                  787.00       2224.99         |   1676.00     4405.99
                  813.00       2310.34         |   1702.00     4448.13
                  838.00       2394.96         |   1727.00     4490.28
                  864.00       2478.83         |   1753.00     4532.43

                 DEPTH       DISCHARGE        |   DEPTH      DISCHARGE
                  (m)          (cms)          |    (m)         (cms)
                 0.010        0.000           |   0.920       0.147
                 0.160        0.021           |   1.070       0.173
                 0.310        0.040           |   1.220       0.194
                 0.460        0.053           |   1.380       0.214
                 0.610        0.063           |   1.450       0.223
                 0.770        0.113           |   0.000       0.000

                    AREA         QPEAK            TPEAK          R.V.
                    (ha)         (cms)            (hrs)          (mm)
      INFLOW:ID= 2   9.24        1.077            10.17         207.55
     OUTFLOW:ID= 1   5.50        0.223             7.27         201.87
    OVERFLOW:ID= 3   3.74        0.854            10.17         201.87

              Volume Reduction Rate[(RVin-RVout)/RVin](%)=         2.74
              Time to reach Max storage             (Hr)=          7.27
              Volume of water for drawdown in LID (cu.m.)=      1839.26
              Volume of maximum water storage     (cu.m.)=      4519.02
              ***** After simulation, water volume is not zero.

   --------------------------
   | Junction Command(0029) |
   --------------------------

                         AREA     QPEAK   TPEAK     R.V.
                         (ha)     (cms)    (hrs)     (mm)
   INFLOW : ID= 3(  0028)    3.74      0.85   10.17   201.87
   OUTFLOW: ID= 2(  0029)    3.74      0.85   10.17   201.87
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  | Junction Command(0030) |
  --------------------------

                         AREA     QPEAK   TPEAK     R.V.
                         (ha)     (cms)    (hrs)     (mm)
  INFLOW : ID= 1(  0028)    5.50      0.22    7.27   201.87
  OUTFLOW: ID= 2(  0030)    5.50      0.22    7.27   201.87

  -------------------------------------------------------------------------------
******************************************
** SIMULATION:6.1 25mm DesignStormChicago **
******************************************
--------------------
| CHICAGO STORM    |     IDF curve parameters: A= 722.949
| Ptotal= 24.99 mm |                           B=   7.503
--------------------                           C=   0.862
                         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
                 0.17    1.20 |  1.17   14.13 |  2.17    3.38 |  3.17    1.48
                 0.33    1.41 |  1.33   61.31 |  2.33    2.77 |  3.33    1.35
                 0.50    1.72 |  1.50   19.06 |  2.50    2.36 |  3.50    1.25
                 0.67    2.20 |  1.67    9.21 |  2.67    2.05 |  3.67    1.16
                 0.83    3.07 |  1.83    5.90 |  2.83    1.81 |  3.83    1.08
                 1.00    5.10 |  2.00    4.30 |  3.00    1.63 |  4.00    1.02


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--------------------
| CALIB            |
| STANDHYD (  1001)|   Area    (ha)=   2.35
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                        IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.33         0.02
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     125.17        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    1.20 | 1.083   14.13 | 2.083    3.38 |  3.08    1.48
                0.167    1.20 | 1.167   14.13 | 2.167    3.38 |  3.17    1.48
                0.250    1.41 | 1.250   61.31 | 2.250    2.77 |  3.25    1.35
                0.333    1.41 | 1.333   61.31 | 2.333    2.77 |  3.33    1.35
                0.417    1.72 | 1.417   19.06 | 2.417    2.36 |  3.42    1.25
                0.500    1.72 | 1.500   19.06 | 2.500    2.36 |  3.50    1.25
                0.583    2.20 | 1.583    9.21 | 2.583    2.05 |  3.58    1.16
                0.667    2.20 | 1.667    9.21 | 2.667    2.05 |  3.67    1.16
                0.750    3.07 | 1.750    5.90 | 2.750    1.81 |  3.75    1.08
                0.833    3.07 | 1.833    5.90 | 2.833    1.81 |  3.83    1.08
                0.917    5.10 | 1.917    4.30 | 2.917    1.63 |  3.92    1.02
                1.000    5.10 | 2.000    4.30 | 3.000    1.63 |  4.00    1.02

     Max.Eff.Inten.(mm/hr)=      61.31        17.20
                over (min)        5.00         5.00
     Storage Coeff.  (min)=       3.55 (ii)    4.92 (ii)
     Unit Hyd. Tpeak (min)=       5.00         5.00
     Unit Hyd. peak  (cms)=       0.26         0.22
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.38         0.00        0.379 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.33         1.33
     RUNOFF VOLUME    (mm)=      23.99         8.86        23.84
     TOTAL RAINFALL   (mm)=      24.99        24.99        24.99
     RUNOFF COEFFICIENT   =       0.96         0.35         0.95

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

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN* =  91.0    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.

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--------------------
| RESERVOIR(  0035)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |   OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |    (cms)     (ha.m.)
                         0.0000     0.0000    |   0.1120      0.0665
                         0.0560     0.0333    |   0.1690      0.0998

                               AREA     QPEAK      TPEAK        R.V.
                               (ha)     (cms)      (hrs)        (mm)
    INFLOW : ID= 2 (  1001)    2.350     0.379       1.33        23.84
    OUTFLOW: ID= 1 (  0035)    2.350     0.057       1.67        23.78

                 PEAK   FLOW   REDUCTION [Qout/Qin](%)= 15.12
                 TIME SHIFT OF PEAK FLOW        (min)= 20.00
                 MAXIMUM  STORAGE   USED       (ha.m.)=  0.0342

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--------------------
| CALIB            |
| STANDHYD (  1002)|   Area    (ha)=   2.11
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                        IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.09         0.02
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     118.60        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    1.20 | 1.083   14.13 | 2.083    3.38 |  3.08    1.48
                0.167    1.20 | 1.167   14.13 | 2.167    3.38 |  3.17    1.48
                0.250    1.41 | 1.250   61.31 | 2.250    2.77 |  3.25    1.35
                0.333    1.41 | 1.333   61.31 | 2.333    2.77 |  3.33    1.35
                0.417    1.72 | 1.417   19.06 | 2.417    2.36 |  3.42    1.25
                0.500    1.72 | 1.500   19.06 | 2.500    2.36 |  3.50    1.25
                0.583    2.20 | 1.583    9.21 | 2.583    2.05 |  3.58    1.16
                0.667    2.20 | 1.667    9.21 | 2.667    2.05 |  3.67    1.16
                0.750    3.07 | 1.750    5.90 | 2.750    1.81 |  3.75    1.08
                0.833    3.07 | 1.833    5.90 | 2.833    1.81 |  3.83    1.08
                0.917    5.10 | 1.917    4.30 | 2.917    1.63 |  3.92    1.02
                1.000    5.10 | 2.000    4.30 | 3.000    1.63 |  4.00    1.02

     Max.Eff.Inten.(mm/hr)=      61.31        17.20
                over (min)        5.00         5.00
     Storage Coeff.  (min)=       3.44 (ii)    4.81 (ii)
     Unit Hyd. Tpeak (min)=       5.00         5.00
     Unit Hyd. peak  (cms)=       0.26         0.22
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.34         0.00        0.342 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.33         1.33
     RUNOFF VOLUME    (mm)=      23.99         8.86        23.84
     TOTAL RAINFALL   (mm)=      24.99        24.99        24.99
     RUNOFF COEFFICIENT   =       0.96         0.35         0.95

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

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN* =  91.0    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(  0036)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |   OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |    (cms)     (ha.m.)
                         0.0000     0.0000    |   0.1020      0.0597
                         0.0510     0.0298    |   0.1530      0.0895

                               AREA     QPEAK      TPEAK        R.V.
                               (ha)     (cms)      (hrs)        (mm)
```

```
   INFLOW : ID= 2 (  1002)      2.110      0.342      1.33       23.84
   OUTFLOW: ID= 1 (  0036)      2.110      0.052      1.67       23.77

                 PEAK   FLOW   REDUCTION [Qout/Qin](%)= 15.27
                 TIME SHIFT OF PEAK FLOW        (min)= 20.00
                 MAXIMUM  STORAGE   USED       (ha.m.)=  0.0306

--------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  1003)|   Area    (ha)=   4.78
|ID= 1 DT= 5.0 min |   Total Imp(%)=  79.10   Dir. Conn.(%)=  79.10
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       3.78          1.00
     Dep. Storage     (mm)=       1.00          5.00
     Average Slope     (%)=       1.00          2.00
     Length            (m)=     178.51         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    1.20 | 1.083   14.13 | 2.083    3.38 |  3.08    1.48
                   0.167    1.20 | 1.167   14.13 | 2.167    3.38 |  3.17    1.48
                   0.250    1.41 | 1.250   61.31 | 2.250    2.77 |  3.25    1.35
                   0.333    1.41 | 1.333   61.31 | 2.333    2.77 |  3.33    1.35
                   0.417    1.72 | 1.417   19.06 | 2.417    2.36 |  3.42    1.25
                   0.500    1.72 | 1.500   19.06 | 2.500    2.36 |  3.50    1.25
                   0.583    2.20 | 1.583    9.21 | 2.583    2.05 |  3.58    1.16
                   0.667    2.20 | 1.667    9.21 | 2.667    2.05 |  3.67    1.16
                   0.750    3.07 | 1.750    5.90 | 2.750    1.81 |  3.75    1.08
                   0.833    3.07 | 1.833    5.90 | 2.833    1.81 |  3.83    1.08
                   0.917    5.10 | 1.917    4.30 | 2.917    1.63 |  3.92    1.02
                   1.000    5.10 | 2.000    4.30 | 3.000    1.63 |  4.00    1.02

     Max.Eff.Inten.(mm/hr)=       61.31         13.64
               over (min)          5.00         25.00
     Storage Coeff.  (min)=        4.40 (ii)    20.06 (ii)
     Unit Hyd. Tpeak (min)=        5.00         25.00
     Unit Hyd. peak  (cms)=        0.23          0.05
                                                            *TOTALS*
     PEAK FLOW       (cms)=        0.59          0.02         0.596 (iii)
     TIME TO PEAK    (hrs)=        1.33          1.67          1.33
     RUNOFF VOLUME    (mm)=       23.99          8.86         20.83
     TOTAL RAINFALL   (mm)=       24.99         24.99         24.99
     RUNOFF COEFFICIENT   =        0.96          0.35          0.83

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  91.0    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  (  0033)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  1003):      4.78    0.596     1.33    20.83
      + ID2= 2 (  0035):      2.35    0.057     1.67    23.78
        ==================================================
        ID = 3 (  0033):      7.13    0.632     1.33    21.80

     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):      7.13    0.632     1.33    21.80
      + ID2= 2 (  0036):      2.11    0.052     1.67    23.77
        ==================================================
        ID = 1 (  0033):      9.24    0.665     1.33    22.25

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

```
------------------
| CHAMBER(  0028)|  OUTFLOW: ON,   UNDERDRAIN: OFF,  INFIL: OFF
|IN= 2--> OUT= 3 |  CHAMBER:
| DT=  1.0 min   |  MAX STO VOL (cu.m.)= 4532.43  Bottom Area(m2)   = 4149.20
------------------
                      DEPTH       STORAGE         |   DEPTH       STORAGE
                      (mm)        (cu.m.)         |   (mm)        (cu.m.)
                        0.00          0.00        |    889.00      2561.91
                       25.00         42.15        |    914.00      2644.15
                       51.00         84.29        |    940.00      2725.52
                       76.00        126.44        |    965.00      2805.96
                      102.00        168.58        |    991.00      2885.44
                      127.00        210.73        |   1016.00      2963.89
                      152.00        252.88        |   1041.00      3041.23
                      178.00        295.02        |   1067.00      3117.43
                      203.00        337.17        |   1092.00      3192.40
                      229.00        379.32        |   1118.00      3266.04
                      254.00        421.46        |   1143.00      3338.30
                      279.00        463.61        |   1168.00      3409.03
                      305.00        505.75        |   1194.00      3478.15
                      330.00        599.76        |   1219.00      3545.47
                      356.00        693.36        |   1245.00      3610.81
                      381.00        786.64        |   1270.00      3673.92
                      406.00        879.62        |   1295.00      3734.48
                      432.00        972.26        |   1321.00      3791.79
                      457.00       1064.57        |   1346.00      3844.07
                      483.00       1156.53        |   1372.00      3892.17
                      508.00       1248.12        |   1397.00      3938.66
                      533.00       1339.32        |   1422.00      3983.67
                      559.00       1430.11        |   1448.00      4026.67
                      584.00       1520.47        |   1473.00      4068.82
                      610.00       1610.38        |   1499.00      4110.96
                      635.00       1699.82        |   1524.00      4153.11
                      660.00       1788.76        |   1549.00      4195.26
                      686.00       1877.17        |   1575.00      4237.40
                      711.00       1965.05        |   1600.00      4279.55
                      737.00       2052.31        |   1626.00      4321.70
                      762.00       2138.97        |   1651.00      4363.84
                      787.00       2224.99        |   1676.00      4405.99
                      813.00       2310.34        |   1702.00      4448.13
                      838.00       2394.96        |   1727.00      4490.28
                      864.00       2478.83        |   1753.00      4532.43

                     DEPTH        DISCHARGE      |   DEPTH       DISCHARGE
                      (m)          (cms)         |    (m)         (cms)
                     0.010         0.000         |   0.920        0.147
                     0.160         0.021         |   1.070        0.173
                     0.310         0.040         |   1.220        0.194
                     0.460         0.053         |   1.380        0.214
                     0.610         0.063         |   1.450        0.223
                     0.770         0.113         |   0.000        0.000

                       AREA        QPEAK              TPEAK          R.V.
                       (ha)        (cms)              (hrs)          (mm)
       INFLOW:ID= 2    9.24        0.665               1.33         22.25
      OUTFLOW:ID= 1    9.24        0.038               4.37         16.57
     OVERFLOW:ID= 3    0.00        0.000               0.00          0.00

              Volume Reduction Rate[(RVin-RVout)/RVin](%)=      25.52
              Time to reach Max storage           (Hr)=          4.37
              Volume of water for drawdown in LID (cu.m.)=    1007.72
              Volume of maximum water storage     (cu.m.)=    1541.92
              ***** After simulation, water volume is not zero.

  -------------------------
  | Junction Command(0029) |
  -------------------------

                         AREA     QPEAK   TPEAK     R.V.
                         (ha)     (cms)   (hrs)     (mm)
  INFLOW : ID= 3(  0028)   0.00     0.00    0.00     0.00
  OUTFLOW: ID= 2(  0029)   0.00     0.00    0.00     0.00

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

  -------------------------
  | Junction Command(0030) |
  -------------------------

                         AREA     QPEAK   TPEAK     R.V.
                         (ha)     (cms)   (hrs)     (mm)
  INFLOW : ID= 1(  0028)   9.24     0.04    4.37    16.57
  OUTFLOW: ID= 2(  0030)   9.24     0.04    4.37    16.57
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APPENDIX

F

ROOF DRAIN DETAILS

ZURN CANADA

SPECIFICATION DRAINAGE

Control-Flo

Roof Drainage System

www.zurn.com

THE ZURN "CONTROL-FLO CONCEPT"

Originally, Zurn introduced the scientifically-advanced "Control-Flo" drainage principle for dead-level roofs. Today, after thousands of successful applications in modern, large dead-level roof areas, Zurn engineers have adapted the comprehensive "Control-Flo" data to **sloped roof** areas.

WHAT IS "CONTROL-FLO"?

It is an advanced method of removing rain water off dead-level or sloped roofs. As contrasted with conventional drainage practices, which attempt to drain off storm water as quickly as it falls on the roof's surface, "Control-Flo" drains the roof at a controlled rate. Excess water accumulates on the roof under controlled conditions...then drains off at a lower rate after a storm abates.

CUTS DRAINAGE COSTS

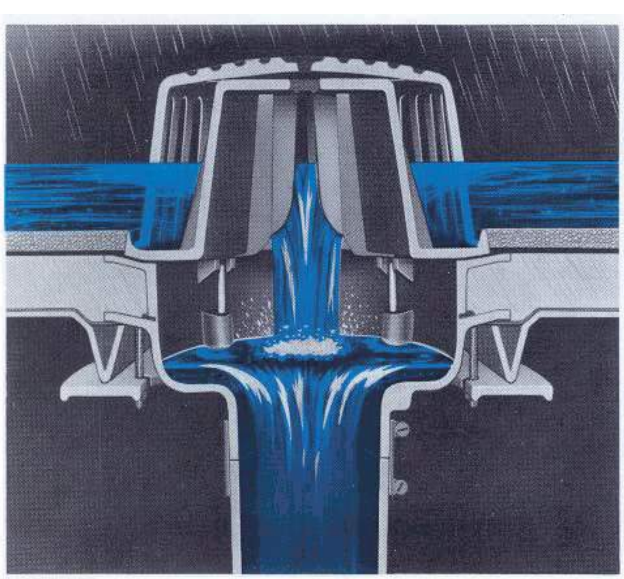
Fewer roof drains, smaller diameter piping, smaller sewer sizes, and lower installation costs are possible with a "Control-Flo" drainage system because roof areas are utilized as temporary storage reservoirs.

REDUCES PROBABILITY OF STORM DAMAGE

Lightens load on combination sewers by reducing rate of water drained from roof tops during severe storms thereby reducing probability of flooded sewers, and consequent backflow into basements and other low areas.

THANKS TO EXCLUSIVE ZURN "AQUA-WEIR" ACTION

Key to successful "Control-Flo" drainage is a unique scientifically-designed weir containing accurately calibrated notches with sides formed by parabolic curves which provide flow rates directly proportional to the head. Shape and size of notches are based on predetermined flow rates, and all factors involved in roof drainage to assure permanent regulation of drainage flow rates for specific geographic locations and rainfall intensities.

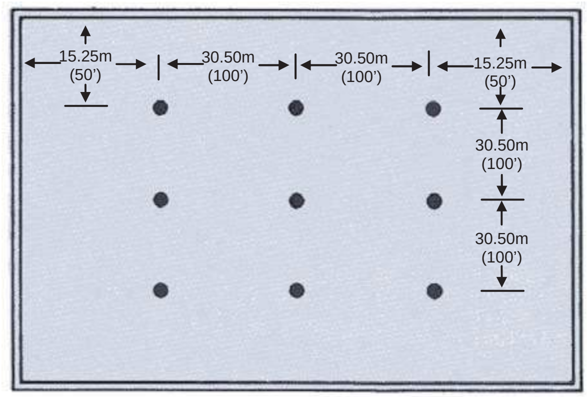


DEFINITION

DEAD LEVEL ROOFS

DIAGRAM "A"

A dead-level roof for purposes of applying the Zurn "Control-Flo" drainage principle is one which has been designed for zero slope across its entire surface. Measurements shown are for maximum distances.



(Plan View)

(Section View)

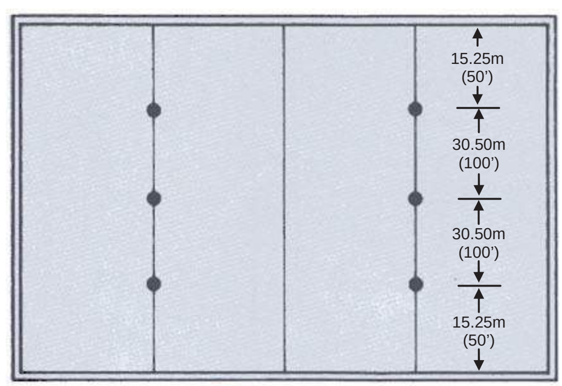
SLOPED ROOFS

DIAGRAM "B"

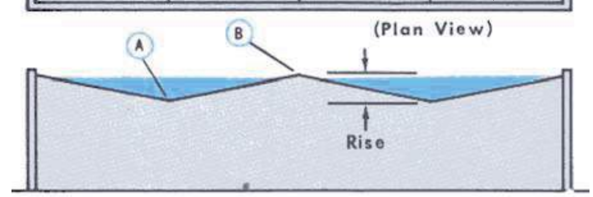
A sloped roof is one designed commonly with a shallow slope. The Zurn "Control-Flo" drainage system can be applied to any slope which results in a total rise up to 152mm (6").

The total rise of a roof as calculated for "Control-Flo" application is defined as the vertical increase in height in inches, from the low point or valley of a sloping roof (A) to the top of the sloping section (B). (Example: a roof that slopes 3mm (1/8") per foot having a 7.25m (24') span would have a rise of 7.25m x 3mm or 76mm (24' x 1/8" or 3")).

Measurements shown are for maximum distances.



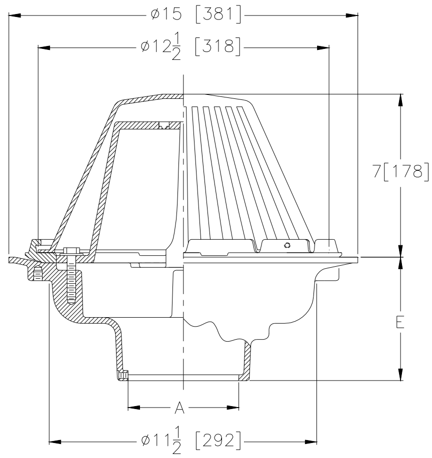
(Plan View)



(Section View)

Dimensions and other measurements given in metric and imperial forms.

SPECIFICATION DATA



ENGINEERING SPECIFICATION: ZURN Z-105 "Control-Flo" roof drain for dead -level or sloped roof construction, Dura-Coated cast iron body. "Control-Flo" weir shall be linear functioning with integral membrane flashing clamp/ gravel guard and Poly-Dome. All data shall be verified proportional to flow rates.

ROOF DESIGN RECOMMENDATIONS

Basic roofing design should incorporate protection that will prevent roof overloading by installing adequate over-flow scuppers in parapet walls.

GENERAL INFORMATION

The “Control-Flo” roof drainage data is tabulated for four areas (232.25m^2 (2500 sq. ft.), 464.502m^2 (5000 sq. ft.), 696.75m^2 (7500 sq. ft.), 929m^2 (10,000 sq. ft.) notch areas ratings) for each locality. For each notch area rating the maximum discharge in L.P.M. (G.P.M.) - draindown in hours, and maximum water depth at the drain in inches for a dead level roof — 51mm (2 inch) rise — 102mm (4 inch) rise and 152mm (6 inch) rise—are tabulated. The rise is the total change in elevation from the valley to the peak. Values for areas, rise or combination thereof other than those listed, can be arrived at by extrapolation. All data listed is based on the fifty-year return frequency storm. In other words the maximum conditions as listed will occur on the average of once every fifty years.

NOTE: The tabulated “Control-Flo” data enables the individual engineer to select his own design limiting condition. The limiting condition can be draindown time, roof load factor, or maximum water depth at the drain. If draindown time is the limiting factor because of possible freezing conditions, it must be recognized that the maximum time listed will occur on the average of once every 50 years and would most likely be during a heavy summer thunder storm. Average winter draindown times would be much shorter in duration than those listed.

GENERAL RECOMMENDATIONS

On sloping roofs, we recommend a design depth referred to as an equivalent depth. An equivalent depth is the depth of water attained at the drains that results in the same roof stresses as those realized on a dead-level roof. In all cases this equivalent depth is almost equal to that attained by using the same notch area rating for the different rises to 152mm (6”). With the same depth of water at the drain the roof stresses will decrease with increasing total rise. Therefore, it would be possible to have a depth in excess of 152mm (6”) at the drain on a sloping roof without exceeding stresses normally encountered in a 152mm (6”) depth on a dead-level roof. However, it is recommended that scuppers be placed to limit the maximum water depth on any roof to 152mm (6”) to prevent the overflow of the weirs on the drains and consequent overloading of drain piping. In the few cases where the data shows a flow rate in excess of 136 L.P.M. (30 G.P.M.) if all drains and drain lines are sized according to recommendations, and the one storm in fifty years occurs, the only consequence will be a brief flow through the scuppers or over-flow drains.

NOTE: An equivalent depth is that depth of water attained at the drains at the lowest line or valley of the roof with all other conditions such as notch area and rainfall intensity being equal. For Toronto, Ontario a notch area rating of 464.50m^2 (5,000 sq. ft.) results in a 74mm (2.9 inch) depth on a dead level roof for a 50-year storm. For the same notch area and conditions, equivalent depths for a 51mm (2”), 102mm (4”) and 152mm (6”) rise respectively on a sloped roof would be 86mm (3.4”), 104mm (4.1”) and 124mm (4.9”). Roof stresses will be approximately equal in all cases.

Control-Flo Drain Selection Is Quick and Easy...

The exclusive Zurn "Selecta-Drain" Chart (pages 8—11) tabulates selection data for 34 localities in Canada. Proper use of this chart constitutes your best assurance of sure, safe, economical application of Zurn "Control-Flo" systems for your specific geographical area. If the "Selecta-Drain Chart does not cover your specific design criteria, contact Zurn Industries Limited, Mississauga, Ontario, for additional data for your locality. Listed below is additional information pertinent to proper engineering of the "Control-Flo" system.

ROOF USED AS TEMPORARY RETENTION

The key to economical "Control-Flo" is the utilization of large roof areas to temporarily store the maximum amount of water without overloading average roofs or creating excessive draindown time during periods of heavy rainfall. The data shown in the "Selecta-Drain" Chart enables the engineer to select notch area ratings from 232.25 m^2 (2,500 $ft.^2$) to 929m^2 (10,000 $ft.^2$) and to accurately predict all other design factors such as maximum roof load, L.P.M. (G.P.M.) discharge, draindown time and water depth at the drain. Obviously, as design factors permit the notch area rating to increase the resulting money saved in being able to use small leaders and drain lines will also increase.

ROOF LOADING AND RUN-OFF RATES

The four values listed in the "Selecta-Drain" Chart for notch area ratings for different localities will normally span the range of good design. If areas per notch below 232.25m^2 (2,500 $ft.^2$) are used considerable economy of the "Control-Flo" concept is being lost. The area per notch is limited to 929m^2 (10,000 $ft.^2$) to keep the draindown time within reasonable limits. Extensive studies show that stresses due to water load on a sloping roof for any fixed set of conditions are very nearly the same as those on a dead-level roof. A sloping roof tends to concentrate more water in the valleys and increase the water depth at this point. The greater depth around the drain leads to a faster run-off rate, particularly a faster early run -off rate. As a result, the total volume of water stored on the roof is less, and the total load on the sloping roof is less. By using the same area on the sloping roof as on the dead-level roof the increase in roof stresses due to increased water depth in the valleys is offset by the decrease in the total load due to less water stored. The net result of the maximum roof stress is approximately the same for any single span rise and fixed set of conditions. A fixed set of conditions, would be the same notch area, the same frequency store, and the same locality.

SPECIAL CONSIDERATIONS FOR STRUCTURAL SAFETY: Normal practice of roof design is based on 18kg (40 lbs.) per 929 cm^2 (sq ft.). (Subject to local codes and by-laws.) Thus it is extremely important that design is in accordance with normal load factors so deflection will be slight enough in any bay to prevent progressive deflection which could cause water depths to load the roof beyond its design limits.

ADDITIONAL NOTCH RATINGS

The 'Selecta-Drain" Chart along with Tables I and II enables the engineer to select "Control-Flo" Drains and drain pipe sizes for most Canadian applications. These calculations are computed for a proportional flow weir that is sized to give a flow of 23 L.P.M. (5 G.P.M.) per inch of head. The 23 L.P.M. (5 G.P.M.) per inch of head notch opening is selected as the bases of design as it offers the most economical installation as applied to actual rainfall experienced in Canada.
Should you require design criteria for locations outside of Canada or for special project applications please contact Zurn Industries Limited, Mississauga, Ontario.

LEADER AND DRAIN PIPE SIZING

Since all data in the "Selecta-Drain" Chart is based on the 50-year-storm it is possible to exceed the water depth listed in these charts if a 100-year or 1000-year storm would occur. Therefore, for good design it is recommended that scuppers or other methods be used to limit water depth to the design depth and tables I and II be used to size the leaders and drain pipes. If the roof is capable of supporting more water than the design depth it is permissible to locate the scuppers or other overflow means at a height that will allow a greater water depth on the roof. However, in this case the leader and drain pipes should be sized to handle the higher flow rates possible based on a flow rate of 23 L.P.M. (5 G.P.M.) per inch of depth at the drain.

PROPER DRAIN LOCATION

The following good design practice is recommended for selecting the proper number of "Control-Flo" drains for a given area. **On dead-level roofs**, drains should be located no further than 15.25m (50 feet) from edge of roof and no further than 30.50m (100 feet) between drains. See diagram "A" page 2. **On sloping roofs**, drains should be located in the valleys at a distance no greater than 15.25m (50 feet) from each end of the valleys and no further than 30.50m (100 feet) between drains. See diagram "B" page 2. Compliance with these recommendations will assure good run off regardless of wind direction.

Saves Specification Time, Assures Proper Application

QUICK, EASY SELECTION

Using the "Selecta-Drain" Chart (pages 9—13) in combination with the steps and examples appearing below, should save you countless hours in engineering specification time. This vast compilation of data is related to the proper selection of drains for 34 cities. All cities in alphabetical order by province. If a specific city does not appear in the tabulation, chooses the city nearest your area and select the proper drain using these factors.

3 EASY STEPS…

AND 3 TYPICAL EXAMPLES FOR APPLICATION OF SURE, SCIENTIFIC CONTROL OF DRAINAGE FROM DEAD-LEVEL AND SLOPING ROOFS WITH THE ZURN CONCEPT.

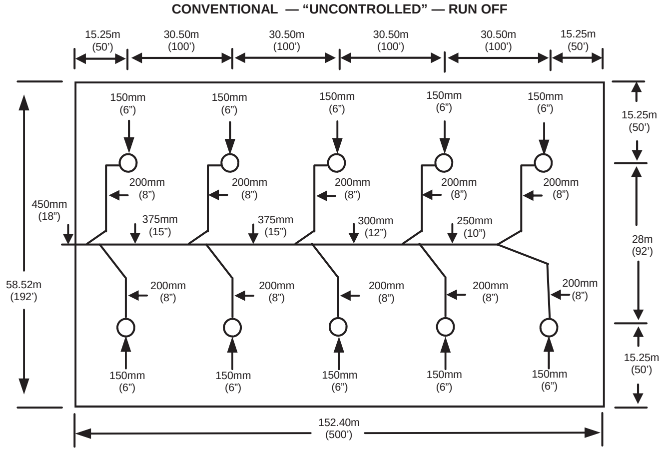
NOTE: Where roof area to be drained is adjacent to one or more vertical walls projecting above the roof, then a percentage of the of the wall(s) must be added to the roof area in determining total roof area to be drained.

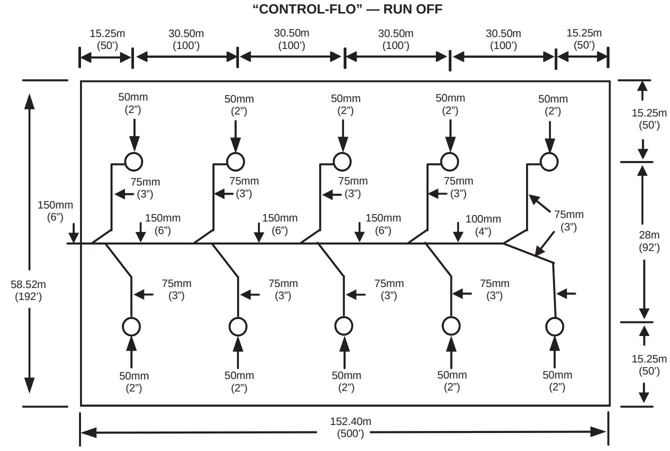
	TORONTO, ONTARIO	DEAD-LEVEL ROOF	102mm (4 INCH) SLOPE	152mm (6 INCH) SLOPE
1	Determine total roof area or individual areas when roof is divided by expansion joints or peaks in the case of sloping roof.	Roof Area: 56.52m x 152.40m = 8918.40m^2 (192ft x 500ft = 96,000 sq. ft.) (See Z105 layout bottom of this page.)	3 Individual Roof Areas: 19.50m x 152.40m = 2972.80m^2 (64ft x 500ft = 32,000 sq. ft.) Valleys 152.40m (500ft) long 3 x 2972.80 = 8918.40m^2 (3 x 32,000 = 96,000 sq. ft.)	2 Individual Roof Areas: 29.87m x 152.40m = 4552m^2 (98ft x 500ft = 49,000 sq. ft.) Valleys 152.40m (500ft) long 2 x 4552 = 9104m^2 (2 x 49,000 = 98,000 sq. ft.)
2	Divide roof area or individual areas by Zurn Notch Area Rating selected to obtain the total number of notches required.	Zurn Notch Area Rating selected for Toronto = 464.50m^2 (5,000 sq. ft.) from "Selecta-Drain Chart, page 11. Total Roof Area = 8918.40m^2 (96,000 sq. ft.) Entire roof. 464.50m^2 (5,000 sq. ft.) notch area = 19.2 notches—USE 20.	Zurn Notch Area Rating selected for Toronto = 464.50m^2 (5,000 sq. ft.) from "Selecta-Drain Chart, page 11. Total Roof Area = 2972.80m^2 (32,000 sq. ft.) Each area. 464.50m^2 (5,000 sq. ft.) notch area = 6.4 notches—USE 7 PER AREA.	Zurn Notch Area Rating selected for Toronto = 464.50m^2 (5,000 sq. ft.) from "Selecta-Drain Chart, page 11. Total Roof Area = 4552m^2 (49,000 sq. ft.) Each area. 464.50m^2 (5,000 sq. ft.) notch area = 9.8 notches—USE 10 PER AREA.
3	Determine total number of drains required by not exceeding maximum spacing dimensions in the preceding instructions. See Diagrams "A" or "B", page 2. Divide total number of notches required to determine the number of notches per drain. Note maximum water depth at drain and use this dimension to determine scupper height. Maximum scupper height to be used is 152mm (6"). *Use this flow rate to size leaders and drain lines.*	*10 drains required. All drains must have two notches each for a total of 20 notches. Flow rate is 66 L.P.M. (14.5 G.P.M.) per notch. Size leaders for 2 notch weirs for a flow rate of 66 L.P.M. (14.5 G.P.M.) 50 mm (two inch) pipe size leaders required. Maximum water depth and scupper height is 74mm (2.9"). Requires 19 hours draindown time maximum. For drain, vertical and horizontal pipe sizing data see Tables I and II on page 6 and 7.	**5 drains per area required located in the valleys 15.25m (50ft.) from each end with 3 in the middle at 30.50m (100ft.) spacings. Two drains on ends with two notches—3 drains in middle on notch each for a total of 7 notches. Maximum flow rate 93 L.P.M. (20.5 G.P.M.) per notch. Leader size 50mm (2") for single notch weirs—75mm (3") notch weirs. Maximum water depth and scupper height is 104mm (4.1"). Requires 11 hours draindown time maximum. For drain, vertical and horizontal pipe sizing data see Tables I and II on page 6 and 7.	**5 drains per area required located in the valleys 15.25m (50ft.) from each end with 3 in the middle at 30.50m (100ft.) spacing in the middle. 10 notches are required therefore all drains must have two notches. Flow rate is 111 L.P.M. (24.5 G.P.M.) per notch. Size all leaders for 2 notch weirs. 75mm (3") pipe size required. Maximum water depth and scupper height is 124mm (4.9"). Requires 9 hours draindown time maximum. For drain, vertical and horizontal pipe sizing data see Tables I and II on page 6 and 7.

*See Diagram "A" page 2 for recommended drain placement.
**See Diagram "B" page 2 for recommended drain placement.

DEAD LEVEL ROOF

6mm (1/4") PER FT. SLOPE STORM DRAIN





ROOF DRAINAGE DATA

The flow rate for any design condition can be easily read from the data contained on the following pages; the tabulations shown below (and on the opposite page) can be used to simplify selection of drain line sizes.

TABLE 1 - SUGGESTED RELATION OF DRAIN OUTLET AND VERTICAL LEADER SIZE TO ZURN CONTROL-FLO ROOF DRAINS (BASED ON NATIONAL PLUMBING CODE ASA -A40.8 DATA ON VERTICAL LEADERS).

No. of Notches in Drain	**Max. Flow per Notch in L.P.M. (G.P.M.)**		
	Pipe Size		
	50mm (2”)	75mm (3”)	100mm (4”)
1	136* (30*)	—	—
2	68 (15)	136* (30*)	—
3	45 (10)	136* (30*)	—
4	—	105 (23)	136* (30*)
5	—	82 (18)	136* (30*)
6	—	68 (15)	136* (30*)

*Maximum flow obtainable from 1 notch with 152mm (6”) water depth at drain.

Table 1 should be used to select **vertical drain** leaders which at the same time establishes the drain outlet size. This table illustrates the minimum flow per notch in L.P.M. (G.P.M.) Since the Z-105 drain is available with a minimum of one and a maximum of six notches, calculations have already been a made and are listed in this table for any quantity of weir notch openings established in your design. It was determined ten drains with two notches each weir would be required in the Dead-Level Roof example on page 5. A 66 L.P.M. (14.5 G.P.M.) discharge per notch flow rate was also established.

Once this design criteria has been determined it will be the key to the proper selection of all drain outlet sizes, vertical and horizontal storm drain sizes in Table I and II. Enter the column “Number of Notches in Drain”, Table I, read down the column to the figure 2 which indicates two notches in weir, then read across until you reach a figure equal to or closest figure in excess of 66 L.P.M. (14.5 G.P.M.) You will find fifteen in the column under 50mm (2”) which represents the pipe size. Therefore all drain outlets and vertical leaders are 50mm (2”) size.

Let us digress for a moment assuming a specific structure requires a total of six drains each containing a weir with a different number of notches. One with 1, one with 2, etc. Table 1 discloses the pipe size for one notch is 50mm (2”), two notch is 50mm (2”), three notch is 75mm (3”), four notch is 75mm (3”), five notch is 75mm (3”) and six notch is 75mm (3”) as they all equal or closely exceed the 66 L.P.M. (14.5 G.P.M.) design.

NOTE: Although pipe size calculations should be based on accumulated flow rate, local by-laws should be referred to for minimum pipe size requirements and roof drain spacing.

TABLE II should be used to select **horizontal** storm drain piping. Use the same flow rate 66 L.P.M. (14.5 G.P.M.) used to establish the vertical leaders to size the storm drainage system and main storm drain. Let us assume the ten drains each with two notch weirs were actually on the roof in two separate lines of five drains each and joined at a common point before leaving the building. Since Table II includes 3mm (1/8”), 6mm (1/4”) and 13mm (1/2”) per foot slope, let **us use 6mm (1/4”) as our basis for selection** which will take us to the centre section. Starting with the first of five drains we enter the extreme left column in Table II and read down to the figure 2 since this drain has two notches in weir, read across horizontally and the size of first section of horizontal storm drain is 75mm (3”) between 1st and 2nd drain, return to left hand column proceed reading down until you reach figure 4 then read across horizontally and the pipe size will be 100mm (4”) between 2nd and 3rd drain, 100mm (4”) between 3rd and 4th and 125mm (5”) (if available) between 4th and 5th. If not available use 150mm (6”). (You may be tempted to use 100mm (4”) since the capacity is close. We recommend you go to the larger size.) Pipe size leaving 5th drain would be 150mm (6”). The same sizing would hold true for the second line of five drains. Since both columns of five drains each are being joined together before leaving the building there will be total of twenty notches discharging into the main building storm sewer. Enter left hand column Table II, read down until you reach the figure twenty, then read across horizontally to the 6mm (1/4”) per 305mm (1’) slope column and you will see a 150mm (6”) storm drain will handle the job adequately. The same procedure should be followed for sloped roof installations. The above method of sizing was done to better acquaint you with Table II and its use. The more economical and practical way of laying out and installing this same job is illustrated in the control-flo layout shown on bottom of page 5.

NOTE: Although pipe size calculations should be based on accumulated flow rates, local by-laws should be referred to for minimum pipe size requirements and roof drain spacing.

Select Proper Horizontal Storm Drain Piping

ZURN®

Table II — SUGGESTED RELATION OF HORIZONTAL STORM DRAIN SIZE TO ZURN CONTROL-FLO ROOF DRAINAGE

Total No. of Notches Discharging to Storm Drain	MAX. FLOW PER NOTCH IN L.P.M. (G.P.M.) Storm Drain Size 3mm (1/8") per 305mm (1') Slope								MAX. FLOW PER NOTCH IN L.P.M. (G.P.M.) Storm Drain Size 6mm (1/4") per 305mm (1') Slope							MAX. FLOW PER NOTCH IN L.P.M. (G.P.M.) Storm Drain Size 13mm (1/2") per 305mm (1') Slope						
	75 (3")	100 (4")	125 (5")	150 (6")	200 (8")	250 (10")	300 (12")	375 (15")	75 (3")	100 (4")	125 (5")	150 (6")	200 (8")	250 (10")	300 (12")	75 (3")	100 (4")	125 (5")	150 (6")	200 (8")	250 (10")	300 (12")
1	136* (30*)	—	—	—	—	—	—	—	136* (30*)	—	—	—	—	—	—	136* (30*)	—	—	—	—	—	—
2	77 (17)	136* (30*)	—	—	—	—	—	—	109 (24)	136* (30*)	—	—	—	—	—	136* (30*)	—	—	—	—	—	—
3	50 (11)	118 (26)	136* (30*)	—	—	—	—	—	73 (16)	136* (30*)	—	—	—	—	—	100 (22)	136* (30*)	—	—	—	—	—
4	36 (8)	86 (19)	136* (30*)	—	—	—	—	—	55 (12)	127 (28)	136* (30*)	—	—	—	—	77 (17)	136* (30*)	—	—	—	—	—
5	—	65 (15)	127* (28*)	136* (30*)	—	—	—	—	—	100 (22)	136* (30*)	—	—	—	—	59 (13)	136* (30*)	—	—	—	—	—
6	—	59 (13)	105 (23)	136* (30*)	—	—	—	—	—	82 (18)	136* (30*)	—	—	—	—	50 (11)	118 (26)	136* (30*)	—	—	—	—
7	—	50 (11)	91 (20)	136* (30*)	—	—	—	—	—	73 (16)	127 (28)	136* (30*)	—	—	—	—	100 (22)	136* (30*)	—	—	—	—
8	—	—	77 (17)	127 (28)	136* (30*)	—	—	—	—	64 (14)	114 (25)	136* (30*)	—	—	—	—	86 (19)	136* (30*)	—	—	—	—
9	—	—	68 (15)	114 (25)	136* (30*)	—	—	—	—	55 (12)	100 (22)	136* (30*)	—	—	—	—	77 (17)	136* (30*)	—	—	—	—
10	—	—	64 (14)	100 (22)	136* (30*)	—	—	—	—	—	91 (20)	136* (30*)	—	—	—	—	68 (15)	123 (27)	136* (30*)	—	—	—
11	—	—	55 (12)	91 (20)	136* (30*)	—	—	—	—	—	82 (18)	132 (29)	136* (30*)	—	—	—	64 (14)	114 (25)	136* (30*)	—	—	—
12	—	—	—	82 (18)	136* (30*)	—	—	—	—	—	73 (16)	118 (26)	136* (30*)	—	—	—	59 (13)	105 (23)	136* (30*)	—	—	—
13	—	—	—	77 (17)	136* (30*)	—	—	—	—	—	68 (15)	109 (24)	136* (30*)	—	—	—	55 (12)	95 (21)	136* (30*)	—	—	—
14	—	—	—	73 (16)	136* (30*)	—	—	—	—	—	64 (14)	100 (22)	136* (30*)	—	—	—	—	86 (19)	136* (30*)	—	—	—
15	—	—	—	68 (15)	136* (30*)	—	—	—	—	—	59 (13)	95 (21)	136* (30*)	—	—	—	—	82 (18)	132 (29)	136* (30*)	—	—
16	—	—	—	64 (14)	136* (30*)	—	—	—	—	—	—	91 (20)	136* (30*)	—	—	—	—	77 (17)	123 (27)	136* (30*)	—	—
17	—	—	—	59 (13)	127 (28)	136* (30*)	—	—	—	—	—	82 (18)	136* (30*)	—	—	—	—	73 (16)	118 (26)	136* (30*)	—	—
18	—	—	—	55 (12)	118 (26)	136* (30*)	—	—	—	—	—	77 (17)	136* (30*)	—	—	—	—	68 (15)	109 (24)	136* (30*)	—	—
19	—	—	—	—	114 (25)	136* (30*)	—	—	—	—	—	73 (16)	136* (30*)	—	—	—	—	64 (14)	105 (23)	136* (30*)	—	—
20	—	—	—	—	109 (24)	136* (30*)	—	—	—	—	—	68 (15)	136* (30*)	—	—	—	—	59 (13)	100 (22)	136* (30*)	—	—
23	—	—	—	—	91 (20)	136* (30*)	—	—	—	—	—	64 (14)	132 (29)	136* (30*)	—	—	—	55 (12)	86 (19)	136* (30*)	—	—
25	—	—	—	—	86 (19)	136* (30*)	—	—	—	—	—	59 (13)	123 (27)	136* (30*)	—	—	—	—	77 (17)	136* (30*)	—	—
30	—	—	—	—	73 (16)	127 (28)	136* (30*)	—	—	—	—	—	100 (22)	136* (30*)	—	—	—	—	64 (14)	136* (30*)	—	—
35	—	—	—	—	59 (13)	109 (24)	136* (30*)	—	—	—	—	—	86 (19)	136* (30*)	—	—	—	—	55 (12)	123 (27)	136* (30*)	—
40	—	—	—	—	55 (12)	95 (21)	136* (30*)	—	—	—	—	—	77 (17)	136* (30*)	—	—	—	—	—	105 (23)	136* (30*)	—
45	—	—	—	—	—	86 (19)	136* (30*)	—	—	—	—	—	68 (15)	123 (27)	136* (30*)	—	—	—	—	95 (21)	136* (30*)	—
50	—	—	—	—	—	77 (17)	123 (27)	136* (30*)	—	—	—	—	59 (13)	109 (24)	136* (30*)	—	—	—	—	86 (19)	136* (30*)	—
55	—	—	—	—	—	68 (15)	114 (25)	136* (30*)	—	—	—	—	—	100 (22)	136* (30*)	—	—	—	—	77 (17)	136* (30*)	—
60	—	—	—	—	—	64 (14)	105 (23)	136* (30*)	—	—	—	—	—	91 (20)	136* (30*)	—	—	—	—	68 (15)	127 (28)	136* (30*)
65	—	—	—	—	—	59 (13)	95 (21)	136* (30*)	—	—	—	—	—	82 (18)	136* (30*)	—	—	—	—	64 (14)	118 (26)	136* (30*)
70	—	—	—	—	—	55 (12)	91 (20)	136* (30*)	—	—	—	—	—	77 (17)	127 (28)	—	—	—	—	59 (13)	109 (24)	136* (30*)

*Maximum flow obtainable from 1 notch with 152mm (6") water depth at drain.

TABLE III - TO BE USED WHEN ROOF STORM WATER RUN OFF AND OTHER SURFACE WATER RUN OFF IS BEING CONSOLIDATED INTO ONE COMMON MAIN HORIZONTAL STORM SEWER.

Flow capacity of vertical leaders litres per minute (gallons per minute)

Pipe Size	Maximum Capacity L.P.M. (G.P.M.)
50mm (2")	136 (30)
75mm (3")	409 (90)
100mm (4")	864 (190)
†125mm (5")	1582 (348)
150mm (6")	2550 (561)

†In some areas 125mm (5") drainage pipe may not be available.

Flow capacity of horizontal storm sewers litres per minute (gallons per minute).

Pipe Size	Slope per 305mm (1'0")		
	3mm (1/8")	6mm (1/4")	13mm (1/2")
75mm (3")	163 (36)	232 (51)	327 (72)
100mm (4")	355 (78)	505 (111)	714 (157)
†125mm (5")	646 (142)	914 (201)	1291 (284)
150mm (6")	1050 (231)	1487 (327)	2100 (462)
200mm (8")	2264 (498)	3205 (705)	4528 (996)
250mm (10")	4100 (902)	5796 (1275)	8201 (1804)
300mm (12")	6669 (1467)	9437 (2076)	13338 (2934)
375mm (15")	12120 (2666)	17157 (3774)	24239 (5332)

Note: Although pipe size calculations should be based on accumulated flow rate, local by-laws should be referred to for minimum pipe size requirements and roof drain spacing.

SCUPPER AND OVERFLOW DRAINS

Roofing members and understructures, weakened by seepage and rot resulting from improper drainage and roof construction can give away under the weight of rapidly accumulated water during flash storms. Thus, it is recommended, and often required by building codes, to install scuppers and overflow drains in parapet-type roofs. Properly selected and sized scuppers and overflow drains are vital to a well-engineered drainage system to prevent excessive loading, erosion, seepage and rotting.

Selecta-Drain Chart

ZURN

LOCATION	SQUARE METRE (SQUARE FOOT) NOTCH AREA RATING	ROOF LOAD FACTOR KGS. (LBS.)	TOTAL ROOF SLOPE											
			DEAD LEVEL			51mm (2") RISE			102mm (4") RISE			152mm (6") RISE		
			L.P.M. (G.P.M.) Discharge	**Draindown Time Hrs.**	mm (in.) Water Depth	L.P.M. (G.P.M.) Discharge	**Draindown Time Hrs.**	mm (in.) Water Depth	L.P.M. (G.P.M.) Discharge	**Draindown Time Hrs.**	mm (in.) Water Depth	L.P.M. (G.P.M.) Discharge	**Draindown Time Hrs.**	mm (in.) Water Depth
Calgary, Alberta	232 (2,500)	4.7 (10.4)	45.5 (10)	**7**	51 (2)	57 (12.5)	**6**	63.5 (2.5)	72.5 (16)	**4**	81.5 (3.2)	86.5 (19)	**3.2**	96.5 (3.8)
	465 (5,000)	5.9 (13)	57 (12.5)	**17**	63.5 (2.5)	66 (14.5)	**14**	73.5 (2.9)	82 (18)	**9**	91.5 (3.6)	97.5 (21.5)	**7.5**	109 (4.3)
	697 (7,500)	6.4 (14)	61.5 (13.5)	**28**	68.5 (2.7)	72.5 (16)	**22**	81.5 (3.2)	88.5 (19.5)	**15**	99 (3.9)	104.5 (23)	**12**	117 (4.6)
	929 (10,000)	6.8 (15.1)	66 (14.5)	**38**	73.5 (2.9)	77.5 (17)	**31**	86.5 (3.4)	93 (20.5)	**22**	104 (4.1)	109 (24)	**17**	122 (4.8)
Edmonton, Alberta	232 (2,500)	4.5 (9.9)	43 (9.5)	**7**	48.5 (1.9)	57 (12.5)	**6**	63.5 (2.5)	72.5 (16)	**4**	81.5 (3.2)	82 (18)	**3**	91.5 (3.6)
	465 (5,000)	5.9 (13)	57 (12.5)	**17**	63.5 (2.5)	68 (15)	**14.5**	76 (3)	84 (18.5)	**9.5**	94 (3.7)	97.5 (21.5)	**7.5**	109 (4.3)
	697 (7,500)	6.6 (14.5)	63.5 (14)	**28**	71 (2.8)	75 (16.5)	**24**	84 (3.3)	97.5 (21.5)	**16**	104 (4.1)	107 (23.5)	**12**	119.5 (4.7)
	929 (10,000)	7.1 (15.6)	68 (15)	**38**	76 (3.0)	79.5 (17.5)	**32**	89 (3.5)	100 (22)	**22**	112 (4.4)	113.5 (25)	**18**	127 (5.0)
Penticton, British Columbia	232 (2,500)	3.8 (8.3)	36.5 (8)	**6**	40.5 (1.6)	38.5 (8.5)	**4**	43 (1.7)	52.5 (11.5)	**3**	58.5 (2.3)	61.5 (13.5)	**2.3**	68.5 (2.7)
	465 (5,000)	4.0 (8.8)	38.5 (8.5)	**13**	43 (1.7)	41 (9)	**9**	45.5 (1.8)	57 (12.5)	**6**	63.5 (2.5)	68 (15)	**5**	76 (3)
	697 (7,500)	4.2 (9.3)	41 (9)	**21**	45.5 (1.8)	43 (9.5)	**14.5**	48.5 (1.9)	61.5 (13.5)	**10.5**	68.5 (2.7)	72.5 (16)	**8**	81.5 (3.2)
	929 (10,000)	4.2 (9.3)	41 (9)	**27**	45.5 (1.8)	45.5 (10)	**20**	51 (2)	63.5 (14)	**14**	71 (2.8)	75 (16.5)	**11**	84 (3.3)
Vancouver, British Columbia	232 (2,500)	3.3 (7.3)	32 (7)	**5.5**	35.5 (1.4)	38.5 (8.5)	**4**	43 (1.7)	47.5 (10.5)	**2.8**	53.5 (2.1)	57 (12.5)	**2**	63.5 (2.5)
	465 (5,000)	4.0 (8.8)	38.5 (8.5)	**13**	43 (1.7)	45.5 (10)	**10**	51 (2)	57 (12.5)	**6**	63.5 (2.5)	68 (15)	**5**	76 (3)
	697 (7,500)	4.5 (9.9)	43 (9.5)	**22**	48.5 (1.9)	50 (11)	**17**	56 (2.2)	63.5 (14)	**11**	71 (2.8)	75 (16.5)	**8.5**	84 (3.3)
	929 (10,000)	4.9 (10.9)	47.5 (10.5)	**30**	53.5 (2.1)	54.5 (12)	**24**	61 (2.4)	68 (15)	**15**	76 (3)	79.5 (17.5)	**12**	89 (3.5)
Victoria, British Columbia	232 (2,500)	3.3 (7.3)	32 (7)	**5.5**	35.5 (1.4)	38.5 (8.5)	**4**	43 (1.7)	43 (9.5)	**2.5**	48.5 (1.9)	54.5 (12)	**2**	61 (2.4)
	465 (5,000)	4.0 (8.8)	38.5 (8.5)	**13**	43 (1.7)	45.5 (10)	**10**	51 (2)	54.5 (12)	**6**	61 (2.4)	68 (15)	**5**	76 (3)
	697 (7,500)	4.5 (9.9)	43 (9.5)	**22**	48.5 (1.9)	50 (11)	**16**	56 (2.2)	59 (13)	**10**	66 (2.6)	75 (16.5)	**8**	84 (3.3)
	929 (10,000)	4.7 (10.4)	45.5 (10)	**30**	51 (2)	54.5 (12)	**23**	61 (2.4)	63.5 (14)	**14**	71 (2.8)	79.5 (17.5)	**12**	89 (3.5)
Brandon, Manitoba	232 (2,500)	5.9 (13)	57 (12.5)	**8**	63.5 (2.5)	68 (15)	**7**	76 (3)	82 (18)	**4.5**	91.5 (3.6)	92.5 (21)	**3.5**	106.5 (4.2)
	465 (5,000)	7.3 (16.1)	73 (16)	**20**	81.5 (3.2)	84 (18.5)	**17**	94 (3.7)	97.5 (21.5)	**11**	109 (4.3)	113.5 (25)	**8.5**	127 (5)
	697 (7,500)	8.3 (18.2)	79.5 (17.5)	**32**	89 (3.5)	93 (20.5)	**27**	104 (4.1)	107 (23.5)	**19**	119.5 (4.7)	125 (27.5)	**15**	139.5 (5.5)
	929 (10,000)	9.0 (19.8)	86.5 (19)	**43**	96.5 (3.8)	100 (22)	**38**	112 (4.4)	113.5 (25)	**26**	127 (5.0)	132 (29)	**21**	147.5 (5.8)
Winnipeg, Manitoba	232 (2,500)	4.7 (10.4)	45.5 (10)	**7**	51 (2)	57 (12.5)	**6**	63.5 (2.5)	75 (16.5)	**4**	84 (3.3)	86.5 (19)	**3.2**	96.5 (3.8)
	465 (5,000)	5.9 (13)	57 (12.5)	**17**	63.5 (2.5)	68 (15)	**15**	76 (3)	84 (18.5)	**10**	94 (3.7)	100 (22)	**7.5**	112 (4.4)
	697 (7,500)	6.6 (14.5)	63.5 (14)	**28**	71 (2.8)	75 (16.5)	**24**	84 (3.3)	93 (20.5)	**16**	104 (4.1)	107 (23.5)	**12**	119.5 (4.7)
	929 (10,000)	7.1 (15.6)	68 (15)	**39**	76 (3)	82 (18)	**32**	91.5 (3.6)	97.5 (21.5)	**22**	109 (4.3)	113.5 (25)	**17**	127 (5.0)
Campbellton, New Brunswick	232 (2,500)	6.4 (14)	62 (13.5)	**9**	68.5 (2.7)	70.5 (15.5)	**7**	78.5 (3.1)	79.5 (17.5)	**4.5**	89 (3.5)	91 (20)	**3.5**	101.5 (4.0)
	465 (5,000)	9.0 (19.8)	86.5 (19)	**22**	96.5 (3.8)	91 (20)	**18**	101.5 (4)	102.5 (22.5)	**12**	115 (4.5)	113.5 (25)	**9**	127 (5.0)
	697 (7,500)	10.4 (22.9)	100 (22)	**35**	112 (4.4)	102.5 (22.5)	**28**	114.5 (4.5)	118 (26)	**20**	132 (5.2)	132 (29)	**15**	147.5 (5.8)
	929 (10,000)	11.3 (25)	109 (24)	**47**	122 (4.8)	111.5 (24.5)	**40**	124.5 (4.9)	127.5 (28)	**29**	142 (5.6)	141 (31)	**22**	157.5 (6.2)

Selecta-Drain Chart

ZURN

LOCATION	SQUARE METRE (SQUARE FOOT) NOTCH AREA RATING	ROOF LOAD FACTOR KGS. (LBS.)	TOTAL ROOF SLOPE											
			DEAD LEVEL			51mm (2”) RISE			102mm (4”) RISE			152mm (6”) RISE		
			L.P.M. (G.P.M.) Discharge	**Draindown Time Hrs.**	mm (in.) Water Depth	L.P.M. (G.P.M.) Discharge	**Draindown Time Hrs.**	mm (in.) Water Depth	L.P.M. (G.P.M.) Discharge	**Draindown Time Hrs.**	mm (in.) Water Depth	L.P.M. (G.P.M.) Discharge	**Draindown Time Hrs.**	mm (in.) Water Depth
Chatham, New Brunswick	232 (2,500)	4.5 (9.9)	43 (9.5)	**7**	48.5 (1.9)	52.5 (11.5)	**5.5**	58.5 (2.3)	63.5 (14)	**3.5**	71 (2.8)	77.5 (17)	**2.9**	86.5 (3.4)
	465 (5,000)	5.7 (12.5)	54.5 (12)	**16**	61 (2.4)	63.5 (14)	**13**	71 (2.8)	77.5 (17)	**9**	86.5 (3.4)	91 (20)	**7**	101.5 (4.0)
	697 (7,500)	6.4 (14)	61.5 (13.5)	**27**	68.5 (2.7)	68 (15)	**22**	76 (3)	84 (18.5)	**14**	94 (3.7)	102.5 (22.5)	**12**	114.5 (4.5)
	929 (10,000)	6.6 (14.6)	63.5 (14)	**37**	71 (2.8)	75 (16.5)	**30**	84 (3.3)	91 (20)	**20**	101.5 (4.0)	107 (23.5)	**16**	119.5 (4.7)
Moncton, New Brunswick	232 (2,500)	4.3 (9.4)	41 (9)	**7**	45.5 (1.8)	54.5 (12)	**6**	61 (2.4)	63.5 (14)	**3.5**	71 (2.8)	72.5 (16)	**2.7**	81.5 (3.2)
	465 (5,000)	5.9 (13)	57 (12.5)	**17**	63.5 (2.5)	68 (15)	**14**	76 (3)	82 (18)	**9**	91.5 (3.6)	93 (20.5)	**7**	104 (4.1)
	697 (7,500)	6.6 (14.6)	63.5 (14)	**28**	71 (2.8)	79.5 (17.5)	**24**	89 (3.5)	93 (20.5)	**16**	104 (4.1)	104.5 (23)	**12**	117 (4.6)
	929 (10,000)	7.5 (16.6)	73.5 (16)	**39**	81.5 (3.2)	84 (18.5)	**34**	94 (3.7)	100 (22)	**23**	112 (4.4)	113.5 (25)	**17**	127 (5.0)
Saint John, New Brunswick	232 (2,500)	5.7 (12.5)	54.5 (12)	**8**	61 (2.4)	57 (12.5)	**6**	63.5 (2.5)	75 (16.5)	**4**	84 (3.3)	86.5 (19)	**3**	96.5 (3.8)
	465 (5,000)	7.5 (16.6)	72.5 (16)	**20**	81.5 (3.2)	79.5 (17.5)	**16**	89 (3.5)	95.5 (21)	**11**	106.5 (4.2)	104.5 (23)	**8**	117 (4.6)
	697 (7,500)	8.7 (19.2)	84 (18.5)	**32**	94 (3.7)	93 (20.5)	**27**	104 (4.1)	107 (23.5)	**19**	119.5 (4.7)	118 (26)	**13.5**	132 (5.2)
	929 (10,000)	9.7 (21.3)	93 (20.5)	**44**	104 (4.1)	104.5 (23)	**38**	117 (4.6)	113.5 (25)	**27**	127 (5.0)	127.5 (28)	**20**	142 (5.6)
Gander, Newfound-land	232 (2,500)	3.5 (7.8)	34 (7.5)	**5.5**	38 (1.5)	45.5 (10)	**5**	51 (2.0)	57 (12.5)	**3.5**	63.5 (2.5)	68 (15)	**2.5**	76 (3.0)
	465 (5,000)	4.7 (10.4)	45.5 (10)	**15**	51 (2.0)	57 (12.5)	**12**	63.5 (2.5)	72.5 (16)	**8**	81.5 (3.2)	82 (18)	**6.5**	91.5 (3.6)
	697 (7,500)	5.7 (12.5)	54.5 (12)	**25**	61 (2.4)	63.5 (14)	**21**	71 (2.8)	79.5 (17.5)	**13.5**	89 (3.5)	93 (20.5)	**11**	104 (4.1)
	929 (10,000)	6.1 (13.5)	59 (13)	**35**	66 (2.6)	70.5 (15.5)	**29**	78.5 (3.1)	84 (18.5)	**19**	94 (3.7)	100 (22)	**15**	112 (4.4)
St. Andrews, Newfound-land	232 (2,500)	3.5 (7.8)	34 (7.5)	**5.5**	38 (1.5)	45.5 (10)	**5**	51 (2.0)	59 (13)	**3.5**	66 (2.6)	63.5 (14)	**2.5**	71 (2.8)
	465 (5,000)	5.2 (11.4)	47.5 (10.5)	**15**	53.5 (2.1)	59 (13)	**13**	66 (2.6)	72.5 (16)	**8**	81.5 (3.2)	79.5 (17.5)	**6**	89 (3.5)
	697 (7,500)	5.9 (13)	57 (12.5)	**26**	63.5 (2.5)	66 (14.5)	**21**	73.5 (2.9)	82 (18)	**14**	91.5 (3.6)	88.5 (19.5)	**10**	99 (3.9)
	929 (10,000)	6.6 (14.6)	63.5 (14)	**36**	71 (2.8)	72.5 (16)	**30**	81.5 (3.2)	86.5 (19)	**20**	96.5 (3.8)	95.5 (21)	**14.5**	106.5 (4.2)
St. John’s, Newfound-land	232 (2,500)	5.9 (13)	57 (12.5)	**8**	63.5 (2.6)	68 (15)	**7**	76 (3.0)	77.5 (17)	**4.5**	86.5 (3.4)	86.5 (19)	**3.2**	96.5 (3.8)
	465 (5,000)	8.5 (18.7)	82 (18)	**21**	91.5 (3.6)	91 (20)	**18**	101 (4.0)	100 (22)	**11**	112 (4.4)	113.5 (25)	**9**	127 (5.0)
	697 (7,500)	10.6 (23.4)	102.5 (22.5)	**34**	114.5 (4.5)	109 (24)	**29**	122 (4.8)	122.5 (27)	**21**	137 (5.4)	132 (29)	**15**	147.5 (5.8)
	929 (10,000)	11.8 (26)	113.5 (25)	**48**	127 (5.0)	129.5 (28.5)	**43**	145 (5.7)	143 (31.5)	**33**	160 (6.3)	150 (33)	**24**	167.5 (6.6)
Torbay, Newfound-land	232 (2,500)	4.9 (10.9)	47.5 (10.5)	**7.5**	53.5 (2.1)	61.5 (13.5)	**6.5**	68.5 (2.7)	75 (16.5)	**4**	84 (3.3)	84 (18.5)	**3**	94 (3.7)
	465 (5,000)	6.4 (14)	61.5 (13.5)	**18**	68.5 (2.7)	75 (16.5)	**15.5**	84 (3.3)	88.5 (19.5)	**10**	99 (3.9)	102.5 (22.5)	**8**	114.5 (4.5)
	697 (7,500)	7.3 (16.1)	70.5 (15.5)	**29**	78.5 (3.1)	84 (18.5)	**25**	94 (3.7)	100 (22)	**17.5**	112 (4.4)	113.5 (25)	**13**	127 (5)
	929 (10,000)	8.0 (17.7)	77.5 (17)	**40**	86.5 (3.4)	88.5 (19.5)	**34**	99 (3.9)	107 (23.5)	**24**	119.5 (4.7)	122.5 (27)	**19**	137 (5.4)
Halifax, Nova Scotia	232 (2,500)	5.9 (13)	57 (12.5)	**8**	63.5 (2.5)	68 (15)	**7**	76 (3.0)	77.5 (17)	**4.5**	86.5 (3.4)	86.5 (19)	**3.2**	96.5 (3.8)
	465 (5,000)	8.5 (18.7)	82 (18)	**21**	91.5 (3.6)	91 (20)	**18**	101.5 (4.0)	100 (22)	**11**	112 (4.4)	113.5 (25)	**9**	127 (5.0)
	697 (7,500)	10.6 (23.4)	102.5 (22.5)	**34**	114.5 (4.5)	109 (24)	**29**	122 (4.8)	122.5 (27)	**21**	137 (5.4)	132 (29)	**15**	147.5 (5.8)
	929 (10,000)	11.8 (26)	113.5 (25)	**48**	127 (5.0)	129.5 (28.5)	**43**	145 (5.7)	143 (31.5)	**33**	160 (6.3)	150 (33)	**24**	167.5 (6.6)

Selecta-Drain Chart

LOCATION	SQUARE METRE (SQUARE FOOT) NOTCH AREA RATING	ROOF LOAD FACTOR KGS. (LBS.)	TOTAL ROOF SLOPE											
			DEAD LEVEL			51mm (2") RISE			102mm (4") RISE			152mm (6") RISE		
			L.P.M. (G.P.M.) Discharge	**Draindown Time Hrs.**	mm (in.) Water Depth	L.P.M. (G.P.M.) Discharge	**Draindown Time Hrs.**	mm (in.) Water Depth	L.P.M. (G.P.M.) Discharge	**Draindown Time Hrs.**	mm (in.) Water Depth	L.P.M. (G.P.M.) Discharge	**Draindown Time Hrs.**	mm (in.) Water Depth
Sydney, Nova Scotia	232 (2,500)	4.3 (9.4)	41 (9)	**6.5**	45.5 (1.8)	45.5 (10)	**5**	51 (2.0)	57 (12.5)	**3.5**	6.5 (2.5)	68 (15)	**2.5**	76 (3)
	465 (5,000)	5.7 (12.5)	54.5 (12)	**16**	61 (2.4)	59 (13)	**13**	66 (2.6)	75 (16.5)	**8**	84 (3.3)	84 (18.5)	**6.5**	94 (3.7)
	697 (7,500)	6.4 (14)	61.5 (13.5)	**28**	68.5 (2.7)	68 (15)	**22**	76 (3)	84 (18.5)	**14**	94 (3.7)	97.5 (21.5)	**11**	109 (4.3)
	929 (10,000)	7.1 (15.6)	68 (15)	**38**	76 (3)	75 (16.5)	**30**	84 (3.3)	91 (20)	**20**	101.5 (4)	104.5 (23)	**16**	117 (4.6)
Yarmouth, Nova Scotia	232 (2,500)	6.4 (14)	61.5 (13.5)	**9**	68.5 (2.7)	70.5 (15.5)	**7.5**	78.5 (3.1)	82 (18)	**4.5**	91.5 (3.6)	91 (20)	**3.5**	101.5 (4)
	465 (5,000)	8.3 (18.2)	79.5 (17.5)	**21**	89 (3.5)	88.5 (19.5)	**18**	99 (3.9)	104.5 (23)	**12**	117 (4.6)	116 (25.5)	**9**	129.5 (5.1)
	697 (7,500)	9.4 (20.8)	91 (20)	**34**	101.5 (4)	102.5 (22.5)	**29**	114.5 (4.5)	118 (26)	**21**	132 (5.2)	132 (29)	**15**	147.5 (5.8)
	929 (10,000)	10.4 (22.9)	100 (22)	**45**	112 (4.4)	109 (24)	**41**	122 (4.8)	129.5 (28.5)	**29**	145 (5.7)	141 (31)	**22**	157.5 (6.2)
Thunder Bay, Ontario	232 (2,500)	4.9 (10.9)	47.5 (10.5)	**7.5**	53.5 (2.1)	61.5 (13.5)	**6.5**	68.5 (2.7)	75 (16.5)	**4**	84 (3.3)	88.5 (19.5)	**3.5**	91.5 (3.6)
	465 (5,000)	6.1 (13.5)	59 (13)	**18**	66 (2.6)	72.5 (16)	**15**	81.5 (3.2)	86.5 (19)	**9.5**	96.5 (3.8)	102.5 (22.5)	**7.5**	114.5 (4.5)
	697 (7,500)	6.6 (14.6)	63.5 (14)	**28**	71 (2.8)	77.5 (17)	**24**	86.5 (3.4)	93 (20.5)	**16**	104 (4.1)	109 (24)	**13**	122 (4.8)
	929 (10,000)	7.1 (15.6)	68 (15)	**38**	76 (3)	84 (18.5)	**33**	94 (3.7)	97.5 (21.5)	**22**	109 (4.3)	116 (25.5)	**18**	129.5 (5.1)
Guelph, Ontario	232 (2,500)	5.7 (12.5)	54.5 (12)	**8**	61 (2.4)	63.5 (14)	**7**	71 (2.8)	86.5 (19)	**5**	96.5 (3.8)	100 (22)	**3.7**	112 (4.4)
	465 (5,000)	6.6 (14.6)	63.5 (14)	**19**	71 (2.8)	75 (16.5)	**15.5**	84 (3.3)	97.5 (21.5)	**11**	109 (4.3)	116 (25.5)	**9**	129.5 (5.1)
	697 (7,500)	7.3 (16.1)	70.5 (15.5)	**29**	78.5 (3.1)	82 (18)	**25**	91.5 (3.6)	104.5 (23)	**18**	117 (4.6)	125 (27.5)	**14**	139.5 (5.5)
	929 (10,000)	8.0 (17.7)	77.5 (17)	**40**	86.5 (3.4)	84 (18.5)	**34**	94 (3.7)	109 (24)	**26**	122 (4.8)	132 (29)	**20**	147.5 (5.8)
Hamilton, Ontario	232 (2,500)	5.9 (13)	57 (12.5)	**8.5**	63.5 (2.5)	72.5 (16)	**7.5**	81.5 (3.2)	93 (20.5)	**5**	104 (4.1)	109 (24)	**4**	122 (4.8)
	465 (5,000)	6.6 (14.6)	63.5 (14)	**19**	71 (2.8)	79.5 (17.5)	**16**	89 (3.5)	104.5 (23)	**12**	117 (4.6)	122.5 (27)	**9**	137 (5.4)
	697 (7,500)	6.8 (15.1)	66 (14.5)	**28**	73.5 (2.9)	84 (18.5)	**26**	94 (3.7)	111.5 (24.5)	**20**	124.5 (4.9)	127.5 (28)	**15**	142 (5.6)
	929 (10,000)	7.1 (15.6)	68 (15)	**39**	76 (3)	86.5 (19)	**34**	96.5 (3.8)	116 (25.5)	**27**	129.5 (5.1)	134 (29.5)	**21**	150 (5.9)
Kingston, Ontario	232 (2,500)	6.4 (14)	61.5 (13.5)	**9**	68.5 (2.7)	77.5 (17)	**8**	86.5 (3.4)	91 (20)	**5**	101.5 (4)	109 (24)	**4**	122 (4.8)
	465 (5,000)	7.5 (16.6)	72.5 (16)	**20**	81.5 (3.2)	86.5 (19)	**18**	96.5 (3.8)	104.5 (23)	**12**	117 (4.6)	122.5 (27)	**9.5**	137 (5.4)
	697 (7,500)	8.5 (18.7)	82 (18)	**31**	91.5 (3.6)	93 (20.5)	**28**	104 (4.1)	111.5 (24.5)	**20**	124.5 (4.9)	132 (29)	**15**	147.5 (5.8)
	929 (10,000)	8.7 (19.2)	86.5 (19)	**42**	96.5 (3.8)	97.5 (21.5)	**38**	109 (4.3)	116 (25.5)	**27**	129.5 (5.1)	68 (15)	**21**	152.5 (6)
London, Ontario	232 (2,500)	6.1 (13.5)	59 (13)	**8.5**	66 (2.6)	72.5 (16)	**7.5**	81.5 (3.2)	88.5 (19.5)	**5**	99 (3.9)	107 (23.5)	**4**	119.5 (4.7)
	465 (5,000)	7.1 (15.6)	68 (15)	**20**	76 (3)	84 (18.5)	**17**	94 (3.7)	102.5 (22.5)	**12**	114.5 (4.5)	122.5 (27)	**9.5**	137 (5.4)
	697 (7,500)	8.0 (17.7)	77.5 (17)	**30**	86.5 (3.4)	88.5 (19.5)	**27**	99 (3.9)	109 (24)	**19**	122 (4.8)	129.5 (28.5)	**15**	145 (5.7)
	929 (10,000)	8.5 (18.7)	82 (18)	**41**	91.5 (3.6)	91 (20)	**36**	101.5 (4)	113.5 (25)	**27**	127 (5)	134 (29.5)	**21**	150 (5.9)
North Bay, Ontario	232 (2,500)	5.7 (12.5)	54.5 (12)	**8**	61 (2.4)	68 (15)	**7**	76 (3)	86.5 (19)	**5**	96.5 (3.8)	100 (22)	**3.8**	112 (4.4)
	465 (5,000)	6.6 (14.6)	63.5 (14)	**19**	71 (2.8)	79.5 (17.5)	**16**	89 (3.5)	97.5 (21.5)	**11**	109 (4.3)	113.5 (25)	**9**	127 (5)
	697 (7,500)	7.5 (16.6)	72.5 (16)	**30**	81.5 (3.2)	86.5 (19)	**26**	96.5 (3.8)	107 (23.5)	**19**	119.5 (4.7)	122.5 (27)	**14**	137 (5.4)
	929 (10,000)	8.3 (18.2)	77.5 (17)	**40**	86.5 (3.4)	93 (20.5)	**36**	104 (4.1)	111.5 (24.5)	**26**	124.5 (4.9)	127.5 (28)	**20**	142 (5.6)

Selecta-Drain Chart

ZURN

LOCATION	SQUARE METRE (SQUARE FOOT) NOTCH AREA RATING	ROOF LOAD FACTOR KGS. (LBS.)	TOTAL ROOF SLOPE											
			DEAD LEVEL			51mm (2”) RISE			102mm (4”) RISE			152mm (6”) RISE		
			L.P.M. (G.P.M.) Discharge	**Draindown Time Hrs.**	mm (in.) Water Depth	L.P.M. (G.P.M.) Discharge	**Draindown Time Hrs.**	mm (in.) Water Depth	L.P.M. (G.P.M.) Discharge	**Draindown Time Hrs.**	mm (in.) Water Depth	L.P.M. (G.P.M.) Discharge	**Draindown Time Hrs.**	mm (in.) Water Depth
Ottawa, Ontario	232 (2,500)	4.7 (10.4)	45.5 (10)	**7**	51 (2)	59 (13)	**6.5**	66 (2.6)	77.5 (17)	**4.5**	86.5 (3.4)	86.5 (19)	**3.2**	96.5 (3.8)
	465 (5,000)	5.9 (13)	57 (12.5)	**17**	63.5 (2.5)	68 (15)	**14**	76 (3)	86.5 (19)	**10**	96.5 (3.8)	100 (22)	**7.5**	112 (4.4)
	697 (7,500)	6.4 (14)	61.5 (13.5)	**27**	68.5 (2.7)	75 (16.5)	**23**	84 (3.3)	93 (20.5)	**16**	104 (4.1)	107 (23.5)	**12**	119.5 (4.7)
	929 (10,000)	6.6 (14.6)	63.5 (14)	**36**	71 (2.8)	79.5 (17.5)	**32**	89 (3.5)	97.5 (21.5)	**22**	109 (4.3)	113.5 (25)	**18**	127 (5)
St. Thomas, Ontario	232 (2,500)	5.7 (12.5)	54.5 (12)	**8**	61 (2.4)	68 (15)	**7**	76 (3.0)	86.5 (19)	**5**	96.5 (3.8)	104.5 (23)	**4**	117 (4.6)
	465 (5,000)	6.6 (14.6)	63.5 (14)	**19**	71 (2.8)	77.5 (17)	**16**	86.5 (3.4)	97.5 (21.5)	**11**	109 (4.3)	118 (26)	**9**	132 (5.2)
	697 (7,500)	7.1 (16.6)	68 (15)	**29**	76 (3.0)	82 (18)	**26**	91.5 (3.6)	102.5 (22.5)	**18**	114.5 (4.5)	125 (27.5)	**15**	139.5 (5.5)
	929 (10,000)	7.5 (16.6)	72.5 (16)	**40**	81.5 (3.2)	86.5 (19)	**34**	96.5 (3.8)	107 (23.5)	**24**	119.5 (4.7)	132 (29)	**20**	147.5 (5.8)
Timmins, Ontario	232 (2,500)	4.3 (9.4)	41 (9)	**7**	45.5 (1.8)	57 (12.5)	**6**	63.5 (2.5)	72.5 (16)	**4**	81.5 (3.2)	86.5 (19)	**3.3**	96.5 (3.8)
	465 (5,000)	5.7 (12.5)	54.5 (12)	**16**	61 (2.4)	63.5 (14)	**14**	71 (2.8)	82 (18)	**9**	91.5 (3.6)	97.5 (21.5)	**7.5**	109 (4.3)
	697 (7,500)	6.4 (14)	61.5 (13.5)	**27**	68.5 (2.7)	70.5 (15.5)	**22**	78.5 (3.1)	86.5 (19)	**15**	96.5 (3.8)	104.5 (23)	**12**	117 (4.6)
	929 (10,000)	6.6 (14.6)	63.5 (14)	**36**	71 (2.8)	72.5 (16)	**30**	81.5 (3.2)	91 (20)	**21**	101.5 (4.0)	109 (24)	**17**	122 (4.8)
Toronto, Ontario	232 (2,500)	5.7 (12.5)	54.5 (12)	**8**	61 (2.4)	66 (14.5)	**7**	73.5 (2.9)	82 (18)	**4.5**	91.5 (3.6)	97.5 (21.5)	**3.5**	109 (4.3)
	465 (5,000)	6.8 (15.1)	66 (14.5)	**19**	73.5 (2.9)	77.5 (17)	**16**	86.5 (3.4)	93 (20.5)	**11**	104 (4.1)	111.5 (24.5)	**9**	124.5 (4.9)
	697 (7,500)	8.0 (17.7)	77.5 (17)	**30**	86.5 (3.4)	84 (18.5)	**26**	94 (3.7)	100 (22)	**18**	112 (4.4)	120.5 (26.5)	**14**	134.5 (5.3)
	929 (10,000)	8.7 (19.2)	82 (18)	**42**	91.5 (3.6)	86.5 (19)	**34**	96.5 (3.8)	104.5 (23)	**24**	117 (4.6)	127.5 (28)	**20**	142 (5.6)
Windsor, Ontario	232 (2,500)	6.1 (13.5)	59 (13)	**8.5**	66 (2.6)	70.5 (15.5)	**7.5**	78.5 (3.1)	84 (18.5)	**4.5**	94 (3.7)	107 (23.5)	**4**	119.5 (4.7)
	465 (5,000)	7.1 (15.6)	68 (15)	**20**	76 (3.0)	79.5 (17.5)	**16**	89 (3.5)	97.5 (21.5)	**11**	109 (4.3)	118 (26)	**9**	132 (5.2)
	697 (7,500)	8.0 (17.7)	77.5 (17)	**30**	86.5 (3.4)	86.5 (19)	**26**	96.5 (3.8)	107 (23.5)	**18**	119.5 (4.7)	125 (27.5)	**15**	139.5 (5.5)
	929 (10,000)	8.7 (19.2)	82 (18)	**42**	91.5 (3.6)	91 (20)	**36**	101.5 (4.0)	113.5 (25)	**26**	127 (5.0)	129.5 (28.5)	**20**	145 (5.7)
Charlottetown, Prince Edward Island	232 (2,500)	4.9 (10.9)	47.5 (10.5)	**7.5**	53.5 (2.1)	57 (12.5)	**6**	63.5 (2.5)	68 (15)	**3.8**	76 (3.0)	79.5 (17.5)	**3**	89 (3.5)
	465 (5,000)	6.6 (14.6)	63.5 (14)	**19**	71 (2.8)	75 (16.5)	**15.5**	84 (3.3)	88.5 (19.5)	**10**	99 (3.9)	100 (22)	**7.5**	112 (4.4)
	697 (7,500)	7.8 (17.2)	75 (16.5)	**31**	84 (3.3)	86.5 (19)	**26**	96.5 (3.8)	102.5 (22.5)	**18**	114.5 (4.5)	113.5 (25)	**13**	127 (5.0)
	929 (10,000)	8.7 (19.2)	84 (18.5)	**42**	94 (3.7)	97.5 (21.5)	**37**	106.5 (4.2)	111.5 (24.5)	**26**	124.5 (4.9)	125 (27.5)	**20**	139.5 (5.5)
Montreal, Quebec	232 (2,500)	5.2 (11.4)	50 (11)	**7.5**	56 (2.2)	61.5 (13.5)	**7**	68.5 (2.7)	79.5 (17.5)	**4.5**	89 (3.5)	97.5 (21.5)	**3.5**	109 (4.36)
	465 (5,000)	5.9 (13)	57 (12.5)	**17**	63.5 (2.5)	70.5 (15.5)	**15**	78.5 (3.1)	88.5 (19.5)	**10**	99 (3.9)	109 (24)	**8**	122 (4.8)
	697 (7,500)	6.1 (13.5)	59 (13)	**27**	66 (2.6)	72.5 (16)	**23**	81.5 (3.2)	93 (20.5)	**16**	104 (4.1)	113.5 (25)	**13**	127 (5.0)
	929 (10,000)	6.4 (14)	61.5 (13.5)	**36**	68.5 (2.7)	77.5 (17)	**31**	86.5 (3.4)	95.5 (21)	**22**	106.5 (4.2)	120.5 (26.5)	**19**	134.5 (5.3)
Quebec City, Quebec	232 (2,500)	5.4 (12)	52.5 (11.5)	**8**	58.5 (2.3)	63.5 (14)	**7**	71 (2.8)	79.5 (17.5)	**4.5**	89 (3.5)	97.5 (21.5)	**3.5**	109 (4.3)
	465 (5,000)	6.4 (14)	61.5 (13.5)	**18**	68.5 (2.7)	70.5 (15.5)	**15**	78.5 (3.1)	84 (18.5)	**10**	94 (3.7)	104.5 (23)	**8**	117 (4.6)
	697 (7,500)	6.6 (14.6)	63.5 (14)	**28**	71 (2.8)	72.5 (16)	**23**	81.5 (3.2)	86.5 (19)	**15**	96.5 (3.8)	107 (23.5)	**12**	119.5 (4.7)
	929 (10,000)	7.1 (15.6)	68 (15)	**37**	76 (3.0)	77.5 (17)	**31**	86.5 (3.4)	88.5 (19.5)	**20**	99 (3.9)	109 (24)	**17**	122 (4.8)

Selecta-Drain Chart

LOCATION	SQUARE METRE (SQUARE FOOT) NOTCH AREA RATING	ROOF LOAD FACTOR KGS. (LBS.)	TOTAL ROOF SLOPE											
			DEAD LEVEL			51mm (2") RISE			102mm (4") RISE			152mm (6") RISE		
			L.P.M. (G.P.M.) Discharge	**Draindown Time Hrs.**	mm (in.) Water Depth	L.P.M. (G.P.M.) Discharge	**Draindown Time Hrs.**	mm (in.) Water Depth	L.P.M. (G.P.M.) Discharge	**Draindown Time Hrs.**	mm (in.) Water Depth	L.P.M. (G.P.M.) Discharge	**Draindown Time Hrs.**	mm (in.) Water Depth
Regina, Saskatchewan	232 (2,500)	4.5 (9.9)	43 (9.5)	**7**	48.5 (1.9)	54.5 (12)	**6**	61 (2.4)	72.5 (16)	**4**	81.5 (3.2)	79.5 (17.5)	**3**	89 (3.5)
	465 (5,000)	6.4 (14)	61.5 (13.5)	**18**	68.5 (2.7)	68 (15)	**14**	76 (3.0)	86.5 (19)	**10**	96.5 (3.8)	97.5 (21.5)	**7.5**	109 (4.3)
	697 (7,500)	7.3 (16.1)	70.5 (15.5)	**29**	78.5 (3.1)	77.5 (17)	**24**	86.5 (3.4)	100 (22)	**17**	112 (4.4)	109 (24)	**12**	122 (4.8)
	929 (10,000)	8.3 (18.2)	79.5 (17.5)	**40**	89 (3.5)	82 (18)	**32**	91.5 (3.6)	104.5 (23)	**24**	117 (4.6)	118 (26)	**18**	132 (5.2)
Saskatoon, Saskatchewan	232 (2,500)	4.0 (8.8)	38.5 (8.5)	**6**	43 (1.7)	57 (12.5)	**6**	63.5 (2.5)	66 (14.5)	**3.8**	73.5 (2.9)	77.5 (17)	**2.8**	86.5 (3.4)
	465 (5,000)	5.7 (12.5)	54.5 (12)	**16**	61 (2.4)	68 (15)	**14.5**	76 (3.0)	82 (18)	**9**	91.5 (3.6)	95.5 (21)	**7**	106.5 (4.2)
	697 (7,500)	6.6 (14.6)	63.5 (14)	**28**	71 (2.8)	75 (16.5)	**24**	84 (3.3)	91 (20)	**16**	101.5 (4.0)	104.5 (23)	**12**	117 (4.6)
	929 (10,000)	7.1 (15.6)	68 (15)	**38**	76 (3.0)	82 (18)	**32**	91.5 (3.6)	97.5 (21.5)	**22**	109 (4.3)	113.5 (25)	**18**	127 (5.0)

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APPENDIX

G

UNDERGROUND STORAGE DETAILS

User Inputs

Chamber Model:	MC-3500
Outlet Control Structure:	Yes
Project Name:	6034 Mayfield Road
Engineer:	Ivan Mock
Project Location:	
Measurement Type:	Metric
Required Storage Volume:	4500.00 cubic meters.
Stone Porosity:	40%
Stone Foundation Depth:	300 mm.
Stone Above Chambers:	305 mm.
Average Cover Over Chambers:	600 mm.
Design Constraint Dimensions:	(50.00 m. x 100.00 m.)

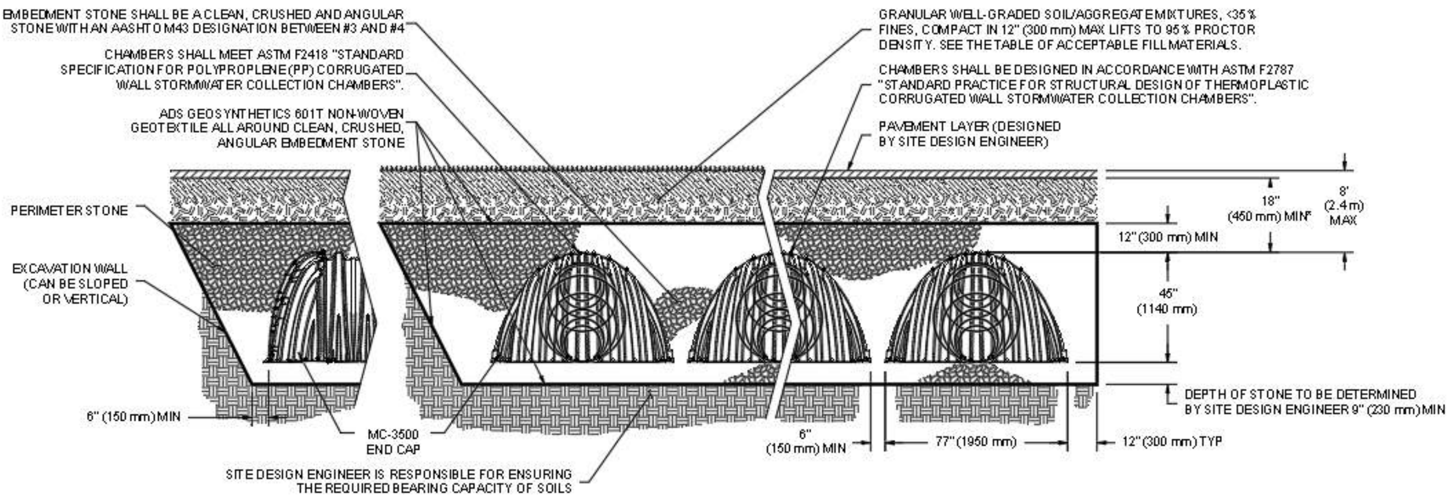
Results

System Volume and Bed Size

Installed Storage Volume:	4524.13 cubic meters.
Storage Volume Per Chamber:	3.11 cubic meters.
Number Of Chambers Required:	864
Number Of End Caps Required:	40
Chamber Rows:	20
Maximum Length:	99.23 m.
Maximum Width:	42.80 m.
Approx. Bed Size Required:	4149.20 square meters.

System Components

Amount Of Stone Required:	4546.09 cubic meters
Volume Of Excavation (Not Including Fill):	7251.66 cubic meters



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

StormTech® Isolator® Row Plus

The StormTech Isolator Row Plus is an enhancement to our proven water quality treatment system. This updated system is both a NJCAT and ETV verified water quality treatment device that can be incorporated into any system layout.

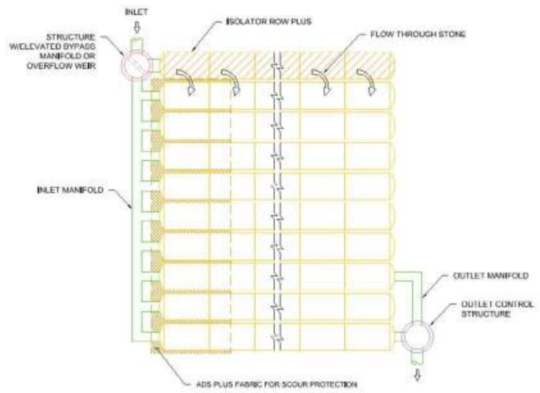
Features

- Isolator Row Plus is now ETV verified. As a Manufactured Treatment Device it achieves over 81% TSS removal per the ISO 14034:2016 ETV standard and the Canadian Environmental Technology Verification Process.
- A patented Flamp™ (Flared End Ramp) provides a smooth transition from pipe invert to fabric bottom. The FLAMP is attached to the inlet pipe inside the chamber end cap and improves chamber function over time by distributing sediment and debris that would otherwise collect at the inlet. It also serves to improve the fluid and solid flow back into the inlet pipe during maintenance and cleaning.
- Proprietary ADS Plus fabric maintains durability and sediment removal while allowing for higher water quality flow rates. A single layer of ADS Plus fabric is placed between the angular base stone and the Isolator Row Plus chambers.

Technology Descriptions

The Isolator Row Plus is designed to capture the “first flush” runoff and offers the versatility to be sized on a volume or a flow basis. Considered an LID (low impact development) technology, the Isolator Row Plus can be part of the treatment train design for water quality. An upstream manhole not only provides access to the Isolator Row Plus but includes a high/low concept such that stormwater flow rates or volumes that exceed the capacity of the Isolator Row Plus bypass through a manifold to the other chambers. This creates a differential between the Isolator Row Plus row of chambers and the manifold to the rest of the system, thus allowing for settlement time in the Isolator Row Plus. Stormwater is then either infiltrated into the soils below or passed at a controlled rate through an outlet manifold and outlet control structure.

Schematic of the StormTech Isolator Row PLUS System



Summary of Verified Claims[1]

Maximum Treatment Flow Rate (MTFR) (L/s/m^2)	2.8
Effective Filtration Treatment Area (m^2)	5.06
Test Sediment Size (microns)	1-1000
Mean Particle Concentration (mg/L)	200
TSS Removal Efficiency	81%

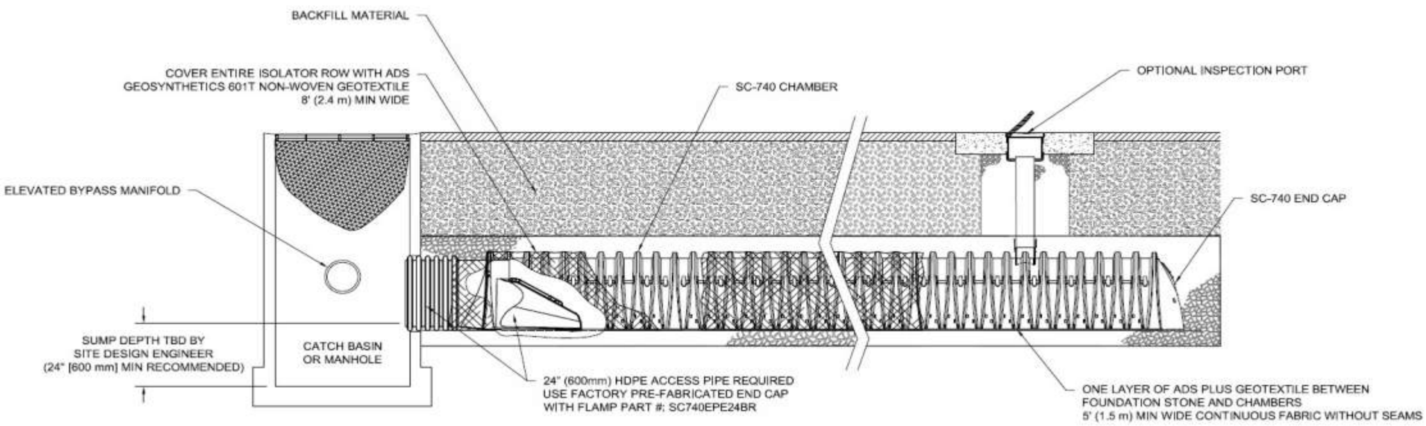
[1] Verification of StormTech SC-740 Isolator Row PLUS test results in accordance with the ISO 14034:2016 ETV standard. The full Verification Statement for the StormTech SC-740 Isolator Row PLUS can be downloaded from the VerifiGlobal website

ADS StormTech™

VerifiGlobal

ads-pipecanada.ca
519-699-0222

StormTech Isolator Row Plus (not to scale)
Note: Non-woven fabric is only required over the chambers for the SC-310 and SC-740 chamber models.



Maintenance
The Isolator Row Plus was designed to reduce the cost of periodic maintenance. By "isolating" sediment to just one row of the StormTech system, costs are dramatically reduced by eliminating the need to clean out each row of the entire storage bed. If inspection indicates the potential need for maintenance, access is provided via a manhole(s) located on the end(s) of the row for cleanout. Maintenance is accomplished with the JetVac process. The JetVac® process utilizes a high-pressure water nozzle to propel itself down the Isolator Row Plus while scouring and suspending sediment. As the nozzle is retrieved, the captured pollutants are flushed back into the manhole for vacuuming. Most sewer and pipe maintenance companies have vacuum/JetVac combination vehicles. Selection of an appropriate JetVac nozzle will improve maintenance efficiency.

	Chamber Storage	Chamber Footprint	Treatment Rate
SC-160LP	0.42 m^3 (15.0 cf)	1.06 m^2 (11.45 sf)	3.11 L/s (0.11 cfs)
SC-310	0.88 m^3 (31.0 cf)	1.64 m^2 (17.7 sf)	4.53 L/s (0.16 cfs)
SC-740	2.12 m^3 (74.9 cf)	2.58 m^2 (27.8 sf)	7.36 L/s (0.26 cfs)
DC-780	2.22 m^3 (78.4 cf)	2.58 m^2 (27.8 sf)	7.36 L/s (0.26 cfs)
MC-3500	4.96 m^3 (175.0 cf)	3.99 m^2 (42.9 sf)	11.32 L/s (0.40 cfs)
MC-4500	4.60 m^3 (162.6 cf)	2.80 m^2 (30.1 sf)	7.93 L/s (0.28 cfs)

Installation
Installation of the stormwater treatment unit(s) shall be preformed per manufacture's installation instructions. Such instructions can be obtained by calling Advanced Drainage systems at 888-367-7473 or by logging on to www.ads-pipe.com or www.stormtech.com.

Verification Statement

StormTech Isolator® Row PLUS
Registration number: (V-2020-10-01)
Date of issue: (2020-October-27)

Technology type	Stormwater Filtration Device		
Application	Stormwater filtration technology to remove sediments, nutrients, heavy metals, and organic contaminants from stormwater runoff		
Company	StormTech, LLC.		
Address	520 Cromwell Avenue, Rocky Hill, CT 06067 USA	**Phone**	+1-888-892-2694
Website	www.stormtech.com		
E-mail	info@stormtech.com		

Verified Performance Claims

The StormTech Isolator® Row PLUS technology was tested at the Mid-Atlantic Storm Water Research Center (MASWRC), under the supervision of Boggs Environmental Consultants, Inc. The performance test results for two overlapping StormTech Isolator® Row PLUS chambers (commercial unit model SC-740) were verified by Good Harbour Laboratories Inc. (GHL), following the requirements of ISO 14034:2016 and the VerifiGlobal Performance Verification Protocol. Based on the laboratory testing conducted, the verified performance claims are as follows:

Total Suspended Solids (TSS) Removal Efficiency - The StormTech Isolator® Row PLUS achieved 82% ± 1% removal efficiency of suspended sediment concentration (SCC) at a 95% confidence level.

Average Loading Rate - Based on the reported flow rate data and the effective sedimentation and filtration treatment area of the test unit, the average loading rate of the test unit was 4.15 ± 0.03 GPM/ft^2 at a 95% confidence level.

Maximum Treatment Flow Rate (MTFR) - Although the MTFR varies among the StormTech Isolator® Row PLUS model sizes and the number of chambers, the design surface loading rate remains the same (4.13 gpm/ ft^2 of treatment surface area). The test unit consisted of two overlapping StormTech SC-740 chambers with a nominal MTFR of 225 GPM (0.501 CFS) and an effective filtration treatment area (EFTA) of approximately 54.5 ft^2.

Detention Time and Volume - The StormTech Isolator Row PLUS detention time and wet volume varies with model size. The unit tested had a wet volume of approximately 65.1 ft^3 and a detention time of 2.2 minutes.

Maximum Sediment Storage Depth and Volume - The sediment storage volume and depth vary according to the StormTech Isolator® Row PLUS model sizes and system configuration. For the two overlapping StormTech SC-740 chambers tested, the maximum sediment storage volume is 2.3 ft^3 at a sediment depth of 0.5 inches.

Effective Sedimentation/Filtration Treatment Areas - The Effective Sedimentation Area (ESA) and the Effective Filtration Treatment Area (EFTA) increase as the size of the system increases. For the two overlapping StormTech SC-740 chambers tested, the ESA and the ratio of ESA/EFTA were 54.5 ft^2 and 1.0, respectively.

Sediment Mass Load Capacity - The sediment mass load capacity varies according to the StormTech Isolator® Row PLUS model sizes and system configuration. For the two overlapping StormTech SC-740 chambers tested, the mass loading capture was 158.4 lbs ± 0.8 lbs (2.91 ±0.01 lbs/ ft^2) following a total sediment loading of 195.2 lbs.

Technology Application

The StormTech "Isolator® Row PLUS" is a stormwater treatment technology designed for use under parking lots, roadways and heavy earth loads while providing a superior and durable structural system. The technology comprises a row of chambers covered in a non-woven geotextile fabric with a single layer of proprietary woven fabric at the bottom that serves as a filter strip, providing surface area for infiltration and runoff reduction with enhanced suspended solids and pollutant removal. The following features make the Isolator® Row PLUS effective as a water quality solution:

- Enhanced infiltration Surface Area
- Runoff Volume Reduction
- Peak Flow Reduction
- Sediment/Pollutant Removal
- Internal Water Storage (IWS)
- Water Temperature Cooling (Thermal Buffer).

Technology Description

The Isolator® Row PLUS (shown in Figures 1 and 2) is the first row of StormTech chambers that is surrounded with filter fabric and connected to a closely located manhole for easy access. The Isolator® Row PLUS provides for settling and filtration of sediment as stormwater rises in the chamber and ultimately passes through the filter fabric. The open-bottom chambers allow stormwater to flow out of the chambers, while sediment is captured in the Isolator® Row PLUS.

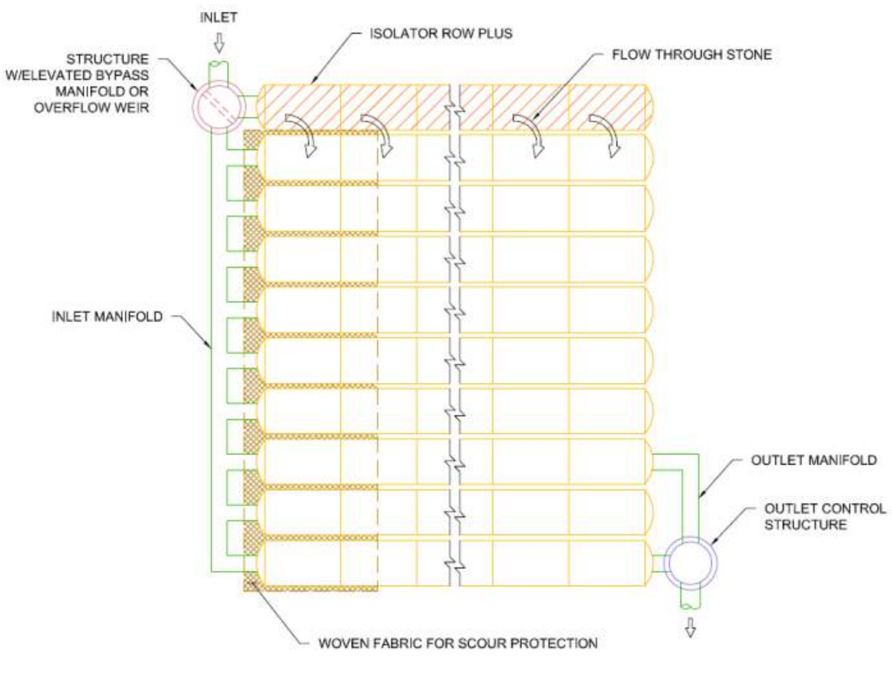


Figure 1: Schematic of the StormTech Isolator® Row PLUS System

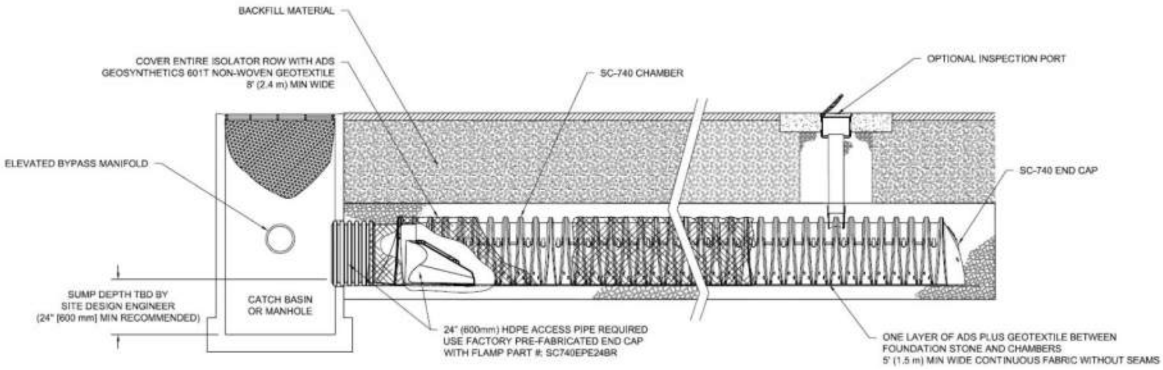


Figure 2: Isolator® Row PLUS Detail

A single layer of proprietary Advanced Drainage Systems (ADS) PLUS fabric is placed between the angular base stone and the Isolator Row PLUS chamber. The geotextile provides the means for stormwater filtration and provides a durable surface for maintenance operations. A 6 oz. non-woven fabric is placed over the chambers.

The Isolator® Row PLUS is designed to capture the "first flush" and offers the versatility to be sized on a volume basis or a flow-rate basis. An upstream manhole not only provides access to the Isolator® Row PLUS but includes a high low/concept such that stormwater flow rates or volumes that exceed the capacity of the Isolator® Row PLUS bypass through a manifold to the other chambers. This is achieved with either a high-flow weir or an elevated manifold. This creates a differential between the Isolator® Row PLUS and the manifold, thus allowing for settlement time in the Isolator® Row PLUS. After Stormwater flows through the Isolator® Row PLUS and into the rest of the StormTech chamber system it is either infiltrated into the soils below or passed at a controlled rate through an outlet manifold and outlet control structure.

StormTech developed and owns the Isolator® Row PLUS technology and has filed a number of patent applications relating to the Isolator® Row PLUS system.[1]

Description of Test Procedure for the StormTech Isolator® Row PLUS

In January 2020, two overlapping StormTech SC-740 Isolator® Row PLUS commercial size chambers were installed at the Mid-Atlantic Storm Water Research Center (MASWRC, a subsidiary of BaySaver), in Mount Airy, Maryland, to evaluate the performance of the Isolator® Row PLUS system for Total Suspended Solid (TSS) removal (Figure 3) All testing and data collection procedures were supervised by Boggs Environmental Consultants, Inc. (BEC), who was hired by ADS for third party oversight, and were in accordance with the *New Jersey Department of Environmental Protection Laboratory Protocol to Assess Total Suspended Solids Removal by a Filtration Manufactured Treatment Device (January 2013)*.

Prior to the start of testing, a Quality Assurance Project Plan (QAPP), revision dated January 09, 2020, was submitted and approved by the New Jersey Corporation for Advanced Technology (NJCAT), c/o Center for Environmental Systems, Stevens Institute of Technology, Castle Point on Hudson, Hoboken, NJ 07030.

[1] (U.S. Provisional Application No. 62/753,050, filed October 30, 2018; U.S. Non-Provisional Application No. 16/670,628, filed October 31, 2019; International Application No. PCT/US2019/059283, filed October 31, 2019; U.S. Application No. 16/938,482, filed July 24, 2020; U.S. Application No. 16/938,657, filed July 24, 2020; PCT International Application No. PCT/US2020/043543, filed July 24, 2020; PCT International Application No. PCT/US2020/043557, filed July 24, 2020.

Figure 3: StormTech "Isolator® Row PLUS" Test Set-up at MASWRC

Verification Results

The verification process for the StormTech Isolator® Row PLUS technology was conducted by GHL in accordance with the VerifiGlobal Verification Plan for the StormTech "Isolator® Row PLUS" Technology – 2020-09-09. The technology performance claims verified by GHL are summarized at the front of this Verification Statement and in Table 6 on Page 8 under the heading "Verification Summary".

Particle size distribution analysis was performed by ECS Mid-Atlantic, LLC of Frederick, MD in accordance with ASTM D422-63(2007). ECS is accredited by the American Association of State Highways and Transportation Officials (AASHTO).

ASTM D422-63(2007) is a sieve and hydrometer method where the larger particles, > 75 microns, are measured using a standard sieve stack while the smaller particles are measured based on their settling time using a hydrometer.

The PSD meets the requirements of NJDEP, which is generally accepted as representative of the type of particle sizes an OGS would be designed to treat. Actual PSD is site and rainfall event specific, so it was necessary to choose a standard PSD to make testing and comparison manageable.

Table 1 shows the NJDEP PSD specification. Table 2 and Figure 4 show the incoming material PSD as determined by ECS Mid-Atlantic and confirmed by the verifier.

Table 1: NJDEP PSD Specification

Particle Size (µm)	NJDEP Minimum Specification
1000	98
500	93
250	88
150	73
100	58
75	48
50	43
20	33
8	18
5	8
2	3
d_{50}	< 75 µm

Table 2 – Particle Size Distribution (PSD) of Test Sediment

Mesh (mm)	US Sieve Size	Sample ID		
		PSD A	PSD B	PSD C
		Percent Finer		
9.525	0.375	100.0	100.0	100.0
4.750	#4	100.0	100.0	100.0
4.000	#5	100.0	100.0	100.0
2.360	#8	100.0	100.0	100.0
2.000	#10	100.0	100.0	100.0
1.180	#16	100.0	100.0	100.0
1.000	#18	100.0	100.0	100.0
0.500	#35	100.0	100.0	100.0
0.425	#40	93.3	93.0	93.6
0.250	#60	90.3	89.8	90.2
0.150	#100	79.3	78.1	78.1
0.125	#120	73.6	71.7	71.7
0.106	#140	68.4	65.2	64.8
0.090	#170	60.2	58.3	57.5
0.075	#200	52.0	50.9	50.3
0.053	#270	48.0	48.3	47.8
0.045	Hydrometer	46.6	46.7	46.7
0.032		42.8	42.9	41.0
0.021		37.1	37.2	35.3
0.0125		25.7	25.7	25.8
0.0090		20.1	20.1	19.2
0.0064		16.3	16.4	14.5
0.0032		8.8	8.7	7.8
0.0014		3.8	3.7	3.8

The suspended sediment concentration analysis was completed by Fredericktowne Labs Inc., Meyersville, MD. Fredericktown Labs is accredited by the Maryland Department of Environment as Maryland Certified Water Quality Laboratory. The analysis procedure was ASTM D3977-97, Suspended Sediment Concentration. The sampling procedure and submission of samples to the test lab were overseen by the independent observer, Boggs Environmental Consultants, Inc.

All test data and calculations were detailed in the report “NJCAT TECHNOLOGY VERIFICATION Isolator® Row PLUS StormTech, LLC”, July 2020, which was submitted to and verified by the New Jersey Corporation for Advanced Technology (NJCAT).

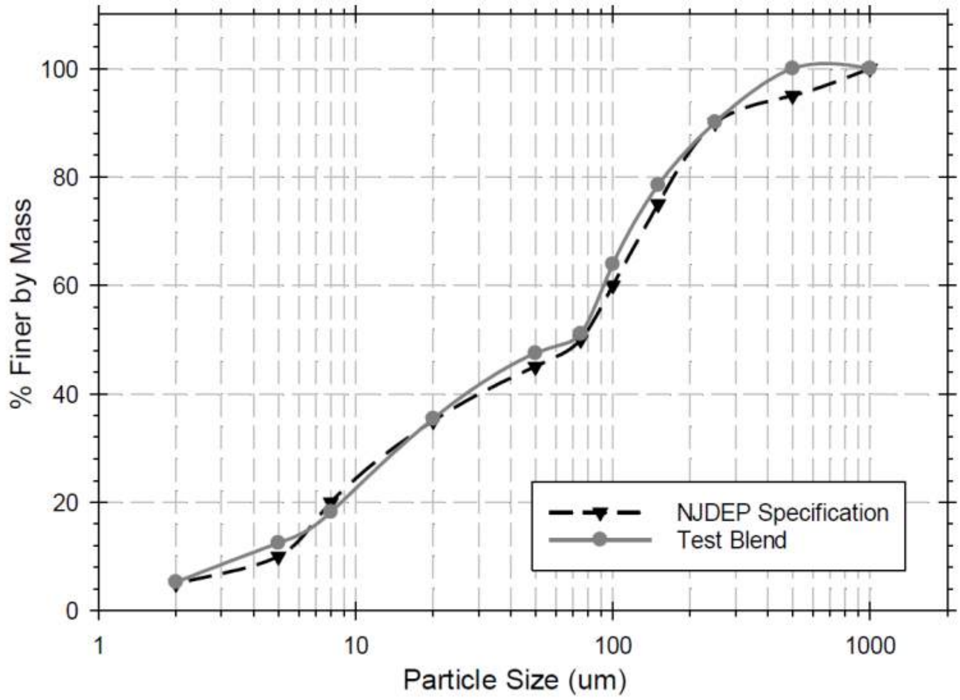


Figure 4– Particle Size Distribution (PSD)

The data in Table 3 (Flow Rate and Temperature) and Table 4 (Removal Efficiency) form the basis for the verified technology performance claim, specifically, flow rate, sediment captured and removal efficiency.

Table 3: Flow Rate and Temperature Summary

Run	Max Flow (gpm)	Min Flow (gpm)	Average Flow (gpm)	Flow COV	Flow Compliance (COV< 0.1)	Maximum Temperature (Fahrenheit)	NJDEP Temperature Compliance (< 80 F)
1	232.8	223.9	226.3	0.0078	Y	48.2	Y
2	228.9	218.6	220.8	0.0104	Y	51.5	Y
3	229.4	220.0	227.2	0.0094	Y	44.7	Y
4	230.2	218.7	223.2	0.0138	Y	40.5	Y
5	228.7	216.9	222.2	0.0103	Y	44.7	Y
6	227.6	217.0	224.2	0.0115	Y	46.7	Y
7	229.7	221.9	226.4	0.0092	Y	44.6	Y
8	230.3	222.2	226.8	0.0089	Y	43.5	Y
9	233.2	218.4	225.6	0.0136	Y	45.5	Y
10	232.2	219.7	228.4	0.0126	Y	44.7	Y
11	226.9	219.2	224.1	0.0088	Y	52.4	Y
12	232.2	222.1	226.9	0.0107	Y	48.5	Y
13	234.7	221.2	226.1	0.0109	Y	48.5	Y
14	231.9	223.4	228.7	0.0103	Y	45.6	Y
15	236.8	224.1	231.4	0.0131	Y	52.2	Y
16	232.5	221.3	229.0	0.0137	Y	47.8	Y

Table 4: Removal Efficiency Results

Run	Average Influent TSS (mg/L)	Influent Water Volume (gal)	Adjusted Average Effluent TSS (mg/L)	Effluent Water Volume (gal)	Adjusted Average Drain Down TSS (mg/L)	Drain Down Water Volume (gal)	Single Run Removal Efficiency (%)	Mass of Captured Sediment (g)	Cumulative Removal Efficiency (%)
1	203	7166	46	6881	34	285	77.8	4282	77.8
2	199	6993	32	6639	27	354	84.0	4415	80.8
3	207	7197	37	6793	27	403	82.6	4654	81.4
4	217	7068	33	6635	29	433	84.9	4923	82.3
5	215	7037	39	6593	29	444	82.2	4705	82.3
6	207	7097	40	6643	31	454	81.2	4504	82.1
7	198	7169	37	6693	30	476	81.6	4386	82.0
8	201	7184	37	6716	32	468	81.6	4473	82.0
9	205	7147	38	6675	30	472	81.8	4539	82.0
10	203	7235	38	6759	31	476	81.4	4523	81.9
11	208	7096	38	6624	30	472	81.8	4567	81.9
12	209	7185	41	6709	30	476	80.7	4584	81.8
13	198	7162	41	6680	32	482	79.7	4277	81.6
14	200	7242	43	6757	34	485	78.8	4318	81.4
15	196	7329	41	6842	32	487	79.5	4320	81.3
16	202	7254	44	6769	31	485	78.9	4384	81.2
Avg.	**204.2**	**7160**	**39**	**6713**	**31**	**447**	**81.2**	**4491**	**N/A**
Cumulative Mass Removed (g)							**71854**		
Cumulative Mass Removed (lb)							**158.4**		
Total Mass Loaded (lb)							**195.2**		
Cumulative Removal Efficiency (%)							**81.2**		

Quality Assurance

Performance verification of the StormTech Isolator® Row PLUS technology was performed in accordance with the requirements of ISO 14034:2016 and the VerifiGlobal Performance Verification Protocol. This included reviewing all data sheets and calculated values, as well as overall management of the test system, quality control and data integrity.

Additional information on quality control measures taken can be found in section 5 of the QAPP for StormTech Isolator Row New Jersey Department of Environmental Protection Testing, Rev. 1/9/2020.

Specific QA/QC measures reviewed by the verifier are summarized in Table 5 below.

Table 5. Validation of QA/QC Procedures

QC Parameter	Acceptance Criteria
Independence of observer	Confirmed in letter from Boggs Environmental Consultants, Inc. to NJCAT
Consistency of procedure	Daily logs confirm proper procedure
Existence of QAPP	Confirmed. “QAPP For StormTech Isolator Row New Jersey Department of Environmental Protection Testing”, Rev. 1/9/2020*)*
Use of appropriate sample analysis method – ASTM D3799	Confirmed by method reference on lab reports from Fredericktowne Labs Inc.
Test method appropriate for the technology	Used industry stakeholder approved protocol: *New Jersey Department of Environmental Protection Laboratory Protocol to Assess Total Suspended Solids*

	Removal by a Filtration Manufactured Treatment Device (January 2013)
Test parameters stayed within required limits	Confirmed in report "NJCAT TECHNOLOGY VERIFICATION Isolator® Row PLUS StormTech, LLC", July 2020
Third party verified data	All testing was observed and reviewed by Boggs Environmental Consultants, Inc.

Variance

Performance claims regarding structural load limitations were not verified as they are outside the scope of the performance testing that was conducted in accordance with the 'Quality Assurance Project Plan (QAPP) for StormTech Isolator Row, New Jersey Department of Environmental Protection Testing', revision dated January 09, 2020.

Verification Summary

The StormTech "Isolator® Row PLUS" is a stormwater treatment technology designed for use under parking lots, roadways and heavy earth loads while providing a superior and durable structural system. The technology comprises a row of chambers wrapped in woven geotextile fabric with two layers at the bottom that serve as a filter strip, providing surface area for infiltration and runoff reduction with enhanced suspended solids and pollutant removal.

The StormTech Isolator® Row PLUS technology was tested at the Mid-Atlantic Storm Water Research Center (MASWRC), under the supervision of Boggs Environmental Consultants, Inc. The performance test results for two overlapping StormTech Isolator® Row PLUS chambers (commercial unit model SC-740) were verified by Good Harbour Laboratories Inc. (GHL), following the requirements of ISO 14034:2016 and the VerifiGlobal Performance Verification Protocol. Table 6 summarizes the verification results in relation to the technology performance parameters that were identified in the Verification Plan to determine the efficacy of the StormTech Isolator® Row PLUS technology.

Table 6 - Summary of Verification Results Against Performance Parameters

Parameters	Verified Claims	Accuracy
Total Suspended Solids (TSS) Removal Efficiency	Based on the laboratory testing conducted, the StormTech Isolator® Row PLUS achieved an average 82% removal efficiency of SSC	± 1% (95% confidence level)
Average Loading Rate	Based on the laboratory testing parameters, the StormTech Isolator® Row PLUS maintained a loading rate of 4.15 GPM/sf	±0.03 GPM/sf (95% confidence level)
Maximum Treatment Flow Rate (MTFR)	Although the MTFR varies among the StormTech Isolator® Row PLUS model sizes and the number of chambers, the design surface loading rate remains the same (4.13 GPM/ft^2 of treatment surface area). The test unit consisted of two overlapping StormTech SC-740 chambers with a nominal MTFR of 225 GPM (0.501 CFS) and an effective filtration treatment area (EFTA) of approximately 54.5 ft^2.	± 1.4 GPM (95% confidence level)
Detention Time and Volume	Detention time and wet volume varies with model size. The unit tested had a wet volume of approximately 65.1 ft^3 (based on	N/A

	physical measurement) and a detention time of 2.2 minutes.	
Maximum Sediment Storage Depth and Volume	The sediment storage volume and depth vary according to the StormTech Isolator® Row PLUS model sizes and system configuration. For the two overlapping StormTech SC-740 chambers tested, the maximum sediment storage volume is 2.3 ft^3 at a sediment depth of 0.5 inches.	N/A
Effective Sedimentation/ Filtration Treatment Area	The effective sedimentation and filtration treatment area increases as the size of the chamber increases. Under the tested conditions using 2 overlapping chambers, the treatment area was 54.5 ft^2	The sedimentation /filtration area was determined from the actual physical dimensions of the test unit*
Sediment Mass Load Capacity	The sediment mass load capacity varies according to the StormTech Isolator® Row PLUS model sizes and system configuration. For the two overlapping StormTech SC-740 chambers tested, the mass loading capture was 158.4 lbs (2.91 lbs/ ft^2) following a total sediment loading of 195.2 lbs	± 0.8 lbs (±0.01 lbs/ft^2) (95% confidence level)

*Note: These numbers are determined based on physical measurement or a dimensional drawing, which is standard practice. Highly accurate measurements are not practical.

In conclusion, the StormTech Isolator® Row PLUS is a viable technology that can be used to remove contaminants from stormwater runoff via filtration. This technology has proven effective at removing suspended sediment from stormwater through in-lab testing using an industry recognized laboratory protocol.

By extension of sediment removal, this technology should also remove particle bound nutrients, heavy metals, and a wide variety of organic contaminants. Performance is a function of pollutant properties, hydraulic retention time, filter media, pre-treatment, and flow rate, such that proper design of the system is critical to achieving the desired results.

What is ISO 14034?

The purpose of environmental technology verification is to provide a credible and impartial account of the performance of environmental technologies. Environmental technology verification is based on a number of principles to ensure that verifications are performed and reported accurately, clearly, unambiguously and objectively. The International Organization for Standardization (ISO) standard for environmental technology verification (ETV) is ISO 14034, which was published in November 2016.

Benefits of ETV

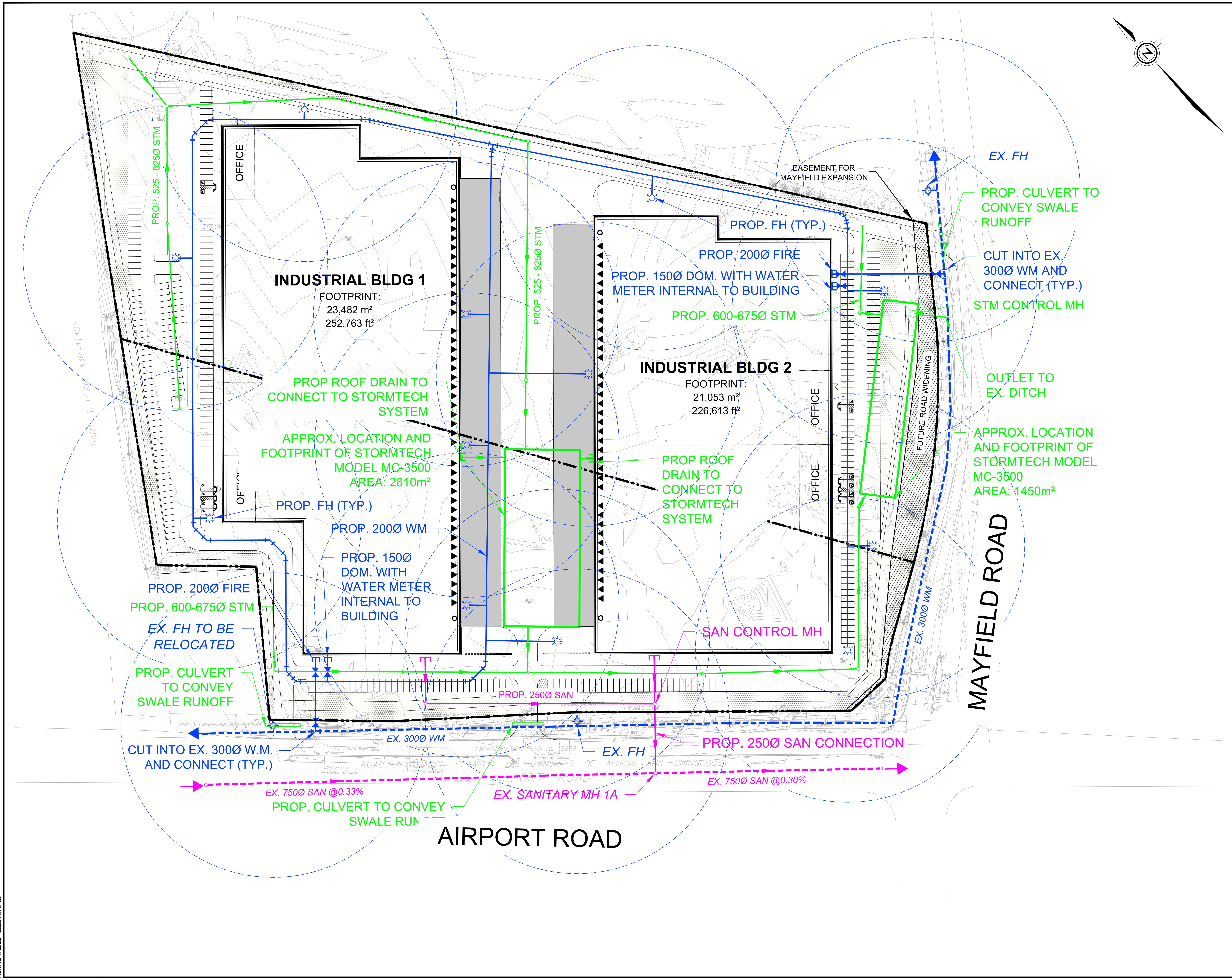
ETV contributes to protection and conservation of the environment by promoting and facilitating market uptake of innovative environmental technologies, especially those that perform better than relevant alternatives. ETV is particularly applicable to those environmental technologies whose innovative features or performance cannot be fully assessed using existing standards. Through the provision of objective evidence, ETV provides an independent and impartial confirmation of the performance of an environmental technology based on reliable test data. ETV aims to strengthen the credibility of new, innovative technologies by supporting informed decision-making among interested parties.

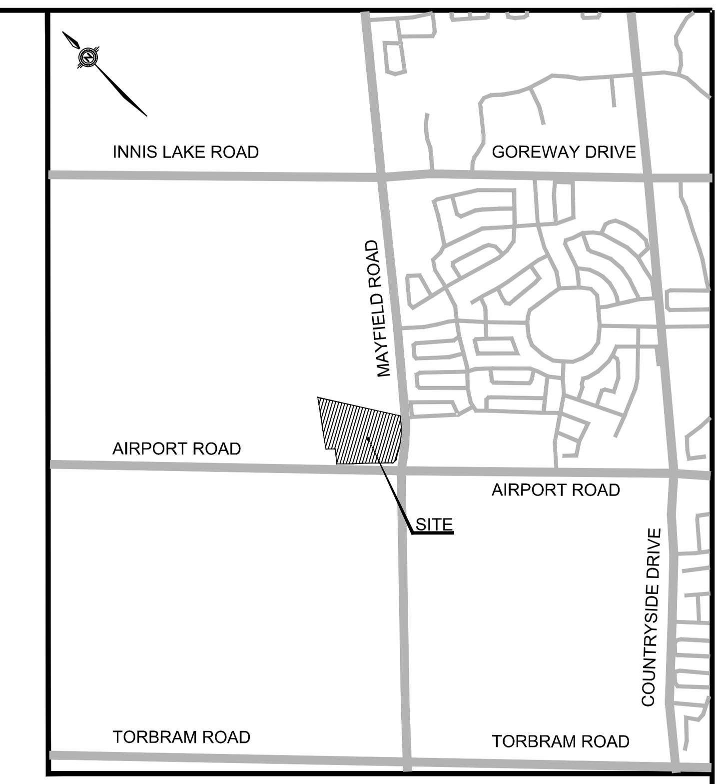
For more information on the StormTech "Isolator® Row PLUS" technology, contact:	For more information on VerifiGlobal, contact:
StormTech, LLC. 520 Cromwell Avenue, Rocky Hill, CT 06067 USA t: +1-888-892-2694 e: info@stormtech.com w: www.stormtech.com	VerifiGlobal c/o ETA-Danmark A/S Göteborg Plads 1, DK-2150 Nordhaven t +45 7224 5900 e: info@verifiglobal.com w: www. verifiglobal.com
Signed for StormTech: *Original signed by:* *Greg Spires* Greg Spires, P.E. General Manager	Signed for VerifiGlobal: *Original signed by:* *Thomas Bruun* Thomas Bruun, Managing Director *Original signed by:* *John Neate* John Neate, Managing Director

APPENDIX

H

SERVICING AND GRADING FIGURES





KEY PLAN NTS

LEGEND

- LIMIT OF PROPERTY
- EX. WATERMAIN
- EX. FIRE HYDRANT
- HYDRANT COVERAGE RADIUS
- EX. SAN SEWER
- EX. SEWER MANHOLE
- EX. CATCHBASIN
- PROP. WATERMAIN
- PROP. WATER VALVE
- PROP. HYDRANT & BOLLARDS
- PROP. SAN SEWER
- PROP. STM SEWER
- PROP. CATCHBASINS
- PROP. CATCHBASIN MANHOLE
- PROP. SEWER MANHOLE

SURVEY: DAVID J. PESCE SURVEYING

DATE OF SURVEY: JULY 13, 2011

NOTE: ALL ELEVATIONS SHOWN HEREON ARE GEODETIC AND ARE REFERRED TO REGION OF PEEL BENCHMARK NO. 48, HAVING A POSTED ELEVATION OF 229.756 M. BENCHMARK IS LOCATED ON THE SOUTH FACE AT THE EAST CORNER OF GARAGE OF A RED BRICK BUNGALOW LOCATED ON THE NORTH SIDE OF SEVENTEENTH SIDEROAD (REGIONAL ROAD #14). APPROX. 0.80KM EAST OF AIRPORT ROAD

No.	REVISIONS TO DRAWING	BY	DATE	APPR.
1	ISSUED FOR CLIENT REVIEW	G.W	2021-07-22	A.D.R

ALL PREVIOUS ISSUES OF THIS DRAWING ARE SUPERSEDED

CLIENT
AIRFIELD DEVELOPMENTS INC. &
AIRFIELD DEVELOPMENTS II INC.

MUNICIPALITY
TOWN OF CALEDON

PROJECT TITLE
6034 MAYFIELD ROAD

SHEET TITLE
PRELIMINARY SITE
SERVICING FIGURE

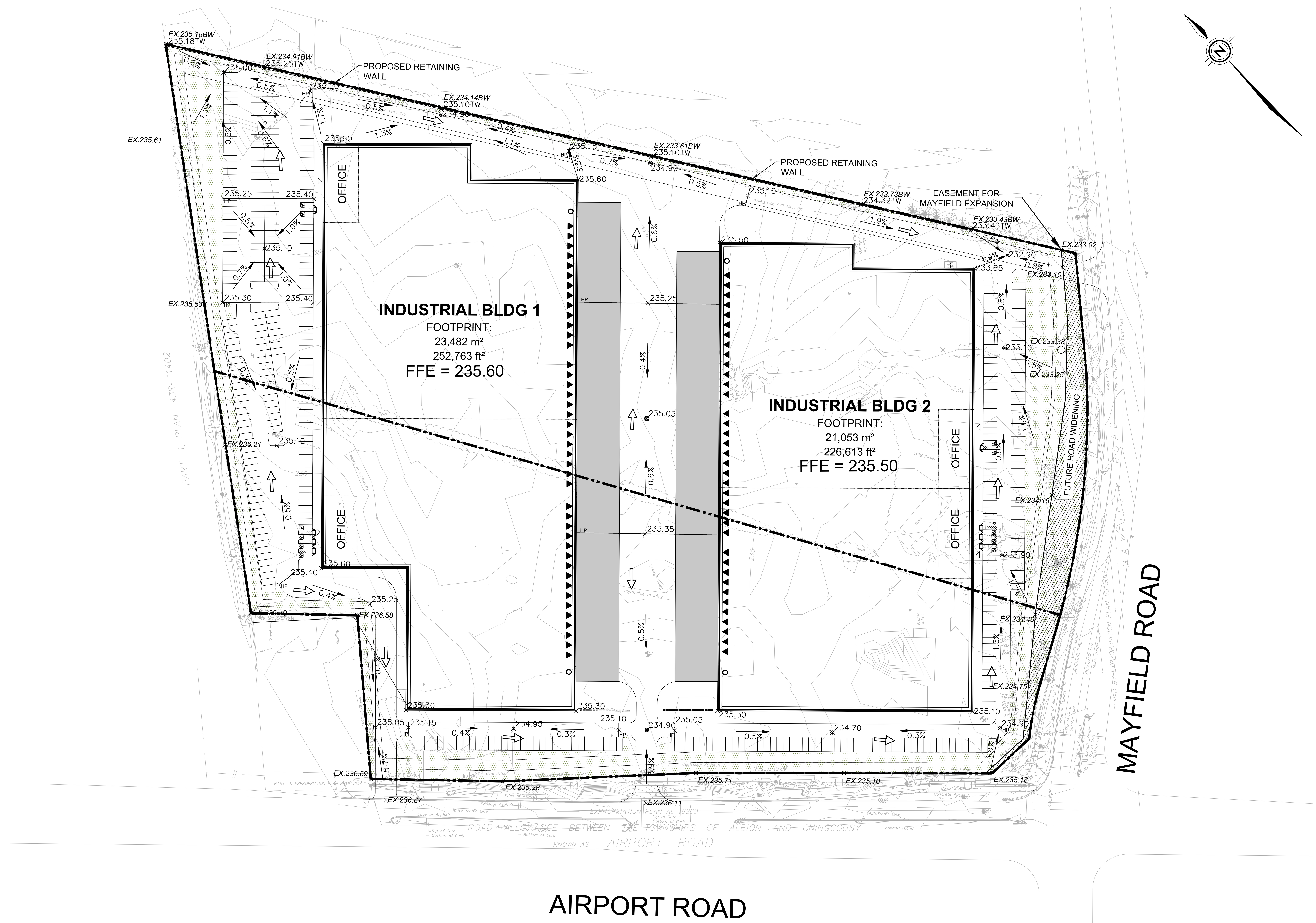
CONSULTANT
wsp
100 Commerce Valley Dr. West, Thornhill, ON Canada L3T 0A1
t: 905.882.1100 f: 905.882.0055 www.wsp.com

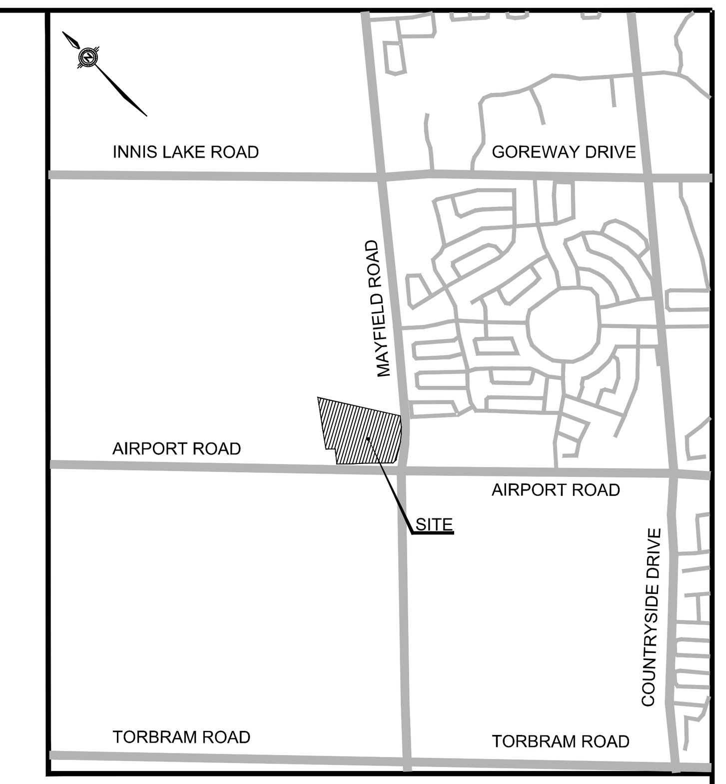
STAMP

DESIGNED	DRAWN	CHECKED
G.W	CAD 10/12	A.D.R.

SCALE	DATE
1:750	JULY 2021

DWG. NUMBER	SHEET NUMBER
211-07736	4





KEY PLAN NTS

LEGEND

— · —	LIMIT OF PROPERTY
EX.±216.25×	EX. ELEVATION
216.25×	PROP. ELEVATION
0.5%	PROPOSED SLOPE
⇨	OVERLAND FLOW DIRECTION
BW	BOTTOM OF WALL
TW	TOP OF WALL

SURVEY: DAVID J. PESCE SURVEYING

DATE OF SURVEY: JULY 13, 2011

NOTE: ALL ELEVATIONS SHOWN HEREON ARE GEODETIC AND ARE REFERRED TO REGION OF PEEL BENCHMARK NO. 48, HAVING A POSTED ELEVATION OF 229.756 M. BENCHMARK IS LOCATED ON THE SOUTH FACE AT THE EAST CORNER OF GARAGE OF A RED BRICK BUNGALOW LOCATED ON THE NORTH SIDE OF SEVENTEENTH SIDEROAD (REGIONAL ROAD #14). APPROX. 0.80KM EAST OF AIRPORT ROAD

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PROJECT TITLE
6034 MAYFIELD ROAD

SHEET TITLE
PRELIMINARY SITE GRADING FIGURE

CONSULTANT
WSP
100 Commerce Valley Dr. West, Thornhill, ON Canada L3T 0A1
t: 905.882.1100 f: 905.882.0055 www.wsp.com

STAMP

DESIGNED	DRAWN	CHECKED
G.W	CAD 10/12	A.D.R.
SCALE 1:750	DATE JULY 2021	
DWG. NUMBER 211-07736	SHEET NUMBER 5	