Coleraine Drive - Canadian Pacific Rail Grade Separation Schedule ‘C’ Municipal Class EA, Bolton, Town of Caledon

Drainage and Stormwater Management Report

FINAL

August 13, 2024

Project No. B000738

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Regional Municipality of Peel

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1 Introduction

CIMA Canada Inc. (CIMA+) has been retained by the Regional Municipality of Peel (Region) to complete a Schedule 'C' Municipal Class EA as a part of the grade separation analysis of Coleraine Drive at the Canadian Pacific (CP) Rail crossing located in the Community of Bolton. The project will include drainage assessments for the original conditions (pre 2010 construction), existing conditions (post 2010 construction), as well as for the proposed alternatives of the roadway grade separation and a recommendation of preferred alternative from a Stormwater Management (SWM) perspective.

Based on available background information, applicable design criteria, original and existing drainage conditions, the SWM Report will provide an assessment of both alternative design options and include a drainage plan, a description of changes to existing conditions, plans for both water quality and quantity control and an assessment of SWM controls.

The study area is located at the intersection of Coleraine Drive and the C.P. Railway, just south of the intersection of Coleraine Drive and Old Ellwood Drive, within the upper portion of the Humber River watershed. **Figure 1** shows the location map of the study area.

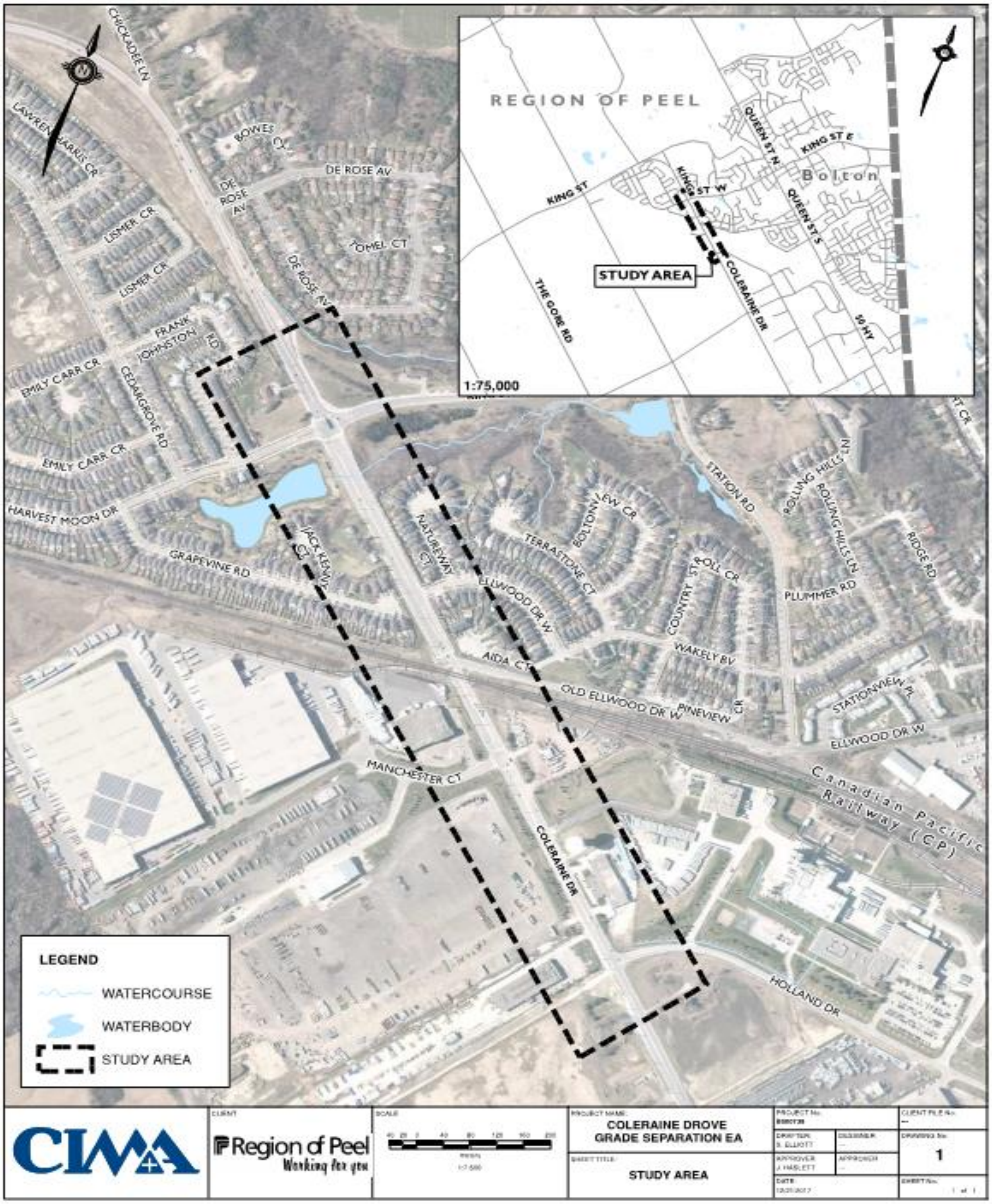


Figure 1: Study Area Location

2 Background Review

The study area is located at the intersection of Coleraine Drive and the C.P. Railway, just south of the intersection of Coleraine Drive and Old Ellwood Drive, within the upper portion of the Humber River watershed (**Figure 1**). The Humber River is within the jurisdiction of the Toronto and Region Conservation Authority (TRCA).

The following background drawings, study reports, GIS data and guidance documents were obtained and reviewed as part of the SWM Study:

- King Street – Humber Lea Rd. To Albion Vaughan Road – 09-4090 – Storm Sewer Design Sheets
- King Street – Humber Lea Rd. To Albion Vaughan Road – 09-4090 – Drainage Area Plan
- Region of Peel GIS data including 2015 Aerial Images, contours, storm sewers, catchbasins, and drainage features
- Stormwater Management Criteria, TRCA August 2012
- Hydrology Study: - Humber River Watershed Hydrology Update (Aquafor Beech Ltd, Nov. 2002)
- Humber River Hydrology Update, Civica, June 2015
- Guidelines for the Preparation of Stormwater Management Reports in Support of Municipal Class Environmental Assessments
- MECP Stormwater Management Planning and Design Manual, March 2003
- Region of Peel, Public Works Stormwater Design Criteria and Procedural Manual, June 2019
- Region of Peel, Public Works Sanitary Trunk Sewer Drawing – 23613-D, December 1998
- Heritage Hills Subdivision Phase 2, Falby Burnside and Associates, August 1997

3 Stormwater Management Objectives and Standards

This section will provide an overview of stormwater management objectives and design criteria for the study area based on applicable standards from The Town of Caledon, Region of Peel, Ministry of Environment, Conservation and Parks (MECP) and Toronto Region Conservation Authority (TRCA).

3.1 Stormwater Management Design Criteria

The following section provides an overview of stormwater management objectives and design criteria for the study area, with reference to the MECP SWM Planning and Design Manual (2003), Region of Peel Public Works Stormwater Design Criteria (June 2019), Town of Caledon Development Standards Manual (V 5.0, 2019) and TRCA SWM Guidelines (2012). Excerpts of all these design criteria can be found in **Appendix A**.

The MECP issued Peel Regional Road Stormwater Management System CLI ECA 009-S701 on September 30, 2022. The Stormwater CLI ECA contains criteria for design of alterations to the Region's existing stormwater system. It is recommended that at the Detailed Design Stage, the Engineering Consultant re-assess the EA recommendations against the CLI ECA criteria and make the necessary adjustments and changes to the stormwater recommendations to be in compliance."

3.1.1 Quantity Control

- No quantity control is required in this portion of the Humber River Watershed as per the TRCA's Stormwater Management Criteria, August 2012. (See **Appendix A** for Table E.1 summarizing the quantity control release rates for the Humber River)

3.1.2 Quality Control

- All watercourses within TRCA's jurisdiction are classified as requiring an Enhanced level of water quality protection, equivalent to 80% Total Suspended Solids (TSS) removal on an annual basis as per MECP's stormwater design manual. This means that any added impervious area will need to have quality control provided.
- The Region of Peel has the same quality control requirements as the TRCA's requirements mentioned above.

- The Town of Caledon has the same quality control requirements as the TRCA's requirements mentioned above, with the addition that groundwater infiltration is to be encouraged where soil conditions permit. It should be noted that the potential for groundwater contamination (e.g., by road salt) should be considered as the majority of infiltration from the study area will be roadway runoff.

3.1.3 Erosion Control

- The minimum erosion control requirement for TRCA's entire jurisdiction is retention of the first 5 mm of every rainfall event, for the area of widening or, if for a SWM Pond, 48 hr detention of the 25 mm event, which is consistent with the standards from the Region of Peel and the MECP.

3.1.4 Water Balance

- Based on the MECP Runoff Volume Control targets (RVCt) for Ontario, 2016, it is recommended to capture and retain the 90th percentile event (infiltrate 90% of the annual rainfall runoff) for all new impervious surfaces. This recommendation is founded on the principles of maintaining the pre-development water balance to ensure the ecosystem function and natural quality and hydrological characteristics of natural features.

3.2 Hydrologic Modeling and Storm Sewer Design Requirements

The following section provides an overview of the design requirements for the minor storm sewer system along Coleraine Drive. The storm sewer was likely designed under the Town of Caledon Criteria as the roadway was reconstructed by the Town of Caledon in 2010. As the Region of Peel now owns the roadway, any proposed storm sewer will need to be upgraded to the Region of Peel criteria where feasible.

3.2.1 Town of Caledon

The Town of Caledon storm sewer requirements are as follows:

- Storm sewers systems shall be designed to accommodate a 10-year design storm where foundation drains are connected.
- For systems that do not allow for foundation drains, a 5-year design will be allowed.
- A minimum time of concentration of 10 minutes shall be used for storm sewer design.
- Guelph O.A.C. (Town Standard Drawing No. 103) rainfall intensity curve values must be used.

3.2.2 Region of Peel

The Region of Peel storm sewer requirements are as follows:

- Storm sewers shall be designed to accommodate a 10-year design storm.
- A minimum time of concentration of 10 minutes shall be used for storm sewer design.
- During the detailed design phase, Region of Peel's Public Works Stormwater Design Criteria and Procedural Manual 2019 must be followed for the storm sewer design.
- For the hydrologic modelling, storm hyetograph as per TRCA SWM Guideline 2012 for Humber River Watershed must be followed which are 6-hr AES or 12-hr AES. The original hydrologic model prepared for the Heritage Hills SWM Report used 6-hr AES distribution, therefore, the same storm data has been used in the hydrologic modelling.

3.3 Site Constraint

There is a 1350 mm diameter storm sewer which receives flow from the study area as well as surrounding tributary drainage areas and runs northwest for approximately 500 m where it outlets into the East Humber River. As there are no major drainage outlets for flow at this location, the storm sewer was designed to convey the 100-year storm. The storm sewer was analyzed during the Master Drainage Plan (MDP) update to have a maximum capacity of 4.8 m^3/s, an excerpt of which is provided in **Appendix B**. This max peak flow will need to be used as a basis for quantity control for this project to ensure that the sewer does not go over capacity for the 100-year storm.

4 Existing Conditions Analysis

This section describes the original (pre 2010 construction) and existing (post 2010 construction) conditions drainage and SWM within the study area that will be impacted by the intersection improvements. The drainage characteristics of the site depend on many factors, including topography, local land use and the type of native soil.

The entire study area hydrology was analyzed by Falby Burnside and Associates and summarized in their Stormwater Management Report for the Heritage Hills subdivision written in August 1997. The report also included output from the Visual Otthymo (VO) model which was used to recreate the original design VO model. This full report can be found in **Appendix B**.

4.1 Land Use and Soils Conditions

Land use in the study area generally consist of medium-density residential development, industrial/commercial land and undeveloped valley lands. The soil within the study area consists primarily of Bottom Land, Chinguacousy Clay Loam, King Clay Loam, Monoghan Clay Loam, which are Hydraulic Soil Group C and Peel Clay which is classified as Hydraulic Soil Group D. In terms of drainage these types of soil are considered to have a moderate (Loam) to poor (Clay) drainage capability, meaning a minimal amount of rainfall in the open areas will soak into the ground resulting in the chance of significant runoff during rainfall events. Refer to **Figure 2** for the existing soils conditions.

4.2 Existing Conditions Drainage

The original drainage map was taken from the Falby Burnside and Associates Stormwater Management Report for the Heritage Hills subdivision. Topography of the study area is defined by the valley / channel of the Humber River, and the confluence with Cold Creek Tributary. The catchment areas and outlets are described below and depicted in **Figure 3.**

Catchment 100: Located to the southwest of the study area, this undeveloped area drains towards C.P. Railway tracks. Before leaving the site, a stormwater facility unit is used to reduce the peak flow to 0.78 m^3/s. This water outlets to join flow from Catchment 200, flows past the railway and into Catchment 300.

Catchment 200: Located to the southwest of the study area, this industrially developed area drains towards the C.P. Railroad track. Before exiting the site, a stormwater facility is used to reduce the peak flow to 0.87 m^3/s. This water outlets to join flow from Catchment 100, flows past the railway and into Catchment 300.

Catchment 300: Located to the west of the study area, this residential area accumulates flows from Catchments 100 and 200 and drains to the Heritage Hills SWM Pond 9 (SWMP 9).

Catchments 401, 402 & 500: These external drainage areas are a mix of industrial, residential, and open space/valley land.

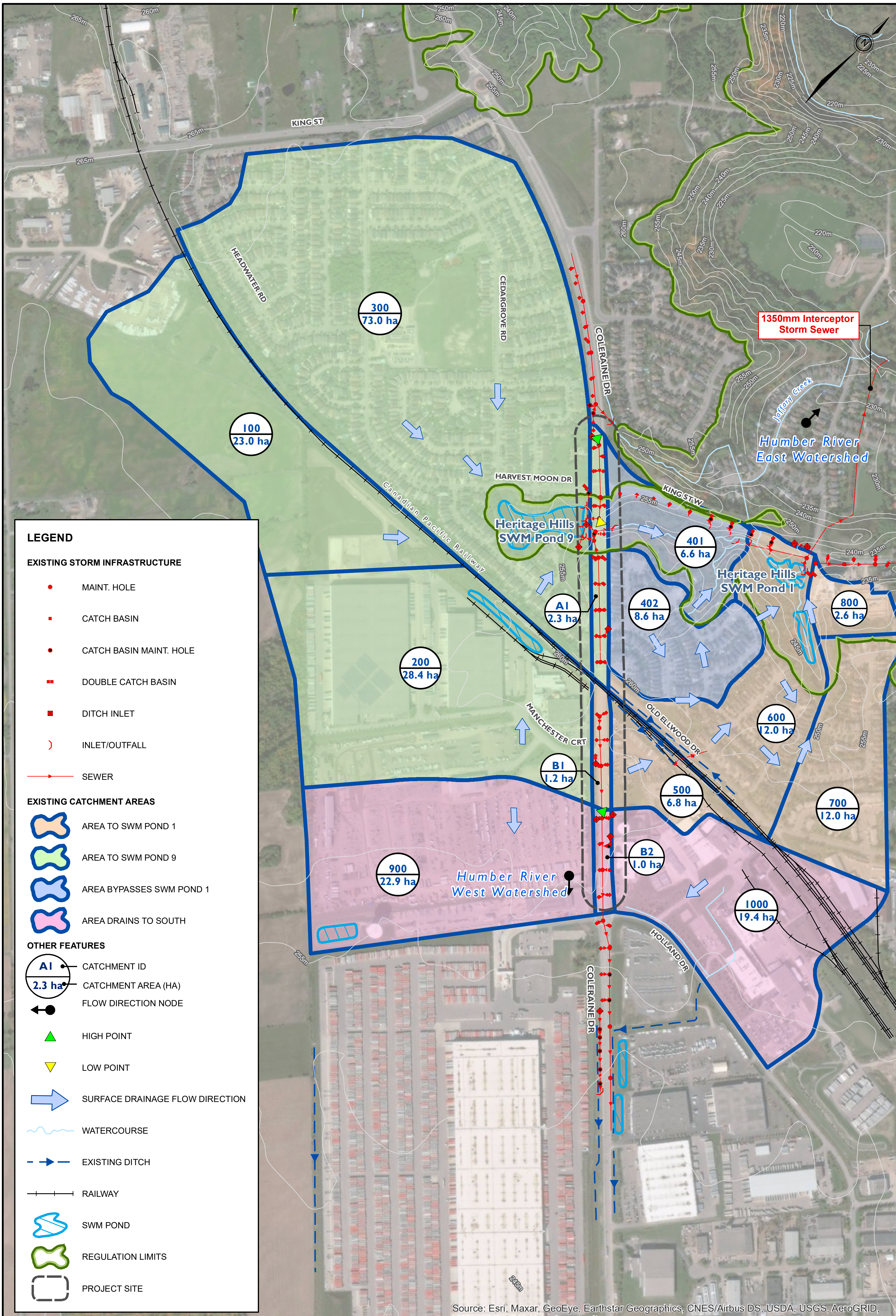
Before 2010 construction for the widening and reconstruction of Coleraine Drive, runoff from Catchment 500 used to drain to Catchment 600 through a culvert located under C.P. Railway which ultimately drained to East Humber River. The construction of storm sewers along Coleraine Drive south of the railway in 2010 took minor roadway drainage south while allowing major flow to continue northeast as per pre-2010 conditions. This minor flow redirection would lead minor roadway flow to enter the West Humber River watershed.

While performing the reconstruction in 2010, storm sewers were added within Catchment 402 along Coleraine Drive from the north of the C.P. Railway to the low point of Coleraine Drive just south of King Street West. This storm sewer flows directly into the existing SWMP 9, draining approximately 2.3 ha of Catchment 402. This inlet is located adjacent to the SWMP quality outlet, which would bypass the main quality function of the SMWP. There is a known occasional flooding within the residential area of Catchment 402, which is partially caused by the major drainage from Catchment 500 being directed into the residential storm sewers.

Catchments 600, 700, 800, 900 & 1000: These external drainage areas are the mix of industrial, residential, and open space/valley land.

Existing SWM Ponds: There are two existing stormwater management ponds (SWMP) within the study area that were constructed as part of the Heritage Hills Subdivision. Both ponds are included in the original VO model and are significant to the project. SWMP 1 receives drainage from Catchments 500, 600, 700 and 800 and minor drainage from Catchment 402. SWMP 1 outlets near the inlet of the 1350 mm trunk storm sewer. SWMP 9 receives drainage from Catchments 100, 200 and 300. The pond outlets across Coleraine Drive and into the creek flowing through Catchment 401, eventually entering the 1350 mm diameter interceptor storm sewer.

The proposed grade separation work will only affect Catchments 401, 402 and 500. There will be no change in drainage conditions in other catchments.



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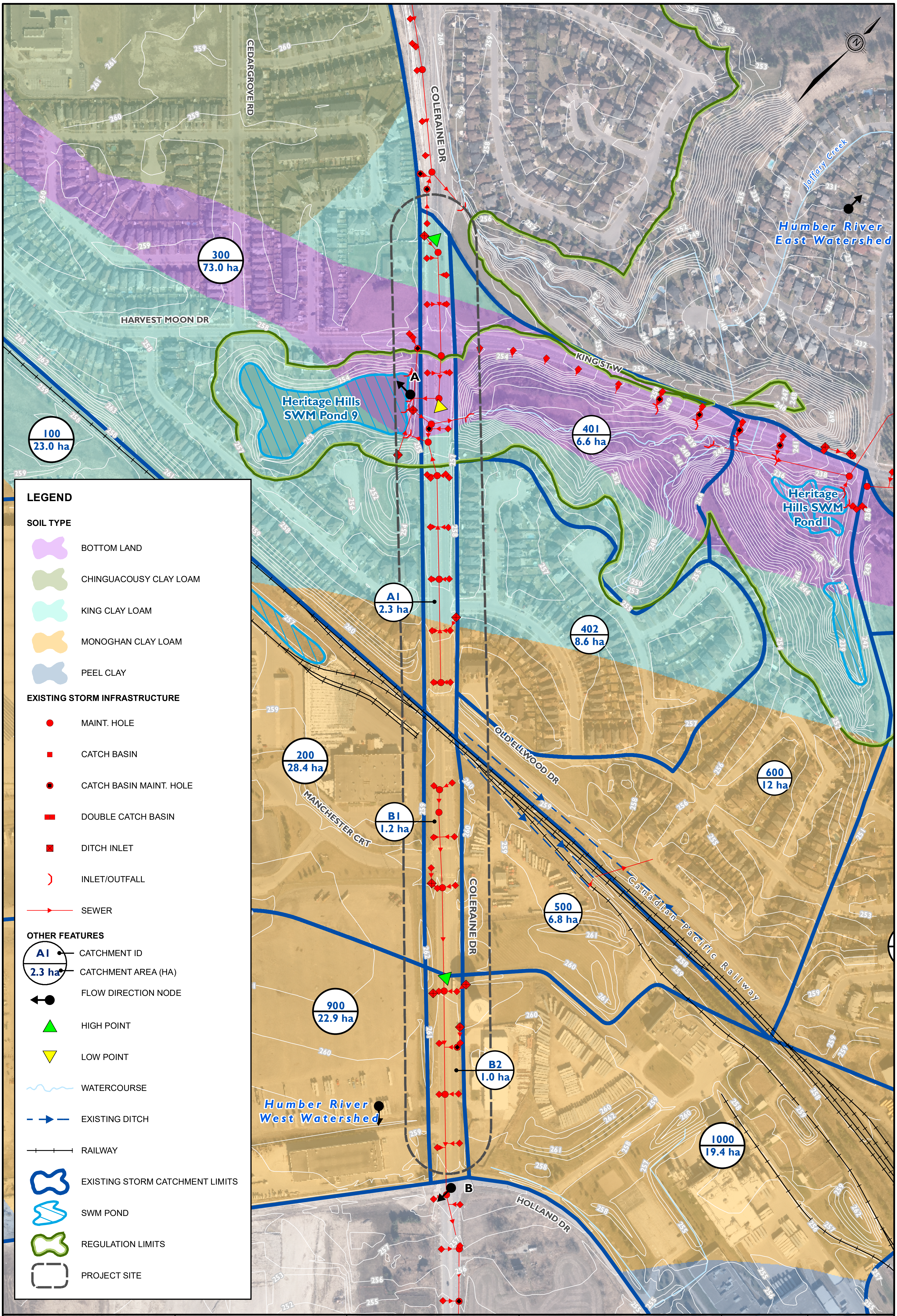

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SHEET TITLE: SOILS MOSAIC POST 2010 CONSTRUCTION

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DRAFTER: S. ELLIOTT	DESIGNER ---	DRAWING No: FIG. 2
APPROVER M. BARAL	APPROVER ---	
DATE: 1/27/2022		SHEET No: 1 of 1

4.3 Existing Conditions Hydrologic Analysis

The following section describes the rainfall distribution used in the hydrologic models, the re-creation of original hydrologic model and update to existing condition and their results.

4.3.1 Rainfall

The TRCA SWM Criteria 2012 states that for the Humber River watershed, return period peak flows should be based on the 6-hour and 12-hour AES storm distributions. According to the Heritage Hills SWM Report, the 4-hour 25 mm Chicago storm distribution and 6-hour AES distribution were used in the original hydrologic model. The 25 mm storm was re-created to match the original VO model output, while the 2-year to 100-year storms were taken from the TRCA Bloor Street design storm, whose 100-year storm matched with the original VO model outlet. A full summary of the rainfall used in the models can be found in **Appendix C**.

4.3.2 Recreation of Original (pre 2010) Hydrologic Model

A Visual OTTHYMO (VO) hydrologic model was re-created for the existing conditions analysis using the VO Model Output file for the 25 mm and 100-year storms from the Falby Burnside and Associates Ltd. Stormwater Management Report prepared for Heritage Hills Subdivision Phase 2 in August 1997. The output of the re-created VO Model was compared with the VO Model output of the original SWM Report to ensure the accuracy of re-creation.

A summary of catchment parameters based on the original hydrologic model extracted from the VO Model output from the Heritage Hills Subdivisions Phase 2 Report is provided in Table 1. A copy of the report can be found in **Appendix B**.

The schematic of re-created VO Model is provided in **Appendix C**.

Table 1: Original VO Model – Catchment Parameters

Drainage Area	Area (ha)	Type	TIMP	XIMP	CN	IA (mm)	Tp (hr)
100	23.0	StandHyd	0.75	0.65	71	5	-
200	28.4	StandHyd	0.75	0.65	71	5	-
300	72.0	StandHyd	0.49	0.40	71	5	-
401	7.5	NasHyd	-	-	63	1.5	0.2
402	10.0	StandHyd	0.50	0.40	71	5	-
500	8.0	StandHyd	0.75	0.65	71	5	-
600	12.0	StandHyd	0.50	0.40	71	5	-
700	12.0	StandHyd	0.55	0.43	71	5	-
800	2.6	StandHyd	0.60	0.45	71	5	-

The Heritage Hills Subdivisions Phase 2 Report VO model output has included the Outflow vs Storage information for both SWMP 1 and 9. Note that the original Falby Burnside and Associates Stormwater Management Report for the Heritage Hills Subdivision (Aug 1997) references SWMP 9 as SWMP 5. Upon discussions with the Town of Caledon, this pond is identified as SWMP 9 and will be referenced as such throughout this report. A summary is provided in the **Table 2** below.

Table 2: Original SWMP Outflow (m^3/s) vs. Storage (ha*m)

SWM Pond 1	
Outflow (m^3/s)	Storage (ha*m)
0.000	0.000
0.050	0.195
0.080	0.386
0.130	0.475
0.940	0.621
2.660	0.776
4.020	0.911

SWM Pond 9	
Outflow (m^3/s)	Storage (ha*m)
0.000	0.000
0.050	0.420
0.080	0.840
0.090	1.390
0.100	1.600
0.190	1.930
0.470	2.640
0.850	3.340
1.320	3.700
2.460	4.250

Results were compared between the re-created VO Model output and the VO output of Heritage Hills Subdivisions Phase 2 Report. **Table 3** below includes a summary of the comparison, while complete output files can be found in **Appendix B** and **C**.

Table 3: Comparison – Heritage Hills VO Output vs. Re-Created Model

Catchment ID / Node	25 mm Flow (m^3/s)		100 Year Flow (m^3/s)	
	Original	Recreated	Original	Recreated
100	1.02	1.02	3.52	3.53
200	1.23	1.23	4.31	4.31
300	1.64	1.64	7.80	7.81
401	0.05	0.05	0.41	0.41
402	0.30	0.30	1.20	1.20
500	0.40	0.40	1.27	1.27
600	0.36	0.36	1.45	1.45
700	0.38	0.38	1.51	1.51
800	0.10	0.10	0.39	0.39
11*	0.23	0.23	4.74	4.73

*Note: Node 11 is the final summation of upstream catchment areas at the end of the system, which every drainage area in the model eventually drains to and will be used to calculate the peak flow entering the 1350 mm intercepting storm sewer with a peak capacity of approximately 4.8 m^3/s.

4.3.3 Existing Updated (post 2010) Hydrology Model

In 2010, a widening and reconstruction of Coleraine Drive was completed. This reconstruction made changes to the flow paths for both Catchments 402 and 500.

Within Catchment 500 along Coleraine Drive (the very west portion of the catchment), storm sewers were implemented, bringing minor drainage flow from Coleraine Drive south to outlet into the West Humber River. It is unknown if any SWM was implemented to control the impact of this minor stormwater flow change. Major drainage continued to flow into Catchment 600 as in the original conditions.

The reconstruction of Coleraine Drive also impacted SWMP 9. The reconstruction directed minor and major flows from a portion of Catchment 402 (approximately 2.30 ha) along Coleraine Drive into SWMP 9.

Figure 3 illustrates the existing condition drainage mosaic based on the post 2010 construction. Drainage areas along Coleraine Drive, which are Catchments A1, B1 and B2, were separated from Catchments 401, 402 and 500. Therefore, there will be the reduction in drainage areas in Catchments 401, 402 and 500. The new catchments A1, B1 and B2 had their impervious areas calculated using existing typical cross sections of the roadway, their LGI (Impervious Overland Flow Length) auto calculated and the remaining parameters left the same as their existing drainage areas. A summary of catchment parameters is provided in **Table 4**.

Catchment A1 (drainage area 2.30 ha) includes a portion of Coleraine Drive north of the railway. Both major and minor system flow from this catchment is conveyed to SWMP 9 via storm sewers constructed in 2010. This roadway catchment has a low point along Coleraine Drive adjacent to the SWM Pond.

Catchment B1 (drainage area 1.24 ha) include the roadway area to the south of the railway and has its minor storm drainage directed south through the 2010 storm sewers into Catchment B2. Major drainage flows north toward the railway ditch which ultimately outlets into Catchment 600 as in original conditions.

Roadway Catchment B2 (drainage area 1.03 ha) is located to the south of Catchment B1. Both minor and major system runoff is conveyed south away from the study area into the West Humber River.

In October of 2021, Ecosystems Recovery Inc completed an assessment of water quality and erosion control for SWMP 9. In this report, an assessment of the catchment area (Area 300 in the VO model) was noted to have increased drainage area and impervious area from the original design. This catchment area was updated to match the inputs from the report within. This report can be found in **Appendix E**.

Table 4: Catchment Parameters for Existing Conditions VO Model

Drainage Area	Area (ha)	Type	TIMP	XIMP	CN	IA (mm)	Tp (hr)
A1	2.30	StandHyd	0.71	0.71	71	5	-
300	73	StandHyd	0.57	0.47	71	5	-
401	6.62	NasHyd	-	-	63	1.5	0.2
402	8.58	StandHyd	0.50	0.40	71	5	-
B1	1.24	StandHyd	0.47	0.47	71	5	-
B2	1.03	StandHyd	0.47	0.47	71	5	-
500	6.76	StandHyd	0.75	0.65	71	5	-

For the purpose of comparison with proposed alternatives, the results of the existing conditions hydrologic model are provided at three points of Interest (POI). The first POI is the south outlet to the West Humber River drainage area, the second POI is SWMP 9 (both outflows and storage volumes) and the last POI is Node 11 of the VO model, which accumulates all drainage entering the 1350 mm trunk storm sewer directing flow to the East Humber River. The results of the model can be seen below.

Table 5: Summary of VO Model Output - Existing Condition (post 2010)

Storm Event	Point of Interest (POI)			
	POI 1: South Outlet West Humber River Peak Flow (m^3/s)	POI 2: SWMP 9		POI 3: Node 11 Outlet to 1350 mm Storm Sewer Max Flow 4.8 m^3/s
		Outflow (m^3/s	Volume (ha*m)	
2-Year	0.10	0.41	2.50	0.86
5-Year	0.15	0.94	3.41	1.64
10-Year	0.17	1.54	3.81	2.33
25-Year	0.19	2.04	4.05	3.22
50-Year	0.20	2.38	4.21	3.88
100-Year	0.22	2.76	4.39	4.58

5 Proposed Conditions Analysis

It is proposed to reconstruct Coleraine Drive with a grade separation for the C.P. Railway Line with two potential alternatives. Alternative 1 will assess the impacts of reconstructing Coleraine Drive to pass under the C.P. Railway, while Alternative 2 will assess the impacts of reconstructing Coleraine Drive to pass over the C.P. Railway. Both alternatives will cause a slight increase to impervious areas due to the addition of sidewalks and multi-use paths. This will have nominal impacts to the existing minor and major drainage peak flows. Alternative 2 is further divided into 2A and 2B to differentiate without control and with control scenarios, respectively.

Proposed conditions drainage mosaics for both alternatives are shown in **Figure 3** and **Figure 4**.

5.1 Proposed Conditions Drainage

5.1.1 Alternative 1 – Roadway Under Railway

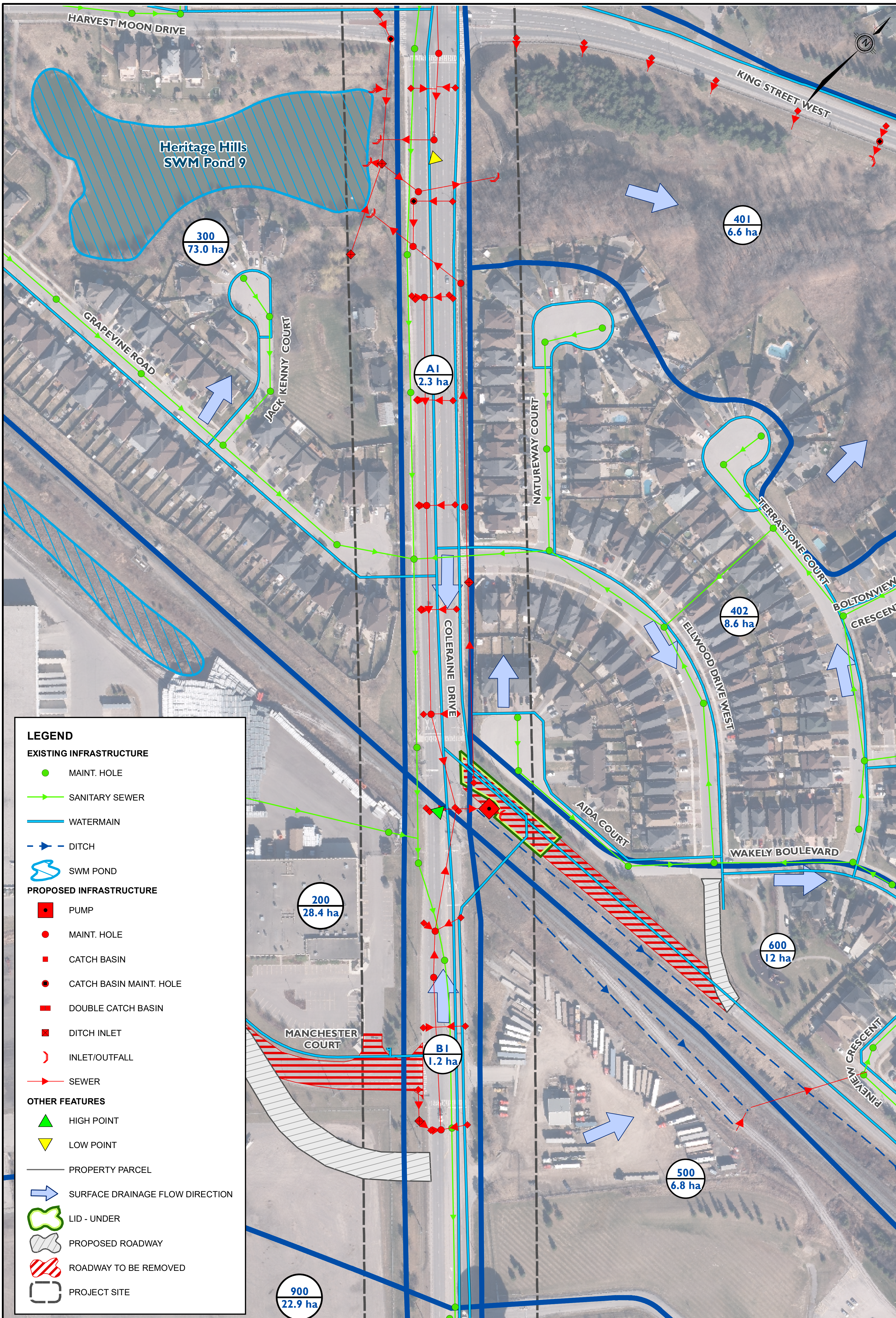
Lowering the roadway under the railway will create a new low point at the railway crossing. Minor and major drainage from both drainage areas A1 and B1 will be directed to the low point. Due to the depth of the low point, there is likely no opportunity to have the water discharge by gravity, therefore, a pump station and associated appurtenances would be required. The impact to downstream receiving watercourses will need to be mitigated as the entirety of the flow to the low point will be routed in one direction to the East Humber River. The safe pedestrian and vehicle ingress/regress will need to be considered during major storm events should the roadway be overtopped during a major storm event.

This alternative will redirect all flow direction back to original conditions, directing all minor and major drainage from Catchment 500 back to the East Humber River.

5.1.2 Alternative 2 – Roadway Over Railway

Raising the roadway over the railway will create a new high point along the roadway at the railway crossing. This new high point will continue to allow minor drainage from area B1 to flow south through the existing storm sewers but will cause the major drainage to flow south instead of north.

This alternative will completely change the flow direction of Catchment B1 from original conditions, causing the entire drainage area to enter the West Humber River. In order to mitigate this, stormwater infrastructure will need to be put in place to at a minimum return the minor flow back to existing conditions and preferably return both major and minor flow back to original conditions.



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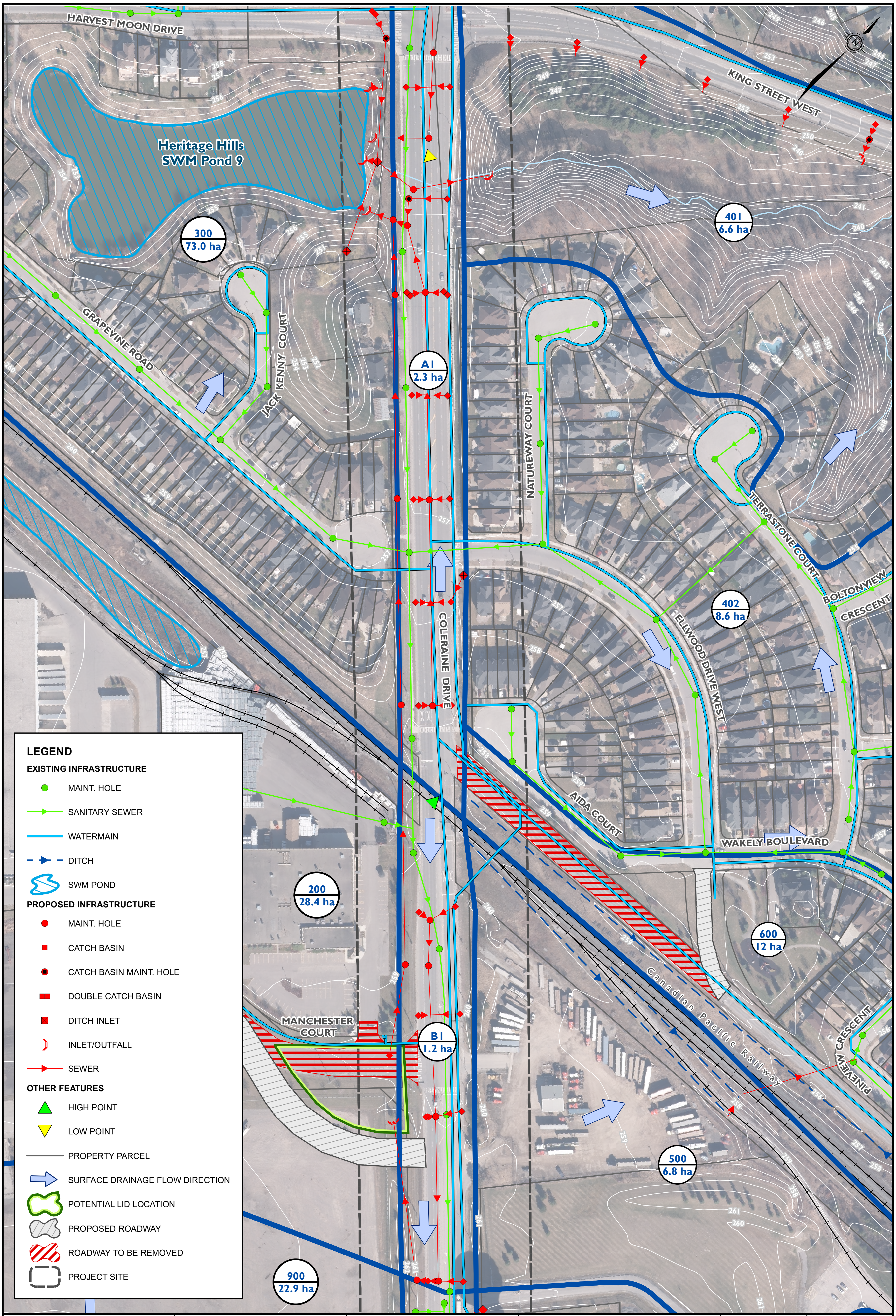
				DATE: 1/27/2022	SHEET No: 1 of 1



CIMA+	CLIENT Region of Peel Working for you	SCALE 0 5 10 20 30 40 50 meters 1:2,000	PROJECT NAME: COLERAINE DRIVE CP GRADE SEPARATION ENVIRONMENTAL ASSESSMENT SHEET TITLE: ALTERNATIVE 2 ROAD OVER RAILROAD	PROJECT No: B000738 DRAFTER: S. ELLIOTT — DESIGNER: K. LUKAWIECKI APPROVER: M. BARAL — APPROVER: --- DATE: 1/28/2022	CLIENT FILE No: --- DRAWING No: FIG. 5 SHEET No: 1 of 1

5.2 Evaluation of Proposed Alternatives

The table below summarizes the analysis of both proposed alternatives with regards to their stormwater management and climate change adaptability from existing conditions.

Table 6: Evaluation of Alternative Designs

Criteria	Do Nothing	Alternative 1 - Road Under Rail	Alternative 2A & 2B - Road Over Rail
Stormwater Management	• Portions of the existing roadway north of the C.P. Railway currently discharge to the Heritage Hills SWM Pond 9 (SWMP 9) for both water quality and quantity. • Portions of the existing roadway south of the C.P. Railway currently do not provide any stormwater management for quality and quantity. • No change to storm drainage condition.	• More complex option for accommodating stormwater. • Minor stormwater flow will change directions from existing southerly direction and to north with the major flow. This will match the original drainage conditions before the 2010 Town of Caledon reconstruction. • There is likely no opportunity to have the water discharge by gravity. Therefore, a pump station (PS) and associated appurtenances would be required, which will increase project costs and require ongoing maintenance to keep the PS functioning. Temporary storage may also be required to offset outlet constraints. • There is an opportunity to mitigate stormwater impacts by discharging to the existing Heritage Hills SWM Pond 9 (SWMP 9). • The low point in the roadway will change from the stormwater management pond to the CP underpass. Safe pedestrian and vehicle ingress/regress will need to be considered during major storm events should the roadway be overtopped. • Stormwater management analysis will need to be performed to assess the capacity of existing stormwater management pond and ensure that there is sufficient capacity to handle any new flows, whether from rerouting or an increase in impervious area, to the stormwater management pond. • With the introduction of a PS, there is a possibility of mechanical failure and the chance of increased flooding due to the PS being offline during a storm event.	**Alternative 2A:** • Less complex option for accommodating stormwater. • Minor storm drainage could remain the same as existing conditions. • The new high point in the roadway caused by the roadway/bridge would change area B1 major drainage direction to flow south. • The impact to downstream receiving capacities would need to be mitigated. • The low point in the roadway would remain the same, and safe pedestrian and vehicle ingress/regress is not a concern in major storm events should the roadway be overtopped. • Bridge over rail is more susceptible to roadway icing and freezing. **Alternative 2B** – Includes all of Alternative 2A with the following changes: • Implementation of storm sewers to direct minor storm flow north to SWMP 9 for quality and quantity control. • Implementation of a storage facility at the low point of the southern overpass, retaining major overland flow until it can be released through the proposed minor storm sewers north to SWMP 9. • A stormwater management analysis has been performed to assess the capacity of the existing SWMP 9 to ensure that there is sufficient capacity to handle any additional flows. This can be found in **Appendix E**.
Climate Change	• No improvements to stormwater infrastructure to improve resilience.	• Opportunity to improve resilience of stormwater infrastructure. Alternative more susceptible to flooding.	• Opportunity to improve resilience of stormwater infrastructure.

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5.3 Proposed Conditions Hydrologic Analysis

The existing VO model was modified to assess the impacts of both the increase in impervious area due to the additions of sidewalks and multi-use path, as well as the changes in drainage patterns. The **Table 7** below details the changes in impervious area for each catchment due to proposed alternatives. No other changes were made to the drainage area parameters for each alternative.

Table 7: Impervious Area Changes Due to Proposed Alternatives

Description	Existing	Alternative 1	Alternative 2A	Alternative 2B
	Catchment A1			
Area (ha)	2.30	2.30	2.30	2.30
% Impervious	71%	90%	71%	71%
	Catchment B1			
Area (ha)	1.24	1.24	1.24	1.24
% Impervious	47%	63%	63%	63%
	Catchment B2			
Area (ha)	1.03	1.03	1.03	1.03
% Impervious	47%	63%	63%	63%

As in existing conditions, the same three key flow node locations i.e., point of interest (POI), were considered for the analysis under the proposed conditions VO models. The first POI is the south outlet to the West Humber River drainage area, the second POI is SWMP 9 (both outflows and storage volumes) and the third POI is Node 11 of the VO model, which accumulates all drainage entering the 1350 mm diameter intercepting trunk storm sewer directing flow to the Humber River. The 100-year flow into the 1350 mm trunk storm sewer must remain below the maximum flow of 4.8 m^3/s.

5.3.1 Alternative 1 – Road Under Rail

The implementation of the underpass will cause the minor and major drainage from both Catchments A1 and B1 to drain toward the roadway sag under the railway line. A pump station will be installed to bring this water back north to the SWMP 9 via a storm sewer which will provide quantity and quality control for the flow.

Table 8 below provides a summary of the changes in flows at the point of interests (POI) which are south outlet to the West Humber River, SWMP 9 and the flows at Node 11 heading into the 1350 mm diameter intercepting trunk storm sewer.

In this alternative minor storm flows from Catchment B1 will be redirected to the north, this redirection in flow will match the original conditions i.e., before modifications were made to the roadway in 2010, directing all flows from Catchment B1 back to the East Humber River.

Table 8: Flow and Volume Comparison Alternative 1 – Road Under Rail

Storm Event	Point of Interests							
	POI 1: South Outlet West Humber River Peak Flow (m^3/s)		POI 2: SWMP 9				POI 3: Node 11 Outlet to 1350 mm Strom Sewer Max 4.8 m^3/s	
			Outflow (m^3/s)		Volume (ha*m)			
	Flow	Change from Existing	Flow	Change from Existing	Volume	Change from Existing	Flow	Change from Existing
2-Year	0.06	-40.0%	0.43	4.88%	2.53	1.20%	0.88	2.33%
5-Year	0.09	-40.0%	0.98	4.26%	3.45	1.17%	1.66	1.22%
10-Year	0.10	-41.2%	1.59	3.25%	3.83	0.52%	2.35	0.86%
25-Year	0.12	-36.8%	2.09	2.45%	4.07	0.49%	3.25	0.93%
50-Year	0.14	-30.0%	2.44	2.52%	4.24	0.71%	3.91	0.77%
100-Year	0.16	-27.3%	2.83	2.54%	4.43	0.91%	4.62	0.87%

The change in flow direction will cause a large decrease in the peak flow draining south to the West Humber River, while increasing the total runoff volume stored along with the maximum outflow of SWMP 9 from existing conditions.

The overall increases to SWMP 9 were assessed based on the original design of the pond, ensuring that the pond can accommodate the additional flow. This analysis can be found in the SWMP 9 Capacity Assessment Memo included in **Appendix E**.

The 100-year flow into the 1350 mm diameter intercepting trunk storm sewer will remain below the maximum value of 4.80 m^3/s.

If this alternative will be selected as the preferred alternative, detailed updates to the pond stage-storage discharge curves and resulting outflow, storage and elevations within the existing pond will need to be completed. Further consultation and approvals in principle will need to be obtained from the TRCA and the Town of Caledon for the utilization of the existing SWMP 9 to mitigate the impacts of the grade separation.

5.3.2 Alternative 2A (No Control) – Road Over Rail

The implementation of the overpass with no quantity or quality controls in place will force the major drainage from Catchment B1 south and into the West Humber River. A preliminary assessment of the impacts associated with Alternative 2A was completed to evaluate the changes from existing conditions. **Table 9** below provides a summary of the change in flows at three points of interests (POI) discussed in previous sections.

Table 9: Flow and Volume Comparison Alternative 2A (No Controls) – Road Over Rail

Storm Event	Point of Interests							
	POI 1: South Outlet West Humber River Peak Flow (m^3/s)		POI 2: SWMP 9				POI 3: Node 11 Outlet to 1350 mm Storm Sewer Max 4.8 m^3/s	
			Outflow (m^3/s)		Volume (ha*m)			
	Flow	Change from Existing	Flow	Change from Existing	Volume	Change from Existing	Flow	Change from Existing
2-Year	0.14	40.0%	0.41	0.00%	2.50	0.00%	0.86	0.00%
5-Year	0.19	26.7%	0.94	0.00%	3.41	0.00%	1.64	0.00%
10-Year	0.22	29.4%	1.54	0.00%	3.81	0.00%	2.33	0.00%
25-Year	0.27	42.1%	2.04	0.00%	4.05	0.00%	3.23	0.31%
50-Year	0.31	55.0%	2.38	0.00%	4.21	0.00%	3.88	0.00%
100-Year	0.34	54.6%	2.76	0.00%	4.39	0.00%	4.59	0.22%

While this alternative will cause no changes to SWMP 9 and negligible changes to Node 11 outlet at the 1350 mm diameter intercepting trunk storm sewer, it will cause a significant increase in flows to the West Humber River. This change in flow direction is completely opposite the original model, causing flows that originally went to the East Humber River to head south towards the West Humber River. There are also limited opportunities to implement quantity and quality controls measures on the downstream.

5.3.3 Alternative 2B (B1 Flow North) – Road Over Rail

To mitigate the impacts associated with the road over rail alternative it is proposed to implement storm sewers directing the 10-year minor system drainage from Catchment B1 to the north across the railway and into the existing SWMP 9. This alternative will also include a storage facility at the low point of the southern overpass, retaining major overland flow until it can be released through the proposed minor storm sewers north to SWMP 9. A preliminary assessment of the impacts associated with alternative 2B to existing conditions was completed. **Table 10** below provides a summary of the change in flows compared to the existing conditions at three points of interests (POI) discussed in previously.

Table 10: Flow and Volume Comparison Alternative 2B (B1 Flow North) – Road Over Rail

Storm Event	Point of Interests							
	POI 1: South Outlet West Humber River Peak Flow (m^3/s)		POI 2: SWMP 9				POI 3: Node 11 Outlet to 1350 mm Storm Sewer Max 4.8 m^3/s	
			Outflow (m^3/s)		Volume (ha*m)			
	Flow	Change from Existing	Flow	Change from Existing	Volume	Change from Existing	Flow	Change from Existing
2-Year	0.06	-40.0%	0.42	2.44%	2.52	0.80%	0.87	1.16%
5-Year	0.09	-40.0%	0.97	3.19%	3.44	0.88%	1.65	0.61%
10-Year	0.10	-41.2%	1.58	2.60%	3.83	0.52%	2.35	0.86%
25-Year	0.12	-36.8%	2.08	1.96%	4.06	0.25%	3.24	0.62%
50-Year	0.14	-30.0%	2.43	2.10%	4.24	0.71%	3.90	0.52%
100-Year	0.16	-27.3%	2.82	2.17%	4.42	0.68%	4.60	0.44%

This alternative will cause a decrease in peak flows discharge to the West Humber River. This alternative will also return the drainage pattern back to the original condition, causing all minor and major flow from Catchment B1 to flow north towards SWMP 9 ultimately discharging to the East Humber River. Due to this, there will be increased in flow and storage volume at the SWMP 9.

The 100-year flow into the 1350 mm diameter intercepting trunk storm sewer will remain below the max flow of 4.80 m^3/s.

If this alternative will be selected as the preferred alternative, detailed updates to the pond stage-storage discharge curves and resulting outflow, storage and elevations within the existing pond will need to be completed. Further consultation and approvals in principle will need to be obtained from the TRCA and the Town of Caledon for the utilization of the existing SWMP 9 to mitigate the impacts of the grade separation.

6 Storm Water Management

The proposed preferred alternative is to reconstruct Coleraine Drive to pass over the C.P. Railway. The proposed modification of Coleraine Drive will cause changes to the existing drainage flow paths and slightly increase the impervious area along the roadway due to the addition of active transportation. It is also proposed to direct the affected drainage area into SWMP 9, returning the flow paths to pre 2010 conditions outletting to the East Humber River watershed. The pond will provide quality and quantity control for the affected drainage areas.

The SWMP 9 will provide quality and quantity control for the storm flow from Coleraine Drive. For the major storm from Catchment B1, an additional storage facility is proposed for peak flow control until the minor storm sewers have the capacity to convey the flow north to SWMP 9. An assessment was completed to review the available capacity of SWM 9 to ensure that the pond can handle the additional flow from the roadway area. The analysis is presented in the SWMP 9 Capacity Assessment Memo, which can be found in **Appendix E.** The assessment concluded that the existing SWMP 9 has the capacity for the additional flows from the roadway.

The SWMP 9 Capacity Assessment Memo has discussed in detail about meeting the requirement for the quantity, quality and erosion control. The memo has concluded that a minimum additional quantity control volume of 278 m^3 must be provided in order to return to the existing (Post 2010) conditions and recommended to complete the detailed sizing and outlet design of the LID facility during the detailed design phase to ensure that the LID has a storage capacity of greater than 278 m^3 for the 100-year storm event, providing the necessary additional quantity control to allow SWMP 9 to continue to function as it does in existing conditions.

6.1 LID and Water Balance Measure

It is proposed to utilize the MECP Runoff Volume Control Targets to provide pre-development groundwater recharge as well as related hydrologic and ecologic functions. Since the roadway is a linear rehabilitation (not a new linear infrastructure project) and improvement project, instead of performing a water balance study, best efforts are proposed to infiltrate 90% of the annual rainfall runoff from the increased impervious area created through this project. Given the nature of the project, the objective is to achieve volume control to the Maximum Extent Possible (MEP) using all known, available and reasonable methods, given the site restrictions to achieve the maximum volume control. This recommendation is founded on the principles of maintaining the pre-development water balance to ensure the ecosystem function and natural quality and hydrological characteristics of natural features.

As per the Region of Peel Public Works Stormwater Design Criteria and Procedural Manual, the RVCt shall be met with the implementation of LID where possible, which will accumulate the 90th percentile (27-28 mm) of runoff for the new impervious areas.

A detailed analysis has been provided in the LID Capacity Assessment Memo which is included in **Appendix E**. The summary of infiltration volume calculation is provided in **Table 11**, **Table 12** and **Table 13** below.

Table 11: Required Infiltration Volume – 90th Percentile Storms - Area A1

Description	Existing	Alternative 1	Alternative 2
Area (ha)	2.30	2.30	2.30
% Impervious	71%	90%	71%
Imp. Area (m^2)	16,330	20,700	16,330
Change in Imp. Area (m^2)	-	4,370	0
Infiltration Volume (28mm) (m^3)	-	122	0

Table 12: Required Infiltration Volume – 90th Percentile Storms - Area B1

Description	Existing	Alternative 1	Alternative 2
Area (ha)	1.24	1.24	1.24
% Impervious	47%	63%	63%
Imp. Area (m^2)	5,828	7,872	7,872
Change in Imp. Area (m^2)	-	1,984	1,984
Infiltration Volume (28mm) (m^3)	-	56	56

Table 13: Required InfiltrationVolume – 90th Percentile Storms - Area B2

Description	Existing	Alternative 1	Alternative 2
Area (ha)	1.03	1.03	1.03
% Impervious	47%	63%	63%
Imp. Area (m^2)	4,841	6,489	6,489
Change in Imp. Area (m^2)	-	1,648	1,648
Infiltration Volume (28mm) (m^3)	-	46	46

The results shown in the tables show that the increased impervious area will require a maximum of 122 m^3, 56 m^3 and 46 m^3 runoff volume for Catchments A1, B1 and B2, respectively to achieve the 28 mm runoff targets.

There is an opportunity to construct Low Impact Development (LID) best management practices as part of the realignment of Old Ellwood Drive and Manchester Court to achieve these targets. These areas can be seen in **Figures 4** and **5** above.

As minor flows are proposed to be redirected in Catchment B1 from flowing south into Catchment B2, the proposed LID will be used to provide all water balance runoff volume infiltration for Catchments B1 and B2.

7 Conclusions

It can be concluded through the preliminary assessment of the alternative grade separation options and SWM mitigation strategies that the proposed grade separation may proceed in general conformance with the applicable Region of Peel, Town of Caledon, MECP and TRCA requirements. The findings of this report are summarized as follows:

- The proposed alternatives will cause a minor increase in imperviousness of the study area due to the implementation of sidewalks, multiuse paths and pedestrian bridges, causing a marginal increase in runoff peak flows.
- In both alternatives, the minor and major drainage outlets to the East and West main branches of the Humber River will be returned to original conditions before the roadway reconstruction in 2010.
- Quality, quantity and erosion controls will be provided under both design alternatives by the existing SWMP 9.
- The overall increases to SWMP 9 under both alternatives should be confirmed based on the original design of the pond to ensure that the pond can accommodate the additional flows.
- These increases in flow caused by either of the alternatives will not increase the 100-year flow at the 1350 mm diameter intercepting trunk storm sewer beyond its 100-year capacity.
- The current storm sewer system is designed for a 5-year storm event. As the road is being taken over by the Region of Peel, the storm sewers will need to be upgraded to the 10-year storm design standard.
- Runoff Volume Control targets (90^{th} percentile, 27-28 mm) shall be met with the implementation of low impact development. There is an opportunity to construct LID as part of the realignment of Manchester Court and Old Ellwood Drive to achieve these targets.
- The alternative 2B, which is road over rail, is preferred with respect to the SWM perspective.

Upon selection of the preferred alternative for the grade separation, the stormwater management strategy should be further reviewed. For both alternatives (1 or 2B), a detailed update to the pond stage-storage discharge curves and resulting outflow, storage and elevations within the existing pond will be required. Further consultation and approvals in principle will need to be obtained from the TRCA and the Town of

Caledon for the utilization of the existing SWMP 9 to mitigate the impacts of the grade separation.

Followings are recommended for future considerations:

- **Coordination with Town of Caledon:** Continue to engage with the Town of Caledon to obtain the confirmation and necessary data regarding the discharge of flows into Pond 9. This includes acquiring any relevant studies or surveys, such as the bathymetric survey, to validate the analysis in this report.
- **Capacity Assessment:** Conduct a detailed capacity assessment of SWM Pond 9 to evaluate its ability to accommodate additional runoff from the Coleraine Drive grade separation project and potential new developments. This assessment should include modeling to confirm any changes to the outflow hydrograph and ensure compliance with environmental standards.
- **Enhancement of LID Strategies:** While LID strategies have already been considered in this report, enhancing these strategies as well as exploration of other potential LID measures can be carried out during the detailed design phase to further improve the stormwater management with providing focus on increasing infiltration, improving sedimentation control, and enhancing water quality management. This approach aims to optimize the ecological function of the area and maintain stormwater quality.
- **Documentation for Detailed Design Phase:** Ensure that the findings and recommendations from this report are incorporated into the detailed design phase of the project. This integration will provide a comprehensive framework for addressing future considerations and ensuring compliance with regulatory requirements and the Town of Caledon's expectations.

A

Appendix A: SWM Criteria

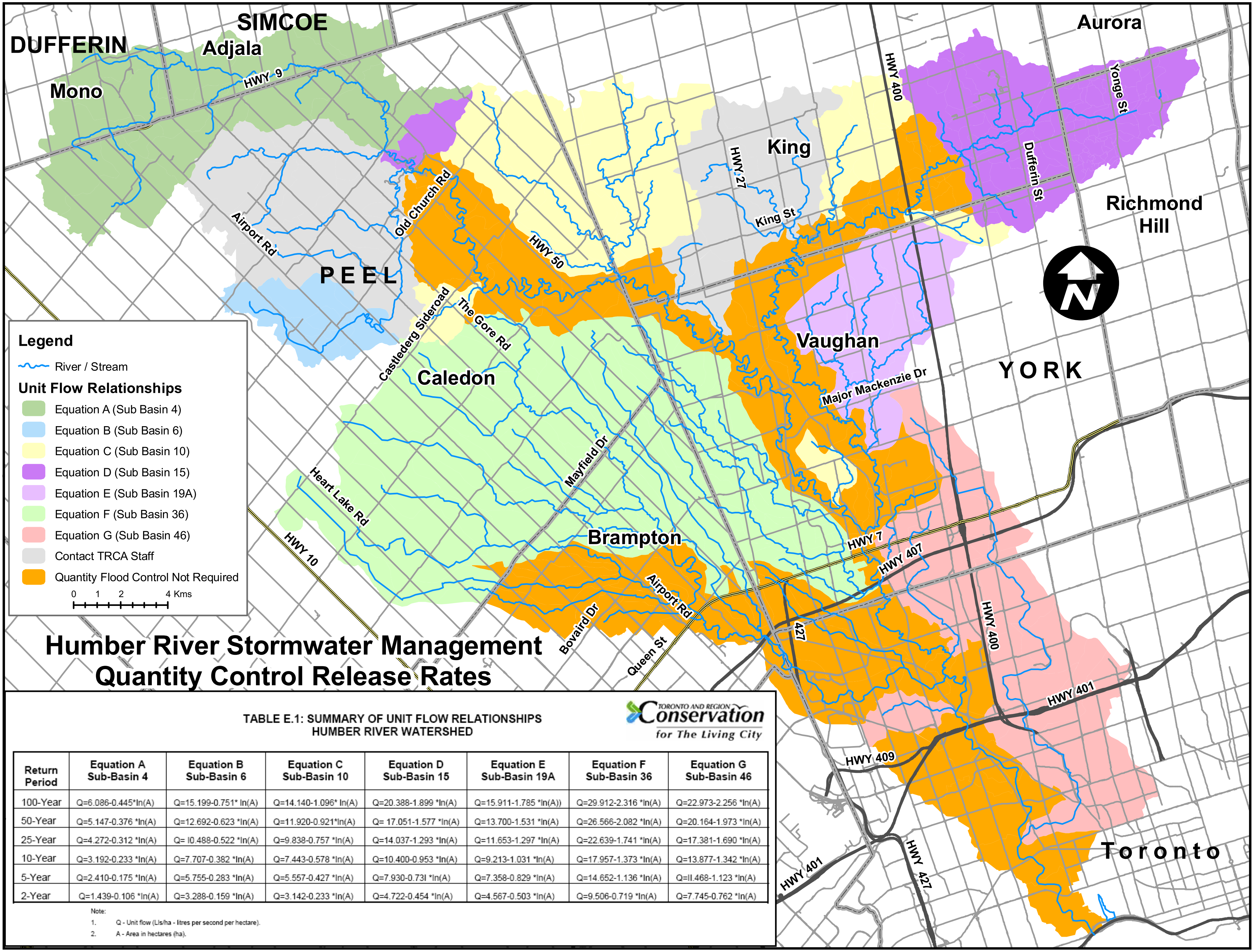
- Excerpts: Stormwater Management Criteria, TRCA, 2012
- Excerpts: Humber River SWM Quantity Control Release Rates
- Excerpts: Town of Caledon Development Standards Manual, 2019
- Excerpts: Region of Peel SWM Design Criteria, 2019
- Excerpts: MOE Stormwater Management Planning and Design Manual, 2003

STORMWATER MANAGEMENT CRITERIA

AUGUST 2012 VERSION 1.0

TORONTO AND REGION Conservation for The Living City

Watershed	Water Quantity Control Criteria	References and Notes
Etobicoke Creek	▪ Control post-development peak flows to 85% of pre-development levels for all storms up to and including the 100 year storm (i.e., 2, 5, 10, 25, 50, and 100 year storms) for the following reach: ‣ Headwaters: north of Old School Road and west of McLaughlin Road Unit flow rates have been established (see **Appendix A**) and should be used for all sites that require control ▪ Control post-development peak flows to pre-development levels for all storms up to and including the 100 year storm (i.e., 2, 5, 10, 25, 50, and 100 year storms) for the following reach: ‣ Headwaters: east of McLaughlin Road, between Mayfield and Old School Road ‣ Spring Creek: north of Bovaird Drive ‣ Little Etobicoke Creek Unit flow rates have been established (see **Appendix A**) and should be used for all sites that require control ▪ For all other tributaries and reaches, post to pre development quantity controls are not required ▪ Development outside of the approved urban boundary when the hydrology study was finalized may require Regional storm protection, proponents should consult with TRCA staff to confirm	▪ Hydrologic Model: VISUAL OTTHYMO ▪ Return period peak flows based on the AES - 6 hour design storm. ▪ Hydrology Study: "Etobicoke Creek Hydrology Update" (Totten Sims Hubicki, 2007)
Highland Creek	▪ Control post development peak flows to pre-development levels for all storms up to and including the 100 year storm (I.e. 2, 5, 10, 25, 50 and 100 year storms)	▪ Hydrologic Model: VISUAL OTTHYMO. ▪ Return period peak flows based on 6 hour AES event. ▪ Hydrology Study: Highland Creek Hydrology Update (Aquafor Beech Ltd., December 2004)
Humber River	▪ Control post-development peak flows to pre-development levels for all storms up to and including the 100 year storm (i.e., 2, 5, 10, 25, 50, and 100 year storms) except for the main branches of the Lower, Main, East, Upper and West Humber where no quantity control is required (see **Appendix A**) ▪ Unit flow relationships have been established (see **Appendix A**) and should be used for all other sites located in the Humber River Watershed not discharging to the main channels listed above. ▪ Development outside of the approved urban boundary when the hydrology study was finalized may require Regional storm protection, proponents should consult with TRCA staff to confirm	▪ Hydrologic Model SWMHYMO ▪ Return period peak flows based on 6 & 12 hours AES (basin specific - Tributary Based Control Strategy) ▪ Hydrology Study: - "Humber River Watershed Hydrology Update" (Aquafor Beech Ltd., Nov. 2002)
Krosno Creek	▪ No quantity control required for sites draining directly to Frenchmans Bay. ▪ For all other areas, control post-development peak flows to pre-development levels for all storms up to and including the 100 year storm (i.e., 2, 5, 10, 25, 50, and 100 year storms)	▪ Hydrologic Model: VISUAL OTTHYMO. ▪ Return period peak flows based on the Chicago - 4 hour design storm. ▪ Hydrology Study: Stormwater Management Master Plan, Frenchmans Bay, April 2009 (MMM Group Ltd.)



Humber River Stormwater Management Quantity Control Release Rates

Toronto and Region Conservation for The Living City

TABLE E.1: SUMMARY OF UNIT FLOW RELATIONSHIPS HUMBER RIVER WATERSHED

Return Period	Equation A Sub-Basin 4	Equation B Sub-Basin 6	Equation C Sub-Basin 10	Equation D Sub-Basin 15	Equation E Sub-Basin 19A	Equation F Sub-Basin 36	Equation G Sub-Basin 46
100-Year	Q=6.086-0.445*In(A)	Q=15.199-0.751* In(A)	Q=14.140-1.096* In(A)	Q=20.388-1.899 *In(A)	Q=15.911-1.785 *In(A))	Q=29.912-2.316 *In(A)	Q=22.973-2.256 *In(A)
50-Year	Q=5.147-0.376 *In(A)	Q=12.692-0.623 *In(A)	Q=11.920-0.921*In(A)	Q= 17.051-1.577 *In(A)	Q=13.700-1.531 *In(A)	Q=26.566-2.082 *In(A)	Q=20.164-1.973 *In(A)
25-Year	Q=4.272-0.312 *In(A)	Q= I0.488-0.522 *In(A)	Q=9.838-0.757 *In(A)	Q=14.037-1.293 *In(A)	Q=11.653-1.297 *In(A)	Q=22.639-1.741 *In(A)	Q=17.381-1.690 *In(A)
10-Year	Q=3.192-0.233 *In(A)	Q=7.707-0.382 *In(A)	Q=7.443-0.578 *In(A)	Q=10.400-0.953 *In(A)	Q=9.213-1.031 *In(A)	Q=17.957-1.373 *In(A)	Q=13.877-1.342 *In(A)
5-Year	Q=2.410-0.175 *In(A)	Q=5.755-0.283 *In(A)	Q=5.557-0.427 *In(A)	Q=7.930-0.73I *In(A)	Q=7.358-0.829 *In(A)	Q=14.652-1.136 *In(A)	Q=II.468-1.123 *In(A)
2-Year	Q=1.439-0.106 *In(A)	Q=3.288-0.159 *In(A)	Q=3.142-0.233 *In(A)	Q=4.722-0.454 *In(A)	Q=4.567-0.503 *In(A)	Q=9.506-0.719 *In(A)	Q=7.745-0.762 *In(A)

Note:

1. Q - Unit flow (Lls/ha - litres per second per hectare).
2. A - Area in hectares (ha).

5 Stormwater Quality

5.1 Quality Control Objective

Stormwater quality control criteria are necessary to protect receiving water bodies from the water quality degradation that may result from development and urbanization. The Ministry of Environment (MOE) administers a number of acts and regulations that are concerned with the protection and conservation of water, and the quality of drinking water supplied to the public, with associated requirements pertaining to SWM. Furthermore, the federal *Fisheries Act* prohibits the deposit of deleterious substances into waters that may degrade or alter the quality of water causing impact fish or fish habitat, In the context of these regulatory provisions, both suspended solids and thermal warming can be considered pollutants to the aquatic ecosystem. These principles form the basis for TRCA's requirements with regard to stormwater quality control.

5.2 Quality Control Criteria

The MOE SWMPD Manual (2003) provides technical and procedural guidance for the planning, design, and review of SWM practices. In particular, the SWMPD Manual regulates water quality treatment levels corresponding to the removal of a percentage of total suspended solids (TSS) from runoff prior to discharge to the receiving water body.

The stormwater management criterion stipulates that all watercourses and water bodies (e.g. Lake Ontario) within TRCA's jurisdiction are classified as requiring an Enhanced level of protection (80% TSS removal).

▷ All watercourses and water bodies within TRCA's jurisdiction are classified as requiring an Enhanced level of water quality protection, equivalent to 80% TSS removal.

It is important to note that this criterion represents a minimum requirement that may be superseded by the results of additional studies and/or municipal and provincial requirements. For example, the City of Toronto's Wet Weather Flow Management Guideline requires treatment of *E.coli* bacteria for discharges directly to Lake Ontario. Areas draining to Lake Wilcox within the Town of Richmond Hill must also consider phosphorus removal as part of the treatment strategy, in accordance with Official Plan Amendment 129. Similarly, the Ministry of Natural Resources (2007) has produced draft urban guidelines for the purposes of administering the Endangered Species Act that recommends a threshold for discharge temperatures for stormwater management facilities connected to Redside Dace streams. For areas with coldwater species and other target species, it is recommended that SWM controls ensure discharge temperatures meet ambient stream temperatures or within an acceptable ecological range. Section 3 of the CVC Study Report "*Thermal Impacts of Urbanization including Preventative and Mitigation Techniques*" (January 2011) provides further guidance on the planning and design of SWM infrastructure to address potential thermal impacts.

Wetlands are essential parts of ecosystems and can be sensitive to adverse water quality including chlorides from road salts. To maintain the health and ecological function, only sources of clean water (e.g. roof drainage, rain collection systems etc.) should be allowed to enter sensitive wetlands and the water balance should be managed with the intent to maintain ecological functions and characteristics and hydrological functions under post development conditions (see section 6).

In some cases, the catchments of riparian wetlands may be so large that the effect of the development on the wetland will not be detectable and not require a water balance. However, there may be instances where the sensitivity of riparian wetlands to the scale of development proposed may be of concern, and the preference for water balance mitigation in these instances will be to maximize the use of clean water. Therefore, it is recommended to consult with TRCA staff to confirm the requirements if a wetland are located within the catchment area of the proposed development.

As described in **Section 2.2**, construction stage SWM is largely focused on erosion and sediment control practices. The *Erosion and Sediment Control Guideline for Urban Construction* (Greater Golden Horseshoe Conservation Authorities, 2006), provides guidance on the suitable SWM approaches and criteria to be applied during construction, and can be downloaded from the TRCA and STEP websites.

5.3 Quality Control Practices

The MOE SWMPD Manual (2003) and the TRCA/CVC LID Manual (2010) describe a number of practices that can be implemented to provide quality treatment of stormwater runoff as part of urban development. Examples of SWM practices that can be applied to provide stormwater quality control include:

- wet ponds;
- wetlands;
- infiltration facilities;
- low impact development practices; and,
- oil grit separators.

Section 7 of this document provides specific guidance on the planning and design of SWM infrastructure within TRCA's watersheds, and outlines the volumetric requirements of different SWM practices to achieve the Enhanced level of treatment in accordance with the provisions of the MOE SWMPD (2003).

DEVELOPMENT STANDARDS MANUAL

TOWN OF CALEDON

Version 5.0
2019

1.4.2. Storm Drainage System

1.4.2.1. Sewer System

Storm sewers designed and constructed in accordance with the most recent requirements and specifications of the Town of Caledon are required on every street within all proposed plans of subdivision. Inverts of service connections at the property line shall be surcharge free and be above the 100-year hydraulic grade line of the municipal storm sewer system. Storm sewers shall be of adequate size and depth to provide service for the development of lands within the upstream watershed and/or for the drainage of any areas designated by the Town. Storm drainage shall be directed to an outlet considered adequate in the opinion of the Town and applicable agencies.

Channel works, bridges, culverts and all other drainage structures or works shall be designed and constructed in accordance with the most recent drawings and specifications. Approvals by the Town and all other applicable agencies such as the Ministry of the Environment, Conservation and Parks (MECP), the Toronto Regional Conservation Authority (TRCA), Credit Valley Conservation (CVC), the Ministry of Natural Resources and Forestry (MNRF), Department of Fisheries and Oceans (DFO) and the Niagara Escarpment Commission (N.E.C) etc. are required.

1.4.2.2. Storm Sewer Design

1.4.2.2.1. Run-off Calculations

Storm sewers shall be designed on Town Standard 104 Design Sheets. Storm sewers shall be designed to drain all lands based on the Rational Method. The Rational Method calculations must be checked using a model approved by the Town, where the drainage area is greater than 5 hectares. The larger of the flows is to be used in the design of the sewer system.
$Q = 0.0028\ CIA$

Q = Flow in cubic meters per second (m^3/s)
A = Area in hectares
C = Run-off coefficient
I = Intensity in mm/hr

Intensity of Rainfall

The intensity of rainfall is to be determined from the most recent Town of Caledon standard INTESITY – DURATION – FREQUENCY RAINFALL CURVES in accordance with Town Standard Drawing No. 103. The equations for the I.D.F. curves are listed in Town Standard Drawing No. 103 and section 1.4.7. Meteorology.

Time of Concentration

The minimum initial time of concentration is to be 10 minutes.

Pre-Development

1.4.7. Meteorology

Town of Caledon intensity-duration frequency curves were originally derived from the rainfall data taken from the Guelph O.A.C. (Town Standard Drawing No. 103). The equations for these curves are as follows:

Return Period (Yrs.)	A	B	C
2	1070	0.8759	7.85
5	1593	0.8789	11
10	2221	0.9080	12
25	3158	0.9335	15
50	3886	0.9495	16
100	4688	0.9624	17

$$I = \frac{a}{(t + c)^{b}}$$

Where: a, b, c = above
I = intensity (mm/hr)
t = storm duration (min)

Based on these I.D.F. curves, the Consultant is to develop the proper design storms for use in hydrologic studies. In general, the S.C.S. design storms should be used for determining the hydrographs for undeveloped watersheds and for checking detention storage required for quantity control. The Chicago design storms should be used for determining hydrographs in urban areas and also for checking detention storage. In many cases, the consultant will be required to run both sets of design storms to make sure that the more stringent is used for each individual element of the drainage system (pipe flow, street flow, channel flow, detention storage).

The time step for discretization of the design storm can vary according to the size of the subwatershed but must not exceed the estimated time of concentration. The maximum rainfall intensity should be compatible with that of real storms on record.
In detailed design of storage structures, the operation must be checked for spring flood conditions due to combined snowmelt and rain. Wet ponds are to be checked for spring flood conditions due to combined snowmelt and rain. Wet ponds are to be checked for evaporative losses. Temperature data is to be submitted with these calculations. Operation of storage facilities must also be checked in order to verify that a sequence of storms is not more critical than a design storm.

1.4.8. Stormwater Management Analytical Methods

1.4.8.1. Rational Method

The Rational Method of determining design flows should only be used as an approximation of flows for relatively small drainage areas (i.e. less than 5 ha) due to the conservativeness of the approach. Flows determined using the Rational Method are typically higher than those resulting from complex hydrologic models.

Low Impact Development (LID)

Low Impact Development (LID) technologies are to be incorporated into the stormwater management design. See "Low Impact Development Stormwater Management Planning and Design Guide" Version 1.0 by the CVC and TRCA. The Town will consider the use of technologies that utilize efficient design of features such as roof drain collectors, soak away pits, lot level controls, etc. wherever they are deemed appropriate and acceptable.

1.4.3. Stormwater Quantity, Quality and Erosion Control

Stormwater management is required to control increases in storm runoff due to development. Typical methods of quantity control are temporary storage of water on flat roof tops and parking lots, discharging rainwater leaders onto grassed areas or infiltration galleries, and downstream stormwater retention or detention ponds. Stormwater quantity controls are to be implemented on all applications in accordance with any applicable master drainage or subwatershed plan.

1.4.3.1. Quantity Control

A. Flood Management

Criteria

All newly developing or redeveloping areas must assess their potential impacts on local and regional flooding and mitigate accordingly.

Design

In areas where no Watershed or Subwatershed Planning or Subwatershed Impact Study has been completed, it is the policy of the Town of Caledon to require that runoff peak flows are controlled to pre-development levels, unless the proponent can demonstrate through appropriate modelling and analysis that uncontrolled flow will not cause detrimental impacts on flood conditions on downstream properties and watercourse systems. Before the Town will accept any increase in runoff rates, it must also receive endorsement from the agencies having jurisdiction.

Where the Subwatershed Plans or Subwatershed Impact Studies have been completed, the development proponent will be required to comply with the recommendations of the specific plan. Any variations will need to be appropriately supported by detailed analysis and also be approved by any agencies having jurisdiction. Refer to Section 1.4.8. for analytical methodologies.

B. Erosion Control

Criteria

Depending on the downstream water level and the nature of the soil strata affected, streambanks can be subject to increased erosion potential. In these cases the proponent(s) will be required to provide appropriate protection in accordance with the Watershed or Subwatershed Plans or with the Subwatershed Impact Study, as well as policies of the appropriate Conservation Authority.

In areas where no Subwatershed Plan exists, it shall be the responsibility of the development proponent to provide adequate erosion protection in accordance with Provincial Guidelines, unless it can be demonstrated through appropriate modeling and/or analysis that erosion processes will not be adversely affected by the proposed development.

Design

Erosion Control and management involves:

- Extended Detention storage for the 25 mm rainfall event as outlined in the Provincial Guidelines (ref. SWM Planning & Design Manual, MOECC, 2003), in the absence of specific direction from a Subwatershed or Watershed Plan.
- Assessment of downstream erosion susceptibility and critical flow values in conjunction with event modelling.
- Assessment of downstream erosion critical velocity or shear forces in conjunction with continuous simulation techniques (duration analysis).

In areas where the downstream receiving watercourse is determined to be unstable, or where control/over control of flow rates is ineffective or not feasible, design of channel alterations may be considered, subject to design in accordance with natural channel design principles (refer to "Adaptive Management of Stream Corridors in Ontario", Ministry of Natural Resources, 2001).

Storm sewer outfalls in natural channels should be provided with proper protection against erosion which includes appropriate bank scouring protection on either side of the outfall and creek. Where storm sewer outfalls outlet to steep and/or deep valleys, drop structures should be designed in such a manner as to provide integral bank stability. Such local erosion protection measures should be designed so as not to interfere with the natural channel forming processes of the receiving watercourse system. Refer to Section 1.4.8. for analytical methodologies.

1.4.3.2. Quality Control

Criteria

Water quality treatment will be required for all new development within the Town of Caledon. Water quality treatment performance shall conform to Provincial requirements (refer to Stormwater Management Planning and Design Manual, MOECC, 2003).

In areas of existing development where re-development is proposed, provisions for water quality measures will be evaluated on a site-specific basis, based on the feasibility of implementation. Where on-site measures are considered infeasible, the Town of Caledon may consider the potential for contributions to off-site improvements (i.e. cash-in-lieu), subject to agency concurrence.

In areas where a Subwatershed Plan has been prepared and approved, the guidelines and criteria cited within the plan shall be adopted by the Development Proponent.

Design

Specific guidelines for SWMP application have been developed by the Province based on the type of fisheries habitat downstream of the proposed development.

Three levels of protection are given, with the goal to maintain or enhance existing aquatic habitat, based on the suspended solids removal performance for the different end-of-pipe stormwater management facilities developed in the continuous simulation modelling. These levels of protection are based on a general relationship between the end-of-pipe stormwater management facilities long-term suspended solids removal and the lethal and chronic effects of suspended solids on aquatic life. The levels of protection correspond to the following long-term suspended solids removal:

- **Enhanced** protection corresponds to the end-of-pipe storage volumes required for the long-term removal of 80% of suspended solids;

- **Normal** protection corresponds to the end-of-pipe storage volumes required for the long-term removal of 70% of suspended solids; and

- **Basic** protection corresponds to the end-of-pipe storage volumes required for long-term removal of 60% of suspended solids.

As a general consideration, maintenance of the natural hydrologic cycle including infiltration is encouraged where soil conditions permit. Therefore, the use of stormwater management practices which enhance or maintain infiltration should be considered for each development. Generally active infiltration measures will be applicable in permeable soils areas only and their use will require supporting soils documentation. Passive measures such as disconnection of roof leaders have been historically utilized in many areas and should be implemented as a matter of course in all areas unless specific constraints preclude these measures.

In all cases, the potential for groundwater contamination shall be considered, particularly where infiltration of road runoff is contemplated.

In areas where hydrogeological concerns are identified and/or critical linkages to fisheries habitat are present, additional study and analysis may be required to determine the appropriate level of mitigation.

1.4.4. Stormwater Quantity/Quality Erosion Techniques

1.4.4.1. General

Current stormwater management practice advocates the consideration of SWMP's on a hierarchical basis, whereby more pro-active techniques are considered first. The SWMP's are grouped under the following headings in order of preferred application:

A. Lot Level Techniques and Source Controls and Alternative Development Standards

B. Transport or Conveyance Controls

C. End-of-Pipe Management Techniques

The philosophy behind this hierarchy is that stormwater management techniques are usually more effective when applied at the source. Table 1.1 constitutes a comprehensive list of currently available techniques associated with each of the foregoing categories. It is recognized that stormwater management remains an emerging science; hence this list will change over time. It will be the responsibility of the proponent to demonstrate that any technique, not currently approved by the Town, will address the intended function within expected maintenance and cost parameters, to the satisfaction of the Town of Caledon.

Stormwater management solutions should take into account multi-uses for the site. Integrated pathways, trails and passive recreational uses must be integrated in all designs. Stormwater management facilities shall be designed as an amenity and an asset and not as a rear yard, out of sight, piece of infrastructure. The use of Stormwater management facilities for passive recreational uses is not considered in lieu of parkland dedication, this is just considered good engineering principles.

During construction of the stormwater management facility, over excavation of the stormwater management pond cells is not allowed.

TABLE 1.1
COMPREHENSIVE LIST OF AVAILABLE STORMWATER MANAGEMENT PRACTICES

Source Controls

Stormwater Management Technique	Town of Caledon Perspective[1]
• reduced lot grades	Not currently endorsed
• roof leader discharge to surface at front of dwelling	Endorsed
• roof leader and sump pumps discharge to soakaway pits	Not currently endorsed
• rear yard ponding	Not currently endorsed
• rooftop storage	Applicable for peak flow control only in industrial/commercial applications
• parking lot storage	Applicable for peak flow control only in industrial/commercial applications
• porous pavement	Will be considered for rural sites and driveway/parking lot applications

Conveyance Controls

Stormwater Management Technique	Town of Caledon Perspective[2]
• pervious pipe systems	Will be considered at Town's discretion
• pervious catch basins	Not currently endorsed
• grassed swales (semi-urban road sections)	Encouraged where applicable (ref. Official Plan) ref. Hybrid Roadway Cross-section
• oversized pipes (Superpipes)	Appropriate in redevelopment of existing areas only

[1] The use of any of the foregoing SWMP's is subject to appropriate soil conditions.
[2] The use of any of the foregoing SWMP's is subject to appropriate soil conditions.

Low Impact Development (LID) Practices

Stormwater Management Technique	Town of Caledon Perspective[3]
• buffer strips	Only considered appropriate for low density, small drainage areas
• infiltration basins	Will be considered for rural and industrial sites
• infiltration trenches	Will be considered for rural and industrial sites
• vegetated filter strips	Only considered appropriate for low density, small drainage areas

End-of-Pipe Facilities[4]

Stormwater Management Technique	Town of Caledon Perspective[5]
• dry ponds	Applicable for water quantity control only
• wetlands	Applicable for water quality/quantity treatment
• wet ponds	Applicable for water quality/quantity treatment
• oil/grit separators and equivalent systems	Applicable; most appropriate for Commercial/Industrial land use; require consideration of treatment train philosophy

1.4.5. Sediment and Erosion Control During Construction

Criteria

In all cases, it is required that sediment loading be controlled as per the guidelines "Erosion and Sediment Control Guidelines for Urban Construction" published by the Greater Golden Horseshoe Area Conservation Authorities (including the Credit Valley Conservation and Toronto Region Conservation Authority) December 2006, and the "Ontario Guidelines on Erosion and Sediment Control for Urban Construction Sites" 1987. All Erosion and Sediment Control facilities shall be inspected and maintained until the site is stabilized to the satisfaction of the Town. Inspection reports must be submitted to the Town as per the requirements of the "Erosion and Sediment Control Guidelines for Urban Construction" published by the Greater Golden Horseshoe Area Conservation Authorities (including the Credit Valley Conservation and Toronto Region Conservation Authority) December 2006.

Note:

All Erosion and Sediment Controls will follow the most recent updates (if any) to the guidelines provided above.

Design

[3] The use of any of the foregoing SWMP's is subject to appropriate soil conditions.
[4] The Town requires appropriate signage for all surface end-of-pipe techniques.
[5] The use of any of the foregoing SWMP's is subject to appropriate soil conditions.

REGION OF PEEL

PUBLIC WORKS STORMWATER DESIGN CRITERIA AND PROCEDURAL MANUAL

June 2019 (version 2.1)

4.0 STORMWATER MANAGEMENT REQUIREMENTS

Stormwater management techniques shall be implemented to the satisfaction of the Region of Peel, the local Conservation Authority and all concerned departments and agencies.

The following sections describe the stormwater management requirements for Quality Control; Runoff Volume Control; Quantity Control, Erosion Control and Water Balance (infiltration). The following criteria is for use in SWM planning and design and is intended to streamlines permitting and approvals with the relevant agencies involved in the construction and /or reconstruction of Regional Roads and site plans.

4.1 Stormwater Quality Control

Urban runoff carries surficial sediments and debris into receiving streams and watercourses which degrades water quality and impacts aquatic habitat conditions. In addition, metals and other pollutants adhere to particulate matter found in the stormwater runoff column which further degrades water quality. The importance of stormwater runoff quality in the Region of Peel is underscored by the fact that runoff can impact drinking water wells within the Region or it quickly finds its way to Lake Ontario which is a primary source of the Region's drinking water.

Requirements:

1. Ensuring stormwater management practices minimize stormwater contaminant loads and maintain or increase the extent of vegetative and pervious surfaces.

2. Where possible retain rural cross-section using low-impact development (LID).

3. Level 1 (80%) Level 1 Enhanced treatment through the long-term removal of 80% Total Suspended Solids (TSS)

Additional Water Quality Control Requirements within Endangered Species Habitat for Redside Dace and Jefferson Salamander:

4. Control of the runoff from the Regional specific 90th percentile rainfall volume using the control hierarchy. See **Section 4.2 - Volume Control** to limit discharges to 25mg/L above background stream level.

5. Thermal mitigation: To minimize thermal impacts, preventative measures (e.g. low-impact development practices) and mitigation measures should be applied to limit discharges to 24°C maximum

If implementing Recommended Volume Control Criteria:

If implementing Recommended Volume Control Criteria, the following shall satisfy the water quality requirements for the subject undertaking:

6. Control of the runoff from the Regional specific 90th percentile rainfall volume using the control hierarchy. See Recommended Volume Control Criteria
    - Reduction in pollutant load to the receiver by 80% or greater through the control of 90th percentile runoff event.

- 80% load reduction on an annual basis is equivalent to Level 1 Enhanced treatment through the long-term removal of 80% Total Suspended Solids (TSS).
- Stormwater shall not be discharged directly to the stream without treatment corresponding to the runoff generated from the 90th percentile event.

4.2 Recommended Stormwater Runoff Volume Control

Note: At time of release of this **Draft Public Works Stormwater Design Criteria and Procedural Manual (Version 2.0)**, the MECP Low Impact Development Stormwater Management Guidance Manual has not been formally released by the MECP, as such the following volume control targets are 'recommended'. Users are encouraged by the Region of Peel to apply the volume control criteria to realize synergistic benefits among other stormwater criteria, specifically water quality, erosion, water balance and quantity (flood) control).

Stormwater runoff from developed sites impacts streams and watercourses by introducing erosive forces during frequent storms. In addition, the alteration of the hydrologic regime from raw land reduces the amount of water that would naturally evaporate, transpire or infiltrate essentially generating more runoff volume. These impacts are the target of the requirement outlined within this section with the goal being to reduce stormwater runoff volume from developing sites. Practices implemented to address this criterion may assist in mitigating water quality impacts, erosion and water balance requirements, per the MECP and local Conservation Authority requirements.

Volume control to be recognized as providing a portion of the detention and/or peak flow requirement, as long as the volume control facilities are maintained for their function as designed. Practitioners shall be required to demonstrate through calculations or hydrologic modelling the storage quantity and/or the peak flow reductions associated with incorporating the required volume controls.

Volume controlled shall be recognized as providing benefits to water quantity (detention and/or peak flow requirement), water quality impacts, erosion and water balance requirements. It is not the intent of the Region of Peel to require redundant SWM infrastructure.

Requirement:

1. Control of the runoff from the Regional specific 90th percentile rainfall volume (27-28mm) per **Figure 4.2**) using the Control Hierarchy (see **Section 4.2.1**):

    a) Priority 1 –Volume Retention (infiltration, re-use and/or ET) using LIDs to satisfy the pre-development water balance requirements.
        - Minimum post development recharge of the first 5 mm for any precipitation event. See **Sections 4.4 and 4.6 - Erosion and Water Balance**.

    b) Priority 2 – LID Volume Capture and Release using LIDs filtration techniques.
        - Treat remainder of 90th percentile rainfall volume (27-28mm) not retained using Priority 1 measures to enhance water quality and reduce runoff volumes. See **Section 4.1 - Water Quality** and **Section 4.4 Erosion**.

    c) Priority 3 – Volume Capture and Release using OGS, dry-ponds, wet-ponds and/or wetlands.

- Treat remainder of 90th percentile rainfall volume (27-28mm) not retained or filtered using Priority 1 and Priority 2 measures respectively to enhance water quality and reduce runoff volumes. See **Section 4.1 - Water Quality** and **Section 4.4 Erosion**.

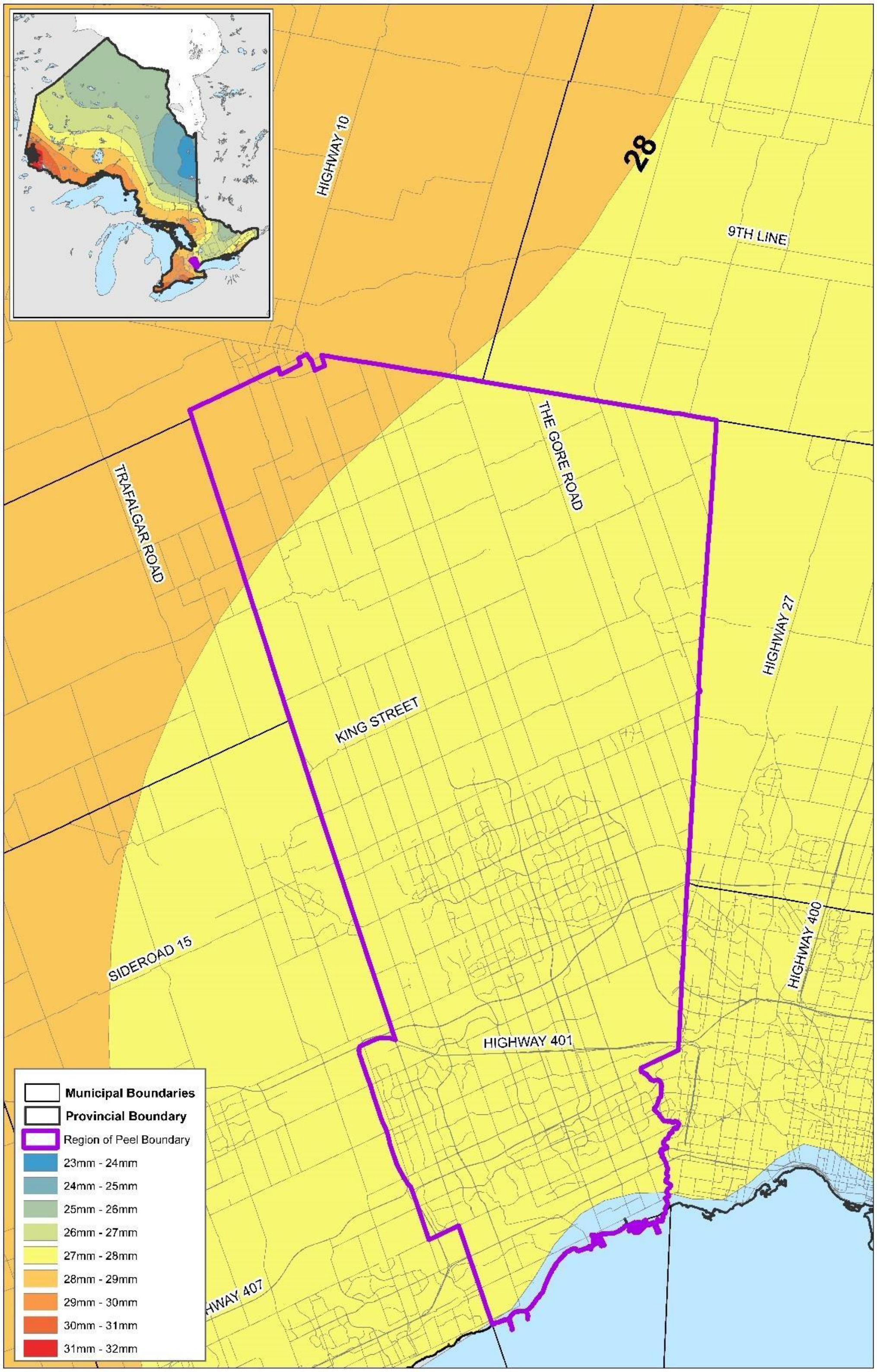


Figure 4.2 - 90th Percentile Rainfall Volume Target (27-28mm) for the Region of Peel per the Draft MECP Low Impact Development Stormwater Management Guidance Manual (Pending)

4.2.1 Control Hierarchy

A control hierarchy has been proposed whereby stormwater management practices are preferentially selected to control the 90th percentile rainfall volume (27-28mm) per **Figure 4.2**; which:

- Begin with better site design (see **Section 5.20.2**)
- Utilize natural systems and preserve existing natural systems;
- Create multifunctional landscapes that achieve goals and objectives beyond stormwater management to include broader community goals of livability and sustainably as well as environmental protection objectives;
- Contribute to water sustainability across the watershed to reduce the use of resources including potable water; and
- Provides climate change co-benefits. A co-benefit is an action or a technology that is designed to both reduce greenhouse gas (GHG) emissions and reduce vulnerability to climate impacts in the future. When something contributes to both climate change mitigation and adaptation, it is a climate co-benefit (see **Section 7.0**).

The control hierarchy for application includes the following priorities in keeping with the above noted rationale. While the control hierarchy provides inherent flexibility in the types of SWM BMPs which can be used, it shall be a requirement by the Region of Peel that the practitioner document the selection process of treatment approaches from priority 1 approaches to priority 3 approaches, explicitly describing the site restriction or constraints which prevented the implementation including all relevant supporting documentation as required.

1. **Control Hierarchy Priority 1 (Retention)** – LID retention technologies which utilize the mechanisms of infiltration, evapotranspiration and or re-use to recharge shallow and/or deep groundwater; return collected rainwater to the atmosphere and/or re-use collected rainwater for internal or external uses respectively. The target volume is controlled and not later discharged to the municipal sewer networks (with the exception of internal water re-use activities) or surface waters and does not therefore become runoff.

   Priority 1 BMPs shall be applied to meet local water balance requirements and are encouraged to be applied to the maximum level possible given the on-site conditions and the local environmental considerations. **Priority 1** BMPs:

   - Reduce runoff volumes
   - Provide less variable pollution control as pollutant loads to receivers are reduced through runoff volume reductions (infiltration, evapotranspiration and re-use) as compared to approaches which rely on removal efficiencies (i.e. % removal)
   - Prevent urban flood by increasing the sewer capacity by reduced volume and peak flows, as well as delayed time-to-peak;
   - Maintain the pre-development water balance;
   - Contribute to stream baseflow and mitigation of thermal impacts to urban streams; and
   - Preserve groundwater quantity and levels.

2. **Control Hierarchy Priority 2 (LID Volume Capture and Release)** – LID filtration technologies which utilize filtration to filter runoff using LIDs with appropriate filter media per the LID Stormwater Planning and Design Guide (wiki.sustainabletechnologies.ca as amended from time to time). The controlled volume is filtered and released to the municipal sewer networks or surface waters at a reduced rate and volume (a portion of LID Volume Capture and Release may be infiltrated or evapotranspirated).

   Priority 2 BMPs shall be applied to the maximum level possible given the on-site conditions and the local environmental considerations: **Priority 2** BMPs:

   - Reduce runoff volumes (LID filtration controls have been demonstrated to provide runoff volume reductions irrespective of the ability to infiltrate through absorption, material wetting and increased depression storage).
   - Provide less variable pollution control as pollutant loads to receivers are reduced through runoff volume reductions as compared to approaches which rely on removal efficiencies (i.e. % removal)
   - Provide additional water quality benefits result from treatment process of filtration which may also include pollution adsorption and sedimentation;

3. **Control Hierarchy Priority 3 (Other Volume Detention and Release)** – Other stormwater technologies which utilize filtration, hydrodynamic separation and or sedimentation (i.e. end-of-pipe facilities) to detain and treat runoff using an appropriate filter media per industry standard verification protocols; separate contaminates from runoff; and/or facilitate the sedimentation and removal of contaminants respectively. The controlled volume is treated and released to the municipal sewer networks or surface waters at a reduced rate.

   Priority 3 BMPs shall be applied such that the Regional specific 90th percentile rainfall volume (27-29mm) is satisfied and that other SWM criteria i.e. water quantity control, erosion control etc. are also satisfied. **Priority 3** BMPs:

   - Provide additional water quality benefits result from treatment process of filtration (which may also include pollution adsorption and sedimentation), separation of pollutants from runoff or sedimentation;

4.3 Stormwater Quantity (Flood) Control

Flooding that occurs through the storm drainage network, whether it be through a surcharged storm sewer or excess of flows backing up a creek, can cause impacts to large areas of public and private property as well Regional Infrastructure and the local watercourses. In order to help mitigate this and reduce the chance this may occur, the Region of Peel shall require stormwater quantity control, which echo the Conservation Authority flood control requirements in many cases, to reduce stormwater peak flow runoff from developing sites.

Requirements:

Post to Pre-control of peak flows of 2 to 100-year design storms to the appropriate Watershed Flood Control Criteria and/or local requirement. Where Watershed Flood Control Criteria does not exist, at a minimum, post-development flows must be equal to pre-development.

Post development flows shall not:

a) Adversely affect the performance of downstream Region of Peel infrastructure,
b) Negatively impact adjacent properties,
c) Exacerbate or increase the downstream flood or erosion risk.

Flood Control per CA's Jurisdiction: Consult agency's SWM criteria document or other as required.

- Credit Valley Conservation (CVC) Watershed
- Toronto and Regional Conservation Authority (TRCA) Watershed
- Lake Simcoe Region Conservation Authority (LSRCA) Watershed
- Nottawasaga Valley Conservation Authority (NVCA) Watershed
- Halton Conservation Authority (HC) Watershed

4.4 Erosion and Sediment Control

Erosion and sediment control measures should be implemented during construction projects to protect water quality. Adhering to CSA W202 (Erosion and Sediment Control, Inspection and Monitoring) is recommended, especially when there is the potential to impact the receiving watercourse.

4.5 Stormwater Erosion Control

Watercourse erosion is cause by Hydromodification. Hydromodification affects the elements of natural channel form that can lead to watercourse destabilization and destruction of aquatic habitat. Hydromodification is made up of three (3) key concepts as outlined in the table below.

Key Concepts in Watercourse Erosion

Hydromodification Component	Stromwater Relevance	Description, Rationale or Outcome
Magnitude	Peak flow rate	Excessive erosion occurs post-development, even with the inclusion of 'traditional' erosion controls because peak flow management often results in flows that are in excess of the watercourse erosion thresholds for prolonged periods of time when compared to pre-development.
Duration	Runoff volume	To mitigate the geomorphic impacts from development, runoff volumes must be prevented from increasing post development. Therefore, the pre-development water balance should be maintained.
Frequency	Number of Runoff Events	When dealing with watercourse erosion, the frequency of runoff events is important. It is during these frequent runoff events and corresponding watercourse flows (effective discharge) that the majority of the annual sediment load is conveyed. Stormwater techniques that are inherently designed to manage the smaller, more frequent rainfall events are highly effective at reducing runoff frequency, thereby reducing watercourse erosion.

Requirements:

1. Avoid increases in the amount of surface runoff during rain storms (i.e., stormwater) causing streams to become wider and more unstable as erosion of the banks occurs and increased sediment enters the streams as result of the erosion of the banks. Therefore:

    a) At a minimum retain 5 mm on site where conditions do not warrant the detailed analyses.

    b) If a site drains to a sensitive creek, or a subwatershed study, MESP or EIR is required, then the proponent must complete a geomorphologic assessment study to determine the erosion threshold. The proponent may need to consult the appropriate CA for direction on how to identify whether the creek is sensitive.

    c) For sites with SWM ponds and sites which directly discharge to a watercourse, 25mm- 48hr detention may also be required, depending on the results of the erosion assessment.

4.6 Water Balance

Water balance is defined as the mass balance accounting for water entering, accumulating and exiting a system. It can include rainwater, potable drinking water, evapotranspiration and infiltration, wastewater and stormwater.

In many cases, even small incremental changes in watershed hydrology commensurate with an increase in impermeable surfaces of 4%, can result in changes to stream channel characteristics and aquatic communities. To offset these impacts, an increased emphasis on maintaining natural water balance and replicating the predevelopment hydrologic cycle is required. The maintenance of water balance can serve to protect groundwater recharge and discharge functions, including local groundwater infiltration volumes, patterns, and flows to wetlands and streams as well as preserve local water supply aquifers.

Requirements:

1. Stormwater management should mimic pre-development hydrologic regimes by incorporating a 'treatment-train' approach and low-impact development (LID) source and conveyance controls. To the greatest extent possible, the pre-development water balance should be maintained, returning precipitation volume to the natural pathways of runoff, evapotranspiration and infiltration in proportions which are in keeping with the watershed conditions prior to development. For the purpose of this manual, maintaining the pre-development water balance requires each development to match the infiltration volume on an annual basis based on a site-specific assessment, acknowledging that ET is variable pre vs. post development and that full runoff control may not always be possible.

2. Mandatory requirement to meet the pre-development water balance using LID Retention (Priority 1) for Significant, Ecologically Significant, High and Medium Volume Groundwater Recharge Areas (SGRA, EGRA, HGRA and MGRA) as well as endangered species habitat. Site specific water balance analyses is required.

Stormwater Management Planning and Design Manual

March 2003

Ontario

Ministry of the Environment

As shown in the following simple example, Table 3.1 can be used to determine infiltration amounts for varying land uses:

Pre-Development Conditions

The site area is approximately 10.0 ha with pasture type vegetation in fine sand soil. The average annual site infiltration would be approximately 307 mm or approximately 30,700 m^3 (307 mm × 10.0 ha).

Post-Development Conditions

Of the total site area 3.5 ha (35 %) would be converted to impervious area. The infiltration for this area would be 0 mm. The remaining 6.5 ha of the site (65 %) is assumed to be covered with urban lawns (shallow rooted crops) with an average annual infiltration of 276 mm or approximately 17,940 m^3 (276 mm × 6.5 ha). There would be a net reduction in infiltration of 12,760 m^3. If the reduction has a significant impact, then 12,760 m^3, or some portion of it, may have to be infiltrated using SWMPs.

3.3 Water Quality

3.3.1 Criteria Development

During the development of the 1994 SWMP Manual, a review of the existing water quality criteria in Canada and the United States was made. The primary criteria used in most jurisdictions were volumetric (i.e., runoff from a specified design storm was to be captured and treated). In most cases the selected design storm ranged from 12.5 mm to 25 mm. The use of this type of volumetric design storm criteria remains prevalent today, although some jurisdictions have established methods for refining the size of the design event, based on area-specific conditions such as climate or the receiving water body.

An alternate approach to the volumetric sizing of stormwater facilities has been applied in Ontario. Computer modelling of end-of-pipe stormwater management facilities was undertaken to assess the variation in pollutant removal with SWMP type and level of imperviousness. The modelling results were based on many assumptions, primarily related to the proper design of facilities, and the theoretical build-up, wash-off and settling of sediment particles. The approach however allowed the development of volumetric criteria that reflected a twenty year period of climatic record. This meant that the effect of storms in series (i.e., several storms in a few days), event overflows and winter melt conditions were accounted for in selecting the volumetric criteria. It also allowed specification of the volumetric criteria according to some basic characteristics of the different SWMP types (e.g., depth, detention time). An assessment of regional variations in climate indicated that the same volumetric guidelines could be used throughout the province.

The continuous simulation models yielded several useful, theoretical findings:

- The amount of suspended solids settling for a given design storage varies with SWMP type because of their inherent design characteristics. SWMPs therefore require different volumes of storage to provide the same suspended solids removal performance.

- The volume of water in the permanent pool of a wet facility (wet pond, wetland) is more important than the active storage component (that portion of a facility that drains after an event) for suspended solids removal.

- The suspended solids removal performance becomes asymptotic with increasing design storage (there is a limit to storage beyond which there are negligible increases in suspended solids settling).

The variation in performance with SWMP type was explained by the typical configurations of the facilities and the different removal mechanisms. For example, infiltration type SWMPs were assumed to remove 90% to 95% of the suspended solids from water which was infiltrated. This results in a high removal efficiency if the storage is large enough to contain the storm (or polluted portion of the storm). The model only looked at sedimentation, and assumed that re-suspension of previous settled pollutants would not occur. Therefore, wetlands were more effective than wet ponds since they were modelled with a shallower depth.

The importance of the permanent pool was seen to be considerable. The simulations that were conducted indicated that a wet pond without any extended detention storage was still highly effective for solids settling. The results can be explained by the hydraulic operation of these facilities. During a storm, the influent loading is diluted in the permanent pool. Any discharge from the pond during the storm event is therefore diluted (given that the configuration of the pond is appropriately designed). After the storm has subsided there is still a considerable volume of suspended solids which is trapped in the permanent pool and has not settled. These solids have the inter-event times (i.e., 2 to 3 days on average) to settle out in the pond. This combined action of dilution and inter-event settling makes wet facilities efficient.

The diminishing return for large storage volumes can be explained by the frequency distribution of rainfall events. Once the storage exceeds the volume of most small runoff events, the excess storage provides limited benefit. This is particularly true in terms of the permanent pool volume.

The results of modelling led to the development of volumetric criteria which differed in several major aspects from those found in other jurisdictions:

- For wet facilities, the importance of the permanent pool was recognized by specifying a maximum active storage volume (relative to the total volume);

- Different volumetric criteria were specified for the major classes of SWMP to reflect their varying removal efficiencies (which result from their inherent design); and

- Different volumetric criteria were recommended according to the predicted level of long-term sediment removal.

3.3.1.1 Level of Protection

The federal *Fisheries Act* prohibits "the deposit of a deleterious substance of any type in water frequented by fish or in any place under any conditions where the deleterious substance or any other deleterious substance that results from the deposit of the deleterious substance may enter any such water" (subsection 36(3)). Any substance with a potentially harmful chemical, physical (including temperature) or biological effect on fish or fish habitat is considered to be deleterious. The "first-order" impacts of stormwater runoff are primarily related to suspended solids (SS), however, so the design of facilities is usually based on the long-term removal of SS from the stormwater discharge.

The federal *Fisheries Act* does not differentiate between different types of habitat, but Fisheries and Oceans Canada (Fish Habitat Management) does recognize that some habitats are more resilient to perturbation. Based on this, the levels of protection should be chosen to maintain or enhance the existing aquatic habitat. The level of water quality protection given in watershed management plans, fisheries management plans, official plans, official plan amendments, plans of subdivision, site plans, or other environmental management plans should be adhered to when designing stormwater management facilities. In the absence of these plans, it is possible to select the desired level of protection based on the characteristics of the receiving watercourse. However, the decision regarding the level of protection needed should be made based on input from a qualified aquatic biologist. While general guidance is provided below on the level of protection recommended for the different habitat types, the level of protection should be based on site-specific conditions determined through quantification of pre-development suspended solids loadings to receiving waters and the sediment loading characteristics of the receiving waters. This will require examination of the existing receiving water aquatic habitat and its interaction with the surrounding terrestrial habitat through instream sampling, soil type delineation, vegetation cover, and existing aquatic species inventory as required to justify the level of protection.

Three levels of protection are given, with the goal to maintain or enhance existing aquatic habitat, based on the suspended solids removal performance for the different end-of-pipe stormwater management facilities developed in the continuous simulation modelling. Descriptions of the habitat characteristics corresponding to the three levels of protection are given below.

Enhanced Protection
Enhanced protection or greater should be used when sensitive aquatic habitat will be impacted by end-of-pipe discharge. Generally this will include receiving waters that have aquatic communities that have adapted to a low suspended solids environment. Conditions where a minimum of enhanced protection should be used include:

- Areas with high permeability soils (i.e., Soil Conservation Service (SCS) hydrologic classes A and B) conducive to infiltration resulting in low suspended solids loadings from the pre development site;

- Habitat sensitive to sediment and siltation (such as gravel bottom used for bass or brook trout spawning);

- High baseflow discharge areas (such as groundwater upwellings important to brook trout);

- Low upstream sediment loads resulting in clear surface water important to maintaining habitat for sight feeding fish species (such as bass, northern pike, lake trout, and brook trout); and

- Low pre development erosion characteristics (such as dense vegetation, or erosion resistant soils).

Normal Protection
Normal protection can be considered when conditions for enhanced protection do not exist. Example habitats where normal protection may be appropriate include:

- Areas with moderate, natural upstream sediment loads (such as some walleye feeding habitat); and

- Spawning habitat less sensitive to suspended solids loadings (such as aquatic and emergent plant beds used by pike and perch).

If there is no subwatershed plan or fisheries information available on the receiving waters, agencies with fisheries and habitat management responsibilities may require sufficient background study to justify the use of normal protection where there is known potential for sensitive aquatic habitat within a reasonable distance downstream. Responsible agencies should be contacted early in the design process in order to establish a reasonable downstream distance based on specific studies and local conditions. Generally, normal protection will be considered suitable where a stable downstream habitat has adapted to moderate sediment loading.

Basic Protection
Basic protection would only be acceptable where the receiving aquatic habitat is demonstrated to be insensitive to stormwater impacts and has little potential for immediate or long-term rehabilitation. Generally, basic protection may be applied in the following conditions:

- Areas where downstream aquatic habitat has adapted to high suspended solid loadings prior to anthropomorphic changes to the watershed (for example, aquatic habitat conditions that may be found naturally in areas of fine grained soils); and

- Downstream watercourses have been significantly altered (by urbanization or agricultural practices), hardened, or polluted, and there is little short or long-term potential for rehabilitation.

Proponents proposing basic treatment must seek approval from the appropriate agencies with fisheries and habitat management responsibilities with clear rational and site-specific supporting data collected from baseline studies or from existing resource management agency data bases (such as, fishery management plans, watershed management plans, etc.).

Agencies with fisheries responsibilities may also require habitat compensation where stormwater management design impacts are determined to result in harmful alteration, disruption, or destruction of fish habitat as defined in the *Fisheries Act*. Habitat compensation typically involves the replacing of damaged habitat with newly created habitat or improving the productive capacity of other aquatic habitat at or near the area of impact.

The levels of protection are based on a general relationship between the long-term average suspended solids removal of the end-of-pipe stormwater management facilities and the lethal and chronic effects of suspended solids on aquatic life. The levels of protection correspond to the following 'long-term average suspended solids removals' which refer to the removal by the SWM facility of suspended solids from the site runoff for the entire range of rainfall events on that site for a long period of time, at least 10 years. The use of a long-term average is to account for the variability in characteristics of rainfall events.

- *Enhanced* protection corresponds to the end-of-pipe storage volumes required for the long-term average removal of 80% of suspended solids.

- *Normal* protection corresponds to the end-of-pipe storage volumes required for the long-term average removal of 70% of suspended solids.

- *Basic* protection corresponds to the end-of-pipe storage volumes required for the long-term average removal of 60% of suspended solids.

For SWMPs designed with a by-pass, the calculation of long-term suspended solids removal must be based on both suspended solids removal in the facility plus suspended solids by-passed around the facility.

3.3.2 Water Quality Sizing Criteria

The volumetric water quality criteria are presented in Table 3.2. The values are based on a 24 hour drawdown time and a design which conforms to the guidance provided in this manual. Requirements differ with SWMP type to reflect differences in removal efficiencies. Of the specified storage volume for wet facilities, 40 m^3/ha is extended detention, while the remainder represents the permanent pool.

Table 3.2 Water Quality Storage Requirements based on Receiving Waters[1, 2]

Protection Level	SWMP Type	Storage Volume (m^3/ha) for Impervious Level			
		35%	55%	70%	85%
Enhanced 80% long-term S.S. removal	Infiltration	25	30	35	40
	Wetlands	80	105	120	140
	Hybrid Wet Pond/Wetland	110	150	175	195
	Wet Pond	140	190	225	250
Normal 70% long-term S.S. removal	Infiltration	20	20	25	30
	Wetlands	60	70	80	90
	Hybrid Wet Pond/Wetland	75	90	105	120
	Wet Pond	90	110	130	150
Basic 60% long-term S.S. removal	Infiltration	20	20	20	20
	Wetlands	60	60	60	60
	Hybrid Wet Pond/Wetland	60	70	75	80
	Wet Pond	60	75	85	95
	Dry Pond (Continuous Flow)	90	150	200	240

[1]*Table 3.2 does not include every available SWMP type. Any SWMP type that can be demonstrated to the approval agencies to meet the required long-term suspended solids removal for the selected protection levels under the conditions of the site is acceptable for water quality objectives. The sizing for these SWMP types is to be determined based on performance results that have been peer-reviewed. The designer and those who review the design should be fully aware of the assumptions and sampling methodologies used in formulating performance predictions and their implications for the design.*

[2]*Hybrid Wet Pond/Wetland systems have 50-60% of their permanent pool volume in deeper portions of the facility (e.g., forebay, wet pond).*

Basic protection would only be acceptable where the receiving aquatic habitat is demonstrated to be insensitive to stormwater impacts and has little potential for immediate or long-term rehabilitation. Generally, basic protection may be applied in the following conditions:

- Areas where downstream aquatic habitat has adapted to high suspended solid loadings prior to anthropomorphic changes to the watershed (for example, aquatic habitat conditions that may be found naturally in areas of fine grained soils); and
- Downstream watercourses have been significantly altered (by urbanization or agricultural practices), hardened, or polluted, and there is little short or long-term potential for rehabilitation.

Proponents proposing basic treatment must seek approval from the appropriate agencies with fisheries and habitat management responsibilities with clear rational and site-specific supporting data collected from baseline studies or from existing resource management agency data bases (such as, fishery management plans, watershed management plans, etc.).

Agencies with fisheries responsibilities may also require habitat compensation where stormwater management design impacts are determined to result in harmful alteration, disruption, or destruction of fish habitat as defined in the *Fisheries Act*. Habitat compensation typically involves the replacing of damaged habitat with newly created habitat or improving the productive capacity of other aquatic habitat at or near the area of impact.

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- Enhanced protection corresponds to the end-of-pipe storage volumes required for the long-term average removal of 80% of suspended solids.
- Normal protection corresponds to the end-of-pipe storage volumes required for the long-term average removal of 70% of suspended solids.
- Basic protection corresponds to the end-of-pipe storage volumes required for the long-term average removal of 60% of suspended solids.

For SWMPs designed with a by-pass, the calculation of long-term suspended solids removal must be based on both suspended solids removal in the facility plus suspended solids by-passed around the facility.

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Table 3.2 Water Quality Storage Requirements based on Receiving Waters [1] , [2]

Protection Level	SWMP Type	Storage Volume (m^3/ha) for Impervious Level: 35%	Storage Volume (m^3/ha) for Impervious Level: 55%	Storage Volume (m^3/ha) for Impervious Level: 70%	Storage Volume (m^3/ha) for Impervious Level: 85%
Enhanced 80% long-term S.S. removal	Infiltration	25	30	35	40
Enhanced 80% long-term S.S. removal	Wetlands	80	105	120	140
Enhanced 80% long-term S.S. removal	Hybrid Wet Pond/Wetland	110	150	175	195
Enhanced 80% long-term S.S. removal	Wet Pond	140	190	225	250
Normal 70% long-term S.S. removal	Infiltration	20	20	25	30
Normal 70% long-term S.S. removal	Wetlands	60	70	80	90
Normal 70% long-term S.S. removal	Hybrid Wet Pond/Wetland	75	90	105	120
Normal 70% long-term S.S. removal	Wet Pond	90	110	130	150
Basic 60% long-term S.S. removal	Infiltration	20	20	20	20
Basic 60% long-term S.S. removal	Wetlands	60	60	60	60
Basic 60% long-term S.S. removal	Hybrid Wet Pond/Wetland	60	70	75	80
Basic 60% long-term S.S. removal	Wet Pond	60	70	85	95
Basic 60% long-term S.S. removal	Dry Pond (Continuous Flow)	90	150	200	240

For levels of imperviousness below 35%, required storage volumes may be obtained by extrapolating the values provided in Table 3.2. For levels of imperviousness between those included in Table 3.2, required storage volumes may be obtained by interpolation.

It should be noted that the total drainage area contributing to the facility should be included in sizing (lumped imperviousness or separate calculations for internal and external drainage areas is permissible) in most cases. The exception occurs when an external drainage area is itself controlled by a separate water quality facility (and erosion and quantity control are either not required or provided separately). Modelling studies (Marshall Macklin Monaghan Limited, 1997) indicate comparable combined long-term removal rates for ponds in series and separate parallel ponds. More frequent overflows will occur from the most downstream pond, but this can be compensated for by doubling the water quality active storage volume from 40 to 80 m^3/ha.

The volumetric criteria specified in Table 3.2 address only water quality, not erosion, baseflow or flooding concerns. Furthermore, the criteria were developed based on the removal of suspended solids via settling, and therefore, may not adequately address contaminants which must be removed by other mechanisms.

For levels of imperviousness below 35%, required storage volumes may be obtained by extrapolating the values provided in Table 3.2. For levels of imperviousness between those included in Table 3.2, required storage volumes may be obtained by interpolation.

It should be noted that the total drainage area contributing to the facility should be included in sizing (lumped imperviousness or separate calculations for internal and external drainage areas is permissible) in most cases. The exception occurs when an external drainage area is itself controlled by a separate water quality facility (and erosion and quantity control are either not required or provided separately). Modelling studies (Marshall Macklin Monaghan Limited, 1997) indicate comparable combined long-term removal rates for ponds in series and separate parallel ponds. More frequent overflows will occur from the most downstream pond, but this can be compensated for by doubling the water quality active storage volume from 40 to 80 m^3/ha.

The volumetric criteria specified in Table 3.2 address only water quality, not erosion, baseflow or flooding concerns. Furthermore, the criteria were developed based on the removal of suspended solids via settling, and therefore, may not adequately address contaminants which must be removed by other mechanisms.

3.3.3 Results of Monitoring SWMP Performance

In the late 1990s a partnership of government agencies pooled their resources to undertake a series of monitoring studies aimed at assessing the water quality performance of selected SWMPs through the Stormwater Assessment and Monitoring Performance (SWAMP) Program (Meek and Liang, 1998). Most of the facilities monitored did not meet the design guidance provided in this or the previous version of the Manual as they were constructed before this guidance was available. Nevertheless, the results of the monitoring program are of use in assessing the performance of stormwater management facilities.

In addition to the efforts conducted under SWAMP, numerous studies of performance have been conducted both inside and outside of Ontario. Most performance studies in Ontario have been of wet pond or pond/wetland systems. Key results of performance studies, and their implications to SWMP design in Ontario, are summarized below.

- The results of performance studies indicate a fair consistency for most end-of-pipe SWMP types (typically 60-80% suspended solids (SS) removal and 40-50% total phosphorus (TP) removal);

- Extremes in performance are observed in all end-of-pipe SWMP types (from negative performance to 99% removal of SS and TP);

- For wet facilities, the volume of the permanent pool appears to be important. Some facilities with no active storage (i.e., those with permanent pool only) have performed well;

- Greater than anticipated removal rates have been observed in some instances. Flocculent settling may be the mechanism for enhanced removal;

- Dry ponds (i.e., those with no permanent pool) may be more effective than previously credited, when longer detention times can be achieved (e.g., 48 hours); and

- Performance can be enhanced through techniques other than adding volume (e.g., extending the flow path with baffles).

Overall, the results point to an optimistic view of SWMP performance, particularly in retro-fit situations. The results, however, continue to show significant variability from facility to facility. There is not currently a sufficient body of monitoring results to warrant alterations to the volumetric criteria specified in Table 3.2. It is also apparent that many factors other than volume can influence the performance of a SWM facility.

The analysis of the results of performance studies suggests that:

- The current volumetric criteria should be retained;

- There should be greater emphasis on meeting other recommended design criteria (use of forebays, minimum length-to-width ratio, etc.);

- The monitoring of facilities should be continued, but that the emphasis should be shifted to assessing the processes and mechanisms (and associated design elements) that govern performance which may require alternate monitoring techniques (such as dye tracing); and

- The use of more sophisticated settling and flow dynamics models should be investigated, for testing SWMP design characteristics.

3.4.3 Simplified Design Approach

3.4.3.1 Application of Simplified Design Approach

Application of the Simplified Design Approach requires agreement by both the reviewing agency and the proponent of the development.

The Simplified Design Approach may be adopted for watersheds whose development area is generally less than twenty hectares **AND** either one or the other of the following two conditions apply.

A)
- the catchment area of the receiving channel at the point-of-entry of stormwater drainage from the development is equal to or greater than twenty-five square kilometres;

OR

B)
- the channel bankfull depth is less than three quarters of a metre;
- the channel is a headwater stream;
- the receiving channel is not designated as an Environmentally Sensitive Area (ESA) or Area of Natural or Scientific Interest (ANSI) and does not provide habitat for a sensitive aquatic species;
- the channel is stable to transitional; and
- the channel is slightly entrenched.

The selection criteria are provided in Table 3.4, and explained below.

Table 3.4: Criteria for Selection of Approach for the Design of an End-of-Pipe Facility for the Control of In-Stream Erosion Potential

Parameter	Criteria	Comment/Definition
Subwatershed/Area Plan	N/A	No Area or Subwatershed Plan exists
Size of Development	$CDA_{DEV} \leq 20$ ha	The Catchment Drainage Area of the Development is generally less than or equal to 20 ha
Headwater (or First-Order) Stream	1st	The stream is a first-order channel according to the Horton classification system using 1:50,000 topographic mapping

Table 3.4: Criteria for Selection of Approach for the Design of an End-of-Pipe Facility for the Control of In-Stream Erosion Potential (cont'd)

Parameter	Criteria	Comment/Definition
Stability Index Value	$SI \leq 0.4$	The channel is classified as stable or transitional according to the Stability Index value computed using the Rapid Geomorphic Assessment (RGA) form (Appendix C)
Entrenchment Ratio	$T \geq 2.2$	The channel is slightly entrenched according to the Rosgen (1996) classification system
Bankfull Depth	DBFL < 0.75 m	The bankfull depth is less than 0.75 m in height
ANSI/ESA	N/A	The stream is not considered to be an Area of Natural or Scientific Interest, nor part of an Environmentally Significant Area, and does not provide habitat for a sensitive aquatic species
Riparian Vegetation	Dense	Riparian Vegetation coverage is dense, covers virtually all of the bank area with a root depth which penetrates to or below the low flow water level

Subwatershed/Area Plan: If a Subwatershed or Environmental Management Plan already exists for the proposed development area, then these Plans take precedence.

Size of Development: While the Detailed Design Approach represents a more comprehensive method, a simplified approach was considered useful for small developments where detailed environmental data were not already available.

Stream Order: The channel network can be mapped and the channel divided into segments, according to a hierarchy of orders. Each fingertip, or headwater channel, is designated as a segment of the first order. The order increases at the junction of two first-order segments. A stream of higher order implies a stream of greater geomorphic diversity and greater magnitude in dimension. By definition, first-order streams represent those channels having the smallest dimensions within the watershed.

Stability Index Value: A stable stream has an innate ability to absorb a certain amount of change in the sediment-flow regime before the threshold of adjustment is reached. This tolerance is reduced in streams designated as in "transition" or in "adjustment" according to the Rapid Geomorphic Assessment approach (Appendix C). Because a "zero increase" in erosion potential is difficult to achieve, this tolerance becomes an integral part of the design process. Consequently, a stable stream channel is required for application of the "Simplified Design Approach."

Entrenchment Ratio: The Entrenchment Ratio provides an indication of the flow conveyance capacity of the active channel. A higher flow conveyance capacity means that flows of higher return period (greater flow rate and volume) will be contained within the active channel. Given the likelihood that flow rate and volume will increase as a consequence of development, this additional conveyance capacity translates into higher in-stream erosion potential. In contrast, a less entrenched channel means that flows of higher return period will spill out over the floodplain thereby dissipating the erosive energy. Consequently, a channel of low entrenchment is preferred.

Bankfull Depth: For bank heights of greater than 0.75 m the characteristics of the soil materials (cohesion, particle size and compaction, stratification, etc.) and the root binding effects of vegetation are generally considered to be the controlling and modifying factors, respectively. For these channel systems a stability analysis based on critical shear stress concepts may be required. For bank heights of less than 0.75 m colonized by dense, herbaceous vegetation, the influence of root binding may become dominant. In first-order tributaries having bankfull widths less than 3 m, channel gradients less than 1.5% and mature, dense woody vegetation, the occurrence of Large Organic Debris (LOD) may also control channel form. Consequently, both biological and pedological (i.e., soil) factors may contribute to channel form in first-order channels.

ANSI/ESA: These designations or any other environmentally significant factors that may be identified may require that the Detailed Design Approach be adopted.

Riparian Vegetation: As noted under "Bankfull Depth" above, riparian cover is an important determinant in boundary material resistance to erosion. Riparian cover must be dense and complete to be effective.

3.4.3.2 Overview of Technical Steps

The Simplified Design Approach involves three components:

- a synoptic level geomorphic survey of the stream channel to collect measurements of channel form;
- assessment of the applicability of the Simplified Design Approach for the proposed development; and
- determination of the volume of source control and the active storage volume flow rate for an end-of-pipe facility.

These technical steps are described in more detail in Appendix C.

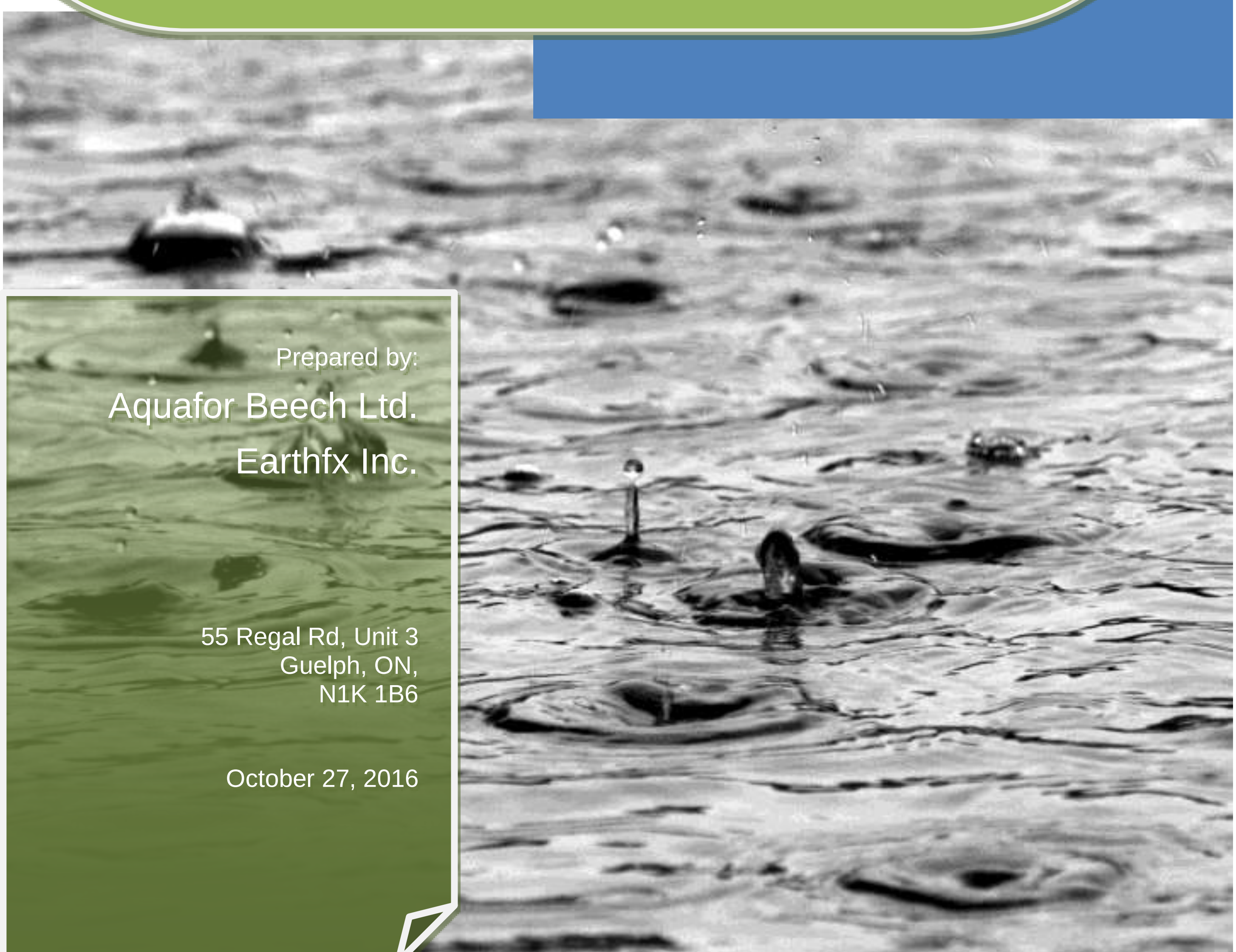
October 27, 2016

Prepared for:

Ministry of the Environment & Climate Change

Runoff Volume Control Targets for Ontario

Final Report



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October 27, 2016

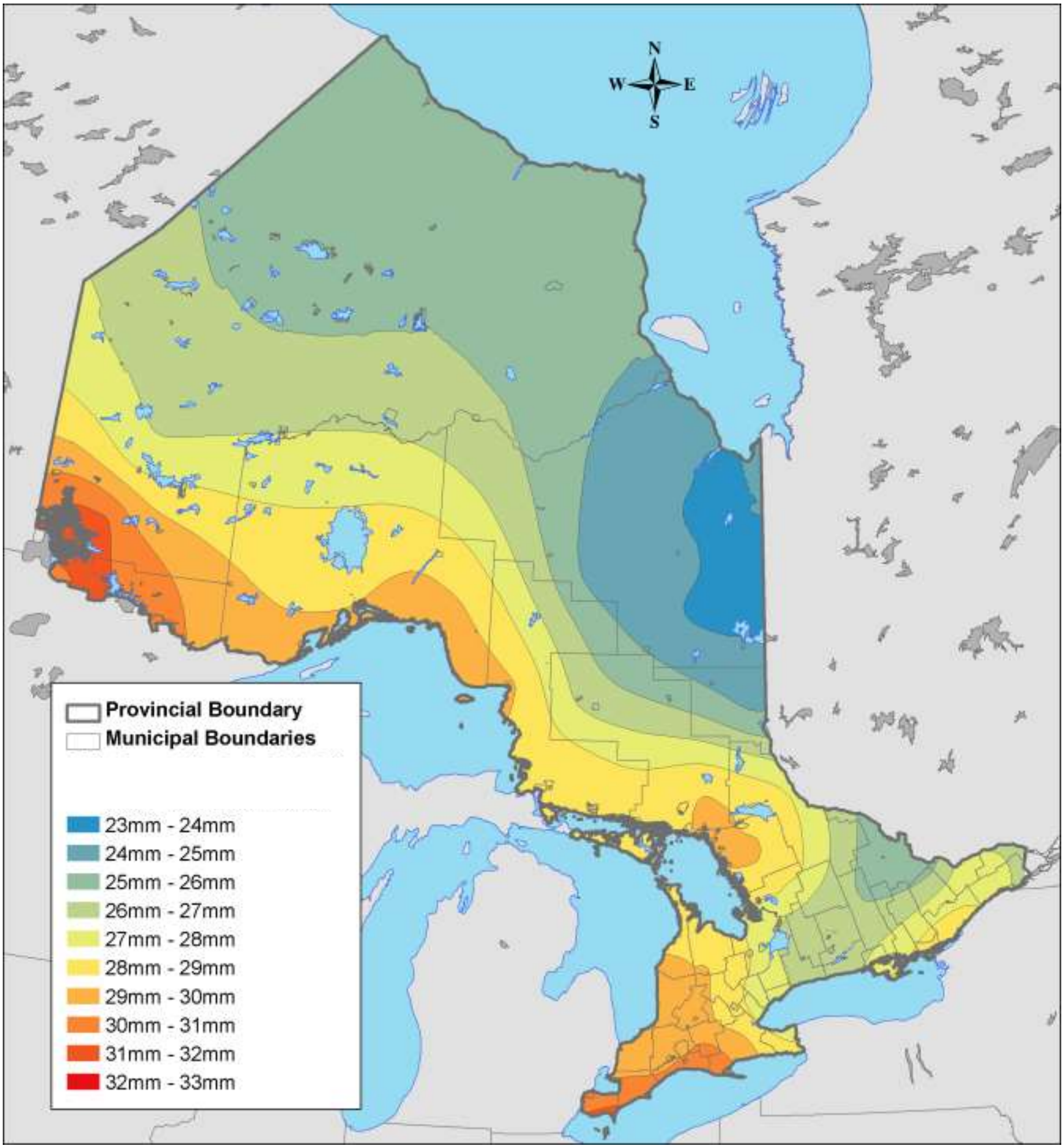

Figure 3.67 – Recommended Regional 90% Percentile Volume Targets for Ontario
(represented by the 95th percentile daily rainfall contours April - October, where daily volume exceeds 2 mm).

B

Appendix B: Heritage Hills Background Report

- Heritage Hills Phase 2 Report & Drainage Map, Falby Burnside and Associates Ltd., August 1997

Stormwater Management Report
Heritage Hills Subdivision Phase 2
August 1997

43M 1287

FB File: 9015.2

Prepared for:

Jetron Investments Inc.
2 Holland Drive, Unit 1
Bolton, Ontario
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Prepared by:

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TELEPHONE: 905-793-9239 FAX: 905-793-5018
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August 19, 1997

Town of Caledon
6311 Old Church Road
Caledon East, Ontario L0N 1E0

Attention: **Mr. John Hook, P.Eng.**

RE: **Stormwater Management Report**
Heritage Hills Phase 2, Town of Caledon
FB File: 9015-2

Dear John,

Please find enclosed a copy of the Stormwater Management Report for the above noted development. The report has been prepared to comply with the Bolton South West Master Drainage Plan Update (January 1997) prepared for the Ontario Municipal Board hearing last spring.

The report provides:

- technical information on the design and operation of the Stormwater Management Pond No.1 which will be constructed for the Heritage Hills Phase 2 subdivision, as well as
- management of stormwater flows within the subdivision,
- measures recommended as erosion and sediment control during construction, and finally
- a detailed operation maintenance program which may be of assistance to the municipal forces after assumption of the facility for maintenance.

We have also submitted the report along with Fill Permit applications to the MTRCA. We wish to submit a certificate of approval application for the stormwater management pond to the MOEE and will require your signature on the application. Therefore we will delay forwarding the application for a week to allow you and your staff to have an opportunity to review the details of Stormwater Management Pond No.1 Our C of A applications will be ready for signing for the end of the month.

We trust this submission is complete and satisfactory. Should you have any questions regarding the submission and the design of the pond, please do not hesitate to contact me or Tony Elias at our office.

Yours truly,

FALBY BURNSIDE & ASSOCIATES LTD.

J. El

for Christopher Crozier, P. Eng.

c. Mr. Frank DeRose, Jetron Investments Inc.
Mr. Shawn McGuire, Falby Burnside & Associates Ltd.

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Appendix C	Forebay Sizing per MOEE (1994) Criteria

1.0 Introduction

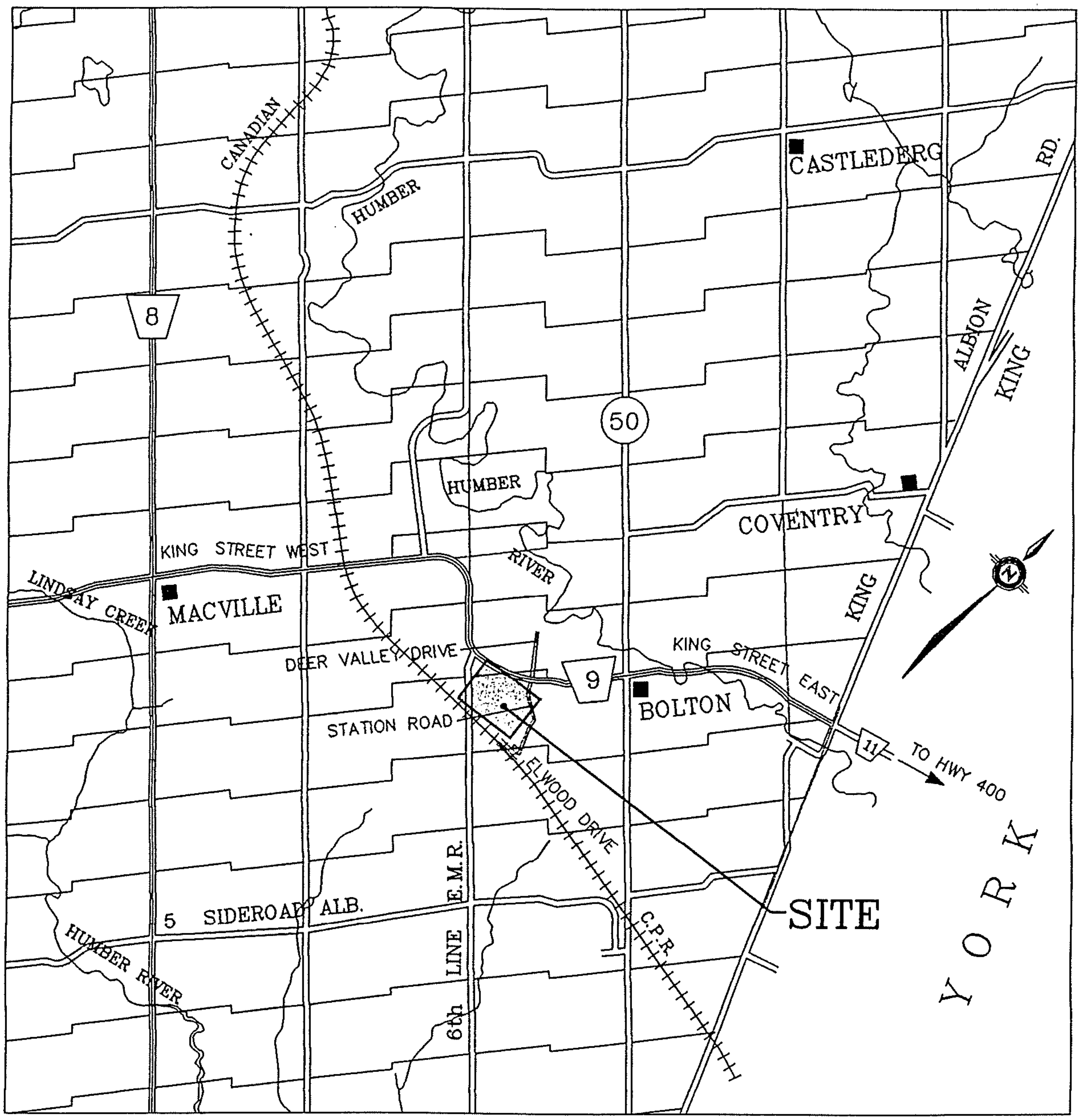
Jetron Investments Inc. have retained Falby Burnside & Associates Ltd. to complete a Stormwater Management Report for the Heritage Hills Subdivision, Phase 2, located in the community of Bolton (Figure 1). This proposed residential development was recently draft approved following an Ontario Municipal Board hearing into Official Plan Amendments 124 and 114 . The subdivision represents the second phase of the Heritage Hills development and consists of a mix of low and medium density residential totalling 282 units.

This report is intended to satisfy the conditions of draft approval issued by the Metro Toronto Region Conservation Authority, and Town of Caledon with regard to storm drainage. Furthermore, it provides technical documentation in support of the Certificate of Approval Permit which will be sought from the Ministry of the Environment and Energy for the stormwater management facility (Pond 1).

This report has been prepared in accordance with the requirements and directive set out in the Bolton South West Sector Master Drainage Plan Update (January 1997) which was prepared by Falby Burnside & Associates Ltd. and approved by the Town of Caledon and Metro Toronto Region Conservation Authority during the OMB hearing. Reference will be made throughout this report to the MDP Update with intent that it serves as a master planning document for this drainage shed within Bolton.

2.0 Site Description and Study Area

Heritage Hills Phase 2 is a land holding of approximately 21.5 ha and is characterized by gently sloping tableland and valley features typical of the Humber River watershed within Bolton. The residential areas proposed for the development are situated on the tableland all outside the top of bank line which was established by MTRCA in 1993. Stormwater management facilities will be located within the valley lands in a location approved through the MDP Update. The Phase 2 draft plan is reflected in Dwg-DP-1 which also identifies the proposed stormwater management facility locations.



SCALE N.T.S.

PREPARED BY:

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DATE AUG/97 SCALE N.T.S. JOB No 9015-2

SITE LOCATION PLAN

FIGURE 1

90152SLP.DWG

The valley and a small portion of tableland lie within the Fill Regulated area of the Humber River under the jurisdiction of the MTRCA. In accordance with Authority regulations, a Fill permit will be acquired by the proponents prior to any construction activity occurring within this area.

Soil conditions within the Heritage Hills development are consistent with that of the Bolton area, specifically clayey silts (hydrologic soil group C). These soils are of low permeability and have a limited infiltration potential.

3.0 Bolton Master Drainage Plan Update Context

Heritage Hills Phase 2 is one of some 30 land holdings with the watershed catchment of the Bolton South West Sector Master Drainage Plan (Figure 2). The entire post-development catchment of 45 ha is tributary to an existing 1350mm diameter sewer outfall at Station Road and King Street. This outfall will hereby be referred to as the "trunk storm sewer" and drains this area to the Humber River.

The recommendations of the MDP update included the use of two proposed master stormwater management facilities as primary sources of floodcontrol, erosion protection and water quality treatment for stormwater runoff within the study area. The facilities, referred to as Pond 1 and Pond 5, will be located within the Humber River valley lands (Figure 2). These locations have been deemed acceptable to the MTRCA and Town of Caledon. Pond 1, located furthest downstream, will provide the principal stormwater management control of runoff from the Heritage Hills Phase 2 subdivision among other development land tributary to it. This will be discussed in further context in Section 6.2. Pond 5, which will be constructed with the Papertious Investments Inc. development and provide the suitable treatment for those lands and others located west (upstream) of Coleraine Drive (6th Line). **The MDP Update has been structured such that Heritage Hills Phase 2 and all other development lands east of Coleraine Drive require construction of Pond 1 as their stormwater management treatment, whereas lands west Coleraine Drive require Pond 5 for their stormwater management. Ponds 1 and 5 can operate independently until the entire watershed is developed, at which time they will jointly provide necessary stormwater management treatment.**

4.0 Proposed Development Plan

The Heritage Hills Phase 2 site will be developed as a residential subdivision with a mix of single family, semi detached and townhouses totalling 282 units. Apartments are also proposed in the development.

4.1 Site Servicing and Drainage Systems

The subdivision is to be serviced by a municipal water supply, storm and sanitary sewers, 20m local road allowances and 8.5m asphalt roadways with curb and gutter all in conformity with Town of Caledon standards. Stormwater on the site will be safely conveyed through minor and major storm drainage systems. The minor drainage system, consisting of roadway curb and gutter, catchbasins and storm sewers, will capture and convey surface runoff from storms up to the 10 year frequency (as per Town standards). The major storm drainage system consisting of overland flow routes and road allowances will safely convey flows in excess of the 10 year event up the 100 year event to designated outlet points.

Storm sewer design sheets for the subdivision are enclosed in Appendix A, as are calculations for major system outlet capacities.

End-of-pipe stormwater treatment will consist of a stormwater wetland constructed at the southwest corner of Station Road and King Street. The existing stormwater pond which was constructed in 1994 to service the first phase of Heritage Hills will be retrofitted as a sediment forebay, treating all runoff prior to its release into the stormwater wetland immediately downstream. The complete drainage system is illustrated on DP-1.

4.2 Development Phasing

Heritage Hills Phase 2 will likely be developed in multiple stages subject to market conditions. The limits of stage 1 are reflected on DP-1. Jetron Investments Inc. aim to service Stage 1 during the fall of 1997, housing starts thereafter. It is noted that the stormwater management end-of-pipe facilities, which will be described in the following sections, are designed to accommodate full development of Heritage Hills Phase 2 and it's tributary drainage areas. Therefore, future staging of the Heritage Hills Phase 2 subdivision will not require any retrofits of the end-of-pipe facilities.

4.3 External Drainage

The following external drainage areas are tributary to Heritage Hills Phase 2 and will be accommodated within the storm drainage system for the subdivision:

- Proposed industrial land south of Ellwood Drive (8ha)
- Heritage Hills Phase 1 (7.5 ha)
- Peel Co-op Housing (4.5 ha)

The Heritage Hills Phase 1 and Peel Co-op Housing drainage will enter the proposed sewer system immediately upstream of the stormwater management facility. Overland flow from these areas will continue to drain northward along Station Road and outlet into Pond 1 (Dwgs. SWM-1 and SWM-2).

Drainage from the future industrial areas is currently conveyed into Heritage Hills Phase 2 via two culverts beneath the CPR property and Ellwood Drive. Recommendations of the MDP Update were that these lands control runoff to the 100 year predevelopment rates. As such, the storm sewer system within Heritage Hills Phase 2 has been designed to accommodate the 100 year predevelopment peak flow from these external lands. This has resulted in an oversizing of the storm sewer through Heritage Hills Phase 2 to the outfall at the sediment forebay.

Lands west of Coleraine Drive do contribute external drainage into the Heritage Hills Phase 2 property, albeit through the valley system. This drainage has no bearing or impact on the sizing of storm sewers within the subdivision on the tablelands. A collector sewer will be constructed adjacent to Pond 1 as recommended in the MDP Update to intercept these flows and convey them directly to the 1350mm trunk sewer, thus by-passing Pond 1. This is further discussed in Section 6.5.

5.0 Stormwater Management Design Criteria

The design criteria for stormwater management which is applied to the end-of-pipe facility and subdivision are based on the following:

- Humber River Regional Unit Flow Study (MTRCA 1997)
- Stormwater Management Planning and Design manual (MOEE 1994)

- Town of Caledon Design Standards
- Bolton South West Sector Master Drainage Plan Update (FBA 1997)

Peak Flow Control

MTRCA have advised that "Post to Pre" control for design storm events is not required in this reach of the Humber River watershed, as determined in the Unit Flow Study. Therefore, the peak flow control criteria is governed by the capacity of the 1350 diameter trunk storm sewer. The "as built" capacity of the trunk sewer is approximately 4.8m³/second(MDP Update).

Erosion Control

As per the recommendations of the MDP update, extended detention for erosion control of a short duration 25mm event will be accomodated in Pond 1. Extended detention erosion control will also be applied to Pond 5 when it is constructed in the future, in accordance with the MDP erosion analysis.

Water Quality

Level 1 treatment for the tributary drainage area to Pond 1. This will consist of extended detention for water quality and permanent pool provisions.

6.0 Stormwater Management Pond 1 Design

SWM Pond 1 will consist of 3 major features designed to capture and treat runoff from the development lands east of Coleraine Drive, while bypassing excess flows from lands west of Coleraine Drive and major flows from the west portion of Heritage Hills Phase 2 (10 ha approximately) directly to the trunk storm sewer and Humber River. These features are:

- Sediment forebay
- Stormwater wetland
- Flow splitting structure and collector sewer

SWM Pond 1 will operate as an extended detention wetland with flood storage. The constructed wetland is the preferred stormwater Best Management Practice (BMP) for this site. The design of Pond 1 incorporates the following features:

- Shallow water areas with occasional deep pools and long sinuous flow paths
- Extended detention of 25mm first flush event for a 24 hour period
- Active storage for quantity control to reduce peak flows to capacity of 1350mm trunk storm sewer
- Retro fit of existing Heritage Hills Phase 1 Pond a sediment forebay with 10 year sediment yield capacity
- Maintenance access and sediment removal provisions
- Bottom draw outlet structure
- Provisions for future trail system in valley to Pond 1 area, subject to Town of Caledon Secondary Planning approval
- Linkage of existing watercourse to Pond 1 via low flow pipe allowing for movement of fish into the upstream reaches of the watercourse as per MDP update (Section 5.8)
- Enhancement of aquatic habitat with variable depth marsh and permanent pools
- Comprehensive landscaping plan to enhance terrestrial habitat (provided by others and forwarded as part of the approval process)

Drainage from the proposed development areas within the catchment east of Coleraine Drive will be conveyed via storm sewer into the former Heritage Hills Phase 1 Pond which will be retrofitted as a sediment forebay. Overland flow (10 - 100 year) from Heritage Hills Phase 1, Heritage Hills Phase 2, and the Peel Co-op Development will be conveyed toward Station Road and flow northward to the sag point immediately south of King Street where it will be released into Pond 1 via a 7m curb cut. In this manner, these major system flows will bypass the sediment forebay. Capacity calculations of the curb cut is found in Appendix A.

Following the treatment achieved within the sediment forebay, the drainage will be conveyed downstream into the stormwater wetland feature of Pond 1. Extended detention of the 25mm event will be provided within this single cell facility. The water will eventually be discharged into the existing 1350mm trunk sewer via a control structure equipped with a reverse fall outlet pipe, at rates not exceeding the capacity of the trunk.

Drainage from lands west of Coleraine Drive and that from the valley lands within Heritage Hills Phase 2 will be conveyed within the valley watercourse toward the stormwater wetland of Pond 1. Immediately upstream of the wetland, a flow splitting structure will convey the existing base flow of approximately 5 L/s into the stormwater wetland while facilitating the bypass of higher flows to a collector storm sewer which is connected directly to the 1350mm trunk storm sewer. In this manner, the "treated" and/or "clean" drainage from this catchment is not mixed with the drainage of Heritage Hills and adjacent sites nor does it create resuspension problems within the facility. Pond 1 is described in detail on Dwg.SWM-1.

6.1 Hydrologic Modelling

The hydrologic modelling which was undertaken in the MDP update (Interhymo) was modified slightly to reflect the detailed design of the outlet structure for Pond 1 as well as the change in design criteria for quantity control administered by the MTRCA. (At the time of the MDP update preparation, the MTRCA had advised that "Post to Pre" control would be required in this area of the Humber River watershed. This criteria was later superseded as a result of the Unit Flow Study on the Humber River.) The hydrologic modelling utilizes AES rainfall distributions and rainfall depths from the Bloor Street Station. A four hour, 25mm Chicago storm event was applied for the "first flush" extended detention analysis. The updated hydrologic modelling for post development conditions(100 year and 25mm events) is enclosed in Appendix B. The hydrologic modelling schematic is presented in Figure 3 and can be cross referenced to the overall watershed drainage plan (S2).

6.2 Tributary Drainage

The tributary drainage areas which receive stormwater management treatment through Pond 1 are shown in Figure 2. It should be noted, that provision for the treatment of approximately 2 ha of land east of Station Road, referred to as the Robb property, is provided in the facility. The actual feasibility of directing stormwater to Pond 1 is the subject of the detailed servicing design of the Robb property. In total, 45 ha of drainage area can be treated within Pond 1.

6.3 Operational Design Characteristics

The operational characteristics of Pond 1 for peak flow control and extended detention are summarized in Tables 1 & 2. All design storm events are regulated within Pond 1 up to and including the 100 year event to the capacity of the trunk storm sewer. Allowance has been made for the uncontrolled flows which by-pass the pond and are conveyed directly to the 1350mm sewer.

Table 1
Outlet Structure Design for Pond 1 (No Quantity Control)
Heritage Hills Phase 2, Bolton

22-Aug-97

worksheet file: discharge.wk4
FB File: 9015.2

Description of Outlet Structure:

low flow opening:	pipe dia. (mm) =	200.00
	sill elev (m)=	234.00
high flow grate:	height (m):	1.2
	width (m):	1.5
	grate slope:	2h : 1v
	foundation elev. (m)=	235.15

Operating Characteristics

water elevation, m	stage, m	design discharge * m^3/s	calculated discharge			
			low flow pipe m^3/s		grate flow ** m^3/s	total flow m^3/s
236.00	2.00	4.20	0.12	orifice eq'n	3.90	4.02
235.80	1.80	4.00	0.11	"	2.55	2.66
235.50	1.50	3.00	0.10	"	0.84	0.94
235.20	1.20	1.30	0.09	"	0.04	0.13
235.15	1.15	-	0.09	"	0.00	0.09
235.00	1.00	**0.08**	0.08	"	0.00	0.08
234.50	0.50	**0.04**	0.05	"	0.00	0.05
234.25	0.25	-	0.03	"	0.00	0.03
234.20	0.20	-	0.03	"	0.00	0.03
234.10	0.10	-	0.02	manning's eq'n	0.00	0.02
234.05	0.05	-	0.01	"	0.00	0.01
234.00	0.00	0.00	0.00	"	0.00	0.00

* Design Discharge values for Extended Detention (bolded) taken from the Bolton South West Section MDP Update Report (dated January 1997). Since the completion of the MDP Update, the Humber River Hydraulics\Hydrology Study was completed, recommending No Quantity Controls for this sub-catchment of the Humber River.

** Grate Flow calculated from MTO Chart E4-11

Table 2
Flood Elevations in Pond 1
Heritage Hills Phase 2, Bolton

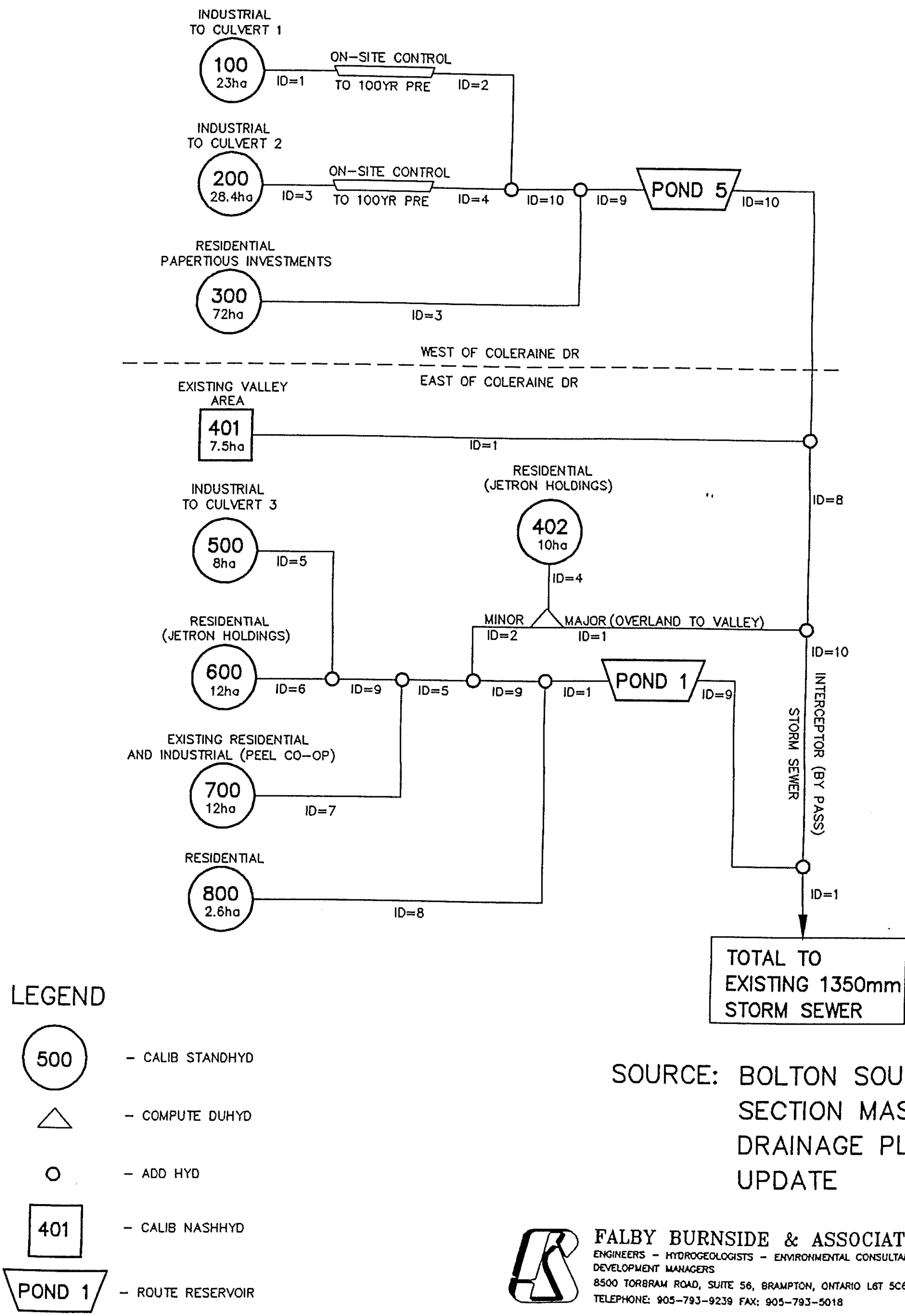
22-Aug-97

water elevation, m	stage, m	Storage, m^3	Rain Event	Pond Feature	Interhymo File
236.00	2.00	9108.00	100 Year	High Water Level	herit100.dat
235.90	1.90	-	50 Year		herit50.dat
235.80	1.80	7760.00	25 Year		herit25.dat
235.70	1.70	-	10 Year		herit10.dat
235.60	1.60	-	5 Year		herit5.dat
235.50	1.50	6210.00			
235.40	1.40	-	2 Year		herit2.dat
235.20	1.20	4750.00	25 mm		9653-ff.dat
235.15	1.15	-		High Flow Sill	
235.00	1.00	3855.00			
234.50	0.50	1950.00			
234.00	0.00	-		Normal Water Level	

file: fldelevs.wk4

FIGURE 3

INTERHYMO SCHEMATIC
POST DEVELOPMENT



SOURCE: BOLTON SOUTHWEST SECTION MASTER DRAINAGE PLAN UPDATE

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The Pond 1 design will accommodate extended detention for the 25mm event for water quality control. The actual treatment volumes for Pond 1 are summarized in Table 2.

6.4 Stormwater Wetland

The wetland component of Pond 1 has been designed in accordance with Table 12 of the MDP update. The "targets" provided by the 1994 MOEE SWM manual ensure that the wetland provides maximum treatability of stormwater.

The wetland incorporates undulating microtopography to promote flow distribution and settling of sediment. Alternating shallow and deep zones (0-3m deep) will provide a variety of water quality treatment functions and encourage the growth of several different emergent plant species.

Furthermore, the area is naturally suited for a constructed wetland as it presently exhibits a high watertable and flourishing aquatic plant life. The proposed facility will provide areas of deeper water and larger areas of flood fringe. This expansion will provide a buffer to the higher flow rates anticipated, allowing it to continue functioning as a wetland environment.

6.5 Sediment Forebay

Pond 1 will utilize the retrofitted Heritage Hills Phase 1 pond as sediment forebay. The storm sewer system currently draining to this facility which serves Heritage Hills Phase 1 and Peel Co-op Housing will continue to do so in the future. In addition, the 10 year flow from the Heritage Hills Phase 2 site and upstream industrial lands will be directed to the forebay at its upstream end. Modifications to the inlet sewer configuration are proposed which will facilitate a single outfall into the upstream end of the facility. Less frequent events will bypass the forebay area and enter Pond 1 directly via overland flow as noted previously.

The sediment forebay is sized based on MOEE 1994 criteria (Appendix C). The forebay capacity will be equivalent to a 10 year sediment yield of $270m^3$.

Access to the forebay for cleanout is available at the upstream and downstream end of the facility from Station Road. The detailed design of the sediment forebay is presented on Dwg SWM-2 (enclosed).

6.6 Flow Splitting Structure and Collector Sewer

Along with the sediment forebay and stormwater wetland, the third principal feature of Pond 1 is the flow splitting structure and collector sewer. The collector sewer will be constructed in the valley with its inlet located upstream of the stormwater wetland. The sewer is designed to convey the 100 year peak flow tributary to this location of approximately 2.5m³/second directly to the 1350mm trunk storm sewer. The tributary drainage area contributing to this point is the following:

- Lands draining to Pond 5 located west of Coleraine Drive (Papertious, future industrial and others)
- Valley lands between the sewer inlet and Coleraine Drive (Heritage Hills Phase 2)
- Major drainage system from the west half of the Heritage Hills Phase 2 tablelands (catchment 401 shown on Figure 2)

The inlet to the collector sewer will be constructed at the narrowest point of the valley upstream of the wetland. The flow splitting structure will allow the passage of the 5-10 L/s perrenial base flow directly to the wetland by maintaining the low flow channel of the existing watercourse. Storm flows will be directed into the flow splitting structure and directed to the collector sewer. Details of the flow splitting structure are found on a Dwg SWM-1 (enclosed).

6.7 Extended Detention Draw Down

The extended detention is regulated by a 200mm diameter PVC pipe. The reverse fall pipe will extend into the permanent pool, approximately 1.3m below the water surface elevation. The pipe is sized to draw down the extended detention volume in approximately 24 hours.

7.0 Operation and Maintenance

Maintenance of stormwater management facilities is an issue for municipalities as more and more facilities are constructed. Since performance related monitoring is not yet common in Ontario, much is still to be learned regarding short and long term performance. As a result, maintenance schedules are difficult to standardize and prescribe. Consequently a flexible maintenance program guided by comprehensive inspection schedule is best suited. Maintenance forces can be mobilized as needed; inspection records can contribute to the accumulation of performance data.

Following is a flexible maintenance program and inspection schedule which may be applicable to Pond 1. All other traditional maintenance activities which municipal staff undertake for subdivisions are prescribed for the Heritage Hills Phase 2 site. This would include flushing of storm sewers, catchbasin sump cleanouts, etc.

Inspection Timing

Prior to the complete development of Heritage Hills Phase 2, construction related sediment loading is expected to migrate into the sediment forebay of Pond 1. Tableland sediment basins are recommended in the erosion sediment control design for the site (see Section 8) however, sediment is still anticipated to migrate into the forebay. It is a responsibility of Jetron Investments Inc. to provide cleanout of the accumulated sediment prior to assumption of Pond 1 by the Town of Caledon. After the complete development of Heritage Hills Phase 2, and assumption by the Town of Caledon, it will be prudent to make visual inspection of the pond following major storm events. Furthermore, seasonal inspection of the facility is recommended as a minimum to ensure the pond is functioning properly.

Inspection Check List

No. 1 Hydraulic Operation of Facility

The following features in the pond should be inspected to ensure the facility is operating as designed. This would include looking for evidence of blockage of inlets, and erosion and observing water levels. The list to be inspected includes:

- Storm sewer inlets
- Flow splitting structure in valley
- Low flow bypass sewer
- Extended Detention Inlet within control manhole
- Rip rap at outfall from storm sewer
- Normal water level
- High water marks
- High flow intake within control structure

Should the normal water level within the facility be unusually high, it is likely as result of blockage of theinlet control. Should the normal water level be lower than expected, inspection of the gravity dewatering valves (located in the pond control manhole and within CMH manhole on Station Road, between manholes 16 and 17) should be made to ensure they are not leaking.

No. 2 Vegetation

- The vegetation within the facility should receive an overview examination. Shallow water areas of the pond should be inhabited with species including cattails, bulrush and reed grass. Deep water areas of the pond should be inhabited with species of pond weed and water lily. It is preferable that a landscape architect, environmental planner or biologist inspect the vegetation in this facility periodically.
- Examine the plant vegetation around the facility. The planting plan for the areas around the pond have been designed to provide shading and create a physical buffer between the facility and the surrounding lands. If vegetation is sparse or not establishing itself, revegetation may be required.

No. 3 Water Quality

- Visually inspect the water surface. Evidence of oil sheen, frothy or unusual colour on the water, will suggest that an oil spill has occurred and cleanup is required. High turbidity levels in Pond 1 may suggest that the forebay has reached it's sediment accumulation capacity.

No. 4 Sediment Accumulation

- The sediment forebay is designed to store up to 1000m^3 of sediment accumulation over 10 years. However, monitoring of the sediment accumulation within the forebay is suggested. The sediment can be measured within the forebay using a graduated rod permanently installed within the forebay. It is suggested that measurements be taken at several locations and tracked annually.
- It is recommended that if the volume of sediment reaches two thirds of the design volume that cleanout be arranged within the next 12 months. The volume of sediment will be two thirds the volume of the forebay when the sediment has reached an elevation of 237.5m. This corresponds to the invert of the 1350 diameter stormsewer entering the facility.

Maintenance Activities

In order that Pond 1 continue to provide flood control, erosion protection and water quality treatment, it is imperative that regular maintenance be performed to ensure the functionality is maintained as designed. The following tasks have been identified as the activities to be performed by the municipality after the assumption of the faciltiy.

No. 1 Trash Removal

Trash removal should be performed as required based on observations made during regular inspections.

No. 2 Grass Cutting

Grass cutting around the pond need only be undertaken for aesthetic purposes. This may consist of areas along the boulevards and within the daylighting triangle at Station Road and King Street. Low maintenance ground cover will be specified by the landscape architect for the rehabilitation of the pond. This may consist of species such as birdsfoot trefoil or crown vetch. It is suggested that grass cutting be restricted within the zone of the pond inundated under design flow conditions (elevation 235, 25mm event). The landscaping plan for the facility will identify a variety of trees and shrubs planted along this flood fringe line. These trees and shrubs should help to specify the design water level under frequent storm events (25mm event) however, it may be useful to install a series of well marked stakes along the 235 contour to identify the no cut area for the pond.

No. 3 Sediment Removal

As with trash removal, sediment removal should be performed as required based on inspection and observation of sediment build up. It is anticipated that the sediment forebay will require cleanout within a 10 year period following final assumption of Heritage Hills Phase 2. This is based on MOEE sediment yields for typical low residential land use. The sediment forebay cleanout should consider the following:

- Dewatering of forebay using pump or drain located in the quality control manhole (MH) on Station Road
- Precaution not to draw off sediment laden water from the forebay during dewatering

- Removal of sediment using typical grading/excavation equipment such as backhoe or hydraulic excavator
- Special care taken not to damage shoreline and slope vegetation. Any damaged plants should be replaced.
- Testing of sediment removed from the pond to determine disposal options. It is not anticipated that the material will be considered hazardous waste but MOEE Sediment Disposal Guidelines should be consulted prior to determining a suitable disposal location.

Complete cleanout of the stormwater wetland of Pond 1 is anticipated within 20 to 25 years. Dredging of the facility is the most practical means of cleanout. This will cause severe damage and loss of much of the wetland vegetation. However, as more experience is gained with the operation of constructed wetlands in Southern Ontario, new approaches that allow for the preservation of plant life when removing finer sediments may very well emerge. Rather than dredging the entire wetland at one time, for example, staging the clean-out will allow for some wetland vegetation to maintain their function as natural filters.

8.0 Erosion and Sediment Control During Construction

The factors affecting the erosion potential from the site include the soil type, slope gradation, and slope length. The degree of erosion protection that should be applied to the site is a function of the site's erosion potential (MNR 1987). Review of the above factors and how they relate to the Heritage Hills Phase 2 subdivision are summarized as follows:

- Soil type: clay loam (medium soil erodibility)
- Soil gradient: <10%
- Slope length: >70m (long classification)

Given the above data, the erosion potential is classified as **moderate** under the MNR criteria within a range of low, moderate or high categories. The most effective means of handling medium to high levels of silt is with sediment basins. Therefore all flows (where feasible) are to be directed to on-site sedimentation ponds and controls.

Sedimentation controls will consist of sediment basins and silt fence, a mud mat is proposed at the construction entrance and filter cloth is being used to keep sediment out of the stormwewer system. All sediment-laden drainage will flow overland to the sediment basins. Design drawing of the erosion sediment control strategy, Dwg ES1 is enclosed.

Sedimentation Basins

Sedimentation basins will be constructed across the tablelands of the site which are under construction. The temporary basins are sized to treat $250m^3$/ha of disturbance. Sediment basins will be constructed in two phases. During pregrading operations they will consist of excavated depressions and overflow rip rap spillways. Drainage will be directed to the basins by interceptor swales. After the pregrade has been established and the base course asphalt installed, the sediment basins will be dewatered using perforated riser pipes which are connected to the storm sewer laterals of the future house foundation drain connections. In total, 3 sediment basins are proposed through the property.

Silt Fence

Silt fence will be installed as indicated on the erosion sediment control plan. The silt fence will be generally installed "along the contour". The silt fence will treat drainage areas which convey sheet flow and are unable to be directed to the sedimentation ponds.

Construction Access

Construction access to Heritage Hills Phase 2 will be made from Station Road. A course aggregate "mud matt" is recommended at the access point to the property during the construction period.

Topsoil Stripping and Stockpiling

It is anticipated that the entire tablelands of Heritage Hills Phase 2 will require grading during the fall of 1997. This is in order to facilitate cut-to-fill earth balance on the site. A topsoil stockpile location has been identified on the erosion sediment control plan. The downstream gradient of the stockpile will be protected with silt fence.

Temporary Revegetation

Following the establishment of pregrade across the entire Heritage Hills Phase 2 site, lands outside of Stage 1 will be temporarily vegetated with a fine layer of topsoil and seed.

Maintenance and Inspection

Regular maintenance and inspection of sediment controls is recommended through the course of construction. This will be carried out by the Contractor and Engineering inspector on site, as per instructions on the Sediment and Erosion Control Plan enclosed.

Prepared by:
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Appendix A

Stormsewer Design Sheets and Major System Conveyance Calculations

STORM SEWER DESIGN SHEET

Falby Burnside & Associates Ltd
8500 Torbram Rd, Suite 56 Brampton Ont. L6T 5C6
(905) 793-9239 Fax (905) 793-5018

Date : 22-Aug-97
Project : Jetron
Job No : 9015-2
Municipality : Town of Caledon
Designer : EG
Checker : EG

$Q = 2.78\ Ca \times A \times I \times R$
Q peak flow in litres per second (l/s)
Ca antecedent precipitation factor
A area (ha)
I rainfall intensity (mm/hr)
R runoff coefficient

Rainfall I.D.F.	5 Year	10 Year	100 Year
A =	1593	2221	4688
B =	11.0	12.0	17.0
C =	0.879	0.908	0.962
Ca=	1.00	1.00	1.25

Location			Areas (ha)								Sewer Data					
Street Name	From	To	R= 0.25	R= 0.50	R= 0.75	Individual 2.78AR	Accumulated 2.78AR	Time of Concentration (mins)	Rainfall Intensity (mm/hr)	Peak Flow (l/s)	Diameter 0.013 (mm)	Slope (%)	Length (m)	Capacity l/s	Velocity (m/s)	Time of Flow (mins)
STREET C	30	29		0.53		0.74	0.74	10.00	134.2	98.8	375	0.50	34.5	124.0	1.12	0.51
	29	28		0.71		0.99	1.72	10.51	131.4	226.5	525	0.50	66.5	304.1	1.41	0.79
	28	27		0.42		0.58	2.31	11.30	127.3	293.8	525	0.50	59.0	304.1	1.41	0.70
STREET A	31	27		0.23		0.32	0.32	10.00	134.2	42.9	300	0.50	26.0	68.4	0.97	0.45
							2.31	12.00								
							0.32	10.45								
STREET A	27	26		0.71		0.99	3.61	12.00	124.0	448.0	675	0.50	78.5	594.5	1.66	0.79
	26	25		0.45		0.63	4.24	12.79	120.4	510.4	675	0.50	49.0	594.5	1.66	0.49
	25	24		0.52		0.72	4.96	13.28	118.3	586.8	675	0.50	94.5	594.5	1.66	0.95
STREET H	34	33			0.56	1.17	1.17	10.00	134.2	156.6	450	0.50	30.5	201.6	1.27	0.40
	33	32			0.37	0.77	1.94	10.40	132.0	255.9	525	0.50	83.0	304.1	1.41	0.98
	32	24			0.18	0.38	2.31	11.39	126.9	293.7	525	0.50	52.0	304.1	1.41	0.62
							4.96	10.40								
							2.31	12.00								
STREET B	24	23	0.31	0.48	0.15	1.20	8.47	12.00	124.0	1050.2	900	0.50	82.0	1280.3	2.01	0.68
	23	22		0.18		0.25	8.72	12.68	120.9	1054.2	900	0.50	42.5	1280.3	2.01	0.35
	22	21			0.08	0.17	8.89	13.03	119.3	1060.6	900	0.50	45.5	1280.3	2.01	0.38
STREET G	37	36		0.33		0.46	0.46	10.00	134.2	61.5	300	1.00	106.5	96.7	1.37	1.30
	36	35		0.11		0.15	0.61	11.30	127.4	77.9	375	1.00	14.0	175.4	1.59	0.15
	35	21		0.43		0.60	1.21	11.44	126.6	153.1	375	1.00	79.0	175.4	1.59	0.83
							8.89	13.41								
							1.21	12.27								
STREET B	21	20		0.94		1.31	11.40	12.27	122.7	1399.4	975	0.50	102.0	1585.0	2.12	0.80
	20	19					11.40	13.07	119.1	1358.8	975	0.50	17.5	1585.0	2.12	0.14
STREET G	39	38		0.36		0.50	0.50	10.00	134.2	67.1	300	1.00	57.5	96.7	1.37	0.70
STREET B	40	38		0.24		0.33	0.33	10.00	134.2	44.8	300	0.50	42.0	68.4	0.97	0.72
							0.50	10.70								
							0.33	10.72								
STREET F	38	19				0.00	0.83	10.70	130.4	108.8	375	0.50	15.50	124.0	1.12	0.23

							11.40	13.07								
							0.83	11.82								
STREET B	19	18		0.76		1.06	13.30	13.07	119.1	1584.0	975	0.50	50.5	1585.0	2.12	0.40
	18	3		0.77		1.07	14.37	13.47	117.5	1687.3	1050	0.50	66.0	1931.3	2.23	0.49
STREET D	13	12		0.23		0.32	0.32	10.00	134.2	42.9	300	0.50	28.5	68.4	0.97	0.49
	12	11		0.73		1.01	1.33	10.49	131.5	175.5	450	0.50	116.0	201.6	1.27	1.52
STREET D	15	11		0.22		0.31	0.31	10.00	134.2	41.0	300	0.50	78.0	68.4	0.97	1.34
							1.33	12.02								
							0.31	11.34								
STREET E	11	10		0.38		0.53	2.17	12.02	123.9	268.7	525	0.50	54.0	304.1	1.41	0.64
	10	9		0.39		0.54	2.71	12.66	121.0	327.9	600	0.50	55.5	434.2	1.54	0.60
	9	8		0.09		0.13	2.84	13.26	118.3	335.6	600	0.50	25.0	434.2	1.54	0.27
	8	7		0.19		0.26	3.10	13.53	117.2	363.3	600	0.50	60.0	434.2	1.54	0.65
	7	6		0.13		0.18	3.28	14.18	114.6	375.8	600	0.50	35.0	434.2	1.54	0.38
STREET D	16	15		0.34		0.47	0.47	10.00	134.2	63.4	300	0.50	38.5	68.4	0.97	16
							0.47	10.38								
STREET E	15	14		0.22		0.31	0.78	10.38	132.1	102.8	375	0.50	56.0	124.0	1.12	0.83
	14	6		0.24		0.33	1.11	11.21	127.8	142.1	450	0.50	53.5	201.6	1.27	0.70
							3.28	14.56								
							1.11	11.91								
EASEMENT	6	5				0.00	4.39	14.56	113.1	496.6	675	0.50	90.0	594.5	1.66	0.90
STREET F	17	5		1.08		1.50	1.50	10.00	134.2	201.4	375	1.50	114.5	214.8	1.94	0.98
							4.39	15.46								
							1.50	10.98								
STREET F	5	4		0.21		0.29	6.14	15.46	109.7	673.9	750	0.50	15.0	787.3	1.78	0.14
	4	3		0.18		0.25	6.39	15.60	109.2	698.1	750	1.00	62.5	1113.5	2.52	0.41
							14.37	13.96								
							6.39	16.02								
BLOCK 245	3	2		0.04		0.06	20.76	13.96	115.4	2396.2	1050	5.00	59.5	6107.2	7.05	0.14
	2	1				0.00	20.76	14.10	114.9	2384.5	1050	4.00	60.0	5462.5	6.31	0.16
	EXT	1				28.69	49.45	30.48	0.0	0.0	0	0.00	0.0	0.0	0.00	0.00
	1	OUT				0.00	49.45	30.48	73.8	3650.2	1350	0.50	15.0	3774.8	2.64	0.09

Curb Cut Width at Station Road to Convey 100 Year Flow into Pond 1

100 Year Flow: 5.0 m^3/s

Weir Flow Calculation:

$Q = CLH^{1.5}$

where C = coefficient of Discharge
L = width of the spillway crest
H = static head + approaching velocity head (v^2/2g)
(assume velocity on Station Road is 3m/s)

Solving for L:

$L = Q \backslash (CH^{1.5})$

assume C = 1.6
Q = 5.0 m^3/s
H = 0.15 m (height of curb) + 3^2/2g = 0.61

Substituting in values produces:

L = 6.56 m (use 7m)

Outflow Channel from Forebay Retrofit
Worksheet for Trapezoidal Channel

Project Description	
Project File	d:\9653\erosion\fm\10yrchan.fm2
Worksheet	outflow channel from forebay
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.045	
Channel Slope	0.100000	m/m
Left Side Slope	2.000000	H : V
Right Side Slope	2.000000	H : V
Bottom Width	1.50	m
Discharge	3.60	m^3/s

Results		
Depth	0.46	m
Flow Area	1.11	m^2
Wetted Perimeter	3.56	m
Top Width	3.34	m
Critical Depth	0.63	m
Critical Slope	0.028861	m/m
Velocity	3.24	m/s
Velocity Head	0.53	m
Specific Energy	0.99	m
Froude Number	1.79	
Flow is supercritical.		

by-pass sewer
Worksheet for Circular Channel

Project Description	
Project File	d:\9653\erosion\fm\bypass.fm2
Worksheet	capacity of by-pass sewer
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Full Flow Diameter

Input Data		
Mannings Coefficient	0.012	
Channel Slope	0.024000	m/m
Discharge	2.50	m^3/s

Results		
Depth	840	mm
Diameter	836.54	mm
Flow Area	0.55	m^2
Wetted Perimeter	2.63	m
Top Width	0.00	m
Critical Depth	0.82	m
Percent Full	100.00	
Critical Slope	0.021330	m/m
Velocity	4.55	m/s
Velocity Head	1.05	m
Specific Energy	FULL	m
Froude Number	FULL	
Maximum Discharge	2.69	m^3/s
Full Flow Capacity	2.50	m^3/s
Full Flow Slope	0.024000	m/m

APPENDIX B

UPDATED HYDROLOGIC MODELLING

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

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

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

     OOO     TTTTT   TTTTT  H    H  Y    Y  M    M   OOO    I N T E R H Y M O
    O   O      T       T    H    H   Y Y    MM MM   O   O   * * * 1989b * * *
    O   O      T       T    HHHHH     Y     M M M   O   O
    O   O      T       T    H    H    Y     M    M  O   O
     OOO       T       T    H    H    Y     M    M   OOO    E-9516061300000

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  Input   filename: 9653-ff.dat
  Output  filename: 9653-ff.out
  Summary filename: 9653-ff.sum


DATE: 06-24-1960                         TIME: 11:57:00

COMMENTS: ____________________________________________________________

--------------------------------------------------------------------------------
  ****************************
  ** SIMULATION NUMBER:   1 **
  ****************************

*#*****************************************************************************
 #   HYDROLOGIC MODEL                                                          *
 #                                                                             *
*#                 MASTER DRAINAGE PLAN UPDATE                                 *
 #                      SOUTHWEST BOLTON                                       *
 #                      TOWN OF CALEDON                                        *
 #=============================================================================*
*#       PREPARED BY:   FALBY BURNSIDE & ASSOCIATES LIMITED                    *
 #           FB FILE:   9653                                                   *
 #      PROJECT DATE:   JAN 1997                                               *
*#         FILE NAME:   9653-FF.DAT                                            *
*#      MODEL UPDATE:   JAN  7/96                                              *
 #*****************************************************************************
 #                    POST DEVELOPMENT CONDITIONS                              *
*#*****************************************************************************
*
    4 YR CHICAGO STORM DISTRIBUTION - 25mm STORM FIRST FLUSH EVENT

 --------------------
 | MASS STORM        |       Filename: 4HR-CHI.MST
 | Ptotal= 25.00 mm  |       Comments: 4 Hour, Chicago Distribution with 10 min
 --------------------
                              Duration of storm     =  4.00 hrs
                              Mass curve time step = 10.00 min
                              New Storm time step   =  2.00 min

                  TIME     RAIN |   TIME     RAIN |   TIME     RAIN |   TIME     RAIN
                   hrs    mm/hr |    hrs    mm/hr |    hrs    mm/hr |    hrs    mm/hr
                   .03      .30 |   1.03    10.80 |   2.03     4.62 |   3.03     2.04
                   .07      .60 |   1.07    14.10 |   2.07     4.44 |   3.07     1.98
```

.10	.90	1.10	17.40	2.10	4.26	3.10	1.92
.13	1.20	1.13	20.70	2.13	4.08	3.13	1.86
.17	1.50	1.17	24.00	2.17	3.90	3.17	1.80
.20	1.62	1.20	26.46	2.20	3.75	3.20	1.77
.23	1.74	1.23	28.92	2.23	3.60	3.23	1.74
.27	1.86	1.27	31.38	2.27	3.45	3.27	1.71
.30	1.98	1.30	33.84	2.30	3.30	3.30	1.68
.33	2.10	1.33	36.30	2.33	3.15	3.33	1.65
.37	2.13	1.37	33.75	2.37	3.09	3.37	1.65
.40	2.16	1.40	31.20	2.40	3.03	3.40	1.65
.43	2.19	1.43	28.65	2.43	2.97	3.43	1.65
.47	2.22	1.47	26.10	2.47	2.91	3.47	1.65
.50	2.25	1.50	23.55	2.50	2.85	3.50	1.65
.53	2.31	1.53	20.82	2.53	2.76	3.53	1.62
.57	2.37	1.57	18.09	2.57	2.67	3.57	1.59
.60	2.43	1.60	15.36	2.60	2.58	3.60	1.56
.63	2.49	1.63	12.63	2.63	2.49	3.63	1.53
.67	2.55	1.67	9.90	2.67	2.40	3.67	1.50
.70	2.85	1.70	9.18	2.70	2.37	3.70	1.41
.73	3.15	1.73	8.46	2.73	2.34	3.73	1.32
.77	3.45	1.77	7.74	2.77	2.31	3.77	1.23
.80	3.75	1.80	7.02	2.80	2.28	3.80	1.14
.83	4.05	1.83	6.30	2.83	2.25	3.83	1.05
.87	4.74	1.87	6.00	2.87	2.22	3.87	.96
.90	5.43	1.90	5.70	2.90	2.19	3.90	.87
.93	6.12	1.93	5.40	2.93	2.16	3.93	.78
.97	6.81	1.97	5.10	2.97	2.13	3.97	.69
1.00	7.50	2.00	4.80	3.00	2.10	4.00	.60

```
*#**************************************************************************
*#      INDUSTRIAL/COMMERCIAL AREA SOUTH/WEST OF C.P.R.    @ CULVERT 1      *
 #      CATCHMENT 100  -   North west industrial area                       *
 #**************************************************************************
--------------------
| CALIB              |
| STANDHYD  (0100)   |   Area     (ha)=   23.00
|ID= 1 DT=15.0 min   |   Total Imp(%)=   75.00   Dir. Conn.(%)=   65.00
--------------------
                                IMPERVIOUS     PERVIOUS (i)
    Surface Area       (ha)=       17.25          5.75
    Dep. Storage       (mm)=        2.00          5.00
    Average Slope       (%)=        1.00          2.00
    Length              (m)=      390.00         40.00
    Mannings n             =        .030          .200

        NOTE:  RAINFALL WAS TRANSFORMED TO  15.0 MIN. TIME STEP.

                                IMPERVIOUS     PERVIOUS (i)
    Max.eff.Inten.(mm/hr)=        30.54          6.72
               over (min)         15.00         45.00
    Storage Coeff.  (min)=        15.34 (ii)    33.52 (ii)
    Unit Hyd. Tpeak (min)=        15.00         45.00
    Unit Hyd. peak  (cms)=          .07           .03
                                                            *TOTALS*
    PEAK FLOW       (cms)=         1.01           .06         1.02 (iii)
    TIME TO PEAK    (hrs)=         1.50          2.25         1.50
    RUNOFF VOLUME    (mm)=        22.91          4.77        16.56
    TOTAL RAINFALL   (mm)=        24.91         24.91        24.91
    RUNOFF COEFFICIENT   =          .92           .19          .66

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN*   =  71.0      Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
```

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

 ------------------------------------------------------------------------------
 #      POST TO 100 YR PRE CONTROL ON INDUSTRIAL LANDS                        *
 --------------------
 | RESERVOIR (0101) |
 | IN= 1---> OUT= 2 |
 | DT= 15.0 min     |         OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
 --------------------          (cms)     (ha.m.)   |   (cms)     (ha.m.)
                                .000       .000    |    .780      1.000
                                .780       .000    |    .000       .000

                                   AREA     QPEAK     TPEAK        R.V.
                                   (ha)     (cms)     (hrs)        (mm)
    INFLOW : ID= 1 (0100)         23.00      1.02      1.50       16.56
    OUTFLOW: ID= 2 (0101)         23.00       .78      1.50       16.87

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 76.146
                   TIME SHIFT OF PEAK FLOW          (min)=   .000
                   MAXIMUM  STORAGE   USED         (ha.m.)=   .073

 ------------------------------------------------------------------------------
 #************************************************************************
*#      INDUSTRIAL/COMMERCIAL AREA SOUTH/WEST OF C.P.R.  @ CULVERT 2          *
 #      CATCHMENT 200  -   South west industrial area                         *
 #************************************************************************
 --------------------
 | CALIB            |
 | STANDHYD  (0200) |    Area     (ha)=  28.40
 |ID= 3 DT=15.0 min |    Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
 --------------------
                                IMPERVIOUS    PERVIOUS (i)
    Surface Area       (ha)=       21.30          7.10
    Dep. Storage       (mm)=        2.00          5.00
    Average Slope       (%)=        1.00          2.00
    Length              (m)=      435.00         40.00
    Mannings n             =        .030          .200

    Max.eff.Inten.(mm/hr)=        30.54          6.72
              over (min)          15.00         45.00
    Storage Coeff.   (min)=       16.38 (ii)    34.56 (ii)
    Unit Hyd. Tpeak  (min)=       15.00         45.00
    Unit Hyd. peak   (cms)=         .07           .03
                                                              *TOTALS*
    PEAK FLOW        (cms)=        1.22           .07            1.23 (iii)
    TIME TO PEAK     (hrs)=        1.50          2.25            1.50
    RUNOFF VOLUME     (mm)=       22.91          4.77           16.56
    TOTAL RAINFALL    (mm)=       24.91         24.91           24.91
    RUNOFF COEFFICIENT    =         .92           .19             .66

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

 ------------------------------------------------------------------------------
 #      POST TO 100 YR PRE CONTROL ON INDUSTRIAL LANDS                        *
 --------------------
 | RESERVOIR (0201) |
 | IN= 3---> OUT= 4 |
 | DT= 15.0 min     |         OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
 --------------------          (cms)     (ha.m.)   |   (cms)     (ha.m.)
                                .000       .000    |    .870      1.200
                                .870       .000    |    .000       .000
```

```
                                  AREA      QPEAK      TPEAK        R.V.
                                  (ha)      (cms)      (hrs)        (mm)
    INFLOW : ID= 3 (0200)        28.40      1.23       1.50        16.56
    OUTFLOW: ID= 4 (0201)        28.40       .87       1.50        17.08

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 70.505
                  TIME SHIFT OF PEAK FLOW        (min)=   .000
                  MAXIMUM  STORAGE   USED       (ha.m.)=   .103

 -----------------------------------------------------------------------------
*#***************************************************************************
*#      ADD CATCHMENTS 100 & 200                                            *
 #***************************************************************************

 -------------------
| ADD HYD    (0001) |
|  2 +  4 = 10      |          AREA     QPEAK     TPEAK       R.V.
 -------------------           (ha)     (cms)     (hrs)       (mm)
          ID1= 2 (0101):      23.00      .78      1.50      16.87
        + ID2= 4 (0201):      28.40      .87      1.50      17.08
          ===============================================================
          ID =10 (0001):      51.40     1.65      1.50      16.99

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 -----------------------------------------------------------------------------
*#***************************************************************************
 #      RESIDENTIAL DEVELOPMENT - POLICY AREA A - WEST OF 6TH LINE         *
 #      CATCHMENT 300                                                       *
*#***************************************************************************
 -------------------
| CALIB             |
| STANDHYD  (0300)  |    Area     (ha)=  72.00
|ID= 3 DT=15.0 min  |    Total Imp(%)=  49.00   Dir. Conn.(%)=  40.00
 -------------------
                              IMPERVIOUS    PERVIOUS (i)
    Surface Area      (ha)=      35.28        36.72
    Dep. Storage      (mm)=       2.00         5.00
    Average Slope      (%)=       1.00         2.00
    Length             (m)=     692.00        40.00
    Mannings n            =       .030         .200

    Max.eff.Inten.(mm/hr)=       25.81         4.60
              over (min)         30.00        45.00
    Storage Coeff.  (min)=       23.15 (ii)   44.31 (ii)
    Unit Hyd. Tpeak (min)=       30.00        45.00
    Unit Hyd. peak  (cms)=         .04          .03
                                                            *TOTALS*
    PEAK FLOW        (cms)=       1.51          .22           1.64 (iii)
    TIME TO PEAK     (hrs)=       1.75         2.25           1.75
    RUNOFF VOLUME     (mm)=      22.91         3.92          11.52
    TOTAL RAINFALL    (mm)=      24.91        24.91          24.91
    RUNOFF COEFFICIENT    =        .92          .16            .46

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

 -----------------------------------------------------------------------------
 #***************************************************************************
*#      ADD hydrographs 10 & 3                                              *
 #      TOTAL FLOW TO POND 5                                                *
```

*#**

```
 ------------------
| ADD HYD    (0002) |
| 10 +  3 =  9      |          AREA     QPEAK     TPEAK      R.V.
 ------------------            (ha)     (cms)     (hrs)      (mm)
          ID1=10 (0001):      51.40      1.65      1.50     16.99
        + ID2= 3 (0300):      72.00      1.64      1.75     11.52
          ===================================================
          ID = 9 (0002):     123.40      3.29      1.75     13.80
```

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```
*#******************************************************************************
*#     POND 5     -    EROSION, QUALITY & PEAK FLOW CONTROL                    *
*#******************************************************************************
 ------------------
| RESERVOIR (0003) |
| IN= 9---> OUT=10 |
| DT= 15.0 min     |       OUTFLOW     STORAGE  |  OUTFLOW     STORAGE
 ------------------         (cms)     (ha.m.)  |   (cms)     (ha.m.)
                             .000        .000  |    .190      1.930
                             .050        .420  |    .470      2.640
                             .080        .840  |    .850      3.340
                             .090       1.390  |   1.320      3.700
                             .100       1.600  |   2.460      4.250

                                  AREA     QPEAK     TPEAK       R.V.
                                  (ha)     (cms)     (hrs)       (mm)
  INFLOW : ID= 9 (0002)         123.40      3.29      1.75      13.80
  OUTFLOW: ID=10 (0003)         123.40       .10      4.75      13.78

                PEAK   FLOW   REDUCTION [Qout/Qin](%)=  3.009
                TIME SHIFT OF PEAK FLOW         (min)=180.000
                MAXIMUM  STORAGE   USED       (ha.m.)=  1.578
```

```
 -------------------
| PRINT HYD (0003)  |    AREA        (ha)= 123.40
| ID=10    PCYC=  1 |    QPEAK      (cms)=    .10 (i)
| DT=15.0 min       |    TPEAK      (hrs)=   4.75
 -------------------     VOLUME      (mm)=  13.78
```

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

TIME hrs	FLOW cms	TIME hrs	FLOW cms	TIME hrs	FLOW cms	TIME hrs	FLOW cms	TIME hrs	FLOW cms
.00	.00	34.25	.07	68.50	.02	102.75	.00	137.00	.00
.25	.00	34.50	.07	68.75	.02	103.00	.00	137.25	.00
.50	.00	34.75	.07	69.00	.02	103.25	.00	137.50	.00
.75	.00	35.00	.07	69.25	.02	103.50	.00	137.75	.00
1.00	.00	35.25	.07	69.50	.02	103.75	.00	138.00	.00
1.25	.01	35.50	.07	69.75	.02	104.00	.00	138.25	.00
1.50	.04	35.75	.07	70.00	.02	104.25	.00	138.50	.00
1.75	.06	36.00	.07	70.25	.02	104.50	.00	138.75	.00
2.00	.08	36.25	.07	70.50	.02	104.75	.00	139.00	.00
2.25	.08	36.50	.07	70.75	.02	105.00	.00	139.25	.00
2.50	.09	36.75	.07	71.00	.02	105.25	.00	139.50	.00
2.75	.09	37.00	.06	71.25	.02	105.50	.00	139.75	.00
3.00	.09	37.25	.06	71.50	.02	105.75	.00	140.00	.00
3.25	.09	37.50	.06	71.75	.02	106.00	.00	140.25	.00
3.50	.09	37.75	.06	72.00	.02	106.25	.00	140.50	.00
3.75	.10	38.00	.06	72.25	.02	106.50	.00	140.75	.00
4.00	.10	38.25	.06	72.50	.02	106.75	.00	141.00	.00
4.25	.10	38.50	.06	72.75	.02	107.00	.00	141.25	.00

4.50	.10	38.75	.06	73.00	.02	107.25	.00	141.50	.00
4.75	.10	39.00	.06	73.25	.02	107.50	.00	141.75	.00
5.00	.10	39.25	.06	73.50	.02	107.75	.00	142.00	.00
5.25	.10	39.50	.06	73.75	.02	108.00	.00	142.25	.00
5.50	.10	39.75	.06	74.00	.02	108.25	.00	142.50	.00
5.75	.10	40.00	.06	74.25	.02	108.50	.00	142.75	.00
6.00	.10	40.25	.06	74.50	.02	108.75	.00	143.00	.00
6.25	.10	40.50	.06	74.75	.02	109.00	.00	143.25	.00
6.50	.10	40.75	.06	75.00	.02	109.25	.00	143.50	.00
6.75	.10	41.00	.06	75.25	.01	109.50	.00	143.75	.00
7.00	.10	41.25	.06	75.50	.01	109.75	.00	144.00	.00
7.25	.10	41.50	.06	75.75	.01	110.00	.00	144.25	.00
7.50	.10	41.75	.06	76.00	.01	110.25	.00	144.50	.00
7.75	.09	42.00	.06	76.25	.01	110.50	.00	144.75	.00
8.00	.09	42.25	.06	76.50	.01	110.75	.00	145.00	.00
8.25	.09	42.50	.06	76.75	.01	111.00	.00	145.25	.00
8.50	.09	42.75	.06	77.00	.01	111.25	.00	145.50	.00
8.75	.09	43.00	.06	77.25	.01	111.50	.00	145.75	.00
9.00	.09	43.25	.06	77.50	.01	111.75	.00	146.00	.00
9.25	.09	43.50	.05	77.75	.01	112.00	.00	146.25	.00
9.50	.09	43.75	.05	78.00	.01	112.25	.00	146.50	.00
9.75	.09	44.00	.05	78.25	.01	112.50	.00	146.75	.00
10.00	.09	44.25	.05	78.50	.01	112.75	.00	147.00	.00
10.25	.09	44.50	.05	78.75	.01	113.00	.00	147.25	.00
10.50	.09	44.75	.05	79.00	.01	113.25	.00	147.50	.00
10.75	.09	45.00	.05	79.25	.01	113.50	.00	147.75	.00
11.00	.09	45.25	.05	79.50	.01	113.75	.00	148.00	.00
11.25	.09	45.50	.05	79.75	.01	114.00	.00	148.25	.00
11.50	.09	45.75	.05	80.00	.01	114.25	.00	148.50	.00
11.75	.09	46.00	.05	80.25	.01	114.50	.00	148.75	.00
12.00	.09	46.25	.05	80.50	.01	114.75	.00	149.00	.00
12.25	.09	46.50	.05	80.75	.01	115.00	.00	149.25	.00
12.50	.09	46.75	.05	81.00	.01	115.25	.00	149.50	.00
12.75	.09	47.00	.05	81.25	.01	115.50	.00	149.75	.00
13.00	.09	47.25	.05	81.50	.01	115.75	.00	150.00	.00
13.25	.09	47.50	.05	81.75	.01	116.00	.00	150.25	.00
13.50	.09	47.75	.05	82.00	.01	116.25	.00	150.50	.00
13.75	.09	48.00	.05	82.25	.01	116.50	.00	150.75	.00
14.00	.09	48.25	.05	82.50	.01	116.75	.00	151.00	.00
14.25	.09	48.50	.05	82.75	.01	117.00	.00	151.25	.00
14.50	.09	48.75	.05	83.00	.01	117.25	.00	151.50	.00
14.75	.09	49.00	.05	83.25	.01	117.50	.00	151.75	.00
15.00	.09	49.25	.05	83.50	.01	117.75	.00	152.00	.00
15.25	.09	49.50	.05	83.75	.01	118.00	.00	152.25	.00
15.50	.09	49.75	.04	84.00	.01	118.25	.00	152.50	.00
15.75	.09	50.00	.04	84.25	.01	118.50	.00	152.75	.00
16.00	.09	50.25	.04	84.50	.01	118.75	.00	153.00	.00
16.25	.09	50.50	.04	84.75	.01	119.00	.00	153.25	.00
16.50	.09	50.75	.04	85.00	.01	119.25	.00	153.50	.00
16.75	.09	51.00	.04	85.25	.01	119.50	.00	153.75	.00
17.00	.09	51.25	.04	85.50	.01	119.75	.00	154.00	.00
17.25	.09	51.50	.04	85.75	.01	120.00	.00	154.25	.00
17.50	.09	51.75	.04	86.00	.01	120.25	.00	154.50	.00
17.75	.09	52.00	.04	86.25	.01	120.50	.00	154.75	.00
18.00	.09	52.25	.04	86.50	.01	120.75	.00	155.00	.00
18.25	.09	52.50	.04	86.75	.01	121.00	.00	155.25	.00
18.50	.09	52.75	.04	87.00	.01	121.25	.00	155.50	.00
18.75	.09	53.00	.04	87.25	.01	121.50	.00	155.75	.00
19.00	.09	53.25	.04	87.50	.01	121.75	.00	156.00	.00
19.25	.09	53.50	.04	87.75	.01	122.00	.00	156.25	.00
19.50	.09	53.75	.04	88.00	.01	122.25	.00	156.50	.00
19.75	.08	54.00	.04	88.25	.01	122.50	.00	156.75	.00
20.00	.08	54.25	.04	88.50	.01	122.75	.00	157.00	.00
20.25	.08	54.50	.04	88.75	.01	123.00	.00	157.25	.00
20.50	.08	54.75	.04	89.00	.01	123.25	.00	157.50	.00
20.75	.08	55.00	.04	89.25	.01	123.50	.00	157.75	.00

21.00	.08	55.25	.04	89.50	.01	123.75	.00	158.00	.00
21.25	.08	55.50	.03	89.75	.01	124.00	.00	158.25	.00
21.50	.08	55.75	.03	90.00	.01	124.25	.00	158.50	.00
21.75	.08	56.00	.03	90.25	.01	124.50	.00	158.75	.00
22.00	.08	56.25	.03	90.50	.01	124.75	.00	159.00	.00
22.25	.08	56.50	.03	90.75	.01	125.00	.00	159.25	.00
22.50	.08	56.75	.03	91.00	.01	125.25	.00	159.50	.00
22.75	.08	57.00	.03	91.25	.01	125.50	.00	159.75	.00
23.00	.08	57.25	.03	91.50	.01	125.75	.00	160.00	.00
23.25	.08	57.50	.03	91.75	.01	126.00	.00	160.25	.00
23.50	.08	57.75	.03	92.00	.01	126.25	.00	160.50	.00
23.75	.08	58.00	.03	92.25	.01	126.50	.00	160.75	.00
24.00	.08	58.25	.03	92.50	.01	126.75	.00	161.00	.00
24.25	.08	58.50	.03	92.75	.01	127.00	.00	161.25	.00
24.50	.08	58.75	.03	93.00	.01	127.25	.00	161.50	.00
24.75	.08	59.00	.03	93.25	.01	127.50	.00	161.75	.00
25.00	.08	59.25	.03	93.50	.01	127.75	.00	162.00	.00
25.25	.08	59.50	.03	93.75	.01	128.00	.00	162.25	.00
25.50	.08	59.75	.03	94.00	.01	128.25	.00	162.50	.00
25.75	.08	60.00	.03	94.25	.01	128.50	.00	162.75	.00
26.00	.08	60.25	.03	94.50	.01	128.75	.00	163.00	.00
26.25	.08	60.50	.03	94.75	.01	129.00	.00	163.25	.00
26.50	.08	60.75	.03	95.00	.01	129.25	.00	163.50	.00
26.75	.08	61.00	.03	95.25	.01	129.50	.00	163.75	.00
27.00	.08	61.25	.03	95.50	.01	129.75	.00	164.00	.00
27.25	.08	61.50	.03	95.75	.01	130.00	.00	164.25	.00
27.50	.08	61.75	.03	96.00	.01	130.25	.00	164.50	.00
27.75	.08	62.00	.03	96.25	.01	130.50	.00	164.75	.00
28.00	.08	62.25	.03	96.50	.01	130.75	.00	165.00	.00
28.25	.08	62.50	.03	96.75	.01	131.00	.00	165.25	.00
28.50	.08	62.75	.03	97.00	.01	131.25	.00	165.50	.00
28.75	.08	63.00	.03	97.25	.01	131.50	.00	165.75	.00
29.00	.08	63.25	.03	97.50	.01	131.75	.00	166.00	.00
29.25	.08	63.50	.02	97.75	.01	132.00	.00	166.25	.00
29.50	.08	63.75	.02	98.00	.01	132.25	.00	166.50	.00
29.75	.08	64.00	.02	98.25	.01	132.50	.00	166.75	.00
30.00	.08	64.25	.02	98.50	.01	132.75	.00	167.00	.00
30.25	.08	64.50	.02	98.75	.01	133.00	.00	167.25	.00
30.50	.08	64.75	.02	99.00	.01	133.25	.00	167.50	.00
30.75	.08	65.00	.02	99.25	.01	133.50	.00	167.75	.00
31.00	.08	65.25	.02	99.50	.01	133.75	.00	168.00	.00
31.25	.08	65.50	.02	99.75	.01	134.00	.00	168.25	.00
31.50	.07	65.75	.02	100.00	.01	134.25	.00	168.50	.00
31.75	.07	66.00	.02	100.25	.01	134.50	.00	168.75	.00
32.00	.07	66.25	.02	100.50	.01	134.75	.00	169.00	.00
32.25	.07	66.50	.02	100.75	.01	135.00	.00	169.25	.00
32.50	.07	66.75	.02	101.00	.00	135.25	.00	169.50	.00
32.75	.07	67.00	.02	101.25	.00	135.50	.00	169.75	.00
33.00	.07	67.25	.02	101.50	.00	135.75	.00	170.00	.00
33.25	.07	67.50	.02	101.75	.00	136.00	.00	170.25	.00
33.50	.07	67.75	.02	102.00	.00	136.25	.00	170.50	.00
33.75	.07	68.00	.02	102.25	.00	136.50	.00		
34.00	.07	68.25	.02	102.50	.00	136.75	.00		

```
--------------------------------------------------------------------------------
*#*****************************************************************************
*#     VALLEY FEATURE ALONG KING STREET                                        *
*#     CATCHMENT 401                                                           *
*#*****************************************************************************

-------------------
| CALIB            |
| NASHYD    (0401) |   Area     (ha)=    7.50   Curve Number   (CN)= 63.0
| ID= 1 DT=15.0 min|   Ia       (mm)=    1.50   # of Linear Res.(N)= 2.00
-------------------    U.H. Tp(hrs)=      .20

   Unit Hyd Qpeak  (cms)=    .973
```

```
    PEAK FLOW          (cms)=     .045 (i)
    TIME TO PEAK       (hrs)=    1.750
    RUNOFF VOLUME       (mm)=    2.792
    TOTAL RAINFALL      (mm)=   24.910
    RUNOFF COEFFICIENT     =     .112

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

-------------------------------------------------------------------------------
 #   ADD POND 5 OUTFLOW TO VALLEY FLOW

-------------------
| ADD HYD    (0004) |
  10 +   1 =   8    |          AREA     QPEAK     TPEAK      R.V.
-------------------            (ha)     (cms)     (hrs)      (mm)
         ID1=10 (0003):     123.40       .10      4.75     13.78
       + ID2= 1 (0401):       7.50       .05      1.75      2.79
         =====================================================
         ID = 8 (0004):     130.90       .11      2.00     13.15

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
*#*************************************************************************
 #      FUTURE RESIDENTIAL - POLICY AREA A - EAST OF 6TH LINE              *
 #      CATCHMENT 402                                                      *
*#*************************************************************************
-------------------
| CALIB             |
| STANDHYD  (0402)  |    Area     (ha)=  10.00
|ID= 4 DT=15.0 min  |    Total Imp(%)=  50.00   Dir. Conn.(%)=  40.00
-------------------
                            IMPERVIOUS     PERVIOUS (i)
    Surface Area      (ha)=       5.00          5.00
    Dep. Storage      (mm)=       2.00          5.00
    Average Slope      (%)=       1.00          2.00
    Length             (m)=     288.00         40.00
    Mannings n            =       .030          .200

    Max.eff.Inten.(mm/hr)=       30.54          4.81
               over (min)        15.00         45.00
    Storage Coeff.  (min)=       12.79 (ii)    33.57 (ii)
    Unit Hyd. Tpeak (min)=       15.00         45.00
    Unit Hyd. peak  (cms)=         .08           .03
                                                              *TOTALS*
    PEAK FLOW       (cms)=         .29           .04              .30 (iii)
    TIME TO PEAK    (hrs)=        1.50          2.25             1.50
    RUNOFF VOLUME    (mm)=       22.91          4.01            11.57
    TOTAL RAINFALL   (mm)=       24.91         24.91            24.91
    RUNOFF COEFFICIENT   =         .92           .16              .46

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

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

-------------------------------------------------------------------------------
*#*************************************************************************
*#      MAJOR MINOR FLOW SPLIT CATCHMENT 402                               *
 #      MINOR FLOW TO POND 1  - MAJOR TO VALLEY                            *
 #*************************************************************************
-------------------
| DUHYD     (0402) |
```

```
| Inlet Cap.= .740 |
| #of Inlets=    1 |
| Total(cms)=   .7 |      AREA      QPEAK      TPEAK     R.V.
-------------------       (ha)      (cms)      (hrs)     (mm)
    TOTAL HYD.(ID= 4):   10.00        .30       1.50    11.57
    =========================================================
    MAJOR SYS.(ID= 1):     .00        .00        .00      .00
    MINOR SYS.(ID= 2):   10.00        .30       1.50    11.57

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
*#**************************************************************************
 #      ADD POND 5 OUTFLOW TO CATCHMENT 4 MAJOR FLOWS                      *
 #      TOTAL FLOW IN VALLEY TO INTERCEPTOR STORM SEWER                    *
*#**************************************************************************

-------------------
| ADD HYD   (0005) |
|  8 +  1 = 10     |          AREA     QPEAK     TPEAK      R.V.
-------------------           (ha)     (cms)     (hrs)      (mm)
** W A R N I N G :  HYDROGRAPH 0402 <ID= 1> IS DRY.
** W A R N I N G :  HYDROGRAPH 0010 = HYDROGRAPH 0008
         ID1= 8 (0004):    130.90       .11      2.00     13.15
       + ID2= 1 (0402):       .00       .00       .00       .00
         ======================================================
         ID =10 (0005):    130.90       .11      2.00     13.15

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
*#**************************************************************************
 #      INDUSTRIAL/COMMERCIAL AREA SOUTH/WEST OF C.P.R.   @ CULVERT 3      *
 #      CATCHMENT 500   -   South east industrial area                     *
*#**************************************************************************
-------------------
| CALIB             |
| STANDHYD  (0500)  |   Area     (ha)=    8.00
|ID= 5 DT=15.0 min  |   Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
-------------------
                             IMPERVIOUS    PERVIOUS (i)
    Surface Area      (ha)=       6.00          2.00
    Dep. Storage      (mm)=       2.00          5.00
    Average Slope      (%)=       1.00          2.00
    Length             (m)=     230.00         40.00
    Mannings n            =       .030          .200

    Max.eff.Inten.(mm/hr)=       30.54          6.72
               over (min)        15.00         30.00
    Storage Coeff.  (min)=       11.18 (ii)    29.35 (ii)
    Unit Hyd. Tpeak (min)=       15.00         30.00
    Unit Hyd. peak  (cms)=         .08           .04
                                                             *TOTALS*
    PEAK FLOW       (cms)=         .39           .02            .40 (iii)
    TIME TO PEAK    (hrs)=        1.50          2.00           1.50
    RUNOFF VOLUME    (mm)=       22.91          4.77          16.56
    TOTAL RAINFALL   (mm)=       24.91         24.91          24.91
    RUNOFF COEFFICIENT   =         .92           .19            .66

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

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

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-------------------------------------------------------------------------------
 #*****************************************************************************
 #      FUTURE RESIDENTIAL - POLICY AREA A - EAST OF 6TH LINE                  *
*#      CATCHMENT 600                                                          *
*#*****************************************************************************
 ------------------
 CALIB             |
| STANDHYD  (0600) |   Area    (ha)=  12.00
|ID= 6 DT=15.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  40.00
 ------------------
                             IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=       6.00         6.00
    Dep. Storage     (mm)=       2.00         5.00
    Average Slope     (%)=       1.00         2.00
    Length            (m)=     270.00        40.00
    Mannings n          =        .030         .200

    Max.eff.Inten.(mm/hr)=      30.54         4.81
               over (min)       15.00        45.00
    Storage Coeff.  (min)=      12.31 (ii)   33.09 (ii)
    Unit Hyd. Tpeak (min)=      15.00        45.00
    Unit Hyd. peak  (cms)=        .08          .03
                                                          *TOTALS*
    PEAK FLOW       (cms)=        .35          .04           .36 (iii)
    TIME TO PEAK    (hrs)=       1.50         2.25          1.50
    RUNOFF VOLUME    (mm)=      22.91         4.01         11.57
    TOTAL RAINFALL   (mm)=      24.91        24.91         24.91
    RUNOFF COEFFICIENT   =        .92          .16           .46

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

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

-------------------------------------------------------------------------------
 #    TOTAL CATCHMENTS 5 & 6

 ------------------
| ADD HYD   (0006) |
|  5 + 6 =  9      |          AREA    QPEAK    TPEAK     R.V.
 ------------------           (ha)    (cms)    (hrs)     (mm)
         ID1= 5 (0500):       8.00      .40     1.50    16.56
       + ID2= 6 (0600):      12.00      .36     1.50    11.57
         ===============================================
         ID = 9 (0006):      20.00      .76     1.50    13.57

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
*#*****************************************************************************
 #      CATCHMENT 700                                                          *
 #      EXISTING RESIDENTIAL DEVELOPMENT (INCLUDING TOP OF THE RIDGE)          *
*#      HERITAGE HILLS & PEEL CO-OP HOUSING & INDUSTRIAL                       *
*#*****************************************************************************
 ------------------
 CALIB             |
| STANDHYD  (0700) |   Area    (ha)=  12.00
|ID= 7 DT=15.0 min |   Total Imp(%)=  55.00   Dir. Conn.(%)=  43.00
 ------------------
                             IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=       6.60         5.40
    Dep. Storage     (mm)=       2.00         5.00
```

```
     Average Slope      (%)=        1.00          2.00
     Length             (m)=      282.00         40.00
     Mannings n            =        .030          .200

     Max.eff.Inten.(mm/hr)=        30.54          5.42
                over (min)         15.00         45.00
     Storage Coeff.  (min)=        12.63 (ii)    32.44 (ii)
     Unit Hyd. Tpeak (min)=        15.00         45.00
     Unit Hyd. peak  (cms)=          .08           .03
                                                              *TOTALS*
     PEAK FLOW       (cms)=          .37           .04            .38 (iii)
     TIME TO PEAK    (hrs)=         1.50          2.25           1.50
     RUNOFF VOLUME    (mm)=        22.91          4.27          12.28
     TOTAL RAINFALL   (mm)=        24.91         24.91          24.91
     RUNOFF COEFFICIENT   =          .92           .17            .49

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

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

-------------------------------------------------------------------------------
#    TOTAL CATCHMENTS 500, 600 & 700

--------------------
 ADD HYD    (0007) |
  7 +  9 =   5     |              AREA     QPEAK     TPEAK       R.V.
--------------------              (ha)     (cms)     (hrs)       (mm)
          ID1= 7 (0700):        12.00       .38      1.50      12.28
        + ID2= 9 (0006):        20.00       .76      1.50      13.57
          ==================================================
          ID = 5 (0007):        32.00      1.14      1.50      13.09

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
#    ADD MINOR FLOW FROM CATHCHMENT 400

--------------------
| ADD HYD    (0008) |
   2 +  5 =   9     |              AREA     QPEAK     TPEAK       R.V.
--------------------              (ha)     (cms)     (hrs)       (mm)
          ID1= 2 (0402):        10.00       .30      1.50      11.57
        + ID2= 5 (0007):        32.00      1.14      1.50      13.09
          ==================================================
          ID = 9 (0008):        42.00      1.44      1.50      12.72

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
*#***************************************************************************
 #      CATCHMENT 800                                                       *
 #      FUTURE ALLOWANCE FOR HIGH DENSITY HOUSING                           *
*#***************************************************************************
--------------------
 CALIB             |
 STANDHYD  (0800)  |    Area     (ha)=    2.60
|ID= 8 DT=15.0 min |    Total Imp(%)=   60.00   Dir. Conn.(%)=   45.00
--------------------
                              IMPERVIOUS     PERVIOUS (i)
    Surface Area      (ha)=        1.56          1.04
    Dep. Storage      (mm)=        2.00          5.00
    Average Slope      (%)=        1.00          2.00
```

```
    Length              (m)=      131.00        40.00
    Mannings n             =        .030         .200

    Max.eff.Inten.(mm/hr)=       30.54          6.47
               over (min)        15.00         30.00
    Storage Coeff.  (min)=        7.97 (ii)    26.43 (ii)
    Unit Hyd. Tpeak (min)=       15.00         30.00
    Unit Hyd. peak  (cms)=         .10           .04
                                                                *TOTALS*
    PEAK FLOW       (cms)=         .09           .01               .10 (iii)
    TIME TO PEAK    (hrs)=        1.50          2.00              1.50
    RUNOFF VOLUME    (mm)=       22.91          4.68             12.88
    TOTAL RAINFALL   (mm)=       24.91         24.91             24.91
    RUNOFF COEFFICIENT   =         .92           .19               .52

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

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

-------------------------------------------------------------------------------
*#    ADD CATCHMENT 800 -  TOTAL TO POND 1

 ------------------
| ADD HYD    (0009) |
|  8 +  9 =  1      |          AREA     QPEAK      TPEAK      R.V.
 ------------------            (ha)     (cms)      (hrs)      (mm)
          ID1= 8 (0800):       2.60       .10       1.50     12.88
        + ID2= 9 (0008):      42.00      1.44       1.50     12.72
          =======================================================
          ID = 1 (0009):      44.60      1.53       1.50     12.73

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
*#*****************************************************************************
*#      POND 1     -   QUALITY (NO PEAK FLOW CONTROL, see revision notes) *
*#*****************************************************************************
 ------------------
| RESERVOIR (0010) |
| IN= 1---> OUT= 9 |
| DT= 15.0 min     |       OUTFLOW     STORAGE   |   OUTFLOW     STORAGE
 ------------------         (cms)      (ha.m.)   |    (cms)      (ha.m.)
                             .000        .000    |     .940        .621
                             .050        .195    |    2.660        .776
                             .080        .386    |    4.020        .911
                             .130        .475    |     .000        .000

                                 AREA      QPEAK      TPEAK        R.V.
                                 (ha)      (cms)      (hrs)        (mm)
    INFLOW : ID= 1 (0009)       44.60       1.53       1.50       12.73
    OUTFLOW: ID= 9 (0010)       44.60        .12       4.00       12.71

               PEAK   FLOW   REDUCTION [Qout/Qin](%)=  7.959
               TIME SHIFT OF PEAK FLOW         (min)=150.000
               MAXIMUM  STORAGE   USED       (ha.m.)=   .461

-------------------------------------------------------------------------------
*#*****************************************************************************
*#     TOTAL FLOW TO 1350 CONCRETE STORM SEWER                                *
*#*****************************************************************************

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

```
| ADD HYD   (0011) |
| 10 +  9 =  1     |              AREA     QPEAK     TPEAK      R.V.
-------------------               (ha)     (cms)     (hrs)      (mm)
         ID1=10 (0005):         130.90       .11      2.00     13.15
       + ID2= 9 (0010):          44.60       .12      4.00     12.71
         ==========================================================
         ID = 1 (0011):         175.50       .23      3.75     13.04

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

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

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

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

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

      OOO    TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    I N T E R H Y M O
     O   O     T      T    H   H   Y Y   MM MM  O   O   * * * 1989b * * *
     O   O     T      T    HHHHH    Y    M M M  O   O
     O   O     T      T    H   H    Y    M   M  O   O
      OOO      T      T    H   H    Y    M   M   OOO    E-9516061300000

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 Input   filename: noquan1.dat
 Output  filename: noquan1.out
 Summary filename: noquan1.sum


ATE: 06-24-1960                       TIME: 11:57:00

COMMENTS: ____________________________________________________________

--------------------------------------------------------------------------------
 ****************************
 ** SIMULATION NUMBER:   1 **
 ****************************

*#*****************************************************************************
 #   HYDROLOGIC MODEL                                                         *
 #                                                                            *
*#                 MASTER DRAINAGE PLAN UPDATE                                *
 #                      SOUTHWEST BOLTON                                      *
 #                      TOWN OF CALEDON                                       *
*#============================================================================*
*#       PREPARED BY:   FALBY BURNSIDE & ASSOCIATES LIMITED                   *
 #           FB FILE:   9653                                                  *
 #      PROJECT DATE:   JAN 1997                                              *
*#         FILE NAME:   9653-100.DAT                                          *
*#      MODEL UPDATE:   JAN  7/97                                             *
 #                                                                            *
 #          revised:   July 1997 - Humber River Study concludes              *
*#                                  that No Quantity Control required.        *
 #                                  Only limitation is capacity of            *
 #                                  1350 dia. stormsewer (4.8 m^3/s)          *
 #*****************************************************************************
*#                 POST DEVELOPMENT CONDITIONS                                *
 #*****************************************************************************

*#       100 Year DESIGN STORM - 6 HOUR DURATION - AES DISTRIBUTION
*
 ------------------
 MASS STORM       |      Filename: AES-6HR.MST
| Ptotal= 80.25 mm |      Comments: MASS CURVE: 6 HR AES DESIGN STORM
 ------------------
```

```
                    Duration of storm    =  6.00 hrs
                    Mass curve time step = 30.00 min

              TIME     RAIN |  TIME     RAIN |  TIME    RAIN |  TIME     RAIN
               hrs    mm/hr |   hrs    mm/hr |   hrs   mm/hr |   hrs    mm/hr
               .50     1.61 |  2.00    27.29 |  3.50   14.45 |  5.00     1.60
              1.00     1.61 |  2.50    73.83 |  4.00    3.21 |  5.50     1.60
              1.50     9.63 |  3.00    20.86 |  4.50    3.21 |  6.00     1.60


 #***************************************************************************
 *#      INDUSTRIAL/COMMERCIAL AREA SOUTH/WEST OF C.P.R.    @ CULVERT 1     *
 *#      CATCHMENT 100  -   North west industrial area                      *
 #***************************************************************************
 ------------------
 | CALIB           |
 | STANDHYD  (0100)|    Area     (ha)=  23.00
 |ID= 1 DT=15.0 min|    Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
 ------------------
                                IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=       17.25         5.75
     Dep. Storage      (mm)=        2.00         5.00
     Average Slope      (%)=        1.00         2.00
     Length             (m)=      390.00        40.00
     Mannings n            =        .030         .200

         NOTE:  RAINFALL WAS TRANSFORMED TO  15.0 MIN. TIME STEP.

                                IMPERVIOUS    PERVIOUS (i)
     Max.eff.Inten.(mm/hr)=        73.83        62.54
                over (min)         15.00        30.00
     Storage Coeff.  (min)=        10.78 (ii)   18.23 (ii)
     Unit Hyd. Tpeak (min)=        15.00        30.00
     Unit Hyd. peak  (cms)=          .09          .05
                                                             *TOTALS*
     PEAK FLOW       (cms)=         2.94          .67          3.52 (iii)
     TIME TO PEAK    (hrs)=         2.50         2.75          2.50
     RUNOFF VOLUME    (mm)=        78.25        38.99         64.51
     TOTAL RAINFALL   (mm)=        80.25        80.25         80.25
     RUNOFF COEFFICIENT   =          .98          .49           .80

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

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

 ------------------------------------------------------------------------------
 *#      POST TO 100 YR PRE CONTROL ON INDUSTRIAL LANDS                     *
 ------------------
 | RESERVOIR (0101) |
 | IN= 1---> OUT= 2 |
 | DT= 15.0 min     |       OUTFLOW    STORAGE  |  OUTFLOW    STORAGE
 ------------------          (cms)     (ha.m.)  |   (cms)     (ha.m.)
                              .000       .000   |    .780      1.000
                              .780       .000   |    .000       .000

                                  AREA     QPEAK     TPEAK       R.V.
                                  (ha)     (cms)     (hrs)       (mm)
     INFLOW : ID= 1 (0100)       23.00      3.52      2.50      64.51
     OUTFLOW: ID= 2 (0101)       23.00       .78      1.75      65.53

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 22.134
                  TIME SHIFT OF PEAK FLOW          (min)=-45.000
```

```
                     MAXIMUM  STORAGE   USED       (ha.m.)=   .697

 ----------------------------------------------------------------------------
 #***************************************************************************
*#      INDUSTRIAL/COMMERCIAL AREA SOUTH/WEST OF C.P.R.  @ CULVERT 2        *
*#      CATCHMENT 200  -   South west industrial area                       *
 #***************************************************************************
 ------------------
| CALIB            |
| STANDHYD  (0200) |   Area     (ha)=  28.40
|ID= 3 DT=15.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
 ------------------
                              IMPERVIOUS    PERVIOUS (i)
    Surface Area      (ha)=      21.30          7.10
    Dep. Storage      (mm)=       2.00          5.00
    Average Slope      (%)=       1.00          2.00
    Length             (m)=     435.00         40.00
    Mannings n            =       .030          .200

    Max.eff.Inten.(mm/hr)=       73.83         62.54
               over (min)        15.00         30.00
    Storage Coeff.  (min)=       11.51 (ii)    18.96 (ii)
    Unit Hyd. Tpeak (min)=       15.00         30.00
    Unit Hyd. peak  (cms)=         .08           .05
                                                           *TOTALS*
    PEAK FLOW       (cms)=        3.60           .81         4.31 (iii)
    TIME TO PEAK    (hrs)=        2.50          2.75         2.50
    RUNOFF VOLUME    (mm)=       78.25         38.99        64.51
    TOTAL RAINFALL   (mm)=       80.25         80.25        80.25
    RUNOFF COEFFICIENT   =         .98           .49          .80

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

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

 ----------------------------------------------------------------------------
 #      POST TO 100 YR PRE CONTROL ON INDUSTRIAL LANDS                      *
 ------------------
| RESERVOIR (0201) |
| IN= 3---> OUT= 4 |
| DT= 15.0 min     |      OUTFLOW    STORAGE   |   OUTFLOW    STORAGE
 ------------------        (cms)     (ha.m.)   |    (cms)     (ha.m.)
                            .000       .000    |     .870      1.200
                            .870       .000    |     .000       .000

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
    INFLOW : ID= 3 (0200)     28.40      4.31      2.50      64.51
    OUTFLOW: ID= 4 (0201)     28.40       .87      1.75      65.77

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)= 20.190
                    TIME SHIFT OF PEAK FLOW        (min)=-45.000
                    MAXIMUM  STORAGE   USED       (ha.m.)=   .924

 ----------------------------------------------------------------------------
 #***************************************************************************
*#      ADD CATCHMENTS 100 & 200                                            *
*#***************************************************************************

 ------------------
| ADD HYD   (0001) |
|  2 +  4 = 10     |        AREA     QPEAK     TPEAK      R.V.
```

```
--------------------         (ha)     (cms)     (hrs)      (mm)
        ID1= 2 (0101):     23.00       .78      1.75     65.53
      + ID2= 4 (0201):     28.40       .87      1.75     65.77
        ====================================================
        ID =10 (0001):     51.40      1.65      1.75     65.67

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
*#**************************************************************************
*#      RESIDENTIAL DEVELOPMENT - POLICY AREA A - WEST OF 6TH LINE         *
*#      CATCHMENT 300                                                      *
*#**************************************************************************
 -------------------
| CALIB             |
| STANDHYD  (0300)  |    Area     (ha)=  72.00
| ID= 3 DT=15.0 min |    Total Imp(%)=  49.00   Dir. Conn.(%)=  40.00
 -------------------
                             IMPERVIOUS     PERVIOUS (i)
    Surface Area      (ha)=     35.28         36.72
    Dep. Storage      (mm)=      2.00          5.00
    Average Slope      (%)=      1.00          2.00
    Length             (m)=    692.00         40.00
    Mannings n            =      .030          .200

    Max.eff.Inten.(mm/hr)=      73.83         47.71
               over (min)       15.00         30.00
    Storage Coeff.  (min)=      15.21 (ii)    23.51 (ii)
    Unit Hyd. Tpeak (min)=      15.00         30.00
    Unit Hyd. peak  (cms)=        .07           .04
                                                              *TOTALS*
    PEAK FLOW       (cms)=       5.36          2.95              7.80 (iii)
    TIME TO PEAK    (hrs)=       2.50          2.75              2.50
    RUNOFF VOLUME    (mm)=      78.25         35.18             52.41
    TOTAL RAINFALL   (mm)=      80.25         80.25             80.25
    RUNOFF COEFFICIENT   =        .98           .44               .65

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

--------------------------------------------------------------------------------
*#**************************************************************************
*#      ADD hydrographs 10 & 3                                             *
*#      TOTAL FLOW TO POND 5                                               *
*#**************************************************************************

 -------------------
| ADD HYD    (0002) |
|  10 +  3 =   9    |        AREA     QPEAK     TPEAK      R.V.
 -------------------         (ha)     (cms)     (hrs)      (mm)
        ID1=10 (0001):     51.40      1.65      1.75     65.67
      + ID2= 3 (0300):     72.00      7.80      2.50     52.41
        ====================================================
        ID = 9 (0002):    123.40      9.45      2.50     57.93

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
*#**************************************************************************
*#    POND 5     -    EROSION, QUALITY & PEAK FLOW CONTROL                 *
*#**************************************************************************
 -------------------
```

```
 -----------------
| RESERVOIR (0003)|
| IN= 9---> OUT=10|
| DT= 15.0 min    |      OUTFLOW     STORAGE   |   OUTFLOW     STORAGE
 -----------------        (cms)      (ha.m.)   |    (cms)      (ha.m.)
                           .000        .000    |     .190       1.930
                           .050        .420    |     .470       2.640
                           .080        .840    |     .850       3.340
                           .090       1.390    |    1.320       3.700
                           .100       1.600    |    2.460       4.250

                               AREA      QPEAK      TPEAK        R.V.
                               (ha)      (cms)      (hrs)        (mm)
   INFLOW : ID= 9 (0002)     123.40       9.45       2.50       57.93
   OUTFLOW: ID=10 (0003)     123.40       2.39       4.50       57.91

                PEAK   FLOW   REDUCTION [Qout/Qin](%)= 25.274
                TIME SHIFT OF PEAK FLOW          (min)=120.000
                MAXIMUM  STORAGE   USED        (ha.m.)=  4.218

-------------------------------------------------------------------------------
*#*************************************************************************
 #      VALLEY FEATURE ALONG KING STREET                                  *
 #      CATCHMENT 401                                                     *
*#*************************************************************************
 -----------------
| CALIB           |
| NASHYD   (0401) |    Area     (ha)=    7.50   Curve Number    (CN)= 63.0
|ID= 1 DT=15.0 min|    Ia       (mm)=    1.50   # of Linear Res.(N)= 2.00
 -----------------     U.H. Tp(hrs)=      .20

    Unit Hyd Qpeak   (cms)=     .973

    PEAK FLOW        (cms)=     .414 (i)
    TIME TO PEAK     (hrs)=    2.500
    RUNOFF VOLUME     (mm)=   23.926
    TOTAL RAINFALL    (mm)=   80.250
    RUNOFF COEFFICIENT    =     .298

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

-------------------------------------------------------------------------------
*#   ADD POND 5 OUTFLOW TO VALLEY FLOW

 -----------------
| ADD HYD   (0004)|
| 10 +  1 =   8   |          AREA     QPEAK     TPEAK       R.V.
 -----------------           (ha)     (cms)     (hrs)       (mm)
           ID1=10 (0003):   123.40     2.39      4.50      57.91
         + ID2= 1 (0401):     7.50      .41      2.50      23.93
           ==================================================
           ID = 8 (0004):   130.90     2.42      4.25      55.97

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
 #*************************************************************************
*#      FUTURE RESIDENTIAL - POLICY AREA A - EAST OF 6TH LINE             *
*#      CATCHMENT 402                                                     *
 #*************************************************************************
 -----------------
| CALIB           |
| STANDHYD  (0402)|    Area     (ha)=   10.00
|ID= 4 DT=15.0 min|    Total Imp(%)=   50.00   Dir. Conn.(%)=   40.00
 -----------------
                              IMPERVIOUS     PERVIOUS (i)
    Surface Area      (ha)=      5.00           5.00
```

```
    Dep. Storage     (mm)=        2.00          5.00
    Average Slope     (%)=        1.00          2.00
    Length            (m)=      288.00         40.00
    Mannings n           =        .030          .200

    Max.eff.Inten.(mm/hr)=       73.83         49.24
               over (min)        15.00         30.00
    Storage Coeff.  (min)=        8.99 (ii)    17.18 (ii)
    Unit Hyd. Tpeak (min)=       15.00         30.00
    Unit Hyd. peak  (cms)=         .09           .05
                                                            *TOTALS*
    PEAK FLOW       (cms)=         .80           .46           1.20 (iii)
    TIME TO PEAK    (hrs)=        2.50          2.75           2.50
    RUNOFF VOLUME    (mm)=       78.25         35.61          52.67
    TOTAL RAINFALL   (mm)=       80.25         80.25          80.25
    RUNOFF COEFFICIENT   =         .98           .44            .66

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

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

 ------------------------------------------------------------------------------
*#*************************************************************************
*#      MAJOR MINOR FLOW SPLIT CATHCHMENT 402                             *
 #      MINOR FLOW TO POND 1  - MAJOR TO VALLEY                           *
 #*************************************************************************
 -------------------
| DUHYD      (0402) |
| Inlet Cap.= .740  |
| #of Inlets=     1 |
| Total(cms)=    .7 |      AREA      QPEAK      TPEAK      R.V.
 -------------------       (ha)      (cms)      (hrs)      (mm)
    TOTAL HYD.(ID= 4):   10.00       1.20       2.50     52.67
    ==========================================================
    MAJOR SYS.(ID= 1):    1.14        .46       2.50     52.67
    MINOR SYS.(ID= 2):    8.86        .74       2.25     52.67

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ------------------------------------------------------------------------------
 #*************************************************************************
*#      ADD POND 5 OUTFLOW TO CATCHMENT 4 MAJOR FLOWS                     *
*#      TOTAL FLOW IN VALLEY TO INTERCEPTOR STORM SEWER                   *
 #*************************************************************************

 -------------------
| ADD HYD    (0005) |
|  8 +  1 = 10      |          AREA      QPEAK      TPEAK      R.V.
 -------------------           (ha)      (cms)      (hrs)      (mm)
          ID1= 8 (0004):     130.90       2.42       4.25     55.97
        + ID2= 1 (0402):       1.14        .46       2.50     52.67
          ==========================================================
          ID =10 (0005):     132.04       2.42       4.25     55.94

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ------------------------------------------------------------------------------
*#*************************************************************************
 #      INDUSTRIAL/COMMERCIAL AREA SOUTH/WEST OF C.P.R.    @ CULVERT 3    *
 #      CATCHMENT 500   -   South east industrial area                    *
*#*************************************************************************
 -------------------
```

```
 | CALIB            |
 | STANDHYD  (0500) |    Area     (ha)=    8.00
 |ID= 5 DT=15.0 min |    Total Imp(%)=  75.00    Dir. Conn.(%)=  65.00
 -------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=     6.00          2.00
     Dep. Storage      (mm)=     2.00          5.00
     Average Slope      (%)=     1.00          2.00
     Length             (m)=   230.00         40.00
     Mannings n            =     .030          .200

     Max.eff.Inten.(mm/hr)=     73.83         62.54
                over (min)      15.00         30.00
     Storage Coeff.  (min)=      7.85 (ii)    15.30 (ii)
     Unit Hyd. Tpeak (min)=     15.00         30.00
     Unit Hyd. peak  (cms)=       .10           .05
                                                            *TOTALS*
     PEAK FLOW       (cms)=      1.05           .24           1.27 (iii)
     TIME TO PEAK    (hrs)=      2.50          2.75           2.50
     RUNOFF VOLUME    (mm)=     78.25         38.99          64.51
     TOTAL RAINFALL   (mm)=     80.25         80.25          80.25
     RUNOFF COEFFICIENT   =       .98           .49            .80

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

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

--------------------------------------------------------------------------------
 #***************************************************************************
 #      FUTURE RESIDENTIAL - POLICY AREA A - EAST OF 6TH LINE                *
*#      CATCHMENT 600                                                        *
*#***************************************************************************
 -------------------
 | CALIB            |
 | STANDHYD  (0600) |    Area     (ha)=   12.00
 |ID= 6 DT=15.0 min |    Total Imp(%)=  50.00    Dir. Conn.(%)=  40.00
 -------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=     6.00          6.00
     Dep. Storage      (mm)=     2.00          5.00
     Average Slope      (%)=     1.00          2.00
     Length             (m)=   270.00         40.00
     Mannings n            =     .030          .200

     Max.eff.Inten.(mm/hr)=     73.83         49.24
                over (min)      15.00         30.00
     Storage Coeff.  (min)=      8.65 (ii)    16.84 (ii)
     Unit Hyd. Tpeak (min)=     15.00         30.00
     Unit Hyd. peak  (cms)=       .09           .05
                                                            *TOTALS*
     PEAK FLOW       (cms)=       .96           .55           1.45 (iii)
     TIME TO PEAK    (hrs)=      2.50          2.75           2.50
     RUNOFF VOLUME    (mm)=     78.25         35.61          52.67
     TOTAL RAINFALL   (mm)=     80.25         80.25          80.25
     RUNOFF COEFFICIENT   =       .98           .44            .66

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  71.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
```

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

--------------------------------------------------------------------------------
#    TOTAL CATCHMENTS 5 & 6

 -------------------
| ADD HYD   (0006) |
|  5 +  6 =  9     |          AREA     QPEAK     TPEAK       R.V.
 -------------------          (ha)     (cms)     (hrs)       (mm)
          ID1= 5 (0500):      8.00      1.27      2.50      64.51
        + ID2= 6 (0600):     12.00      1.45      2.50      52.67
          ===================================================
          ID = 9 (0006):     20.00      2.72      2.50      57.40

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
#**************************************************************************
#      CATCHMENT 700                                                      *
*#      EXISTING RESIDENTIAL DEVELOPMENT (INCLUDING TOP OF THE RIDGE)     *
*#      HERITAGE HILLS & PEEL CO-OP HOUSING & INDUSTRIAL                  *
#**************************************************************************
 -------------------
| CALIB            |
| STANDHYD  (0700) |    Area     (ha)=  12.00
|ID= 7 DT=15.0 min |    Total Imp(%)=  55.00   Dir. Conn.(%)=  43.00
 -------------------
                              IMPERVIOUS    PERVIOUS (i)
    Surface Area      (ha)=       6.60         5.40
    Dep. Storage      (mm)=       2.00         5.00
    Average Slope      (%)=       1.00         2.00
    Length             (m)=     282.00        40.00
    Mannings n            =       .030         .200

    Max.eff.Inten.(mm/hr)=       73.83        53.60
               over (min)        15.00        30.00
    Storage Coeff.  (min)=        8.87 (ii)   16.80 (ii)
    Unit Hyd. Tpeak (min)=       15.00        30.00
    Unit Hyd. peak  (cms)=         .09          .05
                                                             *TOTALS*
    PEAK FLOW       (cms)=        1.04          .54             1.51 (iii)
    TIME TO PEAK    (hrs)=        2.50         2.75             2.50
    RUNOFF VOLUME    (mm)=       78.25        36.80            54.62
    TOTAL RAINFALL   (mm)=       80.25        80.25            80.25
    RUNOFF COEFFICIENT   =         .98          .46              .68

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

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

--------------------------------------------------------------------------------
#    TOTAL CATCHMENTS 500, 600 & 700

 -------------------
| ADD HYD   (0007) |
|  7 +  9 =  5     |          AREA     QPEAK     TPEAK       R.V.
 -------------------          (ha)     (cms)     (hrs)       (mm)
          ID1= 7 (0700):     12.00      1.51      2.50      54.62
        + ID2= 9 (0006):     20.00      2.72      2.50      57.40
          ===================================================
          ID = 5 (0007):     32.00      4.23      2.50      56.36
```

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

--------------------------------------------------------------------------------
#    ADD MINOR FLOW FROM CATHCHMENT 400

--------------------
| ADD HYD    (0008) |
|  2 +  5 =  9      |        AREA     QPEAK     TPEAK      R.V.
--------------------         (ha)     (cms)     (hrs)      (mm)
         ID1= 2 (0402):      8.86       .74      2.25     52.67
       + ID2= 5 (0007):     32.00      4.23      2.50     56.36
         ==================================================
         ID = 9 (0008):     40.86      4.97      2.50     55.56

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
#***************************************************************************
#      CATCHMENT 800                                                        *
*#      FUTURE ALLOWANCE FOR HIGH DENSITY HOUSING                           *
*#***************************************************************************
--------------------
| CALIB              |
| STANDHYD  (0800)   |   Area    (ha)=   2.60
|ID= 8 DT=15.0 min   |   Total Imp(%)=  60.00   Dir. Conn.(%)=  45.00
--------------------
                               IMPERVIOUS    PERVIOUS (i)
    Surface Area      (ha)=       1.56         1.04
    Dep. Storage      (mm)=       2.00         5.00
    Average Slope      (%)=       1.00         2.00
    Length             (m)=     131.00        40.00
    Mannings n            =       .030         .200

    Max.eff.Inten.(mm/hr)=       73.83        60.85
               over (min)        15.00        15.00
    Storage Coeff.  (min)=        5.60 (ii)   13.13 (ii)
    Unit Hyd. Tpeak (min)=       15.00        15.00
    Unit Hyd. peak  (cms)=         .11          .08
                                                          *TOTALS*
    PEAK FLOW       (cms)=         .24          .15           .39 (iii)
    TIME TO PEAK    (hrs)=        2.50         2.50          2.50
    RUNOFF VOLUME    (mm)=       78.25        38.60         56.44
    TOTAL RAINFALL   (mm)=       80.25        80.25         80.25
    RUNOFF COEFFICIENT   =         .98          .48           .70

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

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

--------------------------------------------------------------------------------
#    ADD CATCHMENT 800 -  TOTAL TO POND 1

--------------------
| ADD HYD    (0009) |
|  8 +  9 =  1      |        AREA     QPEAK     TPEAK      R.V.
--------------------         (ha)     (cms)     (hrs)      (mm)
         ID1= 8 (0800):      2.60       .39      2.50     56.44
       + ID2= 9 (0008):     40.86      4.97      2.50     55.56
         ==================================================
         ID = 1 (0009):     43.46      5.36      2.50     55.61

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

```
-------------------------------------------------------------------------------
#*************************************************************************
#      POND 1      -   QUALITY (NO PEAK FLOW CONTROL, see revision notes) *
**#************************************************************************
-------------------
| RESERVOIR (0010) |
| IN= 1---> OUT= 9 |
| DT= 15.0 min     |        OUTFLOW     STORAGE   |   OUTFLOW     STORAGE
-------------------          (cms)      (ha.m.)   |    (cms)      (ha.m.)
                              .000         .000   |      .940        .621
                              .050         .195   |     2.660        .776
                              .080         .386   |     4.020        .911
                              .130         .475   |      .000        .000

                                     AREA     QPEAK     TPEAK        R.V.
                                     (ha)     (cms)     (hrs)        (mm)
    INFLOW : ID= 1 (0009)           43.46      5.36      2.50       55.61
    OUTFLOW: ID= 9 (0010)           43.46      3.90      2.75       55.59

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 72.760
                  TIME SHIFT OF PEAK FLOW         (min)= 15.000
                  MAXIMUM  STORAGE   USED       (ha.m.)=   .917

-------------------------------------------------------------------------------
#*************************************************************************
#      TOTAL FLOW TO 1350 CONCRETE STORM SEWER                            *
**#************************************************************************

-------------------
| ADD HYD    (0011) |
|  10 +  9 =  1     |          AREA     QPEAK     TPEAK      R.V.
-------------------             (ha)     (cms)     (hrs)      (mm)
          ID1=10 (0005):      132.04      2.42      4.25     55.94
        + ID2= 9 (0010):       43.46      3.90      2.75     55.59
          ===================================================
          ID = 1 (0011):      175.50      4.74      2.75     55.85

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

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

APPENDIX C

FOREBAY SIZING PER MOEE (1994) CRITERIA

R. J. BURNSIDE & ASSOCIATES LIMITED
WATER RESOURCES

file: forebay1.wk4

QUALITY CONTROL POND - SEDIMENT FOREBAY SIZING CALCULATIONS
BASED ON MINISTRY OF THE ENVIRONMENT AND ENERGY (MOEE) 1994 SWMP MANUAL

Project:	Bolton Master Drainage Plan Update - Town of Caledon
Project No.:	9653
Date:	January 8, 1997.
Pond Location:	Retrofit existing Station Road quality control pond :

Design Data:

A = urbanized tributary drainage area (ha)
Qqual = pond inlet flow rate during the design quality event (m^3/sec.)
Qpipe = max. pond inlet flow rate from storm sewer - 10 yr. design maximum (m^3/sec.)
Qp = outflow from forebay during quality storm event (m^3/s)
r = forebay length to width ratio (minimum 2:1 ratio)
Vs = settling velocity of particle size to be removed
d = average permanent pool depth (m) (i.e. pool elev. - avg. pond bottom elev.)
Vf = desired flow velocity in the forebay (typically 0.5 m/s)
a = forebay sideslope ratio (3:1 typical)
Dist = forebay length (m)
w = minimum forebay bottom width (m)
Upstream catchment average imperviousness = 35%

Set : Preliminary permanent pool elevation = 237.95 m
Preliminary pond bottom elevation (weighted) = 236.62 m

Therefore,

A =	45	ha	
Qqual (25 mm stm)=	1.5	m^3/sec	(from INTERHYMO modelling)
Qpipe (10 yr stm) =	3.6	m^3/sec	(from INTERHYMO modelling)
Qp =	1.29	m^3/sec	(from INTERHYMO modelling)
r =	8	:1	
Vs =	0.0003	m/s	(150 um particle)
d =	1.33	m	(perm. pool - weighted pond bottom elevations)
Vf =	0.5	m/s	
a =	3	:1	
Dist =	80	m	(existing pond length)

A. Check settling length and dispersion length:

a) Settling Length - reference Appendix G - SWMP Manual

Criteria: Settle out 150 um particle below the overflow weir elevation during the 25 mm storm event.

From INTERHYMO modelling :

Qp =	1.29	m^3/sec
Calculated ponding elev. =	239.17	m
Weir invert elev. =	239.00	m
Therefore, required distance for particle to settle =	**0.17**	**m**

Calculated cross sectional flow area (A) = 37.8 m^2
Calculated velocity through forebay = (Qp / A) = 0.034 m/s
Given existing forebay length, calculate
detention time for particles in the forebay = 2344 seconds or 39 minutes

Vertical settled distance for 150 um particle,
during detention time in forebay = (Vs x detention time) = **0.70 m** **(vertical settling depth > flow depth over weir, therefore, 150 um particle will be captured)**

b) Check existing pond length for minimum dispersion length:

Minimum Dispersion Length = (8 x Qpipe) / (d x Vf) = **43.3 m** **(existing pond length>min. dispersion length)**

Therefore, existing forebay length (dist) = 80 m
satisfies minimum settling length and dispersion length criteria.

B. Minimum forebay bottom width:

Preferred minimum width (w) = dist / 8 = 10.0 m

Selected average forebay bottom width = 10 m **(same as existing forebay width)**

C. Check for average flow velocity in the forebay is < 0.15 m/s (to pass 10 yr. inflow rate):

Proposed overflow weir elevation =	239.00 m
Estimated 10 yr. flow depth over weir =	0.34 m
Estimated water elevation over weir to pass 10 yr. flow =	239.34 m

Average depth in forebay during 10 yr. inflow event = 2.72 m
(10 yr. flow elev. - weighted pond bottom elev.)

Average 10 yr. flow cross-sectional area = 49.4 m^2

Therefore, average flow velocity = **0.07 m/s** **(less than 0.15 m^3/s per critèria)**.

D. Check total forebay volume > 10 years of sediment accumulation:

Forebay permanent pool volume = average cross sectional area x dist

Average permanent pool cross-sectional area = 14.0 m^2
Therefore, total forebay volume = **1119 m^3**

Select annual sediment loading based on catchment imperviousness (MOEE Table 5.3):

Imperviousness (%)	Annual Loading (m^3/ha)
35 %	0.6
55 %	1.9
70 %	2.8
85 %	3.8

Selected loading = 0.6 m^3/ha

Projected 10 year sediment accumulation = urbanized drainage area x selected loading x 10 years

Therefore, projected sediment accumulation = **270 m^3** **(forebay volume, 1119 m^3 > 270 m^3)**

E. Check ratio of forebay area to total downstream quality pond area < 0.3:

Total downstream quality pond area = 5780 m^2 (25 mm storm ponding area)

Total forebay area = ((sideslp. ratio x depth x 2) + preferred width) x distance

Total forebay area = 1438.4 m^2

Therefore, total forebay area / total quality pond area = **0.25** **(less than 0.3 per criteria)**

Heritage Hills Phase II, Town of Caledon
FB File: 9015.2

03-Sep-97
suspensn.wk4

Forebay Retrofit:
Hydraulic Calculations Using 100 Year Event

A. Settling Length and Dispersion Length

from Stormwater Management Report (Heritage Hills Phase 2):

i) Cross-Sectional Flow Area: 40 m^2
ii) Total Flow: 3.7 m^3/s
(Catchments 500 + 600, plus minor system flows from Catchments 402 and 700)
iii) settling velocity (Vs): .0006 m/s (average Vs for particles 0.13 mm to 0.40 mm)
iv) exist. forebay length (Lf): 80 m

Settling Length:

Calc. velocity thru pond (Vp)): Qp/A = 3.7/40 = .09 m/s
detention time: Lf/Vp= 890 seconds

Vertical Distance Settled as Particle moves thru pond = Vs x Detention time = .0006 x 890 = 0.53m

Depth of flow on overflow weir for 100 Year event is 0.3 to 0.4m. Therefore Settling Distance > Flow Depth on Weir meaning that all particles within this size category will settle out as they move thru the forebay.

Dispersion Length (10 year flow only):

Min. Dispersion length= 8 x Qpipe/ (d x Vf)

where: d is permanent pool depth
Vf is flow velocity in forebay (0.5 m/s approx.)

Dispersion Length = 8 x 2.9/ (2.1 x .15) = 73 m < actual length of 80m

B. Minimum Forebay Bottom Width:

Min. Width = forebay length/8 = 10m (same as actual)

C. Average Flow Velocity:

V = Q/A where: V is the avarage flow velocity
Q is maximum flow into forebay (3.7 m^3/s)
A is cross-sectional area of forebay (40 m^2 approx.)

therefore, V = 3.7/40 = 0.09 m/s (< recommended allowable of 0.15 m/s)

D. Estimated Clean-out Frequency (should be 10 years or more)

Est. Forebay Volume = 40 m^2 (cross-sectional area) x 80 m (length) = 3200 m^3

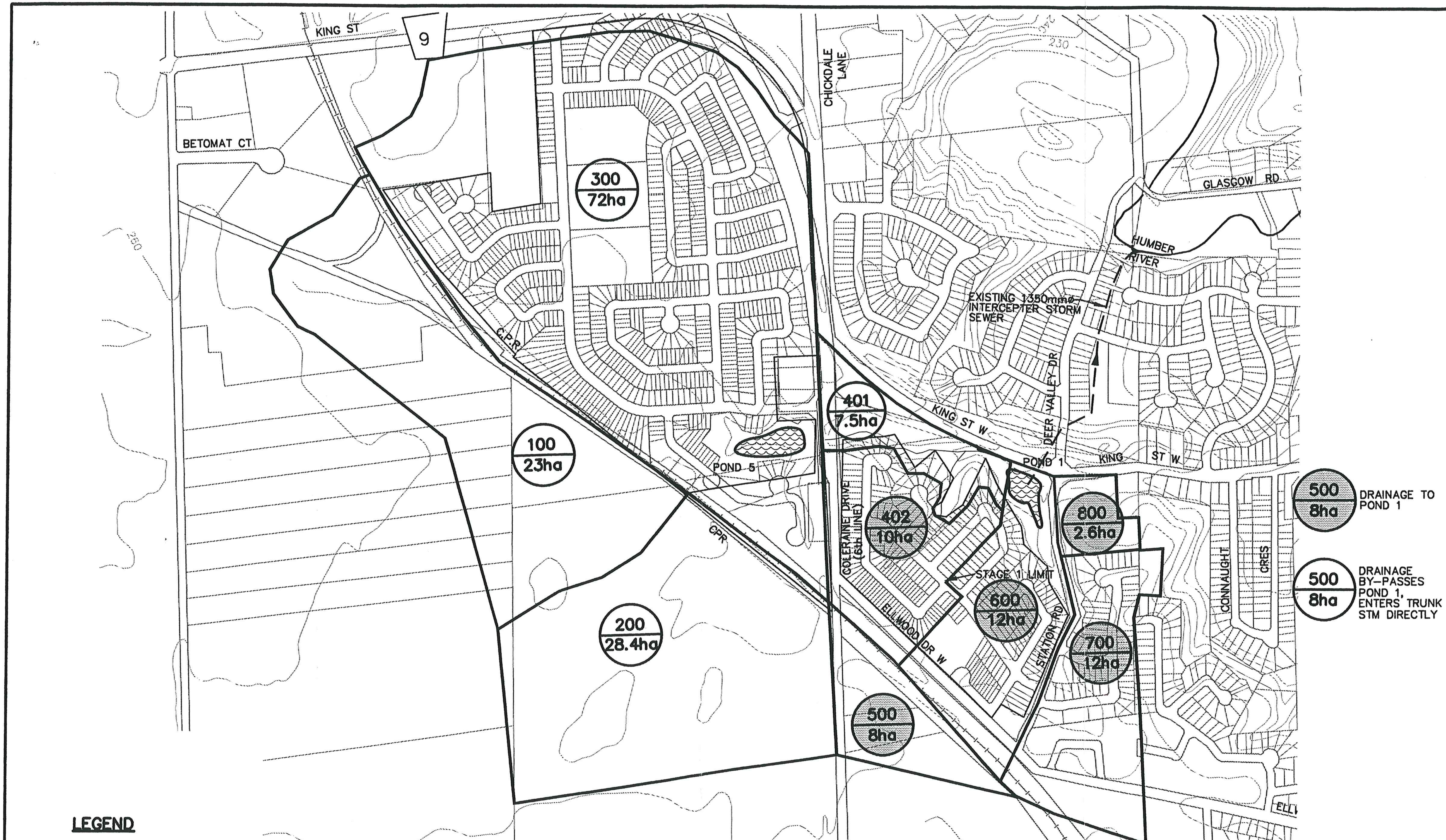
Annual Sediment accumulation	= 0.6 m^3/ha x 36.5 ha (drainage area to forebay) = 22 m^3
and 10 year accumulation	10 x 22 = 220 m^3 (<< total forebay volume)

E. Ratio of Forebay Area to Downstream Quality Pond Area (should be <0.3):

Quality Pond Area: 4500 m^2 (volume of pond at First Flush elevation / average depth)

Forebay Area: 1440 m^2

Forebay Area/ Quality Pond Area: 0.32 (slightly > recommended criteria)



LEGEND

500
8ha — WATERSHED AREA

NOTE: BASE PLAN INFORMATION PREPARED IN COOPERATION WITH THE REGION OF PEEL

PREPARED BY:

FALBY BURNSIDE & ASSOCIATES LTD.
ENGINEERS – HYDROGEOLOGISTS – ENVIRONMENTAL CONSULTANTS
8500 TORBRAM ROAD, SUITE 56, BRAMPTON, ONTARIO L6T5C6
TELEPHONE: 905-793-9239 FAX: 905-793-5018
DATE JAN/1997 SCALE 1:7500 JOB No 9015-02

DRAINAGE TO POND 1

FIGURE 2

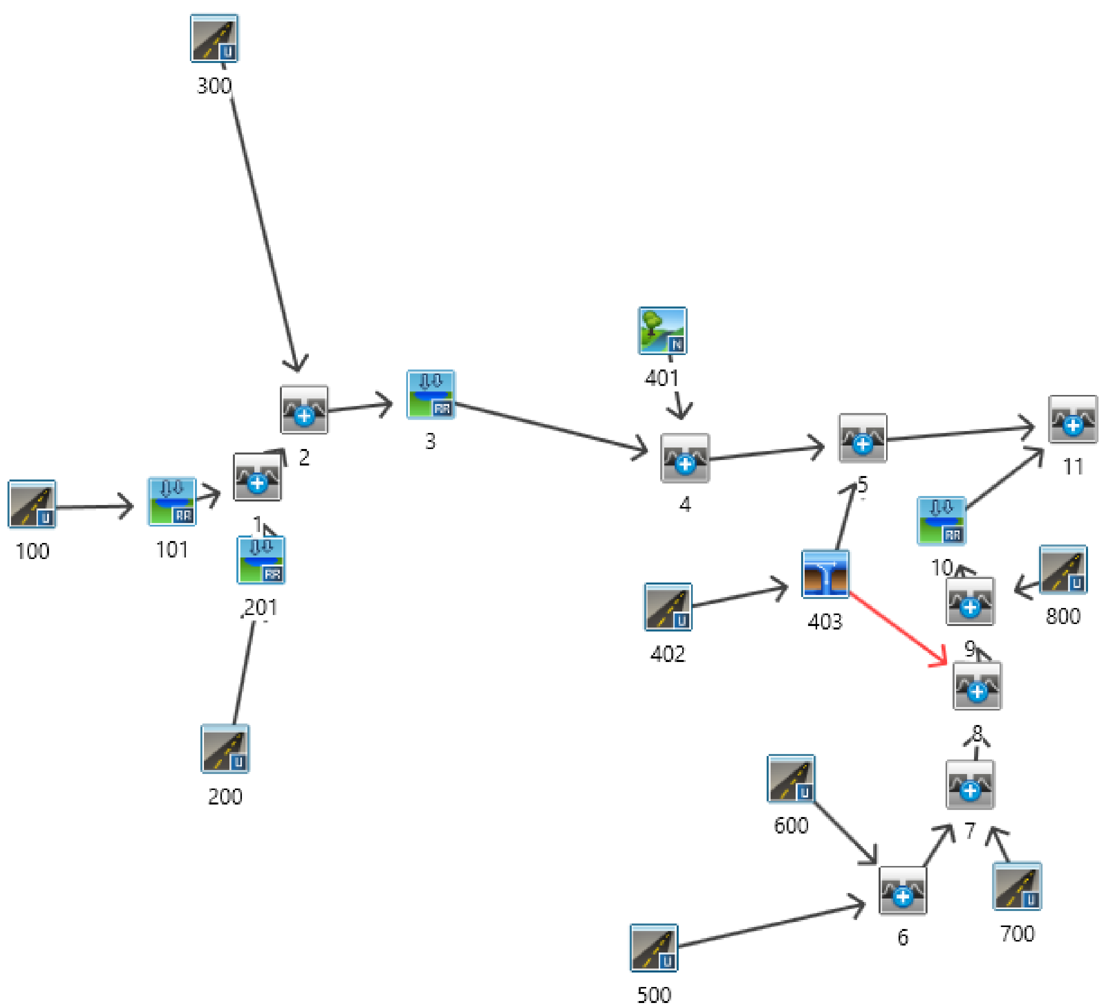
90152F02.DWG

C

Appendix C: VO Model Output

- Rebuilt Original Model
- Existing Conditions Model
- Proposed Under Railway
- Proposed Over Railway – No Controls
- Proposed Over Railway – Minor North

B000738 - Coleraine Drive
Original Recreated VO Model Schematic



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

       V    V   I    SSSSS  U   U    A    L             (v 6.0.2000)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

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



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


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.0\VO2\voin.dat

  Output  filename:
C:\Users\kevin.lukawiecki\AppData\Local\Civica\VH5\a512d3b0-a6e7-43a6-99e8-d9354a433
349\dbb06809-1124-4a61-b580-da487c34
  Summary filename:
C:\Users\kevin.lukawiecki\AppData\Local\Civica\VH5\a512d3b0-a6e7-43a6-99e8-d9354a433
349\dbb06809-1124-4a61-b580-da487c34


DATE: 01/26/2022                          TIME: 11:34:34

USER:


COMMENTS: ____________________________________________________________


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


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



```
|    READ STORM     |    Filename: C:\Users\kevin.lukawiecki\AppD
|                   |              ata\Local\Temp\
|                   |              941a575d-ba22-4919-a20a-7a30f90bf104\e2390d93
| 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             |
| NASHYD  (  0401)|   Area    (ha)=   7.50   Curve Number   (CN)= 63.0
|ID= 1 DT=15.0 min |   Ia      (mm)=   1.50   # of Linear Res.(N)= 2.00
--------------------   U.H. Tp(hrs)=   0.20

     Unit Hyd Qpeak  (cms)=   0.973

     PEAK FLOW      (cms)=   0.216 (i)
     TIME TO PEAK    (hrs)=   2.750
     RUNOFF VOLUME    (mm)=  12.698
     TOTAL RAINFALL   (mm)=  55.690
     RUNOFF COEFFICIENT   =   0.228

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

--------------------------------------------------------------------------------
--------------------
| CALIB             |
| STANDHYD (  0100)|   Area    (ha)=  23.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      17.25         5.75
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     390.00        40.00
     Mannings n           =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      51.24        34.94
                over (min)       15.00        30.00
```



```
     Storage Coeff.  (min)=      12.48 (ii)   21.88 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.08         0.05
                                                         *TOTALS*
     PEAK FLOW       (cms)=       2.00         0.34          2.283 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00          2.75
     RUNOFF VOLUME    (mm)=      53.69        21.52         42.43
     TOTAL RAINFALL   (mm)=      55.69        55.69         55.69
     RUNOFF COEFFICIENT   =       0.96         0.39          0.76

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

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

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0101)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 15.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                         0.0000     0.0000    |  0.7800      1.0000
                         0.7800     0.0000    |  0.0000      0.0000

                              AREA     QPEAK     TPEAK       R.V.
                              (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0100)     23.000     2.283      2.75      42.43
   OUTFLOW: ID= 1 (  0101)     23.000     0.780      2.50      43.11

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 34.16
                  TIME SHIFT OF PEAK FLOW         (min)=-15.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0939

--------------------------------------------------------------------------------
--------------------
| CALIB             |
| STANDHYD (  0200)|   Area    (ha)=  28.40
|ID= 1 DT=15.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      21.30         7.10
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     435.00        40.00
     Mannings n           =      0.030        0.200
```



```
     Max.Eff.Inten.(mm/hr)=      51.24        34.94
                over (min)       15.00        30.00
     Storage Coeff.  (min)=      13.32 (ii)   22.72 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.08         0.04
                                                         *TOTALS*
     PEAK FLOW       (cms)=       2.45         0.42          2.786 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00          2.75
     RUNOFF VOLUME    (mm)=      53.69        21.52         42.43
     TOTAL RAINFALL   (mm)=      55.69        55.69         55.69
     RUNOFF COEFFICIENT   =       0.96         0.39          0.76

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

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

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0201)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 15.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                         0.0000     0.0000    |  0.8700      1.2000
                         0.8700     0.0000    |  0.0000      0.0000

                              AREA     QPEAK     TPEAK       R.V.
                              (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0200)     28.400     2.786      2.75      42.43
   OUTFLOW: ID= 1 (  0201)     28.400     0.870      2.25      43.12

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 31.23
                  TIME SHIFT OF PEAK FLOW         (min)=-30.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.1257

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

--------------------
| ADD HYD  (  0001)|
|  1 +  2 =  3     |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0101):     23.00    0.780     2.50    43.11
     + ID2= 2 (  0201):     28.40    0.870     2.25    43.12
     ===============================================
```

```
    ID = 3 (  0001):    51.40   1.650     2.50    43.12

 NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0300)|   Area    (ha)=  72.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  49.00   Dir. Conn.(%)=  40.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      35.28        36.72
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     692.00        40.00
     Mannings n           =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      51.24        25.97
                over (min)       15.00        30.00
     Storage Coeff.  (min)=      17.60 (ii)   28.18 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.06         0.04
                                                           *TOTALS*
     PEAK FLOW       (cms)=       3.59         1.45          4.719 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00           2.75
     RUNOFF VOLUME    (mm)=      53.69        18.95          32.85
     TOTAL RAINFALL   (mm)=      55.69        55.69          55.69
     RUNOFF COEFFICIENT   =       0.96         0.34           0.59


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

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

--------------------
| ADD HYD  (  0002)|
|   1 +  2 =  3    |        AREA    QPEAK    TPEAK     R.V.
--------------------        (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0001):    51.40   1.650     2.50    43.12
     + ID2= 2 (  0300):    72.00   4.719     2.75    32.85
       ==================================================
       ID = 3 (  0002):   123.40   6.369     2.75    37.12

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



```
--------------------
| RESERVOIR(  0003)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 15.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                         0.0000     0.0000    |   0.1900     1.9300
                         0.0500     0.4200    |   0.4700     2.6400
                         0.0800     0.8400    |   0.8500     3.3400
                         0.0900     1.3900    |   1.3200     3.7000
                         0.1000     1.6000    |   2.4600     4.2500

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0002)    123.400      6.369      2.75      37.12
   OUTFLOW: ID= 1 (  0003)    123.400      1.261      5.50      37.11

                 PEAK   FLOW   REDUCTION [Qout/Qin](%)= 19.80
                 TIME SHIFT OF PEAK FLOW         (min)=165.00
                 MAXIMUM  STORAGE   USED       (ha.m.)=  3.6622

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

--------------------
| ADD HYD  (  0004)|
|   1 +  2 =  3    |        AREA    QPEAK    TPEAK     R.V.
--------------------        (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0003):   123.40   1.261     5.50    37.11
     + ID2= 2 (  0401):     7.50   0.216     2.75    12.70
       ==================================================
       ID = 3 (  0004):   130.90   1.271     5.50    35.71

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0402)|   Area    (ha)=  10.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  40.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       5.00         5.00
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     288.00        40.00
     Mannings n           =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      51.24        26.88
                over (min)       15.00        30.00
     Storage Coeff.  (min)=      10.40 (ii)   20.84 (ii)
```



```
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.09         0.05
                                                           *TOTALS*
     PEAK FLOW       (cms)=       0.55         0.23          0.737 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00           2.75
     RUNOFF VOLUME    (mm)=      53.69        19.24          33.02
     TOTAL RAINFALL   (mm)=      55.69        55.69          55.69
     RUNOFF COEFFICIENT   =       0.96         0.35           0.59

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

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

-------------------------------------------------------------------------------
--------------------
| DUHYD    (  0403)|
| Inlet Cap.= 0.740|
| #of Inlets=     1|
| Total(cms)=   0.7|      AREA     QPEAK     TPEAK    R.V.
--------------------      (ha)     (cms)     (hrs)    (mm)
     TOTAL HYD.(ID= 1):  10.00      0.74      2.75   33.02
     ==================================================
     MAJOR SYS.(ID= 2):   0.00      0.00      0.00    0.00
     MINOR SYS.(ID= 3):  10.00      0.74      2.75   33.02

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD  (  0005)|
|   1 +  2 =  3    |        AREA    QPEAK    TPEAK     R.V.
--------------------        (ha)    (cms)    (hrs)     (mm)
*** W A R N I N G :  HYDROGRAPH   0403 <ID= 2> IS DRY.
*** W A R N I N G :  HYDROGRAPH   0003 = HYDROGRAPH 0001
       ID1= 1 (  0004):   130.90   1.271     5.50    35.71
     + ID2= 2 (  0403):     0.00   0.000     0.00     0.00
       ==================================================
       ID = 3 (  0005):   130.90   1.271     5.50    35.71

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



```
| STANDHYD (  0500)|   Area    (ha)=   8.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       6.00         2.00
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     230.00        40.00
     Mannings n           =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      51.24        34.94
                over (min)       15.00        30.00
     Storage Coeff.  (min)=       9.09 (ii)   18.49 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.09         0.05
                                                           *TOTALS*
     PEAK FLOW       (cms)=       0.72         0.13          0.829 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00           2.75
     RUNOFF VOLUME    (mm)=      53.69        21.52          42.43
     TOTAL RAINFALL   (mm)=      55.69        55.69          55.69
     RUNOFF COEFFICIENT   =       0.96         0.39           0.76

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

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

-------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0600)|   Area    (ha)=  12.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  40.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       6.00         6.00
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     270.00        40.00
     Mannings n           =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      51.24        26.88
                over (min)       15.00        30.00
     Storage Coeff.  (min)=      10.01 (ii)   20.45 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.09         0.05
```

```
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.66        0.28          0.889 (iii)
     TIME TO PEAK    (hrs)=       2.75        3.00           2.75
     RUNOFF VOLUME    (mm)=      53.69       19.24          33.02
     TOTAL RAINFALL   (mm)=      55.69       55.69          55.69
     RUNOFF COEFFICIENT   =       0.96        0.35           0.59

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

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

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

--------------------
| ADD HYD  (  0006)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0500):     8.00   0.829     2.75    42.43
      + ID2= 2 (  0600):    12.00   0.889     2.75    33.02
        ==================================================
        ID = 3 (  0006):    20.00   1.717     2.75    36.78

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0700)|   Area    (ha)=  12.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  55.00   Dir. Conn.(%)=  43.00
--------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       6.60        5.40
     Dep. Storage     (mm)=       2.00        5.00
     Average Slope     (%)=       1.00        2.00
     Length            (m)=     282.00       40.00
     Mannings n           =      0.030       0.200

     Max.Eff.Inten.(mm/hr)=      51.24       29.51
                over (min)      15.00       30.00
     Storage Coeff.  (min)=      10.27 (ii)  20.33 (ii)
     Unit Hyd. Tpeak (min)=      15.00       30.00
     Unit Hyd. peak  (cms)=       0.09        0.05
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.71        0.28          0.936 (iii)
     TIME TO PEAK    (hrs)=       2.75        3.00           2.75
```



```
     RUNOFF VOLUME    (mm)=      53.69       20.03          34.50
     TOTAL RAINFALL   (mm)=      55.69       55.69          55.69
     RUNOFF COEFFICIENT   =       0.96        0.36           0.62

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

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

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

--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0006):    20.00   1.717     2.75    36.78
      + ID2= 2 (  0700):    12.00   0.936     2.75    34.50
        ==================================================
        ID = 3 (  0007):    32.00   2.654     2.75    35.93

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

--------------------
| ADD HYD  (  0008)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0403):    10.00   0.737     2.75    33.02
      + ID2= 2 (  0007):    32.00   2.654     2.75    35.93
        ==================================================
        ID = 3 (  0008):    42.00   3.390     2.75    35.24

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0800)|   Area    (ha)=   2.60
|ID= 1 DT=15.0 min |   Total Imp(%)=  60.00   Dir. Conn.(%)=  45.00
--------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.56        1.04
     Dep. Storage     (mm)=       2.00        5.00
     Average Slope     (%)=       1.00        2.00
     Length            (m)=     131.00       40.00
     Mannings n           =      0.030       0.200
```



```
     Max.Eff.Inten.(mm/hr)=      51.24       33.90
                over (min)      15.00       30.00
     Storage Coeff.  (min)=       6.48 (ii)  16.00 (ii)
     Unit Hyd. Tpeak (min)=      15.00       30.00
     Unit Hyd. peak  (cms)=       0.10        0.05
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.17        0.07          0.222 (iii)
     TIME TO PEAK    (hrs)=       2.75        3.00           2.75
     RUNOFF VOLUME    (mm)=      53.69       21.25          35.85
     TOTAL RAINFALL   (mm)=      55.69       55.69          55.69
     RUNOFF COEFFICIENT   =       0.96        0.38           0.64

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

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

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

--------------------
| ADD HYD  (  0009)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0008):    42.00   3.390     2.75    35.24
      + ID2= 2 (  0800):     2.60   0.222     2.75    35.85
        ==================================================
        ID = 3 (  0009):    44.60   3.612     2.75    35.27

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR( 0010)|      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   |   0.9400     0.6210
                           0.0500     0.1950   |   2.6600     0.7760
                           0.0800     0.3860   |   4.0200     0.9110
                           0.1300     0.4750   |   0.0000     0.0000

                                  AREA     QPEAK     TPEAK       R.V.
                                  (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0009)      44.600     3.612      2.75      35.27
   OUTFLOW: ID= 1 (  0010)      44.600     2.076      3.08      35.25
```



```
                    PEAK   FLOW   REDUCTION [Qout/Qin](%)= 57.47
                    TIME SHIFT OF PEAK FLOW         (min)= 20.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=  0.7240

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

--------------------
| ADD HYD  (  0011)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0010):    44.60   2.076     3.08    35.25
      + ID2= 2 (  0005):   130.90   1.271     5.50    35.71
        ==================================================
        ID = 3 (  0011):   175.50   2.444     3.08    35.57

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

 FINISH
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       V    V   I    SSSSS  U    U    A    L              (v 6.0.2000)
       V    V   I    SS     U    U   A A   L
        V  V    I     SS    U    U  AAAAA  L
        V  V    I      SS   U    U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

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



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


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.0\VO2\voin.dat

  Output  filename:
C:\Users\kevin.lukawiecki\AppData\Local\Civica\VH5\a512d3b0-a6e7-43a6-99e8-d9354a433
```

```
349\c8b1aced-c822-4809-b2c6-ab952cdc
  Summary filename:
C:\Users\kevin.lukawiecki\AppData\Local\Civica\VH5\a512d3b0-a6e7-43a6-99e8-d9354a433
349\c8b1aced-c822-4809-b2c6-ab952cdc


DATE: 01/26/2022                           TIME: 11:34:34

USER:



COMMENTS: ___________________________________________________________


------------------------------------------------------------------------------------
----------------------
  ************************************************
  ** SIMULATION : 100 Year                      **
  ************************************************


--------------------
|    READ STORM    |    Filename: C:\Users\kevin.lukawiecki\AppD
|                  |              ata\Local\Temp\
|                  |              941a575d-ba22-4919-a20a-7a30f90bf104\073ffba8
| 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            |
| NASHYD   (  0401)|   Area    (ha)=   7.50   Curve Number   (CN)= 63.0
|ID= 1 DT=15.0 min |   Ia      (mm)=   1.50   # of Linear Res.(N)= 2.00
--------------------   U.H. Tp(hrs)=   0.20

     Unit Hyd Qpeak  (cms)=   0.973
```



```
     PEAK FLOW       (cms)=   0.414 (i)
     TIME TO PEAK    (hrs)=   2.750
     RUNOFF VOLUME    (mm)=  23.957
     TOTAL RAINFALL   (mm)=  80.310
     RUNOFF COEFFICIENT   =   0.298

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0100)|   Area    (ha)=  23.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      17.25         5.75
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     390.00        40.00
     Mannings n          =       0.030        0.200

     Max.Eff.Inten.(mm/hr)=      73.88        62.61
                over (min)       15.00        30.00
     Storage Coeff.  (min)=      10.78 (ii)   18.22 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.09         0.05
                                                          *TOTALS*
     PEAK FLOW       (cms)=       2.95         0.67          3.527 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00           2.75
     RUNOFF VOLUME    (mm)=      78.31        39.04          64.56
     TOTAL RAINFALL   (mm)=      80.31        80.31          80.31
     RUNOFF COEFFICIENT   =       0.98         0.49           0.80

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

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

--------------------------------------------------------------------------------
--------------------
| RESERVOIR( 0101)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 15.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.7800     1.0000
```



```
                          0.7800     0.0000   |   0.0000      0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0100)     23.000     3.527      2.75      64.56
   OUTFLOW: ID= 1 (  0101)     23.000     0.780      2.00      65.64

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 22.12
                  TIME SHIFT OF PEAK FLOW         (min)=-45.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.2357

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0200)|   Area    (ha)=  28.40
|ID= 1 DT=15.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      21.30         7.10
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     435.00        40.00
     Mannings n          =       0.030        0.200

     Max.Eff.Inten.(mm/hr)=      73.88        62.61
                over (min)       15.00        30.00
     Storage Coeff.  (min)=      11.51 (ii)   18.95 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.08         0.05
                                                          *TOTALS*
     PEAK FLOW       (cms)=       3.61         0.81          4.312 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00           2.75
     RUNOFF VOLUME    (mm)=      78.31        39.04          64.56
     TOTAL RAINFALL   (mm)=      80.31        80.31          80.31
     RUNOFF COEFFICIENT   =       0.98         0.49           0.80

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

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

--------------------------------------------------------------------------------
--------------------
| RESERVOIR( 0201)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
```



```
| DT= 15.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.8700     1.2000
                          0.8700     0.0000   |   0.0000     0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0200)     28.400     4.312      2.75      64.56
   OUTFLOW: ID= 1 (  0201)     28.400     0.870      2.00      65.78

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 20.17
                  TIME SHIFT OF PEAK FLOW         (min)=-45.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.3070

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


--------------------
| ADD HYD  (  0001)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0101):    23.00   0.780     2.00    65.64
      + ID2= 2 (  0201):    28.40   0.870     2.00    65.78
        ===============================================
        ID = 3 (  0001):    51.40   1.650     2.00    65.72

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0300)|   Area    (ha)=  72.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  49.00   Dir. Conn.(%)=  40.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      35.28        36.72
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     692.00        40.00
     Mannings n          =       0.030        0.200

     Max.Eff.Inten.(mm/hr)=      73.88        47.77
                over (min)       15.00        30.00
     Storage Coeff.  (min)=      15.20 (ii)   23.50 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.07         0.04
                                                          *TOTALS*
     PEAK FLOW       (cms)=       5.36         2.96          7.805 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00           2.75
     RUNOFF VOLUME    (mm)=      78.31        35.22          52.46
```

```
     TOTAL RAINFALL   (mm)=      80.31        80.31          80.31
     RUNOFF COEFFICIENT   =       0.98         0.44           0.65

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

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

--------------------
| ADD HYD  (  0002)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0001):    51.40   1.650     2.00    65.72
     + ID2= 2 (  0300):    72.00   7.805     2.75    52.46
       ==================================================
       ID = 3 (  0002):   123.40   9.455     2.75    57.98

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR( 0003)|      OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 15.0 min     |      OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------       (cms)     (ha.m.)   |   (cms)     (ha.m.)
                           0.0000     0.0000   |   0.1900     1.9300
                           0.0500     0.4200   |   0.4700     2.6400
                           0.0800     0.8400   |   0.8500     3.3400
                           0.0900     1.3900   |   1.3200     3.7000
                           0.1000     1.6000   |   2.4600     4.2500

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0002)    123.400      9.455      2.75      57.98
   OUTFLOW: ID= 1 (  0003)    123.400      2.408      4.75      57.96

                 PEAK   FLOW   REDUCTION [Qout/Qin](%)= 25.47
                 TIME SHIFT OF PEAK FLOW         (min)=120.00
                 MAXIMUM  STORAGE   USED       (ha.m.)=  4.2253

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

--------------------
| ADD HYD  (  0004)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
```



```
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0003):   123.40   2.408     4.75    57.96
     + ID2= 2 (  0401):     7.50   0.414     2.75    23.96
       ==================================================
       ID = 3 (  0004):   130.90   2.449     4.75    56.01

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0402)|   Area    (ha)=  10.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  40.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       5.00         5.00
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     288.00        40.00
     Mannings n          =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      73.88        49.29
                over (min)      15.00        30.00
     Storage Coeff.  (min)=       8.98 (ii)   17.18 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.09         0.05
                                                          *TOTALS*
     PEAK FLOW      (cms)=       0.80         0.46          1.201 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00           2.75
     RUNOFF VOLUME    (mm)=      78.31        35.66          52.72
     TOTAL RAINFALL   (mm)=      80.31        80.31          80.31
     RUNOFF COEFFICIENT   =       0.98         0.44           0.66

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

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

--------------------------------------------------------------------------------
--------------------
| DUHYD    (  0403)|
| Inlet Cap.= 0.740|
| #of Inlets=     1|
| Total(cms)=   0.7|      AREA     QPEAK     TPEAK     R.V.
--------------------      (ha)     (cms)     (hrs)     (mm)
     TOTAL HYD.(ID= 1):  10.00      1.20      2.75   52.72
```



```
     ===================================================
     MAJOR SYS.(ID= 2):   1.15      0.46      2.75   52.72
     MINOR SYS.(ID= 3):   8.85      0.74      2.50   52.72

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD  (  0005)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0004):   130.90   2.449     4.75    56.01
     + ID2= 2 (  0403):     1.15   0.461     2.75    52.72
       ==================================================
       ID = 3 (  0005):   132.05   2.449     4.75    55.99

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0500)|   Area    (ha)=   8.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       6.00         2.00
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     230.00        40.00
     Mannings n          =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      73.88        62.61
                over (min)      15.00        30.00
     Storage Coeff.  (min)=       7.85 (ii)   15.30 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.10         0.05
                                                          *TOTALS*
     PEAK FLOW      (cms)=       1.05         0.24          1.269 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00           2.75
     RUNOFF VOLUME    (mm)=      78.31        39.04          64.56
     TOTAL RAINFALL   (mm)=      80.31        80.31          80.31
     RUNOFF COEFFICIENT   =       0.98         0.49           0.80

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
```



```
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0600)|   Area    (ha)=  12.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  40.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       6.00         6.00
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     270.00        40.00
     Mannings n          =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      73.88        49.29
                over (min)      15.00        30.00
     Storage Coeff.  (min)=       8.64 (ii)   16.84 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.09         0.05
                                                          *TOTALS*
     PEAK FLOW      (cms)=       0.97         0.56          1.448 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00           2.75
     RUNOFF VOLUME    (mm)=      78.31        35.66          52.72
     TOTAL RAINFALL   (mm)=      80.31        80.31          80.31
     RUNOFF COEFFICIENT   =       0.98         0.44           0.66

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

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

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

--------------------
| ADD HYD  (  0006)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0500):     8.00   1.269     2.75    64.56
     + ID2= 2 (  0600):    12.00   1.448     2.75    52.72
       ==================================================
       ID = 3 (  0006):    20.00   2.718     2.75    57.46

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

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------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD ( 0700)|   Area    (ha)=  12.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  55.00   Dir. Conn.(%)=  43.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       6.60         5.40
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     282.00        40.00
     Mannings n           =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      73.88        53.66
                over (min)       15.00        30.00
     Storage Coeff.  (min)=       8.87 (ii)   16.79 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.09         0.05
                                                            *TOTALS*
     PEAK FLOW       (cms)=       1.04         0.55          1.513 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00           2.75
     RUNOFF VOLUME    (mm)=      78.31        36.84          54.67
     TOTAL RAINFALL   (mm)=      80.31        80.31          80.31
     RUNOFF COEFFICIENT   =       0.98         0.46           0.68

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

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

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

--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0006):     20.00   2.718     2.75    57.46
     + ID2= 2 (  0700):     12.00   1.513     2.75    54.67
       ==================================================
       ID = 3 (  0007):     32.00   4.231     2.75    56.41

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

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```



```
| ADD HYD  (  0008)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0403):      8.85   0.740     2.50    52.72
     + ID2= 2 (  0007):     32.00   4.231     2.75    56.41
       ==================================================
       ID = 3 (  0008):     40.85   4.971     2.75    55.61

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

--------------------
| CALIB              |
| STANDHYD ( 0800)|   Area    (ha)=   2.60
|ID= 1 DT=15.0 min |   Total Imp(%)=  60.00   Dir. Conn.(%)=  45.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.56         1.04
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     131.00        40.00
     Mannings n           =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      73.88        60.91
                over (min)       15.00        15.00
     Storage Coeff.  (min)=       5.60 (ii)   13.13 (ii)
     Unit Hyd. Tpeak (min)=      15.00        15.00
     Unit Hyd. peak  (cms)=       0.11         0.08
                                                            *TOTALS*
     PEAK FLOW       (cms)=       0.24         0.15          0.390 (iii)
     TIME TO PEAK    (hrs)=       2.75         2.75           2.75
     RUNOFF VOLUME    (mm)=      78.31        38.64          56.49
     TOTAL RAINFALL   (mm)=      80.31        80.31          80.31
     RUNOFF COEFFICIENT   =       0.98         0.48           0.70

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

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

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

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



```
       ID1= 1 (  0008):     40.85   4.971     2.75    55.61
     + ID2= 2 (  0800):      2.60   0.390     2.75    56.49
       ==================================================
       ID = 3 (  0009):     43.45   5.360     2.75    55.66

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

--------------------
| RESERVOIR(  0010)|     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   |   0.9400     0.6210
                          0.0500     0.1950   |   2.6600     0.7760
                          0.0800     0.3860   |   4.0200     0.9110
                          0.1300     0.4750   |   0.0000     0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0009)     43.454      5.360      2.75      55.66
   OUTFLOW: ID= 1 (  0010)     43.454      3.814      2.92      55.64

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 71.15
                  TIME SHIFT OF PEAK FLOW        (min)= 10.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.8951

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

--------------------
| ADD HYD  (  0011)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0010):     43.45   3.814     2.92    55.64
     + ID2= 2 (  0005):    132.05   2.449     4.75    55.99
       ==================================================
       ID = 3 (  0011):    175.50   4.731     2.92    55.88

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

       V    V   I    SSSSS  U   U    A     L              (v 6.0.2000)
       V    V   I    SS     U   U   A A    L
        V  V    I     SS    U   U  AAAAA   L
        V  V    I      SS   U   U  A   A   L
         VV     I    SSSSS  UUUUU  A    A  LLLLL
```



```
       OOO    TTTTT  TTTTT  H   H  Y   Y  M   M   OOO     TM
      O   O     T      T    H   H   Y Y   MM MM  O   O
      O   O     T      T    H   H    Y    M   M  O   O
       OOO      T      T    H   H    Y    M   M   OOO
Developed and Distributed by Civica Infrastructure
```



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


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.0\VO2\voin.dat

  Output  filename:
C:\Users\kevin.lukawiecki\AppData\Local\Civica\VH5\a512d3b0-a6e7-43a6-99e8-d9354a433
349\8b477683-b9ab-4a00-a773-075b22fd
  Summary filename:
C:\Users\kevin.lukawiecki\AppData\Local\Civica\VH5\a512d3b0-a6e7-43a6-99e8-d9354a433
349\8b477683-b9ab-4a00-a773-075b22fd


DATE: 01/26/2022                           TIME: 11:34:33

USER:


COMMENTS: ____________________________________________________________


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


--------------------
|   READ STORM      |    Filename: C:\Users\kevin.lukawiecki\AppD
|                   |              ata\Local\Temp\
|                   |              941a575d-ba22-4919-a20a-7a30f90bf104\e5851225
| 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            |
| NASHYD   (  0401)|   Area    (ha)=   7.50   Curve Number   (CN)= 63.0
|ID= 1 DT=15.0 min |   Ia      (mm)=   1.50   # of Linear Res.(N)= 2.00
--------------------   U.H. Tp(hrs)=   0.20

     Unit Hyd Qpeak  (cms)=   0.973

     PEAK FLOW       (cms)=   0.095 (i)
     TIME TO PEAK    (hrs)=   2.750
     RUNOFF VOLUME    (mm)=   5.698
     TOTAL RAINFALL   (mm)=  36.000
     RUNOFF COEFFICIENT   =   0.158

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

-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0100)|   Area    (ha)=  23.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      17.25         5.75
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     390.00        40.00
     Mannings n           =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      33.12        16.19
                over (min)       15.00        30.00
     Storage Coeff.  (min)=      14.85 (ii)   27.64 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.07         0.04
                                                          *TOTALS*
     PEAK FLOW       (cms)=       1.25         0.14          1.359 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00           2.75
     RUNOFF VOLUME    (mm)=      34.00         9.87          25.55
     TOTAL RAINFALL   (mm)=      36.00        36.00          36.00
     RUNOFF COEFFICIENT   =       0.94         0.27           0.71
```



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

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

-------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0101)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 15.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.7800     1.0000
                          0.7800     0.0000   |   0.0000     0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0100)     23.000     1.359      2.75      25.55
   OUTFLOW: ID= 1 (  0101)     23.000     0.780      2.50      25.67

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 57.41
                  TIME SHIFT OF PEAK FLOW         (min)=-15.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0268

-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0200)|   Area    (ha)=  28.40
|ID= 1 DT=15.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      21.30         7.10
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     435.00        40.00
     Mannings n           =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      33.12        16.19
                over (min)       15.00        30.00
     Storage Coeff.  (min)=      15.86 (ii)   28.65 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.07         0.04
                                                          *TOTALS*
     PEAK FLOW       (cms)=       1.53         0.17          1.653 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00           2.75
```



```
     RUNOFF VOLUME    (mm)=      34.00         9.87          25.55
     TOTAL RAINFALL   (mm)=      36.00        36.00          36.00
     RUNOFF COEFFICIENT   =       0.94         0.27           0.71


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

-------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0201)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 15.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.8700     1.2000
                          0.8700     0.0000   |   0.0000     0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0200)     28.400     1.653      2.75      25.55
   OUTFLOW: ID= 1 (  0201)     28.400     0.870      2.50      25.73

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 52.64
                  TIME SHIFT OF PEAK FLOW         (min)=-15.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0385

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

--------------------
| ADD HYD  (  0001)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0101):    23.00   0.780     2.50    25.67
      + ID2= 2 (  0201):    28.40   0.870     2.50    25.73
        ==================================================
        ID = 3 (  0001):    51.40   1.650     2.50    25.71

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0300)|   Area    (ha)=  72.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  49.00   Dir. Conn.(%)=  40.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
```



```
     Surface Area     (ha)=      35.28        36.72
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     692.00        40.00
     Mannings n           =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      33.12        11.62
                over (min)       15.00        45.00
     Storage Coeff.  (min)=      20.95 (ii)   35.56 (ii)
     Unit Hyd. Tpeak (min)=      15.00        45.00
     Unit Hyd. peak  (cms)=       0.06         0.03
                                                          *TOTALS*
     PEAK FLOW       (cms)=       2.20         0.54          2.450 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.25           2.75
     RUNOFF VOLUME    (mm)=      34.00         8.41          18.64
     TOTAL RAINFALL   (mm)=      36.00        36.00          36.00
     RUNOFF COEFFICIENT   =       0.94         0.23           0.52

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

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

--------------------
| ADD HYD  (  0002)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0001):    51.40   1.650     2.50    25.71
      + ID2= 2 (  0300):    72.00   2.450     2.75    18.64
        ==================================================
        ID = 3 (  0002):   123.40   4.100     2.75    21.59

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0003)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 15.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.1900     1.9300
                          0.0500     0.4200   |   0.4700     2.6400
                          0.0800     0.8400   |   0.8500     3.3400
                          0.0900     1.3900   |   1.3200     3.7000
                          0.1000     1.6000   |   2.4600     4.2500
```

```
                              AREA     QPEAK     TPEAK       R.V.
                              (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0002)    123.400      4.100      2.75      21.59
   OUTFLOW: ID= 1 (  0003)    123.400      0.343      5.25      21.57

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  8.38
                  TIME SHIFT OF PEAK FLOW         (min)=150.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  2.3204

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

--------------------
| ADD HYD  (  0004)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0003):   123.40   0.343     5.25    21.57
     + ID2= 2 (  0401):     7.50   0.095     2.75     5.70
       ===================================================
       ID = 3 (  0004):   130.90   0.349     5.25    20.66

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0402)|   Area    (ha)=  10.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  40.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       5.00         5.00
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     288.00        40.00
     Mannings n          =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      33.12        12.08
                over (min)       15.00        30.00
     Storage Coeff.  (min)=      12.38 (ii)   26.76 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.08         0.04
                                                            *TOTALS*
     PEAK FLOW       (cms)=       0.35         0.09           0.414 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00            2.75
     RUNOFF VOLUME    (mm)=      34.00         8.57           18.74
     TOTAL RAINFALL   (mm)=      36.00        36.00           36.00
     RUNOFF COEFFICIENT   =       0.94         0.24            0.52

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



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

-------------------------------------------------------------------------------
--------------------
| DUHYD    (  0403)|
| Inlet Cap.= 0.740|
| #of Inlets=     1|
| Total(cms)=   0.7|      AREA     QPEAK     TPEAK     R.V.
--------------------      (ha)     (cms)     (hrs)     (mm)
     TOTAL HYD.(ID= 1):  10.00      0.41      2.75   18.74
     ==================================================
     MAJOR SYS.(ID= 2):   0.00      0.00      0.00    0.00
     MINOR SYS.(ID= 3):  10.00      0.41      2.75   18.74

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD  (  0005)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
*** W A R N I N G :  HYDROGRAPH   0403 <ID= 2> IS DRY.
*** W A R N I N G :  HYDROGRAPH   0003 = HYDROGRAPH 0001
       ID1= 1 (  0004):   130.90   0.349     5.25    20.66
     + ID2= 2 (  0403):     0.00   0.000     0.00     0.00
       ===================================================
       ID = 3 (  0005):   130.90   0.349     5.25    20.66

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0500)|   Area    (ha)=   8.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       6.00         2.00
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     230.00        40.00
     Mannings n          =      0.030        0.200
```



```
     Max.Eff.Inten.(mm/hr)=      33.12        16.19
                over (min)       15.00        30.00
     Storage Coeff.  (min)=      10.82 (ii)   23.61 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.08         0.04
                                                            *TOTALS*
     PEAK FLOW       (cms)=       0.46         0.05           0.499 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00            2.75
     RUNOFF VOLUME    (mm)=      34.00         9.87           25.55
     TOTAL RAINFALL   (mm)=      36.00        36.00           36.00
     RUNOFF COEFFICIENT   =       0.94         0.27            0.71

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

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

-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0600)|   Area    (ha)=  12.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  40.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       6.00         6.00
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     270.00        40.00
     Mannings n          =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      33.12        12.08
                over (min)       15.00        30.00
     Storage Coeff.  (min)=      11.91 (ii)   26.29 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.08         0.04
                                                            *TOTALS*
     PEAK FLOW       (cms)=       0.42         0.11           0.500 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00            2.75
     RUNOFF VOLUME    (mm)=      34.00         8.57           18.74
     TOTAL RAINFALL   (mm)=      36.00        36.00           36.00
     RUNOFF COEFFICIENT   =       0.94         0.24            0.52

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
```



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

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

--------------------
| ADD HYD  (  0006)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0500):     8.00   0.499     2.75    25.55
     + ID2= 2 (  0600):    12.00   0.500     2.75    18.74
       ===================================================
       ID = 3 (  0006):    20.00   0.999     2.75    21.46

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0700)|   Area    (ha)=  12.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  55.00   Dir. Conn.(%)=  43.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       6.60         5.40
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     282.00        40.00
     Mannings n          =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      33.12        13.41
                over (min)       15.00        30.00
     Storage Coeff.  (min)=      12.23 (ii)   26.02 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.08         0.04
                                                            *TOTALS*
     PEAK FLOW       (cms)=       0.45         0.11           0.531 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00            2.75
     RUNOFF VOLUME    (mm)=      34.00         9.02           19.76
     TOTAL RAINFALL   (mm)=      36.00        36.00           36.00
     RUNOFF COEFFICIENT   =       0.94         0.25            0.55

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
```

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

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

--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0006):    20.00   0.999     2.75    21.46
      + ID2= 2 (  0700):    12.00   0.531     2.75    19.76
        ==================================================
        ID = 3 (  0007):    32.00   1.531     2.75    20.82

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

--------------------
| ADD HYD  (  0008)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0403):    10.00   0.414     2.75    18.74
      + ID2= 2 (  0007):    32.00   1.531     2.75    20.82
        ==================================================
        ID = 3 (  0008):    42.00   1.945     2.75    20.33

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
----------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0800)|   Area    (ha)=   2.60
|ID= 1 DT=15.0 min |   Total Imp(%)=  60.00   Dir. Conn.(%)=  45.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.56         1.04
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     131.00        40.00
     Mannings n          =       0.030        0.200

     Max.Eff.Inten.(mm/hr)=      33.12        15.66
               over (min)       15.00        30.00
     Storage Coeff.  (min)=       7.72 (ii)   20.68 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.10         0.05
                                                           *TOTALS*
     PEAK FLOW       (cms)=       0.11         0.03          0.128 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00           2.75
     RUNOFF VOLUME    (mm)=      34.00         9.71          20.64
```



```
     TOTAL RAINFALL   (mm)=      36.00        36.00          36.00
     RUNOFF COEFFICIENT   =       0.94         0.27           0.57

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

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

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

--------------------
| ADD HYD  (  0009)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0008):    42.00   1.945     2.75    20.33
      + ID2= 2 (  0800):     2.60   0.128     2.75    20.64
        ==================================================
        ID = 3 (  0009):    44.60   2.073     2.75    20.35

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
----------------------------------------------------------------------------
--------------------
| RESERVOIR(  0010)|     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   |   0.9400     0.6210
                          0.0500     0.1950   |   2.6600     0.7760
                          0.0800     0.3860   |   4.0200     0.9110
                          0.1300     0.4750   |   0.0000     0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0009)     44.600      2.073      2.75      20.35
   OUTFLOW: ID= 1 (  0010)     44.600      0.654      3.50      20.32

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 31.57
                  TIME SHIFT OF PEAK FLOW         (min)= 45.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.5695

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

--------------------
| ADD HYD  (  0011)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
```



```
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0010):    44.60   0.654     3.50    20.32
      + ID2= 2 (  0005):   130.90   0.349     5.25    20.66
        ==================================================
        ID = 3 (  0011):   175.50   0.857     3.83    20.56

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

       V    V   I    SSSSS  U   U    A    L              (v 6.0.2000)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                   *****  D E T A I L E D   O U T P U T *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.0\VO2\voin.dat

  Output  filename:
C:\Users\kevin.lukawiecki\AppData\Local\Civica\VH5\a512d3b0-a6e7-43a6-99e8-d9354a433
349\014f6269-dfd1-4e24-99f3-051c9984
  Summary filename:
C:\Users\kevin.lukawiecki\AppData\Local\Civica\VH5\a512d3b0-a6e7-43a6-99e8-d9354a433
349\014f6269-dfd1-4e24-99f3-051c9984


DATE: 01/26/2022                           TIME: 11:34:32

USER:


COMMENTS: ____________________________________________________________
```



```
------------------------------------------------------------------------------
----------------------
  **********************************************
  ** SIMULATION : 25 Year                    **
  **********************************************


--------------------
|   READ STORM     |    Filename: C:\Users\kevin.lukawiecki\AppD
|                  |              ata\Local\Temp\
|                  |              941a575d-ba22-4919-a20a-7a30f90bf104\1b8bf92b
| 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            |
| NASHYD   (  0401)|   Area    (ha)=   7.50   Curve Number   (CN)= 63.0
|ID= 1 DT=15.0 min |   Ia      (mm)=   1.50   # of Linear Res.(N)= 2.00
--------------------   U.H. Tp(hrs)=   0.20

     Unit Hyd Qpeak  (cms)=   0.973

     PEAK FLOW       (cms)=   0.290 (i)
     TIME TO PEAK    (hrs)=   2.750
     RUNOFF VOLUME    (mm)=  16.937
     TOTAL RAINFALL   (mm)=  65.590
     RUNOFF COEFFICIENT   =   0.258

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

----------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0100)|   Area    (ha)=  23.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
```

```
     Surface Area     (ha)=      17.25        5.75
     Dep. Storage     (mm)=       2.00        5.00
     Average Slope     (%)=       1.00        2.00
     Length            (m)=     390.00       40.00
     Mannings n           =      0.030       0.200

     Max.Eff.Inten.(mm/hr)=      60.35       45.65
                over (min)       15.00       30.00
     Storage Coeff.  (min)=      11.68 (ii)  20.13 (ii)
     Unit Hyd. Tpeak (min)=      15.00       30.00
     Unit Hyd. peak  (cms)=       0.08        0.05
                                                           *TOTALS*
     PEAK FLOW       (cms)=       2.38        0.47          2.774 (iii)
     TIME TO PEAK    (hrs)=       2.75        3.00           2.75
     RUNOFF VOLUME    (mm)=      63.59       28.26          51.22
     TOTAL RAINFALL   (mm)=      65.59       65.59          65.59
     RUNOFF COEFFICIENT   =       0.97        0.43           0.78

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

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

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0101)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 15.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.7800     1.0000
                          0.7800     0.0000   |   0.0000     0.0000

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0100)     23.000     2.774      2.75      51.22
   OUTFLOW: ID= 1 (  0101)     23.000     0.780      2.25      51.25

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 28.12
                  TIME SHIFT OF PEAK FLOW         (min)=-30.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.1424

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0200)|   Area    (ha)=  28.40
```



```
|ID= 1 DT=15.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      21.30        7.10
     Dep. Storage     (mm)=       2.00        5.00
     Average Slope     (%)=       1.00        2.00
     Length            (m)=     435.00       40.00
     Mannings n           =      0.030       0.200

     Max.Eff.Inten.(mm/hr)=      60.35       45.65
                over (min)       15.00       30.00
     Storage Coeff.  (min)=      12.48 (ii)  20.92 (ii)
     Unit Hyd. Tpeak (min)=      15.00       30.00
     Unit Hyd. peak  (cms)=       0.08        0.05
                                                           *TOTALS*
     PEAK FLOW       (cms)=       2.91        0.57          3.388 (iii)
     TIME TO PEAK    (hrs)=       2.75        3.00           2.75
     RUNOFF VOLUME    (mm)=      63.59       28.26          51.22
     TOTAL RAINFALL   (mm)=      65.59       65.59          65.59
     RUNOFF COEFFICIENT   =       0.97        0.43           0.78

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

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

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0201)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 15.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.8700     1.2000
                          0.8700     0.0000   |   0.0000     0.0000

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0200)     28.400     3.388      2.75      51.22
   OUTFLOW: ID= 1 (  0201)     28.400     0.870      2.00      51.50

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 25.68
                  TIME SHIFT OF PEAK FLOW         (min)=-45.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.1907

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



```
--------------------
| ADD HYD  (  0001)|
|   1 +  2 =  3    |        AREA    QPEAK    TPEAK     R.V.
--------------------        (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0101):    23.00   0.780     2.25    51.25
     + ID2= 2 (  0201):    28.40   0.870     2.00    51.50
       ==================================================
       ID = 3 (  0001):    51.40   1.650     2.25    51.39

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0300)|   Area    (ha)=  72.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  49.00   Dir. Conn.(%)=  40.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      35.28       36.72
     Dep. Storage     (mm)=       2.00        5.00
     Average Slope     (%)=       1.00        2.00
     Length            (m)=     692.00       40.00
     Mannings n           =      0.030       0.200

     Max.Eff.Inten.(mm/hr)=      60.35       34.34
                over (min)       15.00       30.00
     Storage Coeff.  (min)=      16.48 (ii)  25.95 (ii)
     Unit Hyd. Tpeak (min)=      15.00       30.00
     Unit Hyd. peak  (cms)=       0.07        0.04
                                                           *TOTALS*
     PEAK FLOW       (cms)=       4.30        2.02          5.910 (iii)
     TIME TO PEAK    (hrs)=       2.75        3.00           2.75
     RUNOFF VOLUME    (mm)=      63.59       25.16          40.53
     TOTAL RAINFALL   (mm)=      65.59       65.59          65.59
     RUNOFF COEFFICIENT   =       0.97        0.38           0.62


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

--------------------------------------------------------------------------------
--------------------
| ADD HYD  (  0002)|
|   1 +  2 =  3    |        AREA    QPEAK    TPEAK     R.V.
```



```
--------------------        (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0001):    51.40   1.650     2.25    51.39
     + ID2= 2 (  0300):    72.00   5.910     2.75    40.53
       ==================================================
       ID = 3 (  0002):   123.40   7.560     2.75    45.05

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0003)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 15.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.1900     1.9300
                          0.0500     0.4200   |   0.4700     2.6400
                          0.0800     0.8400   |   0.8500     3.3400
                          0.0900     1.3900   |   1.3200     3.7000
                          0.1000     1.6000   |   2.4600     4.2500

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0002)    123.400     7.560      2.75      45.05
   OUTFLOW: ID= 1 (  0003)    123.400     1.829      5.75      45.04

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 24.19
                  TIME SHIFT OF PEAK FLOW         (min)=180.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  3.9484

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

--------------------
| ADD HYD  (  0004)|
|   1 +  2 =  3    |        AREA    QPEAK    TPEAK     R.V.
--------------------        (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0003):   123.40   1.829     5.75    45.04
     + ID2= 2 (  0401):     7.50   0.290     2.75    16.94
       ==================================================
       ID = 3 (  0004):   130.90   1.842     5.75    43.43

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0402)|   Area    (ha)=  10.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  40.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       5.00        5.00
```

```
     Dep. Storage     (mm)=       2.00        5.00
     Average Slope     (%)=       1.00        2.00
     Length            (m)=     288.00       40.00
     Mannings n           =      0.030       0.200

     Max.Eff.Inten.(mm/hr)=      60.35       35.50
                over (min)       15.00       30.00
     Storage Coeff.  (min)=       9.74 (ii)   19.08 (ii)
     Unit Hyd. Tpeak (min)=      15.00       30.00
     Unit Hyd. peak  (cms)=       0.09        0.05
                                                            *TOTALS*
     PEAK FLOW       (cms)=       0.65        0.32          0.916 (iii)
     TIME TO PEAK    (hrs)=       2.75        3.00           2.75
     RUNOFF VOLUME    (mm)=      63.59       25.51          40.74
     TOTAL RAINFALL   (mm)=      65.59       65.59          65.59
     RUNOFF COEFFICIENT   =       0.97        0.39           0.62

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

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

--------------------------------------------------------------------------------
--------------------
| DUHYD    (  0403)|
| Inlet Cap.= 0.740|
| #of Inlets=     1|
| Total(cms)=   0.7|      AREA     QPEAK     TPEAK     R.V.
--------------------      (ha)     (cms)     (hrs)     (mm)
     TOTAL HYD.(ID= 1):  10.00      0.92      2.75   40.74
     ===================================================
     MAJOR SYS.(ID= 2):   0.39      0.18      2.75   40.74
     MINOR SYS.(ID= 3):   9.61      0.74      2.75   40.74

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD  (  0005)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0004):   130.90   1.842     5.75    43.43
      + ID2= 2 (  0403):     0.39   0.176     2.75    40.74
        ===================================================
```



```
        ID = 3 (  0005):   131.29   1.842     5.75    43.42

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0500)|   Area    (ha)=   8.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       6.00        2.00
     Dep. Storage     (mm)=       2.00        5.00
     Average Slope     (%)=       1.00        2.00
     Length            (m)=     230.00       40.00
     Mannings n           =      0.030       0.200

     Max.Eff.Inten.(mm/hr)=      60.35       45.65
                over (min)       15.00       30.00
     Storage Coeff.  (min)=       8.51 (ii)   16.96 (ii)
     Unit Hyd. Tpeak (min)=      15.00       30.00
     Unit Hyd. peak  (cms)=       0.09        0.05
                                                            *TOTALS*
     PEAK FLOW       (cms)=       0.86        0.17          1.003 (iii)
     TIME TO PEAK    (hrs)=       2.75        3.00           2.75
     RUNOFF VOLUME    (mm)=      63.59       28.26          51.22
     TOTAL RAINFALL   (mm)=      65.59       65.59          65.59
     RUNOFF COEFFICIENT   =       0.97        0.43           0.78

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

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0600)|   Area    (ha)=  12.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  40.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       6.00        6.00
     Dep. Storage     (mm)=       2.00        5.00
     Average Slope     (%)=       1.00        2.00
     Length            (m)=     270.00       40.00
     Mannings n           =      0.030       0.200
```



```
     Max.Eff.Inten.(mm/hr)=      60.35       35.50
                over (min)       15.00       30.00
     Storage Coeff.  (min)=       9.37 (ii)   18.71 (ii)
     Unit Hyd. Tpeak (min)=      15.00       30.00
     Unit Hyd. peak  (cms)=       0.09        0.05
                                                            *TOTALS*
     PEAK FLOW       (cms)=       0.78        0.38          1.105 (iii)
     TIME TO PEAK    (hrs)=       2.75        3.00           2.75
     RUNOFF VOLUME    (mm)=      63.59       25.51          40.74
     TOTAL RAINFALL   (mm)=      65.59       65.59          65.59
     RUNOFF COEFFICIENT   =       0.97        0.39           0.62

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

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

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

--------------------
| ADD HYD  (  0006)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0500):     8.00   1.003     2.75    51.22
      + ID2= 2 (  0600):    12.00   1.105     2.75    40.74
        ===================================================
        ID = 3 (  0006):    20.00   2.108     2.75    44.93

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0700)|   Area    (ha)=  12.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  55.00   Dir. Conn.(%)=  43.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       6.60        5.40
     Dep. Storage     (mm)=       2.00        5.00
     Average Slope     (%)=       1.00        2.00
     Length            (m)=     282.00       40.00
     Mannings n           =      0.030       0.200

     Max.Eff.Inten.(mm/hr)=      60.35       38.81
                over (min)       15.00       30.00
```



```
     Storage Coeff.  (min)=       9.62 (ii)   18.63 (ii)
     Unit Hyd. Tpeak (min)=      15.00       30.00
     Unit Hyd. peak  (cms)=       0.09        0.05
                                                            *TOTALS*
     PEAK FLOW       (cms)=       0.84        0.38          1.160 (iii)
     TIME TO PEAK    (hrs)=       2.75        3.00           2.75
     RUNOFF VOLUME    (mm)=      63.59       26.47          42.43
     TOTAL RAINFALL   (mm)=      65.59       65.59          65.59
     RUNOFF COEFFICIENT   =       0.97        0.40           0.65

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

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

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

--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0006):    20.00   2.108     2.75    44.93
      + ID2= 2 (  0700):    12.00   1.160     2.75    42.43
        ===================================================
        ID = 3 (  0007):    32.00   3.268     2.75    44.00

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

--------------------
| ADD HYD  (  0008)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0403):     9.61   0.740     2.75    40.74
      + ID2= 2 (  0007):    32.00   3.268     2.75    44.00
        ===================================================
        ID = 3 (  0008):    41.61   4.008     2.75    43.24

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0800)|   Area    (ha)=   2.60
|ID= 1 DT=15.0 min |   Total Imp(%)=  60.00   Dir. Conn.(%)=  45.00
--------------------
```

```
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=     1.56         1.04
     Dep. Storage     (mm)=     2.00         5.00
     Average Slope     (%)=     1.00         2.00
     Length            (m)=   131.00        40.00
     Mannings n           =    0.030        0.200

     Max.Eff.Inten.(mm/hr)=    60.35        44.35
                over (min)     15.00        15.00
     Storage Coeff.  (min)=     6.07 (ii)   14.62 (ii)
     Unit Hyd. Tpeak (min)=    15.00        15.00
     Unit Hyd. peak  (cms)=     0.10         0.07
                                                        *TOTALS*
     PEAK FLOW       (cms)=     0.20         0.10          0.300 (iii)
     TIME TO PEAK    (hrs)=     2.75         2.75           2.75
     RUNOFF VOLUME    (mm)=    63.59        27.93          43.98
     TOTAL RAINFALL   (mm)=    65.59        65.59          65.59
     RUNOFF COEFFICIENT   =     0.97         0.43           0.67

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

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

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

--------------------
| ADD HYD  (  0009)|
|   1 +  2 =  3    |        AREA    QPEAK    TPEAK     R.V.
--------------------        (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0008):    41.61   4.008     2.75    43.24
      + ID2= 2 (  0800):     2.60   0.300     2.75    43.98
        ==================================================
        ID = 3 (  0009):    44.21   4.308     2.75    43.29

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0010)|     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   |   0.9400      0.6210
                          0.0500     0.1950   |   2.6600      0.7760
                          0.0800     0.3860   |   4.0200      0.9110
```



```
                    0.1300      0.4750    |   0.0000      0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0009)     44.210      4.308      2.75      43.29
   OUTFLOW: ID= 1 (  0010)     44.210      2.835      3.00      43.27

                PEAK   FLOW   REDUCTION [Qout/Qin](%)= 65.81
                TIME SHIFT OF PEAK FLOW         (min)= 15.00
                MAXIMUM  STORAGE   USED       (ha.m.)=  0.7949

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

--------------------
| ADD HYD  (  0011)|
|   1 +  2 =  3    |        AREA    QPEAK    TPEAK     R.V.
--------------------        (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0010):    44.21   2.835     3.00    43.27
      + ID2= 2 (  0005):   131.29   1.842     5.75    43.42
        ==================================================
        ID = 3 (  0011):   175.50   3.338     3.00    43.36

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

       V    V   I    SSSSS  U   U    A    L              (v 6.0.2000)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

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



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


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.0\VO2\voin.dat

  Output  filename:
```



```
C:\Users\kevin.lukawiecki\AppData\Local\Civica\VH5\a512d3b0-a6e7-43a6-99e8-d9354a433
349\786e6134-b59f-44f1-a036-3aec1629
  Summary filename:
C:\Users\kevin.lukawiecki\AppData\Local\Civica\VH5\a512d3b0-a6e7-43a6-99e8-d9354a433
349\786e6134-b59f-44f1-a036-3aec1629


DATE: 01/26/2022                          TIME: 11:34:33

USER:


COMMENTS: ____________________________________________________________


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


--------------------
|    READ STORM    |    Filename: C:\Users\kevin.lukawiecki\AppD
|                  |              ata\Local\Temp\
|                  |              941a575d-ba22-4919-a20a-7a30f90bf104\ef6bf4f6
| 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            |
| NASHYD   (  0401)|   Area    (ha)=   7.50   Curve Number   (CN)= 63.0
|ID= 1 DT=15.0 min |   Ia      (mm)=   1.50   # of Linear Res.(N)= 2.00
--------------------   U.H. Tp(hrs)=   0.20

     Unit Hyd Qpeak  (cms)=   0.973
```



```
     PEAK FLOW       (cms)=   0.163 (i)
     TIME TO PEAK    (hrs)=   2.750
     RUNOFF VOLUME    (mm)=   9.647
     TOTAL RAINFALL   (mm)=  47.810
     RUNOFF COEFFICIENT   =   0.202

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

-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0100)|   Area    (ha)=  23.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=    17.25         5.75
     Dep. Storage     (mm)=     2.00         5.00
     Average Slope     (%)=     1.00         2.00
     Length            (m)=   390.00        40.00
     Mannings n           =    0.030        0.200

     Max.Eff.Inten.(mm/hr)=    43.98        26.95
                over (min)     15.00        30.00
     Storage Coeff.  (min)=    13.26 (ii)   23.69 (ii)
     Unit Hyd. Tpeak (min)=    15.00        30.00
     Unit Hyd. peak  (cms)=     0.08         0.04
                                                        *TOTALS*
     PEAK FLOW       (cms)=     1.70         0.25          1.904 (iii)
     TIME TO PEAK    (hrs)=     2.75         3.00           2.75
     RUNOFF VOLUME    (mm)=    45.81        16.54          35.56
     TOTAL RAINFALL   (mm)=    47.81        47.81          47.81
     RUNOFF COEFFICIENT   =     0.96         0.35           0.74

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

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

-------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0101)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 15.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
```

```
                     0.0000     0.0000  |   0.7800      1.0000
                     0.7800     0.0000  |   0.0000      0.0000

                           AREA     QPEAK     TPEAK       R.V.
                           (ha)     (cms)     (hrs)       (mm)
 INFLOW : ID= 2 (  0100)     23.000      1.904      2.75      35.56
 OUTFLOW: ID= 1 (  0101)     23.000      0.780      2.50      36.08

                PEAK   FLOW   REDUCTION [Qout/Qin](%)= 40.97
                TIME SHIFT OF PEAK FLOW         (min)=-15.00
                MAXIMUM  STORAGE   USED       (ha.m.)=  0.0663

--------------------------------------------------------------------------------
--------------------
| CALIB             |
| STANDHYD (  0200)|   Area    (ha)=  28.40
|ID= 1 DT=15.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      21.30         7.10
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     435.00        40.00
     Mannings n          =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      43.98        26.95
                over (min)      15.00        30.00
     Storage Coeff.  (min)=      14.16 (ii)   24.59 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.07         0.04
                                                         *TOTALS*
     PEAK FLOW       (cms)=       2.08         0.31          2.321 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00           2.75
     RUNOFF VOLUME    (mm)=      45.81        16.54          35.56
     TOTAL RAINFALL   (mm)=      47.81        47.81          47.81
     RUNOFF COEFFICIENT   =       0.96         0.35           0.74

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

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

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0201)|     OVERFLOW IS OFF
```



```
| IN= 2---> OUT= 1 |
| DT= 15.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.8700      1.2000
                          0.8700     0.0000   |   0.0000      0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0200)     28.400      2.321      2.75      35.56
   OUTFLOW: ID= 1 (  0201)     28.400      0.870      2.50      36.58

                PEAK   FLOW   REDUCTION [Qout/Qin](%)= 37.49
                TIME SHIFT OF PEAK FLOW         (min)=-15.00
                MAXIMUM  STORAGE   USED       (ha.m.)=  0.0866

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

--------------------
| ADD HYD  (  0001)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0101):    23.00   0.780     2.50    36.08
      + ID2= 2 (  0201):    28.40   0.870     2.50    36.58
        ===============================================
        ID = 3 (  0001):    51.40   1.650     2.50    36.36

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB             |
| STANDHYD (  0300)|   Area    (ha)=  72.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  49.00   Dir. Conn.(%)=  40.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      35.28        36.72
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     692.00        40.00
     Mannings n          =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      43.98        19.81
                over (min)      15.00        45.00
     Storage Coeff.  (min)=      18.71 (ii)   30.50 (ii)
     Unit Hyd. Tpeak (min)=      15.00        45.00
     Unit Hyd. peak  (cms)=       0.06         0.03
                                                         *TOTALS*
     PEAK FLOW       (cms)=       3.03         1.00          3.533 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.25           2.75
```



```
     RUNOFF VOLUME    (mm)=      45.81        14.40          26.97
     TOTAL RAINFALL   (mm)=      47.81        47.81          47.81
     RUNOFF COEFFICIENT   =       0.96         0.30           0.56


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

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

--------------------
| ADD HYD  (  0002)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0001):    51.40   1.650     2.50    36.36
      + ID2= 2 (  0300):    72.00   3.533     2.75    26.97
        ===============================================
        ID = 3 (  0002):   123.40   5.183     2.75    30.88

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0003)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 15.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.1900      1.9300
                          0.0500     0.4200   |   0.4700      2.6400
                          0.0800     0.8400   |   0.8500      3.3400
                          0.0900     1.3900   |   1.3200      3.7000
                          0.1000     1.6000   |   2.4600      4.2500

                           AREA     QPEAK     TPEAK       R.V.
                           (ha)     (cms)     (hrs)       (mm)
 INFLOW : ID= 2 (  0002)    123.400      5.183      2.75      30.88
 OUTFLOW: ID= 1 (  0003)    123.400      0.776      5.00      30.86

                PEAK   FLOW   REDUCTION [Qout/Qin](%)= 14.97
                TIME SHIFT OF PEAK FLOW         (min)=135.00
                MAXIMUM  STORAGE   USED       (ha.m.)=  3.2189

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

--------------------
| ADD HYD  (  0004)|
```



```
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0003):   123.40   0.776     5.00    30.86
      + ID2= 2 (  0401):     7.50   0.163     2.75     9.65
        ===============================================
        ID = 3 (  0004):   130.90   0.788     5.00    29.64

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB             |
| STANDHYD (  0402)|   Area    (ha)=  10.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  40.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       5.00         5.00
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     288.00        40.00
     Mannings n          =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      43.98        20.53
                over (min)      15.00        30.00
     Storage Coeff.  (min)=      11.06 (ii)   22.69 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.08         0.04
                                                         *TOTALS*
     PEAK FLOW       (cms)=       0.47         0.17          0.601 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00           2.75
     RUNOFF VOLUME    (mm)=      45.81        14.64          27.11
     TOTAL RAINFALL   (mm)=      47.81        47.81          47.81
     RUNOFF COEFFICIENT   =       0.96         0.31           0.57

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

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

--------------------------------------------------------------------------------
--------------------
| DUHYD    (  0403)|
| Inlet Cap.= 0.740|
| #of Inlets=     1|
| Total(cms)=   0.7|      AREA     QPEAK     TPEAK     R.V.
--------------------      (ha)     (cms)     (hrs)     (mm)
```

```
     TOTAL HYD.(ID= 1):  10.00      0.60      2.75   27.11
     ==================================================
     MAJOR SYS.(ID= 2):   0.00      0.00      0.00    0.00
     MINOR SYS.(ID= 3):  10.00      0.60      2.75   27.11

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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


--------------------
| ADD HYD  (  0005)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
*** W A R N I N G :  HYDROGRAPH   0403 <ID= 2> IS DRY.
*** W A R N I N G :  HYDROGRAPH   0003 = HYDROGRAPH 0001
        ID1= 1 (  0004):   130.90   0.788     5.00    29.64
      + ID2= 2 (  0403):     0.00   0.000     0.00     0.00
        ==================================================
        ID = 3 (  0005):   130.90   0.788     5.00    29.64

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0500)|   Area    (ha)=   8.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       6.00         2.00
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     230.00        40.00
     Mannings n          =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      43.98        26.95
                over (min)       15.00        30.00
     Storage Coeff.  (min)=       9.66 (ii)   20.09 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.09         0.05
                                                             *TOTALS*
     PEAK FLOW       (cms)=       0.62         0.09          0.694 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00           2.75
     RUNOFF VOLUME    (mm)=      45.81        16.54          35.56
     TOTAL RAINFALL   (mm)=      47.81        47.81          47.81
     RUNOFF COEFFICIENT   =       0.96         0.35           0.74

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



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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0600)|   Area    (ha)=  12.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  40.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       6.00         6.00
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     270.00        40.00
     Mannings n          =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      43.98        20.53
                over (min)       15.00        30.00
     Storage Coeff.  (min)=      10.64 (ii)   22.27 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.09         0.04
                                                             *TOTALS*
     PEAK FLOW       (cms)=       0.56         0.21          0.726 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00           2.75
     RUNOFF VOLUME    (mm)=      45.81        14.64          27.11
     TOTAL RAINFALL   (mm)=      47.81        47.81          47.81
     RUNOFF COEFFICIENT   =       0.96         0.31           0.57

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

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

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


--------------------
| ADD HYD  (  0006)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0500):     8.00   0.694     2.75    35.56
      + ID2= 2 (  0600):    12.00   0.726     2.75    27.11
        ==================================================
```



```
        ID = 3 (  0006):    20.00   1.419     2.75    30.49

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0700)|   Area    (ha)=  12.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  55.00   Dir. Conn.(%)=  43.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       6.60         5.40
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     282.00        40.00
     Mannings n          =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      43.98        22.61
                over (min)       15.00        30.00
     Storage Coeff.  (min)=      10.92 (ii)   22.11 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.08         0.04
                                                             *TOTALS*
     PEAK FLOW       (cms)=       0.60         0.20          0.767 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00           2.75
     RUNOFF VOLUME    (mm)=      45.81        15.30          28.42
     TOTAL RAINFALL   (mm)=      47.81        47.81          47.81
     RUNOFF COEFFICIENT   =       0.96         0.32           0.59

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

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

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


--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0006):    20.00   1.419     2.75    30.49
      + ID2= 2 (  0700):    12.00   0.767     2.75    28.42
        ==================================================
        ID = 3 (  0007):    32.00   2.186     2.75    29.71

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



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--------------------
| ADD HYD  (  0008)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0403):    10.00   0.601     2.75    27.11
      + ID2= 2 (  0007):    32.00   2.186     2.75    29.71
        ==================================================
        ID = 3 (  0008):    42.00   2.787     2.75    29.09

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0800)|   Area    (ha)=   2.60
|ID= 1 DT=15.0 min |   Total Imp(%)=  60.00   Dir. Conn.(%)=  45.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.56         1.04
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     131.00        40.00
     Mannings n          =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      43.98        26.12
                over (min)       15.00        30.00
     Storage Coeff.  (min)=       6.89 (ii)   17.45 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.10         0.05
                                                             *TOTALS*
     PEAK FLOW       (cms)=       0.14         0.05          0.183 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00           2.75
     RUNOFF VOLUME    (mm)=      45.81        16.31          29.58
     TOTAL RAINFALL   (mm)=      47.81        47.81          47.81
     RUNOFF COEFFICIENT   =       0.96         0.34           0.62

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

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

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```
| ADD HYD  (  0009)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0008):    42.00   2.787     2.75    29.09
     + ID2= 2 (  0800):     2.60   0.183     2.75    29.58
       ==================================================
       ID = 3 (  0009):    44.60   2.970     2.75    29.12

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0010)|     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   |   0.9400     0.6210
                          0.0500     0.1950   |   2.6600     0.7760
                          0.0800     0.3860   |   4.0200     0.9110
                          0.1300     0.4750   |   0.0000     0.0000

                                  AREA     QPEAK     TPEAK       R.V.
                                  (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0009)     44.600      2.970      2.75      29.12
   OUTFLOW: ID= 1 (  0010)     44.600      1.454      3.17      29.10

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 48.95
                  TIME SHIFT OF PEAK FLOW         (min)= 25.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.6682

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

--------------------
| ADD HYD  (  0011)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0010):    44.60   1.454     3.17    29.10
     + ID2= 2 (  0005):   130.90   0.788     5.00    29.64
       ==================================================
       ID = 3 (  0011):   175.50   1.725     3.25    29.49

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

       V    V   I    SSSSS  U   U    A    L              (v 6.0.2000)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
```



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

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

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


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.0\VO2\voin.dat

  Output  filename:
C:\Users\kevin.lukawiecki\AppData\Local\Civica\VH5\a512d3b0-a6e7-43a6-99e8-d9354a433
349\02162509-1602-4b73-bb81-293ba744
  Summary filename:
C:\Users\kevin.lukawiecki\AppData\Local\Civica\VH5\a512d3b0-a6e7-43a6-99e8-d9354a433
349\02162509-1602-4b73-bb81-293ba744


DATE: 01/26/2022                         TIME: 11:34:33

USER:


COMMENTS: ____________________________________________________________


--------------------------------------------------------------------------------
----------------------
  ************************************************
  ** SIMULATION : 50 Year                        **
  ************************************************


--------------------
|    READ STORM    |    Filename: C:\Users\kevin.lukawiecki\AppD
|                  |              ata\Local\Temp\
|                  |              941a575d-ba22-4919-a20a-7a30f90bf104\1e0878d6
| 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            |
| NASHYD   (  0401)|   Area    (ha)=   7.50   Curve Number   (CN)= 63.0
|ID= 1 DT=15.0 min |   Ia      (mm)=   1.50   # of Linear Res.(N)= 2.00
--------------------   U.H. Tp(hrs)=   0.20

     Unit Hyd Qpeak  (cms)=   0.973

     PEAK FLOW       (cms)=   0.351 (i)
     TIME TO PEAK    (hrs)=   2.750
     RUNOFF VOLUME    (mm)=  20.372
     TOTAL RAINFALL   (mm)=  73.000
     RUNOFF COEFFICIENT   =   0.279

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0100)|   Area    (ha)=  23.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      17.25         5.75
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     390.00        40.00
     Mannings n           =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      67.16        54.05
                over (min)       15.00        30.00
     Storage Coeff.  (min)=      11.20 (ii)   19.09 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.08         0.05
                                                          *TOTALS*
     PEAK FLOW       (cms)=       2.67         0.56          3.150 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00           2.75
```



```
     RUNOFF VOLUME    (mm)=      71.00        33.58          57.90
     TOTAL RAINFALL   (mm)=      73.00        73.00          73.00
     RUNOFF COEFFICIENT   =       0.97         0.46           0.79

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

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

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0101)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 15.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.7800     1.0000
                          0.7800     0.0000   |   0.0000     0.0000

                                  AREA     QPEAK     TPEAK       R.V.
                                  (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0100)     23.000      3.150      2.75      57.90
   OUTFLOW: ID= 1 (  0101)     23.000      0.780      2.00      58.59

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 24.76
                  TIME SHIFT OF PEAK FLOW         (min)=-45.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.1881

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0200)|   Area    (ha)=  28.40
|ID= 1 DT=15.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      21.30         7.10
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     435.00        40.00
     Mannings n           =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      67.16        54.05
                over (min)       15.00        30.00
     Storage Coeff.  (min)=      11.95 (ii)   19.85 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.08         0.05
```

```
                                                    *TOTALS*
     PEAK FLOW       (cms)=       3.26        0.69          3.849 (iii)
     TIME TO PEAK    (hrs)=       2.75        3.00           2.75
     RUNOFF VOLUME    (mm)=      71.00       33.58          57.90
     TOTAL RAINFALL   (mm)=      73.00       73.00          73.00
     RUNOFF COEFFICIENT   =       0.97        0.46           0.79

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

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

-------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0201)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 15.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.8700      1.2000
                          0.8700     0.0000   |   0.0000      0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0200)     28.400      3.849      2.75      57.90
   OUTFLOW: ID= 1 (  0201)     28.400      0.870      2.00      58.62

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 22.60
                   TIME SHIFT OF PEAK FLOW         (min)=-45.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.2488

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

--------------------
| ADD HYD  (  0001)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0101):    23.00   0.780     2.00    58.59
     + ID2= 2 (  0201):    28.40   0.870     2.00    58.62
       ==================================================
       ID = 3 (  0001):    51.40   1.650     2.00    58.61

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



```
| STANDHYD (  0300)|   Area    (ha)=  72.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  49.00   Dir. Conn.(%)=  40.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      35.28       36.72
     Dep. Storage     (mm)=       2.00        5.00
     Average Slope     (%)=       1.00        2.00
     Length            (m)=     692.00       40.00
     Mannings n           =      0.030       0.200

     Max.Eff.Inten.(mm/hr)=      67.16       40.97
                over (min)       15.00       30.00
     Storage Coeff.  (min)=      15.79 (ii)   24.61 (ii)
     Unit Hyd. Tpeak (min)=      15.00       30.00
     Unit Hyd. peak  (cms)=       0.07        0.04
                                                       *TOTALS*
     PEAK FLOW       (cms)=       4.83        2.48          6.847 (iii)
     TIME TO PEAK    (hrs)=       2.75        3.00           2.75
     RUNOFF VOLUME    (mm)=      71.00       30.12          46.47
     TOTAL RAINFALL   (mm)=      73.00       73.00          73.00
     RUNOFF COEFFICIENT   =       0.97        0.41           0.64


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

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

--------------------
| ADD HYD  (  0002)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0001):    51.40   1.650     2.00    58.61
     + ID2= 2 (  0300):    72.00   6.847     2.75    46.47
       ==================================================
       ID = 3 (  0002):   123.40   8.497     2.75    51.53

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0003)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 15.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.1900      1.9300
```



```
                          0.0500     0.4200   |   0.4700      2.6400
                          0.0800     0.8400   |   0.8500      3.3400
                          0.0900     1.3900   |   1.3200      3.7000
                          0.1000     1.6000   |   2.4600      4.2500

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0002)    123.400      8.497      2.75      51.53
   OUTFLOW: ID= 1 (  0003)    123.400      2.084      5.00      51.51

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 24.53
                   TIME SHIFT OF PEAK FLOW         (min)=135.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  4.0712

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--------------------
| ADD HYD  (  0004)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0003):   123.40   2.084     5.00    51.51
     + ID2= 2 (  0401):     7.50   0.351     2.75    20.37
       ==================================================
       ID = 3 (  0004):   130.90   2.108     5.00    49.73

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0402)|   Area    (ha)=  10.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  40.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       5.00        5.00
     Dep. Storage     (mm)=       2.00        5.00
     Average Slope     (%)=       1.00        2.00
     Length            (m)=     288.00       40.00
     Mannings n           =      0.030       0.200

     Max.Eff.Inten.(mm/hr)=      67.16       42.31
                over (min)       15.00       30.00
     Storage Coeff.  (min)=       9.33 (ii)   18.04 (ii)
     Unit Hyd. Tpeak (min)=      15.00       30.00
     Unit Hyd. peak  (cms)=       0.09        0.05
                                                       *TOTALS*
     PEAK FLOW       (cms)=       0.73        0.39          1.057 (iii)
     TIME TO PEAK    (hrs)=       2.75        3.00           2.75
     RUNOFF VOLUME    (mm)=      71.00       30.51          46.71
```



```
     TOTAL RAINFALL   (mm)=      73.00       73.00          73.00
     RUNOFF COEFFICIENT   =       0.97        0.42           0.64

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

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

-------------------------------------------------------------------------------
--------------------
| DUHYD    (  0403)|
| Inlet Cap.= 0.740|
| #of Inlets=     1|
| Total(cms)=   0.7|      AREA     QPEAK     TPEAK    R.V.
--------------------      (ha)     (cms)     (hrs)    (mm)
     TOTAL HYD.(ID= 1):  10.00      1.06      2.75  46.71
     ==================================================
     MAJOR SYS.(ID= 2):   0.70      0.32      2.75  46.71
     MINOR SYS.(ID= 3):   9.30      0.74      2.50  46.71

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD  (  0005)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0004):   130.90   2.108     5.00    49.73
     + ID2= 2 (  0403):     0.70   0.317     2.75    46.71
       ==================================================
       ID = 3 (  0005):   131.60   2.108     5.00    49.71

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0500)|   Area    (ha)=   8.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       6.00        2.00
     Dep. Storage     (mm)=       2.00        5.00
     Average Slope     (%)=       1.00        2.00
     Length            (m)=     230.00       40.00
```

```
     Mannings n           =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      67.16        54.05
                over (min)       15.00        30.00
     Storage Coeff.  (min)=       8.16 (ii)   16.05 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.10         0.05
                                                           *TOTALS*
     PEAK FLOW       (cms)=       0.95         0.21          1.136 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00           2.75
     RUNOFF VOLUME    (mm)=      71.00        33.58          57.90
     TOTAL RAINFALL   (mm)=      73.00        73.00          73.00
     RUNOFF COEFFICIENT   =       0.97         0.46           0.79

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

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD ( 0600)|   Area    (ha)=  12.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  40.00
--------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       6.00         6.00
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     270.00        40.00
     Mannings n           =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      67.16        42.31
                over (min)       15.00        30.00
     Storage Coeff.  (min)=       8.98 (ii)   17.69 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.09         0.05
                                                           *TOTALS*
     PEAK FLOW       (cms)=       0.88         0.47          1.275 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00           2.75
     RUNOFF VOLUME    (mm)=      71.00        30.51          46.71
     TOTAL RAINFALL   (mm)=      73.00        73.00          73.00
     RUNOFF COEFFICIENT   =       0.97         0.42           0.64

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



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

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

--------------------
| ADD HYD  (  0006)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0500):     8.00   1.136     2.75    57.90
     + ID2= 2 (  0600):    12.00   1.275     2.75    46.71
       ==================================================
       ID = 3 (  0006):    20.00   2.411     2.75    51.18

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD ( 0700)|   Area    (ha)=  12.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  55.00   Dir. Conn.(%)=  43.00
--------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       6.60         5.40
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     282.00        40.00
     Mannings n           =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      67.16        46.16
                over (min)       15.00        30.00
     Storage Coeff.  (min)=       9.22 (ii)   17.63 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.09         0.05
                                                           *TOTALS*
     PEAK FLOW       (cms)=       0.94         0.46          1.335 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00           2.75
     RUNOFF VOLUME    (mm)=      71.00        31.59          48.53
     TOTAL RAINFALL   (mm)=      73.00        73.00          73.00
     RUNOFF COEFFICIENT   =       0.97         0.43           0.66

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
```



```
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0006):    20.00   2.411     2.75    51.18
     + ID2= 2 (  0700):    12.00   1.335     2.75    48.53
       ==================================================
       ID = 3 (  0007):    32.00   3.746     2.75    50.19

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

--------------------
| ADD HYD  (  0008)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0403):     9.30   0.740     2.50    46.71
     + ID2= 2 (  0007):    32.00   3.746     2.75    50.19
       ==================================================
       ID = 3 (  0008):    41.30   4.486     2.75    49.41

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD ( 0800)|   Area    (ha)=   2.60
|ID= 1 DT=15.0 min |   Total Imp(%)=  60.00   Dir. Conn.(%)=  45.00
--------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.56         1.04
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     131.00        40.00
     Mannings n           =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      67.16        52.55
                over (min)       15.00        15.00
     Storage Coeff.  (min)=       5.82 (ii)   13.80 (ii)
     Unit Hyd. Tpeak (min)=      15.00        15.00
     Unit Hyd. peak  (cms)=       0.10         0.08
                                                           *TOTALS*
     PEAK FLOW       (cms)=       0.22         0.13          0.345 (iii)
```



```
     TIME TO PEAK    (hrs)=       2.75         2.75           2.75
     RUNOFF VOLUME    (mm)=      71.00        33.22          50.22
     TOTAL RAINFALL   (mm)=      73.00        73.00          73.00
     RUNOFF COEFFICIENT   =       0.97         0.46           0.69

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

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

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

--------------------
| ADD HYD  (  0009)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0008):    41.30   4.486     2.75    49.41
     + ID2= 2 (  0800):     2.60   0.345     2.75    50.22
       ==================================================
       ID = 3 (  0009):    43.90   4.831     2.75    49.45

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR( 0010)|      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    |   0.9400      0.6210
                          0.0500     0.1950    |   2.6600      0.7760
                          0.0800     0.3860    |   4.0200      0.9110
                          0.1300     0.4750    |   0.0000      0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0009)     43.897      4.831      2.75      49.45
   OUTFLOW: ID= 1 (  0010)     43.897      3.345      3.00      49.43

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 69.23
                  TIME SHIFT OF PEAK FLOW         (min)= 15.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.8470

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```
| ADD HYD  (  0011)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0010):    43.90   3.345     3.00    49.43
      + ID2= 2 (  0005):   131.60   2.108     5.00    49.71
        ==================================================
        ID = 3 (  0011):   175.50   4.013     2.92    49.62

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

       V    V   I    SSSSS  U   U    A    L              (v 6.0.2000)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
Developed and Distributed by Civica Infrastructure
```



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


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.0\VO2\voin.dat

  Output  filename:
C:\Users\kevin.lukawiecki\AppData\Local\Civica\VH5\a512d3b0-a6e7-43a6-99e8-d9354a433
349\68a194d7-68e2-4761-894c-55c138e3
  Summary filename:
C:\Users\kevin.lukawiecki\AppData\Local\Civica\VH5\a512d3b0-a6e7-43a6-99e8-d9354a433
349\68a194d7-68e2-4761-894c-55c138e3


DATE: 01/26/2022                         TIME: 11:34:33

USER:


COMMENTS: ____________________________________________________________
```



```
-----------------------------------------------------------------------------------
----------------------
  ************************************************
  ** SIMULATION : Z5mm                          **
  ************************************************


--------------------
|    READ STORM     |     Filename: C:\Users\kevin.lukawiecki\AppD
|                   |               ata\Local\Temp\
|                   |               941a575d-ba22-4919-a20a-7a30f90bf104\d25d2449
| Ptotal= 24.91 mm  |     Comments: 25MM-4HR
--------------------
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                 0.03    0.30 |  1.03   10.80 |  2.03    4.62 |  3.03    2.04
                 0.07    0.60 |  1.07   14.10 |  2.07    4.44 |  3.07    1.98
                 0.10    0.90 |  1.10   17.40 |  2.10    4.26 |  3.10    1.92
                 0.13    1.20 |  1.13   20.70 |  2.13    4.08 |  3.13    1.86
                 0.17    1.50 |  1.17   24.00 |  2.17    3.90 |  3.17    1.80
                 0.20    1.62 |  1.20   26.46 |  2.20    3.75 |  3.20    1.77
                 0.23    1.74 |  1.23   28.92 |  2.23    3.60 |  3.23    1.74
                 0.27    1.86 |  1.27   31.38 |  2.27    3.45 |  3.27    1.71
                 0.30    1.98 |  1.30   33.84 |  2.30    3.30 |  3.30    1.68
                 0.33    2.10 |  1.33   36.30 |  2.33    3.15 |  3.33    1.65
                 0.37    2.13 |  1.37   33.75 |  2.37    3.09 |  3.37    1.65
                 0.40    2.16 |  1.40   31.20 |  2.40    3.03 |  3.40    1.65
                 0.43    2.19 |  1.43   28.65 |  2.43    2.97 |  3.43    1.65
                 0.47    2.22 |  1.47   26.10 |  2.47    2.91 |  3.47    1.65
                 0.50    2.25 |  1.50   23.55 |  2.50    2.85 |  3.50    1.65
                 0.53    2.31 |  1.53   20.82 |  2.53    2.76 |  3.53    1.62
                 0.57    2.37 |  1.57   18.09 |  2.57    2.67 |  3.57    1.59
                 0.60    2.43 |  1.60   15.36 |  2.60    2.58 |  3.60    1.56
                 0.63    2.49 |  1.63   12.63 |  2.63    2.49 |  3.63    1.53
                 0.67    2.55 |  1.67    9.90 |  2.67    2.40 |  3.67    1.50
                 0.70    2.85 |  1.70    9.18 |  2.70    2.37 |  3.70    1.41
                 0.73    3.15 |  1.73    8.46 |  2.73    2.34 |  3.73    1.32
                 0.77    3.45 |  1.77    7.74 |  2.77    2.31 |  3.77    1.23
                 0.80    3.75 |  1.80    7.02 |  2.80    2.28 |  3.80    1.14
                 0.83    4.05 |  1.83    6.30 |  2.83    2.25 |  3.83    1.05
                 0.87    4.74 |  1.87    6.00 |  2.87    2.22 |  3.87    0.96
                 0.90    5.43 |  1.90    5.70 |  2.90    2.19 |  3.90    0.87
                 0.93    6.12 |  1.93    5.40 |  2.93    2.16 |  3.93    0.78
                 0.97    6.81 |  1.97    5.10 |  2.97    2.13 |  3.97    0.69
                 1.00    7.50 |  2.00    4.80 |  3.00    2.10 |  4.00    0.60
```



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

--------------------
| CALIB             |
| NASHYD   (  0401)|   Area    (ha)=   7.50   Curve Number   (CN)= 63.0
|ID= 1 DT=15.0 min |   Ia      (mm)=   1.50   # of Linear Res.(N)= 2.00
--------------------   U.H. Tp(hrs)=   0.20

         NOTE:  RAINFALL WAS TRANSFORMED TO  15.0 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
               0.250    1.17 | 1.250   21.08 | 2.250    4.05 |  3.25    1.86
               0.500    2.13 | 1.500   30.54 | 2.500    3.07 |  3.50    1.66
               0.750    2.65 | 1.750   13.11 | 2.750    2.50 |  3.75    1.49
               1.000    5.35 | 2.000    5.89 | 3.000    2.20 |  4.00    0.89

     Unit Hyd Qpeak  (cms)=   0.973

     PEAK FLOW       (cms)=   0.045 (i)
     TIME TO PEAK    (hrs)=   1.750
     RUNOFF VOLUME    (mm)=   2.792
     TOTAL RAINFALL   (mm)=  24.910
     RUNOFF COEFFICIENT   =   0.112

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

------------------------------------------------------------------------------
--------------------
| CALIB             |
| STANDHYD (  0100)|   Area    (ha)=  23.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      17.25         5.75
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     390.00        40.00
     Mannings n           =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      30.54         6.72
                over (min)       15.00        45.00
     Storage Coeff.  (min)=      15.34 (ii)   33.52 (ii)
     Unit Hyd. Tpeak (min)=      15.00        45.00
     Unit Hyd. peak  (cms)=       0.07         0.03
                                                          *TOTALS*
```



```
     PEAK FLOW       (cms)=       1.01         0.06          1.024 (iii)
     TIME TO PEAK    (hrs)=       1.50         2.25          1.50
     RUNOFF VOLUME    (mm)=      22.91         4.77         16.56
     TOTAL RAINFALL   (mm)=      24.91        24.91         24.91
     RUNOFF COEFFICIENT   =       0.92         0.19          0.66


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

------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0101)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 15.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.7800     1.0000
                          0.7800     0.0000   |   0.0000     0.0000

                                  AREA     QPEAK     TPEAK       R.V.
                                  (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0100)     23.000      1.024      1.50      16.56
   OUTFLOW: ID= 1 (  0101)     23.000      0.780      1.50      16.87

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 76.15
                  TIME SHIFT OF PEAK FLOW         (min)=  0.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0220

------------------------------------------------------------------------------
--------------------
| CALIB             |
| STANDHYD (  0200)|   Area    (ha)=  28.40
|ID= 1 DT=15.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      21.30         7.10
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     435.00        40.00
     Mannings n           =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      30.54         6.72
                over (min)       15.00        45.00
     Storage Coeff.  (min)=      16.38 (ii)   34.56 (ii)
     Unit Hyd. Tpeak (min)=      15.00        45.00
```

```
     Unit Hyd. peak  (cms)=       0.07         0.03
                                                           *TOTALS*
     PEAK FLOW       (cms)=       1.22         0.07          1.234 (iii)
     TIME TO PEAK    (hrs)=       1.50         2.25           1.50
     RUNOFF VOLUME    (mm)=      22.91         4.77          16.56
     TOTAL RAINFALL   (mm)=      24.91        24.91          24.91
     RUNOFF COEFFICIENT   =       0.92         0.19           0.66

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

--------------------------------------------------------------------------------
--------------------
| RESERVOIR( 0201)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 15.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.8700      1.2000
                          0.8700     0.0000   |   0.0000      0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0200)     28.400      1.234      1.50      16.56
   OUTFLOW: ID= 1 (  0201)     28.400      0.870      1.50      17.08

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 70.51
                   TIME SHIFT OF PEAK FLOW         (min)=  0.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.0328

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

--------------------
| ADD HYD  (  0001)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0101):    23.00   0.780     1.50    16.87
      + ID2= 2 (  0201):    28.40   0.870     1.50    17.08
        ==================================================
        ID = 3 (  0001):    51.40   1.650     1.50    16.99

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



```
| STANDHYD (  0300)|   Area    (ha)=  72.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  49.00   Dir. Conn.(%)=  40.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      35.28       36.72
     Dep. Storage     (mm)=       2.00        5.00
     Average Slope     (%)=       1.00        2.00
     Length            (m)=     692.00       40.00
     Mannings n           =      0.030       0.200

     Max.Eff.Inten.(mm/hr)=      25.81        4.60
               over (min)       30.00       45.00
     Storage Coeff.  (min)=      23.15 (ii)   44.31 (ii)
     Unit Hyd. Tpeak (min)=      30.00       45.00
     Unit Hyd. peak  (cms)=       0.04        0.03
                                                           *TOTALS*
     PEAK FLOW       (cms)=       1.51        0.22          1.639 (iii)
     TIME TO PEAK    (hrs)=       1.75        2.25           1.75
     RUNOFF VOLUME    (mm)=      22.91        3.92          11.52
     TOTAL RAINFALL   (mm)=      24.91       24.91          24.91
     RUNOFF COEFFICIENT   =       0.92        0.16           0.46

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

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

--------------------
| ADD HYD  (  0002)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0001):    51.40   1.650     1.50    16.99
      + ID2= 2 (  0300):    72.00   1.639     1.75    11.52
        ==================================================
        ID = 3 (  0002):   123.40   3.289     1.75    13.80

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0003)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 15.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.1900      1.9300
```



```
                          0.0500     0.4200   |   0.4700      2.6400
                          0.0800     0.8400   |   0.8500      3.3400
                          0.0900     1.3900   |   1.3200      3.7000
                          0.1000     1.6000   |   2.4600      4.2500

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0002)    123.400      3.289      1.75      13.80
   OUTFLOW: ID= 1 (  0003)    123.400      0.099      4.75      13.78

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=  3.01
                   TIME SHIFT OF PEAK FLOW         (min)=180.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  1.5780

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

--------------------
| ADD HYD  (  0004)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0003):   123.40   0.099     4.75    13.78
      + ID2= 2 (  0401):     7.50   0.045     1.75     2.79
        ==================================================
        ID = 3 (  0004):   130.90   0.114     2.00    13.15

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0402)|   Area    (ha)=  10.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  40.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       5.00        5.00
     Dep. Storage     (mm)=       2.00        5.00
     Average Slope     (%)=       1.00        2.00
     Length            (m)=     288.00       40.00
     Mannings n           =      0.030       0.200

     Max.Eff.Inten.(mm/hr)=      30.54        4.81
               over (min)       15.00       45.00
     Storage Coeff.  (min)=      12.79 (ii)   33.57 (ii)
     Unit Hyd. Tpeak (min)=      15.00       45.00
     Unit Hyd. peak  (cms)=       0.08        0.03
                                                           *TOTALS*
     PEAK FLOW       (cms)=       0.29        0.04          0.296 (iii)
     TIME TO PEAK    (hrs)=       1.50        2.25           1.50
     RUNOFF VOLUME    (mm)=      22.91        4.01          11.57
```



```
     TOTAL RAINFALL   (mm)=      24.91       24.91          24.91
     RUNOFF COEFFICIENT   =       0.92        0.16           0.46

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

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

--------------------------------------------------------------------------------
--------------------
| DUHYD    (  0403)|
| Inlet Cap.= 0.740|
| #of Inlets=     1|
| Total(cms)=   0.7|      AREA     QPEAK     TPEAK     R.V.
--------------------      (ha)     (cms)     (hrs)     (mm)
     TOTAL HYD.(ID= 1):  10.00      0.30      1.50    11.57
     ==================================================
     MAJOR SYS.(ID= 2):   0.00      0.00      0.00     0.00
     MINOR SYS.(ID= 3):  10.00      0.30      1.50    11.57

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD  (  0005)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
*** W A R N I N G :  HYDROGRAPH   0403 <ID= 2> IS DRY.
*** W A R N I N G :  HYDROGRAPH   0003 = HYDROGRAPH 0001
        ID1= 1 (  0004):   130.90   0.114     2.00    13.15
      + ID2= 2 (  0403):     0.00   0.000     0.00     0.00
        ==================================================
        ID = 3 (  0005):   130.90   0.114     2.00    13.15

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0500)|   Area    (ha)=   8.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       6.00        2.00
     Dep. Storage     (mm)=       2.00        5.00
```

```
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     230.00        40.00
     Mannings n           =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      30.54         6.72
                over (min)       15.00        30.00
     Storage Coeff.  (min)=      11.18 (ii)   29.35 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.08         0.04
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.39         0.02          0.397 (iii)
     TIME TO PEAK    (hrs)=       1.50         2.00           1.50
     RUNOFF VOLUME    (mm)=      22.91         4.77          16.56
     TOTAL RAINFALL   (mm)=      24.91        24.91          24.91
     RUNOFF COEFFICIENT   =       0.92         0.19           0.66

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

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

--------------------------------------------------------------------------------
--------------------
| CALIB             |
| STANDHYD (  0600)|   Area    (ha)=  12.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  40.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       6.00         6.00
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     270.00        40.00
     Mannings n           =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      30.54         4.81
                over (min)       15.00        45.00
     Storage Coeff.  (min)=      12.31 (ii)   33.09 (ii)
     Unit Hyd. Tpeak (min)=      15.00        45.00
     Unit Hyd. peak  (cms)=       0.08         0.03
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.35         0.04          0.359 (iii)
     TIME TO PEAK    (hrs)=       1.50         2.25           1.50
     RUNOFF VOLUME    (mm)=      22.91         4.01          11.57
     TOTAL RAINFALL   (mm)=      24.91        24.91          24.91
     RUNOFF COEFFICIENT   =       0.92         0.16           0.46
```



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

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

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

--------------------
| ADD HYD  (  0006)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0500):     8.00   0.397     1.50    16.56
      + ID2= 2 (  0600):    12.00   0.359     1.50    11.57
        ===================================================
        ID = 3 (  0006):    20.00   0.756     1.50    13.57

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB             |
| STANDHYD (  0700)|   Area    (ha)=  12.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  55.00   Dir. Conn.(%)=  43.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       6.60         5.40
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     282.00        40.00
     Mannings n           =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      30.54         5.42
                over (min)       15.00        45.00
     Storage Coeff.  (min)=      12.63 (ii)   32.44 (ii)
     Unit Hyd. Tpeak (min)=      15.00        45.00
     Unit Hyd. peak  (cms)=       0.08         0.03
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.37         0.04          0.383 (iii)
     TIME TO PEAK    (hrs)=       1.50         2.25           1.50
     RUNOFF VOLUME    (mm)=      22.91         4.27          12.28
     TOTAL RAINFALL   (mm)=      24.91        24.91          24.91
     RUNOFF COEFFICIENT   =       0.92         0.17           0.49

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



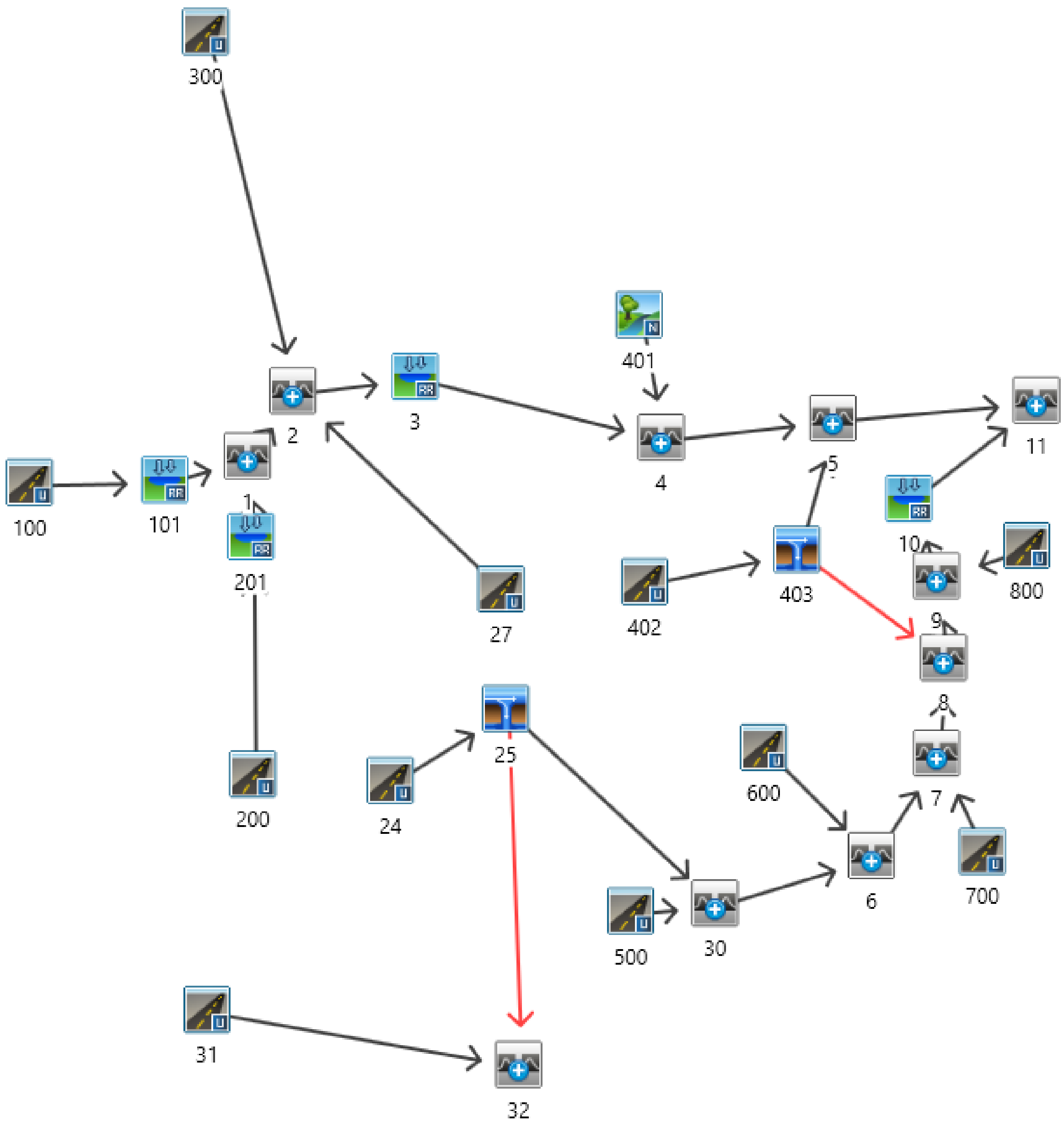
```
       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0006):    20.00   0.756     1.50    13.57
      + ID2= 2 (  0700):    12.00   0.383     1.50    12.28
        ===================================================
        ID = 3 (  0007):    32.00   1.139     1.50    13.09

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

--------------------
| ADD HYD  (  0008)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0403):    10.00   0.296     1.50    11.57
      + ID2= 2 (  0007):    32.00   1.139     1.50    13.09
        ===================================================
        ID = 3 (  0008):    42.00   1.435     1.50    12.72

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB             |
| STANDHYD (  0800)|   Area    (ha)=   2.60
|ID= 1 DT=15.0 min |   Total Imp(%)=  60.00   Dir. Conn.(%)=  45.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.56         1.04
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     131.00        40.00
     Mannings n           =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      30.54         6.47
                over (min)       15.00        30.00
     Storage Coeff.  (min)=       7.97 (ii)   26.43 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.10         0.04
```



```
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.09         0.01          0.099 (iii)
     TIME TO PEAK    (hrs)=       1.50         2.00           1.50
     RUNOFF VOLUME    (mm)=      22.91         4.68          12.88
     TOTAL RAINFALL   (mm)=      24.91        24.91          24.91
     RUNOFF COEFFICIENT   =       0.92         0.19           0.52

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

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

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

--------------------
| ADD HYD  (  0009)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0008):    42.00   1.435     1.50    12.72
      + ID2= 2 (  0800):     2.60   0.099     1.50    12.88
        ===================================================
        ID = 3 (  0009):    44.60   1.534     1.50    12.73

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0010)|      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   |   0.9400     0.6210
                           0.0500     0.1950   |   2.6600     0.7760
                           0.0800     0.3860   |   4.0200     0.9110
                           0.1300     0.4750   |   0.0000     0.0000

                                 AREA     QPEAK     TPEAK       R.V.
                                 (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0009)     44.600     1.534      1.50      12.73
   OUTFLOW: ID= 1 (  0010)     44.600     0.122      3.92      12.71

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  7.96
                  TIME SHIFT OF PEAK FLOW         (min)=145.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.4611

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

```
--------------------
| ADD HYD  (  0011)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0010):    44.60   0.122     3.92    12.71
      + ID2= 2 (  0005):   130.90   0.114     2.00    13.15
        ==================================================
        ID = 3 (  0011):   175.50   0.225     3.83    13.04

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

B000738 - Coleraine Drive
Existing Conditions VO Model Schematic
(Post 2010)



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

      V    V   I    SSSSS  U   U    A    L             (v 6.0.2000)
      V    V   I    SS     U   U   A A   L
       V  V    I     SS    U   U  AAAAA  L
       V  V    I      SS   U   U  A   A  L
        VV     I    SSSSS  UUUUU  A   A  LLLLL

       OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
      O   O    T      T    H   H   Y Y   MM MM  O   O
      O   O    T      T    H   H    Y    M   M  O   O
       OOO     T      T    H   H    Y    M   M   OOO
Developed and Distributed by Civica Infrastructure
```



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


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.0\VO2\voin.dat

  Output  filename:
C:\Users\kevin.lukawiecki\AppData\Local\Civica\VH5\a512d3b0-a6e7-43a6-99e8-d9354a433
349\9efd0158-bd79-469a-b40f-0e0acd27
  Summary filename:
C:\Users\kevin.lukawiecki\AppData\Local\Civica\VH5\a512d3b0-a6e7-43a6-99e8-d9354a433
349\9efd0158-bd79-469a-b40f-0e0acd27


DATE: 01/26/2022                           TIME: 11:35:39

USER:


COMMENTS: ____________________________________________________________


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


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



```
|    READ STORM     |    Filename: C:\Users\kevin.lukawiecki\AppD
|                   |              ata\Local\Temp\
|                   |              a5b67f9a-2ba4-4eeb-aafa-d1354b44751d\e2390d93
| 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             |
| NASHYD   (  0401)|   Area    (ha)=   6.62   Curve Number   (CN)= 63.0
|ID= 1 DT=15.0 min |   Ia      (mm)=   1.50   # of Linear Res.(N)= 2.00
--------------------   U.H. Tp(hrs)=   0.20

     Unit Hyd Qpeak  (cms)=   0.859

     PEAK FLOW      (cms)=   0.191 (i)
     TIME TO PEAK   (hrs)=   2.750
     RUNOFF VOLUME    (mm)=  12.698
     TOTAL RAINFALL   (mm)=  55.690
     RUNOFF COEFFICIENT   =   0.228

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

--------------------------------------------------------------------------------
--------------------
| CALIB             |
| STANDHYD (  0100)|   Area    (ha)=  23.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=     17.25         5.75
     Dep. Storage     (mm)=      2.00         5.00
     Average Slope     (%)=      1.00         2.00
     Length            (m)=    390.00        40.00
     Mannings n           =     0.030        0.200

     Max.Eff.Inten.(mm/hr)=     51.24        34.94
                over (min)      15.00        30.00
```



```
     Storage Coeff.  (min)=     12.48 (ii)   21.88 (ii)
     Unit Hyd. Tpeak (min)=     15.00        30.00
     Unit Hyd. peak  (cms)=      0.08         0.05
                                                         *TOTALS*
     PEAK FLOW      (cms)=       2.00         0.34         2.283 (iii)
     TIME TO PEAK    (hrs)=      2.75         3.00          2.75
     RUNOFF VOLUME    (mm)=     53.69        21.52         42.43
     TOTAL RAINFALL   (mm)=     55.69        55.69         55.69
     RUNOFF COEFFICIENT   =      0.96         0.39          0.76

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

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

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0101)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 15.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.7800     1.0000
                          0.7800     0.0000   |   0.0000     0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0100)     23.000     2.283      2.75      42.43
   OUTFLOW: ID= 1 (  0101)     23.000     0.780      2.50      43.11

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 34.16
                  TIME SHIFT OF PEAK FLOW         (min)=-15.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0939

--------------------------------------------------------------------------------
--------------------
| CALIB             |
| STANDHYD (  0200)|   Area    (ha)=  28.40
|ID= 1 DT=15.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=     21.30         7.10
     Dep. Storage     (mm)=      2.00         5.00
     Average Slope     (%)=      1.00         2.00
     Length            (m)=    435.00        40.00
     Mannings n           =     0.030        0.200
```



```
     Max.Eff.Inten.(mm/hr)=     51.24        34.94
                over (min)      15.00        30.00
     Storage Coeff.  (min)=     13.32 (ii)   22.72 (ii)
     Unit Hyd. Tpeak (min)=     15.00        30.00
     Unit Hyd. peak  (cms)=      0.08         0.04
                                                         *TOTALS*
     PEAK FLOW      (cms)=       2.45         0.42         2.786 (iii)
     TIME TO PEAK    (hrs)=      2.75         3.00          2.75
     RUNOFF VOLUME    (mm)=     53.69        21.52         42.43
     TOTAL RAINFALL   (mm)=     55.69        55.69         55.69
     RUNOFF COEFFICIENT   =      0.96         0.39          0.76

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

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

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0201)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 15.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.8700     1.2000
                          0.8700     0.0000   |   0.0000     0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0200)     28.400     2.786      2.75      42.43
   OUTFLOW: ID= 1 (  0201)     28.400     0.870      2.25      43.12

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 31.23
                  TIME SHIFT OF PEAK FLOW         (min)=-30.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.1257

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

--------------------
| ADD HYD  (  0001)|
|  1 +  2 =  3     |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0101):     23.00    0.780     2.50    43.11
     + ID2= 2 (  0201):     28.40    0.870     2.25    43.12
     ===================================================
```

```
       ID = 3 (  0001):    51.40   1.650     2.50    43.12

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0300)|   Area    (ha)=  73.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  57.00   Dir. Conn.(%)=  47.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      41.61        31.39
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     692.00        40.00
     Mannings n          =       0.030        0.200

     Max.Eff.Inten.(mm/hr)=      51.24        28.16
                over (min)       15.00        30.00
     Storage Coeff.  (min)=      17.60 (ii)   27.85 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.06         0.04
                                                          *TOTALS*
     PEAK FLOW       (cms)=       4.28         1.36          5.340 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00           2.75
     RUNOFF VOLUME    (mm)=      53.69        19.63          35.64
     TOTAL RAINFALL   (mm)=      55.69        55.69          55.69
     RUNOFF COEFFICIENT   =       0.96         0.35           0.64


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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0027)|   Area    (ha)=   2.30
|ID= 1 DT=10.0 min |   Total Imp(%)=  71.00   Dir. Conn.(%)=  71.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.63         0.67
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     123.83        40.00
     Mannings n          =       0.030        0.200
```



```
    NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 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
                0.167    0.00 | 1.833   12.81 | 3.500    7.80 |  5.17    1.11
                0.333    0.56 | 2.000   18.94 | 3.667    7.80 |  5.33    1.11
                0.500    1.11 | 2.167   18.94 | 3.833    6.13 |  5.50    1.11
                0.667    1.11 | 2.333   35.09 | 4.000    4.46 |  5.67    1.11
                0.833    1.11 | 2.500   51.24 | 4.167    4.46 |  5.83    1.11
                1.000    1.11 | 2.667   51.24 | 4.333    3.34 |  6.00    1.11
                1.167    1.11 | 2.833   32.86 | 4.500    2.23 |  6.17    1.11
                1.333    3.89 | 3.000   14.48 | 4.667    2.23 |  6.33    0.56
                1.500    6.68 | 3.167   14.48 | 4.833    1.67 |
                1.667    6.68 | 3.333   11.14 | 5.000    1.11 |

     Max.Eff.Inten.(mm/hr)=      51.24        16.19
                over (min)       10.00        20.00
     Storage Coeff.  (min)=       6.27 (ii)   19.06 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.14         0.06
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.23         0.02          0.246 (iii)
     TIME TO PEAK    (hrs)=       2.67         2.83           2.67
     RUNOFF VOLUME    (mm)=      53.69        16.64          42.94
     TOTAL RAINFALL   (mm)=      55.69        55.69          55.69
     RUNOFF COEFFICIENT   =       0.96         0.30           0.77

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

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

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

--------------------
| ADD HYD  (  0002)|
|   1 +  2 =  3    |        AREA    QPEAK    TPEAK     R.V.
--------------------        (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0001):    51.40   1.650     2.50    43.12
     + ID2= 2 (  0027):     2.30   0.246     2.67    42.94
       ==================================================
       ID = 3 (  0002):    53.70   1.896     2.67    43.23
```



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


--------------------
| ADD HYD  (  0002)|
|   3 +  2 =  1    |        AREA    QPEAK    TPEAK     R.V.
--------------------        (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0002):    53.70   1.896     2.67    43.23
     + ID2= 2 (  0300):    73.00   5.340     2.75    35.64
       ==================================================
       ID = 1 (  0002):   126.70   6.749     2.67    38.85

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0003)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 15.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.1900     1.9300
                          0.0500     0.4200   |   0.4700     2.6400
                          0.0800     0.8400   |   0.8500     3.3400
                          0.0900     1.3900   |   1.3200     3.7000
                          0.1000     1.6000   |   2.4600     4.2500

                              AREA     QPEAK     TPEAK       R.V.
                              (ha)     (cms)     (hrs)       (mm)
  INFLOW : ID= 2 (  0002)    126.700     6.749      2.67      38.85
  OUTFLOW: ID= 1 (  0003)    126.700     1.538      5.33      38.83

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 22.79
                  TIME SHIFT OF PEAK FLOW         (min)=160.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  3.8082

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

--------------------
| ADD HYD  (  0004)|
|   1 +  2 =  3    |        AREA    QPEAK    TPEAK     R.V.
--------------------        (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0003):   126.70   1.538     5.33    38.83
     + ID2= 2 (  0401):     6.62   0.191     2.75    12.70
       ==================================================
       ID = 3 (  0004):   133.32   1.548     5.33    37.53

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



```
| CALIB            |
| STANDHYD (  0402)|   Area    (ha)=   8.58
|ID= 1 DT=15.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  40.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       4.29         4.29
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     239.17        40.00
     Mannings n          =       0.030        0.200

    NOTE:  RAINFALL WAS TRANSFORMED TO  15.0 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
                0.250    0.00 | 2.000   18.94 | 3.750    7.80 |  5.50    1.11
                0.500    1.11 | 2.250   18.94 | 4.000    4.46 |  5.75    1.11
                0.750    1.11 | 2.500   51.24 | 4.250    4.46 |  6.00    1.11
                1.000    1.11 | 2.750   51.24 | 4.500    2.23 |  6.25    1.11
                1.250    1.11 | 3.000   14.48 | 4.750    2.23 |
                1.500    6.68 | 3.250   14.48 | 5.000    1.11 |
                1.750    6.68 | 3.500    7.80 | 5.250    1.11 |

     Max.Eff.Inten.(mm/hr)=      51.24        26.88
                over (min)       15.00        30.00
     Storage Coeff.  (min)=       9.30 (ii)   19.74 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.09         0.05
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.48         0.20          0.641 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00           2.75
     RUNOFF VOLUME    (mm)=      53.69        19.24          33.02
     TOTAL RAINFALL   (mm)=      55.69        55.69          55.69
     RUNOFF COEFFICIENT   =       0.96         0.35           0.59

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

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

--------------------------------------------------------------------------------
--------------------
| DUHYD    (  0403)|
```

```
| Inlet Cap.= 0.740|
| #of Inlets=     1|
| Total(cms)=   0.7|      AREA     QPEAK     TPEAK    R.V.
--------------------      (ha)     (cms)     (hrs)    (mm)
     TOTAL HYD.(ID= 1):   8.58      0.64      2.75   33.02
     ==================================================
     MAJOR SYS.(ID= 2):   0.00      0.00      0.00    0.00
     MINOR SYS.(ID= 3):   8.58      0.64      2.75   33.02

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD  (  0005)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
*** W A R N I N G :  HYDROGRAPH   0403 <ID= 2> IS DRY.
*** W A R N I N G :  HYDROGRAPH   0003 = HYDROGRAPH 0001
        ID1= 1 (  0004):   133.32   1.548     5.33    37.53
      + ID2= 2 (  0403):     0.00   0.000     0.00     0.00
        ==================================================
        ID = 3 (  0005):   133.32   1.548     5.33    37.53

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0500)|   Area    (ha)=   6.76
|ID= 1 DT=15.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       5.07         1.69
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     212.29        40.00
     Mannings n          =       0.030        0.200

     Max.Eff.Inten.(mm/hr)=      51.24        34.94
                over (min)       15.00        30.00
     Storage Coeff.  (min)=       8.66 (ii)   18.06 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.09         0.05
                                                         *TOTALS*
     PEAK FLOW       (cms)=       0.61         0.11          0.703 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00           2.75
     RUNOFF VOLUME    (mm)=      53.69        21.52          42.43
     TOTAL RAINFALL   (mm)=      55.69        55.69          55.69
```



```
     RUNOFF COEFFICIENT   =       0.96         0.39           0.76

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

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0024)|   Area    (ha)=   1.24
|ID= 1 DT=10.0 min |   Total Imp(%)=  47.00   Dir. Conn.(%)=  47.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.58         0.66
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      90.92        40.00
     Mannings n          =       0.030        0.200

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 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
               0.167    0.00 | 1.833   12.81 | 3.500    7.80 |  5.17    1.11
               0.333    0.56 | 2.000   18.94 | 3.667    7.80 |  5.33    1.11
               0.500    1.11 | 2.167   18.94 | 3.833    6.13 |  5.50    1.11
               0.667    1.11 | 2.333   35.09 | 4.000    4.46 |  5.67    1.11
               0.833    1.11 | 2.500   51.24 | 4.167    4.46 |  5.83    1.11
               1.000    1.11 | 2.667   51.24 | 4.333    3.34 |  6.00    1.11
               1.167    1.11 | 2.833   32.86 | 4.500    2.23 |  6.17    1.11
               1.333    3.89 | 3.000   14.48 | 4.667    2.23 |  6.33    0.56
               1.500    6.68 | 3.167   14.48 | 4.833    1.67 |
               1.667    6.68 | 3.333   11.14 | 5.000    1.11 |

     Max.Eff.Inten.(mm/hr)=      51.24        16.19
                over (min)       10.00        20.00
     Storage Coeff.  (min)=       5.21 (ii)   18.00 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.15         0.06
                                                         *TOTALS*
     PEAK FLOW       (cms)=       0.08         0.02          0.100 (iii)
     TIME TO PEAK    (hrs)=       2.67         2.83           2.67
```



```
     RUNOFF VOLUME    (mm)=      53.69        16.64          34.04
     TOTAL RAINFALL   (mm)=      55.69        55.69          55.69
     RUNOFF COEFFICIENT   =       0.96         0.30           0.61

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

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

--------------------------------------------------------------------------------
--------------------
| DUHYD    (  0025)|
| Inlet Cap.= 0.083|
| #of Inlets=     1|
| Total(cms)=   0.1|      AREA     QPEAK     TPEAK    R.V.
--------------------      (ha)     (cms)     (hrs)    (mm)
     TOTAL HYD.(ID= 1):   1.24      0.10      2.67   34.04
     ==================================================
     MAJOR SYS.(ID= 2):   0.04      0.02      2.67   34.04
     MINOR SYS.(ID= 3):   1.20      0.08      2.50   34.04

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD  (  0030)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0025):     0.04   0.017     2.67    34.04
      + ID2= 2 (  0500):     6.76   0.703     2.75    42.43
        ==================================================
        ID = 3 (  0030):     6.80   0.683     2.67    42.35

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0600)|   Area    (ha)=  12.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  40.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       6.00         6.00
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
```



```
     Length            (m)=     270.00        40.00
     Mannings n          =       0.030        0.200

         NOTE:  RAINFALL WAS TRANSFORMED TO  15.0 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
               0.250    0.00 | 2.000   18.94 | 3.750    7.80 |  5.50    1.11
               0.500    1.11 | 2.250   18.94 | 4.000    4.46 |  5.75    1.11
               0.750    1.11 | 2.500   51.24 | 4.250    4.46 |  6.00    1.11
               1.000    1.11 | 2.750   51.24 | 4.500    2.23 |  6.25    1.11
               1.250    1.11 | 3.000   14.48 | 4.750    2.23 |
               1.500    6.68 | 3.250   14.48 | 5.000    1.11 |
               1.750    6.68 | 3.500    7.80 | 5.250    1.11 |

     Max.Eff.Inten.(mm/hr)=      51.24        26.88
                over (min)       15.00        30.00
     Storage Coeff.  (min)=      10.01 (ii)   20.45 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.09         0.05
                                                         *TOTALS*
     PEAK FLOW       (cms)=       0.66         0.28          0.889 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00           2.75
     RUNOFF VOLUME    (mm)=      53.69        19.24          33.02
     TOTAL RAINFALL   (mm)=      55.69        55.69          55.69
     RUNOFF COEFFICIENT   =       0.96         0.35           0.59

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

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

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

--------------------
| ADD HYD  (  0006)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0030):     6.80   0.683     2.67    42.35
      + ID2= 2 (  0600):    12.00   0.889     2.75    33.02
        ==================================================
        ID = 3 (  0006):    18.80   1.500     2.67    36.38
```

```
     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD ( 0700)|   Area    (ha)=  12.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  55.00   Dir. Conn.(%)=  43.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       6.60         5.40
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     282.00        40.00
     Mannings n          =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      51.24        29.51
                over (min)       15.00        30.00
     Storage Coeff.  (min)=      10.27 (ii)   20.33 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.09         0.05
                                                            *TOTALS*
     PEAK FLOW       (cms)=       0.71         0.28          0.936 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00           2.75
     RUNOFF VOLUME    (mm)=      53.69        20.03          34.50
     TOTAL RAINFALL   (mm)=      55.69        55.69          55.69
     RUNOFF COEFFICIENT   =       0.96         0.36           0.62

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

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

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

--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0006):    18.80   1.500     2.67    36.38
      + ID2= 2 (  0700):    12.00   0.936     2.75    34.50
        ==================================================
        ID = 3 (  0007):    30.80   2.362     2.67    35.65

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



```
--------------------
| ADD HYD  (  0008)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0403):     8.58   0.641     2.75    33.02
      + ID2= 2 (  0007):    30.80   2.362     2.67    35.65
        ==================================================
        ID = 3 (  0008):    39.38   2.953     2.67    35.07

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0800)|   Area    (ha)=   2.60
|ID= 1 DT=15.0 min |   Total Imp(%)=  60.00   Dir. Conn.(%)=  45.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.56         1.04
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     131.00        40.00
     Mannings n          =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      51.24        33.90
                over (min)       15.00        30.00
     Storage Coeff.  (min)=       6.48 (ii)   16.00 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.10         0.05
                                                            *TOTALS*
     PEAK FLOW       (cms)=       0.17         0.07          0.222 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00           2.75
     RUNOFF VOLUME    (mm)=      53.69        21.25          35.85
     TOTAL RAINFALL   (mm)=      55.69        55.69          55.69
     RUNOFF COEFFICIENT   =       0.96         0.38           0.64

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

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

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

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



```
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0008):    39.38   2.953     2.67    35.07
      + ID2= 2 (  0800):     2.60   0.222     2.75    35.85
        ==================================================
        ID = 3 (  0009):    41.98   3.161     2.67    35.12

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0010)|      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   |   0.9400     0.6210
                           0.0500     0.1950   |   2.6600     0.7760
                           0.0800     0.3860   |   4.0200     0.9110
                           0.1300     0.4750   |   0.0000     0.0000

                                 AREA     QPEAK     TPEAK       R.V.
                                 (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0009)     41.978      3.161      2.67      35.12
   OUTFLOW: ID= 1 (  0010)     41.978      1.851      3.08      35.09

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 58.57
                   TIME SHIFT OF PEAK FLOW         (min)= 25.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.7038

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

--------------------
| ADD HYD  (  0011)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0010):    41.98   1.851     3.08    35.09
      + ID2= 2 (  0005):   133.32   1.548     5.33    37.53
        ==================================================
        ID = 3 (  0011):   175.30   2.327     3.17    36.93

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0031)|   Area    (ha)=   1.03
|ID= 1 DT=10.0 min |   Total Imp(%)=  47.00   Dir. Conn.(%)=  47.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.48         0.55
     Dep. Storage     (mm)=       2.00         5.00
```



```
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      82.87        40.00
     Mannings n          =      0.030        0.200

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 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
                 0.167    0.00 | 1.833   12.81 | 3.500    7.80 |  5.17    1.11
                 0.333    0.56 | 2.000   18.94 | 3.667    7.80 |  5.33    1.11
                 0.500    1.11 | 2.167   18.94 | 3.833    6.13 |  5.50    1.11
                 0.667    1.11 | 2.333   35.09 | 4.000    4.46 |  5.67    1.11
                 0.833    1.11 | 2.500   51.24 | 4.167    4.46 |  5.83    1.11
                 1.000    1.11 | 2.667   51.24 | 4.333    3.34 |  6.00    1.11
                 1.167    1.11 | 2.833   32.86 | 4.500    2.23 |  6.17    1.11
                 1.333    3.89 | 3.000   14.48 | 4.667    2.23 |  6.33    0.56
                 1.500    6.68 | 3.167   14.48 | 4.833    1.67 |
                 1.667    6.68 | 3.333   11.14 | 5.000    1.11 |

     Max.Eff.Inten.(mm/hr)=      51.24        16.19
                over (min)       10.00        20.00
     Storage Coeff.  (min)=       4.93 (ii)   17.71 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.15         0.06
                                                            *TOTALS*
     PEAK FLOW       (cms)=       0.07         0.02          0.083 (iii)
     TIME TO PEAK    (hrs)=       2.67         2.83           2.67
     RUNOFF VOLUME    (mm)=      53.69        16.64          34.04
     TOTAL RAINFALL   (mm)=      55.69        55.69          55.69
     RUNOFF COEFFICIENT   =       0.96         0.30           0.61

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

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

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

--------------------
| ADD HYD  (  0032)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0025):     1.20   0.083     2.50    34.04
```

```
    + ID2= 2 (  0031):     1.03   0.083     2.67    34.04
      ===============================================
      ID = 3 (  0032):     2.23   0.166     2.67    34.04

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

       V    V   I    SSSSS  U   U    A    L             (v 6.0.2000)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
Developed and Distributed by Civica Infrastructure
```



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


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.0\VO2\voin.dat

  Output  filename:
C:\Users\kevin.lukawiecki\AppData\Local\Civica\VH5\a512d3b0-a6e7-43a6-99e8-d9354a433
349\16b1caa8-5cb4-4870-9c9a-d20b7e15
  Summary filename:
C:\Users\kevin.lukawiecki\AppData\Local\Civica\VH5\a512d3b0-a6e7-43a6-99e8-d9354a433
349\16b1caa8-5cb4-4870-9c9a-d20b7e15


DATE: 01/26/2022                          TIME: 11:35:37

USER:


COMMENTS: ____________________________________________________________

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```



```
 ************************************************
 ** SIMULATION : 100 Year                     **
 ************************************************


--------------------
|    READ STORM    |     Filename: C:\Users\kevin.lukawiecki\AppD
|                  |               ata\Local\Temp\
|                  |               a5b67f9a-2ba4-4eeb-aafa-d1354b44751d\073ffba8
| 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            |
| NASHYD   (  0401)|    Area    (ha)=    6.62   Curve Number   (CN)= 63.0
|ID= 1 DT=15.0 min |    Ia      (mm)=    1.50   # of Linear Res.(N)= 2.00
--------------------    U.H. Tp(hrs)=    0.20

     Unit Hyd Qpeak  (cms)=    0.859

     PEAK FLOW       (cms)=    0.365 (i)
     TIME TO PEAK    (hrs)=    2.750
     RUNOFF VOLUME    (mm)=   23.957
     TOTAL RAINFALL   (mm)=   80.310
     RUNOFF COEFFICIENT   =    0.298

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

------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0100)|    Area    (ha)=  23.00
|ID= 1 DT=15.0 min |    Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      17.25          5.75
     Dep. Storage     (mm)=       2.00          5.00
```



```
     Average Slope     (%)=       1.00          2.00
     Length            (m)=     390.00         40.00
     Mannings n           =      0.030         0.200

     Max.Eff.Inten.(mm/hr)=      73.88         62.61
                over (min)       15.00         30.00
     Storage Coeff.  (min)=      10.78 (ii)    18.22 (ii)
     Unit Hyd. Tpeak (min)=      15.00         30.00
     Unit Hyd. peak  (cms)=       0.09          0.05
                                                            *TOTALS*
     PEAK FLOW       (cms)=       2.95          0.67          3.527 (iii)
     TIME TO PEAK    (hrs)=       2.75          3.00           2.75
     RUNOFF VOLUME    (mm)=      78.31         39.04          64.56
     TOTAL RAINFALL   (mm)=      80.31         80.31          80.31
     RUNOFF COEFFICIENT   =       0.98          0.49           0.80

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

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

------------------------------------------------------------------------------
--------------------
| RESERVOIR( 0101)|      OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 15.0 min     |      OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------       (cms)     (ha.m.)   |   (cms)     (ha.m.)
                           0.0000     0.0000   |   0.7800     1.0000
                           0.7800     0.0000   |   0.0000     0.0000

                                 AREA     QPEAK     TPEAK       R.V.
                                 (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0100)     23.000      3.527      2.75      64.56
   OUTFLOW: ID= 1 (  0101)     23.000      0.780      2.00      65.64

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 22.12
                  TIME SHIFT OF PEAK FLOW         (min)=-45.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.2357

------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0200)|   Area    (ha)=  28.40
|ID= 1 DT=15.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
--------------------
```



```
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      21.30          7.10
     Dep. Storage     (mm)=       2.00          5.00
     Average Slope     (%)=       1.00          2.00
     Length            (m)=     435.00         40.00
     Mannings n           =      0.030         0.200

     Max.Eff.Inten.(mm/hr)=      73.88         62.61
                over (min)       15.00         30.00
     Storage Coeff.  (min)=      11.51 (ii)    18.95 (ii)
     Unit Hyd. Tpeak (min)=      15.00         30.00
     Unit Hyd. peak  (cms)=       0.08          0.05
                                                            *TOTALS*
     PEAK FLOW       (cms)=       3.61          0.81          4.312 (iii)
     TIME TO PEAK    (hrs)=       2.75          3.00           2.75
     RUNOFF VOLUME    (mm)=      78.31         39.04          64.56
     TOTAL RAINFALL   (mm)=      80.31         80.31          80.31
     RUNOFF COEFFICIENT   =       0.98          0.49           0.80

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

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

------------------------------------------------------------------------------
--------------------
| RESERVOIR( 0201)|      OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 15.0 min     |      OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------       (cms)     (ha.m.)   |   (cms)     (ha.m.)
                           0.0000     0.0000   |   0.8700     1.2000
                           0.8700     0.0000   |   0.0000     0.0000

                                 AREA     QPEAK     TPEAK       R.V.
                                 (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0200)     28.400      4.312      2.75      64.56
   OUTFLOW: ID= 1 (  0201)     28.400      0.870      2.00      65.78

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 20.17
                  TIME SHIFT OF PEAK FLOW         (min)=-45.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.3070

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

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

```
| ADD HYD  (  0001)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0101):    23.00   0.780     2.00    65.64
      + ID2= 2 (  0201):    28.40   0.870     2.00    65.78
        ==================================================
        ID = 3 (  0001):    51.40   1.650     2.00    65.72

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
------------------------------------------------------------------------------
--------------------
| CALIB             |
| STANDHYD (  0300)|   Area    (ha)=  73.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  57.00   Dir. Conn.(%)=  47.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      41.61        31.39
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     692.00        40.00
     Mannings n          =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      73.88        51.42
               over (min)       15.00        30.00
     Storage Coeff.  (min)=      15.20 (ii)   23.26 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.07         0.04
                                                           *TOTALS*
     PEAK FLOW       (cms)=       6.39         2.74          8.665 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00           2.75
     RUNOFF VOLUME    (mm)=      78.31        36.24          56.02
     TOTAL RAINFALL   (mm)=      80.31        80.31          80.31
     RUNOFF COEFFICIENT   =       0.98         0.45           0.70


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

------------------------------------------------------------------------------
--------------------
| CALIB             |
| STANDHYD (  0027)|   Area    (ha)=   2.30
|ID= 1 DT=10.0 min |   Total Imp(%)=  71.00   Dir. Conn.(%)=  71.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
```



```
     Surface Area     (ha)=       1.63         0.67
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     123.83        40.00
     Mannings n          =      0.030        0.200

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 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
                 0.167    0.00 | 1.833   18.47 | 3.500   11.24 |  5.17    1.61
                 0.333    0.81 | 2.000   27.30 | 3.667   11.24 |  5.33    1.61
                 0.500    1.61 | 2.167   27.30 | 3.833    8.83 |  5.50    1.61
                 0.667    1.61 | 2.333   50.59 | 4.000    6.42 |  5.67    1.61
                 0.833    1.61 | 2.500   73.88 | 4.167    6.42 |  5.83    1.61
                 1.000    1.61 | 2.667   73.88 | 4.333    4.81 |  6.00    1.61
                 1.167    1.61 | 2.833   47.38 | 4.500    3.21 |  6.17    1.61
                 1.333    5.62 | 3.000   20.88 | 4.667    3.21 |  6.33    0.81
                 1.500    9.64 | 3.167   20.88 | 4.833    2.41 |
                 1.667    9.64 | 3.333   16.06 | 5.000    1.61 |

     Max.Eff.Inten.(mm/hr)=      73.88        35.17
               over (min)       10.00        20.00
     Storage Coeff.  (min)=       5.41 (ii)   14.79 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.14         0.07
                                                           *TOTALS*
     PEAK FLOW       (cms)=       0.33         0.05          0.371 (iii)
     TIME TO PEAK    (hrs)=       2.67         2.83           2.67
     RUNOFF VOLUME    (mm)=      78.31        31.67          64.78
     TOTAL RAINFALL   (mm)=      80.31        80.31          80.31
     RUNOFF COEFFICIENT   =       0.98         0.39           0.81

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

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

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

--------------------
| ADD HYD  (  0002)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
```



```
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0001):    51.40   1.650     2.00    65.72
      + ID2= 2 (  0027):     2.30   0.371     2.67    64.78
        ==================================================
        ID = 3 (  0002):    53.70   2.021     2.67    65.89

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

--------------------
| ADD HYD  (  0002)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0002):    53.70   2.021     2.67    65.89
      + ID2= 2 (  0300):    73.00   8.665     2.75    56.02
        ==================================================
        ID = 1 (  0002):   126.70   9.883     2.67    60.20

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0003)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 15.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.1900     1.9300
                          0.0500     0.4200   |   0.4700     2.6400
                          0.0800     0.8400   |   0.8500     3.3400
                          0.0900     1.3900   |   1.3200     3.7000
                          0.1000     1.6000   |   2.4600     4.2500

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
  INFLOW : ID= 2 (  0002)    126.700      9.883      2.67      60.20
  OUTFLOW: ID= 1 (  0003)    126.700      2.757      4.50      60.19

                PEAK   FLOW   REDUCTION [Qout/Qin](%)= 27.89
                TIME SHIFT OF PEAK FLOW         (min)=110.00
                MAXIMUM  STORAGE   USED       (ha.m.)=  4.3946

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

--------------------
| ADD HYD  (  0004)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0003):   126.70   2.757     4.50    60.19
      + ID2= 2 (  0401):     6.62   0.365     2.75    23.96
```



```
        ==================================================
        ID = 3 (  0004):   133.32   2.804     4.33    58.38

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
------------------------------------------------------------------------------
--------------------
| CALIB             |
| STANDHYD (  0402)|   Area    (ha)=   8.58
|ID= 1 DT=15.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  40.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       4.29         4.29
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     239.17        40.00
     Mannings n          =      0.030        0.200

         NOTE:  RAINFALL WAS TRANSFORMED TO  15.0 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
                 0.250    0.00 | 2.000   27.30 | 3.750   11.24 |  5.50    1.61
                 0.500    1.61 | 2.250   27.30 | 4.000    6.42 |  5.75    1.61
                 0.750    1.61 | 2.500   73.88 | 4.250    6.42 |  6.00    1.61
                 1.000    1.61 | 2.750   73.88 | 4.500    3.21 |  6.25    1.61
                 1.250    1.61 | 3.000   20.88 | 4.750    3.21 |
                 1.500    9.64 | 3.250   20.88 | 5.000    1.61 |
                 1.750    9.64 | 3.500   11.24 | 5.250    1.61 |

     Max.Eff.Inten.(mm/hr)=      73.88        49.29
               over (min)       15.00        30.00
     Storage Coeff.  (min)=       8.04 (ii)   16.23 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.10         0.05
                                                           *TOTALS*
     PEAK FLOW       (cms)=       0.69         0.40          1.044 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00           2.75
     RUNOFF VOLUME    (mm)=      78.31        35.66          52.72
     TOTAL RAINFALL   (mm)=      80.31        80.31          80.31
     RUNOFF COEFFICIENT   =       0.98         0.44           0.66

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
```

```
          THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| DUHYD    (  0403)|
| Inlet Cap.= 0.740|
| #of Inlets=     1|
| Total(cms)=   0.7|      AREA     QPEAK     TPEAK     R.V.
--------------------      (ha)     (cms)     (hrs)     (mm)
     TOTAL HYD.(ID= 1):   8.58      1.04      2.75   52.72
     ==================================================
     MAJOR SYS.(ID= 2):   0.59      0.30      2.75   52.72
     MINOR SYS.(ID= 3):   7.99      0.74      2.50   52.72

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD  (  0005)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0004):   133.32   2.804     4.33    58.38
      + ID2= 2 (  0403):     0.59   0.304     2.75    52.72
        ==================================================
        ID = 3 (  0005):   133.91   2.804     4.33    58.34

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0500)|   Area    (ha)=   6.76
|ID= 1 DT=15.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       5.07        1.69
     Dep. Storage     (mm)=       2.00        5.00
     Average Slope     (%)=       1.00        2.00
     Length            (m)=     212.29       40.00
     Mannings n           =      0.030       0.200

     Max.Eff.Inten.(mm/hr)=      73.88       62.61
                over (min)       15.00       15.00
     Storage Coeff.  (min)=       7.48 (ii)   14.93 (ii)
     Unit Hyd. Tpeak (min)=      15.00       15.00
     Unit Hyd. peak  (cms)=       0.10        0.07
                                                       *TOTALS*
```



```
     PEAK FLOW      (cms)=       0.89        0.24         1.133 (iii)
     TIME TO PEAK    (hrs)=       2.75        2.75          2.75
     RUNOFF VOLUME    (mm)=      78.31       39.04         64.56
     TOTAL RAINFALL   (mm)=      80.31       80.31         80.31
     RUNOFF COEFFICIENT   =       0.98        0.49          0.80

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

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0024)|   Area    (ha)=   1.24
|ID= 1 DT=10.0 min |   Total Imp(%)=  47.00   Dir. Conn.(%)=  47.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.58        0.66
     Dep. Storage     (mm)=       2.00        5.00
     Average Slope     (%)=       1.00        2.00
     Length            (m)=      90.92       40.00
     Mannings n           =      0.030       0.200

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 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
              0.167    0.00 | 1.833   18.47 | 3.500   11.24 |  5.17    1.61
              0.333    0.81 | 2.000   27.30 | 3.667   11.24 |  5.33    1.61
              0.500    1.61 | 2.167   27.30 | 3.833    8.83 |  5.50    1.61
              0.667    1.61 | 2.333   50.59 | 4.000    6.42 |  5.67    1.61
              0.833    1.61 | 2.500   73.88 | 4.167    6.42 |  5.83    1.61
              1.000    1.61 | 2.667   73.88 | 4.333    4.81 |  6.00    1.61
              1.167    1.61 | 2.833   47.38 | 4.500    3.21 |  6.17    1.61
              1.333    5.62 | 3.000   20.88 | 4.667    3.21 |  6.33    0.81
              1.500    9.64 | 3.167   20.88 | 4.833    2.41 |
              1.667    9.64 | 3.333   16.06 | 5.000    1.61 |

     Max.Eff.Inten.(mm/hr)=      73.88       35.17
                over (min)       10.00       20.00
     Storage Coeff.  (min)=       4.50 (ii)   13.88 (ii)
     Unit Hyd. Tpeak (min)=      10.00       20.00
```



```
     Unit Hyd. peak  (cms)=       0.15        0.07
                                                       *TOTALS*
     PEAK FLOW      (cms)=       0.12        0.05         0.159 (iii)
     TIME TO PEAK    (hrs)=       2.67        2.83          2.67
     RUNOFF VOLUME    (mm)=      78.31       31.67         53.59
     TOTAL RAINFALL   (mm)=      80.31       80.31         80.31
     RUNOFF COEFFICIENT   =       0.98        0.39          0.67

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

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

--------------------------------------------------------------------------------
--------------------
| DUHYD    (  0025)|
| Inlet Cap.= 0.083|
| #of Inlets=     1|
| Total(cms)=   0.1|      AREA     QPEAK     TPEAK     R.V.
--------------------      (ha)     (cms)     (hrs)     (mm)
     TOTAL HYD.(ID= 1):   1.24      0.16      2.67   53.59
     ==================================================
     MAJOR SYS.(ID= 2):   0.20      0.08      2.67   53.59
     MINOR SYS.(ID= 3):   1.04      0.08      2.33   53.59

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD  (  0030)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0025):     0.20   0.076     2.67    53.59
      + ID2= 2 (  0500):     6.76   1.133     2.75    64.56
        ==================================================
        ID = 3 (  0030):     6.96   1.156     2.67    64.15

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0600)|   Area    (ha)=  12.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  40.00
--------------------
```



```
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       6.00        6.00
     Dep. Storage     (mm)=       2.00        5.00
     Average Slope     (%)=       1.00        2.00
     Length            (m)=     270.00       40.00
     Mannings n           =      0.030       0.200

         NOTE:  RAINFALL WAS TRANSFORMED TO  15.0 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
              0.250    0.00 | 2.000   27.30 | 3.750   11.24 |  5.50    1.61
              0.500    1.61 | 2.250   27.30 | 4.000    6.42 |  5.75    1.61
              0.750    1.61 | 2.500   73.88 | 4.250    6.42 |  6.00    1.61
              1.000    1.61 | 2.750   73.88 | 4.500    3.21 |  6.25    1.61
              1.250    1.61 | 3.000   20.88 | 4.750    3.21 |
              1.500    9.64 | 3.250   20.88 | 5.000    1.61 |
              1.750    9.64 | 3.500   11.24 | 5.250    1.61 |

     Max.Eff.Inten.(mm/hr)=      73.88       49.29
                over (min)       15.00       30.00
     Storage Coeff.  (min)=       8.64 (ii)   16.84 (ii)
     Unit Hyd. Tpeak (min)=      15.00       30.00
     Unit Hyd. peak  (cms)=       0.09        0.05
                                                       *TOTALS*
     PEAK FLOW      (cms)=       0.97        0.56         1.448 (iii)
     TIME TO PEAK    (hrs)=       2.75        3.00          2.75
     RUNOFF VOLUME    (mm)=      78.31       35.66         52.72
     TOTAL RAINFALL   (mm)=      80.31       80.31         80.31
     RUNOFF COEFFICIENT   =       0.98        0.44          0.66

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

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

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

--------------------
| ADD HYD  (  0006)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0030):     6.96   1.156     2.67    64.15
```

```
      + ID2= 2 (  0600):    12.00   1.448     2.75    52.72
        ==================================================
        ID = 3 (  0006):    18.96   2.481     2.67    56.92

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0700)|   Area    (ha)=  12.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  55.00   Dir. Conn.(%)=  43.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       6.60         5.40
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     282.00        40.00
     Mannings n           =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      73.88        53.66
                over (min)       15.00        30.00
     Storage Coeff.  (min)=       8.87 (ii)   16.79 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.09         0.05
                                                            *TOTALS*
     PEAK FLOW       (cms)=       1.04         0.55          1.513 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00           2.75
     RUNOFF VOLUME    (mm)=      78.31        36.84          54.67
     TOTAL RAINFALL   (mm)=      80.31        80.31          80.31
     RUNOFF COEFFICIENT   =       0.98         0.46           0.68

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

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

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

--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0006):    18.96   2.481     2.67    56.92
      + ID2= 2 (  0700):    12.00   1.513     2.75    54.67
        ==================================================
        ID = 3 (  0007):    30.96   3.869     2.67    56.06
```



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

--------------------
| ADD HYD  (  0008)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0403):     7.99   0.740     2.50    52.72
      + ID2= 2 (  0007):    30.96   3.869     2.67    56.06
        ==================================================
        ID = 3 (  0008):    38.95   4.609     2.67    55.44

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0800)|   Area    (ha)=   2.60
|ID= 1 DT=15.0 min |   Total Imp(%)=  60.00   Dir. Conn.(%)=  45.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.56         1.04
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     131.00        40.00
     Mannings n           =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      73.88        60.91
                over (min)       15.00        15.00
     Storage Coeff.  (min)=       5.60 (ii)   13.13 (ii)
     Unit Hyd. Tpeak (min)=      15.00        15.00
     Unit Hyd. peak  (cms)=       0.11         0.08
                                                            *TOTALS*
     PEAK FLOW       (cms)=       0.24         0.15          0.390 (iii)
     TIME TO PEAK    (hrs)=       2.75         2.75           2.75
     RUNOFF VOLUME    (mm)=      78.31        38.64          56.49
     TOTAL RAINFALL   (mm)=      80.31        80.31          80.31
     RUNOFF COEFFICIENT   =       0.98         0.48           0.70

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

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

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



```
--------------------
| ADD HYD  (  0009)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0008):    38.95   4.609     2.67    55.44
      + ID2= 2 (  0800):     2.60   0.390     2.75    56.49
        ==================================================
        ID = 3 (  0009):    41.55   4.977     2.67    55.50

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0010)|     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   |   0.9400      0.6210
                          0.0500     0.1950   |   2.6600      0.7760
                          0.0800     0.3860   |   4.0200      0.9110
                          0.1300     0.4750   |   0.0000      0.0000

                                AREA      QPEAK      TPEAK       R.V.
                                (ha)      (cms)      (hrs)       (mm)
   INFLOW : ID= 2 (  0009)     41.551      4.977       2.67       55.50
   OUTFLOW: ID= 1 (  0010)     41.551      3.648       2.92       55.47

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 73.30
                  TIME SHIFT OF PEAK FLOW         (min)= 15.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.8785

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

--------------------
| ADD HYD  (  0011)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0010):    41.55   3.648     2.92    55.47
      + ID2= 2 (  0005):   133.91   2.804     4.33    58.34
        ==================================================
        ID = 3 (  0011):   175.46   4.584     2.92    57.64

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0031)|   Area    (ha)=   1.03
|ID= 1 DT=10.0 min |   Total Imp(%)=  47.00   Dir. Conn.(%)=  47.00
```



```
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.48         0.55
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      82.87        40.00
     Mannings n           =      0.030        0.200

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 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
                  0.167    0.00 | 1.833   18.47 | 3.500   11.24 |  5.17    1.61
                  0.333    0.81 | 2.000   27.30 | 3.667   11.24 |  5.33    1.61
                  0.500    1.61 | 2.167   27.30 | 3.833    8.83 |  5.50    1.61
                  0.667    1.61 | 2.333   50.59 | 4.000    6.42 |  5.67    1.61
                  0.833    1.61 | 2.500   73.88 | 4.167    6.42 |  5.83    1.61
                  1.000    1.61 | 2.667   73.88 | 4.333    4.81 |  6.00    1.61
                  1.167    1.61 | 2.833   47.38 | 4.500    3.21 |  6.17    1.61
                  1.333    5.62 | 3.000   20.88 | 4.667    3.21 |  6.33    0.81
                  1.500    9.64 | 3.167   20.88 | 4.833    2.41 |
                  1.667    9.64 | 3.333   16.06 | 5.000    1.61 |

     Max.Eff.Inten.(mm/hr)=      73.88        35.17
                over (min)       10.00        20.00
     Storage Coeff.  (min)=       4.25 (ii)   13.63 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.15         0.07
                                                            *TOTALS*
     PEAK FLOW       (cms)=       0.10         0.04          0.132 (iii)
     TIME TO PEAK    (hrs)=       2.67         2.83           2.67
     RUNOFF VOLUME    (mm)=      78.31        31.67          53.59
     TOTAL RAINFALL   (mm)=      80.31        80.31          80.31
     RUNOFF COEFFICIENT   =       0.98         0.39           0.67

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

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

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```
| ADD HYD  (  0032)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0025):      1.04   0.083     2.33    53.59
     + ID2= 2 (  0031):      1.03   0.132     2.67    53.59
       ==================================================
       ID = 3 (  0032):      2.07   0.215     2.67    53.59

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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==================================================================================
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       V    V   I    SSSSS  U   U    A    L              (v 6.0.2000)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

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



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


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.0\VO2\voin.dat

  Output  filename:
C:\Users\kevin.lukawiecki\AppData\Local\Civica\VH5\a512d3b0-a6e7-43a6-99e8-d9354a433
349\5f42eae7-bc1c-4101-9840-fd8d8ca9
  Summary filename:
C:\Users\kevin.lukawiecki\AppData\Local\Civica\VH5\a512d3b0-a6e7-43a6-99e8-d9354a433
349\5f42eae7-bc1c-4101-9840-fd8d8ca9


DATE: 01/26/2022                          TIME: 11:35:38

USER:


COMMENTS: ____________________________________________________________
```



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


 --------------------
|   READ STORM      |    Filename: C:\Users\kevin.lukawiecki\AppD
|                   |              ata\Local\Temp\
|                   |              a5b67f9a-2ba4-4eeb-aafa-d1354b44751d\e5851225
| 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             |
| NASHYD   (  0401)|   Area    (ha)=   6.62   Curve Number   (CN)= 63.0
|ID= 1 DT=15.0 min |   Ia      (mm)=   1.50   # of Linear Res.(N)= 2.00
 --------------------  U.H. Tp(hrs)=   0.20

     Unit Hyd Qpeak  (cms)=   0.859

     PEAK FLOW      (cms)=   0.084 (i)
     TIME TO PEAK    (hrs)=   2.750
     RUNOFF VOLUME    (mm)=   5.698
     TOTAL RAINFALL   (mm)=  36.000
     RUNOFF COEFFICIENT   =   0.158

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

--------------------------------------------------------------------------------
 --------------------
| CALIB             |
| STANDHYD (  0100)|   Area    (ha)=  23.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
```



```
 --------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      17.25         5.75
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     390.00        40.00
     Mannings n           =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      33.12        16.19
               over (min)        15.00        30.00
     Storage Coeff.  (min)=      14.85 (ii)   27.64 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.07         0.04
                                                            *TOTALS*
     PEAK FLOW      (cms)=        1.25         0.14           1.359 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00            2.75
     RUNOFF VOLUME    (mm)=      34.00         9.87           25.55
     TOTAL RAINFALL   (mm)=      36.00        36.00           36.00
     RUNOFF COEFFICIENT   =       0.94         0.27            0.71

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

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

--------------------------------------------------------------------------------
 --------------------
| RESERVOIR(  0101)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 15.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
 --------------------     (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.7800      1.0000
                          0.7800     0.0000   |   0.0000      0.0000

                               AREA     QPEAK      TPEAK       R.V.
                               (ha)     (cms)      (hrs)       (mm)
   INFLOW : ID= 2 (  0100)     23.000     1.359       2.75      25.55
   OUTFLOW: ID= 1 (  0101)     23.000     0.780       2.50      25.67

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 57.41
                  TIME SHIFT OF PEAK FLOW         (min)=-15.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0268

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```
| CALIB             |
| STANDHYD (  0200)|   Area    (ha)=  28.40
|ID= 1 DT=15.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
 --------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      21.30         7.10
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     435.00        40.00
     Mannings n           =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      33.12        16.19
               over (min)        15.00        30.00
     Storage Coeff.  (min)=      15.86 (ii)   28.65 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.07         0.04
                                                            *TOTALS*
     PEAK FLOW      (cms)=        1.53         0.17           1.653 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00            2.75
     RUNOFF VOLUME    (mm)=      34.00         9.87           25.55
     TOTAL RAINFALL   (mm)=      36.00        36.00           36.00
     RUNOFF COEFFICIENT   =       0.94         0.27            0.71


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

--------------------------------------------------------------------------------
 --------------------
| RESERVOIR(  0201)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 15.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
 --------------------     (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.8700      1.2000
                          0.8700     0.0000   |   0.0000      0.0000

                               AREA     QPEAK      TPEAK       R.V.
                               (ha)     (cms)      (hrs)       (mm)
   INFLOW : ID= 2 (  0200)     28.400     1.653       2.75      25.55
   OUTFLOW: ID= 1 (  0201)     28.400     0.870       2.50      25.73

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 52.64
                  TIME SHIFT OF PEAK FLOW         (min)=-15.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0385
```

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--------------------
| ADD HYD  (  0001)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0101):    23.00   0.780     2.50    25.67
      + ID2= 2 (  0201):    28.40   0.870     2.50    25.73
        ==================================================
        ID = 3 (  0001):    51.40   1.650     2.50    25.71

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0300)|   Area    (ha)=  73.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  57.00   Dir. Conn.(%)=  47.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      41.61       31.39
     Dep. Storage     (mm)=       2.00        5.00
     Average Slope     (%)=       1.00        2.00
     Length            (m)=     692.00       40.00
     Mannings n           =      0.030       0.200

     Max.Eff.Inten.(mm/hr)=      33.12       12.72
               over (min)       15.00       45.00
     Storage Coeff.  (min)=      20.95 (ii)  35.04 (ii)
     Unit Hyd. Tpeak (min)=      15.00       45.00
     Unit Hyd. peak  (cms)=       0.06        0.03
                                                           *TOTALS*
     PEAK FLOW       (cms)=       2.62        0.51           2.861 (iii)
     TIME TO PEAK    (hrs)=       2.75        3.25            2.75
     RUNOFF VOLUME    (mm)=      34.00        8.79           20.64
     TOTAL RAINFALL   (mm)=      36.00       36.00           36.00
     RUNOFF COEFFICIENT   =       0.94        0.24            0.57


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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0027)|   Area    (ha)=   2.30
```



```
|ID= 1 DT=10.0 min |   Total Imp(%)=  71.00   Dir. Conn.(%)=  71.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.63        0.67
     Dep. Storage     (mm)=       2.00        5.00
     Average Slope     (%)=       1.00        2.00
     Length            (m)=     123.83       40.00
     Mannings n           =      0.030       0.200

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 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
                 0.167    0.00 | 1.833    8.28 | 3.500    5.04 |  5.17    0.72
                 0.333    0.36 | 2.000   12.24 | 3.667    5.04 |  5.33    0.72
                 0.500    0.72 | 2.167   12.24 | 3.833    3.96 |  5.50    0.72
                 0.667    0.72 | 2.333   22.68 | 4.000    2.88 |  5.67    0.72
                 0.833    0.72 | 2.500   33.12 | 4.167    2.88 |  5.83    0.72
                 1.000    0.72 | 2.667   33.12 | 4.333    2.16 |  6.00    0.72
                 1.167    0.72 | 2.833   21.24 | 4.500    1.44 |  6.17    0.72
                 1.333    2.52 | 3.000    9.36 | 4.667    1.44 |  6.33    0.36
                 1.500    4.32 | 3.167    9.36 | 4.833    1.08 |
                 1.667    4.32 | 3.333    7.20 | 5.000    0.72 |

     Max.Eff.Inten.(mm/hr)=      33.12        7.02
               over (min)       10.00       30.00
     Storage Coeff.  (min)=       7.46 (ii)  25.32 (ii)
     Unit Hyd. Tpeak (min)=      10.00       30.00
     Unit Hyd. peak  (cms)=       0.13        0.04
                                                           *TOTALS*
     PEAK FLOW       (cms)=       0.15        0.01           0.150 (iii)
     TIME TO PEAK    (hrs)=       2.67        3.17            2.67
     RUNOFF VOLUME    (mm)=      34.00        7.13           26.20
     TOTAL RAINFALL   (mm)=      36.00       36.00           36.00
     RUNOFF COEFFICIENT   =       0.94        0.20            0.73

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

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

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```



```
--------------------
| ADD HYD  (  0002)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0001):    51.40   1.650     2.50    25.71
      + ID2= 2 (  0027):     2.30   0.150     2.67    26.20
        ==================================================
        ID = 3 (  0002):    53.70   1.800     2.67    25.84

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

--------------------
| ADD HYD  (  0002)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0002):    53.70   1.800     2.67    25.84
      + ID2= 2 (  0300):    73.00   2.861     2.75    20.64
        ==================================================
        ID = 1 (  0002):   126.70   4.423     2.67    22.83

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0003)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 15.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.1900     1.9300
                          0.0500     0.4200   |   0.4700     2.6400
                          0.0800     0.8400   |   0.8500     3.3400
                          0.0900     1.3900   |   1.3200     3.7000
                          0.1000     1.6000   |   2.4600     4.2500

                             AREA     QPEAK     TPEAK       R.V.
                             (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0002)    126.700     4.423      2.67      22.83
   OUTFLOW: ID= 1 (  0003)    126.700     0.413      5.17      22.81

                PEAK   FLOW   REDUCTION [Qout/Qin](%)=  9.33
                TIME SHIFT OF PEAK FLOW         (min)=150.00
                MAXIMUM  STORAGE   USED       (ha.m.)=  2.4958

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

--------------------
| ADD HYD  (  0004)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
```



```
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0003):   126.70   0.413     5.17    22.81
      + ID2= 2 (  0401):     6.62   0.084     2.75     5.70
        ==================================================
        ID = 3 (  0004):   133.32   0.419     5.00    21.96

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0402)|   Area    (ha)=   8.58
|ID= 1 DT=15.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  40.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       4.29        4.29
     Dep. Storage     (mm)=       2.00        5.00
     Average Slope     (%)=       1.00        2.00
     Length            (m)=     239.17       40.00
     Mannings n           =      0.030       0.200

         NOTE:  RAINFALL WAS TRANSFORMED TO  15.0 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
                 0.250    0.00 | 2.000   12.24 | 3.750    5.04 |  5.50    0.72
                 0.500    0.72 | 2.250   12.24 | 4.000    2.88 |  5.75    0.72
                 0.750    0.72 | 2.500   33.12 | 4.250    2.88 |  6.00    0.72
                 1.000    0.72 | 2.750   33.12 | 4.500    1.44 |  6.25    0.72
                 1.250    0.72 | 3.000    9.36 | 4.750    1.44 |
                 1.500    4.32 | 3.250    9.36 | 5.000    0.72 |
                 1.750    4.32 | 3.500    5.04 | 5.250    0.72 |

     Max.Eff.Inten.(mm/hr)=      33.12       12.08
               over (min)       15.00       30.00
     Storage Coeff.  (min)=      11.08 (ii)  25.46 (ii)
     Unit Hyd. Tpeak (min)=      15.00       30.00
     Unit Hyd. peak  (cms)=       0.08        0.04
                                                           *TOTALS*
     PEAK FLOW       (cms)=       0.30        0.08           0.362 (iii)
     TIME TO PEAK    (hrs)=       2.75        3.00            2.75
     RUNOFF VOLUME    (mm)=      34.00        8.57           18.74
     TOTAL RAINFALL   (mm)=      36.00       36.00           36.00
     RUNOFF COEFFICIENT   =       0.94        0.24            0.52

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

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

--------------------------------------------------------------------------------
--------------------
| DUHYD    (  0403)|
| Inlet Cap.= 0.740|
| #of Inlets=     1|
| Total(cms)=   0.7|     AREA     QPEAK     TPEAK     R.V.
--------------------     (ha)     (cms)     (hrs)     (mm)
     TOTAL HYD.(ID= 1):   8.58      0.36      2.75   18.74
     ===================================================
     MAJOR SYS.(ID= 2):   0.00      0.00      0.00    0.00
     MINOR SYS.(ID= 3):   8.58      0.36      2.75   18.74

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD  (  0005)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
*** W A R N I N G :  HYDROGRAPH   0403 <ID= 2> IS DRY.
*** W A R N I N G :  HYDROGRAPH   0003 = HYDROGRAPH 0001
        ID1= 1 (  0004):   133.32   0.419     5.00    21.96
      + ID2= 2 (  0403):     0.00   0.000     0.00     0.00
        ==================================================
        ID = 3 (  0005):   133.32   0.419     5.00    21.96

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0500)|   Area    (ha)=   6.76
|ID= 1 DT=15.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       5.07         1.69
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     212.29        40.00
     Mannings n          =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      33.12        16.19
```



```
                over (min)      15.00        30.00
     Storage Coeff.  (min)=      10.31 (ii)   23.10 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.09         0.04
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.39         0.04         0.424 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00          2.75
     RUNOFF VOLUME    (mm)=      34.00         9.87         25.55
     TOTAL RAINFALL   (mm)=      36.00        36.00         36.00
     RUNOFF COEFFICIENT   =       0.94         0.27          0.71

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

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0024)|   Area    (ha)=   1.24
|ID= 1 DT=10.0 min |   Total Imp(%)=  47.00   Dir. Conn.(%)=  47.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.58         0.66
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      90.92        40.00
     Mannings n          =      0.030        0.200

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 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
                 0.167    0.00 | 1.833    8.28 | 3.500    5.04 |  5.17    0.72
                 0.333    0.36 | 2.000   12.24 | 3.667    5.04 |  5.33    0.72
                 0.500    0.72 | 2.167   12.24 | 3.833    3.96 |  5.50    0.72
                 0.667    0.72 | 2.333   22.68 | 4.000    2.88 |  5.67    0.72
                 0.833    0.72 | 2.500   33.12 | 4.167    2.88 |  5.83    0.72
                 1.000    0.72 | 2.667   33.12 | 4.333    2.16 |  6.00    0.72
                 1.167    0.72 | 2.833   21.24 | 4.500    1.44 |  6.17    0.72
                 1.333    2.52 | 3.000    9.36 | 4.667    1.44 |  6.33    0.36
                 1.500    4.32 | 3.167    9.36 | 4.833    1.08 |
                 1.667    4.32 | 3.333    7.20 | 5.000    0.72 |
```



```
     Max.Eff.Inten.(mm/hr)=      33.12         7.02
                over (min)      10.00        30.00
     Storage Coeff.  (min)=       6.20 (ii)   24.06 (ii)
     Unit Hyd. Tpeak (min)=      10.00        30.00
     Unit Hyd. peak  (cms)=       0.14         0.04
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.05         0.01         0.057 (iii)
     TIME TO PEAK    (hrs)=       2.67         3.00          2.67
     RUNOFF VOLUME    (mm)=      34.00         7.13         19.75
     TOTAL RAINFALL   (mm)=      36.00        36.00         36.00
     RUNOFF COEFFICIENT   =       0.94         0.20          0.55

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

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

--------------------------------------------------------------------------------
--------------------
| DUHYD    (  0025)|
| Inlet Cap.= 0.083|
| #of Inlets=     1|
| Total(cms)=   0.1|     AREA     QPEAK     TPEAK     R.V.
--------------------     (ha)     (cms)     (hrs)     (mm)
     TOTAL HYD.(ID= 1):   1.24      0.06      2.67   19.75
     ===================================================
     MAJOR SYS.(ID= 2):   0.00      0.00      0.00    0.00
     MINOR SYS.(ID= 3):   1.24      0.06      2.67   19.75

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD  (  0030)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
*** W A R N I N G :  HYDROGRAPH   0025 <ID= 1> IS DRY.
*** W A R N I N G :  HYDROGRAPH   0030 = HYDROGRAPH 0500
        ID1= 1 (  0025):     0.00   0.000     0.00     0.00
      + ID2= 2 (  0500):     6.76   0.424     2.75    25.55
        ==================================================
        ID = 3 (  0030):     6.76   0.424     2.75    25.55
```



```
     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0600)|   Area    (ha)=  12.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  40.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       6.00         6.00
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     270.00        40.00
     Mannings n          =      0.030        0.200

         NOTE:  RAINFALL WAS TRANSFORMED TO  15.0 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
                 0.250    0.00 | 2.000   12.24 | 3.750    5.04 |  5.50    0.72
                 0.500    0.72 | 2.250   12.24 | 4.000    2.88 |  5.75    0.72
                 0.750    0.72 | 2.500   33.12 | 4.250    2.88 |  6.00    0.72
                 1.000    0.72 | 2.750   33.12 | 4.500    1.44 |  6.25    0.72
                 1.250    0.72 | 3.000    9.36 | 4.750    1.44 |
                 1.500    4.32 | 3.250    9.36 | 5.000    0.72 |
                 1.750    4.32 | 3.500    5.04 | 5.250    0.72 |

     Max.Eff.Inten.(mm/hr)=      33.12        12.08
                over (min)      15.00        30.00
     Storage Coeff.  (min)=      11.91 (ii)   26.29 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.08         0.04
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.42         0.11         0.500 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00          2.75
     RUNOFF VOLUME    (mm)=      34.00         8.57         18.74
     TOTAL RAINFALL   (mm)=      36.00        36.00         36.00
     RUNOFF COEFFICIENT   =       0.94         0.24          0.52

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

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

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

--------------------
| ADD HYD  (  0006)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0030):      6.76   0.424     2.75    25.55
      + ID2= 2 (  0600):     12.00   0.500     2.75    18.74
        ==================================================
        ID = 3 (  0006):     18.76   0.925     2.75    21.19

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0700)|   Area    (ha)=  12.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  55.00   Dir. Conn.(%)=  43.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       6.60         5.40
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     282.00        40.00
     Mannings n          =       0.030        0.200

     Max.Eff.Inten.(mm/hr)=      33.12        13.41
                over (min)       15.00        30.00
     Storage Coeff.  (min)=      12.23 (ii)   26.02 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.08         0.04
                                                            *TOTALS*
     PEAK FLOW       (cms)=       0.45         0.11           0.531 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00           2.75
     RUNOFF VOLUME    (mm)=      34.00         9.02          19.76
     TOTAL RAINFALL   (mm)=      36.00        36.00          36.00
     RUNOFF COEFFICIENT   =       0.94         0.25           0.55

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

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

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```
| ADD HYD  (  0007)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0006):     18.76   0.925     2.75    21.19
      + ID2= 2 (  0700):     12.00   0.531     2.75    19.76
        ==================================================
        ID = 3 (  0007):     30.76   1.456     2.75    20.63

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

--------------------
| ADD HYD  (  0008)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0403):      8.58   0.362     2.75    18.74
      + ID2= 2 (  0007):     30.76   1.456     2.75    20.63
        ==================================================
        ID = 3 (  0008):     39.34   1.818     2.75    20.22

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0800)|   Area    (ha)=   2.60
|ID= 1 DT=15.0 min |   Total Imp(%)=  60.00   Dir. Conn.(%)=  45.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.56         1.04
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     131.00        40.00
     Mannings n          =       0.030        0.200

     Max.Eff.Inten.(mm/hr)=      33.12        15.66
                over (min)       15.00        30.00
     Storage Coeff.  (min)=       7.72 (ii)   20.68 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.10         0.05
                                                            *TOTALS*
     PEAK FLOW       (cms)=       0.11         0.03           0.128 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00           2.75
     RUNOFF VOLUME    (mm)=      34.00         9.71          20.64
     TOTAL RAINFALL   (mm)=      36.00        36.00          36.00
     RUNOFF COEFFICIENT   =       0.94         0.27           0.57

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



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

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

--------------------
| ADD HYD  (  0009)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0008):     39.34   1.818     2.75    20.22
      + ID2= 2 (  0800):      2.60   0.128     2.75    20.64
        ==================================================
        ID = 3 (  0009):     41.94   1.945     2.75    20.25

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0010)|      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   |   0.9400     0.6210
                           0.0500     0.1950   |   2.6600     0.7760
                           0.0800     0.3860   |   4.0200     0.9110
                           0.1300     0.4750   |   0.0000     0.0000

                                 AREA     QPEAK      TPEAK       R.V.
                                 (ha)     (cms)      (hrs)       (mm)
   INFLOW : ID= 2 (  0009)     41.940      1.945      2.75      20.25
   OUTFLOW: ID= 1 (  0010)     41.940      0.560      3.58      20.22

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 28.80
                  TIME SHIFT OF PEAK FLOW         (min)= 50.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.5527

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

--------------------
| ADD HYD  (  0011)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0010):     41.94   0.560     3.58    20.22
      + ID2= 2 (  0005):    133.32   0.419     5.00    21.96
        ==================================================
        ID = 3 (  0011):    175.26   0.863     3.92    21.53
```



```
     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0031)|   Area    (ha)=   1.03
|ID= 1 DT=10.0 min |   Total Imp(%)=  47.00   Dir. Conn.(%)=  47.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.48         0.55
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      82.87        40.00
     Mannings n          =       0.030        0.200

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 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
                 0.167    0.00 | 1.833    8.28 | 3.500    5.04 |  5.17    0.72
                 0.333    0.36 | 2.000   12.24 | 3.667    5.04 |  5.33    0.72
                 0.500    0.72 | 2.167   12.24 | 3.833    3.96 |  5.50    0.72
                 0.667    0.72 | 2.333   22.68 | 4.000    2.88 |  5.67    0.72
                 0.833    0.72 | 2.500   33.12 | 4.167    2.88 |  5.83    0.72
                 1.000    0.72 | 2.667   33.12 | 4.333    2.16 |  6.00    0.72
                 1.167    0.72 | 2.833   21.24 | 4.500    1.44 |  6.17    0.72
                 1.333    2.52 | 3.000    9.36 | 4.667    1.44 |  6.33    0.36
                 1.500    4.32 | 3.167    9.36 | 4.833    1.08 |
                 1.667    4.32 | 3.333    7.20 | 5.000    0.72 |

     Max.Eff.Inten.(mm/hr)=      33.12         7.02
                over (min)       10.00        30.00
     Storage Coeff.  (min)=       5.86 (ii)   23.73 (ii)
     Unit Hyd. Tpeak (min)=      10.00        30.00
     Unit Hyd. peak  (cms)=       0.14         0.04
                                                            *TOTALS*
     PEAK FLOW       (cms)=       0.04         0.01           0.047 (iii)
     TIME TO PEAK    (hrs)=       2.67         3.00           2.67
     RUNOFF VOLUME    (mm)=      34.00         7.13          19.75
     TOTAL RAINFALL   (mm)=      36.00        36.00          36.00
     RUNOFF COEFFICIENT   =       0.94         0.20           0.55

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
```

```
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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


--------------------
| ADD HYD  (  0032)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0025):     1.24  0.057     2.67    19.75
      + ID2= 2 (  0031):     1.03  0.047     2.67    19.75
        ==================================================
        ID = 3 (  0032):     2.27  0.104     2.67    19.75

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

       V    V   I    SSSSS  U   U    A    L             (v 6.0.2000)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

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

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


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.0\VO2\voin.dat

  Output  filename:
C:\Users\kevin.lukawiecki\AppData\Local\Civica\VH5\a512d3b0-a6e7-43a6-99e8-d9354a433
349\d2dfb7eb-6762-4170-8da2-c71e8aa3
  Summary filename:
C:\Users\kevin.lukawiecki\AppData\Local\Civica\VH5\a512d3b0-a6e7-43a6-99e8-d9354a433
349\d2dfb7eb-6762-4170-8da2-c71e8aa3
```



```
DATE: 01/26/2022                           TIME: 11:35:40

USER:


COMMENTS: ____________________________________________________________


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


--------------------
|    READ STORM    |    Filename: C:\Users\kevin.lukawiecki\AppD
|                  |              ata\Local\Temp\
|                  |              a5b67f9a-2ba4-4eeb-aafa-d1354b44751d\1b8bf92b
| 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            |
| NASHYD   (  0401)|   Area    (ha)=   6.62   Curve Number   (CN)= 63.0
|ID= 1 DT=15.0 min |   Ia      (mm)=   1.50   # of Linear Res.(N)= 2.00
--------------------   U.H. Tp(hrs)=   0.20

     Unit Hyd Qpeak  (cms)=   0.859

     PEAK FLOW      (cms)=   0.256 (i)
     TIME TO PEAK    (hrs)=   2.750
     RUNOFF VOLUME    (mm)=  16.937
     TOTAL RAINFALL   (mm)=  65.590
     RUNOFF COEFFICIENT   =   0.258
```



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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0100)|   Area    (ha)=  23.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      17.25         5.75
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     390.00        40.00
     Mannings n          =       0.030        0.200

     Max.Eff.Inten.(mm/hr)=      60.35        45.65
                over (min)       15.00        30.00
     Storage Coeff.  (min)=      11.68 (ii)   20.13 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.08         0.05
                                                         *TOTALS*
     PEAK FLOW      (cms)=        2.38         0.47         2.774 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00          2.75
     RUNOFF VOLUME    (mm)=      63.59        28.26         51.22
     TOTAL RAINFALL   (mm)=      65.59        65.59         65.59
     RUNOFF COEFFICIENT   =       0.97         0.43          0.78

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

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

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0101)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 15.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.7800     1.0000
                          0.7800     0.0000   |   0.0000     0.0000

                                    AREA     QPEAK     TPEAK        R.V.
                                    (ha)     (cms)     (hrs)        (mm)
   INFLOW : ID= 2 (  0100)       23.000      2.774      2.75       51.22
   OUTFLOW: ID= 1 (  0101)       23.000      0.780      2.25       51.25
```



```
                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 28.12
                   TIME SHIFT OF PEAK FLOW         (min)=-30.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.1424

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0200)|   Area    (ha)=  28.40
|ID= 1 DT=15.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      21.30         7.10
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     435.00        40.00
     Mannings n          =       0.030        0.200

     Max.Eff.Inten.(mm/hr)=      60.35        45.65
                over (min)       15.00        30.00
     Storage Coeff.  (min)=      12.48 (ii)   20.92 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.08         0.05
                                                         *TOTALS*
     PEAK FLOW      (cms)=        2.91         0.57         3.388 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00          2.75
     RUNOFF VOLUME    (mm)=      63.59        28.26         51.22
     TOTAL RAINFALL   (mm)=      65.59        65.59         65.59
     RUNOFF COEFFICIENT   =       0.97         0.43          0.78

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

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

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0201)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 15.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.8700     1.2000
                          0.8700     0.0000   |   0.0000     0.0000

                                    AREA     QPEAK     TPEAK        R.V.
```

```
                                  (ha)      (cms)      (hrs)       (mm)
   INFLOW : ID= 2 (  0200)      28.400      3.388      2.75      51.22
   OUTFLOW: ID= 1 (  0201)      28.400      0.870      2.00      51.50

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 25.68
                  TIME SHIFT OF PEAK FLOW         (min)=-45.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.1907

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

--------------------
| ADD HYD  (  0001)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0101):    23.00   0.780     2.25    51.25
      + ID2= 2 (  0201):    28.40   0.870     2.00    51.50
        ==================================================
        ID = 3 (  0001):    51.40   1.650     2.25    51.39

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0300)|   Area    (ha)=  73.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  57.00   Dir. Conn.(%)=  47.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      41.61        31.39
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     692.00        40.00
     Mannings n          =       0.030        0.200

     Max.Eff.Inten.(mm/hr)=      60.35        37.11
                over (min)       15.00        30.00
     Storage Coeff.  (min)=      16.48 (ii)   25.66 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.07         0.04
                                                          *TOTALS*
     PEAK FLOW       (cms)=       5.12         1.88          6.631 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00           2.75
     RUNOFF VOLUME    (mm)=      63.59        25.99          43.66
     TOTAL RAINFALL   (mm)=      65.59        65.59          65.59
     RUNOFF COEFFICIENT   =       0.97         0.40           0.67


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
```



```
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0027)|   Area    (ha)=   2.30
|ID= 1 DT=10.0 min |   Total Imp(%)=  71.00   Dir. Conn.(%)=  71.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.63         0.67
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     123.83        40.00
     Mannings n          =       0.030        0.200

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 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
               0.167    0.00 | 1.833   15.08 | 3.500    9.18 |  5.17    1.31
               0.333    0.65 | 2.000   22.30 | 3.667    9.18 |  5.33    1.31
               0.500    1.31 | 2.167   22.30 | 3.833    7.21 |  5.50    1.31
               0.667    1.31 | 2.333   41.32 | 4.000    5.25 |  5.67    1.31
               0.833    1.31 | 2.500   60.35 | 4.167    5.25 |  5.83    1.31
               1.000    1.31 | 2.667   60.35 | 4.333    3.93 |  6.00    1.31
               1.167    1.31 | 2.833   38.70 | 4.500    2.62 |  6.17    1.31
               1.333    4.59 | 3.000   17.06 | 4.667    2.62 |  6.33    0.66
               1.500    7.87 | 3.167   17.06 | 4.833    1.97 |
               1.667    7.87 | 3.333   13.12 | 5.000    1.31 |

     Max.Eff.Inten.(mm/hr)=      60.35        21.82
                over (min)       10.00        20.00
     Storage Coeff.  (min)=       5.87 (ii)   17.22 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.14         0.06
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.27         0.03          0.295 (iii)
     TIME TO PEAK    (hrs)=       2.67         2.83           2.67
     RUNOFF VOLUME    (mm)=      63.59        22.34          51.62
     TOTAL RAINFALL   (mm)=      65.59        65.59          65.59
     RUNOFF COEFFICIENT   =       0.97         0.34           0.79

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



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

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

--------------------
| ADD HYD  (  0002)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0001):    51.40   1.650     2.25    51.39
      + ID2= 2 (  0027):     2.30   0.295     2.67    51.62
        ==================================================
        ID = 3 (  0002):    53.70   1.945     2.67    51.32

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

--------------------
| ADD HYD  (  0002)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0002):    53.70   1.945     2.67    51.32
      + ID2= 2 (  0300):    73.00   6.631     2.75    43.66
        ==================================================
        ID = 1 (  0002):   126.70   7.967     2.67    46.90

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0003)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 15.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.1900     1.9300
                          0.0500     0.4200   |   0.4700     2.6400
                          0.0800     0.8400   |   0.8500     3.3400
                          0.0900     1.3900   |   1.3200     3.7000
                          0.1000     1.6000   |   2.4600     4.2500

                                 AREA     QPEAK      TPEAK        R.V.
                                 (ha)     (cms)      (hrs)        (mm)
   INFLOW : ID= 2 (  0002)    126.700     7.967      2.67      46.90
   OUTFLOW: ID= 1 (  0003)    126.700     2.036      5.17      46.89

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 25.56
```



```
                  TIME SHIFT OF PEAK FLOW         (min)=150.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  4.0456

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

--------------------
| ADD HYD  (  0004)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0003):   126.70   2.036     5.17    46.89
      + ID2= 2 (  0401):     6.62   0.256     2.75    16.94
        ==================================================
        ID = 3 (  0004):   133.32   2.051     5.17    45.40

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0402)|   Area    (ha)=   8.58
|ID= 1 DT=15.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  40.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       4.29         4.29
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     239.17        40.00
     Mannings n          =       0.030        0.200

         NOTE:  RAINFALL WAS TRANSFORMED TO  15.0 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
               0.250    0.00 | 2.000   22.30 | 3.750    9.18 |  5.50    1.31
               0.500    1.31 | 2.250   22.30 | 4.000    5.25 |  5.75    1.31
               0.750    1.31 | 2.500   60.35 | 4.250    5.25 |  6.00    1.31
               1.000    1.31 | 2.750   60.35 | 4.500    2.62 |  6.25    1.31
               1.250    1.31 | 3.000   17.06 | 4.750    2.62 |
               1.500    7.87 | 3.250   17.06 | 5.000    1.31 |
               1.750    7.87 | 3.500    9.18 | 5.250    1.31 |

     Max.Eff.Inten.(mm/hr)=      60.35        35.50
                over (min)       15.00        30.00
     Storage Coeff.  (min)=       8.71 (ii)   18.06 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.09         0.05
                                                          *TOTALS*
```

```
     PEAK FLOW       (cms)=       0.56         0.28          0.797 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00           2.75
     RUNOFF VOLUME    (mm)=      63.59        25.51          40.74
     TOTAL RAINFALL   (mm)=      65.59        65.59          65.59
     RUNOFF COEFFICIENT   =       0.97         0.39           0.62

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

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

--------------------------------------------------------------------------------
--------------------
| DUHYD    (  0403)|
| Inlet Cap.= 0.740|
| #of Inlets=     1|
| Total(cms)=   0.7|      AREA     QPEAK     TPEAK    R.V.
--------------------      (ha)     (cms)     (hrs)    (mm)
     TOTAL HYD.(ID= 1):   8.58      0.80      2.75   40.74
     ====================================================
     MAJOR SYS.(ID= 2):   0.13      0.06      2.75   40.74
     MINOR SYS.(ID= 3):   8.45      0.74      2.75   40.74

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD  (  0005)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0004):   133.32   2.051     5.17    45.40
      + ID2= 2 (  0403):     0.13   0.057     2.75    40.74
        ===================================================
        ID = 3 (  0005):   133.45   2.051     5.17    45.39

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0500)|   Area    (ha)=   6.76
|ID= 1 DT=15.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       5.07         1.69
```



```
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     212.29        40.00
     Mannings n           =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      60.35        45.65
                over (min)       15.00        30.00
     Storage Coeff.  (min)=       8.11 (ii)   16.56 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.10         0.05
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.72         0.15          0.851 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00           2.75
     RUNOFF VOLUME    (mm)=      63.59        28.26          51.22
     TOTAL RAINFALL   (mm)=      65.59        65.59          65.59
     RUNOFF COEFFICIENT   =       0.97         0.43           0.78

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

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0024)|   Area    (ha)=   1.24
|ID= 1 DT=10.0 min |   Total Imp(%)=  47.00   Dir. Conn.(%)=  47.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.58         0.66
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      90.92        40.00
     Mannings n           =      0.030        0.200

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 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
                  0.167    0.00 | 1.833   15.08 | 3.500    9.18 |  5.17    1.31
                  0.333    0.65 | 2.000   22.30 | 3.667    9.18 |  5.33    1.31
                  0.500    1.31 | 2.167   22.30 | 3.833    7.21 |  5.50    1.31
                  0.667    1.31 | 2.333   41.32 | 4.000    5.25 |  5.67    1.31
```



```
                  0.833    1.31 | 2.500   60.35 | 4.167    5.25 |  5.83    1.31
                  1.000    1.31 | 2.667   60.35 | 4.333    3.93 |  6.00    1.31
                  1.167    1.31 | 2.833   38.70 | 4.500    2.62 |  6.17    1.31
                  1.333    4.59 | 3.000   17.06 | 4.667    2.62 |  6.33    0.66
                  1.500    7.87 | 3.167   17.06 | 4.833    1.97 |
                  1.667    7.87 | 3.333   13.12 | 5.000    1.31 |

     Max.Eff.Inten.(mm/hr)=      60.35        21.82
                over (min)       10.00        20.00
     Storage Coeff.  (min)=       4.88 (ii)   16.23 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.15         0.06
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.10         0.03          0.122 (iii)
     TIME TO PEAK    (hrs)=       2.67         2.83           2.67
     RUNOFF VOLUME    (mm)=      63.59        22.34          41.72
     TOTAL RAINFALL   (mm)=      65.59        65.59          65.59
     RUNOFF COEFFICIENT   =       0.97         0.34           0.64

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

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

--------------------------------------------------------------------------------
--------------------
| DUHYD    (  0025)|
| Inlet Cap.= 0.083|
| #of Inlets=     1|
| Total(cms)=   0.1|      AREA     QPEAK     TPEAK    R.V.
--------------------      (ha)     (cms)     (hrs)    (mm)
     TOTAL HYD.(ID= 1):   1.24      0.12      2.67   41.72
     ====================================================
     MAJOR SYS.(ID= 2):   0.11      0.04      2.67   41.72
     MINOR SYS.(ID= 3):   1.13      0.08      2.50   41.72

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD  (  0030)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0025):     0.11   0.039     2.67    41.72
```



```
      + ID2= 2 (  0500):     6.76   0.851     2.75    51.22
        ===================================================
        ID = 3 (  0030):     6.87   0.845     2.67    51.04

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0600)|   Area    (ha)=  12.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  40.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       6.00         6.00
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     270.00        40.00
     Mannings n           =      0.030        0.200

         NOTE:  RAINFALL WAS TRANSFORMED TO  15.0 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
                  0.250    0.00 | 2.000   22.30 | 3.750    9.18 |  5.50    1.31
                  0.500    1.31 | 2.250   22.30 | 4.000    5.25 |  5.75    1.31
                  0.750    1.31 | 2.500   60.35 | 4.250    5.25 |  6.00    1.31
                  1.000    1.31 | 2.750   60.35 | 4.500    2.62 |  6.25    1.31
                  1.250    1.31 | 3.000   17.06 | 4.750    2.62 |
                  1.500    7.87 | 3.250   17.06 | 5.000    1.31 |
                  1.750    7.87 | 3.500    9.18 | 5.250    1.31 |

     Max.Eff.Inten.(mm/hr)=      60.35        35.50
                over (min)       15.00        30.00
     Storage Coeff.  (min)=       9.37 (ii)   18.71 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.09         0.05
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.78         0.38          1.105 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00           2.75
     RUNOFF VOLUME    (mm)=      63.59        25.51          40.74
     TOTAL RAINFALL   (mm)=      65.59        65.59          65.59
     RUNOFF COEFFICIENT   =       0.97         0.39           0.62

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
```

```
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

--------------------
| ADD HYD  (  0006)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0030):     6.87   0.845     2.67    51.04
      + ID2= 2 (  0600):    12.00   1.105     2.75    40.74
        ==================================================
        ID = 3 (  0006):    18.87   1.859     2.67    44.49

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0700)|   Area    (ha)=  12.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  55.00   Dir. Conn.(%)=  43.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       6.60         5.40
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     282.00        40.00
     Mannings n          =       0.030        0.200

     Max.Eff.Inten.(mm/hr)=      60.35        38.81
                over (min)       15.00        30.00
     Storage Coeff.  (min)=       9.62 (ii)   18.63 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.09         0.05
                                                            *TOTALS*
     PEAK FLOW       (cms)=       0.84         0.38          1.160 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00           2.75
     RUNOFF VOLUME    (mm)=      63.59        26.47          42.43
     TOTAL RAINFALL   (mm)=      65.59        65.59          65.59
     RUNOFF COEFFICIENT   =       0.97         0.40           0.65

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

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



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

--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0006):    18.87   1.859     2.67    44.49
      + ID2= 2 (  0700):    12.00   1.160     2.75    42.43
        ==================================================
        ID = 3 (  0007):    30.87   2.926     2.67    43.69

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

--------------------
| ADD HYD  (  0008)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0403):     8.45   0.740     2.75    40.74
      + ID2= 2 (  0007):    30.87   2.926     2.67    43.69
        ==================================================
        ID = 3 (  0008):    39.33   3.621     2.67    43.07

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0800)|   Area    (ha)=   2.60
|ID= 1 DT=15.0 min |   Total Imp(%)=  60.00   Dir. Conn.(%)=  45.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.56         1.04
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     131.00        40.00
     Mannings n          =       0.030        0.200

     Max.Eff.Inten.(mm/hr)=      60.35        44.35
                over (min)       15.00        15.00
     Storage Coeff.  (min)=       6.07 (ii)   14.62 (ii)
     Unit Hyd. Tpeak (min)=      15.00        15.00
     Unit Hyd. peak  (cms)=       0.10         0.07
                                                            *TOTALS*
     PEAK FLOW       (cms)=       0.20         0.10          0.300 (iii)
     TIME TO PEAK    (hrs)=       2.75         2.75           2.75
     RUNOFF VOLUME    (mm)=      63.59        27.93          43.98
     TOTAL RAINFALL   (mm)=      65.59        65.59          65.59
```



```
     RUNOFF COEFFICIENT   =       0.97         0.43           0.67

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

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

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

--------------------
| ADD HYD  (  0009)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0008):    39.33   3.621     2.67    43.07
      + ID2= 2 (  0800):     2.60   0.300     2.75    43.98
        ==================================================
        ID = 3 (  0009):    41.93   3.904     2.67    43.12

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0010)|     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   |   0.9400     0.6210
                          0.0500     0.1950   |   2.6600     0.7760
                          0.0800     0.3860   |   4.0200     0.9110
                          0.1300     0.4750   |   0.0000     0.0000

                                AREA     QPEAK     TPEAK        R.V.
                                (ha)     (cms)     (hrs)        (mm)
   INFLOW : ID= 2 (  0009)     41.928      3.904      2.67      43.12
   OUTFLOW: ID= 1 (  0010)     41.928      2.627      3.00      43.09

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 67.30
                  TIME SHIFT OF PEAK FLOW         (min)= 20.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.7742

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

--------------------
| ADD HYD  (  0011)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
```



```
        ID1= 1 (  0010):    41.93   2.627     3.00    43.09
      + ID2= 2 (  0005):   133.45   2.051     5.17    45.39
        ==================================================
        ID = 3 (  0011):   175.37   3.224     3.08    44.82

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0031)|   Area    (ha)=   1.03
|ID= 1 DT=10.0 min |   Total Imp(%)=  47.00   Dir. Conn.(%)=  47.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.48         0.55
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      82.87        40.00
     Mannings n          =       0.030        0.200

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 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
                 0.167    0.00 | 1.833   15.08 | 3.500    9.18 |  5.17    1.31
                 0.333    0.65 | 2.000   22.30 | 3.667    9.18 |  5.33    1.31
                 0.500    1.31 | 2.167   22.30 | 3.833    7.21 |  5.50    1.31
                 0.667    1.31 | 2.333   41.32 | 4.000    5.25 |  5.67    1.31
                 0.833    1.31 | 2.500   60.35 | 4.167    5.25 |  5.83    1.31
                 1.000    1.31 | 2.667   60.35 | 4.333    3.93 |  6.00    1.31
                 1.167    1.31 | 2.833   38.70 | 4.500    2.62 |  6.17    1.31
                 1.333    4.59 | 3.000   17.06 | 4.667    2.62 |  6.33    0.66
                 1.500    7.87 | 3.167   17.06 | 4.833    1.97 |
                 1.667    7.87 | 3.333   13.12 | 5.000    1.31 |

     Max.Eff.Inten.(mm/hr)=      60.35        21.82
                over (min)       10.00        20.00
     Storage Coeff.  (min)=       4.61 (ii)   15.96 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.15         0.06
                                                            *TOTALS*
     PEAK FLOW       (cms)=       0.08         0.03          0.102 (iii)
     TIME TO PEAK    (hrs)=       2.67         2.83           2.67
     RUNOFF VOLUME    (mm)=      63.59        22.34          41.72
     TOTAL RAINFALL   (mm)=      65.59        65.59          65.59
     RUNOFF COEFFICIENT   =       0.97         0.34           0.64
```

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

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

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

--------------------
| ADD HYD  (  0032)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0025):     1.13   0.083     2.50    41.72
      + ID2= 2 (  0031):     1.03   0.102     2.67    41.72
        ===================================================
        ID = 3 (  0032):     2.16   0.185     2.67    41.72

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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       V    V   I    SSSSS  U   U    A    L             (v 6.0.2000)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
Developed and Distributed by Civica Infrastructure
```



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


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.0\VO2\voin.dat
```



```
  Output  filename:
C:\Users\kevin.lukawiecki\AppData\Local\Civica\VH5\a512d3b0-a6e7-43a6-99e8-d9354a433
349\53515e6e-6085-4cbf-be54-e9f95023
  Summary filename:
C:\Users\kevin.lukawiecki\AppData\Local\Civica\VH5\a512d3b0-a6e7-43a6-99e8-d9354a433
349\53515e6e-6085-4cbf-be54-e9f95023


DATE: 01/26/2022                          TIME: 11:35:38

USER:


COMMENTS: ____________________________________________________________


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


--------------------
|   READ STORM     |    Filename: C:\Users\kevin.lukawiecki\AppD
|                  |              ata\Local\Temp\
|                  |              a5b67f9a-2ba4-4eeb-aafa-d1354b44751d\ef6bf4f6
| 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            |
| NASHYD   (  0401)|   Area    (ha)=   6.62   Curve Number   (CN)= 63.0
|ID= 1 DT=15.0 min |   Ia      (mm)=   1.50   # of Linear Res.(N)= 2.00
--------------------   U.H. Tp(hrs)=   0.20
```



```
     Unit Hyd Qpeak  (cms)=   0.859

     PEAK FLOW       (cms)=   0.144 (i)
     TIME TO PEAK    (hrs)=   2.750
     RUNOFF VOLUME    (mm)=   9.647
     TOTAL RAINFALL   (mm)=  47.810
     RUNOFF COEFFICIENT   =   0.202

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0100)|   Area    (ha)=  23.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      17.25         5.75
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     390.00        40.00
     Mannings n          =       0.030        0.200

     Max.Eff.Inten.(mm/hr)=      43.98        26.95
               over (min)       15.00        30.00
     Storage Coeff.  (min)=      13.26 (ii)   23.69 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.08         0.04
                                                           *TOTALS*
     PEAK FLOW       (cms)=       1.70         0.25          1.904 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00           2.75
     RUNOFF VOLUME    (mm)=      45.81        16.54          35.56
     TOTAL RAINFALL   (mm)=      47.81        47.81          47.81
     RUNOFF COEFFICIENT   =       0.96         0.35           0.74

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

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

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0101)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
```



```
| DT= 15.0 min     |      OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------       (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000    |   0.7800      1.0000
                          0.7800     0.0000    |   0.0000      0.0000

                                AREA     QPEAK      TPEAK        R.V.
                                (ha)     (cms)      (hrs)        (mm)
   INFLOW : ID= 2 (  0100)     23.000      1.904       2.75       35.56
   OUTFLOW: ID= 1 (  0101)     23.000      0.780       2.50       36.08

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 40.97
                  TIME SHIFT OF PEAK FLOW         (min)=-15.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0663

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0200)|   Area    (ha)=  28.40
|ID= 1 DT=15.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      21.30         7.10
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     435.00        40.00
     Mannings n          =       0.030        0.200

     Max.Eff.Inten.(mm/hr)=      43.98        26.95
               over (min)       15.00        30.00
     Storage Coeff.  (min)=      14.16 (ii)   24.59 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.07         0.04
                                                           *TOTALS*
     PEAK FLOW       (cms)=       2.08         0.31          2.321 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00           2.75
     RUNOFF VOLUME    (mm)=      45.81        16.54          35.56
     TOTAL RAINFALL   (mm)=      47.81        47.81          47.81
     RUNOFF COEFFICIENT   =       0.96         0.35           0.74

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

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

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```

```
--------------------
| RESERVOIR(  0201)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 15.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.8700     1.2000
                          0.8700     0.0000   |   0.0000     0.0000

                              AREA     QPEAK     TPEAK       R.V.
                              (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0200)     28.400     2.321      2.75      35.56
   OUTFLOW: ID= 1 (  0201)     28.400     0.870      2.50      36.58

                PEAK   FLOW   REDUCTION [Qout/Qin](%)= 37.49
                TIME SHIFT OF PEAK FLOW         (min)=-15.00
                MAXIMUM  STORAGE   USED       (ha.m.)=  0.0866

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

--------------------
| ADD HYD  (  0001)|
|   1 +  2 =  3    |        AREA    QPEAK    TPEAK     R.V.
--------------------        (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0101):    23.00   0.780     2.50    36.08
     + ID2= 2 (  0201):    28.40   0.870     2.50    36.58
       ==================================================
       ID = 3 (  0001):    51.40   1.650     2.50    36.36

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0300)|   Area    (ha)=  73.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  57.00   Dir. Conn.(%)=  47.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      41.61        31.39
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     692.00        40.00
     Mannings n          =       0.030        0.200

     Max.Eff.Inten.(mm/hr)=      43.98        21.54
                over (min)       15.00        45.00
     Storage Coeff.  (min)=      18.71 (ii)   30.12 (ii)
     Unit Hyd. Tpeak (min)=      15.00        45.00
     Unit Hyd. peak  (cms)=       0.06         0.03
                                                            *TOTALS*
```



```
     PEAK FLOW       (cms)=       3.61         0.94          4.086 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.25          2.75
     RUNOFF VOLUME    (mm)=      45.81        14.96         29.46
     TOTAL RAINFALL   (mm)=      47.81        47.81         47.81
     RUNOFF COEFFICIENT   =       0.96         0.31          0.62


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

------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0027)|   Area    (ha)=   2.30
|ID= 1 DT=10.0 min |   Total Imp(%)=  71.00   Dir. Conn.(%)=  71.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.63         0.67
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     123.83        40.00
     Mannings n          =       0.030        0.200

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 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
                0.167    0.00 | 1.833   10.99 | 3.500    6.69 |  5.17    0.96
                0.333    0.48 | 2.000   16.25 | 3.667    6.69 |  5.33    0.96
                0.500    0.96 | 2.167   16.25 | 3.833    5.25 |  5.50    0.96
                0.667    0.96 | 2.333   30.11 | 4.000    3.82 |  5.67    0.96
                0.833    0.96 | 2.500   43.98 | 4.167    3.82 |  5.83    0.96
                1.000    0.96 | 2.667   43.98 | 4.333    2.86 |  6.00    0.96
                1.167    0.96 | 2.833   28.20 | 4.500    1.91 |  6.17    0.96
                1.333    3.35 | 3.000   12.43 | 4.667    1.91 |  6.33    0.48
                1.500    5.74 | 3.167   12.43 | 4.833    1.43 |
                1.667    5.74 | 3.333    9.56 | 5.000    0.96 |

     Max.Eff.Inten.(mm/hr)=      43.98        12.22
                over (min)       10.00        30.00
     Storage Coeff.  (min)=       6.66 (ii)   20.97 (ii)
     Unit Hyd. Tpeak (min)=      10.00        30.00
     Unit Hyd. peak  (cms)=       0.13         0.05
```



```
                                                            *TOTALS*
     PEAK FLOW       (cms)=       0.20         0.02          0.204 (iii)
     TIME TO PEAK    (hrs)=       2.67         3.00          2.67
     RUNOFF VOLUME    (mm)=      45.81        12.51         36.15
     TOTAL RAINFALL   (mm)=      47.81        47.81         47.81
     RUNOFF COEFFICIENT   =       0.96         0.26          0.76

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

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

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

--------------------
| ADD HYD  (  0002)|
|   1 +  2 =  3    |        AREA    QPEAK    TPEAK     R.V.
--------------------        (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0001):    51.40   1.650     2.50    36.36
     + ID2= 2 (  0027):     2.30   0.204     2.67    36.15
       ==================================================
       ID = 3 (  0002):    53.70   1.854     2.67    36.45

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

--------------------
| ADD HYD  (  0002)|
|   3 +  2 =  1    |        AREA    QPEAK    TPEAK     R.V.
--------------------        (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0002):    53.70   1.854     2.67    36.45
     + ID2= 2 (  0300):    73.00   4.086     2.75    29.46
       ==================================================
       ID = 1 (  0002):   126.70   5.602     2.67    32.41

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0003)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 15.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.1900     1.9300
                          0.0500     0.4200   |   0.4700     2.6400
                          0.0800     0.8400   |   0.8500     3.3400
```



```
                          0.0900     1.3900   |   1.3200     3.7000
                          0.1000     1.6000   |   2.4600     4.2500

                              AREA     QPEAK     TPEAK       R.V.
                              (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0002)    126.700     5.602      2.67      32.41
   OUTFLOW: ID= 1 (  0003)    126.700     0.938      5.00      32.39

                PEAK   FLOW   REDUCTION [Qout/Qin](%)= 16.75
                TIME SHIFT OF PEAK FLOW         (min)=140.00
                MAXIMUM  STORAGE   USED       (ha.m.)=  3.4133

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

--------------------
| ADD HYD  (  0004)|
|   1 +  2 =  3    |        AREA    QPEAK    TPEAK     R.V.
--------------------        (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0003):   126.70   0.938     5.00    32.39
     + ID2= 2 (  0401):     6.62   0.144     2.75     9.65
       ==================================================
       ID = 3 (  0004):   133.32   0.949     5.00    31.26

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0402)|   Area    (ha)=   8.58
|ID= 1 DT=15.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  40.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       4.29         4.29
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     239.17        40.00
     Mannings n          =       0.030        0.200

         NOTE:  RAINFALL WAS TRANSFORMED TO  15.0 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
                0.250    0.00 | 2.000   16.25 | 3.750    6.69 |  5.50    0.96
                0.500    0.96 | 2.250   16.25 | 4.000    3.82 |  5.75    0.96
                0.750    0.96 | 2.500   43.98 | 4.250    3.82 |  6.00    0.96
                1.000    0.96 | 2.750   43.98 | 4.500    1.91 |  6.25    0.96
                1.250    0.96 | 3.000   12.43 | 4.750    1.91 |
```

```
            1.500    5.74 | 3.250   12.43 | 5.000    0.96 |
            1.750    5.74 | 3.500    6.69 | 5.250    0.96 |

     Max.Eff.Inten.(mm/hr)=      43.98        20.53
                over (min)       15.00        30.00
     Storage Coeff.  (min)=       9.89 (ii)   21.52 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.09         0.05
                                                         *TOTALS*
     PEAK FLOW       (cms)=       0.41         0.15          0.524 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00           2.75
     RUNOFF VOLUME    (mm)=      45.81        14.64          27.11
     TOTAL RAINFALL   (mm)=      47.81        47.81          47.81
     RUNOFF COEFFICIENT   =       0.96         0.31           0.57

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

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

--------------------------------------------------------------------------------
--------------------
| DUHYD    (  0403)|
| Inlet Cap.= 0.740|
| #of Inlets=     1|
| Total(cms)=   0.7|      AREA     QPEAK     TPEAK     R.V.
--------------------      (ha)     (cms)     (hrs)     (mm)
     TOTAL HYD.(ID= 1):   8.58      0.52      2.75   27.11
     ====================================================
     MAJOR SYS.(ID= 2):   0.00      0.00      0.00    0.00
     MINOR SYS.(ID= 3):   8.58      0.52      2.75   27.11

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD  (  0005)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
*** W A R N I N G :  HYDROGRAPH   0403 <ID= 2> IS DRY.
*** W A R N I N G :  HYDROGRAPH   0003 = HYDROGRAPH 0001
        ID1= 1 (  0004):   133.32   0.949     5.00    31.26
      + ID2= 2 (  0403):     0.00   0.000     0.00     0.00
        ====================================================
```



```
        ID = 3 (  0005):   133.32   0.949     5.00    31.26

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0500)|   Area    (ha)=   6.76
|ID= 1 DT=15.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       5.07         1.69
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     212.29        40.00
     Mannings n          =       0.030        0.200

     Max.Eff.Inten.(mm/hr)=      43.98        26.95
                over (min)       15.00        30.00
     Storage Coeff.  (min)=       9.21 (ii)   19.64 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.09         0.05
                                                         *TOTALS*
     PEAK FLOW       (cms)=       0.52         0.08          0.589 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00           2.75
     RUNOFF VOLUME    (mm)=      45.81        16.54          35.56
     TOTAL RAINFALL   (mm)=      47.81        47.81          47.81
     RUNOFF COEFFICIENT   =       0.96         0.35           0.74

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

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0024)|   Area    (ha)=   1.24
|ID= 1 DT=10.0 min |   Total Imp(%)=  47.00   Dir. Conn.(%)=  47.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.58         0.66
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      90.92        40.00
     Mannings n          =       0.030        0.200
```



```
         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 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
             0.167    0.00 | 1.833   10.99 | 3.500    6.69 |  5.17    0.96
             0.333    0.48 | 2.000   16.25 | 3.667    6.69 |  5.33    0.96
             0.500    0.96 | 2.167   16.25 | 3.833    5.25 |  5.50    0.96
             0.667    0.96 | 2.333   30.11 | 4.000    3.82 |  5.67    0.96
             0.833    0.96 | 2.500   43.98 | 4.167    3.82 |  5.83    0.96
             1.000    0.96 | 2.667   43.98 | 4.333    2.86 |  6.00    0.96
             1.167    0.96 | 2.833   28.20 | 4.500    1.91 |  6.17    0.96
             1.333    3.35 | 3.000   12.43 | 4.667    1.91 |  6.33    0.48
             1.500    5.74 | 3.167   12.43 | 4.833    1.43 |
             1.667    5.74 | 3.333    9.56 | 5.000    0.96 |

     Max.Eff.Inten.(mm/hr)=      43.98        12.22
                over (min)       10.00        20.00
     Storage Coeff.  (min)=       5.54 (ii)   19.85 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.14         0.06
                                                         *TOTALS*
     PEAK FLOW       (cms)=       0.07         0.02          0.083 (iii)
     TIME TO PEAK    (hrs)=       2.67         2.83           2.67
     RUNOFF VOLUME    (mm)=      45.81        12.51          28.15
     TOTAL RAINFALL   (mm)=      47.81        47.81          47.81
     RUNOFF COEFFICIENT   =       0.96         0.26           0.59

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

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

--------------------------------------------------------------------------------
--------------------
| DUHYD    (  0025)|
| Inlet Cap.= 0.083|
| #of Inlets=     1|
| Total(cms)=   0.1|      AREA     QPEAK     TPEAK     R.V.
--------------------      (ha)     (cms)     (hrs)     (mm)
     TOTAL HYD.(ID= 1):   1.24      0.08      2.67   28.15
     ====================================================
     MAJOR SYS.(ID= 2):   0.00      0.00      0.00    0.00
```



```
     MINOR SYS.(ID= 3):   1.24      0.08      2.67   28.15

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD  (  0030)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
*** W A R N I N G :  HYDROGRAPH   0025 <ID= 1> IS DRY.
*** W A R N I N G :  HYDROGRAPH   0030 = HYDROGRAPH 0500
        ID1= 1 (  0025):     0.00   0.000     0.00     0.00
      + ID2= 2 (  0500):     6.76   0.589     2.75    35.56
        ====================================================
        ID = 3 (  0030):     6.76   0.589     2.75    35.56

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0600)|   Area    (ha)=  12.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  40.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       6.00         6.00
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     270.00        40.00
     Mannings n          =       0.030        0.200

         NOTE:  RAINFALL WAS TRANSFORMED TO  15.0 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
             0.250    0.00 | 2.000   16.25 | 3.750    6.69 |  5.50    0.96
             0.500    0.96 | 2.250   16.25 | 4.000    3.82 |  5.75    0.96
             0.750    0.96 | 2.500   43.98 | 4.250    3.82 |  6.00    0.96
             1.000    0.96 | 2.750   43.98 | 4.500    1.91 |  6.25    0.96
             1.250    0.96 | 3.000   12.43 | 4.750    1.91 |
             1.500    5.74 | 3.250   12.43 | 5.000    0.96 |
             1.750    5.74 | 3.500    6.69 | 5.250    0.96 |

     Max.Eff.Inten.(mm/hr)=      43.98        20.53
                over (min)       15.00        30.00
     Storage Coeff.  (min)=      10.64 (ii)   22.27 (ii)
```

```
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.09         0.04
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.56         0.21          0.726 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00           2.75
     RUNOFF VOLUME    (mm)=      45.81        14.64          27.11
     TOTAL RAINFALL   (mm)=      47.81        47.81          47.81
     RUNOFF COEFFICIENT   =       0.96         0.31           0.57

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

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

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

--------------------
| ADD HYD  (  0006)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0030):     6.76   0.589     2.75    35.56
      + ID2= 2 (  0600):    12.00   0.726     2.75    27.11
        ==================================================
        ID = 3 (  0006):    18.76   1.315     2.75    30.15

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0700)|   Area    (ha)=  12.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  55.00   Dir. Conn.(%)=  43.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       6.60         5.40
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     282.00        40.00
     Mannings n           =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      43.98        22.61
                over (min)      15.00        30.00
     Storage Coeff.  (min)=      10.92 (ii)   22.11 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.08         0.04
                                                          *TOTALS*
```



```
     PEAK FLOW       (cms)=       0.60         0.20          0.767 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00           2.75
     RUNOFF VOLUME    (mm)=      45.81        15.30          28.42
     TOTAL RAINFALL   (mm)=      47.81        47.81          47.81
     RUNOFF COEFFICIENT   =       0.96         0.32           0.59

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

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

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

--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0006):    18.76   1.315     2.75    30.15
      + ID2= 2 (  0700):    12.00   0.767     2.75    28.42
        ==================================================
        ID = 3 (  0007):    30.76   2.082     2.75    29.48

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

--------------------
| ADD HYD  (  0008)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0403):     8.58   0.524     2.75    27.11
      + ID2= 2 (  0007):    30.76   2.082     2.75    29.48
        ==================================================
        ID = 3 (  0008):    39.34   2.606     2.75    28.96

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0800)|   Area    (ha)=   2.60
|ID= 1 DT=15.0 min |   Total Imp(%)=  60.00   Dir. Conn.(%)=  45.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.56         1.04
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
```



```
     Length            (m)=     131.00        40.00
     Mannings n           =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      43.98        26.12
                over (min)      15.00        30.00
     Storage Coeff.  (min)=       6.89 (ii)   17.45 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.10         0.05
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.14         0.05          0.183 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00           2.75
     RUNOFF VOLUME    (mm)=      45.81        16.31          29.58
     TOTAL RAINFALL   (mm)=      47.81        47.81          47.81
     RUNOFF COEFFICIENT   =       0.96         0.34           0.62

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

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

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

--------------------
| ADD HYD  (  0009)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0008):    39.34   2.606     2.75    28.96
      + ID2= 2 (  0800):     2.60   0.183     2.75    29.58
        ==================================================
        ID = 3 (  0009):    41.94   2.788     2.75    29.00

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0010)|     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   |   0.9400     0.6210
                          0.0500     0.1950   |   2.6600     0.7760
                          0.0800     0.3860   |   4.0200     0.9110
                          0.1300     0.4750   |   0.0000     0.0000

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



```
   INFLOW : ID= 2 (  0009)     41.940      2.788      2.75      29.00
   OUTFLOW: ID= 1 (  0010)     41.940      1.279      3.25      28.97

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 45.87
                   TIME SHIFT OF PEAK FLOW         (min)= 30.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.6517

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

--------------------
| ADD HYD  (  0011)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0010):    41.94   1.279     3.25    28.97
      + ID2= 2 (  0005):   133.32   0.949     5.00    31.26
        ==================================================
        ID = 3 (  0011):   175.26   1.641     3.33    30.69

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0031)|   Area    (ha)=   1.03
|ID= 1 DT=10.0 min |   Total Imp(%)=  47.00   Dir. Conn.(%)=  47.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.48         0.55
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      82.87        40.00
     Mannings n           =      0.030        0.200

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 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
                   0.167    0.00 | 1.833   10.99 | 3.500    6.69 |  5.17    0.96
                   0.333    0.48 | 2.000   16.25 | 3.667    6.69 |  5.33    0.96
                   0.500    0.96 | 2.167   16.25 | 3.833    5.25 |  5.50    0.96
                   0.667    0.96 | 2.333   30.11 | 4.000    3.82 |  5.67    0.96
                   0.833    0.96 | 2.500   43.98 | 4.167    3.82 |  5.83    0.96
                   1.000    0.96 | 2.667   43.98 | 4.333    2.86 |  6.00    0.96
                   1.167    0.96 | 2.833   28.20 | 4.500    1.91 |  6.17    0.96
                   1.333    3.35 | 3.000   12.43 | 4.667    1.91 |  6.33    0.48
                   1.500    5.74 | 3.167   12.43 | 4.833    1.43 |
                   1.667    5.74 | 3.333    9.56 | 5.000    0.96 |
```

```
     Max.Eff.Inten.(mm/hr)=      43.98        12.22
                over (min)       10.00        20.00
     Storage Coeff.  (min)=       5.24 (ii)   19.55 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.14         0.06
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.06         0.01         0.069 (iii)
     TIME TO PEAK    (hrs)=       2.67         2.83          2.67
     RUNOFF VOLUME    (mm)=      45.81        12.51         28.15
     TOTAL RAINFALL   (mm)=      47.81        47.81         47.81
     RUNOFF COEFFICIENT   =       0.96         0.26          0.59

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

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

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


--------------------
| ADD HYD  (  0032)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0025):     1.24   0.083     2.67    28.15
      + ID2= 2 (  0031):     1.03   0.069     2.67    28.15
        ==================================================
        ID = 3 (  0032):     2.27   0.151     2.67    28.15

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

       V    V   I    SSSSS  U   U    A    L              (v 6.0.2000)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
Developed and Distributed by Civica Infrastructure
```



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


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.0\VO2\voin.dat

  Output  filename:
C:\Users\kevin.lukawiecki\AppData\Local\Civica\VH5\a512d3b0-a6e7-43a6-99e8-d9354a433
349\47b0b263-2131-414b-8f8b-11db4b0e
  Summary filename:
C:\Users\kevin.lukawiecki\AppData\Local\Civica\VH5\a512d3b0-a6e7-43a6-99e8-d9354a433
349\47b0b263-2131-414b-8f8b-11db4b0e


DATE: 01/26/2022                          TIME: 11:35:38

USER:



COMMENTS: ____________________________________________________________


------------------------------------------------------------------------------------
----------------------
  **********************************************
  ** SIMULATION : 50 Year                     **
  **********************************************


--------------------
|    READ STORM    |    Filename: C:\Users\kevin.lukawiecki\AppD
|                  |              ata\Local\Temp\
|                  |              a5b67f9a-2ba4-4eeb-aafa-d1354b44751d\1e0878d6
| 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            |
| NASHYD   (  0401)|   Area    (ha)=   6.62   Curve Number   (CN)= 63.0
|ID= 1 DT=15.0 min |   Ia      (mm)=   1.50   # of Linear Res.(N)= 2.00
--------------------   U.H. Tp(hrs)=   0.20

     Unit Hyd Qpeak  (cms)=   0.859

     PEAK FLOW       (cms)=   0.310 (i)
     TIME TO PEAK    (hrs)=   2.750
     RUNOFF VOLUME    (mm)=  20.372
     TOTAL RAINFALL   (mm)=  73.000
     RUNOFF COEFFICIENT   =   0.279

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

------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0100)|   Area    (ha)=  23.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      17.25         5.75
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     390.00        40.00
     Mannings n           =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      67.16        54.05
                over (min)       15.00        30.00
     Storage Coeff.  (min)=      11.20 (ii)   19.09 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.08         0.05
                                                        *TOTALS*
     PEAK FLOW       (cms)=       2.67         0.56         3.150 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00          2.75
     RUNOFF VOLUME    (mm)=      71.00        33.58         57.90
     TOTAL RAINFALL   (mm)=      73.00        73.00         73.00
     RUNOFF COEFFICIENT   =       0.97         0.46          0.79

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
```



```
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0101)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 15.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.7800     1.0000
                          0.7800     0.0000   |   0.0000     0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0100)     23.000     3.150      2.75      57.90
   OUTFLOW: ID= 1 (  0101)     23.000     0.780      2.00      58.59

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 24.76
                   TIME SHIFT OF PEAK FLOW         (min)=-45.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.1881

------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0200)|   Area    (ha)=  28.40
|ID= 1 DT=15.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      21.30         7.10
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     435.00        40.00
     Mannings n           =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      67.16        54.05
                over (min)       15.00        30.00
     Storage Coeff.  (min)=      11.95 (ii)   19.85 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.08         0.05
                                                        *TOTALS*
     PEAK FLOW       (cms)=       3.26         0.69         3.849 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00          2.75
     RUNOFF VOLUME    (mm)=      71.00        33.58         57.90
     TOTAL RAINFALL   (mm)=      73.00        73.00         73.00
     RUNOFF COEFFICIENT   =       0.97         0.46          0.79

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

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

--------------------------------------------------------------------------------
--------------------
| RESERVOIR( 0201)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 15.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.8700     1.2000
                          0.8700     0.0000   |   0.0000     0.0000

                                AREA     QPEAK      TPEAK       R.V.
                                (ha)     (cms)      (hrs)       (mm)
   INFLOW : ID= 2 ( 0200)     28.400      3.849      2.75      57.90
   OUTFLOW: ID= 1 ( 0201)     28.400      0.870      2.00      58.62

                 PEAK   FLOW   REDUCTION [Qout/Qin](%)= 22.60
                 TIME SHIFT OF PEAK FLOW         (min)=-45.00
                 MAXIMUM  STORAGE   USED       (ha.m.)=  0.2488

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

--------------------
| ADD HYD  (  0001)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0101):    23.00   0.780     2.00    58.59
     + ID2= 2 (  0201):    28.40   0.870     2.00    58.62
       ==================================================
       ID = 3 (  0001):    51.40   1.650     2.00    58.61

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0300)|   Area    (ha)=  73.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  57.00   Dir. Conn.(%)=  47.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      41.61        31.39
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     692.00        40.00
```



```
     Mannings n           =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      67.16        44.18
               over (min)       15.00        30.00
     Storage Coeff.  (min)=      15.79 (ii)   24.35 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.07         0.04
                                                         *TOTALS*
     PEAK FLOW       (cms)=       5.76         2.30         7.639 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00          2.75
     RUNOFF VOLUME    (mm)=      71.00        31.04         49.82
     TOTAL RAINFALL   (mm)=      73.00        73.00         73.00
     RUNOFF COEFFICIENT   =       0.97         0.43          0.68

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0027)|   Area    (ha)=   2.30
|ID= 1 DT=10.0 min |   Total Imp(%)=  71.00   Dir. Conn.(%)=  71.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.63         0.67
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     123.83        40.00
     Mannings n           =      0.030        0.200

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 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
                 0.167    0.00 | 1.833   16.79 | 3.500   10.22 |  5.17    1.46
                 0.333    0.73 | 2.000   24.82 | 3.667   10.22 |  5.33    1.46
                 0.500    1.46 | 2.167   24.82 | 3.833    8.03 |  5.50    1.46
                 0.667    1.46 | 2.333   45.99 | 4.000    5.84 |  5.67    1.46
                 0.833    1.46 | 2.500   67.16 | 4.167    5.84 |  5.83    1.46
                 1.000    1.46 | 2.667   67.16 | 4.333    4.38 |  6.00    1.46
                 1.167    1.46 | 2.833   43.07 | 4.500    2.92 |  6.17    1.46
                 1.333    5.11 | 3.000   18.98 | 4.667    2.92 |  6.33    0.73
```



```
                 1.500    8.76 | 3.167   18.98 | 4.833    2.19 |
                 1.667    8.76 | 3.333   14.60 | 5.000    1.46 |

     Max.Eff.Inten.(mm/hr)=      67.16        26.49
               over (min)       10.00        20.00
     Storage Coeff.  (min)=       5.62 (ii)   16.13 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.14         0.06
                                                         *TOTALS*
     PEAK FLOW       (cms)=       0.30         0.04         0.333 (iii)
     TIME TO PEAK    (hrs)=       2.67         2.83          2.67
     RUNOFF VOLUME    (mm)=      71.00        26.92         58.21
     TOTAL RAINFALL   (mm)=      73.00        73.00         73.00
     RUNOFF COEFFICIENT   =       0.97         0.37          0.80

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

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

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

--------------------
| ADD HYD  (  0002)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0001):    51.40   1.650     2.00    58.61
     + ID2= 2 (  0027):     2.30   0.333     2.67    58.21
       ==================================================
       ID = 3 (  0002):    53.70   1.983     2.67    58.70

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

--------------------
| ADD HYD  (  0002)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0002):    53.70   1.983     2.67    58.70
     + ID2= 2 (  0300):    73.00   7.639     2.75    49.82
       ==================================================
       ID = 1 (  0002):   126.70   8.917     2.67    53.59

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



```
--------------------
| RESERVOIR( 0003)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 15.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.1900     1.9300
                          0.0500     0.4200   |   0.4700     2.6400
                          0.0800     0.8400   |   0.8500     3.3400
                          0.0900     1.3900   |   1.3200     3.7000
                          0.1000     1.6000   |   2.4600     4.2500

                                AREA     QPEAK      TPEAK       R.V.
                                (ha)     (cms)      (hrs)       (mm)
   INFLOW : ID= 2 ( 0002)    126.700      8.917      2.67      53.59
   OUTFLOW: ID= 1 ( 0003)    126.700      2.376      4.83      53.57

                 PEAK   FLOW   REDUCTION [Qout/Qin](%)= 26.65
                 TIME SHIFT OF PEAK FLOW         (min)=130.00
                 MAXIMUM  STORAGE   USED       (ha.m.)=  4.2118

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

--------------------
| ADD HYD  (  0004)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0003):   126.70   2.376     4.83    53.57
     + ID2= 2 (  0401):     6.62   0.310     2.75    20.37
       ==================================================
       ID = 3 (  0004):   133.32   2.410     4.67    51.92

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0402)|   Area    (ha)=   8.58
|ID= 1 DT=15.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  40.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       4.29         4.29
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     239.17        40.00
     Mannings n           =      0.030        0.200

         NOTE:  RAINFALL WAS TRANSFORMED TO  15.0 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
     0.250    0.00 | 2.000   24.82 | 3.750   10.22 |  5.50    1.46
     0.500    1.46 | 2.250   24.82 | 4.000    5.84 |  5.75    1.46
     0.750    1.46 | 2.500   67.16 | 4.250    5.84 |  6.00    1.46
     1.000    1.46 | 2.750   67.16 | 4.500    2.92 |  6.25    1.46
     1.250    1.46 | 3.000   18.98 | 4.750    2.92 |
     1.500    8.76 | 3.250   18.98 | 5.000    1.46 |
     1.750    8.76 | 3.500   10.22 | 5.250    1.46 |

     Max.Eff.Inten.(mm/hr)=      67.16        42.31
                over (min)       15.00        30.00
     Storage Coeff.  (min)=       8.35 (ii)   17.06 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.09         0.05
                                                          *TOTALS*
     PEAK FLOW      (cms)=        0.63         0.34         0.919 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00          2.75
     RUNOFF VOLUME    (mm)=      71.00        30.51         46.71
     TOTAL RAINFALL   (mm)=      73.00        73.00         73.00
     RUNOFF COEFFICIENT   =       0.97         0.42          0.64

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

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

--------------------------------------------------------------------------------
--------------------
| DUHYD    (  0403)|
| Inlet Cap.= 0.740|
| #of Inlets=     1|
| Total(cms)=   0.7|      AREA     QPEAK     TPEAK    R.V.
--------------------      (ha)     (cms)     (hrs)    (mm)
     TOTAL HYD.(ID= 1):   8.58      0.92      2.75   46.71
     ==================================================
     MAJOR SYS.(ID= 2):   0.35      0.18      2.75   46.71
     MINOR SYS.(ID= 3):   8.23      0.74      2.75   46.71

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

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```
| ADD HYD  (  0005)|
|   1 +  2 =  3    |        AREA    QPEAK    TPEAK     R.V.
--------------------        (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0004):   133.32   2.410     4.67    51.92
      + ID2= 2 (  0403):     0.35   0.179     2.75    46.71
        ===================================================
        ID = 3 (  0005):   133.67   2.410     4.67    51.89

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0500)|   Area    (ha)=   6.76
|ID= 1 DT=15.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       5.07         1.69
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     212.29        40.00
     Mannings n           =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      67.16        54.05
                over (min)       15.00        30.00
     Storage Coeff.  (min)=       7.77 (ii)   15.67 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.10         0.05
                                                          *TOTALS*
     PEAK FLOW      (cms)=        0.81         0.18         0.964 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00          2.75
     RUNOFF VOLUME    (mm)=      71.00        33.58         57.90
     TOTAL RAINFALL   (mm)=      73.00        73.00         73.00
     RUNOFF COEFFICIENT   =       0.97         0.46          0.79

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

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0024)|   Area    (ha)=   1.24
|ID= 1 DT=10.0 min |   Total Imp(%)=  47.00   Dir. Conn.(%)=  47.00
--------------------
```



```
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.58         0.66
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      90.92        40.00
     Mannings n           =      0.030        0.200

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 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
     0.167    0.00 | 1.833   16.79 | 3.500   10.22 |  5.17    1.46
     0.333    0.73 | 2.000   24.82 | 3.667   10.22 |  5.33    1.46
     0.500    1.46 | 2.167   24.82 | 3.833    8.03 |  5.50    1.46
     0.667    1.46 | 2.333   45.99 | 4.000    5.84 |  5.67    1.46
     0.833    1.46 | 2.500   67.16 | 4.167    5.84 |  5.83    1.46
     1.000    1.46 | 2.667   67.16 | 4.333    4.38 |  6.00    1.46
     1.167    1.46 | 2.833   43.07 | 4.500    2.92 |  6.17    1.46
     1.333    5.11 | 3.000   18.98 | 4.667    2.92 |  6.33    0.73
     1.500    8.76 | 3.167   18.98 | 4.833    2.19 |
     1.667    8.76 | 3.333   14.60 | 5.000    1.46 |

     Max.Eff.Inten.(mm/hr)=      67.16        26.49
                over (min)       10.00        20.00
     Storage Coeff.  (min)=       4.67 (ii)   15.18 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.15         0.07
                                                          *TOTALS*
     PEAK FLOW      (cms)=        0.11         0.04         0.140 (iii)
     TIME TO PEAK    (hrs)=       2.67         2.83          2.67
     RUNOFF VOLUME    (mm)=      71.00        26.92         47.63
     TOTAL RAINFALL   (mm)=      73.00        73.00         73.00
     RUNOFF COEFFICIENT   =       0.97         0.37          0.65

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

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

--------------------------------------------------------------------------------
--------------------
| DUHYD    (  0025)|
| Inlet Cap.= 0.083|
```



```
| #of Inlets=     1|
| Total(cms)=   0.1|      AREA     QPEAK     TPEAK    R.V.
--------------------      (ha)     (cms)     (hrs)    (mm)
     TOTAL HYD.(ID= 1):   1.24      0.14      2.67   47.63
     ==================================================
     MAJOR SYS.(ID= 2):   0.16      0.06      2.67   47.63
     MINOR SYS.(ID= 3):   1.08      0.08      2.50   47.63

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD  (  0030)|
|   1 +  2 =  3    |        AREA    QPEAK    TPEAK     R.V.
--------------------        (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0025):     0.16   0.057     2.67    47.63
      + ID2= 2 (  0500):     6.76   0.964     2.75    57.90
        ===================================================
        ID = 3 (  0030):     6.92   0.970     2.67    57.65

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0600)|   Area    (ha)=  12.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  40.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       6.00         6.00
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     270.00        40.00
     Mannings n           =      0.030        0.200

         NOTE:  RAINFALL WAS TRANSFORMED TO  15.0 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
     0.250    0.00 | 2.000   24.82 | 3.750   10.22 |  5.50    1.46
     0.500    1.46 | 2.250   24.82 | 4.000    5.84 |  5.75    1.46
     0.750    1.46 | 2.500   67.16 | 4.250    5.84 |  6.00    1.46
     1.000    1.46 | 2.750   67.16 | 4.500    2.92 |  6.25    1.46
     1.250    1.46 | 3.000   18.98 | 4.750    2.92 |
     1.500    8.76 | 3.250   18.98 | 5.000    1.46 |
     1.750    8.76 | 3.500   10.22 | 5.250    1.46 |
```

```
     Max.Eff.Inten.(mm/hr)=      67.16        42.31
                over (min)       15.00        30.00
     Storage Coeff.  (min)=       8.98 (ii)   17.69 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.09         0.05
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.88         0.47          1.275 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00          2.75
     RUNOFF VOLUME    (mm)=      71.00        30.51         46.71
     TOTAL RAINFALL   (mm)=      73.00        73.00         73.00
     RUNOFF COEFFICIENT   =       0.97         0.42          0.64

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

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

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

--------------------
| ADD HYD  (  0006)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0030):     6.92   0.970     2.67    57.65
      + ID2= 2 (  0600):    12.00   1.275     2.75    46.71
        ==================================================
        ID = 3 (  0006):    18.92   2.138     2.67    50.71

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0700)|   Area    (ha)=  12.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  55.00   Dir. Conn.(%)=  43.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       6.60         5.40
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     282.00        40.00
     Mannings n           =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      67.16        46.16
                over (min)       15.00        30.00
```



```
     Storage Coeff.  (min)=       9.22 (ii)   17.63 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.09         0.05
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.94         0.46          1.335 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00          2.75
     RUNOFF VOLUME    (mm)=      71.00        31.59         48.53
     TOTAL RAINFALL   (mm)=      73.00        73.00         73.00
     RUNOFF COEFFICIENT   =       0.97         0.43          0.66

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

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

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

--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0006):    18.92   2.138     2.67    50.71
      + ID2= 2 (  0700):    12.00   1.335     2.75    48.53
        ==================================================
        ID = 3 (  0007):    30.92   3.364     2.67    49.87

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

--------------------
| ADD HYD  (  0008)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0403):     8.23   0.740     2.75    46.71
      + ID2= 2 (  0007):    30.92   3.364     2.67    49.87
        ==================================================
        ID = 3 (  0008):    39.15   4.088     2.67    49.25

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0800)|   Area    (ha)=   2.60
|ID= 1 DT=15.0 min |   Total Imp(%)=  60.00   Dir. Conn.(%)=  45.00
--------------------
```



```
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.56         1.04
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     131.00        40.00
     Mannings n           =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      67.16        52.55
                over (min)       15.00        15.00
     Storage Coeff.  (min)=       5.82 (ii)   13.80 (ii)
     Unit Hyd. Tpeak (min)=      15.00        15.00
     Unit Hyd. peak  (cms)=       0.10         0.08
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.22         0.13          0.345 (iii)
     TIME TO PEAK    (hrs)=       2.75         2.75          2.75
     RUNOFF VOLUME    (mm)=      71.00        33.22         50.22
     TOTAL RAINFALL   (mm)=      73.00        73.00         73.00
     RUNOFF COEFFICIENT   =       0.97         0.46          0.69

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

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

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

--------------------
| ADD HYD  (  0009)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0008):    39.15   4.088     2.67    49.25
      + ID2= 2 (  0800):     2.60   0.345     2.75    50.22
        ==================================================
        ID = 3 (  0009):    41.75   4.413     2.67    49.30

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0010)|     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   |   0.9400      0.6210
                          0.0500     0.1950   |   2.6600      0.7760
                          0.0800     0.3860   |   4.0200      0.9110
```



```
                          0.1300     0.4750   |   0.0000      0.0000

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0009)     41.755      4.413      2.67      49.30
   OUTFLOW: ID= 1 (  0010)     41.755      3.136      3.00      49.28

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 71.07
                  TIME SHIFT OF PEAK FLOW         (min)= 20.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.8263

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--------------------
| ADD HYD  (  0011)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0010):    41.75   3.136     3.00    49.28
      + ID2= 2 (  0005):   133.67   2.410     4.67    51.89
        ==================================================
        ID = 3 (  0011):   175.42   3.878     3.00    51.25

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0031)|   Area    (ha)=   1.03
|ID= 1 DT=10.0 min |   Total Imp(%)=  47.00   Dir. Conn.(%)=  47.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.48         0.55
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      82.87        40.00
     Mannings n           =      0.030        0.200

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 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
                 0.167    0.00 | 1.833   16.79 | 3.500   10.22 |  5.17    1.46
                 0.333    0.73 | 2.000   24.82 | 3.667   10.22 |  5.33    1.46
                 0.500    1.46 | 2.167   24.82 | 3.833    8.03 |  5.50    1.46
                 0.667    1.46 | 2.333   45.99 | 4.000    5.84 |  5.67    1.46
                 0.833    1.46 | 2.500   67.16 | 4.167    5.84 |  5.83    1.46
                 1.000    1.46 | 2.667   67.16 | 4.333    4.38 |  6.00    1.46
```

```
           1.167    1.46 | 2.833   43.07 | 4.500    2.92 |  6.17    1.46
           1.333    5.11 | 3.000   18.98 | 4.667    2.92 |  6.33    0.73
           1.500    8.76 | 3.167   18.98 | 4.833    2.19 |
           1.667    8.76 | 3.333   14.60 | 5.000    1.46 |

     Max.Eff.Inten.(mm/hr)=      67.16        26.49
                over (min)       10.00        20.00
     Storage Coeff.  (min)=       4.42 (ii)   14.92 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.15         0.07
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.09         0.03        0.117 (iii)
     TIME TO PEAK    (hrs)=       2.67         2.83        2.67
     RUNOFF VOLUME    (mm)=      71.00        26.92       47.63
     TOTAL RAINFALL   (mm)=      73.00        73.00       73.00
     RUNOFF COEFFICIENT   =       0.97         0.37        0.65

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

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

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

--------------------
| ADD HYD  (  0032)|
|   1 +  2 =  3    |        AREA    QPEAK    TPEAK     R.V.
--------------------        (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0025):     1.08   0.083     2.50    47.63
     + ID2= 2 (  0031):     1.03   0.117     2.67    47.63
       ================================================
       ID = 3 (  0032):     2.11   0.200     2.67    47.63

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

       V    V   I    SSSSS  U   U    A    L              (v 6.0.2000)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
```



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

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


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.0\VO2\voin.dat

  Output  filename:
C:\Users\kevin.lukawiecki\AppData\Local\Civica\VH5\a512d3b0-a6e7-43a6-99e8-d9354a433
349\aceec383-eacb-4ea3-8135-e976e404
  Summary filename:
C:\Users\kevin.lukawiecki\AppData\Local\Civica\VH5\a512d3b0-a6e7-43a6-99e8-d9354a433
349\aceec383-eacb-4ea3-8135-e976e404


DATE: 01/26/2022                            TIME: 11:35:39

USER:


COMMENTS: ____________________________________________________________

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  ***********************************************
  ** SIMULATION : Z5mm                          **
  ***********************************************


--------------------
|   READ STORM     |    Filename: C:\Users\kevin.lukawiecki\AppD
|                  |              ata\Local\Temp\
|                  |              a5b67f9a-2ba4-4eeb-aafa-d1354b44751d\d25d2449
| Ptotal= 24.91 mm |    Comments: 25MM-4HR
--------------------
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                 0.03    0.30 |  1.03   10.80 |  2.03    4.62 |  3.03    2.04
                 0.07    0.60 |  1.07   14.10 |  2.07    4.44 |  3.07    1.98
                 0.10    0.90 |  1.10   17.40 |  2.10    4.26 |  3.10    1.92
```



```
            0.13    1.20 |  1.13   20.70 |  2.13    4.08 |  3.13    1.86
            0.17    1.50 |  1.17   24.00 |  2.17    3.90 |  3.17    1.80
            0.20    1.62 |  1.20   26.46 |  2.20    3.75 |  3.20    1.77
            0.23    1.74 |  1.23   28.92 |  2.23    3.60 |  3.23    1.74
            0.27    1.86 |  1.27   31.38 |  2.27    3.45 |  3.27    1.71
            0.30    1.98 |  1.30   33.84 |  2.30    3.30 |  3.30    1.68
            0.33    2.10 |  1.33   36.30 |  2.33    3.15 |  3.33    1.65
            0.37    2.13 |  1.37   33.75 |  2.37    3.09 |  3.37    1.65
            0.40    2.16 |  1.40   31.20 |  2.40    3.03 |  3.40    1.65
            0.43    2.19 |  1.43   28.65 |  2.43    2.97 |  3.43    1.65
            0.47    2.22 |  1.47   26.10 |  2.47    2.91 |  3.47    1.65
            0.50    2.25 |  1.50   23.55 |  2.50    2.85 |  3.50    1.65
            0.53    2.31 |  1.53   20.82 |  2.53    2.76 |  3.53    1.62
            0.57    2.37 |  1.57   18.09 |  2.57    2.67 |  3.57    1.59
            0.60    2.43 |  1.60   15.36 |  2.60    2.58 |  3.60    1.56
            0.63    2.49 |  1.63   12.63 |  2.63    2.49 |  3.63    1.53
            0.67    2.55 |  1.67    9.90 |  2.67    2.40 |  3.67    1.50
            0.70    2.85 |  1.70    9.18 |  2.70    2.37 |  3.70    1.41
            0.73    3.15 |  1.73    8.46 |  2.73    2.34 |  3.73    1.32
            0.77    3.45 |  1.77    7.74 |  2.77    2.31 |  3.77    1.23
            0.80    3.75 |  1.80    7.02 |  2.80    2.28 |  3.80    1.14
            0.83    4.05 |  1.83    6.30 |  2.83    2.25 |  3.83    1.05
            0.87    4.74 |  1.87    6.00 |  2.87    2.22 |  3.87    0.96
            0.90    5.43 |  1.90    5.70 |  2.90    2.19 |  3.90    0.87
            0.93    6.12 |  1.93    5.40 |  2.93    2.16 |  3.93    0.78
            0.97    6.81 |  1.97    5.10 |  2.97    2.13 |  3.97    0.69
            1.00    7.50 |  2.00    4.80 |  3.00    2.10 |  4.00    0.60

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

--------------------
| CALIB            |
| NASHYD   (  0401)|   Area    (ha)=   6.62   Curve Number   (CN)= 63.0
|ID= 1 DT=15.0 min |   Ia      (mm)=   1.50   # of Linear Res.(N)= 2.00
--------------------   U.H. Tp(hrs)=   0.20

         NOTE:  RAINFALL WAS TRANSFORMED TO  15.0 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
           0.250    1.17 | 1.250   21.08 | 2.250    4.05 |  3.25    1.86
           0.500    2.13 | 1.500   30.54 | 2.500    3.07 |  3.50    1.66
           0.750    2.65 | 1.750   13.11 | 2.750    2.50 |  3.75    1.49
           1.000    5.35 | 2.000    5.89 | 3.000    2.20 |  4.00    0.89

     Unit Hyd Qpeak  (cms)=   0.859
```



```
     PEAK FLOW       (cms)=   0.040 (i)
     TIME TO PEAK    (hrs)=   1.750
     RUNOFF VOLUME    (mm)=   2.792
     TOTAL RAINFALL   (mm)=  24.910
     RUNOFF COEFFICIENT   =   0.112

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0100)|   Area    (ha)=  23.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      17.25         5.75
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     390.00        40.00
     Mannings n          =       0.030        0.200

     Max.Eff.Inten.(mm/hr)=      30.54         6.72
                over (min)       15.00        45.00
     Storage Coeff.  (min)=      15.34 (ii)   33.52 (ii)
     Unit Hyd. Tpeak (min)=      15.00        45.00
     Unit Hyd. peak  (cms)=       0.07         0.03
                                                        *TOTALS*
     PEAK FLOW       (cms)=       1.01         0.06        1.024 (iii)
     TIME TO PEAK    (hrs)=       1.50         2.25        1.50
     RUNOFF VOLUME    (mm)=      22.91         4.77       16.56
     TOTAL RAINFALL   (mm)=      24.91        24.91       24.91
     RUNOFF COEFFICIENT   =       0.92         0.19        0.66


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

--------------------------------------------------------------------------------
--------------------
| RESERVOIR( 0101)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 15.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                         0.0000     0.0000    |   0.7800     1.0000
```

```
                      0.7800     0.0000   |   0.0000      0.0000

                            AREA     QPEAK     TPEAK       R.V.
                            (ha)     (cms)     (hrs)       (mm)
  INFLOW : ID= 2 (  0100)     23.000      1.024      1.50      16.56
  OUTFLOW: ID= 1 (  0101)     23.000      0.780      1.50      16.87

              PEAK   FLOW   REDUCTION [Qout/Qin](%)= 76.15
              TIME SHIFT OF PEAK FLOW         (min)=  0.00
              MAXIMUM  STORAGE   USED       (ha.m.)=  0.0220

-------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0200)|   Area    (ha)=  28.40
|ID= 1 DT=15.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       21.30        7.10
     Dep. Storage     (mm)=        2.00        5.00
     Average Slope     (%)=        1.00        2.00
     Length            (m)=      435.00       40.00
     Mannings n          =       0.030       0.200

     Max.Eff.Inten.(mm/hr)=       30.54        6.72
                over (min)       15.00       45.00
     Storage Coeff.  (min)=       16.38 (ii)   34.56 (ii)
     Unit Hyd. Tpeak (min)=       15.00       45.00
     Unit Hyd. peak  (cms)=        0.07        0.03
                                                        *TOTALS*
     PEAK FLOW       (cms)=        1.22        0.07          1.234 (iii)
     TIME TO PEAK    (hrs)=        1.50        2.25           1.50
     RUNOFF VOLUME    (mm)=       22.91        4.77          16.56
     TOTAL RAINFALL   (mm)=       24.91       24.91          24.91
     RUNOFF COEFFICIENT   =        0.92        0.19           0.66


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

-------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0201)|      OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 15.0 min     |      OUTFLOW    STORAGE    |  OUTFLOW    STORAGE
```



```
--------------------       (cms)     (ha.m.)    |   (cms)     (ha.m.)
                          0.0000     0.0000    |   0.8700      1.2000
                          0.8700     0.0000    |   0.0000      0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0200)     28.400      1.234      1.50      16.56
   OUTFLOW: ID= 1 (  0201)     28.400      0.870      1.50      17.08

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 70.51
                   TIME SHIFT OF PEAK FLOW         (min)=  0.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.0328

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

--------------------
| ADD HYD  (  0001)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0101):    23.00   0.780     1.50    16.87
      + ID2= 2 (  0201):    28.40   0.870     1.50    17.08
        ================================================
        ID = 3 (  0001):    51.40   1.650     1.50    16.99

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0300)|   Area    (ha)=  73.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  57.00   Dir. Conn.(%)=  47.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       41.61       31.39
     Dep. Storage     (mm)=        2.00        5.00
     Average Slope     (%)=        1.00        2.00
     Length            (m)=      692.00       40.00
     Mannings n          =       0.030       0.200

     Max.Eff.Inten.(mm/hr)=       25.81        5.10
                over (min)       30.00       45.00
     Storage Coeff.  (min)=       23.15 (ii)   43.45 (ii)
     Unit Hyd. Tpeak (min)=       30.00       45.00
     Unit Hyd. peak  (cms)=        0.04        0.03
                                                        *TOTALS*
     PEAK FLOW       (cms)=        1.80        0.21          1.924 (iii)
     TIME TO PEAK    (hrs)=        1.75        2.25           1.75
     RUNOFF VOLUME    (mm)=       22.91        4.14          12.96
     TOTAL RAINFALL   (mm)=       24.91       24.91          24.91
```



```
     RUNOFF COEFFICIENT   =        0.92        0.17           0.52


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

-------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0027)|   Area    (ha)=   2.30
|ID= 1 DT=10.0 min |   Total Imp(%)=  71.00   Dir. Conn.(%)=  71.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        1.63        0.67
     Dep. Storage     (mm)=        2.00        5.00
     Average Slope     (%)=        1.00        2.00
     Length            (m)=      123.83       40.00
     Mannings n          =       0.030       0.200

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 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
               0.167    0.90 | 1.167   17.40 | 2.167    4.26 |  3.17    1.92
               0.333    1.86 | 1.333   31.38 | 2.333    3.45 |  3.33    1.71
               0.500    2.19 | 1.500   28.65 | 2.500    2.97 |  3.50    1.65
               0.667    2.43 | 1.667   15.36 | 2.667    2.58 |  3.67    1.56
               0.833    3.45 | 1.833    7.74 | 2.833    2.31 |  3.83    1.23
               1.000    6.12 | 2.000    5.40 | 3.000    2.16 |  4.00    0.78

     Max.Eff.Inten.(mm/hr)=       31.38        3.01
                over (min)       10.00       40.00
     Storage Coeff.  (min)=        7.63 (ii)   32.70 (ii)
     Unit Hyd. Tpeak (min)=       10.00       40.00
     Unit Hyd. peak  (cms)=        0.12        0.03
                                                        *TOTALS*
     PEAK FLOW       (cms)=        0.13        0.00          0.128 (iii)
     TIME TO PEAK    (hrs)=        1.50        2.17           1.50
     RUNOFF VOLUME    (mm)=       22.91        3.21          17.19
     TOTAL RAINFALL   (mm)=       24.91       24.91          24.91
     RUNOFF COEFFICIENT   =        0.92        0.13           0.69

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



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

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

--------------------
| ADD HYD  (  0002)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0001):    51.40   1.650     1.50    16.99
      + ID2= 2 (  0027):     2.30   0.128     1.50    17.19
        ================================================
        ID = 3 (  0002):    53.70   1.778     1.50    16.91

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

--------------------
| ADD HYD  (  0002)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0002):    53.70   1.778     1.50    16.91
      + ID2= 2 (  0300):    73.00   1.924     1.75    12.96
        ================================================
        ID = 1 (  0002):   126.70   3.519     1.83    14.63

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0003)|      OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 15.0 min     |      OUTFLOW    STORAGE    |  OUTFLOW    STORAGE
--------------------       (cms)     (ha.m.)    |   (cms)     (ha.m.)
                          0.0000     0.0000    |   0.1900      1.9300
                          0.0500     0.4200    |   0.4700      2.6400
                          0.0800     0.8400    |   0.8500      3.3400
                          0.0900     1.3900    |   1.3200      3.7000
                          0.1000     1.6000    |   2.4600      4.2500

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0002)    126.700      3.519      1.83      14.63
   OUTFLOW: ID= 1 (  0003)    126.700      0.132      4.67      14.62
```

```
         PEAK   FLOW   REDUCTION [Qout/Qin](%)=  3.74
         TIME SHIFT OF PEAK FLOW         (min)=170.00
         MAXIMUM  STORAGE   USED       (ha.m.)=  1.7159

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

--------------------
| ADD HYD  (  0004)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0003):   126.70   0.132     4.67    14.62
      + ID2= 2 (  0401):     6.62   0.040     1.75     2.79
        ==================================================
        ID = 3 (  0004):   133.32   0.132     4.50    14.03

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0402)|   Area    (ha)=   8.58
|ID= 1 DT=15.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  40.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       4.29         4.29
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     239.17        40.00
     Mannings n          =      0.030        0.200

         NOTE:  RAINFALL WAS TRANSFORMED TO  15.0 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
               0.250    1.17 | 1.250   21.08 | 2.250    4.05 |  3.25    1.86
               0.500    2.13 | 1.500   30.54 | 2.500    3.07 |  3.50    1.66
               0.750    2.65 | 1.750   13.11 | 2.750    2.50 |  3.75    1.49
               1.000    5.35 | 2.000    5.89 | 3.000    2.20 |  4.00    0.89

     Max.Eff.Inten.(mm/hr)=      30.54         4.81
                over (min)      15.00        45.00
     Storage Coeff.  (min)=      11.44 (ii)   32.23 (ii)
     Unit Hyd. Tpeak (min)=      15.00        45.00
     Unit Hyd. peak  (cms)=       0.08         0.03
                                                            *TOTALS*
     PEAK FLOW       (cms)=       0.25         0.03          0.262 (iii)
     TIME TO PEAK    (hrs)=       1.50         2.25           1.50
```



```
     RUNOFF VOLUME    (mm)=      22.91         4.01          11.57
     TOTAL RAINFALL   (mm)=      24.91        24.91          24.91
     RUNOFF COEFFICIENT   =       0.92         0.16           0.46

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

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

--------------------------------------------------------------------------------
--------------------
| DUHYD    (  0403)|
| Inlet Cap.= 0.740|
| #of Inlets=     1|
| Total(cms)=   0.7|      AREA     QPEAK     TPEAK     R.V.
--------------------      (ha)     (cms)     (hrs)     (mm)
     TOTAL HYD.(ID= 1):   8.58      0.26      1.50   11.57
     ====================================================
     MAJOR SYS.(ID= 2):   0.00      0.00      0.00    0.00
     MINOR SYS.(ID= 3):   8.58      0.26      1.50   11.57

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD  (  0005)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
*** W A R N I N G :  HYDROGRAPH   0403 <ID= 2> IS DRY.
*** W A R N I N G :  HYDROGRAPH   0003 = HYDROGRAPH 0001
        ID1= 1 (  0004):   133.32   0.132     4.50    14.03
      + ID2= 2 (  0403):     0.00   0.000     0.00     0.00
        ==================================================
        ID = 3 (  0005):   133.32   0.132     4.50    14.03

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0500)|   Area    (ha)=   6.76
|ID= 1 DT=15.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       5.07         1.69
```



```
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     212.29        40.00
     Mannings n          =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      30.54         6.72
                over (min)      15.00        30.00
     Storage Coeff.  (min)=      10.65 (ii)   28.83 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.09         0.04
                                                            *TOTALS*
     PEAK FLOW       (cms)=       0.33         0.02          0.340 (iii)
     TIME TO PEAK    (hrs)=       1.50         2.00           1.50
     RUNOFF VOLUME    (mm)=      22.91         4.77          16.56
     TOTAL RAINFALL   (mm)=      24.91        24.91          24.91
     RUNOFF COEFFICIENT   =       0.92         0.19           0.66

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

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0024)|   Area    (ha)=   1.24
|ID= 1 DT=10.0 min |   Total Imp(%)=  47.00   Dir. Conn.(%)=  47.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.58         0.66
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      90.92        40.00
     Mannings n          =      0.030        0.200

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 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
               0.167    0.90 | 1.167   17.40 | 2.167    4.26 |  3.17    1.92
               0.333    1.86 | 1.333   31.38 | 2.333    3.45 |  3.33    1.71
               0.500    2.19 | 1.500   28.65 | 2.500    2.97 |  3.50    1.65
               0.667    2.43 | 1.667   15.36 | 2.667    2.58 |  3.67    1.56
```



```
               0.833    3.45 | 1.833    7.74 | 2.833    2.31 |  3.83    1.23
               1.000    6.12 | 2.000    5.40 | 3.000    2.16 |  4.00    0.78

     Max.Eff.Inten.(mm/hr)=      31.38         3.01
                over (min)      10.00        40.00
     Storage Coeff.  (min)=       6.34 (ii)   31.41 (ii)
     Unit Hyd. Tpeak (min)=      10.00        40.00
     Unit Hyd. peak  (cms)=       0.13         0.03
                                                            *TOTALS*
     PEAK FLOW       (cms)=       0.05         0.00          0.047 (iii)
     TIME TO PEAK    (hrs)=       1.50         2.17           1.50
     RUNOFF VOLUME    (mm)=      22.91         3.21          12.45
     TOTAL RAINFALL   (mm)=      24.91        24.91          24.91
     RUNOFF COEFFICIENT   =       0.92         0.13           0.50

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

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

--------------------------------------------------------------------------------
--------------------
| DUHYD    (  0025)|
| Inlet Cap.= 0.083|
| #of Inlets=     1|
| Total(cms)=   0.1|      AREA     QPEAK     TPEAK     R.V.
--------------------      (ha)     (cms)     (hrs)     (mm)
     TOTAL HYD.(ID= 1):   1.24      0.05      1.50   12.45
     ====================================================
     MAJOR SYS.(ID= 2):   0.00      0.00      0.00    0.00
     MINOR SYS.(ID= 3):   1.24      0.05      1.50   12.45

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD  (  0030)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
*** W A R N I N G :  HYDROGRAPH   0025 <ID= 1> IS DRY.
*** W A R N I N G :  HYDROGRAPH   0030 = HYDROGRAPH 0500
        ID1= 1 (  0025):     0.00   0.000     0.00     0.00
      + ID2= 2 (  0500):     6.76   0.340     1.50    16.56
        ==================================================
```

```
       ID = 3 (  0030):     6.76   0.340     1.50    16.56

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0600)|   Area    (ha)=  12.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  40.00
--------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        6.00          6.00
     Dep. Storage     (mm)=        2.00          5.00
     Average Slope     (%)=        1.00          2.00
     Length            (m)=      270.00         40.00
     Mannings n          =       0.030         0.200

         NOTE:  RAINFALL WAS TRANSFORMED TO  15.0 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
              0.250    1.17 | 1.250   21.08 | 2.250    4.05 |  3.25    1.86
              0.500    2.13 | 1.500   30.54 | 2.500    3.07 |  3.50    1.66
              0.750    2.65 | 1.750   13.11 | 2.750    2.50 |  3.75    1.49
              1.000    5.35 | 2.000    5.89 | 3.000    2.20 |  4.00    0.89

     Max.Eff.Inten.(mm/hr)=       30.54         4.81
                over (min)        15.00        45.00
     Storage Coeff.  (min)=       12.31 (ii)   33.09 (ii)
     Unit Hyd. Tpeak (min)=       15.00        45.00
     Unit Hyd. peak  (cms)=        0.08         0.03
                                                             *TOTALS*
     PEAK FLOW       (cms)=        0.35         0.04          0.359 (iii)
     TIME TO PEAK    (hrs)=        1.50         2.25           1.50
     RUNOFF VOLUME    (mm)=       22.91         4.01          11.57
     TOTAL RAINFALL   (mm)=       24.91        24.91          24.91
     RUNOFF COEFFICIENT   =        0.92         0.16           0.46

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

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

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--------------------
| ADD HYD  (  0006)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0030):      6.76   0.340     1.50    16.56
     + ID2= 2 (  0600):     12.00   0.359     1.50    11.57
       ==================================================
       ID = 3 (  0006):     18.76   0.699     1.50    13.37

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0700)|   Area    (ha)=  12.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  55.00   Dir. Conn.(%)=  43.00
--------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        6.60          5.40
     Dep. Storage     (mm)=        2.00          5.00
     Average Slope     (%)=        1.00          2.00
     Length            (m)=      282.00         40.00
     Mannings n          =       0.030         0.200

     Max.Eff.Inten.(mm/hr)=       30.54         5.42
                over (min)        15.00        45.00
     Storage Coeff.  (min)=       12.63 (ii)   32.44 (ii)
     Unit Hyd. Tpeak (min)=       15.00        45.00
     Unit Hyd. peak  (cms)=        0.08         0.03
                                                             *TOTALS*
     PEAK FLOW       (cms)=        0.37         0.04          0.383 (iii)
     TIME TO PEAK    (hrs)=        1.50         2.25           1.50
     RUNOFF VOLUME    (mm)=       22.91         4.27          12.28
     TOTAL RAINFALL   (mm)=       24.91        24.91          24.91
     RUNOFF COEFFICIENT   =        0.92         0.17           0.49

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

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

-------------------------------------------------------------------------------
--------------------
| ADD HYD  (  0007)|
```



```
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0006):     18.76   0.699     1.50    13.37
     + ID2= 2 (  0700):     12.00   0.383     1.50    12.28
       ==================================================
       ID = 3 (  0007):     30.76   1.082     1.50    12.95

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| ADD HYD  (  0008)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0403):      8.58   0.262     1.50    11.57
     + ID2= 2 (  0007):     30.76   1.082     1.50    12.95
       ==================================================
       ID = 3 (  0008):     39.34   1.344     1.50    12.65

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0800)|   Area    (ha)=   2.60
|ID= 1 DT=15.0 min |   Total Imp(%)=  60.00   Dir. Conn.(%)=  45.00
--------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        1.56          1.04
     Dep. Storage     (mm)=        2.00          5.00
     Average Slope     (%)=        1.00          2.00
     Length            (m)=      131.00         40.00
     Mannings n          =       0.030         0.200

     Max.Eff.Inten.(mm/hr)=       30.54         6.47
                over (min)        15.00        30.00
     Storage Coeff.  (min)=        7.97 (ii)   26.43 (ii)
     Unit Hyd. Tpeak (min)=       15.00        30.00
     Unit Hyd. peak  (cms)=        0.10         0.04
                                                             *TOTALS*
     PEAK FLOW       (cms)=        0.09         0.01          0.099 (iii)
     TIME TO PEAK    (hrs)=        1.50         2.00           1.50
     RUNOFF VOLUME    (mm)=       22.91         4.68          12.88
     TOTAL RAINFALL   (mm)=       24.91        24.91          24.91
     RUNOFF COEFFICIENT   =        0.92         0.19           0.52

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
```



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

-------------------------------------------------------------------------------
--------------------
| ADD HYD  (  0009)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0008):     39.34   1.344     1.50    12.65
     + ID2= 2 (  0800):      2.60   0.099     1.50    12.88
       ==================================================
       ID = 3 (  0009):     41.94   1.442     1.50    12.66

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| RESERVOIR( 0010)|      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    |   0.9400     0.6210
                          0.0500     0.1950    |   2.6600     0.7760
                          0.0800     0.3860    |   4.0200     0.9110
                          0.1300     0.4750    |   0.0000     0.0000

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0009)     41.940     1.442      1.50      12.66
   OUTFLOW: ID= 1 (  0010)     41.940     0.108      3.92      12.64

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  7.46
                  TIME SHIFT OF PEAK FLOW         (min)=145.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.4351

-------------------------------------------------------------------------------
--------------------
| ADD HYD  (  0011)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0010):     41.94   0.108     3.92    12.64
     + ID2= 2 (  0005):    133.32   0.132     4.50    14.03
       ==================================================
       ID = 3 (  0011):    175.26   0.237     4.17    13.69
```

```
     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0031)|   Area    (ha)=   1.03
|ID= 1 DT=10.0 min |   Total Imp(%)=  47.00   Dir. Conn.(%)=  47.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.48         0.55
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      82.87        40.00
     Mannings n          =       0.030        0.200

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 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
                0.167    0.90 | 1.167   17.40 | 2.167    4.26 |  3.17    1.92
                0.333    1.86 | 1.333   31.38 | 2.333    3.45 |  3.33    1.71
                0.500    2.19 | 1.500   28.65 | 2.500    2.97 |  3.50    1.65
                0.667    2.43 | 1.667   15.36 | 2.667    2.58 |  3.67    1.56
                0.833    3.45 | 1.833    7.74 | 2.833    2.31 |  3.83    1.23
                1.000    6.12 | 2.000    5.40 | 3.000    2.16 |  4.00    0.78

     Max.Eff.Inten.(mm/hr)=      31.38         3.01
                over (min)       10.00        40.00
     Storage Coeff.  (min)=       5.99 (ii)   31.07 (ii)
     Unit Hyd. Tpeak (min)=      10.00        40.00
     Unit Hyd. peak  (cms)=       0.14         0.03
                                                             *TOTALS*
     PEAK FLOW       (cms)=       0.04         0.00           0.039 (iii)
     TIME TO PEAK    (hrs)=       1.50         2.17           1.50
     RUNOFF VOLUME    (mm)=      22.91         3.21          12.45
     TOTAL RAINFALL   (mm)=      24.91        24.91          24.91
     RUNOFF COEFFICIENT   =       0.92         0.13           0.50

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

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

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

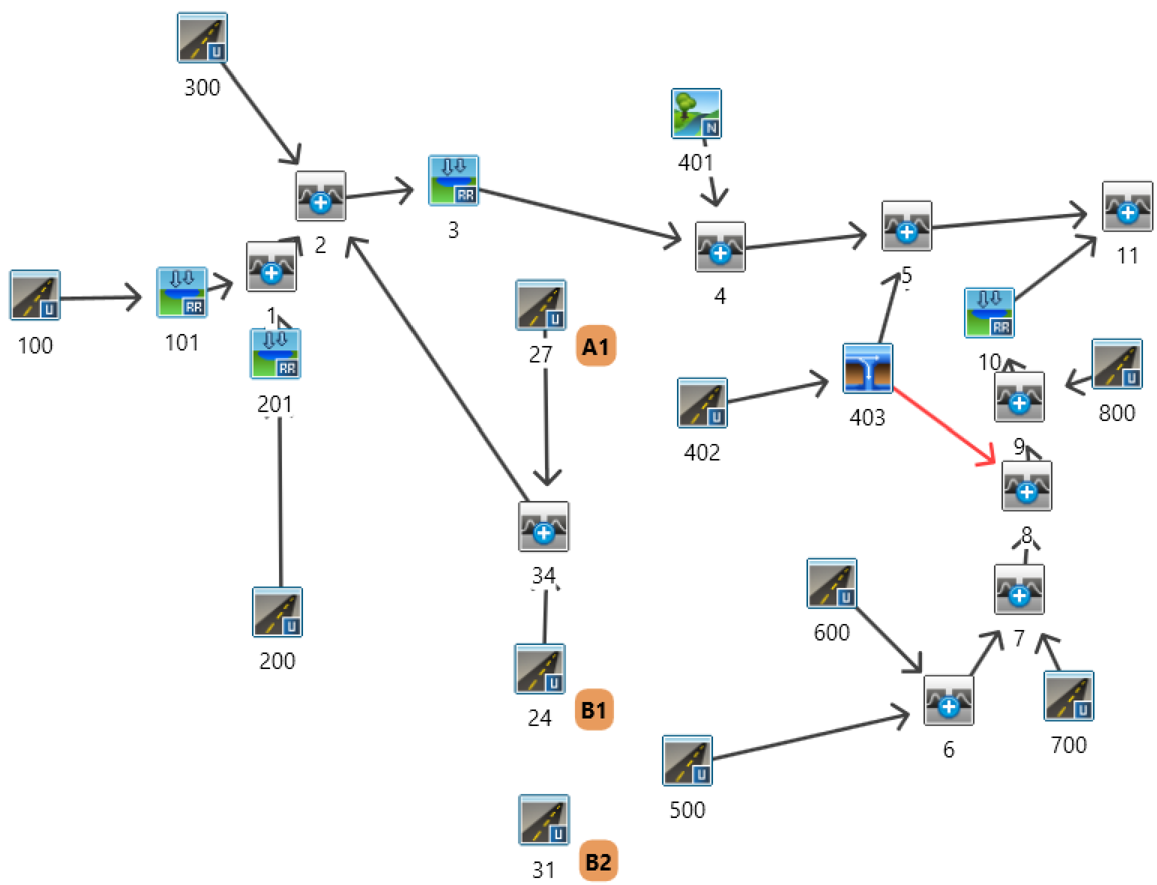


```
--------------------
| ADD HYD  (  0032)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0025):     1.24   0.047     1.50    12.45
     + ID2= 2 (  0031):     1.03   0.039     1.50    12.45
       ==================================================
       ID = 3 (  0032):     2.27   0.086     1.50    12.45

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

B000738 - Coleraine Drive

Proposed Conditions - Road Under Railway Scenario
VO Model Schematic



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

      V    V   I    SSSSS  U   U    A    L              (v 6.0.2000)
      V    V   I    SS     U   U   A A   L
       V  V    I     SS    U   U  AAAAA  L
       V  V    I      SS   U   U  A   A  L
        VV     I    SSSSS  UUUUU  A   A  LLLLL

       OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
      O   O    T      T    H   H   Y Y   MM MM  O   O
      O   O    T      T    H   H    Y    M   M  O   O
       OOO     T      T    H   H    Y    M   M   OOO
Developed and Distributed by Civica Infrastructure
```



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


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.0\VO2\voin.dat

  Output  filename:
C:\Users\kevin.lukawiecki\AppData\Local\Civica\VH5\a512d3b0-a6e7-43a6-99e8-d9354a433
349\e99a2ce2-0d3e-45e6-854f-9f68000a
  Summary filename:
C:\Users\kevin.lukawiecki\AppData\Local\Civica\VH5\a512d3b0-a6e7-43a6-99e8-d9354a433
349\e99a2ce2-0d3e-45e6-854f-9f68000a


DATE: 01/26/2022                           TIME: 11:36:10

USER:


COMMENTS: ____________________________________________________________


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


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



```
|   READ STORM    |    Filename: C:\Users\kevin.lukawiecki\AppD
|                 |              ata\Local\Temp\
|                 |              4d81885e-6790-48a0-a926-ec16e2c2aeb7\e2390d93
| 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            |
| NASHYD   (  0401)|   Area    (ha)=    6.62   Curve Number   (CN)= 63.0
|ID= 1 DT=15.0 min |   Ia      (mm)=    1.50   # of Linear Res.(N)= 2.00
--------------------   U.H. Tp(hrs)=    0.20

     Unit Hyd Qpeak  (cms)=    0.859

     PEAK FLOW       (cms)=    0.191 (i)
     TIME TO PEAK    (hrs)=    2.750
     RUNOFF VOLUME    (mm)=   12.698
     TOTAL RAINFALL   (mm)=   55.690
     RUNOFF COEFFICIENT    =    0.228

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0100)|   Area    (ha)=  23.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      17.25         5.75
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     390.00        40.00
     Mannings n           =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      51.24        34.94
                over (min)       15.00        30.00
```



```
     Storage Coeff.  (min)=      12.48 (ii)   21.88 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.08         0.05
                                                         *TOTALS*
     PEAK FLOW       (cms)=       2.00         0.34         2.283 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00          2.75
     RUNOFF VOLUME    (mm)=      53.69        21.52         42.43
     TOTAL RAINFALL   (mm)=      55.69        55.69         55.69
     RUNOFF COEFFICIENT    =       0.96         0.39          0.76

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

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

-----------------------------------------------------------------------------
--------------------
| RESERVOIR(  0101)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 15.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.7800     1.0000
                          0.7800     0.0000   |   0.0000     0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
  INFLOW : ID= 2 (  0100)     23.000      2.283      2.75      42.43
  OUTFLOW: ID= 1 (  0101)     23.000      0.780      2.50      43.11

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 34.16
                  TIME SHIFT OF PEAK FLOW        (min)=-15.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0939

-----------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0200)|   Area    (ha)=  28.40
|ID= 1 DT=15.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      21.30         7.10
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     435.00        40.00
     Mannings n           =      0.030        0.200
```



```
     Max.Eff.Inten.(mm/hr)=      51.24        34.94
                over (min)       15.00        30.00
     Storage Coeff.  (min)=      13.32 (ii)   22.72 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.08         0.04
                                                         *TOTALS*
     PEAK FLOW       (cms)=       2.45         0.42         2.786 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00          2.75
     RUNOFF VOLUME    (mm)=      53.69        21.52         42.43
     TOTAL RAINFALL   (mm)=      55.69        55.69         55.69
     RUNOFF COEFFICIENT    =       0.96         0.39          0.76

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

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

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0201)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 15.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.8700     1.2000
                          0.8700     0.0000   |   0.0000     0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
  INFLOW : ID= 2 (  0200)     28.400      2.786      2.75      42.43
  OUTFLOW: ID= 1 (  0201)     28.400      0.870      2.25      43.12

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 31.23
                  TIME SHIFT OF PEAK FLOW        (min)=-30.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.1257

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

--------------------
| ADD HYD  (  0001)|
|  1 +  2 =  3     |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0101):     23.00   0.780     2.50    43.11
     + ID2= 2 (  0201):     28.40   0.870     2.25    43.12
     ==============================================
```

```
      ID = 3 (  0001):    51.40   1.650     2.50    43.12

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0300)|   Area    (ha)=  73.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  57.00   Dir. Conn.(%)=  47.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      41.61        31.39
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     692.00        40.00
     Mannings n           =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      51.24        28.16
                over (min)       15.00        30.00
     Storage Coeff.  (min)=      17.60 (ii)   27.85 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.06         0.04
                                                          *TOTALS*
     PEAK FLOW       (cms)=       4.28         1.36         5.340 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00          2.75
     RUNOFF VOLUME    (mm)=      53.69        19.63         35.64
     TOTAL RAINFALL   (mm)=      55.69        55.69         55.69
     RUNOFF COEFFICIENT   =       0.96         0.35          0.64


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

------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0027)|   Area    (ha)=   2.30
|ID= 1 DT=10.0 min |   Total Imp(%)=  90.00   Dir. Conn.(%)=  90.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.07         0.23
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     123.83        40.00
     Mannings n           =      0.030        0.200
```



```
     NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 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
              0.167    0.00 | 1.833   12.81 | 3.500    7.80 |  5.17    1.11
              0.333    0.56 | 2.000   18.94 | 3.667    7.80 |  5.33    1.11
              0.500    1.11 | 2.167   18.94 | 3.833    6.13 |  5.50    1.11
              0.667    1.11 | 2.333   35.09 | 4.000    4.46 |  5.67    1.11
              0.833    1.11 | 2.500   51.24 | 4.167    4.46 |  5.83    1.11
              1.000    1.11 | 2.667   51.24 | 4.333    3.34 |  6.00    1.11
              1.167    1.11 | 2.833   32.86 | 4.500    2.23 |  6.17    1.11
              1.333    3.89 | 3.000   14.48 | 4.667    2.23 |  6.33    0.56
              1.500    6.68 | 3.167   14.48 | 4.833    1.67 |
              1.667    6.68 | 3.333   11.14 | 5.000    1.11 |

     Max.Eff.Inten.(mm/hr)=      51.24        16.19
                over (min)       10.00        20.00
     Storage Coeff.  (min)=       6.27 (ii)   19.06 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.14         0.06
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.29         0.01         0.296 (iii)
     TIME TO PEAK    (hrs)=       2.67         2.83          2.67
     RUNOFF VOLUME    (mm)=      53.69        16.64         49.98
     TOTAL RAINFALL   (mm)=      55.69        55.69         55.69
     RUNOFF COEFFICIENT   =       0.96         0.30          0.90

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

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

------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0024)|   Area    (ha)=   1.24
|ID= 1 DT=10.0 min |   Total Imp(%)=  63.00   Dir. Conn.(%)=  63.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.78         0.46
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      90.92        40.00
```



```
     Mannings n           =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      51.24        16.19
                over (min)       10.00        20.00
     Storage Coeff.  (min)=       5.21 (ii)   18.00 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.15         0.06
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.11         0.02         0.122 (iii)
     TIME TO PEAK    (hrs)=       2.67         2.83          2.67
     RUNOFF VOLUME    (mm)=      53.69        16.64         39.97
     TOTAL RAINFALL   (mm)=      55.69        55.69         55.69
     RUNOFF COEFFICIENT   =       0.96         0.30          0.72

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

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

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

--------------------
| ADD HYD  (  0034)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0024):      1.24   0.122     2.67    39.97
     + ID2= 2 (  0027):      2.30   0.296     2.67    49.98
       ==================================================
       ID = 3 (  0034):      3.54   0.418     2.67    46.47

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

--------------------
| ADD HYD  (  0002)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0001):     51.40   1.650     2.50    43.12
     + ID2= 2 (  0300):     73.00   5.340     2.75    35.64
       ==================================================
       ID = 3 (  0002):    124.40   6.990     2.75    38.73

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



```
--------------------
| ADD HYD  (  0002)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0002):    124.40   6.990     2.75    38.73
     + ID2= 2 (  0034):      3.54   0.418     2.67    46.47
       ==================================================
       ID = 1 (  0002):    127.94   6.922     2.67    38.99

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0003)|      OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 15.0 min     |      OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------       (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000      0.0000   |   0.1900      1.9300
                          0.0500      0.4200   |   0.4700      2.6400
                          0.0800      0.8400   |   0.8500      3.3400
                          0.0900      1.3900   |   1.3200      3.7000
                          0.1000      1.6000   |   2.4600      4.2500

                             AREA     QPEAK     TPEAK       R.V.
                             (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0002)    127.940      6.922      2.67      38.99
   OUTFLOW: ID= 1 (  0003)    127.940      1.588      5.33      38.97

                 PEAK   FLOW   REDUCTION [Qout/Qin](%)= 22.94
                 TIME SHIFT OF PEAK FLOW         (min)=160.00
                 MAXIMUM  STORAGE   USED       (ha.m.)=  3.8336

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

--------------------
| ADD HYD  (  0004)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0003):    127.94   1.588     5.33    38.97
     + ID2= 2 (  0401):      6.62   0.191     2.75    12.70
       ==================================================
       ID = 3 (  0004):    134.56   1.598     5.17    37.68

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0402)|   Area    (ha)=   8.58
|ID= 1 DT=15.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  40.00
```

```
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       4.29         4.29
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     239.17        40.00
     Mannings n           =      0.030        0.200

         NOTE:  RAINFALL WAS TRANSFORMED TO  15.0 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
                0.250    0.00 | 2.000   18.94 | 3.750    7.80 |  5.50    1.11
                0.500    1.11 | 2.250   18.94 | 4.000    4.46 |  5.75    1.11
                0.750    1.11 | 2.500   51.24 | 4.250    4.46 |  6.00    1.11
                1.000    1.11 | 2.750   51.24 | 4.500    2.23 |  6.25    1.11
                1.250    1.11 | 3.000   14.48 | 4.750    2.23 |
                1.500    6.68 | 3.250   14.48 | 5.000    1.11 |
                1.750    6.68 | 3.500    7.80 | 5.250    1.11 |

     Max.Eff.Inten.(mm/hr)=      51.24        26.88
                over (min)       15.00        30.00
     Storage Coeff.  (min)=       9.30 (ii)   19.74 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.09         0.05
                                                            *TOTALS*
     PEAK FLOW       (cms)=       0.48         0.20           0.641 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00            2.75
     RUNOFF VOLUME    (mm)=      53.69        19.24           33.02
     TOTAL RAINFALL   (mm)=      55.69        55.69           55.69
     RUNOFF COEFFICIENT   =       0.96         0.35            0.59

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

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

--------------------------------------------------------------------------------
--------------------
| DUHYD    (  0403)|
| Inlet Cap.= 0.740|
| #of Inlets=     1|
| Total(cms)=   0.7|      AREA     QPEAK     TPEAK     R.V.
```



```
--------------------      (ha)     (cms)      (hrs)     (mm)
     TOTAL HYD.(ID= 1):   8.58      0.64       2.75    33.02
     ==================================================
     MAJOR SYS.(ID= 2):   0.00      0.00       0.00     0.00
     MINOR SYS.(ID= 3):   8.58      0.64       2.75    33.02

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD  (  0005)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
*** W A R N I N G :  HYDROGRAPH   0403 <ID= 2> IS DRY.
*** W A R N I N G :  HYDROGRAPH   0003 = HYDROGRAPH 0001
        ID1= 1 (  0004):   134.56   1.598     5.17    37.68
      + ID2= 2 (  0403):     0.00   0.000     0.00     0.00
        ==================================================
        ID = 3 (  0005):   134.56   1.598     5.17    37.68

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0500)|   Area    (ha)=   6.76
|ID= 1 DT=15.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       5.07         1.69
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     212.29        40.00
     Mannings n           =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      51.24        34.94
                over (min)       15.00        30.00
     Storage Coeff.  (min)=       8.66 (ii)   18.06 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.09         0.05
                                                            *TOTALS*
     PEAK FLOW       (cms)=       0.61         0.11           0.703 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00            2.75
     RUNOFF VOLUME    (mm)=      53.69        21.52           42.43
     TOTAL RAINFALL   (mm)=      55.69        55.69           55.69
     RUNOFF COEFFICIENT   =       0.96         0.39            0.76

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



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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0600)|   Area    (ha)=  12.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  40.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       6.00         6.00
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     270.00        40.00
     Mannings n           =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      51.24        26.88
                over (min)       15.00        30.00
     Storage Coeff.  (min)=      10.01 (ii)   20.45 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.09         0.05
                                                            *TOTALS*
     PEAK FLOW       (cms)=       0.66         0.28           0.889 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00            2.75
     RUNOFF VOLUME    (mm)=      53.69        19.24           33.02
     TOTAL RAINFALL   (mm)=      55.69        55.69           55.69
     RUNOFF COEFFICIENT   =       0.96         0.35            0.59

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

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

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

--------------------
| ADD HYD  (  0006)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0500):     6.76   0.703     2.75    42.43
      + ID2= 2 (  0600):    12.00   0.889     2.75    33.02
```



```
        ==================================================
        ID = 3 (  0006):    18.76   1.592     2.75    36.41

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0700)|   Area    (ha)=  12.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  55.00   Dir. Conn.(%)=  43.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       6.60         5.40
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     282.00        40.00
     Mannings n           =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      51.24        29.51
                over (min)       15.00        30.00
     Storage Coeff.  (min)=      10.27 (ii)   20.33 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.09         0.05
                                                            *TOTALS*
     PEAK FLOW       (cms)=       0.71         0.28           0.936 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00            2.75
     RUNOFF VOLUME    (mm)=      53.69        20.03           34.50
     TOTAL RAINFALL   (mm)=      55.69        55.69           55.69
     RUNOFF COEFFICIENT   =       0.96         0.36            0.62

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

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

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

--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0006):    18.76   1.592     2.75    36.41
      + ID2= 2 (  0700):    12.00   0.936     2.75    34.50
        ==================================================
        ID = 3 (  0007):    30.76   2.528     2.75    35.67
```

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


--------------------
| ADD HYD  (  0008)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0403):     8.58   0.641     2.75    33.02
      + ID2= 2 (  0007):    30.76   2.528     2.75    35.67
        ==================================================
        ID = 3 (  0008):    39.34   3.170     2.75    35.09

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0800)|   Area    (ha)=   2.60
|ID= 1 DT=15.0 min |   Total Imp(%)=  60.00   Dir. Conn.(%)=  45.00
--------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.56         1.04
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     131.00        40.00
     Mannings n           =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      51.24        33.90
                over (min)       15.00        30.00
     Storage Coeff.  (min)=       6.48 (ii)   16.00 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.10         0.05
                                                            *TOTALS*
     PEAK FLOW       (cms)=       0.17         0.07          0.222 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00           2.75
     RUNOFF VOLUME    (mm)=      53.69        21.25          35.85
     TOTAL RAINFALL   (mm)=      55.69        55.69          55.69
     RUNOFF COEFFICIENT   =       0.96         0.38           0.64

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

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

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



```
--------------------
| ADD HYD  (  0009)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0008):    39.34   3.170     2.75    35.09
      + ID2= 2 (  0800):     2.60   0.222     2.75    35.85
        ==================================================
        ID = 3 (  0009):    41.94   3.392     2.75    35.14

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0010)|      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    |   0.9400     0.6210
                          0.0500     0.1950    |   2.6600     0.7760
                          0.0800     0.3860    |   4.0200     0.9110
                          0.1300     0.4750    |   0.0000     0.0000

                                 AREA     QPEAK      TPEAK       R.V.
                                 (ha)     (cms)      (hrs)       (mm)
   INFLOW : ID= 2 (  0009)     41.940      3.392      2.75      35.14
   OUTFLOW: ID= 1 (  0010)     41.940      1.858      3.08      35.11

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 54.77
                   TIME SHIFT OF PEAK FLOW         (min)= 20.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.7043

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

--------------------
| ADD HYD  (  0011)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0010):    41.94   1.858     3.08    35.11
      + ID2= 2 (  0005):   134.56   1.598     5.17    37.68
        ==================================================
        ID = 3 (  0011):   176.50   2.351     3.17    37.05

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0031)|   Area    (ha)=   1.03
|ID= 1 DT=10.0 min |   Total Imp(%)=  63.00   Dir. Conn.(%)=  63.00
--------------------
```



```
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.65         0.38
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      82.87        40.00
     Mannings n           =      0.030        0.200

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 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
                0.167    0.00 | 1.833   12.81 | 3.500    7.80 |  5.17    1.11
                0.333    0.56 | 2.000   18.94 | 3.667    7.80 |  5.33    1.11
                0.500    1.11 | 2.167   18.94 | 3.833    6.13 |  5.50    1.11
                0.667    1.11 | 2.333   35.09 | 4.000    4.46 |  5.67    1.11
                0.833    1.11 | 2.500   51.24 | 4.167    4.46 |  5.83    1.11
                1.000    1.11 | 2.667   51.24 | 4.333    3.34 |  6.00    1.11
                1.167    1.11 | 2.833   32.86 | 4.500    2.23 |  6.17    1.11
                1.333    3.89 | 3.000   14.48 | 4.667    2.23 |  6.33    0.56
                1.500    6.68 | 3.167   14.48 | 4.833    1.67 |
                1.667    6.68 | 3.333   11.14 | 5.000    1.11 |

     Max.Eff.Inten.(mm/hr)=      51.24        16.19
                over (min)       10.00        20.00
     Storage Coeff.  (min)=       4.93 (ii)   17.71 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.15         0.06
                                                            *TOTALS*
     PEAK FLOW       (cms)=       0.09         0.01          0.102 (iii)
     TIME TO PEAK    (hrs)=       2.67         2.83           2.67
     RUNOFF VOLUME    (mm)=      53.69        16.64          39.97
     TOTAL RAINFALL   (mm)=      55.69        55.69          55.69
     RUNOFF COEFFICIENT   =       0.96         0.30           0.72

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

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

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 FINISH
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       V    V   I    SSSSS  U   U    A    L              (v 6.0.2000)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO    TTTTT  TTTTT  H    H  Y    Y  M    M   OOO     TM
       O   O     T      T    H    H   Y  Y   MM  MM  O   O
       O   O     T      T    H    H    Y     M    M  O   O
        OOO      T      T    H    H    Y     M    M   OOO
Developed and Distributed by Civica Infrastructure
```



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


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.0\VO2\voin.dat

  Output  filename:
C:\Users\kevin.lukawiecki\AppData\Local\Civica\VH5\a512d3b0-a6e7-43a6-99e8-d9354a433
349\c0ebebe4-cc1c-4fb2-8e5a-9e859c9b
  Summary filename:
C:\Users\kevin.lukawiecki\AppData\Local\Civica\VH5\a512d3b0-a6e7-43a6-99e8-d9354a433
349\c0ebebe4-cc1c-4fb2-8e5a-9e859c9b


DATE: 01/26/2022                                TIME: 11:36:09

USER:



COMMENTS: ____________________________________________________________


-------------------------------------------------------------------------------------
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  ************************************************
  ** SIMULATION : 100 Year                      **
  ************************************************
```

```
--------------------
|   READ STORM     |    Filename: C:\Users\kevin.lukawiecki\AppD
|                  |              ata\Local\Temp\
|                  |              4d81885e-6790-48a0-a926-ec16e2c2aeb7\073ffba8
| 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            |
| NASHYD   (  0401)|   Area    (ha)=   6.62   Curve Number   (CN)= 63.0
|ID= 1 DT=15.0 min |   Ia      (mm)=   1.50   # of Linear Res.(N)= 2.00
--------------------   U.H. Tp(hrs)=   0.20

     Unit Hyd Qpeak  (cms)=   0.859

     PEAK FLOW       (cms)=   0.365 (i)
     TIME TO PEAK    (hrs)=   2.750
     RUNOFF VOLUME    (mm)=  23.957
     TOTAL RAINFALL   (mm)=  80.310
     RUNOFF COEFFICIENT   =   0.298

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0100)|   Area    (ha)=  23.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=     17.25         5.75
     Dep. Storage     (mm)=      2.00         5.00
     Average Slope     (%)=      1.00         2.00
     Length            (m)=    390.00        40.00
     Mannings n          =      0.030        0.200
```



```
     Max.Eff.Inten.(mm/hr)=      73.88        62.61
                over (min)       15.00        30.00
     Storage Coeff.  (min)=      10.78 (ii)   18.22 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.09         0.05
                                                          *TOTALS*
     PEAK FLOW       (cms)=       2.95         0.67          3.527 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00          2.75
     RUNOFF VOLUME    (mm)=      78.31        39.04         64.56
     TOTAL RAINFALL   (mm)=      80.31        80.31         80.31
     RUNOFF COEFFICIENT   =       0.98         0.49          0.80

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

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

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0101)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 15.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.7800     1.0000
                          0.7800     0.0000   |   0.0000     0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0100)     23.000     3.527      2.75      64.56
   OUTFLOW: ID= 1 (  0101)     23.000     0.780      2.00      65.64

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 22.12
                  TIME SHIFT OF PEAK FLOW         (min)=-45.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.2357

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0200)|   Area    (ha)=  28.40
|ID= 1 DT=15.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=     21.30         7.10
     Dep. Storage     (mm)=      2.00         5.00
     Average Slope     (%)=      1.00         2.00
```



```
     Length            (m)=    435.00        40.00
     Mannings n          =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      73.88        62.61
                over (min)       15.00        30.00
     Storage Coeff.  (min)=      11.51 (ii)   18.95 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.08         0.05
                                                          *TOTALS*
     PEAK FLOW       (cms)=       3.61         0.81          4.312 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00          2.75
     RUNOFF VOLUME    (mm)=      78.31        39.04         64.56
     TOTAL RAINFALL   (mm)=      80.31        80.31         80.31
     RUNOFF COEFFICIENT   =       0.98         0.49          0.80

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

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

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0201)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 15.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.8700     1.2000
                          0.8700     0.0000   |   0.0000     0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0200)     28.400     4.312      2.75      64.56
   OUTFLOW: ID= 1 (  0201)     28.400     0.870      2.00      65.78

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 20.17
                  TIME SHIFT OF PEAK FLOW         (min)=-45.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.3070

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

--------------------
| ADD HYD  (  0001)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0101):    23.00   0.780     2.00    65.64
```



```
      + ID2= 2 (  0201):    28.40   0.870     2.00    65.78
        ====================================================
          ID = 3 (  0001):    51.40   1.650     2.00    65.72

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0300)|   Area    (ha)=  73.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  57.00   Dir. Conn.(%)=  47.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=     41.61        31.39
     Dep. Storage     (mm)=      2.00         5.00
     Average Slope     (%)=      1.00         2.00
     Length            (m)=    692.00        40.00
     Mannings n          =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      73.88        51.42
                over (min)       15.00        30.00
     Storage Coeff.  (min)=      15.20 (ii)   23.26 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.07         0.04
                                                          *TOTALS*
     PEAK FLOW       (cms)=       6.39         2.74          8.665 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00          2.75
     RUNOFF VOLUME    (mm)=      78.31        36.24         56.02
     TOTAL RAINFALL   (mm)=      80.31        80.31         80.31
     RUNOFF COEFFICIENT   =       0.98         0.45          0.70


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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0027)|   Area    (ha)=   2.30
|ID= 1 DT=10.0 min |   Total Imp(%)=  90.00   Dir. Conn.(%)=  90.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      2.07         0.23
     Dep. Storage     (mm)=      2.00         5.00
     Average Slope     (%)=      1.00         2.00
     Length            (m)=    123.83        40.00
```

```
     Mannings n          =      0.030       0.200

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 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
                0.167    0.00 | 1.833   18.47 | 3.500   11.24 |  5.17    1.61
                0.333    0.81 | 2.000   27.30 | 3.667   11.24 |  5.33    1.61
                0.500    1.61 | 2.167   27.30 | 3.833    8.83 |  5.50    1.61
                0.667    1.61 | 2.333   50.59 | 4.000    6.42 |  5.67    1.61
                0.833    1.61 | 2.500   73.88 | 4.167    6.42 |  5.83    1.61
                1.000    1.61 | 2.667   73.88 | 4.333    4.81 |  6.00    1.61
                1.167    1.61 | 2.833   47.38 | 4.500    3.21 |  6.17    1.61
                1.333    5.62 | 3.000   20.88 | 4.667    3.21 |  6.33    0.81
                1.500    9.64 | 3.167   20.88 | 4.833    2.41 |
                1.667    9.64 | 3.333   16.06 | 5.000    1.61 |

     Max.Eff.Inten.(mm/hr)=      73.88       35.17
                over (min)       10.00       20.00
     Storage Coeff.  (min)=       5.41 (ii)   14.79 (ii)
     Unit Hyd. Tpeak (min)=      10.00       20.00
     Unit Hyd. peak  (cms)=       0.14        0.07
                                                          *TOTALS*
     PEAK FLOW      (cms)=        0.42        0.02          0.434 (iii)
     TIME TO PEAK    (hrs)=       2.67        2.83           2.67
     RUNOFF VOLUME    (mm)=      78.31       31.67          73.64
     TOTAL RAINFALL   (mm)=      80.31       80.31          80.31
     RUNOFF COEFFICIENT   =       0.98        0.39           0.92

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

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0024)|   Area    (ha)=   1.24
|ID= 1 DT=10.0 min |   Total Imp(%)=  63.00   Dir. Conn.(%)=  63.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.78        0.46
     Dep. Storage     (mm)=       2.00        5.00
```



```
     Average Slope     (%)=       1.00        2.00
     Length            (m)=      90.92       40.00
     Mannings n          =       0.030       0.200

     Max.Eff.Inten.(mm/hr)=      73.88       35.17
                over (min)       10.00       20.00
     Storage Coeff.  (min)=       4.50 (ii)   13.88 (ii)
     Unit Hyd. Tpeak (min)=      10.00       20.00
     Unit Hyd. peak  (cms)=       0.15        0.07
                                                          *TOTALS*
     PEAK FLOW      (cms)=        0.16        0.03          0.187 (iii)
     TIME TO PEAK    (hrs)=       2.67        2.83           2.67
     RUNOFF VOLUME    (mm)=      78.31       31.67          61.05
     TOTAL RAINFALL   (mm)=      80.31       80.31          80.31
     RUNOFF COEFFICIENT   =       0.98        0.39           0.76

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

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

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

--------------------
| ADD HYD  (  0034)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0024):     1.24   0.187     2.67    61.05
      + ID2= 2 (  0027):     2.30   0.434     2.67    73.64
        ====================================================
        ID = 3 (  0034):     3.54   0.622     2.67    69.23

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

--------------------
| ADD HYD  (  0002)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0001):    51.40   1.650     2.00    65.72
      + ID2= 2 (  0300):    73.00   8.665     2.75    56.02
        ====================================================
        ID = 3 (  0002):   124.40  10.315     2.75    60.02

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



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--------------------
| ADD HYD  (  0002)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0002):   124.40  10.315     2.75    60.02
      + ID2= 2 (  0034):     3.54   0.622     2.67    69.23
        ====================================================
        ID = 1 (  0002):   127.94  10.134     2.67    60.37

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0003)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 15.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.1900     1.9300
                          0.0500     0.4200   |   0.4700     2.6400
                          0.0800     0.8400   |   0.8500     3.3400
                          0.0900     1.3900   |   1.3200     3.7000
                          0.1000     1.6000   |   2.4600     4.2500

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0002)    127.940    10.134     2.67      60.37
   OUTFLOW: ID= 1 (  0003)    127.940     2.829     4.50      60.36

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 27.92
                  TIME SHIFT OF PEAK FLOW         (min)=110.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  4.4312

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--------------------
| ADD HYD  (  0004)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0003):   127.94   2.829     4.50    60.36
      + ID2= 2 (  0401):     6.62   0.365     2.75    23.96
        ====================================================
        ID = 3 (  0004):   134.56   2.884     4.33    58.56

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



```
| STANDHYD (  0402)|   Area    (ha)=   8.58
|ID= 1 DT=15.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  40.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       4.29        4.29
     Dep. Storage     (mm)=       2.00        5.00
     Average Slope     (%)=       1.00        2.00
     Length            (m)=     239.17       40.00
     Mannings n          =       0.030       0.200

         NOTE:  RAINFALL WAS TRANSFORMED TO  15.0 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
                0.250    0.00 | 2.000   27.30 | 3.750   11.24 |  5.50    1.61
                0.500    1.61 | 2.250   27.30 | 4.000    6.42 |  5.75    1.61
                0.750    1.61 | 2.500   73.88 | 4.250    6.42 |  6.00    1.61
                1.000    1.61 | 2.750   73.88 | 4.500    3.21 |  6.25    1.61
                1.250    1.61 | 3.000   20.88 | 4.750    3.21 |
                1.500    9.64 | 3.250   20.88 | 5.000    1.61 |
                1.750    9.64 | 3.500   11.24 | 5.250    1.61 |

     Max.Eff.Inten.(mm/hr)=      73.88       49.29
                over (min)       15.00       30.00
     Storage Coeff.  (min)=       8.04 (ii)   16.23 (ii)
     Unit Hyd. Tpeak (min)=      15.00       30.00
     Unit Hyd. peak  (cms)=       0.10        0.05
                                                          *TOTALS*
     PEAK FLOW      (cms)=        0.69        0.40          1.044 (iii)
     TIME TO PEAK    (hrs)=       2.75        3.00           2.75
     RUNOFF VOLUME    (mm)=      78.31       35.66          52.72
     TOTAL RAINFALL   (mm)=      80.31       80.31          80.31
     RUNOFF COEFFICIENT   =       0.98        0.44           0.66

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

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

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--------------------
| DUHYD    (  0403)|
| Inlet Cap.= 0.740|
```

```
| #of Inlets=     1|
| Total(cms)=   0.7|      AREA     QPEAK     TPEAK    R.V.
--------------------      (ha)     (cms)     (hrs)    (mm)
     TOTAL HYD.(ID= 1):   8.58      1.04      2.75   52.72
     ================================================
     MAJOR SYS.(ID= 2):   0.59      0.30      2.75   52.72
     MINOR SYS.(ID= 3):   7.99      0.74      2.50   52.72

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD  (  0005)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0004):   134.56   2.884     4.33    58.56
      + ID2= 2 (  0403):     0.59   0.304     2.75    52.72
        ==================================================
        ID = 3 (  0005):   135.15   2.884     4.33    58.52

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0500)|   Area    (ha)=   6.76
|ID= 1 DT=15.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       5.07         1.69
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     212.29        40.00
     Mannings n          =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      73.88        62.61
                over (min)       15.00        15.00
     Storage Coeff.  (min)=       7.48 (ii)   14.93 (ii)
     Unit Hyd. Tpeak (min)=      15.00        15.00
     Unit Hyd. peak  (cms)=       0.10         0.07
                                                            *TOTALS*
     PEAK FLOW      (cms)=       0.89         0.24          1.133 (iii)
     TIME TO PEAK    (hrs)=       2.75         2.75           2.75
     RUNOFF VOLUME    (mm)=      78.31        39.04          64.56
     TOTAL RAINFALL   (mm)=      80.31        80.31          80.31
     RUNOFF COEFFICIENT   =       0.98         0.49           0.80

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



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

-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0600)|   Area    (ha)=  12.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  40.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       6.00         6.00
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     270.00        40.00
     Mannings n          =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      73.88        49.29
                over (min)       15.00        30.00
     Storage Coeff.  (min)=       8.64 (ii)   16.84 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.09         0.05
                                                            *TOTALS*
     PEAK FLOW      (cms)=       0.97         0.56          1.448 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00           2.75
     RUNOFF VOLUME    (mm)=      78.31        35.66          52.72
     TOTAL RAINFALL   (mm)=      80.31        80.31          80.31
     RUNOFF COEFFICIENT   =       0.98         0.44           0.66

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

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

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

--------------------
| ADD HYD  (  0006)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0500):     6.76   1.133     2.75    64.56
      + ID2= 2 (  0600):    12.00   1.448     2.75    52.72
```



```
        ==================================================
        ID = 3 (  0006):    18.76   2.581     2.75    56.99

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0700)|   Area    (ha)=  12.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  55.00   Dir. Conn.(%)=  43.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       6.60         5.40
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     282.00        40.00
     Mannings n          =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      73.88        53.66
                over (min)       15.00        30.00
     Storage Coeff.  (min)=       8.87 (ii)   16.79 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.09         0.05
                                                            *TOTALS*
     PEAK FLOW      (cms)=       1.04         0.55          1.513 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00           2.75
     RUNOFF VOLUME    (mm)=      78.31        36.84          54.67
     TOTAL RAINFALL   (mm)=      80.31        80.31          80.31
     RUNOFF COEFFICIENT   =       0.98         0.46           0.68

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

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

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

--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0006):    18.76   2.581     2.75    56.99
      + ID2= 2 (  0700):    12.00   1.513     2.75    54.67
        ==================================================
        ID = 3 (  0007):    30.76   4.094     2.75    56.08
```



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

--------------------
| ADD HYD  (  0008)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0403):     7.99   0.740     2.50    52.72
      + ID2= 2 (  0007):    30.76   4.094     2.75    56.08
        ==================================================
        ID = 3 (  0008):    38.75   4.834     2.75    55.39

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0800)|   Area    (ha)=   2.60
|ID= 1 DT=15.0 min |   Total Imp(%)=  60.00   Dir. Conn.(%)=  45.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.56         1.04
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     131.00        40.00
     Mannings n          =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      73.88        60.91
                over (min)       15.00        15.00
     Storage Coeff.  (min)=       5.60 (ii)   13.13 (ii)
     Unit Hyd. Tpeak (min)=      15.00        15.00
     Unit Hyd. peak  (cms)=       0.11         0.08
                                                            *TOTALS*
     PEAK FLOW      (cms)=       0.24         0.15          0.390 (iii)
     TIME TO PEAK    (hrs)=       2.75         2.75           2.75
     RUNOFF VOLUME    (mm)=      78.31        38.64          56.49
     TOTAL RAINFALL   (mm)=      80.31        80.31          80.31
     RUNOFF COEFFICIENT   =       0.98         0.48           0.70

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

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

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

```
--------------------
| ADD HYD  (  0009)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0008):    38.75   4.834     2.75    55.39
      + ID2= 2 (  0800):     2.60   0.390     2.75    56.49
        ==================================================
        ID = 3 (  0009):    41.35   5.224     2.75    55.46

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0010)|     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   |   0.9400     0.6210
                          0.0500     0.1950   |   2.6600     0.7760
                          0.0800     0.3860   |   4.0200     0.9110
                          0.1300     0.4750   |   0.0000     0.0000

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0009)     41.347     5.224      2.75      55.46
   OUTFLOW: ID= 1 (  0010)     41.347     3.651      2.92      55.43

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 69.90
                  TIME SHIFT OF PEAK FLOW         (min)= 10.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.8784

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

--------------------
| ADD HYD  (  0011)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0010):    41.35   3.651     2.92    55.43
      + ID2= 2 (  0005):   135.15   2.884     4.33    58.52
        ==================================================
        ID = 3 (  0011):   176.50   4.617     2.92    57.77

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0031)|   Area    (ha)=   1.03
|ID= 1 DT=10.0 min |   Total Imp(%)=  63.00   Dir. Conn.(%)=  63.00
--------------------
```



```
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.65         0.38
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      82.87        40.00
     Mannings n          =       0.030        0.200

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 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
                0.167    0.00 | 1.833   18.47 | 3.500   11.24 |  5.17    1.61
                0.333    0.81 | 2.000   27.30 | 3.667   11.24 |  5.33    1.61
                0.500    1.61 | 2.167   27.30 | 3.833    8.83 |  5.50    1.61
                0.667    1.61 | 2.333   50.59 | 4.000    6.42 |  5.67    1.61
                0.833    1.61 | 2.500   73.88 | 4.167    6.42 |  5.83    1.61
                1.000    1.61 | 2.667   73.88 | 4.333    4.81 |  6.00    1.61
                1.167    1.61 | 2.833   47.38 | 4.500    3.21 |  6.17    1.61
                1.333    5.62 | 3.000   20.88 | 4.667    3.21 |  6.33    0.81
                1.500    9.64 | 3.167   20.88 | 4.833    2.41 |
                1.667    9.64 | 3.333   16.06 | 5.000    1.61 |

     Max.Eff.Inten.(mm/hr)=      73.88        35.17
                over (min)       10.00        20.00
     Storage Coeff.  (min)=       4.25 (ii)   13.63 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.15         0.07
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.13         0.03         0.156 (iii)
     TIME TO PEAK    (hrs)=       2.67         2.83           2.67
     RUNOFF VOLUME    (mm)=      78.31        31.67          61.05
     TOTAL RAINFALL   (mm)=      80.31        80.31          80.31
     RUNOFF COEFFICIENT   =       0.98         0.39           0.76

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

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

-------------------------------------------------------------------------------
=====================================================================================
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```



```
       V    V   I    SSSSS  U    U    A    L              (v 6.0.2000)
       V    V   I    SS     U    U   A A   L
        V  V    I     SS    U    U  AAAAA  L
        V  V    I      SS   U    U  A   A  L
         VV     I    SSSSS  UUUUU  A    A  LLLLL

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



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

  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.0\VO2\voin.dat

  Output  filename:
C:\Users\kevin.lukawiecki\AppData\Local\Civica\VH5\a512d3b0-a6e7-43a6-99e8-d9354a433
349\5ab05298-b291-4e70-a826-8b6873d3
  Summary filename:
C:\Users\kevin.lukawiecki\AppData\Local\Civica\VH5\a512d3b0-a6e7-43a6-99e8-d9354a433
349\5ab05298-b291-4e70-a826-8b6873d3


DATE: 01/26/2022                           TIME: 11:36:08

USER:



COMMENTS: ____________________________________________________________


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



--------------------
|    READ STORM    |     Filename: C:\Users\kevin.lukawiecki\AppD
|                  |               ata\Local\Temp\
|                  |               4d81885e-6790-48a0-a926-ec16e2c2aeb7\e5851225
```



```
| 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            |
| NASHYD   (  0401)|   Area    (ha)=   6.62   Curve Number   (CN)= 63.0
|ID= 1 DT=15.0 min |   Ia      (mm)=   1.50   # of Linear Res.(N)= 2.00
--------------------   U.H. Tp(hrs)=   0.20

     Unit Hyd Qpeak  (cms)=   0.859

     PEAK FLOW       (cms)=   0.084 (i)
     TIME TO PEAK    (hrs)=   2.750
     RUNOFF VOLUME    (mm)=   5.698
     TOTAL RAINFALL   (mm)=  36.000
     RUNOFF COEFFICIENT   =   0.158

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

-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0100)|   Area    (ha)=  23.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      17.25         5.75
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     390.00        40.00
     Mannings n          =       0.030        0.200

     Max.Eff.Inten.(mm/hr)=      33.12        16.19
                over (min)       15.00        30.00
     Storage Coeff.  (min)=      14.85 (ii)   27.64 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.07         0.04
```

```
                                                           *TOTALS*
     PEAK FLOW       (cms)=       1.25         0.14          1.359 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00           2.75
     RUNOFF VOLUME    (mm)=      34.00         9.87          25.55
     TOTAL RAINFALL   (mm)=      36.00        36.00          36.00
     RUNOFF COEFFICIENT   =       0.94         0.27           0.71

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

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

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0101)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 15.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.7800     1.0000
                          0.7800     0.0000   |   0.0000     0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0100)     23.000     1.359      2.75      25.55
   OUTFLOW: ID= 1 (  0101)     23.000     0.780      2.50      25.67

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 57.41
                   TIME SHIFT OF PEAK FLOW         (min)=-15.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.0268

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0200)|   Area    (ha)=  28.40
|ID= 1 DT=15.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      21.30         7.10
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     435.00        40.00
     Mannings n          =       0.030        0.200

     Max.Eff.Inten.(mm/hr)=      33.12        16.19
                over (min)       15.00        30.00
```



```
     Storage Coeff.  (min)=      15.86 (ii)   28.65 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.07         0.04
                                                           *TOTALS*
     PEAK FLOW       (cms)=       1.53         0.17          1.653 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00           2.75
     RUNOFF VOLUME    (mm)=      34.00         9.87          25.55
     TOTAL RAINFALL   (mm)=      36.00        36.00          36.00
     RUNOFF COEFFICIENT   =       0.94         0.27           0.71


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

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0201)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 15.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.8700     1.2000
                          0.8700     0.0000   |   0.0000     0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0200)     28.400     1.653      2.75      25.55
   OUTFLOW: ID= 1 (  0201)     28.400     0.870      2.50      25.73

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 52.64
                   TIME SHIFT OF PEAK FLOW         (min)=-15.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.0385

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

--------------------
| ADD HYD  (  0001)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0101):    23.00   0.780     2.50    25.67
      + ID2= 2 (  0201):    28.40   0.870     2.50    25.73
        ====================================================
        ID = 3 (  0001):    51.40   1.650     2.50    25.71

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



```
--------------------
| CALIB            |
| STANDHYD (  0300)|   Area    (ha)=  73.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  57.00   Dir. Conn.(%)=  47.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      41.61        31.39
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     692.00        40.00
     Mannings n          =       0.030        0.200

     Max.Eff.Inten.(mm/hr)=      33.12        12.72
                over (min)       15.00        45.00
     Storage Coeff.  (min)=      20.95 (ii)   35.04 (ii)
     Unit Hyd. Tpeak (min)=      15.00        45.00
     Unit Hyd. peak  (cms)=       0.06         0.03
                                                           *TOTALS*
     PEAK FLOW       (cms)=       2.62         0.51          2.861 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.25           2.75
     RUNOFF VOLUME    (mm)=      34.00         8.79          20.64
     TOTAL RAINFALL   (mm)=      36.00        36.00          36.00
     RUNOFF COEFFICIENT   =       0.94         0.24           0.57


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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0027)|   Area    (ha)=   2.30
|ID= 1 DT=10.0 min |   Total Imp(%)=  90.00   Dir. Conn.(%)=  90.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.07         0.23
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     123.83        40.00
     Mannings n          =       0.030        0.200

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 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
            0.167    0.00 | 1.833    8.28 | 3.500    5.04 |  5.17    0.72
            0.333    0.36 | 2.000   12.24 | 3.667    5.04 |  5.33    0.72
            0.500    0.72 | 2.167   12.24 | 3.833    3.96 |  5.50    0.72
            0.667    0.72 | 2.333   22.68 | 4.000    2.88 |  5.67    0.72
            0.833    0.72 | 2.500   33.12 | 4.167    2.88 |  5.83    0.72
            1.000    0.72 | 2.667   33.12 | 4.333    2.16 |  6.00    0.72
            1.167    0.72 | 2.833   21.24 | 4.500    1.44 |  6.17    0.72
            1.333    2.52 | 3.000    9.36 | 4.667    1.44 |  6.33    0.36
            1.500    4.32 | 3.167    9.36 | 4.833    1.08 |
            1.667    4.32 | 3.333    7.20 | 5.000    0.72 |

     Max.Eff.Inten.(mm/hr)=      33.12         7.02
                over (min)       10.00        30.00
     Storage Coeff.  (min)=       7.46 (ii)   25.32 (ii)
     Unit Hyd. Tpeak (min)=      10.00        30.00
     Unit Hyd. peak  (cms)=       0.13         0.04
                                                           *TOTALS*
     PEAK FLOW       (cms)=       0.19         0.00          0.187 (iii)
     TIME TO PEAK    (hrs)=       2.67         3.17           2.67
     RUNOFF VOLUME    (mm)=      34.00         7.13          31.31
     TOTAL RAINFALL   (mm)=      36.00        36.00          36.00
     RUNOFF COEFFICIENT   =       0.94         0.20           0.87

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

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0024)|   Area    (ha)=   1.24
|ID= 1 DT=10.0 min |   Total Imp(%)=  63.00   Dir. Conn.(%)=  63.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.78         0.46
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      90.92        40.00
     Mannings n          =       0.030        0.200

     Max.Eff.Inten.(mm/hr)=      33.12         7.02
                over (min)       10.00        30.00
```

```
     Storage Coeff.  (min)=       6.20 (ii)   24.06 (ii)
     Unit Hyd. Tpeak (min)=      10.00        30.00
     Unit Hyd. peak  (cms)=       0.14         0.04
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.07         0.01         0.074 (iii)
     TIME TO PEAK    (hrs)=       2.67         3.00          2.67
     RUNOFF VOLUME    (mm)=      34.00         7.13         24.05
     TOTAL RAINFALL   (mm)=      36.00        36.00         36.00
     RUNOFF COEFFICIENT   =       0.94         0.20          0.67

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

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

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

--------------------
| ADD HYD  (  0034)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0024):     1.24  0.074     2.67    24.05
      + ID2= 2 (  0027):     2.30  0.187     2.67    31.31
        ==================================================
        ID = 3 (  0034):     3.54  0.260     2.67    28.77

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

--------------------
| ADD HYD  (  0002)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0001):    51.40  1.650     2.50    25.71
      + ID2= 2 (  0300):    73.00  2.861     2.75    20.64
        ==================================================
        ID = 3 (  0002):   124.40  4.511     2.75    22.73

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

--------------------
| ADD HYD  (  0002)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
```



```
        ID1= 3 (  0002):   124.40   4.511     2.75    22.73
      + ID2= 2 (  0034):     3.54   0.260     2.67    28.77
        ==================================================
        ID = 1 (  0002):   127.94   4.533     2.67    22.94

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0003)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 15.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.1900     1.9300
                          0.0500     0.4200   |   0.4700     2.6400
                          0.0800     0.8400   |   0.8500     3.3400
                          0.0900     1.3900   |   1.3200     3.7000
                          0.1000     1.6000   |   2.4600     4.2500

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0002)    127.940      4.533      2.67      22.94
   OUTFLOW: ID= 1 (  0003)    127.940      0.425      5.17      22.92

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  9.38
                  TIME SHIFT OF PEAK FLOW         (min)=150.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  2.5276

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

--------------------
| ADD HYD  (  0004)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0003):   127.94  0.425     5.17    22.92
      + ID2= 2 (  0401):     6.62  0.084     2.75     5.70
        ==================================================
        ID = 3 (  0004):   134.56  0.431     5.00    22.07

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0402)|   Area    (ha)=   8.58
|ID= 1 DT=15.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  40.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       4.29         4.29
     Dep. Storage     (mm)=       2.00         5.00
```



```
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     239.17        40.00
     Mannings n           =      0.030        0.200

         NOTE:  RAINFALL WAS TRANSFORMED TO  15.0 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
               0.250    0.00 | 2.000   12.24 | 3.750    5.04 |  5.50    0.72
               0.500    0.72 | 2.250   12.24 | 4.000    2.88 |  5.75    0.72
               0.750    0.72 | 2.500   33.12 | 4.250    2.88 |  6.00    0.72
               1.000    0.72 | 2.750   33.12 | 4.500    1.44 |  6.25    0.72
               1.250    0.72 | 3.000    9.36 | 4.750    1.44 |
               1.500    4.32 | 3.250    9.36 | 5.000    0.72 |
               1.750    4.32 | 3.500    5.04 | 5.250    0.72 |

     Max.Eff.Inten.(mm/hr)=      33.12        12.08
                over (min)       15.00        30.00
     Storage Coeff.  (min)=      11.08 (ii)   25.46 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.08         0.04
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.30         0.08         0.362 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00          2.75
     RUNOFF VOLUME    (mm)=      34.00         8.57         18.74
     TOTAL RAINFALL   (mm)=      36.00        36.00         36.00
     RUNOFF COEFFICIENT   =       0.94         0.24          0.52

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

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

------------------------------------------------------------------------------
--------------------
| DUHYD    (  0403)|
| Inlet Cap.= 0.740|
| #of Inlets=     1|
| Total(cms)=   0.7|      AREA     QPEAK     TPEAK    R.V.
--------------------      (ha)     (cms)     (hrs)    (mm)
     TOTAL HYD.(ID= 1):   8.58      0.36      2.75   18.74
     ==================================================
     MAJOR SYS.(ID= 2):   0.00      0.00      0.00    0.00
```



```
     MINOR SYS.(ID= 3):   8.58      0.36      2.75   18.74

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD  (  0005)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
*** W A R N I N G :  HYDROGRAPH   0403 <ID= 2> IS DRY.
*** W A R N I N G :  HYDROGRAPH   0003 = HYDROGRAPH 0001
        ID1= 1 (  0004):   134.56  0.431     5.00    22.07
      + ID2= 2 (  0403):     0.00  0.000     0.00     0.00
        ==================================================
        ID = 3 (  0005):   134.56  0.431     5.00    22.07

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0500)|   Area    (ha)=   6.76
|ID= 1 DT=15.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       5.07         1.69
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     212.29        40.00
     Mannings n           =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      33.12        16.19
                over (min)       15.00        30.00
     Storage Coeff.  (min)=      10.31 (ii)   23.10 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.09         0.04
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.39         0.04         0.424 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00          2.75
     RUNOFF VOLUME    (mm)=      34.00         9.87         25.55
     TOTAL RAINFALL   (mm)=      36.00        36.00         36.00
     RUNOFF COEFFICIENT   =       0.94         0.27          0.71

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
```

```
          THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB             |
| STANDHYD (  0600)|   Area    (ha)=  12.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  40.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       6.00         6.00
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     270.00        40.00
     Mannings n           =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      33.12        12.08
                over (min)       15.00        30.00
     Storage Coeff.  (min)=      11.91 (ii)   26.29 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.08         0.04
                                                            *TOTALS*
     PEAK FLOW       (cms)=       0.42         0.11          0.500 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00           2.75
     RUNOFF VOLUME    (mm)=      34.00         8.57          18.74
     TOTAL RAINFALL   (mm)=      36.00        36.00          36.00
     RUNOFF COEFFICIENT   =       0.94         0.24           0.52

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

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

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--------------------
| ADD HYD  (  0006)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0500):     6.76   0.424     2.75    25.55
      + ID2= 2 (  0600):    12.00   0.500     2.75    18.74
        ==================================================
        ID = 3 (  0006):    18.76   0.925     2.75    21.19

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



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--------------------------------------------------------------------------------
--------------------
| CALIB             |
| STANDHYD (  0700)|   Area    (ha)=  12.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  55.00   Dir. Conn.(%)=  43.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       6.60         5.40
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     282.00        40.00
     Mannings n           =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      33.12        13.41
                over (min)       15.00        30.00
     Storage Coeff.  (min)=      12.23 (ii)   26.02 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.08         0.04
                                                            *TOTALS*
     PEAK FLOW       (cms)=       0.45         0.11          0.531 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00           2.75
     RUNOFF VOLUME    (mm)=      34.00         9.02          19.76
     TOTAL RAINFALL   (mm)=      36.00        36.00          36.00
     RUNOFF COEFFICIENT   =       0.94         0.25           0.55

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

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

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

--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0006):    18.76   0.925     2.75    21.19
      + ID2= 2 (  0700):    12.00   0.531     2.75    19.76
        ==================================================
        ID = 3 (  0007):    30.76   1.456     2.75    20.63

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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```
| ADD HYD  (  0008)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0403):     8.58   0.362     2.75    18.74
      + ID2= 2 (  0007):    30.76   1.456     2.75    20.63
        ==================================================
        ID = 3 (  0008):    39.34   1.818     2.75    20.22

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB             |
| STANDHYD (  0800)|   Area    (ha)=   2.60
|ID= 1 DT=15.0 min |   Total Imp(%)=  60.00   Dir. Conn.(%)=  45.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.56         1.04
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     131.00        40.00
     Mannings n           =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      33.12        15.66
                over (min)       15.00        30.00
     Storage Coeff.  (min)=       7.72 (ii)   20.68 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.10         0.05
                                                            *TOTALS*
     PEAK FLOW       (cms)=       0.11         0.03          0.128 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00           2.75
     RUNOFF VOLUME    (mm)=      34.00         9.71          20.64
     TOTAL RAINFALL   (mm)=      36.00        36.00          36.00
     RUNOFF COEFFICIENT   =       0.94         0.27           0.57

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

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

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

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



```
        ID1= 1 (  0008):    39.34   1.818     2.75    20.22
      + ID2= 2 (  0800):     2.60   0.128     2.75    20.64
        ==================================================
        ID = 3 (  0009):    41.94   1.945     2.75    20.25

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0010)|      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   |   0.9400     0.6210
                           0.0500     0.1950   |   2.6600     0.7760
                           0.0800     0.3860   |   4.0200     0.9110
                           0.1300     0.4750   |   0.0000     0.0000

                                 AREA     QPEAK     TPEAK       R.V.
                                 (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0009)     41.940      1.945      2.75      20.25
   OUTFLOW: ID= 1 (  0010)     41.940      0.560      3.58      20.22

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 28.80
                   TIME SHIFT OF PEAK FLOW         (min)= 50.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.5527

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

--------------------
| ADD HYD  (  0011)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0010):    41.94   0.560     3.58    20.22
      + ID2= 2 (  0005):   134.56   0.431     5.00    22.07
        ==================================================
        ID = 3 (  0011):   176.50   0.876     3.92    21.62

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB             |
| STANDHYD (  0031)|   Area    (ha)=   1.03
|ID= 1 DT=10.0 min |   Total Imp(%)=  63.00   Dir. Conn.(%)=  63.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.65         0.38
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
```

```
     Length           (m)=      82.87       40.00
     Mannings n          =      0.030       0.200

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 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
                0.167    0.00 | 1.833    8.28 | 3.500    5.04 |  5.17    0.72
                0.333    0.36 | 2.000   12.24 | 3.667    5.04 |  5.33    0.72
                0.500    0.72 | 2.167   12.24 | 3.833    3.96 |  5.50    0.72
                0.667    0.72 | 2.333   22.68 | 4.000    2.88 |  5.67    0.72
                0.833    0.72 | 2.500   33.12 | 4.167    2.88 |  5.83    0.72
                1.000    0.72 | 2.667   33.12 | 4.333    2.16 |  6.00    0.72
                1.167    0.72 | 2.833   21.24 | 4.500    1.44 |  6.17    0.72
                1.333    2.52 | 3.000    9.36 | 4.667    1.44 |  6.33    0.36
                1.500    4.32 | 3.167    9.36 | 4.833    1.08 |
                1.667    4.32 | 3.333    7.20 | 5.000    0.72 |

     Max.Eff.Inten.(mm/hr)=      33.12        7.02
                over (min)      10.00       30.00
     Storage Coeff.  (min)=       5.86 (ii)   23.73 (ii)
     Unit Hyd. Tpeak (min)=      10.00       30.00
     Unit Hyd. peak  (cms)=       0.14        0.04
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.06        0.00         0.061 (iii)
     TIME TO PEAK    (hrs)=       2.67        3.00          2.67
     RUNOFF VOLUME    (mm)=      34.00        7.13         24.04
     TOTAL RAINFALL   (mm)=      36.00       36.00         36.00
     RUNOFF COEFFICIENT   =       0.94        0.20          0.67

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

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

--------------------------------------------------------------------------------
==================================================================================
======================

       V    V   I    SSSSS  U   U    A    L              (v 6.0.2000)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
```



```
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO    TTTTT  TTTTT  H   H  Y   Y  M   M   OOO     TM
       O   O     T      T    H   H   Y Y   MM MM  O   O
       O   O     T      T    H   H    Y    M   M  O   O
        OOO      T      T    H   H    Y    M   M   OOO
Developed and Distributed by Civica Infrastructure
```



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


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.0\VO2\voin.dat

  Output  filename:
C:\Users\kevin.lukawiecki\AppData\Local\Civica\VH5\a512d3b0-a6e7-43a6-99e8-d9354a433
349\9c83ff11-c0b2-4ad6-a113-77d599bb
  Summary filename:
C:\Users\kevin.lukawiecki\AppData\Local\Civica\VH5\a512d3b0-a6e7-43a6-99e8-d9354a433
349\9c83ff11-c0b2-4ad6-a113-77d599bb


DATE: 01/26/2022                             TIME: 11:36:09

USER:



COMMENTS: ____________________________________________________________

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  **********************************************
  ** SIMULATION : 25 Year                     **
  **********************************************


--------------------
|   READ STORM     |    Filename: C:\Users\kevin.lukawiecki\AppD
|                  |              ata\Local\Temp\
|                  |              4d81885e-6790-48a0-a926-ec16e2c2aeb7\1b8bf92b
| 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 |

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--------------------
| CALIB            |
| NASHYD   ( 0401)|   Area    (ha)=   6.62   Curve Number   (CN)= 63.0
|ID= 1 DT=15.0 min |   Ia      (mm)=   1.50   # of Linear Res.(N)= 2.00
--------------------   U.H. Tp(hrs)=   0.20

     Unit Hyd Qpeak  (cms)=   0.859

     PEAK FLOW       (cms)=   0.256 (i)
     TIME TO PEAK    (hrs)=   2.750
     RUNOFF VOLUME    (mm)=  16.937
     TOTAL RAINFALL   (mm)=  65.590
     RUNOFF COEFFICIENT   =   0.258

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD ( 0100)|   Area    (ha)=  23.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      17.25        5.75
     Dep. Storage     (mm)=       2.00        5.00
     Average Slope     (%)=       1.00        2.00
     Length            (m)=     390.00       40.00
     Mannings n          =      0.030       0.200

     Max.Eff.Inten.(mm/hr)=      60.35       45.65
                over (min)      15.00       30.00
     Storage Coeff.  (min)=      11.68 (ii)   20.13 (ii)
     Unit Hyd. Tpeak (min)=      15.00       30.00
     Unit Hyd. peak  (cms)=       0.08        0.05
                                                        *TOTALS*
     PEAK FLOW       (cms)=       2.38        0.47         2.774 (iii)
     TIME TO PEAK    (hrs)=       2.75        3.00          2.75
     RUNOFF VOLUME    (mm)=      63.59       28.26         51.22
```



```
     TOTAL RAINFALL   (mm)=      65.59       65.59         65.59
     RUNOFF COEFFICIENT   =       0.97        0.43          0.78

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

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

--------------------------------------------------------------------------------
--------------------
| RESERVOIR( 0101)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 15.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.7800     1.0000
                          0.7800     0.0000   |   0.0000     0.0000

                                 AREA     QPEAK     TPEAK       R.V.
                                 (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0100)     23.000      2.774      2.75      51.22
   OUTFLOW: ID= 1 (  0101)     23.000      0.780      2.25      51.25

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 28.12
                   TIME SHIFT OF PEAK FLOW         (min)=-30.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.1424

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD ( 0200)|   Area    (ha)=  28.40
|ID= 1 DT=15.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      21.30        7.10
     Dep. Storage     (mm)=       2.00        5.00
     Average Slope     (%)=       1.00        2.00
     Length            (m)=     435.00       40.00
     Mannings n          =      0.030       0.200

     Max.Eff.Inten.(mm/hr)=      60.35       45.65
                over (min)      15.00       30.00
     Storage Coeff.  (min)=      12.48 (ii)   20.92 (ii)
     Unit Hyd. Tpeak (min)=      15.00       30.00
     Unit Hyd. peak  (cms)=       0.08        0.05
                                                        *TOTALS*
```

```
     PEAK FLOW       (cms)=       2.91         0.57          3.388 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00           2.75
     RUNOFF VOLUME    (mm)=      63.59        28.26          51.22
     TOTAL RAINFALL   (mm)=      65.59        65.59          65.59
     RUNOFF COEFFICIENT   =       0.97         0.43           0.78

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

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

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0201)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 15.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.8700      1.2000
                          0.8700     0.0000   |   0.0000      0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0200)     28.400      3.388      2.75      51.22
   OUTFLOW: ID= 1 (  0201)     28.400      0.870      2.00      51.50

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 25.68
                   TIME SHIFT OF PEAK FLOW         (min)=-45.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.1907

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

--------------------
| ADD HYD  (  0001)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0101):    23.00   0.780     2.25    51.25
      + ID2= 2 (  0201):    28.40   0.870     2.00    51.50
        ==================================================
        ID = 3 (  0001):    51.40   1.650     2.25    51.39

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0300)|   Area    (ha)=  73.00
```



```
|ID= 1 DT=15.0 min |   Total Imp(%)=  57.00   Dir. Conn.(%)=  47.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      41.61        31.39
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     692.00        40.00
     Mannings n          =       0.030        0.200

     Max.Eff.Inten.(mm/hr)=      60.35        37.11
                over (min)       15.00        30.00
     Storage Coeff.  (min)=      16.48 (ii)   25.66 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.07         0.04
                                                         *TOTALS*
     PEAK FLOW       (cms)=       5.12         1.88          6.631 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00           2.75
     RUNOFF VOLUME    (mm)=      63.59        25.99          43.66
     TOTAL RAINFALL   (mm)=      65.59        65.59          65.59
     RUNOFF COEFFICIENT   =       0.97         0.40           0.67


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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0027)|   Area    (ha)=   2.30
|ID= 1 DT=10.0 min |   Total Imp(%)=  90.00   Dir. Conn.(%)=  90.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.07         0.23
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     123.83        40.00
     Mannings n          =       0.030        0.200

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 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
                 0.167    0.00 | 1.833   15.08 | 3.500    9.18 |  5.17    1.31
```



```
                 0.333    0.65 | 2.000   22.30 | 3.667    9.18 |  5.33    1.31
                 0.500    1.31 | 2.167   22.30 | 3.833    7.21 |  5.50    1.31
                 0.667    1.31 | 2.333   41.32 | 4.000    5.25 |  5.67    1.31
                 0.833    1.31 | 2.500   60.35 | 4.167    5.25 |  5.83    1.31
                 1.000    1.31 | 2.667   60.35 | 4.333    3.93 |  6.00    1.31
                 1.167    1.31 | 2.833   38.70 | 4.500    2.62 |  6.17    1.31
                 1.333    4.59 | 3.000   17.06 | 4.667    2.62 |  6.33    0.66
                 1.500    7.87 | 3.167   17.06 | 4.833    1.97 |
                 1.667    7.87 | 3.333   13.12 | 5.000    1.31 |

     Max.Eff.Inten.(mm/hr)=      60.35        21.82
                over (min)       10.00        20.00
     Storage Coeff.  (min)=       5.87 (ii)   17.22 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.14         0.06
                                                         *TOTALS*
     PEAK FLOW       (cms)=       0.34         0.01          0.351 (iii)
     TIME TO PEAK    (hrs)=       2.67         2.83           2.67
     RUNOFF VOLUME    (mm)=      63.59        22.34          59.46
     TOTAL RAINFALL   (mm)=      65.59        65.59          65.59
     RUNOFF COEFFICIENT   =       0.97         0.34           0.91

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

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0024)|   Area    (ha)=   1.24
|ID= 1 DT=10.0 min |   Total Imp(%)=  63.00   Dir. Conn.(%)=  63.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.78         0.46
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      90.92        40.00
     Mannings n          =       0.030        0.200

     Max.Eff.Inten.(mm/hr)=      60.35        21.82
                over (min)       10.00        20.00
     Storage Coeff.  (min)=       4.88 (ii)   16.23 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.15         0.06
```



```
                                                         *TOTALS*
     PEAK FLOW       (cms)=       0.13         0.02          0.148 (iii)
     TIME TO PEAK    (hrs)=       2.67         2.83           2.67
     RUNOFF VOLUME    (mm)=      63.59        22.34          48.32
     TOTAL RAINFALL   (mm)=      65.59        65.59          65.59
     RUNOFF COEFFICIENT   =       0.97         0.34           0.74

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

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

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

--------------------
| ADD HYD  (  0034)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0024):     1.24   0.148     2.67    48.32
      + ID2= 2 (  0027):     2.30   0.351     2.67    59.46
        ==================================================
        ID = 3 (  0034):     3.54   0.499     2.67    55.56

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

--------------------
| ADD HYD  (  0002)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0001):    51.40   1.650     2.25    51.39
      + ID2= 2 (  0300):    73.00   6.631     2.75    43.66
        ==================================================
        ID = 3 (  0002):   124.40   8.281     2.75    46.85

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

--------------------
| ADD HYD  (  0002)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0002):   124.40   8.281     2.75    46.85
      + ID2= 2 (  0034):     3.54   0.499     2.67    55.56
        ==================================================
```

```
       ID = 1 (  0002):   127.94   8.171      2.67    47.06

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0003)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 15.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.1900     1.9300
                          0.0500     0.4200   |   0.4700     2.6400
                          0.0800     0.8400   |   0.8500     3.3400
                          0.0900     1.3900   |   1.3200     3.7000
                          0.1000     1.6000   |   2.4600     4.2500

                                AREA     QPEAK     TPEAK        R.V.
                                (ha)     (cms)     (hrs)        (mm)
  INFLOW : ID= 2 (  0002)    127.940      8.171      2.67      47.06
  OUTFLOW: ID= 1 (  0003)    127.940      2.086      5.00      47.04

                 PEAK   FLOW   REDUCTION [Qout/Qin](%)= 25.52
                 TIME SHIFT OF PEAK FLOW         (min)=140.00
                 MAXIMUM  STORAGE   USED       (ha.m.)=  4.0702

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

--------------------
| ADD HYD  (  0004)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0003):   127.94   2.086     5.00    47.04
     + ID2= 2 (  0401):     6.62   0.256     2.75    16.94
       ==================================================
       ID = 3 (  0004):   134.56   2.103     5.00    45.56

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0402)|   Area    (ha)=   8.58
|ID= 1 DT=15.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  40.00
--------------------
                         IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=       4.29         4.29
    Dep. Storage     (mm)=       2.00         5.00
    Average Slope     (%)=       1.00         2.00
    Length            (m)=     239.17        40.00
    Mannings n          =      0.030        0.200
```



```
     NOTE:  RAINFALL WAS TRANSFORMED TO  15.0 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
               0.250    0.00 | 2.000   22.30 | 3.750    9.18 |  5.50    1.31
               0.500    1.31 | 2.250   22.30 | 4.000    5.25 |  5.75    1.31
               0.750    1.31 | 2.500   60.35 | 4.250    5.25 |  6.00    1.31
               1.000    1.31 | 2.750   60.35 | 4.500    2.62 |  6.25    1.31
               1.250    1.31 | 3.000   17.06 | 4.750    2.62 |
               1.500    7.87 | 3.250   17.06 | 5.000    1.31 |
               1.750    7.87 | 3.500    9.18 | 5.250    1.31 |

    Max.Eff.Inten.(mm/hr)=      60.35        35.50
               over (min)       15.00        30.00
    Storage Coeff.  (min)=       8.71 (ii)   18.06 (ii)
    Unit Hyd. Tpeak (min)=      15.00        30.00
    Unit Hyd. peak  (cms)=       0.09         0.05
                                                          *TOTALS*
    PEAK FLOW       (cms)=       0.56         0.28          0.797 (iii)
    TIME TO PEAK    (hrs)=       2.75         3.00           2.75
    RUNOFF VOLUME    (mm)=      63.59        25.51          40.74
    TOTAL RAINFALL   (mm)=      65.59        65.59          65.59
    RUNOFF COEFFICIENT   =       0.97         0.39           0.62

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

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

-------------------------------------------------------------------------------
--------------------
| DUHYD    (  0403)|
| Inlet Cap.= 0.740|
| #of Inlets=     1|
| Total(cms)=   0.7|      AREA     QPEAK     TPEAK    R.V.
--------------------      (ha)     (cms)     (hrs)    (mm)
    TOTAL HYD.(ID= 1):   8.58      0.80      2.75   40.74
    ====================================================
    MAJOR SYS.(ID= 2):   0.13      0.06      2.75   40.74
    MINOR SYS.(ID= 3):   8.45      0.74      2.75   40.74

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



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


--------------------
| ADD HYD  (  0005)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0004):   134.56   2.103     5.00    45.56
     + ID2= 2 (  0403):     0.13   0.057     2.75    40.74
       ==================================================
       ID = 3 (  0005):   134.69   2.103     5.00    45.55

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0500)|   Area    (ha)=   6.76
|ID= 1 DT=15.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
--------------------
                         IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=       5.07         1.69
    Dep. Storage     (mm)=       2.00         5.00
    Average Slope     (%)=       1.00         2.00
    Length            (m)=     212.29        40.00
    Mannings n          =      0.030        0.200

    Max.Eff.Inten.(mm/hr)=      60.35        45.65
               over (min)       15.00        30.00
    Storage Coeff.  (min)=       8.11 (ii)   16.56 (ii)
    Unit Hyd. Tpeak (min)=      15.00        30.00
    Unit Hyd. peak  (cms)=       0.10         0.05
                                                          *TOTALS*
    PEAK FLOW       (cms)=       0.72         0.15          0.851 (iii)
    TIME TO PEAK    (hrs)=       2.75         3.00           2.75
    RUNOFF VOLUME    (mm)=      63.59        28.26          51.22
    TOTAL RAINFALL   (mm)=      65.59        65.59          65.59
    RUNOFF COEFFICIENT   =       0.97         0.43           0.78

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

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

-------------------------------------------------------------------------------
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```
| CALIB            |
| STANDHYD (  0600)|   Area    (ha)=  12.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  40.00
--------------------
                         IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=       6.00         6.00
    Dep. Storage     (mm)=       2.00         5.00
    Average Slope     (%)=       1.00         2.00
    Length            (m)=     270.00        40.00
    Mannings n          =      0.030        0.200

    Max.Eff.Inten.(mm/hr)=      60.35        35.50
               over (min)       15.00        30.00
    Storage Coeff.  (min)=       9.37 (ii)   18.71 (ii)
    Unit Hyd. Tpeak (min)=      15.00        30.00
    Unit Hyd. peak  (cms)=       0.09         0.05
                                                          *TOTALS*
    PEAK FLOW       (cms)=       0.78         0.38          1.105 (iii)
    TIME TO PEAK    (hrs)=       2.75         3.00           2.75
    RUNOFF VOLUME    (mm)=      63.59        25.51          40.74
    TOTAL RAINFALL   (mm)=      65.59        65.59          65.59
    RUNOFF COEFFICIENT   =       0.97         0.39           0.62

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

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

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


--------------------
| ADD HYD  (  0006)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0500):     6.76   0.851     2.75    51.22
     + ID2= 2 (  0600):    12.00   1.105     2.75    40.74
       ==================================================
       ID = 3 (  0006):    18.76   1.956     2.75    44.52

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0700)|   Area    (ha)=  12.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  55.00   Dir. Conn.(%)=  43.00
```

```
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       6.60         5.40
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     282.00        40.00
     Mannings n           =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      60.35        38.81
                over (min)       15.00        30.00
     Storage Coeff.  (min)=       9.62 (ii)   18.63 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.09         0.05
                                                            *TOTALS*
     PEAK FLOW       (cms)=       0.84         0.38          1.160 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00           2.75
     RUNOFF VOLUME    (mm)=      63.59        26.47          42.43
     TOTAL RAINFALL   (mm)=      65.59        65.59          65.59
     RUNOFF COEFFICIENT   =       0.97         0.40           0.65

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

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

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

--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0006):    18.76   1.956     2.75    44.52
      + ID2= 2 (  0700):    12.00   1.160     2.75    42.43
        ==================================================
        ID = 3 (  0007):    30.76   3.116     2.75    43.70

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

--------------------
| ADD HYD  (  0008)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0403):     8.45   0.740     2.75    40.74
      + ID2= 2 (  0007):    30.76   3.116     2.75    43.70
```



```
        ==================================================
        ID = 3 (  0008):    39.21   3.856     2.75    43.07

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

--------------------
| CALIB            |
| STANDHYD (  0800)|   Area    (ha)=   2.60
|ID= 1 DT=15.0 min |   Total Imp(%)=  60.00   Dir. Conn.(%)=  45.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.56         1.04
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     131.00        40.00
     Mannings n           =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      60.35        44.35
                over (min)       15.00        15.00
     Storage Coeff.  (min)=       6.07 (ii)   14.62 (ii)
     Unit Hyd. Tpeak (min)=      15.00        15.00
     Unit Hyd. peak  (cms)=       0.10         0.07
                                                            *TOTALS*
     PEAK FLOW       (cms)=       0.20         0.10          0.300 (iii)
     TIME TO PEAK    (hrs)=       2.75         2.75           2.75
     RUNOFF VOLUME    (mm)=      63.59        27.93          43.98
     TOTAL RAINFALL   (mm)=      65.59        65.59          65.59
     RUNOFF COEFFICIENT   =       0.97         0.43           0.67

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

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

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

--------------------
| ADD HYD  (  0009)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0008):    39.21   3.856     2.75    43.07
      + ID2= 2 (  0800):     2.60   0.300     2.75    43.98
        ==================================================
        ID = 3 (  0009):    41.81   4.157     2.75    43.12
```



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

--------------------
| RESERVOIR( 0010)|     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   |   0.9400     0.6210
                          0.0500     0.1950   |   2.6600     0.7760
                          0.0800     0.3860   |   4.0200     0.9110
                          0.1300     0.4750   |   0.0000     0.0000

                                 AREA     QPEAK     TPEAK       R.V.
                                 (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0009)     41.813     4.157      2.75      43.12
   OUTFLOW: ID= 1 (  0010)     41.813     2.631      3.00      43.10

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 63.30
                  TIME SHIFT OF PEAK FLOW         (min)= 15.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.7746

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

--------------------
| ADD HYD  (  0011)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0010):    41.81   2.631     3.00    43.10
      + ID2= 2 (  0005):   134.69   2.103     5.00    45.55
        ==================================================
        ID = 3 (  0011):   176.50   3.253     3.08    44.95

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0031)|   Area    (ha)=   1.03
|ID= 1 DT=10.0 min |   Total Imp(%)=  63.00   Dir. Conn.(%)=  63.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.65         0.38
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      82.87        40.00
     Mannings n           =      0.030        0.200

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 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
               0.167    0.00 | 1.833   15.08 | 3.500    9.18 |  5.17    1.31
               0.333    0.65 | 2.000   22.30 | 3.667    9.18 |  5.33    1.31
               0.500    1.31 | 2.167   22.30 | 3.833    7.21 |  5.50    1.31
               0.667    1.31 | 2.333   41.32 | 4.000    5.25 |  5.67    1.31
               0.833    1.31 | 2.500   60.35 | 4.167    5.25 |  5.83    1.31
               1.000    1.31 | 2.667   60.35 | 4.333    3.93 |  6.00    1.31
               1.167    1.31 | 2.833   38.70 | 4.500    2.62 |  6.17    1.31
               1.333    4.59 | 3.000   17.06 | 4.667    2.62 |  6.33    0.66
               1.500    7.87 | 3.167   17.06 | 4.833    1.97 |
               1.667    7.87 | 3.333   13.12 | 5.000    1.31 |

     Max.Eff.Inten.(mm/hr)=      60.35        21.82
                over (min)       10.00        20.00
     Storage Coeff.  (min)=       4.61 (ii)   15.96 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.15         0.06
                                                            *TOTALS*
     PEAK FLOW       (cms)=       0.11         0.02          0.123 (iii)
     TIME TO PEAK    (hrs)=       2.67         2.83           2.67
     RUNOFF VOLUME    (mm)=      63.59        22.34          48.32
     TOTAL RAINFALL   (mm)=      65.59        65.59          65.59
     RUNOFF COEFFICIENT   =       0.97         0.34           0.74

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

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

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


       V    V   I    SSSSS  U   U    A    L              (v 6.0.2000)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

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

```
   OOO     T      T   H   H   Y    M   M   OOO
```

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

  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.0\VO2\voin.dat

  Output  filename:
C:\Users\kevin.lukawiecki\AppData\Local\Civica\VH5\a512d3b0-a6e7-43a6-99e8-d9354a433
349\42d1243b-c75f-4a29-8e25-a67698f5
  Summary filename:
C:\Users\kevin.lukawiecki\AppData\Local\Civica\VH5\a512d3b0-a6e7-43a6-99e8-d9354a433
349\42d1243b-c75f-4a29-8e25-a67698f5


DATE: 01/26/2022                           TIME: 11:36:08

USER:


COMMENTS: ____________________________________________________________

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


--------------------
|    READ STORM    |     Filename: C:\Users\kevin.lukawiecki\AppD
|                  |               ata\Local\Temp\
|                  |               4d81885e-6790-48a0-a926-ec16e2c2aeb7\ef6bf4f6
| 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            |
| NASHYD   ( 0401)|   Area    (ha)=   6.62   Curve Number   (CN)= 63.0
|ID= 1 DT=15.0 min |   Ia      (mm)=   1.50   # of Linear Res.(N)= 2.00
--------------------   U.H. Tp(hrs)=   0.20

     Unit Hyd Qpeak  (cms)=   0.859

     PEAK FLOW      (cms)=   0.144 (i)
     TIME TO PEAK   (hrs)=   2.750
     RUNOFF VOLUME   (mm)=   9.647
     TOTAL RAINFALL  (mm)=  47.810
     RUNOFF COEFFICIENT   =   0.202

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD ( 0100)|   Area    (ha)=  23.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      17.25         5.75
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     390.00        40.00
     Mannings n          =       0.030        0.200

     Max.Eff.Inten.(mm/hr)=      43.98        26.95
                over (min)       15.00        30.00
     Storage Coeff.  (min)=      13.26 (ii)   23.69 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.08         0.04
                                                           *TOTALS*
     PEAK FLOW       (cms)=       1.70         0.25         1.904 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00          2.75
     RUNOFF VOLUME    (mm)=      45.81        16.54         35.56
     TOTAL RAINFALL   (mm)=      47.81        47.81         47.81
     RUNOFF COEFFICIENT   =       0.96         0.35          0.74

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



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

--------------------------------------------------------------------------------
--------------------
| RESERVOIR( 0101)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 15.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.7800     1.0000
                          0.7800     0.0000   |   0.0000     0.0000

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 ( 0100)     23.000     1.904      2.75      35.56
   OUTFLOW: ID= 1 ( 0101)     23.000     0.780      2.50      36.08

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 40.97
                  TIME SHIFT OF PEAK FLOW         (min)=-15.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0663

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD ( 0200)|   Area    (ha)=  28.40
|ID= 1 DT=15.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      21.30         7.10
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     435.00        40.00
     Mannings n          =       0.030        0.200

     Max.Eff.Inten.(mm/hr)=      43.98        26.95
                over (min)       15.00        30.00
     Storage Coeff.  (min)=      14.16 (ii)   24.59 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.07         0.04
                                                           *TOTALS*
     PEAK FLOW       (cms)=       2.08         0.31         2.321 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00          2.75
     RUNOFF VOLUME    (mm)=      45.81        16.54         35.56
     TOTAL RAINFALL   (mm)=      47.81        47.81         47.81
     RUNOFF COEFFICIENT   =       0.96         0.35          0.74
```



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

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

--------------------------------------------------------------------------------
--------------------
| RESERVOIR( 0201)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 15.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.8700     1.2000
                          0.8700     0.0000   |   0.0000     0.0000

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 ( 0200)     28.400     2.321      2.75      35.56
   OUTFLOW: ID= 1 ( 0201)     28.400     0.870      2.50      36.58

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 37.49
                  TIME SHIFT OF PEAK FLOW         (min)=-15.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0866

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

--------------------
| ADD HYD  ( 0001)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
          ID1= 1 ( 0101):    23.00   0.780     2.50    36.08
        + ID2= 2 ( 0201):    28.40   0.870     2.50    36.58
          ===============================================
          ID = 3 ( 0001):    51.40   1.650     2.50    36.36

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD ( 0300)|   Area    (ha)=  73.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  57.00   Dir. Conn.(%)=  47.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      41.61        31.39
     Dep. Storage     (mm)=       2.00         5.00
```

```
     Average Slope     (%)=       1.00        2.00
     Length            (m)=     692.00       40.00
     Mannings n          =       0.030       0.200

     Max.Eff.Inten.(mm/hr)=      43.98       21.54
                over (min)       15.00       45.00
     Storage Coeff.  (min)=      18.71 (ii)   30.12 (ii)
     Unit Hyd. Tpeak (min)=      15.00       45.00
     Unit Hyd. peak  (cms)=       0.06        0.03
                                                          *TOTALS*
     PEAK FLOW       (cms)=       3.61        0.94         4.086 (iii)
     TIME TO PEAK    (hrs)=       2.75        3.25          2.75
     RUNOFF VOLUME    (mm)=      45.81       14.96         29.46
     TOTAL RAINFALL   (mm)=      47.81       47.81         47.81
     RUNOFF COEFFICIENT   =       0.96        0.31          0.62


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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0027)|   Area    (ha)=   2.30
|ID= 1 DT=10.0 min |   Total Imp(%)=  90.00   Dir. Conn.(%)=  90.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.07        0.23
     Dep. Storage     (mm)=       2.00        5.00
     Average Slope     (%)=       1.00        2.00
     Length            (m)=     123.83       40.00
     Mannings n          =       0.030       0.200

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 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
                0.167    0.00 | 1.833   10.99 | 3.500    6.69 |  5.17    0.96
                0.333    0.48 | 2.000   16.25 | 3.667    6.69 |  5.33    0.96
                0.500    0.96 | 2.167   16.25 | 3.833    5.25 |  5.50    0.96
                0.667    0.96 | 2.333   30.11 | 4.000    3.82 |  5.67    0.96
                0.833    0.96 | 2.500   43.98 | 4.167    3.82 |  5.83    0.96
                1.000    0.96 | 2.667   43.98 | 4.333    2.86 |  6.00    0.96
```



```
                1.167    0.96 | 2.833   28.20 | 4.500    1.91 |  6.17    0.96
                1.333    3.35 | 3.000   12.43 | 4.667    1.91 |  6.33    0.48
                1.500    5.74 | 3.167   12.43 | 4.833    1.43 |
                1.667    5.74 | 3.333    9.56 | 5.000    0.96 |

     Max.Eff.Inten.(mm/hr)=      43.98       12.22
                over (min)       10.00       30.00
     Storage Coeff.  (min)=       6.66 (ii)   20.97 (ii)
     Unit Hyd. Tpeak (min)=      10.00       30.00
     Unit Hyd. peak  (cms)=       0.13        0.05
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.25        0.01         0.251 (iii)
     TIME TO PEAK    (hrs)=       2.67        3.00          2.67
     RUNOFF VOLUME    (mm)=      45.81       12.51         42.47
     TOTAL RAINFALL   (mm)=      47.81       47.81         47.81
     RUNOFF COEFFICIENT   =       0.96        0.26          0.89

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

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0024)|   Area    (ha)=   1.24
|ID= 1 DT=10.0 min |   Total Imp(%)=  63.00   Dir. Conn.(%)=  63.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.78        0.46
     Dep. Storage     (mm)=       2.00        5.00
     Average Slope     (%)=       1.00        2.00
     Length            (m)=      90.92       40.00
     Mannings n          =       0.030       0.200

     Max.Eff.Inten.(mm/hr)=      43.98       12.22
                over (min)       10.00       20.00
     Storage Coeff.  (min)=       5.54 (ii)   19.85 (ii)
     Unit Hyd. Tpeak (min)=      10.00       20.00
     Unit Hyd. peak  (cms)=       0.14        0.06
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.09        0.01         0.103 (iii)
     TIME TO PEAK    (hrs)=       2.67        2.83          2.67
     RUNOFF VOLUME    (mm)=      45.81       12.51         33.48
     TOTAL RAINFALL   (mm)=      47.81       47.81         47.81
```



```
     RUNOFF COEFFICIENT   =       0.96        0.26          0.70

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

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

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

--------------------
| ADD HYD  (  0034)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0024):      1.24   0.103     2.67    33.48
      + ID2= 2 (  0027):      2.30   0.251     2.67    42.47
        ==================================================
        ID = 3 (  0034):      3.54   0.354     2.67    39.32

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

--------------------
| ADD HYD  (  0002)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0001):     51.40   1.650     2.50    36.36
      + ID2= 2 (  0300):     73.00   4.086     2.75    29.46
        ==================================================
        ID = 3 (  0002):    124.40   5.736     2.75    32.31

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

--------------------
| ADD HYD  (  0002)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0002):    124.40   5.736     2.75    32.31
      + ID2= 2 (  0034):      3.54   0.354     2.67    39.32
        ==================================================
        ID = 1 (  0002):    127.94   5.752     2.67    32.53

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



```
| RESERVOIR(  0003)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 15.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.1900     1.9300
                          0.0500     0.4200   |   0.4700     2.6400
                          0.0800     0.8400   |   0.8500     3.3400
                          0.0900     1.3900   |   1.3200     3.7000
                          0.1000     1.6000   |   2.4600     4.2500

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0002)    127.940      5.752      2.67      32.53
   OUTFLOW: ID= 1 (  0003)    127.940      0.984      5.00      32.51

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 17.11
                  TIME SHIFT OF PEAK FLOW         (min)=140.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  3.4472

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

--------------------
| ADD HYD  (  0004)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0003):    127.94   0.984     5.00    32.51
      + ID2= 2 (  0401):      6.62   0.144     2.75     9.65
        ==================================================
        ID = 3 (  0004):    134.56   0.995     5.00    31.39

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0402)|   Area    (ha)=   8.58
|ID= 1 DT=15.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  40.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       4.29        4.29
     Dep. Storage     (mm)=       2.00        5.00
     Average Slope     (%)=       1.00        2.00
     Length            (m)=     239.17       40.00
     Mannings n          =       0.030       0.200

         NOTE:  RAINFALL WAS TRANSFORMED TO  15.0 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
               0.250    0.00 | 2.000   16.25 | 3.750    6.69 |  5.50    0.96
               0.500    0.96 | 2.250   16.25 | 4.000    3.82 |  5.75    0.96
               0.750    0.96 | 2.500   43.98 | 4.250    3.82 |  6.00    0.96
               1.000    0.96 | 2.750   43.98 | 4.500    1.91 |  6.25    0.96
               1.250    0.96 | 3.000   12.43 | 4.750    1.91 |
               1.500    5.74 | 3.250   12.43 | 5.000    0.96 |
               1.750    5.74 | 3.500    6.69 | 5.250    0.96 |

     Max.Eff.Inten.(mm/hr)=      43.98        20.53
                over (min)       15.00        30.00
     Storage Coeff.  (min)=       9.89 (ii)   21.52 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.09         0.05
                                                           *TOTALS*
     PEAK FLOW       (cms)=       0.41         0.15          0.524 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00           2.75
     RUNOFF VOLUME    (mm)=      45.81        14.64          27.11
     TOTAL RAINFALL   (mm)=      47.81        47.81          47.81
     RUNOFF COEFFICIENT   =       0.96         0.31           0.57

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

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

--------------------------------------------------------------------------------
--------------------
| DUHYD    (  0403)|
| Inlet Cap.= 0.740|
| #of Inlets=     1|
| Total(cms)=   0.7|      AREA     QPEAK     TPEAK    R.V.
--------------------      (ha)     (cms)     (hrs)    (mm)
     TOTAL HYD.(ID= 1):   8.58      0.52      2.75   27.11
     ====================================================
     MAJOR SYS.(ID= 2):   0.00      0.00      0.00    0.00
     MINOR SYS.(ID= 3):   8.58      0.52      2.75   27.11

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD  (  0005)|
```



```
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
*** W A R N I N G :  HYDROGRAPH   0403 <ID= 2> IS DRY.
*** W A R N I N G :  HYDROGRAPH   0003 = HYDROGRAPH 0001
       ID1= 1 (  0004):   134.56   0.995     5.00    31.39
     + ID2= 2 (  0403):     0.00   0.000     0.00     0.00
       ==================================================
       ID = 3 (  0005):   134.56   0.995     5.00    31.39

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0500)|   Area    (ha)=   6.76
|ID= 1 DT=15.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       5.07         1.69
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     212.29        40.00
     Mannings n           =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      43.98        26.95
                over (min)       15.00        30.00
     Storage Coeff.  (min)=       9.21 (ii)   19.64 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.09         0.05
                                                           *TOTALS*
     PEAK FLOW       (cms)=       0.52         0.08          0.589 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00           2.75
     RUNOFF VOLUME    (mm)=      45.81        16.54          35.56
     TOTAL RAINFALL   (mm)=      47.81        47.81          47.81
     RUNOFF COEFFICIENT   =       0.96         0.35           0.74

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

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0600)|   Area    (ha)=  12.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  40.00
```



```
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       6.00         6.00
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     270.00        40.00
     Mannings n           =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      43.98        20.53
                over (min)       15.00        30.00
     Storage Coeff.  (min)=      10.64 (ii)   22.27 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.09         0.04
                                                           *TOTALS*
     PEAK FLOW       (cms)=       0.56         0.21          0.726 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00           2.75
     RUNOFF VOLUME    (mm)=      45.81        14.64          27.11
     TOTAL RAINFALL   (mm)=      47.81        47.81          47.81
     RUNOFF COEFFICIENT   =       0.96         0.31           0.57

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

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

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

--------------------
| ADD HYD  (  0006)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0500):     6.76   0.589     2.75    35.56
     + ID2= 2 (  0600):    12.00   0.726     2.75    27.11
       ==================================================
       ID = 3 (  0006):    18.76   1.315     2.75    30.15

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0700)|   Area    (ha)=  12.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  55.00   Dir. Conn.(%)=  43.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       6.60         5.40
```



```
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     282.00        40.00
     Mannings n           =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      43.98        22.61
                over (min)       15.00        30.00
     Storage Coeff.  (min)=      10.92 (ii)   22.11 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.08         0.04
                                                           *TOTALS*
     PEAK FLOW       (cms)=       0.60         0.20          0.767 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00           2.75
     RUNOFF VOLUME    (mm)=      45.81        15.30          28.42
     TOTAL RAINFALL   (mm)=      47.81        47.81          47.81
     RUNOFF COEFFICIENT   =       0.96         0.32           0.59

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

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

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

--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0006):    18.76   1.315     2.75    30.15
     + ID2= 2 (  0700):    12.00   0.767     2.75    28.42
       ==================================================
       ID = 3 (  0007):    30.76   2.082     2.75    29.48

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

--------------------
| ADD HYD  (  0008)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0403):     8.58   0.524     2.75    27.11
     + ID2= 2 (  0007):    30.76   2.082     2.75    29.48
       ==================================================
       ID = 3 (  0008):    39.34   2.606     2.75    28.96
```

```
     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD ( 0800)|   Area    (ha)=   2.60
|ID= 1 DT=15.0 min |   Total Imp(%)=  60.00   Dir. Conn.(%)=  45.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.56         1.04
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     131.00        40.00
     Mannings n           =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      43.98        26.12
                over (min)      15.00        30.00
     Storage Coeff.  (min)=       6.89 (ii)   17.45 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.10         0.05
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.14         0.05          0.183 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00           2.75
     RUNOFF VOLUME    (mm)=      45.81        16.31          29.58
     TOTAL RAINFALL   (mm)=      47.81        47.81          47.81
     RUNOFF COEFFICIENT   =       0.96         0.34           0.62

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

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

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

--------------------
| ADD HYD  (  0009)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0008):    39.34   2.606     2.75    28.96
      + ID2= 2 (  0800):     2.60   0.183     2.75    29.58
        ==================================================
        ID = 3 (  0009):    41.94   2.788     2.75    29.00

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



```
| RESERVOIR(  0010)|     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   |    0.9400     0.6210
                          0.0500     0.1950   |    2.6600     0.7760
                          0.0800     0.3860   |    4.0200     0.9110
                          0.1300     0.4750   |    0.0000     0.0000

                                 AREA     QPEAK     TPEAK       R.V.
                                 (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0009)     41.940      2.788      2.75      29.00
   OUTFLOW: ID= 1 (  0010)     41.940      1.279      3.25      28.97

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 45.87
                   TIME SHIFT OF PEAK FLOW         (min)= 30.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.6517

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

--------------------
| ADD HYD  (  0011)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0010):    41.94   1.279     3.25    28.97
      + ID2= 2 (  0005):   134.56   0.995     5.00    31.39
        ==================================================
        ID = 3 (  0011):   176.50   1.658     3.33    30.80

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0031)|   Area    (ha)=   1.03
|ID= 1 DT=10.0 min |   Total Imp(%)=  63.00   Dir. Conn.(%)=  63.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.65         0.38
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      82.87        40.00
     Mannings n           =      0.030        0.200

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 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
                0.167    0.00 | 1.833   10.99 | 3.500    6.69 |  5.17    0.96
                0.333    0.48 | 2.000   16.25 | 3.667    6.69 |  5.33    0.96
                0.500    0.96 | 2.167   16.25 | 3.833    5.25 |  5.50    0.96
                0.667    0.96 | 2.333   30.11 | 4.000    3.82 |  5.67    0.96
                0.833    0.96 | 2.500   43.98 | 4.167    3.82 |  5.83    0.96
                1.000    0.96 | 2.667   43.98 | 4.333    2.86 |  6.00    0.96
                1.167    0.96 | 2.833   28.20 | 4.500    1.91 |  6.17    0.96
                1.333    3.35 | 3.000   12.43 | 4.667    1.91 |  6.33    0.48
                1.500    5.74 | 3.167   12.43 | 4.833    1.43 |
                1.667    5.74 | 3.333    9.56 | 5.000    0.96 |

     Max.Eff.Inten.(mm/hr)=      43.98        12.22
                over (min)      10.00        20.00
     Storage Coeff.  (min)=       5.24 (ii)   19.55 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.14         0.06
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.08         0.01          0.086 (iii)
     TIME TO PEAK    (hrs)=       2.67         2.83           2.67
     RUNOFF VOLUME    (mm)=      45.81        12.51          33.48
     TOTAL RAINFALL   (mm)=      47.81        47.81          47.81
     RUNOFF COEFFICIENT   =       0.96         0.26           0.70

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

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

-------------------------------------------------------------------------------
===================================================================================
======================

       V    V   I    SSSSS  U   U    A    L              (v 6.0.2000)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

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



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


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.0\VO2\voin.dat

  Output  filename:
C:\Users\kevin.lukawiecki\AppData\Local\Civica\VH5\a512d3b0-a6e7-43a6-99e8-d9354a433
349\0c2ab900-531e-47aa-854d-3b0eafa2
  Summary filename:
C:\Users\kevin.lukawiecki\AppData\Local\Civica\VH5\a512d3b0-a6e7-43a6-99e8-d9354a433
349\0c2ab900-531e-47aa-854d-3b0eafa2


DATE: 01/26/2022                         TIME: 11:36:08

USER:



COMMENTS: ____________________________________________________________


-----------------------------------------------------------------------------------
-----------------------
  **********************************************
  ** SIMULATION : 50 Year                     **
  **********************************************


--------------------
|    READ STORM     |     Filename: C:\Users\kevin.lukawiecki\AppD
|                   |               ata\Local\Temp\
|                   |               4d81885e-6790-48a0-a926-ec16e2c2aeb7\1e0878d6
| 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            |
| NASHYD   (  0401)|   Area    (ha)=   6.62   Curve Number   (CN)= 63.0
|ID= 1 DT=15.0 min |   Ia      (mm)=   1.50   # of Linear Res.(N)= 2.00
--------------------   U.H. Tp(hrs)=   0.20

     Unit Hyd Qpeak  (cms)=   0.859

     PEAK FLOW       (cms)=   0.310 (i)
     TIME TO PEAK    (hrs)=   2.750
     RUNOFF VOLUME    (mm)=  20.372
     TOTAL RAINFALL   (mm)=  73.000
     RUNOFF COEFFICIENT   =   0.279

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0100)|   Area    (ha)=  23.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      17.25         5.75
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     390.00        40.00
     Mannings n           =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      67.16        54.05
                over (min)       15.00        30.00
     Storage Coeff.  (min)=      11.20 (ii)   19.09 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.08         0.05
                                                            *TOTALS*
     PEAK FLOW       (cms)=       2.67         0.56          3.150 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00           2.75
     RUNOFF VOLUME    (mm)=      71.00        33.58          57.90
     TOTAL RAINFALL   (mm)=      73.00        73.00          73.00
     RUNOFF COEFFICIENT   =       0.97         0.46           0.79

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
```



```
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0101)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 15.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.7800     1.0000
                          0.7800     0.0000   |   0.0000     0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0100)     23.000      3.150      2.75      57.90
   OUTFLOW: ID= 1 (  0101)     23.000      0.780      2.00      58.59

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 24.76
                   TIME SHIFT OF PEAK FLOW         (min)=-45.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.1881

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0200)|   Area    (ha)=  28.40
|ID= 1 DT=15.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      21.30         7.10
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     435.00        40.00
     Mannings n           =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      67.16        54.05
                over (min)       15.00        30.00
     Storage Coeff.  (min)=      11.95 (ii)   19.85 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.08         0.05
                                                            *TOTALS*
     PEAK FLOW       (cms)=       3.26         0.69          3.849 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00           2.75
     RUNOFF VOLUME    (mm)=      71.00        33.58          57.90
     TOTAL RAINFALL   (mm)=      73.00        73.00          73.00
     RUNOFF COEFFICIENT   =       0.97         0.46           0.79

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



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

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0201)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 15.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.8700     1.2000
                          0.8700     0.0000   |   0.0000     0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0200)     28.400      3.849      2.75      57.90
   OUTFLOW: ID= 1 (  0201)     28.400      0.870      2.00      58.62

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 22.60
                   TIME SHIFT OF PEAK FLOW         (min)=-45.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.2488

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

--------------------
| ADD HYD  (  0001)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0101):    23.00   0.780     2.00    58.59
      + ID2= 2 (  0201):    28.40   0.870     2.00    58.62
        ===============================================
        ID = 3 (  0001):    51.40   1.650     2.00    58.61

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0300)|   Area    (ha)=  73.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  57.00   Dir. Conn.(%)=  47.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      41.61        31.39
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     692.00        40.00
     Mannings n           =      0.030        0.200
```



```
     Max.Eff.Inten.(mm/hr)=      67.16        44.18
                over (min)       15.00        30.00
     Storage Coeff.  (min)=      15.79 (ii)   24.35 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.07         0.04
                                                            *TOTALS*
     PEAK FLOW       (cms)=       5.76         2.30          7.639 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00           2.75
     RUNOFF VOLUME    (mm)=      71.00        31.04          49.82
     TOTAL RAINFALL   (mm)=      73.00        73.00          73.00
     RUNOFF COEFFICIENT   =       0.97         0.43           0.68


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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0027)|   Area    (ha)=   2.30
|ID= 1 DT=10.0 min |   Total Imp(%)=  90.00   Dir. Conn.(%)=  90.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.07         0.23
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     123.83        40.00
     Mannings n           =      0.030        0.200

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 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
                0.167    0.00 | 1.833   16.79 | 3.500   10.22 |  5.17    1.46
                0.333    0.73 | 2.000   24.82 | 3.667   10.22 |  5.33    1.46
                0.500    1.46 | 2.167   24.82 | 3.833    8.03 |  5.50    1.46
                0.667    1.46 | 2.333   45.99 | 4.000    5.84 |  5.67    1.46
                0.833    1.46 | 2.500   67.16 | 4.167    5.84 |  5.83    1.46
                1.000    1.46 | 2.667   67.16 | 4.333    4.38 |  6.00    1.46
                1.167    1.46 | 2.833   43.07 | 4.500    2.92 |  6.17    1.46
                1.333    5.11 | 3.000   18.98 | 4.667    2.92 |  6.33    0.73
                1.500    8.76 | 3.167   18.98 | 4.833    2.19 |
```

```
            1.667    8.76 | 3.333   14.60 | 5.000    1.46 |

     Max.Eff.Inten.(mm/hr)=      67.16        26.49
                over (min)       10.00        20.00
     Storage Coeff.  (min)=       5.62 (ii)   16.13 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.14         0.06
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.38         0.01         0.393 (iii)
     TIME TO PEAK    (hrs)=       2.67         2.83          2.67
     RUNOFF VOLUME    (mm)=      71.00        26.92         66.59
     TOTAL RAINFALL   (mm)=      73.00        73.00         73.00
     RUNOFF COEFFICIENT   =       0.97         0.37          0.91

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

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

--------------------------------------------------------------------------------
--------------------
| CALIB             |
| STANDHYD (  0024)|   Area    (ha)=   1.24
|ID= 1 DT=10.0 min |   Total Imp(%)=  63.00   Dir. Conn.(%)=  63.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.78         0.46
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      90.92        40.00
     Mannings n          =       0.030        0.200

     Max.Eff.Inten.(mm/hr)=      67.16        26.49
                over (min)       10.00        20.00
     Storage Coeff.  (min)=       4.67 (ii)   15.18 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.15         0.07
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.15         0.03         0.167 (iii)
     TIME TO PEAK    (hrs)=       2.67         2.83          2.67
     RUNOFF VOLUME    (mm)=      71.00        26.92         54.69
     TOTAL RAINFALL   (mm)=      73.00        73.00         73.00
     RUNOFF COEFFICIENT   =       0.97         0.37          0.75

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



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

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

--------------------
| ADD HYD  (  0034)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0024):     1.24   0.167     2.67    54.69
     + ID2= 2 (  0027):     2.30   0.393     2.67    66.59
       ==================================================
       ID = 3 (  0034):     3.54   0.560     2.67    62.42

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

--------------------
| ADD HYD  (  0002)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0001):    51.40   1.650     2.00    58.61
     + ID2= 2 (  0300):    73.00   7.639     2.75    49.82
       ==================================================
       ID = 3 (  0002):   124.40   9.289     2.75    53.45

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

--------------------
| ADD HYD  (  0002)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0002):   124.40   9.289     2.75    53.45
     + ID2= 2 (  0034):     3.54   0.560     2.67    62.42
       ==================================================
       ID = 1 (  0002):   127.94   9.144     2.67    53.75

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0003)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 15.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
```



```
--------------------       (cms)     (ha.m.)   |   (cms)     (ha.m.)
                           0.0000    0.0000    |   0.1900     1.9300
                           0.0500    0.4200    |   0.4700     2.6400
                           0.0800    0.8400    |   0.8500     3.3400
                           0.0900    1.3900    |   1.3200     3.7000
                           0.1000    1.6000    |   2.4600     4.2500

                              AREA     QPEAK     TPEAK       R.V.
                              (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0002)    127.940      9.144      2.67      53.75
   OUTFLOW: ID= 1 (  0003)    127.940      2.441      4.67      53.73

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 26.70
                  TIME SHIFT OF PEAK FLOW         (min)=120.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  4.2417

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

--------------------
| ADD HYD  (  0004)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0003):   127.94   2.441     4.67    53.73
     + ID2= 2 (  0401):     6.62   0.310     2.75    20.37
       ==================================================
       ID = 3 (  0004):   134.56   2.475     4.67    52.09

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB             |
| STANDHYD (  0402)|   Area    (ha)=   8.58
|ID= 1 DT=15.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  40.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       4.29         4.29
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     239.17        40.00
     Mannings n          =       0.030        0.200

         NOTE:  RAINFALL WAS TRANSFORMED TO  15.0 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
                 0.250    0.00 | 2.000   24.82 | 3.750   10.22 |  5.50    1.46
```



```
                 0.500    1.46 | 2.250   24.82 | 4.000    5.84 |  5.75    1.46
                 0.750    1.46 | 2.500   67.16 | 4.250    5.84 |  6.00    1.46
                 1.000    1.46 | 2.750   67.16 | 4.500    2.92 |  6.25    1.46
                 1.250    1.46 | 3.000   18.98 | 4.750    2.92 |
                 1.500    8.76 | 3.250   18.98 | 5.000    1.46 |
                 1.750    8.76 | 3.500   10.22 | 5.250    1.46 |

     Max.Eff.Inten.(mm/hr)=      67.16        42.31
                over (min)       15.00        30.00
     Storage Coeff.  (min)=       8.35 (ii)   17.06 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.09         0.05
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.63         0.34         0.919 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00          2.75
     RUNOFF VOLUME    (mm)=      71.00        30.51         46.71
     TOTAL RAINFALL   (mm)=      73.00        73.00         73.00
     RUNOFF COEFFICIENT   =       0.97         0.42          0.64

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

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

--------------------------------------------------------------------------------
--------------------
| DUHYD    (  0403)|
| Inlet Cap.= 0.740|
| #of Inlets=     1|
| Total(cms)=   0.7|      AREA     QPEAK     TPEAK    R.V.
--------------------      (ha)     (cms)     (hrs)    (mm)
     TOTAL HYD.(ID= 1):   8.58      0.92      2.75   46.71
     =================================================
     MAJOR SYS.(ID= 2):   0.35      0.18      2.75   46.71
     MINOR SYS.(ID= 3):   8.23      0.74      2.75   46.71

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD  (  0005)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0004):   134.56   2.475     4.67    52.09
```

```
     + ID2= 2 (  0403):     0.35   0.179     2.75    46.71
       ==================================================
       ID = 3 (  0005):   134.91   2.475     4.67    52.06

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0500)|   Area    (ha)=   6.76
|ID= 1 DT=15.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       5.07         1.69
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     212.29        40.00
     Mannings n          =       0.030        0.200

     Max.Eff.Inten.(mm/hr)=      67.16        54.05
                over (min)      15.00        30.00
     Storage Coeff.  (min)=       7.77 (ii)   15.67 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.10         0.05
                                                              *TOTALS*
     PEAK FLOW       (cms)=       0.81         0.18          0.964 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00           2.75
     RUNOFF VOLUME    (mm)=      71.00        33.58          57.90
     TOTAL RAINFALL   (mm)=      73.00        73.00          73.00
     RUNOFF COEFFICIENT   =       0.97         0.46           0.79

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

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

--------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0600)|   Area    (ha)=  12.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  40.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       6.00         6.00
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
```



```
     Length            (m)=     270.00        40.00
     Mannings n          =       0.030        0.200

     Max.Eff.Inten.(mm/hr)=      67.16        42.31
                over (min)      15.00        30.00
     Storage Coeff.  (min)=       8.98 (ii)   17.69 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.09         0.05
                                                              *TOTALS*
     PEAK FLOW       (cms)=       0.88         0.47          1.275 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00           2.75
     RUNOFF VOLUME    (mm)=      71.00        30.51          46.71
     TOTAL RAINFALL   (mm)=      73.00        73.00          73.00
     RUNOFF COEFFICIENT   =       0.97         0.42           0.64

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

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

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

--------------------
| ADD HYD  (  0006)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0500):     6.76   0.964     2.75    57.90
     + ID2= 2 (  0600):    12.00   1.275     2.75    46.71
       ==================================================
       ID = 3 (  0006):    18.76   2.239     2.75    50.74

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0700)|   Area    (ha)=  12.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  55.00   Dir. Conn.(%)=  43.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       6.60         5.40
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     282.00        40.00
     Mannings n          =       0.030        0.200
```



```
     Max.Eff.Inten.(mm/hr)=      67.16        46.16
                over (min)      15.00        30.00
     Storage Coeff.  (min)=       9.22 (ii)   17.63 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.09         0.05
                                                              *TOTALS*
     PEAK FLOW       (cms)=       0.94         0.46          1.335 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00           2.75
     RUNOFF VOLUME    (mm)=      71.00        31.59          48.53
     TOTAL RAINFALL   (mm)=      73.00        73.00          73.00
     RUNOFF COEFFICIENT   =       0.97         0.43           0.66

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

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

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

--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0006):    18.76   2.239     2.75    50.74
     + ID2= 2 (  0700):    12.00   1.335     2.75    48.53
       ==================================================
       ID = 3 (  0007):    30.76   3.574     2.75    49.88

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

--------------------
| ADD HYD  (  0008)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0403):     8.23   0.740     2.75    46.71
     + ID2= 2 (  0007):    30.76   3.574     2.75    49.88
       ==================================================
       ID = 3 (  0008):    38.99   4.314     2.75    49.21

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0800)|   Area    (ha)=   2.60
```



```
|ID= 1 DT=15.0 min |   Total Imp(%)=  60.00   Dir. Conn.(%)=  45.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.56         1.04
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     131.00        40.00
     Mannings n          =       0.030        0.200

     Max.Eff.Inten.(mm/hr)=      67.16        52.55
                over (min)      15.00        15.00
     Storage Coeff.  (min)=       5.82 (ii)   13.80 (ii)
     Unit Hyd. Tpeak (min)=      15.00        15.00
     Unit Hyd. peak  (cms)=       0.10         0.08
                                                              *TOTALS*
     PEAK FLOW       (cms)=       0.22         0.13          0.345 (iii)
     TIME TO PEAK    (hrs)=       2.75         2.75           2.75
     RUNOFF VOLUME    (mm)=      71.00        33.22          50.22
     TOTAL RAINFALL   (mm)=      73.00        73.00          73.00
     RUNOFF COEFFICIENT   =       0.97         0.46           0.69

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

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

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

--------------------
| ADD HYD  (  0009)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0008):    38.99   4.314     2.75    49.21
     + ID2= 2 (  0800):     2.60   0.345     2.75    50.22
       ==================================================
       ID = 3 (  0009):    41.59   4.658     2.75    49.27

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0010)|      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    |   0.9400      0.6210
```

```
                     0.0500     0.1950   |   2.6600      0.7760
                     0.0800     0.3860   |   4.0200      0.9110
                     0.1300     0.4750   |   0.0000      0.0000

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
  INFLOW : ID= 2 (  0009)     41.594     4.658      2.75      49.27
  OUTFLOW: ID= 1 (  0010)     41.594     3.135      3.00      49.25

                 PEAK   FLOW   REDUCTION [Qout/Qin](%)= 67.29
                 TIME SHIFT OF PEAK FLOW         (min)= 15.00
                 MAXIMUM  STORAGE   USED       (ha.m.)=  0.8261

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

--------------------
| ADD HYD  (  0011)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0010):    41.59   3.135     3.00    49.25
     + ID2= 2 (  0005):   134.91   2.475     4.67    52.06
       ==================================================
       ID = 3 (  0011):   176.50   3.909     3.00    51.38

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0031)|   Area    (ha)=   1.03
|ID= 1 DT=10.0 min |   Total Imp(%)=  63.00   Dir. Conn.(%)=  63.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.65         0.38
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      82.87        40.00
     Mannings n          =       0.030        0.200

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 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
                0.167    0.00 | 1.833   16.79 | 3.500   10.22 |  5.17    1.46
                0.333    0.73 | 2.000   24.82 | 3.667   10.22 |  5.33    1.46
                0.500    1.46 | 2.167   24.82 | 3.833    8.03 |  5.50    1.46
                0.667    1.46 | 2.333   45.99 | 4.000    5.84 |  5.67    1.46
```



```
                0.833    1.46 | 2.500   67.16 | 4.167    5.84 |  5.83    1.46
                1.000    1.46 | 2.667   67.16 | 4.333    4.38 |  6.00    1.46
                1.167    1.46 | 2.833   43.07 | 4.500    2.92 |  6.17    1.46
                1.333    5.11 | 3.000   18.98 | 4.667    2.92 |  6.33    0.73
                1.500    8.76 | 3.167   18.98 | 4.833    2.19 |
                1.667    8.76 | 3.333   14.60 | 5.000    1.46 |

     Max.Eff.Inten.(mm/hr)=       67.16        26.49
                over (min)        10.00        20.00
     Storage Coeff.  (min)=        4.42 (ii)   14.92 (ii)
     Unit Hyd. Tpeak (min)=       10.00        20.00
     Unit Hyd. peak  (cms)=        0.15         0.07
                                                            *TOTALS*
     PEAK FLOW       (cms)=        0.12         0.02          0.139 (iii)
     TIME TO PEAK    (hrs)=        2.67         2.83           2.67
     RUNOFF VOLUME    (mm)=       71.00        26.92          54.68
     TOTAL RAINFALL   (mm)=       73.00        73.00          73.00
     RUNOFF COEFFICIENT   =        0.97         0.37           0.75

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

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

-------------------------------------------------------------------------------
================================================================================
======================

      V    V   I    SSSSS  U    U    A    L              (v 6.0.2000)
      V    V   I    SS     U    U   A A   L
       V  V    I     SS    U    U  AAAAA  L
       V  V    I      SS   U    U  A   A  L
        VV     I    SSSSS  UUUUU  A    A  LLLLL

       OOO    TTTTT  TTTTT  H    H  Y    Y  M    M   OOO     TM
      O   O     T      T    H    H   Y  Y   MM  MM  O   O
      O   O     T      T    H    H    Y     M    M  O   O
       OOO      T      T    H    H    Y     M    M   OOO
Developed and Distributed by Civica Infrastructure
```



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



```
  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.0\VO2\voin.dat

  Output  filename:
C:\Users\kevin.lukawiecki\AppData\Local\Civica\VH5\a512d3b0-a6e7-43a6-99e8-d9354a433
349\6f8e7588-8ed7-4255-8524-2ada02df
  Summary filename:
C:\Users\kevin.lukawiecki\AppData\Local\Civica\VH5\a512d3b0-a6e7-43a6-99e8-d9354a433
349\6f8e7588-8ed7-4255-8524-2ada02df


DATE: 01/26/2022                          TIME: 11:36:09

USER:



COMMENTS: ____________________________________________________________


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  **********************************************
  ** SIMULATION : Z5mm                        **
  **********************************************


--------------------
|   READ STORM     |    Filename: C:\Users\kevin.lukawiecki\AppD
|                  |              ata\Local\Temp\
|                  |              4d81885e-6790-48a0-a926-ec16e2c2aeb7\d25d2449
| Ptotal= 24.91 mm |    Comments: 25MM-4HR
--------------------
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                 0.03    0.30 |  1.03   10.80 |  2.03    4.62 |  3.03    2.04
                 0.07    0.60 |  1.07   14.10 |  2.07    4.44 |  3.07    1.98
                 0.10    0.90 |  1.10   17.40 |  2.10    4.26 |  3.10    1.92
                 0.13    1.20 |  1.13   20.70 |  2.13    4.08 |  3.13    1.86
                 0.17    1.50 |  1.17   24.00 |  2.17    3.90 |  3.17    1.80
                 0.20    1.62 |  1.20   26.46 |  2.20    3.75 |  3.20    1.77
                 0.23    1.74 |  1.23   28.92 |  2.23    3.60 |  3.23    1.74
                 0.27    1.86 |  1.27   31.38 |  2.27    3.45 |  3.27    1.71
                 0.30    1.98 |  1.30   33.84 |  2.30    3.30 |  3.30    1.68
                 0.33    2.10 |  1.33   36.30 |  2.33    3.15 |  3.33    1.65
                 0.37    2.13 |  1.37   33.75 |  2.37    3.09 |  3.37    1.65
                 0.40    2.16 |  1.40   31.20 |  2.40    3.03 |  3.40    1.65
                 0.43    2.19 |  1.43   28.65 |  2.43    2.97 |  3.43    1.65
```



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                 0.47    2.22 |  1.47   26.10 |  2.47    2.91 |  3.47    1.65
                 0.50    2.25 |  1.50   23.55 |  2.50    2.85 |  3.50    1.65
                 0.53    2.31 |  1.53   20.82 |  2.53    2.76 |  3.53    1.62
                 0.57    2.37 |  1.57   18.09 |  2.57    2.67 |  3.57    1.59
                 0.60    2.43 |  1.60   15.36 |  2.60    2.58 |  3.60    1.56
                 0.63    2.49 |  1.63   12.63 |  2.63    2.49 |  3.63    1.53
                 0.67    2.55 |  1.67    9.90 |  2.67    2.40 |  3.67    1.50
                 0.70    2.85 |  1.70    9.18 |  2.70    2.37 |  3.70    1.41
                 0.73    3.15 |  1.73    8.46 |  2.73    2.34 |  3.73    1.32
                 0.77    3.45 |  1.77    7.74 |  2.77    2.31 |  3.77    1.23
                 0.80    3.75 |  1.80    7.02 |  2.80    2.28 |  3.80    1.14
                 0.83    4.05 |  1.83    6.30 |  2.83    2.25 |  3.83    1.05
                 0.87    4.74 |  1.87    6.00 |  2.87    2.22 |  3.87    0.96
                 0.90    5.43 |  1.90    5.70 |  2.90    2.19 |  3.90    0.87
                 0.93    6.12 |  1.93    5.40 |  2.93    2.16 |  3.93    0.78
                 0.97    6.81 |  1.97    5.10 |  2.97    2.13 |  3.97    0.69
                 1.00    7.50 |  2.00    4.80 |  3.00    2.10 |  4.00    0.60

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--------------------
| CALIB            |
| NASHYD   (  0401)|   Area    (ha)=   6.62   Curve Number   (CN)= 63.0
|ID= 1 DT=15.0 min |   Ia      (mm)=   1.50   # of Linear Res.(N)= 2.00
--------------------   U.H. Tp(hrs)=   0.20

         NOTE:  RAINFALL WAS TRANSFORMED TO  15.0 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
                0.250    1.17 | 1.250   21.08 | 2.250    4.05 |  3.25    1.86
                0.500    2.13 | 1.500   30.54 | 2.500    3.07 |  3.50    1.66
                0.750    2.65 | 1.750   13.11 | 2.750    2.50 |  3.75    1.49
                1.000    5.35 | 2.000    5.89 | 3.000    2.20 |  4.00    0.89

     Unit Hyd Qpeak  (cms)=    0.859

     PEAK FLOW       (cms)=    0.040 (i)
     TIME TO PEAK    (hrs)=    1.750
     RUNOFF VOLUME    (mm)=    2.792
     TOTAL RAINFALL   (mm)=   24.910
     RUNOFF COEFFICIENT   =    0.112

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

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--------------------
| CALIB              |
| STANDHYD ( 0100)|   Area    (ha)=  23.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      17.25         5.75
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     390.00        40.00
     Mannings n           =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      30.54         6.72
                over (min)       15.00        45.00
     Storage Coeff.  (min)=      15.34 (ii)   33.52 (ii)
     Unit Hyd. Tpeak (min)=      15.00        45.00
     Unit Hyd. peak  (cms)=       0.07         0.03
                                                          *TOTALS*
     PEAK FLOW       (cms)=       1.01         0.06         1.024 (iii)
     TIME TO PEAK    (hrs)=       1.50         2.25          1.50
     RUNOFF VOLUME    (mm)=      22.91         4.77         16.56
     TOTAL RAINFALL   (mm)=      24.91        24.91         24.91
     RUNOFF COEFFICIENT   =       0.92         0.19          0.66


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

------------------------------------------------------------------------------
--------------------
| RESERVOIR( 0101)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 15.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.7800     1.0000
                          0.7800     0.0000   |   0.0000     0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0100)     23.000     1.024      1.50      16.56
   OUTFLOW: ID= 1 (  0101)     23.000     0.780      1.50      16.87

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 76.15
                   TIME SHIFT OF PEAK FLOW         (min)=  0.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.0220
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------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD ( 0200)|   Area    (ha)=  28.40
|ID= 1 DT=15.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      21.30         7.10
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     435.00        40.00
     Mannings n           =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      30.54         6.72
                over (min)       15.00        45.00
     Storage Coeff.  (min)=      16.38 (ii)   34.56 (ii)
     Unit Hyd. Tpeak (min)=      15.00        45.00
     Unit Hyd. peak  (cms)=       0.07         0.03
                                                          *TOTALS*
     PEAK FLOW       (cms)=       1.22         0.07         1.234 (iii)
     TIME TO PEAK    (hrs)=       1.50         2.25          1.50
     RUNOFF VOLUME    (mm)=      22.91         4.77         16.56
     TOTAL RAINFALL   (mm)=      24.91        24.91         24.91
     RUNOFF COEFFICIENT   =       0.92         0.19          0.66


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

------------------------------------------------------------------------------
--------------------
| RESERVOIR( 0201)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 15.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.8700     1.2000
                          0.8700     0.0000   |   0.0000     0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0200)     28.400     1.234      1.50      16.56
   OUTFLOW: ID= 1 (  0201)     28.400     0.870      1.50      17.08

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 70.51
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                   TIME SHIFT OF PEAK FLOW         (min)=  0.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.0328

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


--------------------
| ADD HYD  (  0001)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0101):    23.00   0.780     1.50    16.87
      + ID2= 2 (  0201):    28.40   0.870     1.50    17.08
        ==================================================
        ID = 3 (  0001):    51.40   1.650     1.50    16.99

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD ( 0300)|   Area    (ha)=  73.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  57.00   Dir. Conn.(%)=  47.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      41.61        31.39
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     692.00        40.00
     Mannings n           =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      25.81         5.10
                over (min)       30.00        45.00
     Storage Coeff.  (min)=      23.15 (ii)   43.45 (ii)
     Unit Hyd. Tpeak (min)=      30.00        45.00
     Unit Hyd. peak  (cms)=       0.04         0.03
                                                          *TOTALS*
     PEAK FLOW       (cms)=       1.80         0.21         1.924 (iii)
     TIME TO PEAK    (hrs)=       1.75         2.25          1.75
     RUNOFF VOLUME    (mm)=      22.91         4.14         12.96
     TOTAL RAINFALL   (mm)=      24.91        24.91         24.91
     RUNOFF COEFFICIENT   =       0.92         0.17          0.52


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

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--------------------
| CALIB              |
| STANDHYD ( 0027)|   Area    (ha)=   2.30
|ID= 1 DT=10.0 min |   Total Imp(%)=  90.00   Dir. Conn.(%)=  90.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.07         0.23
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     123.83        40.00
     Mannings n           =      0.030        0.200

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 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
               0.167    0.90 | 1.167   17.40 | 2.167    4.26 |  3.17    1.92
               0.333    1.86 | 1.333   31.38 | 2.333    3.45 |  3.33    1.71
               0.500    2.19 | 1.500   28.65 | 2.500    2.97 |  3.50    1.65
               0.667    2.43 | 1.667   15.36 | 2.667    2.58 |  3.67    1.56
               0.833    3.45 | 1.833    7.74 | 2.833    2.31 |  3.83    1.23
               1.000    6.12 | 2.000    5.40 | 3.000    2.16 |  4.00    0.78

     Max.Eff.Inten.(mm/hr)=      31.38         3.01
                over (min)       10.00        40.00
     Storage Coeff.  (min)=       7.63 (ii)   32.70 (ii)
     Unit Hyd. Tpeak (min)=      10.00        40.00
     Unit Hyd. peak  (cms)=       0.12         0.03
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.16         0.00         0.162 (iii)
     TIME TO PEAK    (hrs)=       1.50         2.17          1.50
     RUNOFF VOLUME    (mm)=      22.91         3.21         20.93
     TOTAL RAINFALL   (mm)=      24.91        24.91         24.91
     RUNOFF COEFFICIENT   =       0.92         0.13          0.84

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

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

------------------------------------------------------------------------------
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| CALIB              |
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```
| STANDHYD (  0024)|   Area    (ha)=   1.24
|ID= 1 DT=10.0 min |   Total Imp(%)=  63.00   Dir. Conn.(%)=  63.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.78         0.46
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      90.92        40.00
     Mannings n           =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      31.38         3.01
                over (min)       10.00        40.00
     Storage Coeff.  (min)=       6.34 (ii)   31.41 (ii)
     Unit Hyd. Tpeak (min)=      10.00        40.00
     Unit Hyd. peak  (cms)=       0.13         0.03
                                                             *TOTALS*
     PEAK FLOW       (cms)=       0.06         0.00          0.062 (iii)
     TIME TO PEAK    (hrs)=       1.50         2.17           1.50
     RUNOFF VOLUME    (mm)=      22.91         3.21          15.61
     TOTAL RAINFALL   (mm)=      24.91        24.91          24.91
     RUNOFF COEFFICIENT   =       0.92         0.13           0.63

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

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

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

--------------------
| ADD HYD  (  0034)|
|   1 +  2 =  3    |         AREA    QPEAK     TPEAK     R.V.
--------------------         (ha)    (cms)     (hrs)     (mm)
       ID1= 1 (  0024):      1.24   0.062      1.50    15.61
     + ID2= 2 (  0027):      2.30   0.162      1.50    20.93
       ==================================================
       ID = 3 (  0034):      3.54   0.224      1.50    19.07

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

--------------------
| ADD HYD  (  0002)|
|   1 +  2 =  3    |         AREA    QPEAK     TPEAK     R.V.
--------------------         (ha)    (cms)     (hrs)     (mm)
```



```
       ID1= 1 (  0001):     51.40   1.650      1.50    16.99
     + ID2= 2 (  0300):     73.00   1.924      1.75    12.96
       ==================================================
       ID = 3 (  0002):    124.40   3.574      1.75    14.63

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

--------------------
| ADD HYD  (  0002)|
|   3 +  2 =  1    |         AREA    QPEAK     TPEAK     R.V.
--------------------         (ha)    (cms)     (hrs)     (mm)
       ID1= 3 (  0002):    124.40   3.574      1.75    14.63
     + ID2= 2 (  0034):      3.54   0.224      1.50    19.07
       ==================================================
       ID = 1 (  0002):    127.94   3.565      1.67    14.71

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0003)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 15.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.1900     1.9300
                          0.0500     0.4200   |   0.4700     2.6400
                          0.0800     0.8400   |   0.8500     3.3400
                          0.0900     1.3900   |   1.3200     3.7000
                          0.1000     1.6000   |   2.4600     4.2500

                                  AREA     QPEAK     TPEAK       R.V.
                                  (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0002)    127.940      3.565      1.67      14.71
   OUTFLOW: ID= 1 (  0003)    127.940      0.138      4.67      14.69

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=  3.87
                   TIME SHIFT OF PEAK FLOW         (min)=180.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  1.7401

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

--------------------
| ADD HYD  (  0004)|
|   1 +  2 =  3    |         AREA    QPEAK     TPEAK     R.V.
--------------------         (ha)    (cms)     (hrs)     (mm)
       ID1= 1 (  0003):    127.94   0.138      4.67    14.69
     + ID2= 2 (  0401):      6.62   0.040      1.75     2.79
       ==================================================
```



```
       ID = 3 (  0004):    134.56   0.139      4.50    14.11

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0402)|   Area    (ha)=   8.58
|ID= 1 DT=15.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  40.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       4.29         4.29
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     239.17        40.00
     Mannings n           =      0.030        0.200

         NOTE:  RAINFALL WAS TRANSFORMED TO  15.0 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
                0.250    1.17 | 1.250   21.08 | 2.250    4.05 |  3.25    1.86
                0.500    2.13 | 1.500   30.54 | 2.500    3.07 |  3.50    1.66
                0.750    2.65 | 1.750   13.11 | 2.750    2.50 |  3.75    1.49
                1.000    5.35 | 2.000    5.89 | 3.000    2.20 |  4.00    0.89

     Max.Eff.Inten.(mm/hr)=      30.54         4.81
                over (min)       15.00        45.00
     Storage Coeff.  (min)=      11.44 (ii)   32.23 (ii)
     Unit Hyd. Tpeak (min)=      15.00        45.00
     Unit Hyd. peak  (cms)=       0.08         0.03
                                                             *TOTALS*
     PEAK FLOW       (cms)=       0.25         0.03          0.262 (iii)
     TIME TO PEAK    (hrs)=       1.50         2.25           1.50
     RUNOFF VOLUME    (mm)=      22.91         4.01          11.57
     TOTAL RAINFALL   (mm)=      24.91        24.91          24.91
     RUNOFF COEFFICIENT   =       0.92         0.16           0.46

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

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

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```



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--------------------
| DUHYD    (  0403)|
| Inlet Cap.= 0.740|
| #of Inlets=     1|
| Total(cms)=   0.7|      AREA     QPEAK     TPEAK    R.V.
--------------------      (ha)     (cms)     (hrs)    (mm)
     TOTAL HYD.(ID= 1):   8.58      0.26      1.50   11.57
     ==================================================
     MAJOR SYS.(ID= 2):   0.00      0.00      0.00    0.00
     MINOR SYS.(ID= 3):   8.58      0.26      1.50   11.57

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD  (  0005)|
|   1 +  2 =  3    |         AREA    QPEAK     TPEAK     R.V.
--------------------         (ha)    (cms)     (hrs)     (mm)
*** W A R N I N G :  HYDROGRAPH   0403 <ID= 2> IS DRY.
*** W A R N I N G :  HYDROGRAPH   0003 = HYDROGRAPH 0001
       ID1= 1 (  0004):    134.56   0.139      4.50    14.11
     + ID2= 2 (  0403):      0.00   0.000      0.00     0.00
       ==================================================
       ID = 3 (  0005):    134.56   0.139      4.50    14.11

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0500)|   Area    (ha)=   6.76
|ID= 1 DT=15.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       5.07         1.69
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     212.29        40.00
     Mannings n           =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      30.54         6.72
                over (min)       15.00        30.00
     Storage Coeff.  (min)=      10.65 (ii)   28.83 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.09         0.04
                                                             *TOTALS*
     PEAK FLOW       (cms)=       0.33         0.02          0.340 (iii)
     TIME TO PEAK    (hrs)=       1.50         2.00           1.50
```

```
     RUNOFF VOLUME    (mm)=       22.91         4.77          16.56
     TOTAL RAINFALL   (mm)=       24.91        24.91          24.91
     RUNOFF COEFFICIENT   =        0.92         0.19           0.66

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

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0600)|   Area    (ha)=  12.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  40.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       6.00         6.00
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     270.00        40.00
     Mannings n           =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      30.54         4.81
                over (min)      15.00        45.00
     Storage Coeff.  (min)=      12.31 (ii)   33.09 (ii)
     Unit Hyd. Tpeak (min)=      15.00        45.00
     Unit Hyd. peak  (cms)=       0.08         0.03
                                                           *TOTALS*
     PEAK FLOW       (cms)=       0.35         0.04          0.359 (iii)
     TIME TO PEAK    (hrs)=       1.50         2.25           1.50
     RUNOFF VOLUME    (mm)=      22.91         4.01          11.57
     TOTAL RAINFALL   (mm)=      24.91        24.91          24.91
     RUNOFF COEFFICIENT   =       0.92         0.16           0.46

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

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

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

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



```
| ADD HYD  (  0006)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0500):     6.76   0.340     1.50    16.56
     + ID2= 2 (  0600):    12.00   0.359     1.50    11.57
       ==================================================
       ID = 3 (  0006):    18.76   0.699     1.50    13.37

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0700)|   Area    (ha)=  12.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  55.00   Dir. Conn.(%)=  43.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       6.60         5.40
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     282.00        40.00
     Mannings n           =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      30.54         5.42
                over (min)      15.00        45.00
     Storage Coeff.  (min)=      12.63 (ii)   32.44 (ii)
     Unit Hyd. Tpeak (min)=      15.00        45.00
     Unit Hyd. peak  (cms)=       0.08         0.03
                                                           *TOTALS*
     PEAK FLOW       (cms)=       0.37         0.04          0.383 (iii)
     TIME TO PEAK    (hrs)=       1.50         2.25           1.50
     RUNOFF VOLUME    (mm)=      22.91         4.27          12.28
     TOTAL RAINFALL   (mm)=      24.91        24.91          24.91
     RUNOFF COEFFICIENT   =       0.92         0.17           0.49

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

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

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

--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
```



```
       ID1= 1 (  0006):    18.76   0.699     1.50    13.37
     + ID2= 2 (  0700):    12.00   0.383     1.50    12.28
       ==================================================
       ID = 3 (  0007):    30.76   1.082     1.50    12.95

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

--------------------
| ADD HYD  (  0008)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0403):     8.58   0.262     1.50    11.57
     + ID2= 2 (  0007):    30.76   1.082     1.50    12.95
       ==================================================
       ID = 3 (  0008):    39.34   1.344     1.50    12.65

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0800)|   Area    (ha)=   2.60
|ID= 1 DT=15.0 min |   Total Imp(%)=  60.00   Dir. Conn.(%)=  45.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.56         1.04
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     131.00        40.00
     Mannings n           =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      30.54         6.47
                over (min)      15.00        30.00
     Storage Coeff.  (min)=       7.97 (ii)   26.43 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.10         0.04
                                                           *TOTALS*
     PEAK FLOW       (cms)=       0.09         0.01          0.099 (iii)
     TIME TO PEAK    (hrs)=       1.50         2.00           1.50
     RUNOFF VOLUME    (mm)=      22.91         4.68          12.88
     TOTAL RAINFALL   (mm)=      24.91        24.91          24.91
     RUNOFF COEFFICIENT   =       0.92         0.19           0.52

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
```

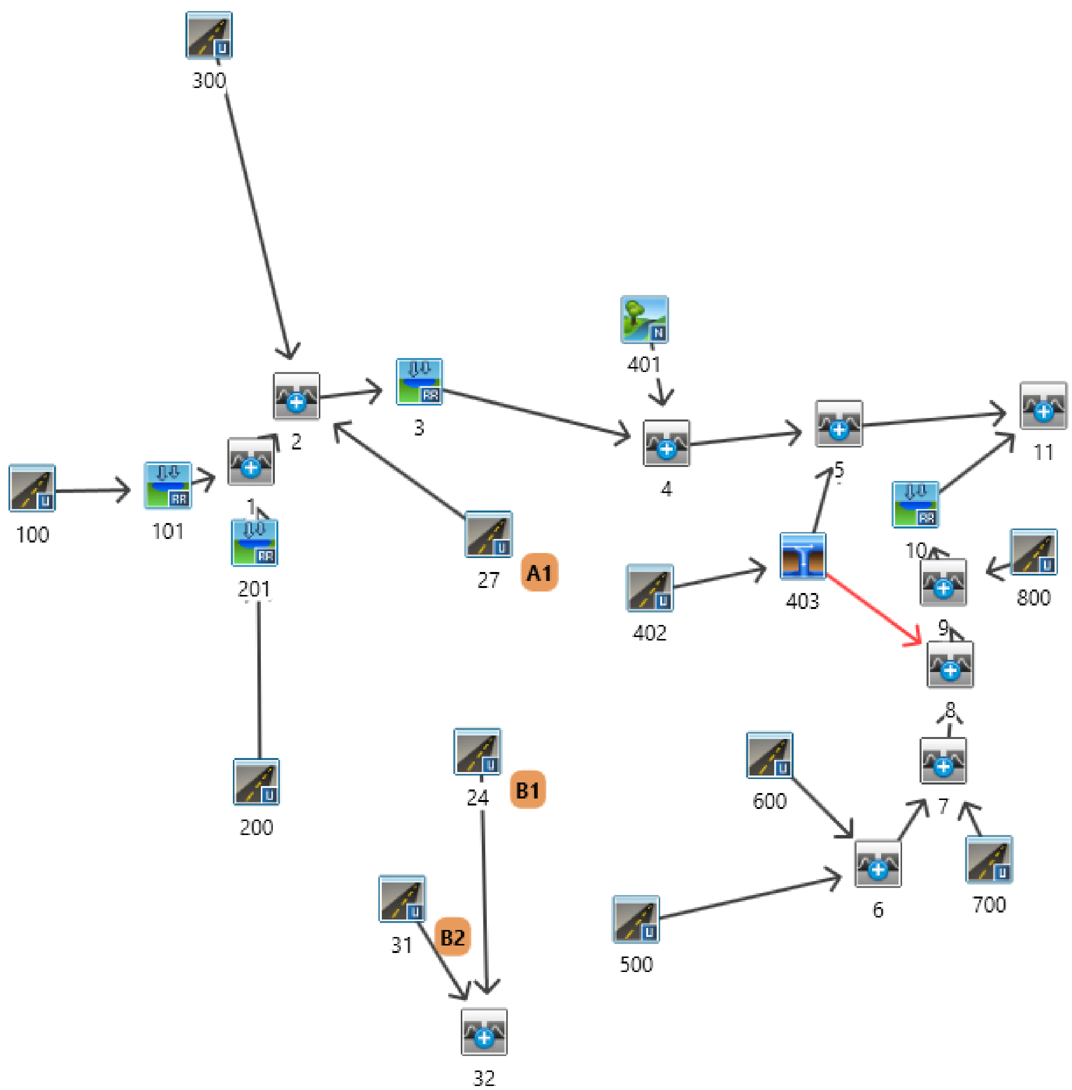


```
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

--------------------
| ADD HYD  (  0009)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0008):    39.34   1.344     1.50    12.65
     + ID2= 2 (  0800):     2.60   0.099     1.50    12.88
       ==================================================
       ID = 3 (  0009):    41.94   1.442     1.50    12.66

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0010)|     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   |   0.9400     0.6210
                          0.0500     0.1950   |   2.6600     0.7760
                          0.0800     0.3860   |   4.0200     0.9110
                          0.1300     0.4750   |   0.0000     0.0000

                             AREA     QPEAK     TPEAK       R.V.
                             (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0009)     41.940     1.442      1.50      12.66
   OUTFLOW: ID= 1 (  0010)     41.940     0.108      3.92      12.64

                PEAK   FLOW   REDUCTION [Qout/Qin](%)=  7.46
                TIME SHIFT OF PEAK FLOW        (min)=145.00
                MAXIMUM  STORAGE   USED       (ha.m.)=  0.4351

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

--------------------
| ADD HYD  (  0011)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0010):    41.94   0.108     3.92    12.64
     + ID2= 2 (  0005):   134.56   0.139     4.50    14.11
       ==================================================
       ID = 3 (  0011):   176.50   0.244     4.17    13.75

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

```
--------------------
| CALIB             |
| STANDHYD (  0031)|   Area    (ha)=   1.03
|ID= 1 DT=10.0 min |   Total Imp(%)=  63.00   Dir. Conn.(%)=  63.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.65         0.38
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      82.87        40.00
     Mannings n          =       0.030        0.200

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 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
                0.167    0.90 | 1.167   17.40 | 2.167    4.26 |  3.17    1.92
                0.333    1.86 | 1.333   31.38 | 2.333    3.45 |  3.33    1.71
                0.500    2.19 | 1.500   28.65 | 2.500    2.97 |  3.50    1.65
                0.667    2.43 | 1.667   15.36 | 2.667    2.58 |  3.67    1.56
                0.833    3.45 | 1.833    7.74 | 2.833    2.31 |  3.83    1.23
                1.000    6.12 | 2.000    5.40 | 3.000    2.16 |  4.00    0.78

     Max.Eff.Inten.(mm/hr)=      31.38         3.01
                over (min)       10.00        40.00
     Storage Coeff.  (min)=       5.99 (ii)   31.07 (ii)
     Unit Hyd. Tpeak (min)=      10.00        40.00
     Unit Hyd. peak  (cms)=       0.14         0.03
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.05         0.00         0.052 (iii)
     TIME TO PEAK    (hrs)=       1.50         2.17          1.50
     RUNOFF VOLUME    (mm)=      22.91         3.21         15.60
     TOTAL RAINFALL   (mm)=      24.91        24.91         24.91
     RUNOFF COEFFICIENT   =       0.92         0.13          0.63

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

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

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

B000738 - Coleraine Drive

Proposed Conditions - Road Over Railway Scenario
VO Model Schematic (No Control)



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

      V    V   I    SSSSS  U    U    A     L              (v 6.0.2000)
      V    V   I    SS     U    U   A A    L
       V  V    I     SS    U    U  AAAAA   L
       V  V    I      SS   U    U  A   A   L
        VV     I    SSSSS  UUUUU  A    A   LLLLL

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



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


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.0\VO2\voin.dat

  Output  filename:
C:\Users\kevin.lukawiecki\AppData\Local\Civica\VH5\a512d3b0-a6e7-43a6-99e8-d9354a433
349\650dc6ce-3f19-4b8d-b378-9dcddf19
  Summary filename:
C:\Users\kevin.lukawiecki\AppData\Local\Civica\VH5\a512d3b0-a6e7-43a6-99e8-d9354a433
349\650dc6ce-3f19-4b8d-b378-9dcddf19


DATE: 01/26/2022                           TIME: 11:37:17

USER:


COMMENTS: ____________________________________________________________


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


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



```
|    READ STORM     |    Filename: C:\Users\kevin.lukawiecki\AppD
|                   |              ata\Local\Temp\
|                   |              d38c255b-b722-4158-86e6-b49511f755aa\e2390d93
| 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             |
| NASHYD   (  0401)|   Area    (ha)=   6.62   Curve Number   (CN)= 63.0
|ID= 1 DT=15.0 min |   Ia      (mm)=   1.50   # of Linear Res.(N)= 2.00
--------------------   U.H. Tp(hrs)=   0.20

    Unit Hyd Qpeak  (cms)=   0.859

    PEAK FLOW       (cms)=   0.191 (i)
    TIME TO PEAK    (hrs)=   2.750
    RUNOFF VOLUME    (mm)=  12.698
    TOTAL RAINFALL   (mm)=  55.690
    RUNOFF COEFFICIENT   =   0.228

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

--------------------------------------------------------------------------------
--------------------
| CALIB             |
| STANDHYD (  0100)|   Area    (ha)=  23.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=      17.25         5.75
    Dep. Storage     (mm)=       2.00         5.00
    Average Slope     (%)=       1.00         2.00
    Length            (m)=     390.00        40.00
    Mannings n          =       0.030        0.200

    Max.Eff.Inten.(mm/hr)=      51.24        34.94
               over (min)       15.00        30.00
```



```
     Storage Coeff.  (min)=      12.48 (ii)   21.88 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.08         0.05
                                                       *TOTALS*
     PEAK FLOW       (cms)=       2.00         0.34        2.283 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00         2.75
     RUNOFF VOLUME    (mm)=      53.69        21.52        42.43
     TOTAL RAINFALL   (mm)=      55.69        55.69        55.69
     RUNOFF COEFFICIENT   =       0.96         0.39         0.76

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

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

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0101)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 15.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.7800     1.0000
                          0.7800     0.0000   |   0.0000     0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0100)     23.000     2.283      2.75      42.43
   OUTFLOW: ID= 1 (  0101)     23.000     0.780      2.50      43.11

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 34.16
                  TIME SHIFT OF PEAK FLOW         (min)=-15.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0939

--------------------------------------------------------------------------------
--------------------
| CALIB             |
| STANDHYD (  0200)|   Area    (ha)=  28.40
|ID= 1 DT=15.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      21.30         7.10
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     435.00        40.00
     Mannings n          =       0.030        0.200
```



```
    Max.Eff.Inten.(mm/hr)=      51.24        34.94
               over (min)       15.00        30.00
    Storage Coeff.  (min)=      13.32 (ii)   22.72 (ii)
    Unit Hyd. Tpeak (min)=      15.00        30.00
    Unit Hyd. peak  (cms)=       0.08         0.04
                                                      *TOTALS*
    PEAK FLOW       (cms)=       2.45         0.42        2.786 (iii)
    TIME TO PEAK    (hrs)=       2.75         3.00         2.75
    RUNOFF VOLUME    (mm)=      53.69        21.52        42.43
    TOTAL RAINFALL   (mm)=      55.69        55.69        55.69
    RUNOFF COEFFICIENT   =       0.96         0.39         0.76

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

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

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0201)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 15.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.8700     1.2000
                          0.8700     0.0000   |   0.0000     0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0200)     28.400     2.786      2.75      42.43
   OUTFLOW: ID= 1 (  0201)     28.400     0.870      2.25      43.12

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 31.23
                  TIME SHIFT OF PEAK FLOW         (min)=-30.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.1257

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

--------------------
| ADD HYD  (  0001)|
|  1 +  2 =  3     |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0101):    23.00   0.780     2.50    43.11
      + ID2= 2 (  0201):    28.40   0.870     2.25    43.12
      ==============================================
```

```
ID = 3 (  0001):    51.40   1.650     2.50    43.12

NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0300)|   Area    (ha)=  73.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  57.00   Dir. Conn.(%)=  47.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      41.61        31.39
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     692.00        40.00
     Mannings n           =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      51.24        28.16
                over (min)       15.00        30.00
     Storage Coeff.  (min)=      17.60 (ii)   27.85 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.06         0.04
                                                          *TOTALS*
     PEAK FLOW       (cms)=       4.28         1.36          5.340 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00           2.75
     RUNOFF VOLUME    (mm)=      53.69        19.63          35.64
     TOTAL RAINFALL   (mm)=      55.69        55.69          55.69
     RUNOFF COEFFICIENT   =       0.96         0.35           0.64


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

-------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0027)|   Area    (ha)=   2.30
|ID= 1 DT=10.0 min |   Total Imp(%)=  71.00   Dir. Conn.(%)=  71.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.63         0.67
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     123.83        40.00
     Mannings n           =      0.030        0.200
```



```
NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 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
                0.167    0.00 | 1.833   12.81 | 3.500    7.80 |  5.17    1.11
                0.333    0.56 | 2.000   18.94 | 3.667    7.80 |  5.33    1.11
                0.500    1.11 | 2.167   18.94 | 3.833    6.13 |  5.50    1.11
                0.667    1.11 | 2.333   35.09 | 4.000    4.46 |  5.67    1.11
                0.833    1.11 | 2.500   51.24 | 4.167    4.46 |  5.83    1.11
                1.000    1.11 | 2.667   51.24 | 4.333    3.34 |  6.00    1.11
                1.167    1.11 | 2.833   32.86 | 4.500    2.23 |  6.17    1.11
                1.333    3.89 | 3.000   14.48 | 4.667    2.23 |  6.33    0.56
                1.500    6.68 | 3.167   14.48 | 4.833    1.67 |
                1.667    6.68 | 3.333   11.14 | 5.000    1.11 |

     Max.Eff.Inten.(mm/hr)=      51.24        16.19
                over (min)       10.00        20.00
     Storage Coeff.  (min)=       6.27 (ii)   19.06 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.14         0.06
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.23         0.02          0.246 (iii)
     TIME TO PEAK    (hrs)=       2.67         2.83           2.67
     RUNOFF VOLUME    (mm)=      53.69        16.64          42.94
     TOTAL RAINFALL   (mm)=      55.69        55.69          55.69
     RUNOFF COEFFICIENT   =       0.96         0.30           0.77

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

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

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


--------------------
| ADD HYD  (  0002)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0001):    51.40   1.650     2.50    43.12
      + ID2= 2 (  0027):     2.30   0.246     2.67    42.94
        ===================================================
        ID = 3 (  0002):    53.70   1.896     2.67    43.23
```



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


--------------------
| ADD HYD  (  0002)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0002):    53.70   1.896     2.67    43.23
      + ID2= 2 (  0300):    73.00   5.340     2.75    35.64
        ===================================================
        ID = 1 (  0002):   126.70   6.749     2.67    38.85

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0003)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 15.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.1900     1.9300
                          0.0500     0.4200   |   0.4700     2.6400
                          0.0800     0.8400   |   0.8500     3.3400
                          0.0900     1.3900   |   1.3200     3.7000
                          0.1000     1.6000   |   2.4600     4.2500

                                 AREA     QPEAK     TPEAK       R.V.
                                 (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0002)    126.700      6.749      2.67      38.85
   OUTFLOW: ID= 1 (  0003)    126.700      1.538      5.33      38.83

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 22.79
                   TIME SHIFT OF PEAK FLOW        (min)=160.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  3.8082

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


--------------------
| ADD HYD  (  0004)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0003):   126.70   1.538     5.33    38.83
      + ID2= 2 (  0401):     6.62   0.191     2.75    12.70
        ===================================================
        ID = 3 (  0004):   133.32   1.548     5.33    37.53

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



```
| CALIB              |
| STANDHYD (  0402)|   Area    (ha)=   8.58
|ID= 1 DT=15.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  40.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       4.29         4.29
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     239.17        40.00
     Mannings n           =      0.030        0.200

         NOTE:  RAINFALL WAS TRANSFORMED TO  15.0 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
                0.250    0.00 | 2.000   18.94 | 3.750    7.80 |  5.50    1.11
                0.500    1.11 | 2.250   18.94 | 4.000    4.46 |  5.75    1.11
                0.750    1.11 | 2.500   51.24 | 4.250    4.46 |  6.00    1.11
                1.000    1.11 | 2.750   51.24 | 4.500    2.23 |  6.25    1.11
                1.250    1.11 | 3.000   14.48 | 4.750    2.23 |
                1.500    6.68 | 3.250   14.48 | 5.000    1.11 |
                1.750    6.68 | 3.500    7.80 | 5.250    1.11 |

     Max.Eff.Inten.(mm/hr)=      51.24        26.88
                over (min)       15.00        30.00
     Storage Coeff.  (min)=       9.30 (ii)   19.74 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.09         0.05
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.48         0.20          0.641 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00           2.75
     RUNOFF VOLUME    (mm)=      53.69        19.24          33.02
     TOTAL RAINFALL   (mm)=      55.69        55.69          55.69
     RUNOFF COEFFICIENT   =       0.96         0.35           0.59

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

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

-------------------------------------------------------------------------------
--------------------
| DUHYD    (  0403)|
```

```
| Inlet Cap.= 0.740|
| #of Inlets=     1|
| Total(cms)=   0.7|      AREA     QPEAK     TPEAK    R.V.
--------------------      (ha)     (cms)     (hrs)    (mm)
     TOTAL HYD.(ID= 1):   8.58      0.64      2.75   33.02
     ==================================================
     MAJOR SYS.(ID= 2):   0.00      0.00      0.00    0.00
     MINOR SYS.(ID= 3):   8.58      0.64      2.75   33.02

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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


--------------------
| ADD HYD  (  0005)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
*** W A R N I N G :  HYDROGRAPH   0403 <ID= 2> IS DRY.
*** W A R N I N G :  HYDROGRAPH   0003 = HYDROGRAPH 0001
        ID1= 1 (  0004):   133.32  1.548     5.33    37.53
      + ID2= 2 (  0403):     0.00  0.000     0.00     0.00
        ==================================================
        ID = 3 (  0005):   133.32  1.548     5.33    37.53

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0500)|   Area    (ha)=   6.76
|ID= 1 DT=15.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       5.07         1.69
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     212.29        40.00
     Mannings n          =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      51.24        34.94
                over (min)      15.00        30.00
     Storage Coeff.  (min)=       8.66 (ii)   18.06 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.09         0.05
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.61         0.11          0.703 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00           2.75
     RUNOFF VOLUME    (mm)=      53.69        21.52          42.43
     TOTAL RAINFALL   (mm)=      55.69        55.69          55.69
```



```
     RUNOFF COEFFICIENT   =       0.96         0.39           0.76

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

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0600)|   Area    (ha)=  12.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  40.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       6.00         6.00
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     270.00        40.00
     Mannings n          =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      51.24        26.88
                over (min)      15.00        30.00
     Storage Coeff.  (min)=      10.01 (ii)   20.45 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.09         0.05
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.66         0.28          0.889 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00           2.75
     RUNOFF VOLUME    (mm)=      53.69        19.24          33.02
     TOTAL RAINFALL   (mm)=      55.69        55.69          55.69
     RUNOFF COEFFICIENT   =       0.96         0.35           0.59

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

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

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


--------------------
| ADD HYD  (  0006)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
```



```
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0500):     6.76  0.703     2.75    42.43
      + ID2= 2 (  0600):    12.00  0.889     2.75    33.02
        ==================================================
        ID = 3 (  0006):    18.76  1.592     2.75    36.41

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0700)|   Area    (ha)=  12.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  55.00   Dir. Conn.(%)=  43.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       6.60         5.40
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     282.00        40.00
     Mannings n          =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      51.24        29.51
                over (min)      15.00        30.00
     Storage Coeff.  (min)=      10.27 (ii)   20.33 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.09         0.05
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.71         0.28          0.936 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00           2.75
     RUNOFF VOLUME    (mm)=      53.69        20.03          34.50
     TOTAL RAINFALL   (mm)=      55.69        55.69          55.69
     RUNOFF COEFFICIENT   =       0.96         0.36           0.62

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

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

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


--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0006):    18.76  1.592     2.75    36.41
      + ID2= 2 (  0700):    12.00  0.936     2.75    34.50
```



```
        ==================================================
        ID = 3 (  0007):    30.76  2.528     2.75    35.67

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


--------------------
| ADD HYD  (  0008)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0403):     8.58  0.641     2.75    33.02
      + ID2= 2 (  0007):    30.76  2.528     2.75    35.67
        ==================================================
        ID = 3 (  0008):    39.34  3.170     2.75    35.09

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0800)|   Area    (ha)=   2.60
|ID= 1 DT=15.0 min |   Total Imp(%)=  60.00   Dir. Conn.(%)=  45.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.56         1.04
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     131.00        40.00
     Mannings n          =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      51.24        33.90
                over (min)      15.00        30.00
     Storage Coeff.  (min)=       6.48 (ii)   16.00 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.10         0.05
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.17         0.07          0.222 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00           2.75
     RUNOFF VOLUME    (mm)=      53.69        21.25          35.85
     TOTAL RAINFALL   (mm)=      55.69        55.69          55.69
     RUNOFF COEFFICIENT   =       0.96         0.38           0.64

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

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

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--------------------
| ADD HYD  (  0009)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0008):    39.34   3.170     2.75    35.09
     + ID2= 2 (  0800):     2.60   0.222     2.75    35.85
       ==================================================
       ID = 3 (  0009):    41.94   3.392     2.75    35.14

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0010)|      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   |   0.9400      0.6210
                           0.0500     0.1950   |   2.6600      0.7760
                           0.0800     0.3860   |   4.0200      0.9110
                           0.1300     0.4750   |   0.0000      0.0000

                                 AREA     QPEAK     TPEAK       R.V.
                                 (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0009)     41.940      3.392      2.75      35.14
   OUTFLOW: ID= 1 (  0010)     41.940      1.858      3.08      35.11

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 54.77
                  TIME SHIFT OF PEAK FLOW         (min)= 20.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.7043

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


--------------------
| ADD HYD  (  0011)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0010):    41.94   1.858     3.08    35.11
     + ID2= 2 (  0005):   133.32   1.548     5.33    37.53
       ==================================================
       ID = 3 (  0011):   175.26   2.332     3.17    36.93

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



```
| STANDHYD (  0024)|   Area    (ha)=   1.24
|ID= 1 DT=10.0 min |   Total Imp(%)=  63.00   Dir. Conn.(%)=  63.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.78         0.46
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      90.92        40.00
     Mannings n          =       0.030        0.200

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 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
               0.167    0.00 | 1.833   12.81 | 3.500    7.80 |  5.17    1.11
               0.333    0.56 | 2.000   18.94 | 3.667    7.80 |  5.33    1.11
               0.500    1.11 | 2.167   18.94 | 3.833    6.13 |  5.50    1.11
               0.667    1.11 | 2.333   35.09 | 4.000    4.46 |  5.67    1.11
               0.833    1.11 | 2.500   51.24 | 4.167    4.46 |  5.83    1.11
               1.000    1.11 | 2.667   51.24 | 4.333    3.34 |  6.00    1.11
               1.167    1.11 | 2.833   32.86 | 4.500    2.23 |  6.17    1.11
               1.333    3.89 | 3.000   14.48 | 4.667    2.23 |  6.33    0.56
               1.500    6.68 | 3.167   14.48 | 4.833    1.67 |
               1.667    6.68 | 3.333   11.14 | 5.000    1.11 |

     Max.Eff.Inten.(mm/hr)=      51.24        16.19
                over (min)      10.00        20.00
     Storage Coeff.  (min)=       5.21 (ii)   18.00 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.15         0.06
                                                            *TOTALS*
     PEAK FLOW       (cms)=       0.11         0.02           0.122 (iii)
     TIME TO PEAK    (hrs)=       2.67         2.83            2.67
     RUNOFF VOLUME    (mm)=      53.69        16.64           39.97
     TOTAL RAINFALL   (mm)=      55.69        55.69           55.69
     RUNOFF COEFFICIENT   =       0.96         0.30            0.72

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

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

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--------------------
| CALIB            |
| STANDHYD (  0031)|   Area    (ha)=   1.03
|ID= 1 DT=10.0 min |   Total Imp(%)=  63.00   Dir. Conn.(%)=  63.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.65         0.38
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      82.87        40.00
     Mannings n          =       0.030        0.200

     Max.Eff.Inten.(mm/hr)=      51.24        16.19
                over (min)      10.00        20.00
     Storage Coeff.  (min)=       4.93 (ii)   17.71 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.15         0.06
                                                            *TOTALS*
     PEAK FLOW       (cms)=       0.09         0.01           0.102 (iii)
     TIME TO PEAK    (hrs)=       2.67         2.83            2.67
     RUNOFF VOLUME    (mm)=      53.69        16.64           39.97
     TOTAL RAINFALL   (mm)=      55.69        55.69           55.69
     RUNOFF COEFFICIENT   =       0.96         0.30            0.72

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

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

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


--------------------
| ADD HYD  (  0032)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0024):     1.24   0.122     2.67    39.97
     + ID2= 2 (  0031):     1.03   0.102     2.67    39.97
       ==================================================
       ID = 3 (  0032):     2.27   0.224     2.67    39.97

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



```
       V    V   I    SSSSS  U    U    A    L              (v 6.0.2000)
       V    V   I    SS     U    U   A A   L
        V  V    I     SS    U    U  AAAAA  L
        V  V    I      SS   U    U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO    TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O     T      T    H   H   Y Y   MM MM  O   O
       O   O     T      T    H   H    Y    M   M  O   O
        OOO      T      T    H   H    Y    M   M   OOO
Developed and Distributed by Civica Infrastructure
```



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


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.0\VO2\voin.dat

  Output  filename:
C:\Users\kevin.lukawiecki\AppData\Local\Civica\VH5\a512d3b0-a6e7-43a6-99e8-d9354a433
349\cfee9cf4-b04b-46a6-be37-82968218
  Summary filename:
C:\Users\kevin.lukawiecki\AppData\Local\Civica\VH5\a512d3b0-a6e7-43a6-99e8-d9354a433
349\cfee9cf4-b04b-46a6-be37-82968218


DATE: 01/26/2022                        TIME: 11:37:19

USER:



COMMENTS: ____________________________________________________________


--------------------------------------------------------------------------------------
----------------------
  **********************************************
  ** SIMULATION : 100 Year                    **
  **********************************************


--------------------
|    READ STORM    |    Filename: C:\Users\kevin.lukawiecki\AppD
|                  |              ata\Local\Temp\
|                  |              d38c255b-b722-4158-86e6-b49511f755aa\073ffba8
```

```
| 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            |
| NASHYD   (  0401)|   Area    (ha)=   6.62   Curve Number   (CN)= 63.0
|ID= 1 DT=15.0 min |   Ia      (mm)=   1.50   # of Linear Res.(N)= 2.00
--------------------   U.H. Tp(hrs)=   0.20

     Unit Hyd Qpeak  (cms)=   0.859

     PEAK FLOW       (cms)=   0.365 (i)
     TIME TO PEAK    (hrs)=   2.750
     RUNOFF VOLUME    (mm)=  23.957
     TOTAL RAINFALL   (mm)=  80.310
     RUNOFF COEFFICIENT   =   0.298

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0100)|   Area    (ha)=  23.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      17.25         5.75
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     390.00        40.00
     Mannings n           =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      73.88        62.61
                over (min)       15.00        30.00
     Storage Coeff.  (min)=      10.78 (ii)   18.22 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.09         0.05
```



```
                                                                *TOTALS*
     PEAK FLOW       (cms)=       2.95         0.67           3.527 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00            2.75
     RUNOFF VOLUME    (mm)=      78.31        39.04           64.56
     TOTAL RAINFALL   (mm)=      80.31        80.31           80.31
     RUNOFF COEFFICIENT   =       0.98         0.49            0.80

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

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

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0101)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 15.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.7800     1.0000
                          0.7800     0.0000   |   0.0000     0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0100)     23.000      3.527      2.75      64.56
   OUTFLOW: ID= 1 (  0101)     23.000      0.780      2.00      65.64

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 22.12
                  TIME SHIFT OF PEAK FLOW         (min)=-45.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.2357

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0200)|   Area    (ha)=  28.40
|ID= 1 DT=15.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      21.30         7.10
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     435.00        40.00
     Mannings n           =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      73.88        62.61
                over (min)       15.00        30.00
```



```
     Storage Coeff.  (min)=      11.51 (ii)   18.95 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.08         0.05
                                                                *TOTALS*
     PEAK FLOW       (cms)=       3.61         0.81           4.312 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00            2.75
     RUNOFF VOLUME    (mm)=      78.31        39.04           64.56
     TOTAL RAINFALL   (mm)=      80.31        80.31           80.31
     RUNOFF COEFFICIENT   =       0.98         0.49            0.80

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

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

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0201)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 15.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.8700     1.2000
                          0.8700     0.0000   |   0.0000     0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0200)     28.400      4.312      2.75      64.56
   OUTFLOW: ID= 1 (  0201)     28.400      0.870      2.00      65.78

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 20.17
                  TIME SHIFT OF PEAK FLOW         (min)=-45.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.3070

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

--------------------
| ADD HYD  (  0001)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0101):    23.00   0.780     2.00    65.64
      + ID2= 2 (  0201):    28.40   0.870     2.00    65.78
        ==================================================
        ID = 3 (  0001):    51.40   1.650     2.00    65.72

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



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--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0300)|   Area    (ha)=  73.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  57.00   Dir. Conn.(%)=  47.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      41.61        31.39
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     692.00        40.00
     Mannings n           =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      73.88        51.42
                over (min)       15.00        30.00
     Storage Coeff.  (min)=      15.20 (ii)   23.26 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.07         0.04
                                                                *TOTALS*
     PEAK FLOW       (cms)=       6.39         2.74           8.665 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00            2.75
     RUNOFF VOLUME    (mm)=      78.31        36.24           56.02
     TOTAL RAINFALL   (mm)=      80.31        80.31           80.31
     RUNOFF COEFFICIENT   =       0.98         0.45            0.70


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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0027)|   Area    (ha)=   2.30
|ID= 1 DT=10.0 min |   Total Imp(%)=  71.00   Dir. Conn.(%)=  71.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.63         0.67
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     123.83        40.00
     Mannings n           =      0.030        0.200

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 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
        0.167    0.00 | 1.833   18.47 | 3.500   11.24 |  5.17    1.61
        0.333    0.81 | 2.000   27.30 | 3.667   11.24 |  5.33    1.61
        0.500    1.61 | 2.167   27.30 | 3.833    8.83 |  5.50    1.61
        0.667    1.61 | 2.333   50.59 | 4.000    6.42 |  5.67    1.61
        0.833    1.61 | 2.500   73.88 | 4.167    6.42 |  5.83    1.61
        1.000    1.61 | 2.667   73.88 | 4.333    4.81 |  6.00    1.61
        1.167    1.61 | 2.833   47.38 | 4.500    3.21 |  6.17    1.61
        1.333    5.62 | 3.000   20.88 | 4.667    3.21 |  6.33    0.81
        1.500    9.64 | 3.167   20.88 | 4.833    2.41 |
        1.667    9.64 | 3.333   16.06 | 5.000    1.61 |

     Max.Eff.Inten.(mm/hr)=      73.88        35.17
                over (min)       10.00        20.00
     Storage Coeff.  (min)=       5.41 (ii)   14.79 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.14         0.07
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.33         0.05         0.371 (iii)
     TIME TO PEAK    (hrs)=       2.67         2.83          2.67
     RUNOFF VOLUME    (mm)=      78.31        31.67         64.78
     TOTAL RAINFALL   (mm)=      80.31        80.31         80.31
     RUNOFF COEFFICIENT   =       0.98         0.39          0.81

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

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

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

--------------------
| ADD HYD  (  0002)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0001):     51.40   1.650     2.00    65.72
     + ID2= 2 (  0027):      2.30   0.371     2.67    64.78
       ==================================================
       ID = 3 (  0002):     53.70   2.021     2.67    65.89

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



```
--------------------
| ADD HYD  (  0002)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0002):     53.70   2.021     2.67    65.89
     + ID2= 2 (  0300):     73.00   8.665     2.75    56.02
       ==================================================
       ID = 1 (  0002):    126.70   9.883     2.67    60.20

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

--------------------
| RESERVOIR(  0003)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 15.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.1900     1.9300
                          0.0500     0.4200   |   0.4700     2.6400
                          0.0800     0.8400   |   0.8500     3.3400
                          0.0900     1.3900   |   1.3200     3.7000
                          0.1000     1.6000   |   2.4600     4.2500

                                 AREA     QPEAK     TPEAK       R.V.
                                 (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0002)    126.700      9.883      2.67      60.20
   OUTFLOW: ID= 1 (  0003)    126.700      2.757      4.50      60.19

                 PEAK   FLOW   REDUCTION [Qout/Qin](%)= 27.89
                 TIME SHIFT OF PEAK FLOW         (min)=110.00
                 MAXIMUM  STORAGE   USED       (ha.m.)=  4.3946

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

--------------------
| ADD HYD  (  0004)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0003):    126.70   2.757     4.50    60.19
     + ID2= 2 (  0401):      6.62   0.365     2.75    23.96
       ==================================================
       ID = 3 (  0004):    133.32   2.804     4.33    58.38

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0402)|   Area    (ha)=   8.58
|ID= 1 DT=15.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  40.00
```



```
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      4.29         4.29
     Dep. Storage     (mm)=      2.00         5.00
     Average Slope     (%)=      1.00         2.00
     Length            (m)=    239.17        40.00
     Mannings n           =     0.030        0.200

         NOTE:  RAINFALL WAS TRANSFORMED TO  15.0 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
        0.250    0.00 | 2.000   27.30 | 3.750   11.24 |  5.50    1.61
        0.500    1.61 | 2.250   27.30 | 4.000    6.42 |  5.75    1.61
        0.750    1.61 | 2.500   73.88 | 4.250    6.42 |  6.00    1.61
        1.000    1.61 | 2.750   73.88 | 4.500    3.21 |  6.25    1.61
        1.250    1.61 | 3.000   20.88 | 4.750    3.21 |
        1.500    9.64 | 3.250   20.88 | 5.000    1.61 |
        1.750    9.64 | 3.500   11.24 | 5.250    1.61 |

     Max.Eff.Inten.(mm/hr)=      73.88        49.29
                over (min)       15.00        30.00
     Storage Coeff.  (min)=       8.04 (ii)   16.23 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.10         0.05
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.69         0.40         1.044 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00          2.75
     RUNOFF VOLUME    (mm)=      78.31        35.66         52.72
     TOTAL RAINFALL   (mm)=      80.31        80.31         80.31
     RUNOFF COEFFICIENT   =       0.98         0.44          0.66

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

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

--------------------------------------------------------------------------------
--------------------
| DUHYD    (  0403)|
| Inlet Cap.= 0.740|
| #of Inlets=     1|
| Total(cms)=   0.7|      AREA     QPEAK     TPEAK     R.V.
```



```
--------------------      (ha)     (cms)     (hrs)    (mm)
     TOTAL HYD.(ID= 1):    8.58      1.04      2.75   52.72
     ==================================================
     MAJOR SYS.(ID= 2):    0.59      0.30      2.75   52.72
     MINOR SYS.(ID= 3):    7.99      0.74      2.50   52.72

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| ADD HYD  (  0005)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0004):    133.32   2.804     4.33    58.38
     + ID2= 2 (  0403):      0.59   0.304     2.75    52.72
       ==================================================
       ID = 3 (  0005):    133.91   2.804     4.33    58.34

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0500)|   Area    (ha)=   6.76
|ID= 1 DT=15.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      5.07         1.69
     Dep. Storage     (mm)=      2.00         5.00
     Average Slope     (%)=      1.00         2.00
     Length            (m)=    212.29        40.00
     Mannings n           =     0.030        0.200

     Max.Eff.Inten.(mm/hr)=      73.88        62.61
                over (min)       15.00        15.00
     Storage Coeff.  (min)=       7.48 (ii)   14.93 (ii)
     Unit Hyd. Tpeak (min)=      15.00        15.00
     Unit Hyd. peak  (cms)=       0.10         0.07
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.89         0.24         1.133 (iii)
     TIME TO PEAK    (hrs)=       2.75         2.75          2.75
     RUNOFF VOLUME    (mm)=      78.31        39.04         64.56
     TOTAL RAINFALL   (mm)=      80.31        80.31         80.31
     RUNOFF COEFFICIENT   =       0.98         0.49          0.80

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
```

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

------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0600)|   Area    (ha)=  12.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  40.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       6.00         6.00
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     270.00        40.00
     Mannings n           =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      73.88        49.29
                over (min)       15.00        30.00
     Storage Coeff.  (min)=       8.64 (ii)   16.84 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.09         0.05
                                                              *TOTALS*
     PEAK FLOW       (cms)=       0.97         0.56          1.448 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00           2.75
     RUNOFF VOLUME    (mm)=      78.31        35.66          52.72
     TOTAL RAINFALL   (mm)=      80.31        80.31          80.31
     RUNOFF COEFFICIENT   =       0.98         0.44           0.66

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

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

------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0006)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0500):     6.76   1.133     2.75    64.56
      + ID2= 2 (  0600):    12.00   1.448     2.75    52.72
        ===================================================
        ID = 3 (  0006):    18.76   2.581     2.75    56.99
```



```
     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0700)|   Area    (ha)=  12.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  55.00   Dir. Conn.(%)=  43.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       6.60         5.40
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     282.00        40.00
     Mannings n           =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      73.88        53.66
                over (min)       15.00        30.00
     Storage Coeff.  (min)=       8.87 (ii)   16.79 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.09         0.05
                                                              *TOTALS*
     PEAK FLOW       (cms)=       1.04         0.55          1.513 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00           2.75
     RUNOFF VOLUME    (mm)=      78.31        36.84          54.67
     TOTAL RAINFALL   (mm)=      80.31        80.31          80.31
     RUNOFF COEFFICIENT   =       0.98         0.46           0.68

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0006):    18.76   2.581     2.75    56.99
      + ID2= 2 (  0700):    12.00   1.513     2.75    54.67
        ===================================================
        ID = 3 (  0007):    30.76   4.094     2.75    56.08

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
------------------------------------------------------------------------------
```



```
--------------------
| ADD HYD  (  0008)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0403):     7.99   0.740     2.50    52.72
      + ID2= 2 (  0007):    30.76   4.094     2.75    56.08
        ===================================================
        ID = 3 (  0008):    38.75   4.834     2.75    55.39

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0800)|   Area    (ha)=   2.60
|ID= 1 DT=15.0 min |   Total Imp(%)=  60.00   Dir. Conn.(%)=  45.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.56         1.04
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     131.00        40.00
     Mannings n           =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      73.88        60.91
                over (min)       15.00        15.00
     Storage Coeff.  (min)=       5.60 (ii)   13.13 (ii)
     Unit Hyd. Tpeak (min)=      15.00        15.00
     Unit Hyd. peak  (cms)=       0.11         0.08
                                                              *TOTALS*
     PEAK FLOW       (cms)=       0.24         0.15          0.390 (iii)
     TIME TO PEAK    (hrs)=       2.75         2.75           2.75
     RUNOFF VOLUME    (mm)=      78.31        38.64          56.49
     TOTAL RAINFALL   (mm)=      80.31        80.31          80.31
     RUNOFF COEFFICIENT   =       0.98         0.48           0.70

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0009)|
```



```
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0008):    38.75   4.834     2.75    55.39
      + ID2= 2 (  0800):     2.60   0.390     2.75    56.49
        ===================================================
        ID = 3 (  0009):    41.35   5.224     2.75    55.46

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0010)|     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   |   0.9400     0.6210
                          0.0500     0.1950   |   2.6600     0.7760
                          0.0800     0.3860   |   4.0200     0.9110
                          0.1300     0.4750   |   0.0000     0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0009)     41.347      5.224      2.75      55.46
   OUTFLOW: ID= 1 (  0010)     41.347      3.651      2.92      55.43

                 PEAK   FLOW   REDUCTION [Qout/Qin](%)= 69.90
                 TIME SHIFT OF PEAK FLOW         (min)= 10.00
                 MAXIMUM  STORAGE   USED       (ha.m.)=  0.8784

------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0011)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0010):    41.35   3.651     2.92    55.43
      + ID2= 2 (  0005):   133.91   2.804     4.33    58.34
        ===================================================
        ID = 3 (  0011):   175.26   4.587     2.92    57.63

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0024)|   Area    (ha)=   1.24
|ID= 1 DT=10.0 min |   Total Imp(%)=  63.00   Dir. Conn.(%)=  63.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.78         0.46
```

```
     Dep. Storage     (mm)=      2.00         5.00
     Average Slope     (%)=      1.00         2.00
     Length            (m)=     90.92        40.00
     Mannings n          =      0.030        0.200

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 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
               0.167    0.00 | 1.833   18.47 | 3.500   11.24 |  5.17    1.61
               0.333    0.81 | 2.000   27.30 | 3.667   11.24 |  5.33    1.61
               0.500    1.61 | 2.167   27.30 | 3.833    8.83 |  5.50    1.61
               0.667    1.61 | 2.333   50.59 | 4.000    6.42 |  5.67    1.61
               0.833    1.61 | 2.500   73.88 | 4.167    6.42 |  5.83    1.61
               1.000    1.61 | 2.667   73.88 | 4.333    4.81 |  6.00    1.61
               1.167    1.61 | 2.833   47.38 | 4.500    3.21 |  6.17    1.61
               1.333    5.62 | 3.000   20.88 | 4.667    3.21 |  6.33    0.81
               1.500    9.64 | 3.167   20.88 | 4.833    2.41 |
               1.667    9.64 | 3.333   16.06 | 5.000    1.61 |

     Max.Eff.Inten.(mm/hr)=      73.88        35.17
                over (min)       10.00        20.00
     Storage Coeff.  (min)=       4.50 (ii)   13.88 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.15         0.07
                                                             *TOTALS*
     PEAK FLOW       (cms)=       0.16         0.03            0.187 (iii)
     TIME TO PEAK    (hrs)=       2.67         2.83            2.67
     RUNOFF VOLUME    (mm)=      78.31        31.67           61.05
     TOTAL RAINFALL   (mm)=      80.31        80.31           80.31
     RUNOFF COEFFICIENT   =       0.98         0.39            0.76

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0031)|   Area    (ha)=   1.03
|ID= 1 DT=10.0 min |   Total Imp(%)=  63.00   Dir. Conn.(%)=  63.00
--------------------
```



```
                                IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      0.65         0.38
     Dep. Storage     (mm)=      2.00         5.00
     Average Slope     (%)=      1.00         2.00
     Length            (m)=     82.87        40.00
     Mannings n          =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      73.88        35.17
                over (min)       10.00        20.00
     Storage Coeff.  (min)=       4.25 (ii)   13.63 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.15         0.07
                                                             *TOTALS*
     PEAK FLOW       (cms)=       0.13         0.03            0.156 (iii)
     TIME TO PEAK    (hrs)=       2.67         2.83            2.67
     RUNOFF VOLUME    (mm)=      78.31        31.67           61.05
     TOTAL RAINFALL   (mm)=      80.31        80.31           80.31
     RUNOFF COEFFICIENT   =       0.98         0.39            0.76

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------


--------------------
| ADD HYD  (  0032)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0024):     1.24   0.187     2.67    61.05
      + ID2= 2 (  0031):     1.03   0.156     2.67    61.05
        ==================================================
        ID = 3 (  0032):     2.27   0.343     2.67    61.05

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
==================================================================================
=======================

       V    V   I    SSSSS  U    U    A    L               (v 6.0.2000)
       V    V   I    SS     U    U   A A   L
        V  V    I     SS    U    U  AAAAA  L
        V  V    I      SS   U    U  A   A  L
         VV     I    SSSSS  UUUUU  A    A  LLLLL
```



```
        OOO    TTTTT  TTTTT  H    H  Y    Y  M    M    OOO     TM
       O   O     T      T    H    H   Y Y    MM MM   O    O
       O   O     T      T    H    H    Y     M    M   O    O
        OOO      T      T    H    H    Y     M    M    OOO
Developed and Distributed by Civica Infrastructure
```


```
                   *****  D E T A I L E D   O U T P U T *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.0\VO2\voin.dat

  Output  filename:
C:\Users\kevin.lukawiecki\AppData\Local\Civica\VH5\a512d3b0-a6e7-43a6-99e8-d9354a433
349\27e2f890-4055-4bc8-81cf-c647352b
  Summary filename:
C:\Users\kevin.lukawiecki\AppData\Local\Civica\VH5\a512d3b0-a6e7-43a6-99e8-d9354a433
349\27e2f890-4055-4bc8-81cf-c647352b


DATE: 01/26/2022                          TIME: 11:37:17

USER:



COMMENTS: ____________________________________________________________



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-----------------------
  ************************************************
  ** SIMULATION : 2 Year                        **
  ************************************************



--------------------
|    READ STORM    |     Filename: C:\Users\kevin.lukawiecki\AppD
|                  |               ata\Local\Temp\
|                  |               d38c255b-b722-4158-86e6-b49511f755aa\e5851225
| 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              |
| NASHYD   (  0401)|   Area    (ha)=   6.62   Curve Number   (CN)= 63.0
|ID= 1 DT=15.0 min |   Ia      (mm)=   1.50   # of Linear Res.(N)= 2.00
--------------------   U.H. Tp(hrs)=   0.20

     Unit Hyd Qpeak  (cms)=   0.859

     PEAK FLOW       (cms)=   0.084 (i)
     TIME TO PEAK    (hrs)=   2.750
     RUNOFF VOLUME    (mm)=   5.698
     TOTAL RAINFALL   (mm)=  36.000
     RUNOFF COEFFICIENT   =   0.158

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0100)|   Area    (ha)=  23.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
--------------------
                                IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=     17.25         5.75
     Dep. Storage     (mm)=      2.00         5.00
     Average Slope     (%)=      1.00         2.00
     Length            (m)=    390.00        40.00
     Mannings n          =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      33.12        16.19
                over (min)       15.00        30.00
     Storage Coeff.  (min)=      14.85 (ii)   27.64 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.07         0.04
                                                             *TOTALS*
     PEAK FLOW       (cms)=       1.25         0.14            1.359 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00            2.75
     RUNOFF VOLUME    (mm)=      34.00         9.87           25.55
     TOTAL RAINFALL   (mm)=      36.00        36.00           36.00
```

```
     RUNOFF COEFFICIENT   =       0.94         0.27           0.71

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0101)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 15.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.7800     1.0000
                          0.7800     0.0000   |   0.0000     0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0100)     23.000     1.359      2.75      25.55
   OUTFLOW: ID= 1 (  0101)     23.000     0.780      2.50      25.67

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 57.41
                   TIME SHIFT OF PEAK FLOW         (min)=-15.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.0268

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0200)|   Area    (ha)=  28.40
|ID= 1 DT=15.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       21.30         7.10
     Dep. Storage     (mm)=        2.00         5.00
     Average Slope     (%)=        1.00         2.00
     Length            (m)=      435.00        40.00
     Mannings n           =       0.030        0.200

     Max.Eff.Inten.(mm/hr)=       33.12        16.19
                over (min)        15.00        30.00
     Storage Coeff.  (min)=       15.86 (ii)   28.65 (ii)
     Unit Hyd. Tpeak (min)=       15.00        30.00
     Unit Hyd. peak  (cms)=        0.07         0.04
                                                             *TOTALS*
     PEAK FLOW      (cms)=        1.53         0.17           1.653 (iii)
```



```
     TIME TO PEAK    (hrs)=       2.75         3.00           2.75
     RUNOFF VOLUME    (mm)=      34.00         9.87          25.55
     TOTAL RAINFALL   (mm)=      36.00        36.00          36.00
     RUNOFF COEFFICIENT   =       0.94         0.27           0.71


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0201)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 15.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.8700     1.2000
                          0.8700     0.0000   |   0.0000     0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0200)     28.400     1.653      2.75      25.55
   OUTFLOW: ID= 1 (  0201)     28.400     0.870      2.50      25.73

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 52.64
                   TIME SHIFT OF PEAK FLOW         (min)=-15.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.0385

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0001)|
|   1 +  2 =  3    |        AREA    QPEAK    TPEAK     R.V.
--------------------        (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0101):    23.00   0.780     2.50    25.67
     + ID2= 2 (  0201):    28.40   0.870     2.50    25.73
       ==================================================
       ID = 3 (  0001):    51.40   1.650     2.50    25.71

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0300)|   Area    (ha)=  73.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  57.00   Dir. Conn.(%)=  47.00
--------------------
```



```
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       41.61        31.39
     Dep. Storage     (mm)=        2.00         5.00
     Average Slope     (%)=        1.00         2.00
     Length            (m)=      692.00        40.00
     Mannings n           =       0.030        0.200

     Max.Eff.Inten.(mm/hr)=       33.12        12.72
                over (min)        15.00        45.00
     Storage Coeff.  (min)=       20.95 (ii)   35.04 (ii)
     Unit Hyd. Tpeak (min)=       15.00        45.00
     Unit Hyd. peak  (cms)=        0.06         0.03
                                                             *TOTALS*
     PEAK FLOW      (cms)=        2.62         0.51           2.861 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.25           2.75
     RUNOFF VOLUME    (mm)=      34.00         8.79          20.64
     TOTAL RAINFALL   (mm)=      36.00        36.00          36.00
     RUNOFF COEFFICIENT   =       0.94         0.24           0.57


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0027)|   Area    (ha)=   2.30
|ID= 1 DT=10.0 min |   Total Imp(%)=  71.00   Dir. Conn.(%)=  71.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        1.63         0.67
     Dep. Storage     (mm)=        2.00         5.00
     Average Slope     (%)=        1.00         2.00
     Length            (m)=      123.83        40.00
     Mannings n           =       0.030        0.200

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 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
                0.167    0.00 | 1.833    8.28 | 3.500    5.04 |  5.17    0.72
                0.333    0.36 | 2.000   12.24 | 3.667    5.04 |  5.33    0.72
                0.500    0.72 | 2.167   12.24 | 3.833    3.96 |  5.50    0.72
```



```
                0.667    0.72 | 2.333   22.68 | 4.000    2.88 |  5.67    0.72
                0.833    0.72 | 2.500   33.12 | 4.167    2.88 |  5.83    0.72
                1.000    0.72 | 2.667   33.12 | 4.333    2.16 |  6.00    0.72
                1.167    0.72 | 2.833   21.24 | 4.500    1.44 |  6.17    0.72
                1.333    2.52 | 3.000    9.36 | 4.667    1.44 |  6.33    0.36
                1.500    4.32 | 3.167    9.36 | 4.833    1.08 |
                1.667    4.32 | 3.333    7.20 | 5.000    0.72 |

     Max.Eff.Inten.(mm/hr)=       33.12         7.02
                over (min)        10.00        30.00
     Storage Coeff.  (min)=        7.46 (ii)   25.32 (ii)
     Unit Hyd. Tpeak (min)=       10.00        30.00
     Unit Hyd. peak  (cms)=        0.13         0.04
                                                             *TOTALS*
     PEAK FLOW      (cms)=        0.15         0.01           0.150 (iii)
     TIME TO PEAK    (hrs)=       2.67         3.17           2.67
     RUNOFF VOLUME    (mm)=      34.00         7.13          26.20
     TOTAL RAINFALL   (mm)=      36.00        36.00          36.00
     RUNOFF COEFFICIENT   =       0.94         0.20           0.73

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0002)|
|   1 +  2 =  3    |        AREA    QPEAK    TPEAK     R.V.
--------------------        (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0001):    51.40   1.650     2.50    25.71
     + ID2= 2 (  0027):     2.30   0.150     2.67    26.20
       ==================================================
       ID = 3 (  0002):    53.70   1.800     2.67    25.84

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0002)|
|   3 +  2 =  1    |        AREA    QPEAK    TPEAK     R.V.
--------------------        (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0002):    53.70   1.800     2.67    25.84
     + ID2= 2 (  0300):    73.00   2.861     2.75    20.64
```

```
       ==================================================
       ID = 1 (  0002):   126.70   4.423     2.67    22.83

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0003)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 15.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.1900     1.9300
                          0.0500     0.4200   |   0.4700     2.6400
                          0.0800     0.8400   |   0.8500     3.3400
                          0.0900     1.3900   |   1.3200     3.7000
                          0.1000     1.6000   |   2.4600     4.2500

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0002)    126.700      4.423      2.67      22.83
   OUTFLOW: ID= 1 (  0003)    126.700      0.413      5.17      22.81

                 PEAK   FLOW   REDUCTION [Qout/Qin](%)=  9.33
                 TIME SHIFT OF PEAK FLOW         (min)=150.00
                 MAXIMUM  STORAGE   USED       (ha.m.)=  2.4958

-------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0004)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0003):   126.70   0.413     5.17    22.81
     + ID2= 2 (  0401):     6.62   0.084     2.75     5.70
       ==================================================
       ID = 3 (  0004):   133.32   0.419     5.00    21.96

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0402)|   Area    (ha)=   8.58
|ID= 1 DT=15.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  40.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=       4.29         4.29
    Dep. Storage     (mm)=       2.00         5.00
    Average Slope     (%)=       1.00         2.00
    Length            (m)=     239.17        40.00
```



```
    Mannings n          =      0.030        0.200

        NOTE:  RAINFALL WAS TRANSFORMED TO  15.0 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
               0.250    0.00 | 2.000   12.24 | 3.750    5.04 |  5.50    0.72
               0.500    0.72 | 2.250   12.24 | 4.000    2.88 |  5.75    0.72
               0.750    0.72 | 2.500   33.12 | 4.250    2.88 |  6.00    0.72
               1.000    0.72 | 2.750   33.12 | 4.500    1.44 |  6.25    0.72
               1.250    0.72 | 3.000    9.36 | 4.750    1.44 |
               1.500    4.32 | 3.250    9.36 | 5.000    0.72 |
               1.750    4.32 | 3.500    5.04 | 5.250    0.72 |

    Max.Eff.Inten.(mm/hr)=      33.12        12.08
               over (min)       15.00        30.00
    Storage Coeff.  (min)=      11.08 (ii)   25.46 (ii)
    Unit Hyd. Tpeak (min)=      15.00        30.00
    Unit Hyd. peak  (cms)=       0.08         0.04
                                                        *TOTALS*
    PEAK FLOW       (cms)=       0.30         0.08          0.362 (iii)
    TIME TO PEAK    (hrs)=       2.75         3.00           2.75
    RUNOFF VOLUME    (mm)=      34.00         8.57          18.74
    TOTAL RAINFALL   (mm)=      36.00        36.00          36.00
    RUNOFF COEFFICIENT   =       0.94         0.24           0.52

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
--------------------
| DUHYD    (  0403)|
| Inlet Cap.= 0.740|
| #of Inlets=     1|
| Total(cms)=   0.7|      AREA     QPEAK     TPEAK    R.V.
--------------------      (ha)     (cms)     (hrs)    (mm)
    TOTAL HYD.(ID= 1):   8.58      0.36      2.75   18.74
    ================================================
    MAJOR SYS.(ID= 2):   0.00      0.00      0.00    0.00
    MINOR SYS.(ID= 3):   8.58      0.36      2.75   18.74
```



```
    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0005)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
*** W A R N I N G :  HYDROGRAPH   0403 <ID= 2> IS DRY.
*** W A R N I N G :  HYDROGRAPH   0003 = HYDROGRAPH 0001
       ID1= 1 (  0004):   133.32   0.419     5.00    21.96
     + ID2= 2 (  0403):     0.00   0.000     0.00     0.00
       ==================================================
       ID = 3 (  0005):   133.32   0.419     5.00    21.96

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0500)|   Area    (ha)=   6.76
|ID= 1 DT=15.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=       5.07         1.69
    Dep. Storage     (mm)=       2.00         5.00
    Average Slope     (%)=       1.00         2.00
    Length            (m)=     212.29        40.00
    Mannings n          =      0.030        0.200

    Max.Eff.Inten.(mm/hr)=      33.12        16.19
               over (min)       15.00        30.00
    Storage Coeff.  (min)=      10.31 (ii)   23.10 (ii)
    Unit Hyd. Tpeak (min)=      15.00        30.00
    Unit Hyd. peak  (cms)=       0.09         0.04
                                                        *TOTALS*
    PEAK FLOW       (cms)=       0.39         0.04          0.424 (iii)
    TIME TO PEAK    (hrs)=       2.75         3.00           2.75
    RUNOFF VOLUME    (mm)=      34.00         9.87          25.55
    TOTAL RAINFALL   (mm)=      36.00        36.00          36.00
    RUNOFF COEFFICIENT   =       0.94         0.27           0.71

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
```



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-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0600)|   Area    (ha)=  12.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  40.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=       6.00         6.00
    Dep. Storage     (mm)=       2.00         5.00
    Average Slope     (%)=       1.00         2.00
    Length            (m)=     270.00        40.00
    Mannings n          =      0.030        0.200

    Max.Eff.Inten.(mm/hr)=      33.12        12.08
               over (min)       15.00        30.00
    Storage Coeff.  (min)=      11.91 (ii)   26.29 (ii)
    Unit Hyd. Tpeak (min)=      15.00        30.00
    Unit Hyd. peak  (cms)=       0.08         0.04
                                                        *TOTALS*
    PEAK FLOW       (cms)=       0.42         0.11          0.500 (iii)
    TIME TO PEAK    (hrs)=       2.75         3.00           2.75
    RUNOFF VOLUME    (mm)=      34.00         8.57          18.74
    TOTAL RAINFALL   (mm)=      36.00        36.00          36.00
    RUNOFF COEFFICIENT   =       0.94         0.24           0.52

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0006)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0500):     6.76   0.424     2.75    25.55
     + ID2= 2 (  0600):    12.00   0.500     2.75    18.74
       ==================================================
       ID = 3 (  0006):    18.76   0.925     2.75    21.19

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
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```

```
| CALIB             |
| STANDHYD ( 0700)|   Area    (ha)=  12.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  55.00   Dir. Conn.(%)=  43.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       6.60        5.40
     Dep. Storage     (mm)=       2.00        5.00
     Average Slope     (%)=       1.00        2.00
     Length            (m)=     282.00       40.00
     Mannings n          =      0.030       0.200

     Max.Eff.Inten.(mm/hr)=      33.12       13.41
                over (min)       15.00       30.00
     Storage Coeff.  (min)=      12.23 (ii)  26.02 (ii)
     Unit Hyd. Tpeak (min)=      15.00       30.00
     Unit Hyd. peak  (cms)=       0.08        0.04
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.45        0.11          0.531 (iii)
     TIME TO PEAK    (hrs)=       2.75        3.00           2.75
     RUNOFF VOLUME    (mm)=      34.00        9.02          19.76
     TOTAL RAINFALL   (mm)=      36.00       36.00          36.00
     RUNOFF COEFFICIENT   =       0.94        0.25           0.55

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0006):    18.76   0.925     2.75    21.19
      + ID2= 2 (  0700):    12.00   0.531     2.75    19.76
        ====================================================
        ID = 3 (  0007):    30.76   1.456     2.75    20.63

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0008)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
```



```
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0403):     8.58   0.362     2.75    18.74
      + ID2= 2 (  0007):    30.76   1.456     2.75    20.63
        ====================================================
        ID = 3 (  0008):    39.34   1.818     2.75    20.22

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
------------------------------------------------------------------------------
--------------------
| CALIB             |
| STANDHYD ( 0800)|   Area    (ha)=   2.60
|ID= 1 DT=15.0 min |   Total Imp(%)=  60.00   Dir. Conn.(%)=  45.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.56        1.04
     Dep. Storage     (mm)=       2.00        5.00
     Average Slope     (%)=       1.00        2.00
     Length            (m)=     131.00       40.00
     Mannings n          =      0.030       0.200

     Max.Eff.Inten.(mm/hr)=      33.12       15.66
                over (min)       15.00       30.00
     Storage Coeff.  (min)=       7.72 (ii)  20.68 (ii)
     Unit Hyd. Tpeak (min)=      15.00       30.00
     Unit Hyd. peak  (cms)=       0.10        0.05
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.11        0.03          0.128 (iii)
     TIME TO PEAK    (hrs)=       2.75        3.00           2.75
     RUNOFF VOLUME    (mm)=      34.00        9.71          20.64
     TOTAL RAINFALL   (mm)=      36.00       36.00          36.00
     RUNOFF COEFFICIENT   =       0.94        0.27           0.57

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0009)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0008):    39.34   1.818     2.75    20.22
      + ID2= 2 (  0800):     2.60   0.128     2.75    20.64
```



```
        ====================================================
        ID = 3 (  0009):    41.94   1.945     2.75    20.25

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
------------------------------------------------------------------------------
--------------------
| RESERVOIR( 0010)|     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   |   0.9400     0.6210
                          0.0500     0.1950   |   2.6600     0.7760
                          0.0800     0.3860   |   4.0200     0.9110
                          0.1300     0.4750   |   0.0000     0.0000

                             AREA     QPEAK     TPEAK       R.V.
                             (ha)     (cms)     (hrs)       (mm)
  INFLOW : ID= 2 (  0009)     41.940     1.945      2.75      20.25
  OUTFLOW: ID= 1 (  0010)     41.940     0.560      3.58      20.22

                PEAK   FLOW   REDUCTION [Qout/Qin](%)= 28.80
                TIME SHIFT OF PEAK FLOW         (min)= 50.00
                MAXIMUM  STORAGE   USED       (ha.m.)=  0.5527

------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0011)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0010):    41.94   0.560     3.58    20.22
      + ID2= 2 (  0005):   133.32   0.419     5.00    21.96
        ====================================================
        ID = 3 (  0011):   175.26   0.863     3.92    21.53

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
------------------------------------------------------------------------------
--------------------
| CALIB             |
| STANDHYD ( 0024)|   Area    (ha)=   1.24
|ID= 1 DT=10.0 min |   Total Imp(%)=  63.00   Dir. Conn.(%)=  63.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.78        0.46
     Dep. Storage     (mm)=       2.00        5.00
     Average Slope     (%)=       1.00        2.00
     Length            (m)=      90.92       40.00
     Mannings n          =      0.030       0.200
```



```
        NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 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
               0.167    0.00 | 1.833    8.28 | 3.500    5.04 |  5.17    0.72
               0.333    0.36 | 2.000   12.24 | 3.667    5.04 |  5.33    0.72
               0.500    0.72 | 2.167   12.24 | 3.833    3.96 |  5.50    0.72
               0.667    0.72 | 2.333   22.68 | 4.000    2.88 |  5.67    0.72
               0.833    0.72 | 2.500   33.12 | 4.167    2.88 |  5.83    0.72
               1.000    0.72 | 2.667   33.12 | 4.333    2.16 |  6.00    0.72
               1.167    0.72 | 2.833   21.24 | 4.500    1.44 |  6.17    0.72
               1.333    2.52 | 3.000    9.36 | 4.667    1.44 |  6.33    0.36
               1.500    4.32 | 3.167    9.36 | 4.833    1.08 |
               1.667    4.32 | 3.333    7.20 | 5.000    0.72 |

     Max.Eff.Inten.(mm/hr)=      33.12        7.02
                over (min)       10.00       30.00
     Storage Coeff.  (min)=       6.20 (ii)  24.06 (ii)
     Unit Hyd. Tpeak (min)=      10.00       30.00
     Unit Hyd. peak  (cms)=       0.14        0.04
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.07        0.01          0.074 (iii)
     TIME TO PEAK    (hrs)=       2.67        3.00           2.67
     RUNOFF VOLUME    (mm)=      34.00        7.13          24.05
     TOTAL RAINFALL   (mm)=      36.00       36.00          36.00
     RUNOFF COEFFICIENT   =       0.94        0.20           0.67

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------
--------------------
| CALIB             |
| STANDHYD ( 0031)|   Area    (ha)=   1.03
|ID= 1 DT=10.0 min |   Total Imp(%)=  63.00   Dir. Conn.(%)=  63.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.65        0.38
     Dep. Storage     (mm)=       2.00        5.00
     Average Slope     (%)=       1.00        2.00
```

```
     Length           (m)=      82.87        40.00
     Mannings n          =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      33.12         7.02
                over (min)      10.00        30.00
     Storage Coeff.  (min)=       5.86 (ii)   23.73 (ii)
     Unit Hyd. Tpeak (min)=      10.00        30.00
     Unit Hyd. peak  (cms)=       0.14         0.04
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.06         0.00         0.061 (iii)
     TIME TO PEAK    (hrs)=       2.67         3.00          2.67
     RUNOFF VOLUME    (mm)=      34.00         7.13         24.04
     TOTAL RAINFALL   (mm)=      36.00        36.00         36.00
     RUNOFF COEFFICIENT   =       0.94         0.20          0.67

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0032)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0024):     1.24   0.074     2.67    24.05
      + ID2= 2 (  0031):     1.03   0.061     2.67    24.04
        ===================================================
        ID = 3 (  0032):     2.27   0.135     2.67    24.05

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
=====================================================================================
======================

       V    V   I    SSSSS  U   U    A    L              (v 6.0.2000)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
```



```
        OOO     T      T    H   H    Y    M   M   OOO
Developed and Distributed by Civica Infrastructure
```



```
                   *****  D E T A I L E D   O U T P U T *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.0\VO2\voin.dat

  Output  filename:
C:\Users\kevin.lukawiecki\AppData\Local\Civica\VH5\a512d3b0-a6e7-43a6-99e8-d9354a433
349\aab8a7ca-dc05-4a85-9661-197e94b0
  Summary filename:
C:\Users\kevin.lukawiecki\AppData\Local\Civica\VH5\a512d3b0-a6e7-43a6-99e8-d9354a433
349\aab8a7ca-dc05-4a85-9661-197e94b0


DATE: 01/26/2022                           TIME: 11:37:18

USER:


COMMENTS: ____________________________________________________________


-------------------------------------------------------------------------------------
-----------------------
  **********************************************
  ** SIMULATION : 25 Year                     **
  **********************************************


--------------------
|    READ STORM     |    Filename: C:\Users\kevin.lukawiecki\AppD
|                   |              ata\Local\Temp\
|                   |              d38c255b-b722-4158-86e6-b49511f755aa\1b8bf92b
| 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            |
| NASHYD   (  0401)|   Area    (ha)=   6.62   Curve Number   (CN)= 63.0
|ID= 1 DT=15.0 min |   Ia      (mm)=   1.50   # of Linear Res.(N)= 2.00
--------------------   U.H. Tp(hrs)=   0.20

     Unit Hyd Qpeak  (cms)=   0.859

     PEAK FLOW       (cms)=   0.256 (i)
     TIME TO PEAK    (hrs)=   2.750
     RUNOFF VOLUME    (mm)=  16.937
     TOTAL RAINFALL   (mm)=  65.590
     RUNOFF COEFFICIENT   =   0.258

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0100)|   Area    (ha)=  23.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      17.25         5.75
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     390.00        40.00
     Mannings n          =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      60.35        45.65
                over (min)      15.00        30.00
     Storage Coeff.  (min)=      11.68 (ii)   20.13 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.08         0.05
                                                          *TOTALS*
     PEAK FLOW       (cms)=       2.38         0.47         2.774 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00          2.75
     RUNOFF VOLUME    (mm)=      63.59        28.26         51.22
     TOTAL RAINFALL   (mm)=      65.59        65.59         65.59
     RUNOFF COEFFICIENT   =       0.97         0.43          0.78

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
```



```
       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0101)|      OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 15.0 min     |      OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------       (cms)     (ha.m.)   |   (cms)     (ha.m.)
                           0.0000     0.0000   |   0.7800     1.0000
                           0.7800     0.0000   |   0.0000     0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0100)     23.000      2.774      2.75      51.22
   OUTFLOW: ID= 1 (  0101)     23.000      0.780      2.25      51.25

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 28.12
                  TIME SHIFT OF PEAK FLOW         (min)=-30.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.1424

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0200)|   Area    (ha)=  28.40
|ID= 1 DT=15.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      21.30         7.10
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     435.00        40.00
     Mannings n          =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      60.35        45.65
                over (min)      15.00        30.00
     Storage Coeff.  (min)=      12.48 (ii)   20.92 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.08         0.05
                                                          *TOTALS*
     PEAK FLOW       (cms)=       2.91         0.57         3.388 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00          2.75
     RUNOFF VOLUME    (mm)=      63.59        28.26         51.22
     TOTAL RAINFALL   (mm)=      65.59        65.59         65.59
     RUNOFF COEFFICIENT   =       0.97         0.43          0.78
```

```
***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0201)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 15.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.8700      1.2000
                          0.8700     0.0000   |   0.0000      0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0200)     28.400      3.388      2.75      51.22
   OUTFLOW: ID= 1 (  0201)     28.400      0.870      2.00      51.50

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 25.68
                   TIME SHIFT OF PEAK FLOW         (min)=-45.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.1907

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0001)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0101):    23.00   0.780     2.25    51.25
      + ID2= 2 (  0201):    28.40   0.870     2.00    51.50
        ==================================================
        ID = 3 (  0001):    51.40   1.650     2.25    51.39

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0300)|   Area    (ha)=  73.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  57.00   Dir. Conn.(%)=  47.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      41.61        31.39
     Dep. Storage     (mm)=       2.00         5.00
```



```
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     692.00        40.00
     Mannings n          =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      60.35        37.11
                over (min)       15.00        30.00
     Storage Coeff.  (min)=      16.48 (ii)   25.66 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.07         0.04
                                                          *TOTALS*
     PEAK FLOW       (cms)=       5.12         1.88          6.631 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00          2.75
     RUNOFF VOLUME    (mm)=      63.59        25.99         43.66
     TOTAL RAINFALL   (mm)=      65.59        65.59         65.59
     RUNOFF COEFFICIENT   =       0.97         0.40          0.67


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0027)|   Area    (ha)=   2.30
|ID= 1 DT=10.0 min |   Total Imp(%)=  71.00   Dir. Conn.(%)=  71.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.63         0.67
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     123.83        40.00
     Mannings n          =      0.030        0.200

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 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
               0.167    0.00 | 1.833   15.08 | 3.500    9.18 |  5.17    1.31
               0.333    0.65 | 2.000   22.30 | 3.667    9.18 |  5.33    1.31
               0.500    1.31 | 2.167   22.30 | 3.833    7.21 |  5.50    1.31
               0.667    1.31 | 2.333   41.32 | 4.000    5.25 |  5.67    1.31
               0.833    1.31 | 2.500   60.35 | 4.167    5.25 |  5.83    1.31
               1.000    1.31 | 2.667   60.35 | 4.333    3.93 |  6.00    1.31
```



```
               1.167    1.31 | 2.833   38.70 | 4.500    2.62 |  6.17    1.31
               1.333    4.59 | 3.000   17.06 | 4.667    2.62 |  6.33    0.66
               1.500    7.87 | 3.167   17.06 | 4.833    1.97 |
               1.667    7.87 | 3.333   13.12 | 5.000    1.31 |

     Max.Eff.Inten.(mm/hr)=      60.35        21.82
                over (min)       10.00        20.00
     Storage Coeff.  (min)=       5.87 (ii)   17.22 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.14         0.06
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.27         0.03          0.295 (iii)
     TIME TO PEAK    (hrs)=       2.67         2.83          2.67
     RUNOFF VOLUME    (mm)=      63.59        22.34         51.62
     TOTAL RAINFALL   (mm)=      65.59        65.59         65.59
     RUNOFF COEFFICIENT   =       0.97         0.34          0.79

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0002)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0001):    51.40   1.650     2.25    51.39
      + ID2= 2 (  0027):     2.30   0.295     2.67    51.62
        ==================================================
        ID = 3 (  0002):    53.70   1.945     2.67    51.32

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0002)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0002):    53.70   1.945     2.67    51.32
      + ID2= 2 (  0300):    73.00   6.631     2.75    43.66
        ==================================================
        ID = 1 (  0002):   126.70   7.967     2.67    46.90
```



```
     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0003)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 15.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.1900      1.9300
                          0.0500     0.4200   |   0.4700      2.6400
                          0.0800     0.8400   |   0.8500      3.3400
                          0.0900     1.3900   |   1.3200      3.7000
                          0.1000     1.6000   |   2.4600      4.2500

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0002)    126.700      7.967      2.67      46.90
   OUTFLOW: ID= 1 (  0003)    126.700      2.036      5.17      46.89

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 25.56
                   TIME SHIFT OF PEAK FLOW         (min)=150.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  4.0456

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--------------------
| ADD HYD  (  0004)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0003):   126.70   2.036     5.17    46.89
      + ID2= 2 (  0401):     6.62   0.256     2.75    16.94
        ==================================================
        ID = 3 (  0004):   133.32   2.051     5.17    45.40

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0402)|   Area    (ha)=   8.58
|ID= 1 DT=15.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  40.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       4.29         4.29
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     239.17        40.00
     Mannings n          =      0.030        0.200

         NOTE:  RAINFALL WAS TRANSFORMED TO  15.0 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
     0.250    0.00 | 2.000   22.30 | 3.750    9.18 |  5.50    1.31
     0.500    1.31 | 2.250   22.30 | 4.000    5.25 |  5.75    1.31
     0.750    1.31 | 2.500   60.35 | 4.250    5.25 |  6.00    1.31
     1.000    1.31 | 2.750   60.35 | 4.500    2.62 |  6.25    1.31
     1.250    1.31 | 3.000   17.06 | 4.750    2.62 |
     1.500    7.87 | 3.250   17.06 | 5.000    1.31 |
     1.750    7.87 | 3.500    9.18 | 5.250    1.31 |

     Max.Eff.Inten.(mm/hr)=      60.35        35.50
                over (min)       15.00        30.00
     Storage Coeff.  (min)=       8.71 (ii)   18.06 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.09         0.05
                                                         *TOTALS*
     PEAK FLOW       (cms)=       0.56         0.28         0.797 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00          2.75
     RUNOFF VOLUME    (mm)=      63.59        25.51         40.74
     TOTAL RAINFALL   (mm)=      65.59        65.59         65.59
     RUNOFF COEFFICIENT   =       0.97         0.39          0.62

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| DUHYD    (  0403)|
| Inlet Cap.= 0.740|
| #of Inlets=     1|
| Total(cms)=   0.7|      AREA     QPEAK     TPEAK    R.V.
--------------------      (ha)     (cms)     (hrs)    (mm)
     TOTAL HYD.(ID= 1):   8.58      0.80      2.75   40.74
     ==================================================
     MAJOR SYS.(ID= 2):   0.13      0.06      2.75   40.74
     MINOR SYS.(ID= 3):   8.45      0.74      2.75   40.74

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
```



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--------------------
| ADD HYD  (  0005)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0004):    133.32   2.051     5.17    45.40
     + ID2= 2 (  0403):      0.13   0.057     2.75    40.74
       ===================================================
       ID = 3 (  0005):    133.45   2.051     5.17    45.39

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0500)|   Area    (ha)=   6.76
|ID= 1 DT=15.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       5.07         1.69
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     212.29        40.00
     Mannings n           =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      60.35        45.65
                over (min)       15.00        30.00
     Storage Coeff.  (min)=       8.11 (ii)   16.56 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.10         0.05
                                                         *TOTALS*
     PEAK FLOW       (cms)=       0.72         0.15         0.851 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00          2.75
     RUNOFF VOLUME    (mm)=      63.59        28.26         51.22
     TOTAL RAINFALL   (mm)=      65.59        65.59         65.59
     RUNOFF COEFFICIENT   =       0.97         0.43          0.78

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0600)|   Area    (ha)=  12.00
```



```
|ID= 1 DT=15.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  40.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       6.00         6.00
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     270.00        40.00
     Mannings n           =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      60.35        35.50
                over (min)       15.00        30.00
     Storage Coeff.  (min)=       9.37 (ii)   18.71 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.09         0.05
                                                         *TOTALS*
     PEAK FLOW       (cms)=       0.78         0.38         1.105 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00          2.75
     RUNOFF VOLUME    (mm)=      63.59        25.51         40.74
     TOTAL RAINFALL   (mm)=      65.59        65.59         65.59
     RUNOFF COEFFICIENT   =       0.97         0.39          0.62

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0006)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0500):      6.76   0.851     2.75    51.22
     + ID2= 2 (  0600):     12.00   1.105     2.75    40.74
       ===================================================
       ID = 3 (  0006):     18.76   1.956     2.75    44.52

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0700)|   Area    (ha)=  12.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  55.00   Dir. Conn.(%)=  43.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
```



```
     Surface Area     (ha)=       6.60         5.40
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     282.00        40.00
     Mannings n           =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      60.35        38.81
                over (min)       15.00        30.00
     Storage Coeff.  (min)=       9.62 (ii)   18.63 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.09         0.05
                                                         *TOTALS*
     PEAK FLOW       (cms)=       0.84         0.38         1.160 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00          2.75
     RUNOFF VOLUME    (mm)=      63.59        26.47         42.43
     TOTAL RAINFALL   (mm)=      65.59        65.59         65.59
     RUNOFF COEFFICIENT   =       0.97         0.40          0.65

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0006):     18.76   1.956     2.75    44.52
     + ID2= 2 (  0700):     12.00   1.160     2.75    42.43
       ===================================================
       ID = 3 (  0007):     30.76   3.116     2.75    43.70

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0008)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0403):      8.45   0.740     2.75    40.74
     + ID2= 2 (  0007):     30.76   3.116     2.75    43.70
       ===================================================
       ID = 3 (  0008):     39.21   3.856     2.75    43.07
```

```
     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0800)|   Area    (ha)=   2.60
|ID= 1 DT=15.0 min |   Total Imp(%)=  60.00   Dir. Conn.(%)=  45.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.56         1.04
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     131.00        40.00
     Mannings n           =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      60.35        44.35
                over (min)      15.00        15.00
     Storage Coeff.  (min)=       6.07 (ii)   14.62 (ii)
     Unit Hyd. Tpeak (min)=      15.00        15.00
     Unit Hyd. peak  (cms)=       0.10         0.07
                                                         *TOTALS*
     PEAK FLOW       (cms)=       0.20         0.10          0.300 (iii)
     TIME TO PEAK    (hrs)=       2.75         2.75           2.75
     RUNOFF VOLUME    (mm)=      63.59        27.93          43.98
     TOTAL RAINFALL   (mm)=      65.59        65.59          65.59
     RUNOFF COEFFICIENT   =       0.97         0.43           0.67

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0009)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0008):     39.21   3.856     2.75    43.07
     + ID2= 2 (  0800):      2.60   0.300     2.75    43.98
       ==================================================
       ID = 3 (  0009):     41.81   4.157     2.75    43.12

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
```



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--------------------
| RESERVOIR(  0010)|     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   |   0.9400     0.6210
                          0.0500     0.1950   |   2.6600     0.7760
                          0.0800     0.3860   |   4.0200     0.9110
                          0.1300     0.4750   |   0.0000     0.0000

                                 AREA     QPEAK     TPEAK       R.V.
                                 (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0009)     41.813      4.157      2.75      43.12
   OUTFLOW: ID= 1 (  0010)     41.813      2.631      3.00      43.10

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 63.30
                  TIME SHIFT OF PEAK FLOW         (min)= 15.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.7746

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0011)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0010):     41.81   2.631     3.00    43.10
     + ID2= 2 (  0005):   133.45   2.051     5.17    45.39
       ==================================================
       ID = 3 (  0011):   175.26   3.227     3.08    44.82

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0024)|   Area    (ha)=   1.24
|ID= 1 DT=10.0 min |   Total Imp(%)=  63.00   Dir. Conn.(%)=  63.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.78         0.46
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      90.92        40.00
     Mannings n           =      0.030        0.200

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 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
             0.167    0.00 | 1.833   15.08 | 3.500    9.18 |  5.17    1.31
             0.333    0.65 | 2.000   22.30 | 3.667    9.18 |  5.33    1.31
             0.500    1.31 | 2.167   22.30 | 3.833    7.21 |  5.50    1.31
             0.667    1.31 | 2.333   41.32 | 4.000    5.25 |  5.67    1.31
             0.833    1.31 | 2.500   60.35 | 4.167    5.25 |  5.83    1.31
             1.000    1.31 | 2.667   60.35 | 4.333    3.93 |  6.00    1.31
             1.167    1.31 | 2.833   38.70 | 4.500    2.62 |  6.17    1.31
             1.333    4.59 | 3.000   17.06 | 4.667    2.62 |  6.33    0.66
             1.500    7.87 | 3.167   17.06 | 4.833    1.97 |
             1.667    7.87 | 3.333   13.12 | 5.000    1.31 |

     Max.Eff.Inten.(mm/hr)=      60.35        21.82
                over (min)      10.00        20.00
     Storage Coeff.  (min)=       4.88 (ii)   16.23 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.15         0.06
                                                         *TOTALS*
     PEAK FLOW       (cms)=       0.13         0.02          0.148 (iii)
     TIME TO PEAK    (hrs)=       2.67         2.83           2.67
     RUNOFF VOLUME    (mm)=      63.59        22.34          48.32
     TOTAL RAINFALL   (mm)=      65.59        65.59          65.59
     RUNOFF COEFFICIENT   =       0.97         0.34           0.74

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0031)|   Area    (ha)=   1.03
|ID= 1 DT=10.0 min |   Total Imp(%)=  63.00   Dir. Conn.(%)=  63.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.65         0.38
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      82.87        40.00
     Mannings n           =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      60.35        21.82
                over (min)      10.00        20.00
```



```
     Storage Coeff.  (min)=       4.61 (ii)   15.96 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.15         0.06
                                                         *TOTALS*
     PEAK FLOW       (cms)=       0.11         0.02          0.123 (iii)
     TIME TO PEAK    (hrs)=       2.67         2.83           2.67
     RUNOFF VOLUME    (mm)=      63.59        22.34          48.32
     TOTAL RAINFALL   (mm)=      65.59        65.59          65.59
     RUNOFF COEFFICIENT   =       0.97         0.34           0.74

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0032)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0024):      1.24   0.148     2.67    48.32
     + ID2= 2 (  0031):      1.03   0.123     2.67    48.32
       ==================================================
       ID = 3 (  0032):      2.27   0.271     2.67    48.32

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
=====================================================================================
======================

       V    V   I    SSSSS  U   U    A    L              (v 6.0.2000)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO    TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T     H   H   Y Y   MM MM  O   O
       O   O    T      T     H   H    Y    M   M  O   O
        OOO     T      T     H   H    Y    M   M   OOO
Developed and Distributed by Civica Infrastructure
```

```
                 *****  D E T A I L E D   O U T P U T *****

  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.0\VO2\voin.dat

  Output  filename:
C:\Users\kevin.lukawiecki\AppData\Local\Civica\VH5\a512d3b0-a6e7-43a6-99e8-d9354a433
349\6d547d36-6b80-45b4-b989-40fd8877
  Summary filename:
C:\Users\kevin.lukawiecki\AppData\Local\Civica\VH5\a512d3b0-a6e7-43a6-99e8-d9354a433
349\6d547d36-6b80-45b4-b989-40fd8877


DATE: 01/26/2022                          TIME: 11:37:17

USER:


COMMENTS: ____________________________________________________________


--------------------------------------------------------------------------------
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  **********************************************
  ** SIMULATION : 5 Year                      **
  **********************************************


--------------------
|    READ STORM    |    Filename: C:\Users\kevin.lukawiecki\AppD
|                  |              ata\Local\Temp\
|                  |              d38c255b-b722-4158-86e6-b49511f755aa\ef6bf4f6
| 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 |

--------------------------------------------------------------------------------
```



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--------------------
| CALIB            |
| NASHYD   (  0401)|   Area    (ha)=   6.62   Curve Number   (CN)= 63.0
|ID= 1 DT=15.0 min |   Ia      (mm)=   1.50   # of Linear Res.(N)= 2.00
--------------------   U.H. Tp(hrs)=   0.20

    Unit Hyd Qpeak  (cms)=   0.859

    PEAK FLOW       (cms)=   0.144 (i)
    TIME TO PEAK    (hrs)=   2.750
    RUNOFF VOLUME    (mm)=   9.647
    TOTAL RAINFALL   (mm)=  47.810
    RUNOFF COEFFICIENT   =   0.202

    (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0100)|   Area    (ha)=  23.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=      17.25         5.75
    Dep. Storage     (mm)=       2.00         5.00
    Average Slope     (%)=       1.00         2.00
    Length            (m)=     390.00        40.00
    Mannings n           =      0.030        0.200

    Max.Eff.Inten.(mm/hr)=      43.98        26.95
               over (min)       15.00        30.00
    Storage Coeff.  (min)=      13.26 (ii)   23.69 (ii)
    Unit Hyd. Tpeak (min)=      15.00        30.00
    Unit Hyd. peak  (cms)=       0.08         0.04
                                                           *TOTALS*
    PEAK FLOW       (cms)=       1.70         0.25          1.904 (iii)
    TIME TO PEAK    (hrs)=       2.75         3.00           2.75
    RUNOFF VOLUME    (mm)=      45.81        16.54          35.56
    TOTAL RAINFALL   (mm)=      47.81        47.81          47.81
    RUNOFF COEFFICIENT   =       0.96         0.35           0.74

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
```



```
--------------------------------------------------------------------------------
--------------------
| RESERVOIR( 0101)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 15.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.7800     1.0000
                          0.7800     0.0000   |   0.0000     0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0100)     23.000      1.904      2.75      35.56
   OUTFLOW: ID= 1 (  0101)     23.000      0.780      2.50      36.08

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 40.97
                  TIME SHIFT OF PEAK FLOW         (min)=-15.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0663

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0200)|   Area    (ha)=  28.40
|ID= 1 DT=15.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=      21.30         7.10
    Dep. Storage     (mm)=       2.00         5.00
    Average Slope     (%)=       1.00         2.00
    Length            (m)=     435.00        40.00
    Mannings n           =      0.030        0.200

    Max.Eff.Inten.(mm/hr)=      43.98        26.95
               over (min)       15.00        30.00
    Storage Coeff.  (min)=      14.16 (ii)   24.59 (ii)
    Unit Hyd. Tpeak (min)=      15.00        30.00
    Unit Hyd. peak  (cms)=       0.07         0.04
                                                           *TOTALS*
    PEAK FLOW       (cms)=       2.08         0.31          2.321 (iii)
    TIME TO PEAK    (hrs)=       2.75         3.00           2.75
    RUNOFF VOLUME    (mm)=      45.81        16.54          35.56
    TOTAL RAINFALL   (mm)=      47.81        47.81          47.81
    RUNOFF COEFFICIENT   =       0.96         0.35           0.74

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
```



```
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR( 0201)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 15.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.8700     1.2000
                          0.8700     0.0000   |   0.0000     0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0200)     28.400      2.321      2.75      35.56
   OUTFLOW: ID= 1 (  0201)     28.400      0.870      2.50      36.58

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 37.49
                  TIME SHIFT OF PEAK FLOW         (min)=-15.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0866

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0001)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0101):    23.00   0.780     2.50    36.08
      + ID2= 2 (  0201):    28.40   0.870     2.50    36.58
        ==============================================
        ID = 3 (  0001):    51.40   1.650     2.50    36.36

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0300)|   Area    (ha)=  73.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  57.00   Dir. Conn.(%)=  47.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=      41.61        31.39
    Dep. Storage     (mm)=       2.00         5.00
    Average Slope     (%)=       1.00         2.00
    Length            (m)=     692.00        40.00
    Mannings n           =      0.030        0.200

    Max.Eff.Inten.(mm/hr)=      43.98        21.54
```

```
               over (min)       15.00        45.00
     Storage Coeff.  (min)=      18.71 (ii)   30.12 (ii)
     Unit Hyd. Tpeak (min)=      15.00        45.00
     Unit Hyd. peak  (cms)=       0.06         0.03
                                                           *TOTALS*
     PEAK FLOW       (cms)=       3.61         0.94          4.086 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.25           2.75
     RUNOFF VOLUME    (mm)=      45.81        14.96          29.46
     TOTAL RAINFALL   (mm)=      47.81        47.81          47.81
     RUNOFF COEFFICIENT   =       0.96         0.31           0.62


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0027)|   Area    (ha)=   2.30
|ID= 1 DT=10.0 min |   Total Imp(%)=  71.00   Dir. Conn.(%)=  71.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.63         0.67
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     123.83        40.00
     Mannings n           =      0.030        0.200

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 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
                0.167    0.00 | 1.833   10.99 | 3.500    6.69 |  5.17    0.96
                0.333    0.48 | 2.000   16.25 | 3.667    6.69 |  5.33    0.96
                0.500    0.96 | 2.167   16.25 | 3.833    5.25 |  5.50    0.96
                0.667    0.96 | 2.333   30.11 | 4.000    3.82 |  5.67    0.96
                0.833    0.96 | 2.500   43.98 | 4.167    3.82 |  5.83    0.96
                1.000    0.96 | 2.667   43.98 | 4.333    2.86 |  6.00    0.96
                1.167    0.96 | 2.833   28.20 | 4.500    1.91 |  6.17    0.96
                1.333    3.35 | 3.000   12.43 | 4.667    1.91 |  6.33    0.48
                1.500    5.74 | 3.167   12.43 | 4.833    1.43 |
                1.667    5.74 | 3.333    9.56 | 5.000    0.96 |
```



```
     Max.Eff.Inten.(mm/hr)=      43.98        12.22
               over (min)       10.00        30.00
     Storage Coeff.  (min)=       6.66 (ii)   20.97 (ii)
     Unit Hyd. Tpeak (min)=      10.00        30.00
     Unit Hyd. peak  (cms)=       0.13         0.05
                                                           *TOTALS*
     PEAK FLOW       (cms)=       0.20         0.02          0.204 (iii)
     TIME TO PEAK    (hrs)=       2.67         3.00           2.67
     RUNOFF VOLUME    (mm)=      45.81        12.51          36.15
     TOTAL RAINFALL   (mm)=      47.81        47.81          47.81
     RUNOFF COEFFICIENT   =       0.96         0.26           0.76

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------


--------------------
| ADD HYD  (  0002)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0001):    51.40   1.650     2.50    36.36
      + ID2= 2 (  0027):     2.30   0.204     2.67    36.15
        ==================================================
        ID = 3 (  0002):    53.70   1.854     2.67    36.45

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0002)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0002):    53.70   1.854     2.67    36.45
      + ID2= 2 (  0300):    73.00   4.086     2.75    29.46
        ==================================================
        ID = 1 (  0002):   126.70   5.602     2.67    32.41

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0003)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
```



```
| DT= 15.0 min     |      OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------       (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000      0.0000   |   0.1900      1.9300
                          0.0500      0.4200   |   0.4700      2.6400
                          0.0800      0.8400   |   0.8500      3.3400
                          0.0900      1.3900   |   1.3200      3.7000
                          0.1000      1.6000   |   2.4600      4.2500

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0002)    126.700     5.602      2.67      32.41
   OUTFLOW: ID= 1 (  0003)    126.700     0.938      5.00      32.39

                 PEAK   FLOW   REDUCTION [Qout/Qin](%)= 16.75
                 TIME SHIFT OF PEAK FLOW        (min)=140.00
                 MAXIMUM  STORAGE   USED       (ha.m.)=  3.4133

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0004)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0003):   126.70   0.938     5.00    32.39
      + ID2= 2 (  0401):     6.62   0.144     2.75     9.65
        ==================================================
        ID = 3 (  0004):   133.32   0.949     5.00    31.26

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0402)|   Area    (ha)=   8.58
|ID= 1 DT=15.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  40.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       4.29         4.29
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     239.17        40.00
     Mannings n           =      0.030        0.200

         NOTE:  RAINFALL WAS TRANSFORMED TO  15.0 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
```



```
                0.250    0.00 | 2.000   16.25 | 3.750    6.69 |  5.50    0.96
                0.500    0.96 | 2.250   16.25 | 4.000    3.82 |  5.75    0.96
                0.750    0.96 | 2.500   43.98 | 4.250    3.82 |  6.00    0.96
                1.000    0.96 | 2.750   43.98 | 4.500    1.91 |  6.25    0.96
                1.250    0.96 | 3.000   12.43 | 4.750    1.91 |
                1.500    5.74 | 3.250   12.43 | 5.000    0.96 |
                1.750    5.74 | 3.500    6.69 | 5.250    0.96 |

     Max.Eff.Inten.(mm/hr)=      43.98        20.53
               over (min)       15.00        30.00
     Storage Coeff.  (min)=       9.89 (ii)   21.52 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.09         0.05
                                                           *TOTALS*
     PEAK FLOW       (cms)=       0.41         0.15          0.524 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00           2.75
     RUNOFF VOLUME    (mm)=      45.81        14.64          27.11
     TOTAL RAINFALL   (mm)=      47.81        47.81          47.81
     RUNOFF COEFFICIENT   =       0.96         0.31           0.57

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| DUHYD    (  0403)|
| Inlet Cap.= 0.740|
| #of Inlets=     1|
| Total(cms)=   0.7|       AREA     QPEAK     TPEAK     R.V.
--------------------       (ha)     (cms)     (hrs)     (mm)
     TOTAL HYD.(ID= 1):    8.58      0.52      2.75   27.11
     ==================================================
     MAJOR SYS.(ID= 2):    0.00      0.00      0.00    0.00
     MINOR SYS.(ID= 3):    8.58      0.52      2.75   27.11

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0005)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
```

```
*** W A R N I N G :  HYDROGRAPH   0403 <ID= 2> IS DRY.
*** W A R N I N G :  HYDROGRAPH   0003 = HYDROGRAPH 0001
        ID1= 1 (  0004):   133.32   0.949     5.00    31.26
      + ID2= 2 (  0403):     0.00   0.000     0.00     0.00
        ===================================================
        ID = 3 (  0005):   133.32   0.949     5.00    31.26

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0500)|   Area    (ha)=   6.76
|ID= 1 DT=15.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       5.07         1.69
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     212.29        40.00
     Mannings n          =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      43.98        26.95
                over (min)       15.00        30.00
     Storage Coeff.  (min)=       9.21 (ii)   19.64 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.09         0.05
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.52         0.08          0.589 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00           2.75
     RUNOFF VOLUME    (mm)=      45.81        16.54          35.56
     TOTAL RAINFALL   (mm)=      47.81        47.81          47.81
     RUNOFF COEFFICIENT   =       0.96         0.35           0.74

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0600)|   Area    (ha)=  12.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  40.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
```



```
     Surface Area     (ha)=       6.00         6.00
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     270.00        40.00
     Mannings n          =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      43.98        20.53
                over (min)       15.00        30.00
     Storage Coeff.  (min)=      10.64 (ii)   22.27 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.09         0.04
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.56         0.21          0.726 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00           2.75
     RUNOFF VOLUME    (mm)=      45.81        14.64          27.11
     TOTAL RAINFALL   (mm)=      47.81        47.81          47.81
     RUNOFF COEFFICIENT   =       0.96         0.31           0.57

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0006)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0500):     6.76   0.589     2.75    35.56
      + ID2= 2 (  0600):    12.00   0.726     2.75    27.11
        ===================================================
        ID = 3 (  0006):    18.76   1.315     2.75    30.15

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0700)|   Area    (ha)=  12.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  55.00   Dir. Conn.(%)=  43.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       6.60         5.40
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
```



```
     Length            (m)=     282.00        40.00
     Mannings n          =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      43.98        22.61
                over (min)       15.00        30.00
     Storage Coeff.  (min)=      10.92 (ii)   22.11 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.08         0.04
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.60         0.20          0.767 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00           2.75
     RUNOFF VOLUME    (mm)=      45.81        15.30          28.42
     TOTAL RAINFALL   (mm)=      47.81        47.81          47.81
     RUNOFF COEFFICIENT   =       0.96         0.32           0.59

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0006):    18.76   1.315     2.75    30.15
      + ID2= 2 (  0700):    12.00   0.767     2.75    28.42
        ===================================================
        ID = 3 (  0007):    30.76   2.082     2.75    29.48

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0008)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0403):     8.58   0.524     2.75    27.11
      + ID2= 2 (  0007):    30.76   2.082     2.75    29.48
        ===================================================
        ID = 3 (  0008):    39.34   2.606     2.75    28.96

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
```



```
--------------------
| CALIB              |
| STANDHYD (  0800)|   Area    (ha)=   2.60
|ID= 1 DT=15.0 min |   Total Imp(%)=  60.00   Dir. Conn.(%)=  45.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.56         1.04
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     131.00        40.00
     Mannings n          =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      43.98        26.12
                over (min)       15.00        30.00
     Storage Coeff.  (min)=       6.89 (ii)   17.45 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.10         0.05
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.14         0.05          0.183 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00           2.75
     RUNOFF VOLUME    (mm)=      45.81        16.31          29.58
     TOTAL RAINFALL   (mm)=      47.81        47.81          47.81
     RUNOFF COEFFICIENT   =       0.96         0.34           0.62

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0009)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0008):    39.34   2.606     2.75    28.96
      + ID2= 2 (  0800):     2.60   0.183     2.75    29.58
        ===================================================
        ID = 3 (  0009):    41.94   2.788     2.75    29.00

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0010)|     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   |   0.9400     0.6210
                          0.0500     0.1950   |   2.6600     0.7760
                          0.0800     0.3860   |   4.0200     0.9110
                          0.1300     0.4750   |   0.0000     0.0000

                                 AREA     QPEAK      TPEAK       R.V.
                                 (ha)     (cms)      (hrs)       (mm)
   INFLOW : ID= 2 (  0009)     41.940      2.788      2.75      29.00
   OUTFLOW: ID= 1 (  0010)     41.940      1.279      3.25      28.97

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 45.87
                  TIME SHIFT OF PEAK FLOW         (min)= 30.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.6517

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0011)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0010):    41.94   1.279     3.25    28.97
     + ID2= 2 (  0005):   133.32   0.949     5.00    31.26
       ==================================================
       ID = 3 (  0011):   175.26   1.641     3.33    30.69

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0024)|   Area    (ha)=   1.24
|ID= 1 DT=10.0 min |   Total Imp(%)=  63.00   Dir. Conn.(%)=  63.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.78         0.46
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      90.92        40.00
     Mannings n          =       0.030        0.200

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 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
                0.167    0.00 | 1.833   10.99 | 3.500    6.69 |  5.17    0.96
```



```
                0.333    0.48 | 2.000   16.25 | 3.667    6.69 |  5.33    0.96
                0.500    0.96 | 2.167   16.25 | 3.833    5.25 |  5.50    0.96
                0.667    0.96 | 2.333   30.11 | 4.000    3.82 |  5.67    0.96
                0.833    0.96 | 2.500   43.98 | 4.167    3.82 |  5.83    0.96
                1.000    0.96 | 2.667   43.98 | 4.333    2.86 |  6.00    0.96
                1.167    0.96 | 2.833   28.20 | 4.500    1.91 |  6.17    0.96
                1.333    3.35 | 3.000   12.43 | 4.667    1.91 |  6.33    0.48
                1.500    5.74 | 3.167   12.43 | 4.833    1.43 |
                1.667    5.74 | 3.333    9.56 | 5.000    0.96 |

     Max.Eff.Inten.(mm/hr)=      43.98        12.22
                over (min)      10.00        20.00
     Storage Coeff.  (min)=       5.54 (ii)   19.85 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.14         0.06
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.09         0.01         0.103 (iii)
     TIME TO PEAK    (hrs)=       2.67         2.83          2.67
     RUNOFF VOLUME    (mm)=      45.81        12.51         33.48
     TOTAL RAINFALL   (mm)=      47.81        47.81         47.81
     RUNOFF COEFFICIENT   =       0.96         0.26          0.70

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0031)|   Area    (ha)=   1.03
|ID= 1 DT=10.0 min |   Total Imp(%)=  63.00   Dir. Conn.(%)=  63.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.65         0.38
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      82.87        40.00
     Mannings n          =       0.030        0.200

     Max.Eff.Inten.(mm/hr)=      43.98        12.22
                over (min)      10.00        20.00
     Storage Coeff.  (min)=       5.24 (ii)   19.55 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.14         0.06
```



```
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.08         0.01         0.086 (iii)
     TIME TO PEAK    (hrs)=       2.67         2.83          2.67
     RUNOFF VOLUME    (mm)=      45.81        12.51         33.48
     TOTAL RAINFALL   (mm)=      47.81        47.81         47.81
     RUNOFF COEFFICIENT   =       0.96         0.26          0.70

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0032)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0024):     1.24   0.103     2.67    33.48
     + ID2= 2 (  0031):     1.03   0.086     2.67    33.48
       ==================================================
       ID = 3 (  0032):     2.27   0.189     2.67    33.48

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
====================================================================================
======================

       V    V   I    SSSSS  U   U    A    L              (v 6.0.2000)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
Developed and Distributed by Civica Infrastructure
```



```
                  *****  D E T A I L E D   O U T P U T *****
```



```
  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.0\VO2\voin.dat

  Output  filename:
C:\Users\kevin.lukawiecki\AppData\Local\Civica\VH5\a512d3b0-a6e7-43a6-99e8-d9354a433
349\6e159d39-b3db-4318-90c7-855e07c0
  Summary filename:
C:\Users\kevin.lukawiecki\AppData\Local\Civica\VH5\a512d3b0-a6e7-43a6-99e8-d9354a433
349\6e159d39-b3db-4318-90c7-855e07c0


DATE: 01/26/2022                          TIME: 11:37:18

USER:


COMMENTS: ____________________________________________________________


------------------------------------------------------------------------------------
----------------------
  **********************************************
  ** SIMULATION : 50 Year                     **
  **********************************************


--------------------
|    READ STORM    |    Filename: C:\Users\kevin.lukawiecki\AppD
|                  |              ata\Local\Temp\
|                  |              d38c255b-b722-4158-86e6-b49511f755aa\1e0878d6
| 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            |
| NASHYD   (  0401)|   Area    (ha)=   6.62   Curve Number   (CN)= 63.0
```

```
|ID= 1 DT=15.0 min |   Ia      (mm)=   1.50   # of Linear Res.(N)= 2.00
--------------------   U.H. Tp(hrs)=   0.20

     Unit Hyd Qpeak  (cms)=   0.859

     PEAK FLOW       (cms)=   0.310 (i)
     TIME TO PEAK    (hrs)=   2.750
     RUNOFF VOLUME    (mm)=  20.372
     TOTAL RAINFALL   (mm)=  73.000
     RUNOFF COEFFICIENT   =   0.279

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0100)|   Area    (ha)=  23.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      17.25         5.75
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     390.00        40.00
     Mannings n           =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      67.16        54.05
                over (min)       15.00        30.00
     Storage Coeff.  (min)=      11.20 (ii)   19.09 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.08         0.05
                                                            *TOTALS*
     PEAK FLOW       (cms)=       2.67         0.56          3.150 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00           2.75
     RUNOFF VOLUME    (mm)=      71.00        33.58          57.90
     TOTAL RAINFALL   (mm)=      73.00        73.00          73.00
     RUNOFF COEFFICIENT   =       0.97         0.46           0.79

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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```



```
| RESERVOIR(  0101)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 15.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.7800      1.0000
                          0.7800     0.0000   |   0.0000      0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0100)     23.000      3.150      2.75      57.90
   OUTFLOW: ID= 1 (  0101)     23.000      0.780      2.00      58.59

              PEAK   FLOW   REDUCTION [Qout/Qin](%)= 24.76
              TIME SHIFT OF PEAK FLOW         (min)=-45.00
              MAXIMUM  STORAGE   USED       (ha.m.)=  0.1881

--------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0200)|   Area    (ha)=  28.40
|ID= 1 DT=15.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      21.30         7.10
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     435.00        40.00
     Mannings n           =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      67.16        54.05
                over (min)       15.00        30.00
     Storage Coeff.  (min)=      11.95 (ii)   19.85 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.08         0.05
                                                            *TOTALS*
     PEAK FLOW       (cms)=       3.26         0.69          3.849 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00           2.75
     RUNOFF VOLUME    (mm)=      71.00        33.58          57.90
     TOTAL RAINFALL   (mm)=      73.00        73.00          73.00
     RUNOFF COEFFICIENT   =       0.97         0.46           0.79

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
```



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--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0201)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 15.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.8700      1.2000
                          0.8700     0.0000   |   0.0000      0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0200)     28.400      3.849      2.75      57.90
   OUTFLOW: ID= 1 (  0201)     28.400      0.870      2.00      58.62

              PEAK   FLOW   REDUCTION [Qout/Qin](%)= 22.60
              TIME SHIFT OF PEAK FLOW         (min)=-45.00
              MAXIMUM  STORAGE   USED       (ha.m.)=  0.2488

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0001)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0101):    23.00   0.780     2.00    58.59
      + ID2= 2 (  0201):    28.40   0.870     2.00    58.62
        ================================================
        ID = 3 (  0001):    51.40   1.650     2.00    58.61

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0300)|   Area    (ha)=  73.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  57.00   Dir. Conn.(%)=  47.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      41.61        31.39
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     692.00        40.00
     Mannings n           =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      67.16        44.18
                over (min)       15.00        30.00
     Storage Coeff.  (min)=      15.79 (ii)   24.35 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
```



```
     Unit Hyd. peak  (cms)=       0.07         0.04
                                                            *TOTALS*
     PEAK FLOW       (cms)=       5.76         2.30          7.639 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00           2.75
     RUNOFF VOLUME    (mm)=      71.00        31.04          49.82
     TOTAL RAINFALL   (mm)=      73.00        73.00          73.00
     RUNOFF COEFFICIENT   =       0.97         0.43           0.68


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0027)|   Area    (ha)=   2.30
|ID= 1 DT=10.0 min |   Total Imp(%)=  71.00   Dir. Conn.(%)=  71.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.63         0.67
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     123.83        40.00
     Mannings n           =      0.030        0.200

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 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
                   0.167    0.00 | 1.833   16.79 | 3.500   10.22 |  5.17    1.46
                   0.333    0.73 | 2.000   24.82 | 3.667   10.22 |  5.33    1.46
                   0.500    1.46 | 2.167   24.82 | 3.833    8.03 |  5.50    1.46
                   0.667    1.46 | 2.333   45.99 | 4.000    5.84 |  5.67    1.46
                   0.833    1.46 | 2.500   67.16 | 4.167    5.84 |  5.83    1.46
                   1.000    1.46 | 2.667   67.16 | 4.333    4.38 |  6.00    1.46
                   1.167    1.46 | 2.833   43.07 | 4.500    2.92 |  6.17    1.46
                   1.333    5.11 | 3.000   18.98 | 4.667    2.92 |  6.33    0.73
                   1.500    8.76 | 3.167   18.98 | 4.833    2.19 |
                   1.667    8.76 | 3.333   14.60 | 5.000    1.46 |

     Max.Eff.Inten.(mm/hr)=      67.16        26.49
                over (min)       10.00        20.00
     Storage Coeff.  (min)=       5.62 (ii)   16.13 (ii)
```

```
     Unit Hyd. Tpeak (min)=      10.00       20.00
     Unit Hyd. peak  (cms)=       0.14        0.06
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.30        0.04         0.333 (iii)
     TIME TO PEAK    (hrs)=       2.67        2.83          2.67
     RUNOFF VOLUME    (mm)=      71.00       26.92         58.21
     TOTAL RAINFALL   (mm)=      73.00       73.00         73.00
     RUNOFF COEFFICIENT   =       0.97        0.37          0.80

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0002)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0001):    51.40   1.650     2.00    58.61
      + ID2= 2 (  0027):     2.30   0.333     2.67    58.21
        ==================================================
        ID = 3 (  0002):    53.70   1.983     2.67    58.70

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0002)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0002):    53.70   1.983     2.67    58.70
      + ID2= 2 (  0300):    73.00   7.639     2.75    49.82
        ==================================================
        ID = 1 (  0002):   126.70   8.917     2.67    53.59

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0003)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 15.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.1900     1.9300
```



```
                          0.0500     0.4200   |   0.4700     2.6400
                          0.0800     0.8400   |   0.8500     3.3400
                          0.0900     1.3900   |   1.3200     3.7000
                          0.1000     1.6000   |   2.4600     4.2500

                                  AREA     QPEAK     TPEAK       R.V.
                                  (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0002)    126.700      8.917      2.67      53.59
   OUTFLOW: ID= 1 (  0003)    126.700      2.376      4.83      53.57

                 PEAK   FLOW   REDUCTION [Qout/Qin](%)= 26.65
                 TIME SHIFT OF PEAK FLOW         (min)=130.00
                 MAXIMUM  STORAGE   USED       (ha.m.)=  4.2118

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0004)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0003):   126.70   2.376     4.83    53.57
      + ID2= 2 (  0401):     6.62   0.310     2.75    20.37
        ==================================================
        ID = 3 (  0004):   133.32   2.410     4.67    51.92

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0402)|   Area    (ha)=   8.58
|ID= 1 DT=15.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  40.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       4.29         4.29
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     239.17        40.00
     Mannings n          =      0.030        0.200

         NOTE:  RAINFALL WAS TRANSFORMED TO  15.0 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
                0.250    0.00 | 2.000   24.82 | 3.750   10.22 |  5.50    1.46
                0.500    1.46 | 2.250   24.82 | 4.000    5.84 |  5.75    1.46
                0.750    1.46 | 2.500   67.16 | 4.250    5.84 |  6.00    1.46
```



```
                1.000    1.46 | 2.750   67.16 | 4.500    2.92 |  6.25    1.46
                1.250    1.46 | 3.000   18.98 | 4.750    2.92 |
                1.500    8.76 | 3.250   18.98 | 5.000    1.46 |
                1.750    8.76 | 3.500   10.22 | 5.250    1.46 |

     Max.Eff.Inten.(mm/hr)=      67.16       42.31
                over (min)       15.00       30.00
     Storage Coeff.  (min)=       8.35 (ii)   17.06 (ii)
     Unit Hyd. Tpeak (min)=      15.00       30.00
     Unit Hyd. peak  (cms)=       0.09        0.05
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.63        0.34         0.919 (iii)
     TIME TO PEAK    (hrs)=       2.75        3.00          2.75
     RUNOFF VOLUME    (mm)=      71.00       30.51         46.71
     TOTAL RAINFALL   (mm)=      73.00       73.00         73.00
     RUNOFF COEFFICIENT   =       0.97        0.42          0.64

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| DUHYD    (  0403)|
| Inlet Cap.= 0.740|
| #of Inlets=     1|
| Total(cms)=   0.7|      AREA     QPEAK     TPEAK     R.V.
--------------------      (ha)     (cms)     (hrs)     (mm)
     TOTAL HYD.(ID= 1):   8.58      0.92      2.75   46.71
     ================================================
     MAJOR SYS.(ID= 2):   0.35      0.18      2.75   46.71
     MINOR SYS.(ID= 3):   8.23      0.74      2.75   46.71

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0005)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0004):   133.32   2.410     4.67    51.92
      + ID2= 2 (  0403):     0.35   0.179     2.75    46.71
        ==================================================
```



```
        ID = 3 (  0005):   133.67   2.410     4.67    51.89

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0500)|   Area    (ha)=   6.76
|ID= 1 DT=15.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       5.07         1.69
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     212.29        40.00
     Mannings n          =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      67.16       54.05
                over (min)       15.00       30.00
     Storage Coeff.  (min)=       7.77 (ii)   15.67 (ii)
     Unit Hyd. Tpeak (min)=      15.00       30.00
     Unit Hyd. peak  (cms)=       0.10        0.05
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.81        0.18         0.964 (iii)
     TIME TO PEAK    (hrs)=       2.75        3.00          2.75
     RUNOFF VOLUME    (mm)=      71.00       33.58         57.90
     TOTAL RAINFALL   (mm)=      73.00       73.00         73.00
     RUNOFF COEFFICIENT   =       0.97        0.46          0.79

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0600)|   Area    (ha)=  12.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  40.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       6.00         6.00
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     270.00        40.00
     Mannings n          =      0.030        0.200
```

```
     Max.Eff.Inten.(mm/hr)=      67.16        42.31
                over (min)       15.00        30.00
     Storage Coeff.  (min)=       8.98 (ii)   17.69 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.09         0.05
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.88         0.47         1.275 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00          2.75
     RUNOFF VOLUME    (mm)=      71.00        30.51         46.71
     TOTAL RAINFALL   (mm)=      73.00        73.00         73.00
     RUNOFF COEFFICIENT   =       0.97         0.42          0.64

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0006)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0500):     6.76   0.964     2.75    57.90
      + ID2= 2 (  0600):    12.00   1.275     2.75    46.71
        ==================================================
        ID = 3 (  0006):    18.76   2.239     2.75    50.74

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0700)|   Area    (ha)=  12.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  55.00   Dir. Conn.(%)=  43.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       6.60         5.40
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     282.00        40.00
     Mannings n           =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      67.16        46.16
                over (min)       15.00        30.00
```



```
     Storage Coeff.  (min)=       9.22 (ii)   17.63 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.09         0.05
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.94         0.46         1.335 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00          2.75
     RUNOFF VOLUME    (mm)=      71.00        31.59         48.53
     TOTAL RAINFALL   (mm)=      73.00        73.00         73.00
     RUNOFF COEFFICIENT   =       0.97         0.43          0.66

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0006):    18.76   2.239     2.75    50.74
      + ID2= 2 (  0700):    12.00   1.335     2.75    48.53
        ==================================================
        ID = 3 (  0007):    30.76   3.574     2.75    49.88

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0008)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0403):     8.23   0.740     2.75    46.71
      + ID2= 2 (  0007):    30.76   3.574     2.75    49.88
        ==================================================
        ID = 3 (  0008):    38.99   4.314     2.75    49.21

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0800)|   Area    (ha)=   2.60
|ID= 1 DT=15.0 min |   Total Imp(%)=  60.00   Dir. Conn.(%)=  45.00
--------------------
```



```
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.56         1.04
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     131.00        40.00
     Mannings n           =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      67.16        52.55
                over (min)       15.00        15.00
     Storage Coeff.  (min)=       5.82 (ii)   13.80 (ii)
     Unit Hyd. Tpeak (min)=      15.00        15.00
     Unit Hyd. peak  (cms)=       0.10         0.08
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.22         0.13         0.345 (iii)
     TIME TO PEAK    (hrs)=       2.75         2.75          2.75
     RUNOFF VOLUME    (mm)=      71.00        33.22         50.22
     TOTAL RAINFALL   (mm)=      73.00        73.00         73.00
     RUNOFF COEFFICIENT   =       0.97         0.46          0.69

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0009)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0008):    38.99   4.314     2.75    49.21
      + ID2= 2 (  0800):     2.60   0.345     2.75    50.22
        ==================================================
        ID = 3 (  0009):    41.59   4.658     2.75    49.27

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0010)|     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   |   0.9400      0.6210
                          0.0500     0.1950   |   2.6600      0.7760
                          0.0800     0.3860   |   4.0200      0.9110
```



```
                          0.1300     0.4750   |   0.0000      0.0000

                              AREA     QPEAK     TPEAK       R.V.
                              (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0009)    41.594     4.658      2.75      49.27
   OUTFLOW: ID= 1 (  0010)    41.594     3.135      3.00      49.25

                 PEAK   FLOW   REDUCTION [Qout/Qin](%)= 67.29
                 TIME SHIFT OF PEAK FLOW         (min)= 15.00
                 MAXIMUM  STORAGE   USED       (ha.m.)=  0.8261

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0011)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0010):    41.59   3.135     3.00    49.25
      + ID2= 2 (  0005):   133.67   2.410     4.67    51.89
        ==================================================
        ID = 3 (  0011):   175.26   3.876     3.00    51.24

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0024)|   Area    (ha)=   1.24
|ID= 1 DT=10.0 min |   Total Imp(%)=  63.00   Dir. Conn.(%)=  63.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.78         0.46
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      90.92        40.00
     Mannings n           =      0.030        0.200

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 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
                 0.167    0.00 | 1.833   16.79 | 3.500   10.22 |  5.17    1.46
                 0.333    0.73 | 2.000   24.82 | 3.667   10.22 |  5.33    1.46
                 0.500    1.46 | 2.167   24.82 | 3.833    8.03 |  5.50    1.46
                 0.667    1.46 | 2.333   45.99 | 4.000    5.84 |  5.67    1.46
                 0.833    1.46 | 2.500   67.16 | 4.167    5.84 |  5.83    1.46
                 1.000    1.46 | 2.667   67.16 | 4.333    4.38 |  6.00    1.46
```

```
             1.167     1.46 | 2.833   43.07 | 4.500    2.92 |  6.17    1.46
             1.333     5.11 | 3.000   18.98 | 4.667    2.92 |  6.33    0.73
             1.500     8.76 | 3.167   18.98 | 4.833    2.19 |
             1.667     8.76 | 3.333   14.60 | 5.000    1.46 |

     Max.Eff.Inten.(mm/hr)=      67.16        26.49
                over (min)       10.00        20.00
     Storage Coeff.  (min)=       4.67 (ii)   15.18 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.15         0.07
                                                            *TOTALS*
     PEAK FLOW       (cms)=       0.15         0.03          0.167 (iii)
     TIME TO PEAK    (hrs)=       2.67         2.83           2.67
     RUNOFF VOLUME    (mm)=      71.00        26.92          54.69
     TOTAL RAINFALL   (mm)=      73.00        73.00          73.00
     RUNOFF COEFFICIENT   =       0.97         0.37           0.75

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------
--------------------
| CALIB             |
| STANDHYD (  0031)|   Area    (ha)=   1.03
|ID= 1 DT=10.0 min |   Total Imp(%)=  63.00   Dir. Conn.(%)=  63.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.65         0.38
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      82.87        40.00
     Mannings n           =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      67.16        26.49
                over (min)       10.00        20.00
     Storage Coeff.  (min)=       4.42 (ii)   14.92 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.15         0.07
                                                            *TOTALS*
     PEAK FLOW       (cms)=       0.12         0.02          0.139 (iii)
     TIME TO PEAK    (hrs)=       2.67         2.83           2.67
     RUNOFF VOLUME    (mm)=      71.00        26.92          54.68
     TOTAL RAINFALL   (mm)=      73.00        73.00          73.00
```



```
     RUNOFF COEFFICIENT   =       0.97         0.37           0.75

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0032)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0024):     1.24   0.167     2.67    54.69
      + ID2= 2 (  0031):     1.03   0.139     2.67    54.68
        ==================================================
        ID = 3 (  0032):     2.27   0.307     2.67    54.68

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
------------------------------------------------------------------------------
===============================================================================
======================

      V    V   I    SSSSS  U   U    A    L              (v 6.0.2000)
      V    V   I    SS     U   U   A A   L
       V  V    I     SS    U   U  AAAAA  L
       V  V    I      SS   U   U  A   A  L
        VV     I    SSSSS  UUUUU  A   A  LLLLL

       OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
      O   O    T      T    H   H   Y Y   MM MM  O   O
      O   O    T      T    H   H    Y    M   M  O   O
       OOO     T      T    H   H    Y    M   M   OOO
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                   *****  D E T A I L E D   O U T P U T *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.0\VO2\voin.dat

  Output  filename:
C:\Users\kevin.lukawiecki\AppData\Local\Civica\VH5\a512d3b0-a6e7-43a6-99e8-d9354a433
```



```
349\ea721cd3-75e4-46c9-b2be-47b0aa97
  Summary filename:
C:\Users\kevin.lukawiecki\AppData\Local\Civica\VH5\a512d3b0-a6e7-43a6-99e8-d9354a433
349\ea721cd3-75e4-46c9-b2be-47b0aa97


DATE: 01/26/2022                        TIME: 11:37:19

USER:



COMMENTS: ____________________________________________________________


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  ************************************************
  ** SIMULATION : Z5mm                          **
  ************************************************


--------------------
|    READ STORM    |    Filename: C:\Users\kevin.lukawiecki\AppD
|                  |              ata\Local\Temp\
|                  |              d38c255b-b722-4158-86e6-b49511f755aa\d25d2449
| Ptotal= 24.91 mm |    Comments: 25MM-4HR
--------------------
                  TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                   hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                  0.03    0.30 |  1.03   10.80 |  2.03    4.62 |  3.03    2.04
                  0.07    0.60 |  1.07   14.10 |  2.07    4.44 |  3.07    1.98
                  0.10    0.90 |  1.10   17.40 |  2.10    4.26 |  3.10    1.92
                  0.13    1.20 |  1.13   20.70 |  2.13    4.08 |  3.13    1.86
                  0.17    1.50 |  1.17   24.00 |  2.17    3.90 |  3.17    1.80
                  0.20    1.62 |  1.20   26.46 |  2.20    3.75 |  3.20    1.77
                  0.23    1.74 |  1.23   28.92 |  2.23    3.60 |  3.23    1.74
                  0.27    1.86 |  1.27   31.38 |  2.27    3.45 |  3.27    1.71
                  0.30    1.98 |  1.30   33.84 |  2.30    3.30 |  3.30    1.68
                  0.33    2.10 |  1.33   36.30 |  2.33    3.15 |  3.33    1.65
                  0.37    2.13 |  1.37   33.75 |  2.37    3.09 |  3.37    1.65
                  0.40    2.16 |  1.40   31.20 |  2.40    3.03 |  3.40    1.65
                  0.43    2.19 |  1.43   28.65 |  2.43    2.97 |  3.43    1.65
                  0.47    2.22 |  1.47   26.10 |  2.47    2.91 |  3.47    1.65
                  0.50    2.25 |  1.50   23.55 |  2.50    2.85 |  3.50    1.65
                  0.53    2.31 |  1.53   20.82 |  2.53    2.76 |  3.53    1.62
                  0.57    2.37 |  1.57   18.09 |  2.57    2.67 |  3.57    1.59
                  0.60    2.43 |  1.60   15.36 |  2.60    2.58 |  3.60    1.56
```



```
                  0.63    2.49 |  1.63   12.63 |  2.63    2.49 |  3.63    1.53
                  0.67    2.55 |  1.67    9.90 |  2.67    2.40 |  3.67    1.50
                  0.70    2.85 |  1.70    9.18 |  2.70    2.37 |  3.70    1.41
                  0.73    3.15 |  1.73    8.46 |  2.73    2.34 |  3.73    1.32
                  0.77    3.45 |  1.77    7.74 |  2.77    2.31 |  3.77    1.23
                  0.80    3.75 |  1.80    7.02 |  2.80    2.28 |  3.80    1.14
                  0.83    4.05 |  1.83    6.30 |  2.83    2.25 |  3.83    1.05
                  0.87    4.74 |  1.87    6.00 |  2.87    2.22 |  3.87    0.96
                  0.90    5.43 |  1.90    5.70 |  2.90    2.19 |  3.90    0.87
                  0.93    6.12 |  1.93    5.40 |  2.93    2.16 |  3.93    0.78
                  0.97    6.81 |  1.97    5.10 |  2.97    2.13 |  3.97    0.69
                  1.00    7.50 |  2.00    4.80 |  3.00    2.10 |  4.00    0.60

------------------------------------------------------------------------------

--------------------
| CALIB             |
| NASHYD   (  0401)|   Area    (ha)=   6.62   Curve Number   (CN)= 63.0
|ID= 1 DT=15.0 min |   Ia      (mm)=   1.50   # of Linear Res.(N)= 2.00
--------------------   U.H. Tp(hrs)=   0.20

         NOTE:  RAINFALL WAS TRANSFORMED TO  15.0 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
                 0.250    1.17 | 1.250   21.08 | 2.250    4.05 |  3.25    1.86
                 0.500    2.13 | 1.500   30.54 | 2.500    3.07 |  3.50    1.66
                 0.750    2.65 | 1.750   13.11 | 2.750    2.50 |  3.75    1.49
                 1.000    5.35 | 2.000    5.89 | 3.000    2.20 |  4.00    0.89

     Unit Hyd Qpeak  (cms)=    0.859

     PEAK FLOW       (cms)=    0.040 (i)
     TIME TO PEAK    (hrs)=    1.750
     RUNOFF VOLUME    (mm)=    2.792
     TOTAL RAINFALL   (mm)=   24.910
     RUNOFF COEFFICIENT   =    0.112

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------
--------------------
| CALIB             |
| STANDHYD (  0100)|   Area    (ha)=  23.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
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                         IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=     17.25        5.75
     Dep. Storage     (mm)=      2.00        5.00
     Average Slope     (%)=      1.00        2.00
     Length            (m)=    390.00       40.00
     Mannings n           =     0.030       0.200

     Max.Eff.Inten.(mm/hr)=     30.54        6.72
                over (min)      15.00       45.00
     Storage Coeff.  (min)=     15.34 (ii)  33.52 (ii)
     Unit Hyd. Tpeak (min)=     15.00       45.00
     Unit Hyd. peak  (cms)=      0.07        0.03
                                                        *TOTALS*
     PEAK FLOW       (cms)=      1.01        0.06         1.024 (iii)
     TIME TO PEAK    (hrs)=      1.50        2.25          1.50
     RUNOFF VOLUME    (mm)=     22.91        4.77         16.56
     TOTAL RAINFALL   (mm)=     24.91       24.91         24.91
     RUNOFF COEFFICIENT   =      0.92        0.19          0.66


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0101)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 15.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.7800     1.0000
                          0.7800     0.0000   |   0.0000     0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0100)     23.000     1.024      1.50      16.56
   OUTFLOW: ID= 1 (  0101)     23.000     0.780      1.50      16.87

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 76.15
                  TIME SHIFT OF PEAK FLOW         (min)=  0.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0220

-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0200)|   Area    (ha)=  28.40
```



```
|ID= 1 DT=15.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
--------------------
                         IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=     21.30        7.10
     Dep. Storage     (mm)=      2.00        5.00
     Average Slope     (%)=      1.00        2.00
     Length            (m)=    435.00       40.00
     Mannings n           =     0.030       0.200

     Max.Eff.Inten.(mm/hr)=     30.54        6.72
                over (min)      15.00       45.00
     Storage Coeff.  (min)=     16.38 (ii)  34.56 (ii)
     Unit Hyd. Tpeak (min)=     15.00       45.00
     Unit Hyd. peak  (cms)=      0.07        0.03
                                                        *TOTALS*
     PEAK FLOW       (cms)=      1.22        0.07         1.234 (iii)
     TIME TO PEAK    (hrs)=      1.50        2.25          1.50
     RUNOFF VOLUME    (mm)=     22.91        4.77         16.56
     TOTAL RAINFALL   (mm)=     24.91       24.91         24.91
     RUNOFF COEFFICIENT   =      0.92        0.19          0.66


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0201)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 15.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.8700     1.2000
                          0.8700     0.0000   |   0.0000     0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0200)     28.400     1.234      1.50      16.56
   OUTFLOW: ID= 1 (  0201)     28.400     0.870      1.50      17.08

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 70.51
                  TIME SHIFT OF PEAK FLOW         (min)=  0.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0328

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--------------------
| ADD HYD  (  0001)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0101):     23.00   0.780     1.50    16.87
     + ID2= 2 (  0201):     28.40   0.870     1.50    17.08
       ==================================================
       ID = 3 (  0001):     51.40   1.650     1.50    16.99

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0300)|   Area    (ha)=  73.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  57.00   Dir. Conn.(%)=  47.00
--------------------
                         IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=     41.61       31.39
     Dep. Storage     (mm)=      2.00        5.00
     Average Slope     (%)=      1.00        2.00
     Length            (m)=    692.00       40.00
     Mannings n           =     0.030       0.200

     Max.Eff.Inten.(mm/hr)=     25.81        5.10
                over (min)      30.00       45.00
     Storage Coeff.  (min)=     23.15 (ii)  43.45 (ii)
     Unit Hyd. Tpeak (min)=     30.00       45.00
     Unit Hyd. peak  (cms)=      0.04        0.03
                                                        *TOTALS*
     PEAK FLOW       (cms)=      1.80        0.21         1.924 (iii)
     TIME TO PEAK    (hrs)=      1.75        2.25          1.75
     RUNOFF VOLUME    (mm)=     22.91        4.14         12.96
     TOTAL RAINFALL   (mm)=     24.91       24.91         24.91
     RUNOFF COEFFICIENT   =      0.92        0.17          0.52


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0027)|   Area    (ha)=   2.30
|ID= 1 DT=10.0 min |   Total Imp(%)=  71.00   Dir. Conn.(%)=  71.00
--------------------
```



```
                         IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      1.63        0.67
     Dep. Storage     (mm)=      2.00        5.00
     Average Slope     (%)=      1.00        2.00
     Length            (m)=    123.83       40.00
     Mannings n           =     0.030       0.200

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 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
                 0.167    0.90 | 1.167   17.40 | 2.167    4.26 |  3.17    1.92
                 0.333    1.86 | 1.333   31.38 | 2.333    3.45 |  3.33    1.71
                 0.500    2.19 | 1.500   28.65 | 2.500    2.97 |  3.50    1.65
                 0.667    2.43 | 1.667   15.36 | 2.667    2.58 |  3.67    1.56
                 0.833    3.45 | 1.833    7.74 | 2.833    2.31 |  3.83    1.23
                 1.000    6.12 | 2.000    5.40 | 3.000    2.16 |  4.00    0.78

     Max.Eff.Inten.(mm/hr)=     31.38        3.01
                over (min)      10.00       40.00
     Storage Coeff.  (min)=      7.63 (ii)  32.70 (ii)
     Unit Hyd. Tpeak (min)=     10.00       40.00
     Unit Hyd. peak  (cms)=      0.12        0.03
                                                        *TOTALS*
     PEAK FLOW       (cms)=      0.13        0.00         0.128 (iii)
     TIME TO PEAK    (hrs)=      1.50        2.17          1.50
     RUNOFF VOLUME    (mm)=     22.91        3.21         17.19
     TOTAL RAINFALL   (mm)=     24.91       24.91         24.91
     RUNOFF COEFFICIENT   =      0.92        0.13          0.69

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0002)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0001):     51.40   1.650     1.50    16.99
     + ID2= 2 (  0027):      2.30   0.128     1.50    17.19
```

```
   ==================================================
   ID = 3 (  0002):    53.70   1.778     1.50    16.91

NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0002)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0002):    53.70   1.778     1.50    16.91
     + ID2= 2 (  0300):    73.00   1.924     1.75    12.96
       ==================================================
       ID = 1 (  0002):   126.70   3.519     1.83    14.63

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
------------------------------------------------------------------------------

--------------------
| RESERVOIR(  0003)|      OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 15.0 min     |      OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------       (cms)     (ha.m.)   |   (cms)     (ha.m.)
                           0.0000     0.0000   |   0.1900     1.9300
                           0.0500     0.4200   |   0.4700     2.6400
                           0.0800     0.8400   |   0.8500     3.3400
                           0.0900     1.3900   |   1.3200     3.7000
                           0.1000     1.6000   |   2.4600     4.2500

                                  AREA     QPEAK     TPEAK        R.V.
                                  (ha)     (cms)     (hrs)        (mm)
  INFLOW : ID= 2 (  0002)    126.700      3.519      1.83       14.63
  OUTFLOW: ID= 1 (  0003)    126.700      0.132      4.67       14.62

                 PEAK   FLOW   REDUCTION [Qout/Qin](%)=  3.74
                 TIME SHIFT OF PEAK FLOW         (min)=170.00
                 MAXIMUM  STORAGE   USED       (ha.m.)=  1.7159

------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0004)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0003):   126.70   0.132     4.67    14.62
     + ID2= 2 (  0401):     6.62   0.040     1.75     2.79
       ==================================================
       ID = 3 (  0004):   133.32   0.132     4.50    14.03
```



```
    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0402)|   Area    (ha)=   8.58
|ID= 1 DT=15.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  40.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=       4.29         4.29
    Dep. Storage     (mm)=       2.00         5.00
    Average Slope     (%)=       1.00         2.00
    Length            (m)=     239.17        40.00
    Mannings n          =      0.030        0.200

        NOTE:  RAINFALL WAS TRANSFORMED TO  15.0 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
              0.250    1.17 | 1.250   21.08 | 2.250    4.05 |  3.25    1.86
              0.500    2.13 | 1.500   30.54 | 2.500    3.07 |  3.50    1.66
              0.750    2.65 | 1.750   13.11 | 2.750    2.50 |  3.75    1.49
              1.000    5.35 | 2.000    5.89 | 3.000    2.20 |  4.00    0.89

    Max.Eff.Inten.(mm/hr)=      30.54         4.81
               over (min)      15.00        45.00
    Storage Coeff.  (min)=      11.44 (ii)   32.23 (ii)
    Unit Hyd. Tpeak (min)=      15.00        45.00
    Unit Hyd. peak  (cms)=       0.08         0.03
                                                        *TOTALS*
    PEAK FLOW       (cms)=       0.25         0.03        0.262 (iii)
    TIME TO PEAK    (hrs)=       1.50         2.25         1.50
    RUNOFF VOLUME    (mm)=      22.91         4.01        11.57
    TOTAL RAINFALL   (mm)=      24.91        24.91        24.91
    RUNOFF COEFFICIENT   =       0.92         0.16         0.46

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  71.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------
--------------------
| DUHYD    (  0403)|
```



```
| Inlet Cap.= 0.740|
| #of Inlets=     1|
| Total(cms)=   0.7|      AREA     QPEAK     TPEAK     R.V.
--------------------      (ha)     (cms)     (hrs)     (mm)
    TOTAL HYD.(ID= 1):    8.58      0.26      1.50    11.57
    ==================================================
    MAJOR SYS.(ID= 2):    0.00      0.00      0.00     0.00
    MINOR SYS.(ID= 3):    8.58      0.26      1.50    11.57

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0005)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
*** W A R N I N G :  HYDROGRAPH   0403 <ID= 2> IS DRY.
*** W A R N I N G :  HYDROGRAPH   0003 = HYDROGRAPH 0001
       ID1= 1 (  0004):   133.32   0.132     4.50    14.03
     + ID2= 2 (  0403):     0.00   0.000     0.00     0.00
       ==================================================
       ID = 3 (  0005):   133.32   0.132     4.50    14.03

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0500)|   Area    (ha)=   6.76
|ID= 1 DT=15.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=       5.07         1.69
    Dep. Storage     (mm)=       2.00         5.00
    Average Slope     (%)=       1.00         2.00
    Length            (m)=     212.29        40.00
    Mannings n          =      0.030        0.200

    Max.Eff.Inten.(mm/hr)=      30.54         6.72
               over (min)      15.00        30.00
    Storage Coeff.  (min)=      10.65 (ii)   28.83 (ii)
    Unit Hyd. Tpeak (min)=      15.00        30.00
    Unit Hyd. peak  (cms)=       0.09         0.04
                                                        *TOTALS*
    PEAK FLOW       (cms)=       0.33         0.02        0.340 (iii)
    TIME TO PEAK    (hrs)=       1.50         2.00         1.50
    RUNOFF VOLUME    (mm)=      22.91         4.77        16.56
    TOTAL RAINFALL   (mm)=      24.91        24.91        24.91
```



```
    RUNOFF COEFFICIENT   =       0.92         0.19         0.66

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  71.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0600)|   Area    (ha)=  12.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  40.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=       6.00         6.00
    Dep. Storage     (mm)=       2.00         5.00
    Average Slope     (%)=       1.00         2.00
    Length            (m)=     270.00        40.00
    Mannings n          =      0.030        0.200

    Max.Eff.Inten.(mm/hr)=      30.54         4.81
               over (min)      15.00        45.00
    Storage Coeff.  (min)=      12.31 (ii)   33.09 (ii)
    Unit Hyd. Tpeak (min)=      15.00        45.00
    Unit Hyd. peak  (cms)=       0.08         0.03
                                                        *TOTALS*
    PEAK FLOW       (cms)=       0.35         0.04        0.359 (iii)
    TIME TO PEAK    (hrs)=       1.50         2.25         1.50
    RUNOFF VOLUME    (mm)=      22.91         4.01        11.57
    TOTAL RAINFALL   (mm)=      24.91        24.91        24.91
    RUNOFF COEFFICIENT   =       0.92         0.16         0.46

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  71.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0006)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
```

```
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0500):     6.76  0.340     1.50    16.56
      + ID2= 2 (  0600):    12.00  0.359     1.50    11.57
        ==================================================
        ID = 3 (  0006):    18.76  0.699     1.50    13.37

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0700)|   Area    (ha)=  12.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  55.00   Dir. Conn.(%)=  43.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       6.60        5.40
     Dep. Storage     (mm)=       2.00        5.00
     Average Slope     (%)=       1.00        2.00
     Length            (m)=     282.00       40.00
     Mannings n           =      0.030       0.200

     Max.Eff.Inten.(mm/hr)=      30.54        5.42
                over (min)       15.00       45.00
     Storage Coeff.  (min)=      12.63 (ii)  32.44 (ii)
     Unit Hyd. Tpeak (min)=      15.00       45.00
     Unit Hyd. peak  (cms)=       0.08        0.03
                                                           *TOTALS*
     PEAK FLOW       (cms)=       0.37        0.04          0.383 (iii)
     TIME TO PEAK    (hrs)=       1.50        2.25           1.50
     RUNOFF VOLUME    (mm)=      22.91        4.27          12.28
     TOTAL RAINFALL   (mm)=      24.91       24.91          24.91
     RUNOFF COEFFICIENT   =       0.92        0.17           0.49

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0006):    18.76  0.699     1.50    13.37
      + ID2= 2 (  0700):    12.00  0.383     1.50    12.28
```



```
        ==================================================
        ID = 3 (  0007):    30.76  1.082     1.50    12.95

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0008)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0403):     8.58  0.262     1.50    11.57
      + ID2= 2 (  0007):    30.76  1.082     1.50    12.95
        ==================================================
        ID = 3 (  0008):    39.34  1.344     1.50    12.65

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0800)|   Area    (ha)=   2.60
|ID= 1 DT=15.0 min |   Total Imp(%)=  60.00   Dir. Conn.(%)=  45.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.56        1.04
     Dep. Storage     (mm)=       2.00        5.00
     Average Slope     (%)=       1.00        2.00
     Length            (m)=     131.00       40.00
     Mannings n           =      0.030       0.200

     Max.Eff.Inten.(mm/hr)=      30.54        6.47
                over (min)       15.00       30.00
     Storage Coeff.  (min)=       7.97 (ii)  26.43 (ii)
     Unit Hyd. Tpeak (min)=      15.00       30.00
     Unit Hyd. peak  (cms)=       0.10        0.04
                                                           *TOTALS*
     PEAK FLOW       (cms)=       0.09        0.01          0.099 (iii)
     TIME TO PEAK    (hrs)=       1.50        2.00           1.50
     RUNOFF VOLUME    (mm)=      22.91        4.68          12.88
     TOTAL RAINFALL   (mm)=      24.91       24.91          24.91
     RUNOFF COEFFICIENT   =       0.92        0.19           0.52

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
```



```
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0009)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0008):    39.34  1.344     1.50    12.65
      + ID2= 2 (  0800):     2.60  0.099     1.50    12.88
        ==================================================
        ID = 3 (  0009):    41.94  1.442     1.50    12.66

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0010)|     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   |   0.9400     0.6210
                          0.0500     0.1950   |   2.6600     0.7760
                          0.0800     0.3860   |   4.0200     0.9110
                          0.1300     0.4750   |   0.0000     0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0009)     41.940      1.442      1.50      12.66
   OUTFLOW: ID= 1 (  0010)     41.940      0.108      3.92      12.64

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  7.46
                  TIME SHIFT OF PEAK FLOW         (min)=145.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.4351

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0011)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0010):    41.94  0.108     3.92    12.64
      + ID2= 2 (  0005):   133.32  0.132     4.50    14.03
        ==================================================
        ID = 3 (  0011):   175.26  0.237     4.17    13.69

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
```



```
| STANDHYD (  0024)|   Area    (ha)=   1.24
|ID= 1 DT=10.0 min |   Total Imp(%)=  63.00   Dir. Conn.(%)=  63.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.78        0.46
     Dep. Storage     (mm)=       2.00        5.00
     Average Slope     (%)=       1.00        2.00
     Length            (m)=      90.92       40.00
     Mannings n           =      0.030       0.200

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 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
                 0.167    0.90 | 1.167   17.40 | 2.167    4.26 |  3.17    1.92
                 0.333    1.86 | 1.333   31.38 | 2.333    3.45 |  3.33    1.71
                 0.500    2.19 | 1.500   28.65 | 2.500    2.97 |  3.50    1.65
                 0.667    2.43 | 1.667   15.36 | 2.667    2.58 |  3.67    1.56
                 0.833    3.45 | 1.833    7.74 | 2.833    2.31 |  3.83    1.23
                 1.000    6.12 | 2.000    5.40 | 3.000    2.16 |  4.00    0.78

     Max.Eff.Inten.(mm/hr)=      31.38        3.01
                over (min)       10.00       40.00
     Storage Coeff.  (min)=       6.34 (ii)  31.41 (ii)
     Unit Hyd. Tpeak (min)=      10.00       40.00
     Unit Hyd. peak  (cms)=       0.13        0.03
                                                           *TOTALS*
     PEAK FLOW       (cms)=       0.06        0.00          0.062 (iii)
     TIME TO PEAK    (hrs)=       1.50        2.17           1.50
     RUNOFF VOLUME    (mm)=      22.91        3.21          15.61
     TOTAL RAINFALL   (mm)=      24.91       24.91          24.91
     RUNOFF COEFFICIENT   =       0.92        0.13           0.63

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0031)|   Area    (ha)=   1.03
|ID= 1 DT=10.0 min |   Total Imp(%)=  63.00   Dir. Conn.(%)=  63.00
```

```
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.65         0.38
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      82.87        40.00
     Mannings n           =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      31.38         3.01
                over (min)       10.00        40.00
     Storage Coeff.  (min)=       5.99 (ii)   31.07 (ii)
     Unit Hyd. Tpeak (min)=      10.00        40.00
     Unit Hyd. peak  (cms)=       0.14         0.03
                                                           *TOTALS*
     PEAK FLOW       (cms)=       0.05         0.00          0.052 (iii)
     TIME TO PEAK    (hrs)=       1.50         2.17           1.50
     RUNOFF VOLUME    (mm)=      22.91         3.21          15.60
     TOTAL RAINFALL   (mm)=      24.91        24.91          24.91
     RUNOFF COEFFICIENT   =       0.92         0.13           0.63

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------

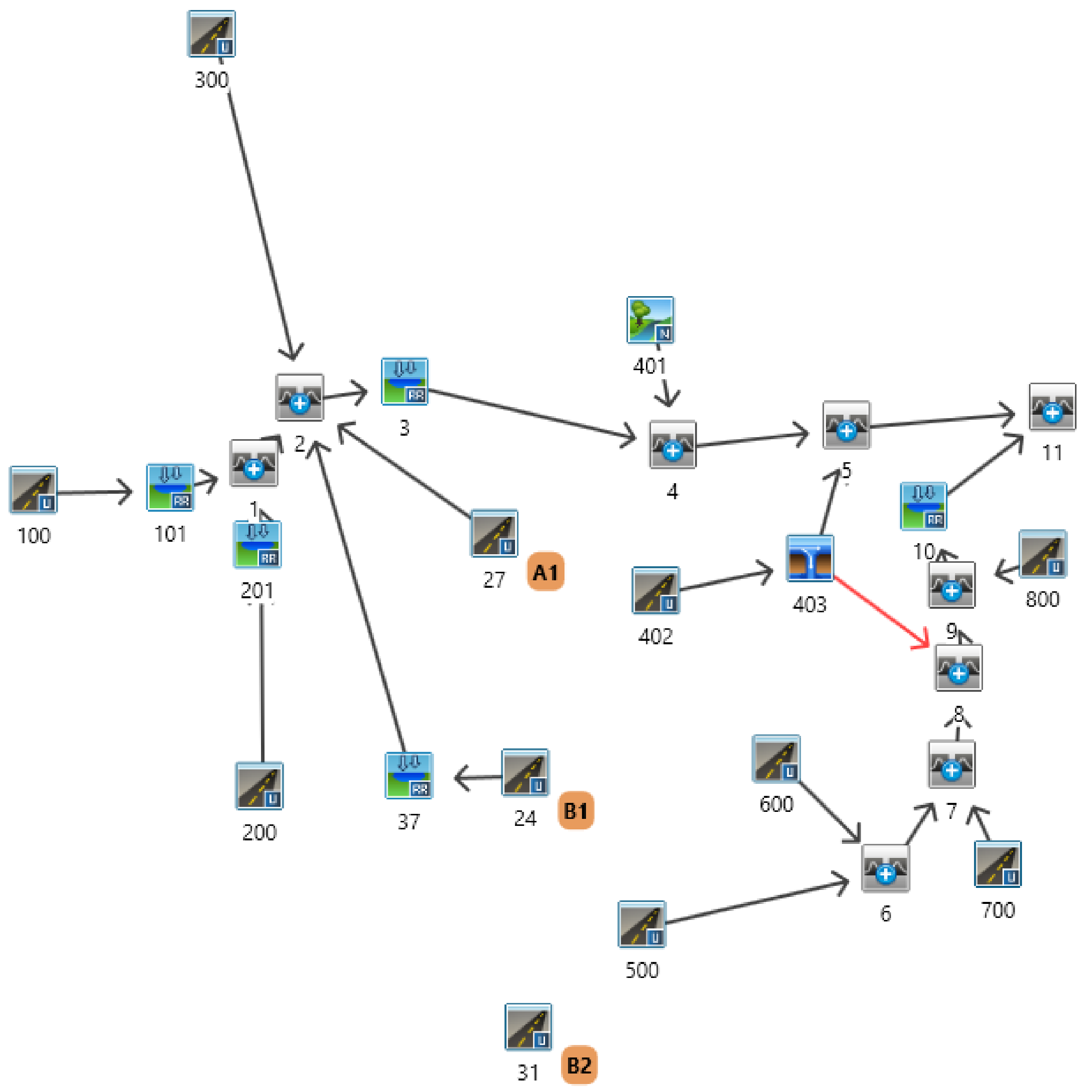
--------------------
| ADD HYD  (  0032)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0024):     1.24   0.062     1.50    15.61
      + ID2= 2 (  0031):     1.03   0.052     1.50    15.60
         ==================================================
        ID = 3 (  0032):     2.27   0.114     1.50    15.60

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------

 FINISH
====================================================================================
=======================
```

B000738 - Coleraine Drive

Proposed Conditions - Road Over Railway Scenario
VO Model Schematic (With Control)



```
==================================================================================================

      V    V   I    SSSSS  U   U    A    L              (v 6.0.2000)
      V    V   I    SS     U   U   A A   L
       V  V    I     SS    U   U  AAAAA  L
       V  V    I      SS   U   U  A   A  L
        VV     I    SSSSS  UUUUU  A   A  LLLLL

       OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
      O   O    T      T    H   H   Y Y   MM MM  O   O
      O   O    T      T    H   H    Y    M   M  O   O
       OOO     T      T    H   H    Y    M   M   OOO
Developed and Distributed by Civica Infrastructure
```



```
                   *****  D E T A I L E D   O U T P U T *****

  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.0\VO2\voin.dat

  Output  filename:
C:\Users\kevin.lukawiecki\AppData\Local\Civica\VH5\a512d3b0-a6e7-43a6-99e8-d9354a433
349\23d7128c-a412-4b54-8b67-73a6442c
  Summary filename:
C:\Users\kevin.lukawiecki\AppData\Local\Civica\VH5\a512d3b0-a6e7-43a6-99e8-d9354a433
349\23d7128c-a412-4b54-8b67-73a6442c

DATE: 01/26/2022                          TIME: 11:36:44

USER:

COMMENTS: ____________________________________________________________

------------------------------------------------------------------------------------------
  **********************************************
  ** SIMULATION : 10 Year                    **
  **********************************************

--------------------
```



```
|    READ STORM    |    Filename: C:\Users\kevin.lukawiecki\AppD
|                  |              ata\Local\Temp\
|                  |              b7e32948-76cc-466b-a4e2-69ca27ada067\e2390d93
| 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            |
| NASHYD   ( 0401)|   Area    (ha)=   6.62   Curve Number   (CN)= 63.0
|ID= 1 DT=15.0 min |   Ia      (mm)=   1.50   # of Linear Res.(N)= 2.00
--------------------   U.H. Tp(hrs)=   0.20

     Unit Hyd Qpeak  (cms)=   0.859

     PEAK FLOW      (cms)=   0.191 (i)
     TIME TO PEAK   (hrs)=   2.750
     RUNOFF VOLUME   (mm)=  12.698
     TOTAL RAINFALL  (mm)=  55.690
     RUNOFF COEFFICIENT   =   0.228

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0100)|   Area    (ha)=  23.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      17.25        5.75
     Dep. Storage     (mm)=       2.00        5.00
     Average Slope     (%)=       1.00        2.00
     Length            (m)=     390.00       40.00
     Mannings n          =       0.030       0.200

     Max.Eff.Inten.(mm/hr)=      51.24       34.94
                over (min)       15.00       30.00
```



```
     Storage Coeff.  (min)=      12.48 (ii)   21.88 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.08         0.05
                                                        *TOTALS*
     PEAK FLOW       (cms)=       2.00         0.34        2.283 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00         2.75
     RUNOFF VOLUME    (mm)=      53.69        21.52        42.43
     TOTAL RAINFALL   (mm)=      55.69        55.69        55.69
     RUNOFF COEFFICIENT   =       0.96         0.39         0.76

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------------------
--------------------
| RESERVOIR( 0101)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 15.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.7800     1.0000
                          0.7800     0.0000   |   0.0000     0.0000

                                 AREA     QPEAK     TPEAK       R.V.
                                 (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0100)     23.000      2.283      2.75      42.43
   OUTFLOW: ID= 1 (  0101)     23.000      0.780      2.50      43.11

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 34.16
                  TIME SHIFT OF PEAK FLOW         (min)=-15.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0939

------------------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0200)|   Area    (ha)=  28.40
|ID= 1 DT=15.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      21.30        7.10
     Dep. Storage     (mm)=       2.00        5.00
     Average Slope     (%)=       1.00        2.00
     Length            (m)=     435.00       40.00
     Mannings n          =       0.030       0.200
```



```
     Max.Eff.Inten.(mm/hr)=      51.24       34.94
                over (min)       15.00       30.00
     Storage Coeff.  (min)=      13.32 (ii)   22.72 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.08         0.04
                                                        *TOTALS*
     PEAK FLOW       (cms)=       2.45         0.42        2.786 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00         2.75
     RUNOFF VOLUME    (mm)=      53.69        21.52        42.43
     TOTAL RAINFALL   (mm)=      55.69        55.69        55.69
     RUNOFF COEFFICIENT   =       0.96         0.39         0.76

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------------------
--------------------
| RESERVOIR( 0201)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 15.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.8700     1.2000
                          0.8700     0.0000   |   0.0000     0.0000

                                 AREA     QPEAK     TPEAK       R.V.
                                 (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0200)     28.400      2.786      2.75      42.43
   OUTFLOW: ID= 1 (  0201)     28.400      0.870      2.25      43.12

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 31.23
                  TIME SHIFT OF PEAK FLOW         (min)=-30.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.1257

------------------------------------------------------------------------------------------
--------------------
| ADD HYD  (  0001)|
|  1 +  2 =  3     |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
         ID1= 1 (  0101):    23.00   0.780     2.50    43.11
       + ID2= 2 (  0201):    28.40   0.870     2.25    43.12
       ==============================================
```

```
      ID = 3 (  0001):    51.40   1.650     2.50    43.12

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0300)|   Area    (ha)=  73.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  57.00   Dir. Conn.(%)=  47.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      41.61        31.39
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     692.00        40.00
     Mannings n           =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      51.24        28.16
                over (min)       15.00        30.00
     Storage Coeff.  (min)=      17.60 (ii)   27.85 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.06         0.04
                                                         *TOTALS*
     PEAK FLOW       (cms)=       4.28         1.36          5.340 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00           2.75
     RUNOFF VOLUME    (mm)=      53.69        19.63          35.64
     TOTAL RAINFALL   (mm)=      55.69        55.69          55.69
     RUNOFF COEFFICIENT   =       0.96         0.35           0.64

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  71.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0027)|   Area    (ha)=   2.30
|ID= 1 DT=10.0 min |   Total Imp(%)=  71.00   Dir. Conn.(%)=  71.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.63         0.67
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     123.83        40.00
     Mannings n           =      0.030        0.200
```



```
   NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 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
           0.167    0.00 | 1.833   12.81 | 3.500    7.80 |  5.17    1.11
           0.333    0.56 | 2.000   18.94 | 3.667    7.80 |  5.33    1.11
           0.500    1.11 | 2.167   18.94 | 3.833    6.13 |  5.50    1.11
           0.667    1.11 | 2.333   35.09 | 4.000    4.46 |  5.67    1.11
           0.833    1.11 | 2.500   51.24 | 4.167    4.46 |  5.83    1.11
           1.000    1.11 | 2.667   51.24 | 4.333    3.34 |  6.00    1.11
           1.167    1.11 | 2.833   32.86 | 4.500    2.23 |  6.17    1.11
           1.333    3.89 | 3.000   14.48 | 4.667    2.23 |  6.33    0.56
           1.500    6.68 | 3.167   14.48 | 4.833    1.67 |
           1.667    6.68 | 3.333   11.14 | 5.000    1.11 |

     Max.Eff.Inten.(mm/hr)=      51.24        16.19
                over (min)       10.00        20.00
     Storage Coeff.  (min)=       6.27 (ii)   19.06 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.14         0.06
                                                         *TOTALS*
     PEAK FLOW       (cms)=       0.23         0.02          0.246 (iii)
     TIME TO PEAK    (hrs)=       2.67         2.83           2.67
     RUNOFF VOLUME    (mm)=      53.69        16.64          42.94
     TOTAL RAINFALL   (mm)=      55.69        55.69          55.69
     RUNOFF COEFFICIENT   =       0.96         0.30           0.77

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  71.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0024)|   Area    (ha)=   1.24
|ID= 1 DT=10.0 min |   Total Imp(%)=  63.00   Dir. Conn.(%)=  63.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.78         0.46
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      90.92        40.00
```



```
     Mannings n           =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      51.24        16.19
                over (min)       10.00        20.00
     Storage Coeff.  (min)=       5.21 (ii)   18.00 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.15         0.06
                                                         *TOTALS*
     PEAK FLOW       (cms)=       0.11         0.02          0.122 (iii)
     TIME TO PEAK    (hrs)=       2.67         2.83           2.67
     RUNOFF VOLUME    (mm)=      53.69        16.64          39.97
     TOTAL RAINFALL   (mm)=      55.69        55.69          55.69
     RUNOFF COEFFICIENT   =       0.96         0.30           0.72

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  71.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR( 0037)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
     **** WARNING : FIRST OUTFLOW IS NOT ZERO.
                          0.1220     0.0000   |   0.1220      0.1000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0024)      1.240      0.122      2.67      39.97
   OUTFLOW: ID= 1 (  0037)      1.240      0.122      2.67      39.98

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 99.60
                   TIME SHIFT OF PEAK FLOW         (min)=  0.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.0000
                   MAXIMUM  STORAGE   USED       (cu.m.)=  0.145297

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0002)|
|  1 +  2 =  3     |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
      ID1= 1 (  0001):    51.40   1.650     2.50    43.12
```



```
    + ID2= 2 (  0027):     2.30   0.246     2.67    42.94
      ==================================================
      ID = 3 (  0002):    53.70   1.896     2.67    43.23

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0002)|
|  3 +  2 =  1     |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
      ID1= 3 (  0002):    53.70   1.896     2.67    43.23
    + ID2= 2 (  0300):    73.00   5.340     2.75    35.64
      ==================================================
      ID = 1 (  0002):   126.70   6.749     2.67    38.85

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0002)|
|  1 +  2 =  3     |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
      ID1= 1 (  0002):   126.70   6.749     2.67    38.85
    + ID2= 2 (  0037):     1.24   0.122     2.67    39.98
      ==================================================
      ID = 3 (  0002):   127.94   6.871     2.67    38.86

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR( 0003)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 15.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.1900      1.9300
                          0.0500     0.4200   |   0.4700      2.6400
                          0.0800     0.8400   |   0.8500      3.3400
                          0.0900     1.3900   |   1.3200      3.7000
                          0.1000     1.6000   |   2.4600      4.2500

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0002)    127.940      6.871      2.67      38.86
   OUTFLOW: ID= 1 (  0003)    127.940      1.580      5.25      38.82

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 22.99
                   TIME SHIFT OF PEAK FLOW         (min)=155.00
```

```
          MAXIMUM  STORAGE   USED       (ha.m.)=  3.8254

     **** WARNING : SELECTED ROUTING TIME STEP DENIED.
-------------------------------------------------------------------------------
--------------------
| ADD HYD  (  0004)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0003):   127.94   1.580     5.25    38.82
      + ID2= 2 (  0401):     6.62   0.191     2.75    12.70
        ==================================================
        ID = 3 (  0004):   134.56   1.590     5.25    37.53

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0402)|   Area    (ha)=   8.58
|ID= 1 DT=15.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  40.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       4.29         4.29
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     239.17        40.00
     Mannings n           =      0.030        0.200

         NOTE:  RAINFALL WAS TRANSFORMED TO  15.0 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
               0.250    0.00 | 2.000   18.94 | 3.750    7.80 |  5.50    1.11
               0.500    1.11 | 2.250   18.94 | 4.000    4.46 |  5.75    1.11
               0.750    1.11 | 2.500   51.24 | 4.250    4.46 |  6.00    1.11
               1.000    1.11 | 2.750   51.24 | 4.500    2.23 |  6.25    1.11
               1.250    1.11 | 3.000   14.48 | 4.750    2.23 |
               1.500    6.68 | 3.250   14.48 | 5.000    1.11 |
               1.750    6.68 | 3.500    7.80 | 5.250    1.11 |

     Max.Eff.Inten.(mm/hr)=      51.24        26.88
                over (min)       15.00        30.00
     Storage Coeff.  (min)=       9.30 (ii)   19.74 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.09         0.05
                                                             *TOTALS*
```



```
     PEAK FLOW       (cms)=       0.48         0.20          0.641 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00           2.75
     RUNOFF VOLUME    (mm)=      53.69        19.24          33.02
     TOTAL RAINFALL   (mm)=      55.69        55.69          55.69
     RUNOFF COEFFICIENT   =       0.96         0.35           0.59

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
--------------------
| DUHYD    (  0403)|
| Inlet Cap.= 0.740|
| #of Inlets=     1|
| Total(cms)=   0.7|      AREA     QPEAK     TPEAK     R.V.
--------------------      (ha)     (cms)     (hrs)     (mm)
     TOTAL HYD.(ID= 1):   8.58      0.64      2.75   33.02
     ===================================================
     MAJOR SYS.(ID= 2):   0.00      0.00      0.00    0.00
     MINOR SYS.(ID= 3):   8.58      0.64      2.75   33.02

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0005)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
*** W A R N I N G :  HYDROGRAPH   0403 <ID= 2> IS DRY.
*** W A R N I N G :  HYDROGRAPH   0003 = HYDROGRAPH 0001
        ID1= 1 (  0004):   134.56   1.590     5.25    37.53
      + ID2= 2 (  0403):     0.00   0.000     0.00     0.00
        ==================================================
        ID = 3 (  0005):   134.56   1.590     5.25    37.53

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0500)|   Area    (ha)=   6.76
|ID= 1 DT=15.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
--------------------
```



```
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       5.07         1.69
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     212.29        40.00
     Mannings n           =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      51.24        34.94
                over (min)       15.00        30.00
     Storage Coeff.  (min)=       8.66 (ii)   18.06 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.09         0.05
                                                             *TOTALS*
     PEAK FLOW       (cms)=       0.61         0.11          0.703 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00           2.75
     RUNOFF VOLUME    (mm)=      53.69        21.52          42.43
     TOTAL RAINFALL   (mm)=      55.69        55.69          55.69
     RUNOFF COEFFICIENT   =       0.96         0.39           0.76

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0600)|   Area    (ha)=  12.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  40.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       6.00         6.00
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     270.00        40.00
     Mannings n           =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      51.24        26.88
                over (min)       15.00        30.00
     Storage Coeff.  (min)=      10.01 (ii)   20.45 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.09         0.05
                                                             *TOTALS*
     PEAK FLOW       (cms)=       0.66         0.28          0.889 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00           2.75
```



```
     RUNOFF VOLUME    (mm)=      53.69        19.24          33.02
     TOTAL RAINFALL   (mm)=      55.69        55.69          55.69
     RUNOFF COEFFICIENT   =       0.96         0.35           0.59

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0006)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0500):     6.76   0.703     2.75    42.43
      + ID2= 2 (  0600):    12.00   0.889     2.75    33.02
        ==================================================
        ID = 3 (  0006):    18.76   1.592     2.75    36.41

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0700)|   Area    (ha)=  12.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  55.00   Dir. Conn.(%)=  43.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       6.60         5.40
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     282.00        40.00
     Mannings n           =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      51.24        29.51
                over (min)       15.00        30.00
     Storage Coeff.  (min)=      10.27 (ii)   20.33 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.09         0.05
                                                             *TOTALS*
     PEAK FLOW       (cms)=       0.71         0.28          0.936 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00           2.75
     RUNOFF VOLUME    (mm)=      53.69        20.03          34.50
     TOTAL RAINFALL   (mm)=      55.69        55.69          55.69
     RUNOFF COEFFICIENT   =       0.96         0.36           0.62
```

```
***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0006):    18.76   1.592     2.75    36.41
      + ID2= 2 (  0700):    12.00   0.936     2.75    34.50
        ===================================================
        ID = 3 (  0007):    30.76   2.528     2.75    35.67

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0008)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0403):     8.58   0.641     2.75    33.02
      + ID2= 2 (  0007):    30.76   2.528     2.75    35.67
        ===================================================
        ID = 3 (  0008):    39.34   3.170     2.75    35.09

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0800)|   Area    (ha)=   2.60
|ID= 1 DT=15.0 min |   Total Imp(%)=  60.00   Dir. Conn.(%)=  45.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.56         1.04
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     131.00        40.00
     Mannings n           =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      51.24        33.90
                over (min)       15.00        30.00
```



```
     Storage Coeff.  (min)=       6.48 (ii)   16.00 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.10         0.05
                                                            *TOTALS*
     PEAK FLOW       (cms)=       0.17         0.07           0.222 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00           2.75
     RUNOFF VOLUME    (mm)=      53.69        21.25          35.85
     TOTAL RAINFALL   (mm)=      55.69        55.69          55.69
     RUNOFF COEFFICIENT   =       0.96         0.38           0.64

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0009)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0008):    39.34   3.170     2.75    35.09
      + ID2= 2 (  0800):     2.60   0.222     2.75    35.85
        ===================================================
        ID = 3 (  0009):    41.94   3.392     2.75    35.14

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0010)|     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   |   0.9400     0.6210
                          0.0500     0.1950   |   2.6600     0.7760
                          0.0800     0.3860   |   4.0200     0.9110
                          0.1300     0.4750   |   0.0000     0.0000

                                 AREA     QPEAK     TPEAK       R.V.
                                 (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0009)      41.940     3.392      2.75      35.14
   OUTFLOW: ID= 1 (  0010)      41.940     1.858      3.08      35.11

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 54.77
                  TIME SHIFT OF PEAK FLOW        (min)= 20.00
```



```
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.7043

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0011)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0010):    41.94   1.858     3.08    35.11
      + ID2= 2 (  0005):   134.56   1.590     5.25    37.53
        ===================================================
        ID = 3 (  0011):   176.50   2.346     3.17    36.96

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0031)|   Area    (ha)=   1.03
|ID= 1 DT=10.0 min |   Total Imp(%)=  63.00   Dir. Conn.(%)=  63.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.65         0.38
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      82.87        40.00
     Mannings n           =      0.030        0.200

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 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
                 0.167    0.00 | 1.833   12.81 | 3.500    7.80 |  5.17    1.11
                 0.333    0.56 | 2.000   18.94 | 3.667    7.80 |  5.33    1.11
                 0.500    1.11 | 2.167   18.94 | 3.833    6.13 |  5.50    1.11
                 0.667    1.11 | 2.333   35.09 | 4.000    4.46 |  5.67    1.11
                 0.833    1.11 | 2.500   51.24 | 4.167    4.46 |  5.83    1.11
                 1.000    1.11 | 2.667   51.24 | 4.333    3.34 |  6.00    1.11
                 1.167    1.11 | 2.833   32.86 | 4.500    2.23 |  6.17    1.11
                 1.333    3.89 | 3.000   14.48 | 4.667    2.23 |  6.33    0.56
                 1.500    6.68 | 3.167   14.48 | 4.833    1.67 |
                 1.667    6.68 | 3.333   11.14 | 5.000    1.11 |

     Max.Eff.Inten.(mm/hr)=      51.24        16.19
                over (min)       10.00        20.00
     Storage Coeff.  (min)=       4.93 (ii)   17.71 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
```



```
     Unit Hyd. peak  (cms)=       0.15         0.06
                                                            *TOTALS*
     PEAK FLOW       (cms)=       0.09         0.01           0.102 (iii)
     TIME TO PEAK    (hrs)=       2.67         2.83           2.67
     RUNOFF VOLUME    (mm)=      53.69        16.64          39.97
     TOTAL RAINFALL   (mm)=      55.69        55.69          55.69
     RUNOFF COEFFICIENT   =       0.96         0.30           0.72

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
====================================================================================
======================

       V    V   I    SSSSS  U   U    A    L              (v 6.0.2000)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                   *****  D E T A I L E D   O U T P U T *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.0\VO2\voin.dat

  Output  filename:
C:\Users\kevin.lukawiecki\AppData\Local\Civica\VH5\a512d3b0-a6e7-43a6-99e8-d9354a433
349\dba7111a-8a7c-4cdf-b3e6-a77a30e7
  Summary filename:
C:\Users\kevin.lukawiecki\AppData\Local\Civica\VH5\a512d3b0-a6e7-43a6-99e8-d9354a433
349\dba7111a-8a7c-4cdf-b3e6-a77a30e7
```

```
DATE: 01/26/2022                         TIME: 11:36:45

USER:


COMMENTS: ____________________________________________________________


------------------------------------------------------------------------------------
----------------------
  **********************************************
  ** SIMULATION : 100 Year                    **
  **********************************************


--------------------
|    READ STORM    |    Filename: C:\Users\kevin.lukawiecki\AppD
|                  |              ata\Local\Temp\
|                  |              b7e32948-76cc-466b-a4e2-69ca27ada067\073ffba8
| 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            |
| NASHYD   ( 0401)|   Area    (ha)=   6.62   Curve Number   (CN)= 63.0
|ID= 1 DT=15.0 min |   Ia      (mm)=   1.50   # of Linear Res.(N)= 2.00
--------------------   U.H. Tp(hrs)=   0.20

     Unit Hyd Qpeak  (cms)=   0.859

     PEAK FLOW       (cms)=   0.365 (i)
     TIME TO PEAK    (hrs)=   2.750
     RUNOFF VOLUME    (mm)=  23.957
     TOTAL RAINFALL   (mm)=  80.310
     RUNOFF COEFFICIENT   =   0.298
```



```
     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0100)|   Area    (ha)=  23.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      17.25         5.75
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     390.00        40.00
     Mannings n          =       0.030        0.200

     Max.Eff.Inten.(mm/hr)=      73.88        62.61
                over (min)       15.00        30.00
     Storage Coeff.  (min)=      10.78 (ii)   18.22 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.09         0.05
                                                          *TOTALS*
     PEAK FLOW       (cms)=       2.95         0.67          3.527 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00           2.75
     RUNOFF VOLUME    (mm)=      78.31        39.04          64.56
     TOTAL RAINFALL   (mm)=      80.31        80.31          80.31
     RUNOFF COEFFICIENT   =       0.98         0.49           0.80

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0101)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 15.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                         0.0000     0.0000   |   0.7800     1.0000
                         0.7800     0.0000   |   0.0000     0.0000

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0100)     23.000      3.527      2.75      64.56
   OUTFLOW: ID= 1 (  0101)     23.000      0.780      2.00      65.64
```



```
                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 22.12
                   TIME SHIFT OF PEAK FLOW         (min)=-45.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.2357

------------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0200)|   Area    (ha)=  28.40
|ID= 1 DT=15.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      21.30         7.10
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     435.00        40.00
     Mannings n          =       0.030        0.200

     Max.Eff.Inten.(mm/hr)=      73.88        62.61
                over (min)       15.00        30.00
     Storage Coeff.  (min)=      11.51 (ii)   18.95 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.08         0.05
                                                          *TOTALS*
     PEAK FLOW       (cms)=       3.61         0.81          4.312 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00           2.75
     RUNOFF VOLUME    (mm)=      78.31        39.04          64.56
     TOTAL RAINFALL   (mm)=      80.31        80.31          80.31
     RUNOFF COEFFICIENT   =       0.98         0.49           0.80

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0201)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 15.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                         0.0000     0.0000   |   0.8700     1.2000
                         0.8700     0.0000   |   0.0000     0.0000

                               AREA     QPEAK     TPEAK       R.V.
```



```
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0200)     28.400      4.312      2.75      64.56
   OUTFLOW: ID= 1 (  0201)     28.400      0.870      2.00      65.78

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 20.17
                   TIME SHIFT OF PEAK FLOW         (min)=-45.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.3070

------------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0001)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0101):    23.00   0.780     2.00    65.64
      + ID2= 2 (  0201):    28.40   0.870     2.00    65.78
        ==================================================
        ID = 3 (  0001):    51.40   1.650     2.00    65.72

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
------------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0300)|   Area    (ha)=  73.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  57.00   Dir. Conn.(%)=  47.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      41.61        31.39
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     692.00        40.00
     Mannings n          =       0.030        0.200

     Max.Eff.Inten.(mm/hr)=      73.88        51.42
                over (min)       15.00        30.00
     Storage Coeff.  (min)=      15.20 (ii)   23.26 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.07         0.04
                                                          *TOTALS*
     PEAK FLOW       (cms)=       6.39         2.74          8.665 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00           2.75
     RUNOFF VOLUME    (mm)=      78.31        36.24          56.02
     TOTAL RAINFALL   (mm)=      80.31        80.31          80.31
     RUNOFF COEFFICIENT   =       0.98         0.45           0.70


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
```

```
  (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
       THAN THE STORAGE COEFFICIENT.
 (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD ( 0027)|   Area    (ha)=   2.30
|ID= 1 DT=10.0 min |   Total Imp(%)=  71.00   Dir. Conn.(%)=  71.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.63         0.67
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     123.83        40.00
     Mannings n          =      0.030        0.200

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 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
               0.167    0.00 | 1.833   18.47 | 3.500   11.24 |  5.17    1.61
               0.333    0.81 | 2.000   27.30 | 3.667   11.24 |  5.33    1.61
               0.500    1.61 | 2.167   27.30 | 3.833    8.83 |  5.50    1.61
               0.667    1.61 | 2.333   50.59 | 4.000    6.42 |  5.67    1.61
               0.833    1.61 | 2.500   73.88 | 4.167    6.42 |  5.83    1.61
               1.000    1.61 | 2.667   73.88 | 4.333    4.81 |  6.00    1.61
               1.167    1.61 | 2.833   47.38 | 4.500    3.21 |  6.17    1.61
               1.333    5.62 | 3.000   20.88 | 4.667    3.21 |  6.33    0.81
               1.500    9.64 | 3.167   20.88 | 4.833    2.41 |
               1.667    9.64 | 3.333   16.06 | 5.000    1.61 |

     Max.Eff.Inten.(mm/hr)=      73.88        35.17
                over (min)       10.00        20.00
     Storage Coeff.  (min)=       5.41 (ii)   14.79 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.14         0.07
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.33         0.05          0.371 (iii)
     TIME TO PEAK    (hrs)=       2.67         2.83          2.67
     RUNOFF VOLUME    (mm)=      78.31        31.67         64.78
     TOTAL RAINFALL   (mm)=      80.31        80.31         80.31
     RUNOFF COEFFICIENT   =       0.98         0.39          0.81

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
```



```
   (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
        CN*  =  71.0    Ia = Dep. Storage  (Above)
  (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
       THAN THE STORAGE COEFFICIENT.
 (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD ( 0024)|   Area    (ha)=   1.24
|ID= 1 DT=10.0 min |   Total Imp(%)=  63.00   Dir. Conn.(%)=  63.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.78         0.46
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      90.92        40.00
     Mannings n          =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      73.88        35.17
                over (min)       10.00        20.00
     Storage Coeff.  (min)=       4.50 (ii)   13.88 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.15         0.07
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.16         0.03          0.187 (iii)
     TIME TO PEAK    (hrs)=       2.67         2.83          2.67
     RUNOFF VOLUME    (mm)=      78.31        31.67         61.05
     TOTAL RAINFALL   (mm)=      80.31        80.31         80.31
     RUNOFF COEFFICIENT   =       0.98         0.39          0.76

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

   (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
        CN*  =  71.0    Ia = Dep. Storage  (Above)
  (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
       THAN THE STORAGE COEFFICIENT.
 (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR( 0037)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------       (cms)     (ha.m.)  |   (cms)     (ha.m.)
     **** WARNING : FIRST OUTFLOW IS NOT ZERO.
                          0.1220     0.0000   |   0.1220     0.1000
```



```
                                  AREA     QPEAK     TPEAK       R.V.
                                  (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 ( 0024)        1.240     0.187      2.67      61.05
   OUTFLOW: ID= 1 ( 0037)        1.240     0.122      2.42      61.66

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 65.14
                  TIME SHIFT OF PEAK FLOW         (min)=-15.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0056

--------------------------------------------------------------------------------

--------------------
| ADD HYD  ( 0002)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 ( 0001):     51.40   1.650     2.00    65.72
     + ID2= 2 ( 0027):      2.30   0.371     2.67    64.78
       ===================================================
       ID = 3 ( 0002):     53.70   2.021     2.67    65.89

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  ( 0002)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 3 ( 0002):     53.70   2.021     2.67    65.89
     + ID2= 2 ( 0300):     73.00   8.665     2.75    56.02
       ===================================================
       ID = 1 ( 0002):    126.70   9.883     2.67    60.20

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  ( 0002)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 ( 0002):    126.70   9.883     2.67    60.20
     + ID2= 2 ( 0037):      1.24   0.122     2.42    61.66
       ===================================================
       ID = 3 ( 0002):    127.94  10.005     2.67    60.22

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR( 0003)|     OVERFLOW IS OFF
```



```
| IN= 2---> OUT= 1 |
| DT= 15.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------       (cms)     (ha.m.)  |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.1900     1.9300
                          0.0500     0.4200   |   0.4700     2.6400
                          0.0800     0.8400   |   0.8500     3.3400
                          0.0900     1.3900   |   1.3200     3.7000
                          0.1000     1.6000   |   2.4600     4.2500

                                  AREA     QPEAK     TPEAK       R.V.
                                  (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 ( 0002)      127.940    10.005      2.67      60.22
   OUTFLOW: ID= 1 ( 0003)      127.940     2.816      4.42      60.17

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 28.15
                  TIME SHIFT OF PEAK FLOW         (min)=105.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  4.4224

     **** WARNING : SELECTED ROUTING TIME STEP DENIED.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  ( 0004)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 ( 0003):    127.94   2.816     4.42    60.17
     + ID2= 2 ( 0401):      6.62   0.365     2.75    23.96
       ===================================================
       ID = 3 ( 0004):    134.56   2.870     4.42    58.39

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD ( 0402)|   Area    (ha)=   8.58
|ID= 1 DT=15.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  40.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       4.29         4.29
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     239.17        40.00
     Mannings n          =      0.030        0.200

         NOTE:  RAINFALL WAS TRANSFORMED TO  15.0 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
   0.250    0.00 | 2.000   27.30 | 3.750   11.24 |  5.50    1.61
   0.500    1.61 | 2.250   27.30 | 4.000    6.42 |  5.75    1.61
   0.750    1.61 | 2.500   73.88 | 4.250    6.42 |  6.00    1.61
   1.000    1.61 | 2.750   73.88 | 4.500    3.21 |  6.25    1.61
   1.250    1.61 | 3.000   20.88 | 4.750    3.21 |
   1.500    9.64 | 3.250   20.88 | 5.000    1.61 |
   1.750    9.64 | 3.500   11.24 | 5.250    1.61 |

     Max.Eff.Inten.(mm/hr)=      73.88        49.29
                over (min)       15.00        30.00
     Storage Coeff.  (min)=       8.04 (ii)   16.23 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.10         0.05
                                                         *TOTALS*
     PEAK FLOW       (cms)=       0.69         0.40          1.044 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00           2.75
     RUNOFF VOLUME    (mm)=      78.31        35.66          52.72
     TOTAL RAINFALL   (mm)=      80.31        80.31          80.31
     RUNOFF COEFFICIENT   =       0.98         0.44           0.66

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| DUHYD    (  0403)|
| Inlet Cap.= 0.740|
| #of Inlets=     1|
| Total(cms)=   0.7|      AREA     QPEAK     TPEAK     R.V.
--------------------      (ha)     (cms)     (hrs)     (mm)
     TOTAL HYD.(ID= 1):   8.58      1.04      2.75    52.72
     ======================================================
     MAJOR SYS.(ID= 2):   0.59      0.30      2.75    52.72
     MINOR SYS.(ID= 3):   7.99      0.74      2.50    52.72

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0005)|
```



```
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
      ID1= 1 (  0004):    134.56   2.870     4.42    58.39
    + ID2= 2 (  0403):      0.59   0.304     2.75    52.72
      ==================================================
      ID = 3 (  0005):    135.15   2.870     4.42    58.37

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0500)|   Area    (ha)=   6.76
|ID= 1 DT=15.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       5.07         1.69
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     212.29        40.00
     Mannings n           =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      73.88        62.61
                over (min)       15.00        15.00
     Storage Coeff.  (min)=       7.48 (ii)   14.93 (ii)
     Unit Hyd. Tpeak (min)=      15.00        15.00
     Unit Hyd. peak  (cms)=       0.10         0.07
                                                         *TOTALS*
     PEAK FLOW       (cms)=       0.89         0.24          1.133 (iii)
     TIME TO PEAK    (hrs)=       2.75         2.75           2.75
     RUNOFF VOLUME    (mm)=      78.31        39.04          64.56
     TOTAL RAINFALL   (mm)=      80.31        80.31          80.31
     RUNOFF COEFFICIENT   =       0.98         0.49           0.80

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0600)|   Area    (ha)=  12.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  40.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
```



```
     Surface Area     (ha)=       6.00         6.00
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     270.00        40.00
     Mannings n           =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      73.88        49.29
                over (min)       15.00        30.00
     Storage Coeff.  (min)=       8.64 (ii)   16.84 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.09         0.05
                                                         *TOTALS*
     PEAK FLOW       (cms)=       0.97         0.56          1.448 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00           2.75
     RUNOFF VOLUME    (mm)=      78.31        35.66          52.72
     TOTAL RAINFALL   (mm)=      80.31        80.31          80.31
     RUNOFF COEFFICIENT   =       0.98         0.44           0.66

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0006)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
      ID1= 1 (  0500):      6.76   1.133     2.75    64.56
    + ID2= 2 (  0600):     12.00   1.448     2.75    52.72
      ==================================================
      ID = 3 (  0006):     18.76   2.581     2.75    56.99

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0700)|   Area    (ha)=  12.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  55.00   Dir. Conn.(%)=  43.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       6.60         5.40
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
```



```
     Length            (m)=     282.00        40.00
     Mannings n           =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      73.88        53.66
                over (min)       15.00        30.00
     Storage Coeff.  (min)=       8.87 (ii)   16.79 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.09         0.05
                                                         *TOTALS*
     PEAK FLOW       (cms)=       1.04         0.55          1.513 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00           2.75
     RUNOFF VOLUME    (mm)=      78.31        36.84          54.67
     TOTAL RAINFALL   (mm)=      80.31        80.31          80.31
     RUNOFF COEFFICIENT   =       0.98         0.46           0.68

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
      ID1= 1 (  0006):     18.76   2.581     2.75    56.99
    + ID2= 2 (  0700):     12.00   1.513     2.75    54.67
      ==================================================
      ID = 3 (  0007):     30.76   4.094     2.75    56.08

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0008)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
      ID1= 1 (  0403):      7.99   0.740     2.50    52.72
    + ID2= 2 (  0007):     30.76   4.094     2.75    56.08
      ==================================================
      ID = 3 (  0008):     38.75   4.834     2.75    55.39

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
```

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--------------------
| CALIB            |
| STANDHYD ( 0800)|   Area    (ha)=   2.60
|ID= 1 DT=15.0 min |   Total Imp(%)=  60.00   Dir. Conn.(%)=  45.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.56          1.04
     Dep. Storage     (mm)=       2.00          5.00
     Average Slope     (%)=       1.00          2.00
     Length            (m)=     131.00         40.00
     Mannings n           =      0.030         0.200

     Max.Eff.Inten.(mm/hr)=      73.88         60.91
                over (min)       15.00         15.00
     Storage Coeff.  (min)=       5.60 (ii)    13.13 (ii)
     Unit Hyd. Tpeak (min)=      15.00         15.00
     Unit Hyd. peak  (cms)=       0.11          0.08
                                                           *TOTALS*
     PEAK FLOW       (cms)=       0.24          0.15         0.390 (iii)
     TIME TO PEAK    (hrs)=       2.75          2.75          2.75
     RUNOFF VOLUME    (mm)=      78.31         38.64         56.49
     TOTAL RAINFALL   (mm)=      80.31         80.31         80.31
     RUNOFF COEFFICIENT   =       0.98          0.48          0.70

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0009)|
|   1 +  2 =  3    |        AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0008):    38.75   4.834     2.75    55.39
      + ID2= 2 (  0800):     2.60   0.390     2.75    56.49
        ==================================================
        ID = 3 (  0009):    41.35   5.224     2.75    55.46

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR( 0010)|      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   |   0.9400     0.6210
                           0.0500     0.1950   |   2.6600     0.7760
                           0.0800     0.3860   |   4.0200     0.9110
                           0.1300     0.4750   |   0.0000     0.0000

                                 AREA     QPEAK     TPEAK       R.V.
                                 (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0009)     41.347      5.224      2.75      55.46
   OUTFLOW: ID= 1 (  0010)     41.347      3.651      2.92      55.43

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 69.90
                  TIME SHIFT OF PEAK FLOW         (min)= 10.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.8784

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0011)|
|   1 +  2 =  3    |        AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0010):    41.35   3.651     2.92    55.43
      + ID2= 2 (  0005):   135.15   2.870     4.42    58.37
        ==================================================
        ID = 3 (  0011):   176.50   4.604     2.92    57.68

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD ( 0031)|   Area    (ha)=   1.03
|ID= 1 DT=10.0 min |   Total Imp(%)=  63.00   Dir. Conn.(%)=  63.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.65          0.38
     Dep. Storage     (mm)=       2.00          5.00
     Average Slope     (%)=       1.00          2.00
     Length            (m)=      82.87         40.00
     Mannings n           =      0.030         0.200

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 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
                0.167    0.00 | 1.833   18.47 | 3.500   11.24 |  5.17    1.61
```



```
                0.333    0.81 | 2.000   27.30 | 3.667   11.24 |  5.33    1.61
                0.500    1.61 | 2.167   27.30 | 3.833    8.83 |  5.50    1.61
                0.667    1.61 | 2.333   50.59 | 4.000    6.42 |  5.67    1.61
                0.833    1.61 | 2.500   73.88 | 4.167    6.42 |  5.83    1.61
                1.000    1.61 | 2.667   73.88 | 4.333    4.81 |  6.00    1.61
                1.167    1.61 | 2.833   47.38 | 4.500    3.21 |  6.17    1.61
                1.333    5.62 | 3.000   20.88 | 4.667    3.21 |  6.33    0.81
                1.500    9.64 | 3.167   20.88 | 4.833    2.41 |
                1.667    9.64 | 3.333   16.06 | 5.000    1.61 |

     Max.Eff.Inten.(mm/hr)=      73.88         35.17
                over (min)       10.00         20.00
     Storage Coeff.  (min)=       4.25 (ii)    13.63 (ii)
     Unit Hyd. Tpeak (min)=      10.00         20.00
     Unit Hyd. peak  (cms)=       0.15          0.07
                                                           *TOTALS*
     PEAK FLOW       (cms)=       0.13          0.03         0.156 (iii)
     TIME TO PEAK    (hrs)=       2.67          2.83          2.67
     RUNOFF VOLUME    (mm)=      78.31         31.67         61.05
     TOTAL RAINFALL   (mm)=      80.31         80.31         80.31
     RUNOFF COEFFICIENT   =       0.98          0.39          0.76

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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      V    V   I    SSSSS  U   U    A    L             (v 6.0.2000)
      V    V   I    SS     U   U   A A   L
       V  V    I     SS    U   U  AAAAA  L
       V  V    I      SS   U   U  A   A  L
        VV     I    SSSSS  UUUUU  A   A  LLLLL

       OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
      O   O    T      T    H   H   Y Y   MM MM  O   O
      O   O    T      T    H   H    Y    M   M  O   O
```



```
        OOO     T      T    H   H    Y    M   M   OOO
Developed and Distributed by Civica Infrastructure
```


```
                   *****  D E T A I L E D   O U T P U T *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.0\VO2\voin.dat

  Output  filename:
C:\Users\kevin.lukawiecki\AppData\Local\Civica\VH5\a512d3b0-a6e7-43a6-99e8-d9354a433
349\1b9098aa-8bba-4889-be9d-f9576ec6
  Summary filename:
C:\Users\kevin.lukawiecki\AppData\Local\Civica\VH5\a512d3b0-a6e7-43a6-99e8-d9354a433
349\1b9098aa-8bba-4889-be9d-f9576ec6


DATE: 01/26/2022                          TIME: 11:36:43

USER:



COMMENTS: ____________________________________________________________


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  **********************************************
  ** SIMULATION : 2 Year                      **
  **********************************************


--------------------
|   READ STORM     |    Filename: C:\Users\kevin.lukawiecki\AppD
|                  |              ata\Local\Temp\
|                  |              b7e32948-76cc-466b-a4e2-69ca27ada067\e5851225
| 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            |
| NASHYD   (  0401)|   Area    (ha)=   6.62   Curve Number   (CN)= 63.0
|ID= 1 DT=15.0 min |   Ia      (mm)=   1.50   # of Linear Res.(N)= 2.00
--------------------   U.H. Tp(hrs)=   0.20

     Unit Hyd Qpeak  (cms)=   0.859

     PEAK FLOW       (cms)=   0.084 (i)
     TIME TO PEAK    (hrs)=   2.750
     RUNOFF VOLUME    (mm)=   5.698
     TOTAL RAINFALL   (mm)=  36.000
     RUNOFF COEFFICIENT   =   0.158

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0100)|   Area    (ha)=  23.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      17.25         5.75
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     390.00        40.00
     Mannings n           =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      33.12        16.19
                over (min)      15.00        30.00
     Storage Coeff.  (min)=      14.85 (ii)   27.64 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.07         0.04
                                                           *TOTALS*
     PEAK FLOW       (cms)=       1.25         0.14          1.359 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00           2.75
     RUNOFF VOLUME    (mm)=      34.00         9.87          25.55
     TOTAL RAINFALL   (mm)=      36.00        36.00          36.00
     RUNOFF COEFFICIENT   =       0.94         0.27           0.71

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
```



```
     (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN*  =  71.0    Ia = Dep. Storage  (Above)
    (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
   (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0101)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 15.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.7800      1.0000
                          0.7800     0.0000   |   0.0000      0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0100)     23.000      1.359      2.75      25.55
   OUTFLOW: ID= 1 (  0101)     23.000      0.780      2.50      25.67

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 57.41
                   TIME SHIFT OF PEAK FLOW         (min)=-15.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.0268

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0200)|   Area    (ha)=  28.40
|ID= 1 DT=15.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      21.30         7.10
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     435.00        40.00
     Mannings n           =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      33.12        16.19
                over (min)      15.00        30.00
     Storage Coeff.  (min)=      15.86 (ii)   28.65 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.07         0.04
                                                           *TOTALS*
     PEAK FLOW       (cms)=       1.53         0.17          1.653 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00           2.75
     RUNOFF VOLUME    (mm)=      34.00         9.87          25.55
     TOTAL RAINFALL   (mm)=      36.00        36.00          36.00
     RUNOFF COEFFICIENT   =       0.94         0.27           0.71
```



```
     (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN*  =  71.0    Ia = Dep. Storage  (Above)
    (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
   (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0201)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 15.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.8700      1.2000
                          0.8700     0.0000   |   0.0000      0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0200)     28.400      1.653      2.75      25.55
   OUTFLOW: ID= 1 (  0201)     28.400      0.870      2.50      25.73

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 52.64
                   TIME SHIFT OF PEAK FLOW         (min)=-15.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.0385

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0001)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
         ID1= 1 (  0101):    23.00   0.780     2.50    25.67
       + ID2= 2 (  0201):    28.40   0.870     2.50    25.73
         ==================================================
         ID = 3 (  0001):    51.40   1.650     2.50    25.71

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0300)|   Area    (ha)=  73.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  57.00   Dir. Conn.(%)=  47.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      41.61        31.39
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
```



```
     Length            (m)=     692.00        40.00
     Mannings n           =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      33.12        12.72
                over (min)      15.00        45.00
     Storage Coeff.  (min)=      20.95 (ii)   35.04 (ii)
     Unit Hyd. Tpeak (min)=      15.00        45.00
     Unit Hyd. peak  (cms)=       0.06         0.03
                                                           *TOTALS*
     PEAK FLOW       (cms)=       2.62         0.51          2.861 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.25           2.75
     RUNOFF VOLUME    (mm)=      34.00         8.79          20.64
     TOTAL RAINFALL   (mm)=      36.00        36.00          36.00
     RUNOFF COEFFICIENT   =       0.94         0.24           0.57

     (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN*  =  71.0    Ia = Dep. Storage  (Above)
    (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
   (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0027)|   Area    (ha)=   2.30
|ID= 1 DT=10.0 min |   Total Imp(%)=  71.00   Dir. Conn.(%)=  71.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.63         0.67
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     123.83        40.00
     Mannings n           =      0.030        0.200

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 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
                   0.167    0.00 | 1.833    8.28 | 3.500    5.04 |  5.17    0.72
                   0.333    0.36 | 2.000   12.24 | 3.667    5.04 |  5.33    0.72
                   0.500    0.72 | 2.167   12.24 | 3.833    3.96 |  5.50    0.72
                   0.667    0.72 | 2.333   22.68 | 4.000    2.88 |  5.67    0.72
                   0.833    0.72 | 2.500   33.12 | 4.167    2.88 |  5.83    0.72
                   1.000    0.72 | 2.667   33.12 | 4.333    2.16 |  6.00    0.72
                   1.167    0.72 | 2.833   21.24 | 4.500    1.44 |  6.17    0.72
```

```
               1.333    2.52 | 3.000    9.36 | 4.667    1.44 |  6.33    0.36
               1.500    4.32 | 3.167    9.36 | 4.833    1.08 |
               1.667    4.32 | 3.333    7.20 | 5.000    0.72 |

     Max.Eff.Inten.(mm/hr)=      33.12         7.02
                over (min)       10.00        30.00
     Storage Coeff.  (min)=       7.46 (ii)   25.32 (ii)
     Unit Hyd. Tpeak (min)=      10.00        30.00
     Unit Hyd. peak  (cms)=       0.13         0.04
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.15         0.01          0.150 (iii)
     TIME TO PEAK    (hrs)=       2.67         3.17           2.67
     RUNOFF VOLUME    (mm)=      34.00         7.13          26.20
     TOTAL RAINFALL   (mm)=      36.00        36.00          36.00
     RUNOFF COEFFICIENT   =       0.94         0.20           0.73

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0024)|   Area    (ha)=   1.24
|ID= 1 DT=10.0 min |   Total Imp(%)=  63.00   Dir. Conn.(%)=  63.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.78         0.46
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      90.92        40.00
     Mannings n          =       0.030        0.200

     Max.Eff.Inten.(mm/hr)=      33.12         7.02
                over (min)       10.00        30.00
     Storage Coeff.  (min)=       6.20 (ii)   24.06 (ii)
     Unit Hyd. Tpeak (min)=      10.00        30.00
     Unit Hyd. peak  (cms)=       0.14         0.04
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.07         0.01          0.074 (iii)
     TIME TO PEAK    (hrs)=       2.67         3.00           2.67
     RUNOFF VOLUME    (mm)=      34.00         7.13          24.05
     TOTAL RAINFALL   (mm)=      36.00        36.00          36.00
     RUNOFF COEFFICIENT   =       0.94         0.20           0.67
```



```
***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0037)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
     **** WARNING : FIRST OUTFLOW IS NOT ZERO.
                          0.1220     0.0000   |   0.1220     0.1000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0024)      1.240      0.074      2.67      24.05
   OUTFLOW: ID= 1 (  0037)      1.240      0.074      2.67      24.05

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=100.00
                  TIME SHIFT OF PEAK FLOW         (min)=  0.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0000
                  MAXIMUM  STORAGE   USED       (cu.m.)=  0.000006

------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0002)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0001):    51.40   1.650     2.50    25.71
      + ID2= 2 (  0027):     2.30   0.150     2.67    26.20
        ==================================================
        ID = 3 (  0002):    53.70   1.800     2.67    25.84

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0002)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0002):    53.70   1.800     2.67    25.84
      + ID2= 2 (  0300):    73.00   2.861     2.75    20.64
```



```
        ==================================================
        ID = 1 (  0002):   126.70   4.423     2.67    22.83

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0002)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0002):   126.70   4.423     2.67    22.83
      + ID2= 2 (  0037):     1.24   0.074     2.67    24.05
        ==================================================
        ID = 3 (  0002):   127.94   4.496     2.67    22.84

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0003)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 15.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.1900     1.9300
                          0.0500     0.4200   |   0.4700     2.6400
                          0.0800     0.8400   |   0.8500     3.3400
                          0.0900     1.3900   |   1.3200     3.7000
                          0.1000     1.6000   |   2.4600     4.2500

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0002)    127.940      4.496      2.67      22.84
   OUTFLOW: ID= 1 (  0003)    127.940      0.422      5.08      22.81

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  9.38
                  TIME SHIFT OF PEAK FLOW         (min)=145.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  2.5179

     **** WARNING : SELECTED ROUTING TIME STEP DENIED.
------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0004)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0003):   127.94   0.422     5.08    22.81
      + ID2= 2 (  0401):     6.62   0.084     2.75     5.70
        ==================================================
        ID = 3 (  0004):   134.56   0.428     4.92    21.97
```



```
     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0402)|   Area    (ha)=   8.58
|ID= 1 DT=15.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  40.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       4.29         4.29
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     239.17        40.00
     Mannings n          =       0.030        0.200

         NOTE:  RAINFALL WAS TRANSFORMED TO  15.0 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
                0.250    0.00 | 2.000   12.24 | 3.750    5.04 |  5.50    0.72
                0.500    0.72 | 2.250   12.24 | 4.000    2.88 |  5.75    0.72
                0.750    0.72 | 2.500   33.12 | 4.250    2.88 |  6.00    0.72
                1.000    0.72 | 2.750   33.12 | 4.500    1.44 |  6.25    0.72
                1.250    0.72 | 3.000    9.36 | 4.750    1.44 |
                1.500    4.32 | 3.250    9.36 | 5.000    0.72 |
                1.750    4.32 | 3.500    5.04 | 5.250    0.72 |

     Max.Eff.Inten.(mm/hr)=      33.12        12.08
                over (min)       15.00        30.00
     Storage Coeff.  (min)=      11.08 (ii)   25.46 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.08         0.04
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.30         0.08          0.362 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00           2.75
     RUNOFF VOLUME    (mm)=      34.00         8.57          18.74
     TOTAL RAINFALL   (mm)=      36.00        36.00          36.00
     RUNOFF COEFFICIENT   =       0.94         0.24           0.52

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
```

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-----------------------------------------------------------------------------
--------------------
| DUHYD    (  0403)|
| Inlet Cap.= 0.740|
| #of Inlets=     1|
| Total(cms)=   0.7|      AREA     QPEAK     TPEAK    R.V.
--------------------      (ha)     (cms)     (hrs)    (mm)
     TOTAL HYD.(ID= 1):   8.58      0.36      2.75   18.74
     ==================================================
     MAJOR SYS.(ID= 2):   0.00      0.00      0.00    0.00
     MINOR SYS.(ID= 3):   8.58      0.36      2.75   18.74

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-----------------------------------------------------------------------------

--------------------
| ADD HYD  (  0005)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
*** W A R N I N G :  HYDROGRAPH   0403 <ID= 2> IS DRY.
*** W A R N I N G :  HYDROGRAPH   0003 = HYDROGRAPH 0001
        ID1= 1 (  0004):   134.56   0.428     4.92    21.97
      + ID2= 2 (  0403):     0.00   0.000     0.00     0.00
        ===================================================
        ID = 3 (  0005):   134.56   0.428     4.92    21.97

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-----------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0500)|   Area    (ha)=   6.76
|ID= 1 DT=15.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       5.07        1.69
     Dep. Storage     (mm)=       2.00        5.00
     Average Slope     (%)=       1.00        2.00
     Length            (m)=     212.29       40.00
     Mannings n           =      0.030       0.200

     Max.Eff.Inten.(mm/hr)=      33.12       16.19
                over (min)       15.00       30.00
     Storage Coeff.  (min)=      10.31 (ii)   23.10 (ii)
     Unit Hyd. Tpeak (min)=      15.00       30.00
     Unit Hyd. peak  (cms)=       0.09        0.04
                                                            *TOTALS*
```



```
     PEAK FLOW       (cms)=       0.39        0.04          0.424 (iii)
     TIME TO PEAK    (hrs)=       2.75        3.00           2.75
     RUNOFF VOLUME    (mm)=      34.00        9.87          25.55
     TOTAL RAINFALL   (mm)=      36.00       36.00          36.00
     RUNOFF COEFFICIENT   =       0.94        0.27           0.71

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-----------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0600)|   Area    (ha)=  12.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  40.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       6.00        6.00
     Dep. Storage     (mm)=       2.00        5.00
     Average Slope     (%)=       1.00        2.00
     Length            (m)=     270.00       40.00
     Mannings n           =      0.030       0.200

     Max.Eff.Inten.(mm/hr)=      33.12       12.08
                over (min)       15.00       30.00
     Storage Coeff.  (min)=      11.91 (ii)   26.29 (ii)
     Unit Hyd. Tpeak (min)=      15.00       30.00
     Unit Hyd. peak  (cms)=       0.08        0.04
                                                            *TOTALS*
     PEAK FLOW       (cms)=       0.42        0.11          0.500 (iii)
     TIME TO PEAK    (hrs)=       2.75        3.00           2.75
     RUNOFF VOLUME    (mm)=      34.00        8.57          18.74
     TOTAL RAINFALL   (mm)=      36.00       36.00          36.00
     RUNOFF COEFFICIENT   =       0.94        0.24           0.52

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-----------------------------------------------------------------------------
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--------------------
| ADD HYD  (  0006)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0500):     6.76   0.424     2.75    25.55
      + ID2= 2 (  0600):    12.00   0.500     2.75    18.74
        ===================================================
        ID = 3 (  0006):    18.76   0.925     2.75    21.19

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-----------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0700)|   Area    (ha)=  12.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  55.00   Dir. Conn.(%)=  43.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       6.60        5.40
     Dep. Storage     (mm)=       2.00        5.00
     Average Slope     (%)=       1.00        2.00
     Length            (m)=     282.00       40.00
     Mannings n           =      0.030       0.200

     Max.Eff.Inten.(mm/hr)=      33.12       13.41
                over (min)       15.00       30.00
     Storage Coeff.  (min)=      12.23 (ii)   26.02 (ii)
     Unit Hyd. Tpeak (min)=      15.00       30.00
     Unit Hyd. peak  (cms)=       0.08        0.04
                                                            *TOTALS*
     PEAK FLOW       (cms)=       0.45        0.11          0.531 (iii)
     TIME TO PEAK    (hrs)=       2.75        3.00           2.75
     RUNOFF VOLUME    (mm)=      34.00        9.02          19.76
     TOTAL RAINFALL   (mm)=      36.00       36.00          36.00
     RUNOFF COEFFICIENT   =       0.94        0.25           0.55

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-----------------------------------------------------------------------------

--------------------
| ADD HYD  (  0007)|
```



```
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0006):    18.76   0.925     2.75    21.19
      + ID2= 2 (  0700):    12.00   0.531     2.75    19.76
        ===================================================
        ID = 3 (  0007):    30.76   1.456     2.75    20.63

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-----------------------------------------------------------------------------

--------------------
| ADD HYD  (  0008)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0403):     8.58   0.362     2.75    18.74
      + ID2= 2 (  0007):    30.76   1.456     2.75    20.63
        ===================================================
        ID = 3 (  0008):    39.34   1.818     2.75    20.22

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-----------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0800)|   Area    (ha)=   2.60
|ID= 1 DT=15.0 min |   Total Imp(%)=  60.00   Dir. Conn.(%)=  45.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.56        1.04
     Dep. Storage     (mm)=       2.00        5.00
     Average Slope     (%)=       1.00        2.00
     Length            (m)=     131.00       40.00
     Mannings n           =      0.030       0.200

     Max.Eff.Inten.(mm/hr)=      33.12       15.66
                over (min)       15.00       30.00
     Storage Coeff.  (min)=       7.72 (ii)   20.68 (ii)
     Unit Hyd. Tpeak (min)=      15.00       30.00
     Unit Hyd. peak  (cms)=       0.10        0.05
                                                            *TOTALS*
     PEAK FLOW       (cms)=       0.11        0.03          0.128 (iii)
     TIME TO PEAK    (hrs)=       2.75        3.00           2.75
     RUNOFF VOLUME    (mm)=      34.00        9.71          20.64
     TOTAL RAINFALL   (mm)=      36.00       36.00          36.00
     RUNOFF COEFFICIENT   =       0.94        0.27           0.57

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
```

```
          CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0009)|
|  1 +  2 =  3     |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0008):    39.34   1.818     2.75    20.22
      + ID2= 2 (  0800):     2.60   0.128     2.75    20.64
        ==================================================
        ID = 3 (  0009):    41.94   1.945     2.75    20.25

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0010)|     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   |   0.9400     0.6210
                          0.0500     0.1950   |   2.6600     0.7760
                          0.0800     0.3860   |   4.0200     0.9110
                          0.1300     0.4750   |   0.0000     0.0000

                                 AREA     QPEAK     TPEAK       R.V.
                                 (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0009)     41.940      1.945      2.75      20.25
   OUTFLOW: ID= 1 (  0010)     41.940      0.560      3.58      20.22

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 28.80
                  TIME SHIFT OF PEAK FLOW         (min)= 50.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.5527

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0011)|
|  1 +  2 =  3     |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0010):    41.94   0.560     3.58    20.22
      + ID2= 2 (  0005):   134.56   0.428     4.92    21.97
        ==================================================
        ID = 3 (  0011):   176.50   0.874     3.92    21.55
```



```
     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0031)|   Area    (ha)=   1.03
|ID= 1 DT=10.0 min |   Total Imp(%)=  63.00   Dir. Conn.(%)=  63.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.65         0.38
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      82.87        40.00
     Mannings n          =       0.030        0.200

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 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
              0.167    0.00 | 1.833    8.28 | 3.500    5.04 |  5.17    0.72
              0.333    0.36 | 2.000   12.24 | 3.667    5.04 |  5.33    0.72
              0.500    0.72 | 2.167   12.24 | 3.833    3.96 |  5.50    0.72
              0.667    0.72 | 2.333   22.68 | 4.000    2.88 |  5.67    0.72
              0.833    0.72 | 2.500   33.12 | 4.167    2.88 |  5.83    0.72
              1.000    0.72 | 2.667   33.12 | 4.333    2.16 |  6.00    0.72
              1.167    0.72 | 2.833   21.24 | 4.500    1.44 |  6.17    0.72
              1.333    2.52 | 3.000    9.36 | 4.667    1.44 |  6.33    0.36
              1.500    4.32 | 3.167    9.36 | 4.833    1.08 |
              1.667    4.32 | 3.333    7.20 | 5.000    0.72 |

     Max.Eff.Inten.(mm/hr)=      33.12         7.02
                over (min)       10.00        30.00
     Storage Coeff.  (min)=       5.86 (ii)   23.73 (ii)
     Unit Hyd. Tpeak (min)=      10.00        30.00
     Unit Hyd. peak  (cms)=       0.14         0.04
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.06         0.00         0.061 (iii)
     TIME TO PEAK    (hrs)=       2.67         3.00          2.67
     RUNOFF VOLUME    (mm)=      34.00         7.13         24.04
     TOTAL RAINFALL   (mm)=      36.00        36.00         36.00
     RUNOFF COEFFICIENT   =       0.94         0.20          0.67

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
```



```
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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=====================================================================================
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       V    V   I    SSSSS  U   U    A    L              (v 6.0.2000)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO     TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
Developed and Distributed by Civica Infrastructure
```



```
                   *****  D E T A I L E D   O U T P U T *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.0\VO2\voin.dat

  Output  filename:
C:\Users\kevin.lukawiecki\AppData\Local\Civica\VH5\a512d3b0-a6e7-43a6-99e8-d9354a433
349\2b2ae87c-6068-46bc-bf3e-9f8e5638
  Summary filename:
C:\Users\kevin.lukawiecki\AppData\Local\Civica\VH5\a512d3b0-a6e7-43a6-99e8-d9354a433
349\2b2ae87c-6068-46bc-bf3e-9f8e5638


DATE: 01/26/2022                           TIME: 11:36:44

USER:


COMMENTS: ____________________________________________________________


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  **********************************************
  ** SIMULATION : 25 Year                     **
```



```
  **********************************************


--------------------
|   READ STORM     |    Filename: C:\Users\kevin.lukawiecki\AppD
|                  |              ata\Local\Temp\
|                  |              b7e32948-76cc-466b-a4e2-69ca27ada067\1b8bf92b
| 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            |
| NASHYD   (  0401)|   Area    (ha)=   6.62   Curve Number   (CN)= 63.0
|ID= 1 DT=15.0 min |   Ia      (mm)=   1.50   # of Linear Res.(N)= 2.00
--------------------   U.H. Tp(hrs)=   0.20

     Unit Hyd Qpeak  (cms)=   0.859

     PEAK FLOW       (cms)=   0.256 (i)
     TIME TO PEAK    (hrs)=   2.750
     RUNOFF VOLUME    (mm)=  16.937
     TOTAL RAINFALL   (mm)=  65.590
     RUNOFF COEFFICIENT   =   0.258

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0100)|   Area    (ha)=  23.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      17.25         5.75
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     390.00        40.00
```

```
     Mannings n           =      0.030       0.200

     Max.Eff.Inten.(mm/hr)=      60.35       45.65
                over (min)       15.00       30.00
     Storage Coeff.  (min)=      11.68 (ii)  20.13 (ii)
     Unit Hyd. Tpeak (min)=      15.00       30.00
     Unit Hyd. peak  (cms)=       0.08        0.05
                                                         *TOTALS*
     PEAK FLOW       (cms)=       2.38        0.47         2.774 (iii)
     TIME TO PEAK    (hrs)=       2.75        3.00          2.75
     RUNOFF VOLUME    (mm)=      63.59       28.26         51.22
     TOTAL RAINFALL   (mm)=      65.59       65.59         65.59
     RUNOFF COEFFICIENT   =       0.97        0.43          0.78

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR( 0101)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 15.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.7800     1.0000
                          0.7800     0.0000   |   0.0000     0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0100)     23.000      2.774      2.75      51.22
   OUTFLOW: ID= 1 (  0101)     23.000      0.780      2.25      51.25

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 28.12
                   TIME SHIFT OF PEAK FLOW         (min)=-30.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.1424

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD ( 0200)|   Area    (ha)=  28.40
|ID= 1 DT=15.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      21.30        7.10
```



```
     Dep. Storage     (mm)=       2.00        5.00
     Average Slope     (%)=       1.00        2.00
     Length            (m)=     435.00       40.00
     Mannings n           =      0.030       0.200

     Max.Eff.Inten.(mm/hr)=      60.35       45.65
                over (min)       15.00       30.00
     Storage Coeff.  (min)=      12.48 (ii)  20.92 (ii)
     Unit Hyd. Tpeak (min)=      15.00       30.00
     Unit Hyd. peak  (cms)=       0.08        0.05
                                                         *TOTALS*
     PEAK FLOW       (cms)=       2.91        0.57         3.388 (iii)
     TIME TO PEAK    (hrs)=       2.75        3.00          2.75
     RUNOFF VOLUME    (mm)=      63.59       28.26         51.22
     TOTAL RAINFALL   (mm)=      65.59       65.59         65.59
     RUNOFF COEFFICIENT   =       0.97        0.43          0.78

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR( 0201)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 15.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.8700     1.2000
                          0.8700     0.0000   |   0.0000     0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0200)     28.400      3.388      2.75      51.22
   OUTFLOW: ID= 1 (  0201)     28.400      0.870      2.00      51.50

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 25.68
                   TIME SHIFT OF PEAK FLOW         (min)=-45.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.1907

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0001)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
```



```
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0101):    23.00   0.780     2.25    51.25
      + ID2= 2 (  0201):    28.40   0.870     2.00    51.50
        ==================================================
        ID = 3 (  0001):    51.40   1.650     2.25    51.39

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD ( 0300)|   Area    (ha)=  73.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  57.00   Dir. Conn.(%)=  47.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      41.61       31.39
     Dep. Storage     (mm)=       2.00        5.00
     Average Slope     (%)=       1.00        2.00
     Length            (m)=     692.00       40.00
     Mannings n           =      0.030       0.200

     Max.Eff.Inten.(mm/hr)=      60.35       37.11
                over (min)       15.00       30.00
     Storage Coeff.  (min)=      16.48 (ii)  25.66 (ii)
     Unit Hyd. Tpeak (min)=      15.00       30.00
     Unit Hyd. peak  (cms)=       0.07        0.04
                                                         *TOTALS*
     PEAK FLOW       (cms)=       5.12        1.88         6.631 (iii)
     TIME TO PEAK    (hrs)=       2.75        3.00          2.75
     RUNOFF VOLUME    (mm)=      63.59       25.99         43.66
     TOTAL RAINFALL   (mm)=      65.59       65.59         65.59
     RUNOFF COEFFICIENT   =       0.97        0.40          0.67


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD ( 0027)|   Area    (ha)=   2.30
|ID= 1 DT=10.0 min |   Total Imp(%)=  71.00   Dir. Conn.(%)=  71.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.63        0.67
     Dep. Storage     (mm)=       2.00        5.00
```



```
     Average Slope     (%)=       1.00        2.00
     Length            (m)=     123.83       40.00
     Mannings n           =      0.030       0.200

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 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
                 0.167    0.00 | 1.833   15.08 | 3.500    9.18 |  5.17    1.31
                 0.333    0.65 | 2.000   22.30 | 3.667    9.18 |  5.33    1.31
                 0.500    1.31 | 2.167   22.30 | 3.833    7.21 |  5.50    1.31
                 0.667    1.31 | 2.333   41.32 | 4.000    5.25 |  5.67    1.31
                 0.833    1.31 | 2.500   60.35 | 4.167    5.25 |  5.83    1.31
                 1.000    1.31 | 2.667   60.35 | 4.333    3.93 |  6.00    1.31
                 1.167    1.31 | 2.833   38.70 | 4.500    2.62 |  6.17    1.31
                 1.333    4.59 | 3.000   17.06 | 4.667    2.62 |  6.33    0.66
                 1.500    7.87 | 3.167   17.06 | 4.833    1.97 |
                 1.667    7.87 | 3.333   13.12 | 5.000    1.31 |

     Max.Eff.Inten.(mm/hr)=      60.35       21.82
                over (min)       10.00       20.00
     Storage Coeff.  (min)=       5.87 (ii)  17.22 (ii)
     Unit Hyd. Tpeak (min)=      10.00       20.00
     Unit Hyd. peak  (cms)=       0.14        0.06
                                                         *TOTALS*
     PEAK FLOW       (cms)=       0.27        0.03         0.295 (iii)
     TIME TO PEAK    (hrs)=       2.67        2.83          2.67
     RUNOFF VOLUME    (mm)=      63.59       22.34         51.62
     TOTAL RAINFALL   (mm)=      65.59       65.59         65.59
     RUNOFF COEFFICIENT   =       0.97        0.34          0.79

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD ( 0024)|   Area    (ha)=   1.24
|ID= 1 DT=10.0 min |   Total Imp(%)=  63.00   Dir. Conn.(%)=  63.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
```

```
     Surface Area     (ha)=       0.78         0.46
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      90.92        40.00
     Mannings n          =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      60.35        21.82
                over (min)      10.00        20.00
     Storage Coeff.  (min)=       4.88 (ii)   16.23 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.15         0.06
                                                              *TOTALS*
     PEAK FLOW       (cms)=       0.13         0.02           0.148 (iii)
     TIME TO PEAK    (hrs)=       2.67         2.83            2.67
     RUNOFF VOLUME    (mm)=      63.59        22.34           48.32
     TOTAL RAINFALL   (mm)=      65.59        65.59           65.59
     RUNOFF COEFFICIENT   =       0.97         0.34            0.74

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0037)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
     **** WARNING : FIRST OUTFLOW IS NOT ZERO.
                          0.1220     0.0000   |   0.1220      0.1000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0024)      1.240      0.148      2.67      48.32
   OUTFLOW: ID= 1 (  0037)      1.240      0.122      2.50      48.87

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 82.52
                   TIME SHIFT OF PEAK FLOW         (min)=-10.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.0017

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0002)|
```



```
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0001):    51.40   1.650     2.25    51.39
      + ID2= 2 (  0027):     2.30   0.295     2.67    51.62
        ==================================================
        ID = 3 (  0002):    53.70   1.945     2.67    51.32

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0002)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0002):    53.70   1.945     2.67    51.32
      + ID2= 2 (  0300):    73.00   6.631     2.75    43.66
        ==================================================
        ID = 1 (  0002):   126.70   7.967     2.67    46.90

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0002)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0002):   126.70   7.967     2.67    46.90
      + ID2= 2 (  0037):     1.24   0.122     2.50    48.87
        ==================================================
        ID = 3 (  0002):   127.94   8.089     2.67    46.92

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0003)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 15.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.1900      1.9300
                          0.0500     0.4200   |   0.4700      2.6400
                          0.0800     0.8400   |   0.8500      3.3400
                          0.0900     1.3900   |   1.3200      3.7000
                          0.1000     1.6000   |   2.4600      4.2500

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0002)    127.940      8.089      2.67      46.92
   OUTFLOW: ID= 1 (  0003)    127.940      2.075      5.08      46.88
```



```
                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 25.65
                   TIME SHIFT OF PEAK FLOW         (min)=145.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  4.0643

     **** WARNING : SELECTED ROUTING TIME STEP DENIED.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0004)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0003):   127.94   2.075     5.08    46.88
      + ID2= 2 (  0401):     6.62   0.256     2.75    16.94
        ==================================================
        ID = 3 (  0004):   134.56   2.091     5.00    45.40

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0402)|   Area    (ha)=   8.58
|ID= 1 DT=15.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  40.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       4.29         4.29
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     239.17        40.00
     Mannings n          =      0.030        0.200

         NOTE:  RAINFALL WAS TRANSFORMED TO  15.0 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
                 0.250    0.00 | 2.000   22.30 | 3.750    9.18 |  5.50    1.31
                 0.500    1.31 | 2.250   22.30 | 4.000    5.25 |  5.75    1.31
                 0.750    1.31 | 2.500   60.35 | 4.250    5.25 |  6.00    1.31
                 1.000    1.31 | 2.750   60.35 | 4.500    2.62 |  6.25    1.31
                 1.250    1.31 | 3.000   17.06 | 4.750    2.62 |
                 1.500    7.87 | 3.250   17.06 | 5.000    1.31 |
                 1.750    7.87 | 3.500    9.18 | 5.250    1.31 |

     Max.Eff.Inten.(mm/hr)=      60.35        35.50
                over (min)      15.00        30.00
     Storage Coeff.  (min)=       8.71 (ii)   18.06 (ii)
```



```
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.09         0.05
                                                              *TOTALS*
     PEAK FLOW       (cms)=       0.56         0.28           0.797 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00            2.75
     RUNOFF VOLUME    (mm)=      63.59        25.51           40.74
     TOTAL RAINFALL   (mm)=      65.59        65.59           65.59
     RUNOFF COEFFICIENT   =       0.97         0.39            0.62

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| DUHYD    (  0403)|
| Inlet Cap.= 0.740|
| #of Inlets=     1|
| Total(cms)=   0.7|      AREA     QPEAK     TPEAK    R.V.
--------------------      (ha)     (cms)     (hrs)    (mm)
     TOTAL HYD.(ID= 1):   8.58      0.80      2.75   40.74
     ==================================================
     MAJOR SYS.(ID= 2):   0.13      0.06      2.75   40.74
     MINOR SYS.(ID= 3):   8.45      0.74      2.75   40.74

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0005)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0004):   134.56   2.091     5.00    45.40
      + ID2= 2 (  0403):     0.13   0.057     2.75    40.74
        ==================================================
        ID = 3 (  0005):   134.69   2.091     5.00    45.40

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0500)|   Area    (ha)=   6.76
|ID= 1 DT=15.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
```

```
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      5.07         1.69
     Dep. Storage     (mm)=      2.00         5.00
     Average Slope     (%)=      1.00         2.00
     Length            (m)=    212.29        40.00
     Mannings n           =     0.030        0.200

     Max.Eff.Inten.(mm/hr)=     60.35        45.65
                over (min)      15.00        30.00
     Storage Coeff.  (min)=      8.11 (ii)   16.56 (ii)
     Unit Hyd. Tpeak (min)=     15.00        30.00
     Unit Hyd. peak  (cms)=      0.10         0.05
                                                          *TOTALS*
     PEAK FLOW       (cms)=      0.72         0.15          0.851 (iii)
     TIME TO PEAK    (hrs)=      2.75         3.00           2.75
     RUNOFF VOLUME    (mm)=     63.59        28.26          51.22
     TOTAL RAINFALL   (mm)=     65.59        65.59          65.59
     RUNOFF COEFFICIENT   =      0.97         0.43           0.78

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0600)|   Area    (ha)=  12.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  40.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      6.00         6.00
     Dep. Storage     (mm)=      2.00         5.00
     Average Slope     (%)=      1.00         2.00
     Length            (m)=    270.00        40.00
     Mannings n           =     0.030        0.200

     Max.Eff.Inten.(mm/hr)=     60.35        35.50
                over (min)      15.00        30.00
     Storage Coeff.  (min)=      9.37 (ii)   18.71 (ii)
     Unit Hyd. Tpeak (min)=     15.00        30.00
     Unit Hyd. peak  (cms)=      0.09         0.05
                                                          *TOTALS*
     PEAK FLOW       (cms)=      0.78         0.38          1.105 (iii)
```



```
     TIME TO PEAK    (hrs)=      2.75         3.00           2.75
     RUNOFF VOLUME    (mm)=     63.59        25.51          40.74
     TOTAL RAINFALL   (mm)=     65.59        65.59          65.59
     RUNOFF COEFFICIENT   =      0.97         0.39           0.62

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0006)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0500):     6.76   0.851     2.75    51.22
      + ID2= 2 (  0600):    12.00   1.105     2.75    40.74
        ==================================================
        ID = 3 (  0006):    18.76   1.956     2.75    44.52

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0700)|   Area    (ha)=  12.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  55.00   Dir. Conn.(%)=  43.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      6.60         5.40
     Dep. Storage     (mm)=      2.00         5.00
     Average Slope     (%)=      1.00         2.00
     Length            (m)=    282.00        40.00
     Mannings n           =     0.030        0.200

     Max.Eff.Inten.(mm/hr)=     60.35        38.81
                over (min)      15.00        30.00
     Storage Coeff.  (min)=      9.62 (ii)   18.63 (ii)
     Unit Hyd. Tpeak (min)=     15.00        30.00
     Unit Hyd. peak  (cms)=      0.09         0.05
                                                          *TOTALS*
     PEAK FLOW       (cms)=      0.84         0.38          1.160 (iii)
     TIME TO PEAK    (hrs)=      2.75         3.00           2.75
     RUNOFF VOLUME    (mm)=     63.59        26.47          42.43
     TOTAL RAINFALL   (mm)=     65.59        65.59          65.59
```



```
     RUNOFF COEFFICIENT   =      0.97         0.40           0.65

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0006):    18.76   1.956     2.75    44.52
      + ID2= 2 (  0700):    12.00   1.160     2.75    42.43
        ==================================================
        ID = 3 (  0007):    30.76   3.116     2.75    43.70

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0008)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0403):     8.45   0.740     2.75    40.74
      + ID2= 2 (  0007):    30.76   3.116     2.75    43.70
        ==================================================
        ID = 3 (  0008):    39.21   3.856     2.75    43.07

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0800)|   Area    (ha)=   2.60
|ID= 1 DT=15.0 min |   Total Imp(%)=  60.00   Dir. Conn.(%)=  45.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      1.56         1.04
     Dep. Storage     (mm)=      2.00         5.00
     Average Slope     (%)=      1.00         2.00
     Length            (m)=    131.00        40.00
     Mannings n           =     0.030        0.200

     Max.Eff.Inten.(mm/hr)=     60.35        44.35
```



```
                over (min)      15.00        15.00
     Storage Coeff.  (min)=      6.07 (ii)   14.62 (ii)
     Unit Hyd. Tpeak (min)=     15.00        15.00
     Unit Hyd. peak  (cms)=      0.10         0.07
                                                          *TOTALS*
     PEAK FLOW       (cms)=      0.20         0.10          0.300 (iii)
     TIME TO PEAK    (hrs)=      2.75         2.75           2.75
     RUNOFF VOLUME    (mm)=     63.59        27.93          43.98
     TOTAL RAINFALL   (mm)=     65.59        65.59          65.59
     RUNOFF COEFFICIENT   =      0.97         0.43           0.67

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0009)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0008):    39.21   3.856     2.75    43.07
      + ID2= 2 (  0800):     2.60   0.300     2.75    43.98
        ==================================================
        ID = 3 (  0009):    41.81   4.157     2.75    43.12

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0010)|     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   |   0.9400     0.6210
                          0.0500     0.1950   |   2.6600     0.7760
                          0.0800     0.3860   |   4.0200     0.9110
                          0.1300     0.4750   |   0.0000     0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0009)     41.813     4.157      2.75      43.12
   OUTFLOW: ID= 1 (  0010)     41.813     2.631      3.00      43.10

               PEAK   FLOW   REDUCTION [Qout/Qin](%)= 63.30
```

```
                   TIME SHIFT OF PEAK FLOW         (min)= 15.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.7746

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0011)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0010):    41.81   2.631     3.00    43.10
      + ID2= 2 (  0005):   134.69   2.091     5.00    45.40
        ==================================================
        ID = 3 (  0011):   176.50   3.238     3.08    44.86

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0031)|   Area    (ha)=   1.03
|ID= 1 DT=10.0 min |   Total Imp(%)=  63.00   Dir. Conn.(%)=  63.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.65         0.38
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      82.87        40.00
     Mannings n          =      0.030        0.200

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 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
               0.167    0.00 | 1.833   15.08 | 3.500    9.18 |  5.17    1.31
               0.333    0.65 | 2.000   22.30 | 3.667    9.18 |  5.33    1.31
               0.500    1.31 | 2.167   22.30 | 3.833    7.21 |  5.50    1.31
               0.667    1.31 | 2.333   41.32 | 4.000    5.25 |  5.67    1.31
               0.833    1.31 | 2.500   60.35 | 4.167    5.25 |  5.83    1.31
               1.000    1.31 | 2.667   60.35 | 4.333    3.93 |  6.00    1.31
               1.167    1.31 | 2.833   38.70 | 4.500    2.62 |  6.17    1.31
               1.333    4.59 | 3.000   17.06 | 4.667    2.62 |  6.33    0.66
               1.500    7.87 | 3.167   17.06 | 4.833    1.97 |
               1.667    7.87 | 3.333   13.12 | 5.000    1.31 |

     Max.Eff.Inten.(mm/hr)=      60.35        21.82
                over (min)       10.00        20.00
     Storage Coeff.  (min)=       4.61 (ii)   15.96 (ii)
```



```
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.15         0.06
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.11         0.02         0.123 (iii)
     TIME TO PEAK    (hrs)=       2.67         2.83          2.67
     RUNOFF VOLUME    (mm)=      63.59        22.34         48.32
     TOTAL RAINFALL   (mm)=      65.59        65.59         65.59
     RUNOFF COEFFICIENT   =       0.97         0.34          0.74

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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==================================================================================
======================

       V    V   I    SSSSS  U   U    A    L                (v 6.0.2000)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO    TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O     T      T    H   H   Y Y   MM MM  O   O
       O   O     T      T    H   H    Y    M   M  O   O
        OOO      T      T    H   H    Y    M   M   OOO
Developed and Distributed by Civica Infrastructure
```



```
                   *****  D E T A I L E D   O U T P U T *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.0\VO2\voin.dat

  Output  filename:
C:\Users\kevin.lukawiecki\AppData\Local\Civica\VH5\a512d3b0-a6e7-43a6-99e8-d9354a433
349\bd89503c-58b0-4714-b46f-3d675b92
  Summary filename:
C:\Users\kevin.lukawiecki\AppData\Local\Civica\VH5\a512d3b0-a6e7-43a6-99e8-d9354a433
349\bd89503c-58b0-4714-b46f-3d675b92
```



```
DATE: 01/26/2022                         TIME: 11:36:45

USER:


COMMENTS: ____________________________________________________________


-------------------------------------------------------------------------------------
----------------------
  **********************************************
  ** SIMULATION : 5 Year                      **
  **********************************************


--------------------
|    READ STORM    |    Filename: C:\Users\kevin.lukawiecki\AppD
|                  |              ata\Local\Temp\
|                  |              b7e32948-76cc-466b-a4e2-69ca27ada067\ef6bf4f6
| 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            |
| NASHYD   (  0401)|   Area    (ha)=   6.62   Curve Number   (CN)= 63.0
|ID= 1 DT=15.0 min |   Ia      (mm)=   1.50   # of Linear Res.(N)= 2.00
--------------------   U.H. Tp(hrs)=   0.20

     Unit Hyd Qpeak  (cms)=   0.859

     PEAK FLOW       (cms)=   0.144 (i)
     TIME TO PEAK    (hrs)=   2.750
     RUNOFF VOLUME    (mm)=   9.647
     TOTAL RAINFALL   (mm)=  47.810
     RUNOFF COEFFICIENT   =   0.202
```



```
     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0100)|   Area    (ha)=  23.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      17.25         5.75
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     390.00        40.00
     Mannings n          =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      43.98        26.95
                over (min)       15.00        30.00
     Storage Coeff.  (min)=      13.26 (ii)   23.69 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.08         0.04
                                                          *TOTALS*
     PEAK FLOW       (cms)=       1.70         0.25         1.904 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00          2.75
     RUNOFF VOLUME    (mm)=      45.81        16.54         35.56
     TOTAL RAINFALL   (mm)=      47.81        47.81         47.81
     RUNOFF COEFFICIENT   =       0.96         0.35          0.74

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0101)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 15.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.7800     1.0000
                          0.7800     0.0000   |   0.0000     0.0000

                                   AREA     QPEAK     TPEAK       R.V.
                                   (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0100)     23.000      1.904      2.75      35.56
```

```
   OUTFLOW: ID= 1 (  0101)     23.000      0.780      2.50      36.08

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 40.97
                   TIME SHIFT OF PEAK FLOW         (min)=-15.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.0663

-------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0200)|   Area    (ha)=  28.40
|ID= 1 DT=15.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      21.30         7.10
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     435.00        40.00
     Mannings n           =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      43.98        26.95
                over (min)       15.00        30.00
     Storage Coeff.  (min)=      14.16 (ii)   24.59 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.07         0.04
                                                             *TOTALS*
     PEAK FLOW       (cms)=       2.08         0.31           2.321 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00            2.75
     RUNOFF VOLUME    (mm)=      45.81        16.54           35.56
     TOTAL RAINFALL   (mm)=      47.81        47.81           47.81
     RUNOFF COEFFICIENT   =       0.96         0.35            0.74

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0201)|      OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 15.0 min     |      OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------       (cms)     (ha.m.)   |   (cms)     (ha.m.)
                           0.0000     0.0000   |  0.8700      1.2000
                           0.8700     0.0000   |  0.0000      0.0000
```



```
                                  AREA     QPEAK     TPEAK       R.V.
                                  (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0200)     28.400      2.321      2.75      35.56
   OUTFLOW: ID= 1 (  0201)     28.400      0.870      2.50      36.58

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 37.49
                   TIME SHIFT OF PEAK FLOW         (min)=-15.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.0866

-------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0001)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0101):    23.00   0.780     2.50    36.08
      + ID2= 2 (  0201):    28.40   0.870     2.50    36.58
        ==================================================
        ID = 3 (  0001):    51.40   1.650     2.50    36.36

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0300)|   Area    (ha)=  73.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  57.00   Dir. Conn.(%)=  47.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      41.61        31.39
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     692.00        40.00
     Mannings n           =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      43.98        21.54
                over (min)       15.00        45.00
     Storage Coeff.  (min)=      18.71 (ii)   30.12 (ii)
     Unit Hyd. Tpeak (min)=      15.00        45.00
     Unit Hyd. peak  (cms)=       0.06         0.03
                                                             *TOTALS*
     PEAK FLOW       (cms)=       3.61         0.94           4.086 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.25            2.75
     RUNOFF VOLUME    (mm)=      45.81        14.96           29.46
     TOTAL RAINFALL   (mm)=      47.81        47.81           47.81
     RUNOFF COEFFICIENT   =       0.96         0.31            0.62


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
```



```
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0027)|   Area    (ha)=   2.30
|ID= 1 DT=10.0 min |   Total Imp(%)=  71.00   Dir. Conn.(%)=  71.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.63         0.67
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     123.83        40.00
     Mannings n           =      0.030        0.200

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 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
               0.167    0.00 | 1.833   10.99 | 3.500    6.69 |  5.17    0.96
               0.333    0.48 | 2.000   16.25 | 3.667    6.69 |  5.33    0.96
               0.500    0.96 | 2.167   16.25 | 3.833    5.25 |  5.50    0.96
               0.667    0.96 | 2.333   30.11 | 4.000    3.82 |  5.67    0.96
               0.833    0.96 | 2.500   43.98 | 4.167    3.82 |  5.83    0.96
               1.000    0.96 | 2.667   43.98 | 4.333    2.86 |  6.00    0.96
               1.167    0.96 | 2.833   28.20 | 4.500    1.91 |  6.17    0.96
               1.333    3.35 | 3.000   12.43 | 4.667    1.91 |  6.33    0.48
               1.500    5.74 | 3.167   12.43 | 4.833    1.43 |
               1.667    5.74 | 3.333    9.56 | 5.000    0.96 |

     Max.Eff.Inten.(mm/hr)=      43.98        12.22
                over (min)       10.00        30.00
     Storage Coeff.  (min)=       6.66 (ii)   20.97 (ii)
     Unit Hyd. Tpeak (min)=      10.00        30.00
     Unit Hyd. peak  (cms)=       0.13         0.05
                                                             *TOTALS*
     PEAK FLOW       (cms)=       0.20         0.02           0.204 (iii)
     TIME TO PEAK    (hrs)=       2.67         3.00            2.67
     RUNOFF VOLUME    (mm)=      45.81        12.51           36.15
     TOTAL RAINFALL   (mm)=      47.81        47.81           47.81
     RUNOFF COEFFICIENT   =       0.96         0.26            0.76

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
```



```
       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0024)|   Area    (ha)=   1.24
|ID= 1 DT=10.0 min |   Total Imp(%)=  63.00   Dir. Conn.(%)=  63.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.78         0.46
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      90.92        40.00
     Mannings n           =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      43.98        12.22
                over (min)       10.00        20.00
     Storage Coeff.  (min)=       5.54 (ii)   19.85 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.14         0.06
                                                             *TOTALS*
     PEAK FLOW       (cms)=       0.09         0.01           0.103 (iii)
     TIME TO PEAK    (hrs)=       2.67         2.83            2.67
     RUNOFF VOLUME    (mm)=      45.81        12.51           33.48
     TOTAL RAINFALL   (mm)=      47.81        47.81           47.81
     RUNOFF COEFFICIENT   =       0.96         0.26            0.70

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0037)|      OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |      OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------       (cms)     (ha.m.)   |   (cms)     (ha.m.)
     **** WARNING : FIRST OUTFLOW IS NOT ZERO.
                           0.1220     0.0000   |  0.1220      0.1000
```

```
                          AREA     QPEAK     TPEAK       R.V.
                          (ha)     (cms)     (hrs)       (mm)
INFLOW : ID= 2 (  0024)      1.240      0.103      2.67      33.48
OUTFLOW: ID= 1 (  0037)      1.240      0.103      2.67      33.47

                 PEAK   FLOW   REDUCTION [Qout/Qin](%)=100.00
                 TIME SHIFT OF PEAK FLOW         (min)=  0.00
                 MAXIMUM  STORAGE   USED       (ha.m.)=  0.0000
                 MAXIMUM  STORAGE   USED       (cu.m.)=  0.000006

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0002)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0001):    51.40   1.650     2.50    36.36
      + ID2= 2 (  0027):     2.30   0.204     2.67    36.15
        ==================================================
        ID = 3 (  0002):    53.70   1.854     2.67    36.45

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0002)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0002):    53.70   1.854     2.67    36.45
      + ID2= 2 (  0300):    73.00   4.086     2.75    29.46
        ==================================================
        ID = 1 (  0002):   126.70   5.602     2.67    32.41

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0002)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0002):   126.70   5.602     2.67    32.41
      + ID2= 2 (  0037):     1.24   0.103     2.67    33.47
        ==================================================
        ID = 3 (  0002):   127.94   5.705     2.67    32.42

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
```



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--------------------
| RESERVOIR(  0003)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 15.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.1900     1.9300
                          0.0500     0.4200   |   0.4700     2.6400
                          0.0800     0.8400   |   0.8500     3.3400
                          0.0900     1.3900   |   1.3200     3.7000
                          0.1000     1.6000   |   2.4600     4.2500

                           AREA     QPEAK     TPEAK       R.V.
                           (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0002)    127.940      5.705      2.67      32.42
   OUTFLOW: ID= 1 (  0003)    127.940      0.974      5.08      32.38

                 PEAK   FLOW   REDUCTION [Qout/Qin](%)= 17.08
                 TIME SHIFT OF PEAK FLOW         (min)=145.00
                 MAXIMUM  STORAGE   USED       (ha.m.)=  3.4363

     **** WARNING : SELECTED ROUTING TIME STEP DENIED.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0004)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0003):   127.94   0.974     5.08    32.38
      + ID2= 2 (  0401):     6.62   0.144     2.75     9.65
        ==================================================
        ID = 3 (  0004):   134.56   0.984     5.08    31.26

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0402)|   Area    (ha)=   8.58
|ID= 1 DT=15.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  40.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       4.29         4.29
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     239.17        40.00
     Mannings n          =      0.030        0.200

         NOTE:  RAINFALL WAS TRANSFORMED TO  15.0 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
             0.250    0.00 | 2.000   16.25 | 3.750    6.69 |  5.50    0.96
             0.500    0.96 | 2.250   16.25 | 4.000    3.82 |  5.75    0.96
             0.750    0.96 | 2.500   43.98 | 4.250    3.82 |  6.00    0.96
             1.000    0.96 | 2.750   43.98 | 4.500    1.91 |  6.25    0.96
             1.250    0.96 | 3.000   12.43 | 4.750    1.91 |
             1.500    5.74 | 3.250   12.43 | 5.000    0.96 |
             1.750    5.74 | 3.500    6.69 | 5.250    0.96 |

     Max.Eff.Inten.(mm/hr)=      43.98        20.53
                over (min)       15.00        30.00
     Storage Coeff.  (min)=       9.89 (ii)   21.52 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.09         0.05
                                                         *TOTALS*
     PEAK FLOW       (cms)=       0.41         0.15         0.524 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00          2.75
     RUNOFF VOLUME    (mm)=      45.81        14.64         27.11
     TOTAL RAINFALL   (mm)=      47.81        47.81         47.81
     RUNOFF COEFFICIENT   =       0.96         0.31          0.57

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| DUHYD    (  0403)|
| Inlet Cap.= 0.740|
| #of Inlets=     1|
| Total(cms)=   0.7|      AREA     QPEAK     TPEAK     R.V.
--------------------      (ha)     (cms)     (hrs)     (mm)
     TOTAL HYD.(ID= 1):   8.58      0.52      2.75   27.11
     ==================================================
     MAJOR SYS.(ID= 2):   0.00      0.00      0.00    0.00
     MINOR SYS.(ID= 3):   8.58      0.52      2.75   27.11

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
```



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--------------------
| ADD HYD  (  0005)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
*** W A R N I N G :  HYDROGRAPH   0403 <ID= 2> IS DRY.
*** W A R N I N G :  HYDROGRAPH   0003 = HYDROGRAPH 0001
        ID1= 1 (  0004):   134.56   0.984     5.08    31.26
      + ID2= 2 (  0403):     0.00   0.000     0.00     0.00
        ==================================================
        ID = 3 (  0005):   134.56   0.984     5.08    31.26

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0500)|   Area    (ha)=   6.76
|ID= 1 DT=15.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       5.07         1.69
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     212.29        40.00
     Mannings n          =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      43.98        26.95
                over (min)       15.00        30.00
     Storage Coeff.  (min)=       9.21 (ii)   19.64 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.09         0.05
                                                         *TOTALS*
     PEAK FLOW       (cms)=       0.52         0.08         0.589 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00          2.75
     RUNOFF VOLUME    (mm)=      45.81        16.54         35.56
     TOTAL RAINFALL   (mm)=      47.81        47.81         47.81
     RUNOFF COEFFICIENT   =       0.96         0.35          0.74

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB            |
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| STANDHYD ( 0600)|   Area    (ha)=  12.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  40.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       6.00         6.00
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     270.00        40.00
     Mannings n           =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      43.98        20.53
                over (min)       15.00        30.00
     Storage Coeff.  (min)=      10.64 (ii)   22.27 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.09         0.04
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.56         0.21          0.726 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00           2.75
     RUNOFF VOLUME    (mm)=      45.81        14.64          27.11
     TOTAL RAINFALL   (mm)=      47.81        47.81          47.81
     RUNOFF COEFFICIENT   =       0.96         0.31           0.57

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0006)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0500):     6.76  0.589     2.75    35.56
      + ID2= 2 (  0600):    12.00  0.726     2.75    27.11
        ==================================================
        ID = 3 (  0006):    18.76  1.315     2.75    30.15

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0700)|   Area    (ha)=  12.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  55.00   Dir. Conn.(%)=  43.00
--------------------
```



```
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       6.60         5.40
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     282.00        40.00
     Mannings n           =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      43.98        22.61
                over (min)       15.00        30.00
     Storage Coeff.  (min)=      10.92 (ii)   22.11 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.08         0.04
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.60         0.20          0.767 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00           2.75
     RUNOFF VOLUME    (mm)=      45.81        15.30          28.42
     TOTAL RAINFALL   (mm)=      47.81        47.81          47.81
     RUNOFF COEFFICIENT   =       0.96         0.32           0.59

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0006):    18.76  1.315     2.75    30.15
      + ID2= 2 (  0700):    12.00  0.767     2.75    28.42
        ==================================================
        ID = 3 (  0007):    30.76  2.082     2.75    29.48

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0008)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0403):     8.58  0.524     2.75    27.11
      + ID2= 2 (  0007):    30.76  2.082     2.75    29.48
        ==================================================
```



```
        ID = 3 (  0008):    39.34  2.606     2.75    28.96

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0800)|   Area    (ha)=   2.60
|ID= 1 DT=15.0 min |   Total Imp(%)=  60.00   Dir. Conn.(%)=  45.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.56         1.04
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     131.00        40.00
     Mannings n           =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      43.98        26.12
                over (min)       15.00        30.00
     Storage Coeff.  (min)=       6.89 (ii)   17.45 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.10         0.05
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.14         0.05          0.183 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00           2.75
     RUNOFF VOLUME    (mm)=      45.81        16.31          29.58
     TOTAL RAINFALL   (mm)=      47.81        47.81          47.81
     RUNOFF COEFFICIENT   =       0.96         0.34           0.62

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0009)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0008):    39.34  2.606     2.75    28.96
      + ID2= 2 (  0800):     2.60  0.183     2.75    29.58
        ==================================================
        ID = 3 (  0009):    41.94  2.788     2.75    29.00

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
```



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--------------------------------------------------------------------------------
--------------------
| RESERVOIR( 0010)|     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   |   0.9400      0.6210
                          0.0500     0.1950   |   2.6600      0.7760
                          0.0800     0.3860   |   4.0200      0.9110
                          0.1300     0.4750   |   0.0000      0.0000

                             AREA     QPEAK     TPEAK       R.V.
                             (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0009)     41.940      2.788      2.75      29.00
   OUTFLOW: ID= 1 (  0010)     41.940      1.279      3.25      28.97

                PEAK   FLOW   REDUCTION [Qout/Qin](%)= 45.87
                TIME SHIFT OF PEAK FLOW         (min)= 30.00
                MAXIMUM  STORAGE   USED       (ha.m.)=  0.6517

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0011)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0010):    41.94  1.279     3.25    28.97
      + ID2= 2 (  0005):   134.56  0.984     5.08    31.26
        ==================================================
        ID = 3 (  0011):   176.50  1.653     3.33    30.72

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0031)|   Area    (ha)=   1.03
|ID= 1 DT=10.0 min |   Total Imp(%)=  63.00   Dir. Conn.(%)=  63.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.65         0.38
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      82.87        40.00
     Mannings n           =      0.030        0.200

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 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
         0.167    0.00 | 1.833   10.99 | 3.500    6.69 |  5.17    0.96
         0.333    0.48 | 2.000   16.25 | 3.667    6.69 |  5.33    0.96
         0.500    0.96 | 2.167   16.25 | 3.833    5.25 |  5.50    0.96
         0.667    0.96 | 2.333   30.11 | 4.000    3.82 |  5.67    0.96
         0.833    0.96 | 2.500   43.98 | 4.167    3.82 |  5.83    0.96
         1.000    0.96 | 2.667   43.98 | 4.333    2.86 |  6.00    0.96
         1.167    0.96 | 2.833   28.20 | 4.500    1.91 |  6.17    0.96
         1.333    3.35 | 3.000   12.43 | 4.667    1.91 |  6.33    0.48
         1.500    5.74 | 3.167   12.43 | 4.833    1.43 |
         1.667    5.74 | 3.333    9.56 | 5.000    0.96 |

     Max.Eff.Inten.(mm/hr)=      43.98        12.22
                over (min)       10.00        20.00
     Storage Coeff.  (min)=       5.24 (ii)   19.55 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.14         0.06
                                                       *TOTALS*
     PEAK FLOW       (cms)=       0.08         0.01       0.086 (iii)
     TIME TO PEAK    (hrs)=       2.67         2.83        2.67
     RUNOFF VOLUME    (mm)=      45.81        12.51       33.48
     TOTAL RAINFALL   (mm)=      47.81        47.81       47.81
     RUNOFF COEFFICIENT   =       0.96         0.26        0.70

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
==================================================================================
=====================

       V    V   I    SSSSS  U    U    A    L              (v 6.0.2000)
       V    V   I    SS     U    U   A A   L
        V  V    I     SS    U    U  AAAAA  L
        V  V    I      SS   U    U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO    TTTTT  TTTTT  H    H  Y    Y  M    M   OOO    TM
       O   O     T      T    H    H   Y Y    MM MM  O   O
       O   O     T      T    H    H    Y     M    M  O   O
        OOO      T      T    H    H    Y     M    M   OOO
```



```
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                   *****  D E T A I L E D   O U T P U T *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.0\VO2\voin.dat

  Output  filename:
C:\Users\kevin.lukawiecki\AppData\Local\Civica\VH5\a512d3b0-a6e7-43a6-99e8-d9354a433
349\d26b1385-cd0b-422c-a9e3-8d82bae5
  Summary filename:
C:\Users\kevin.lukawiecki\AppData\Local\Civica\VH5\a512d3b0-a6e7-43a6-99e8-d9354a433
349\d26b1385-cd0b-422c-a9e3-8d82bae5


DATE: 01/26/2022                           TIME: 11:36:45

USER:



COMMENTS: ____________________________________________________________


----------------------------------------------------------------------------------
-----------------------
  **********************************************
  ** SIMULATION : 50 Year                     **
  **********************************************


--------------------
|    READ STORM    |    Filename: C:\Users\kevin.lukawiecki\AppD
|                  |              ata\Local\Temp\
|                  |              b7e32948-76cc-466b-a4e2-69ca27ada067\1e078d6
| 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            |
| NASHYD   (  0401)|   Area    (ha)=   6.62   Curve Number   (CN)= 63.0
|ID= 1 DT=15.0 min |   Ia      (mm)=   1.50   # of Linear Res.(N)= 2.00
--------------------   U.H. Tp(hrs)=   0.20

     Unit Hyd Qpeak  (cms)=   0.859

     PEAK FLOW       (cms)=   0.310 (i)
     TIME TO PEAK    (hrs)=   2.750
     RUNOFF VOLUME    (mm)=  20.372
     TOTAL RAINFALL   (mm)=  73.000
     RUNOFF COEFFICIENT   =   0.279

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0100)|   Area    (ha)=  23.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      17.25         5.75
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     390.00        40.00
     Mannings n           =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      67.16        54.05
                over (min)       15.00        30.00
     Storage Coeff.  (min)=      11.20 (ii)   19.09 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.08         0.05
                                                       *TOTALS*
     PEAK FLOW       (cms)=       2.67         0.56       3.150 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00        2.75
     RUNOFF VOLUME    (mm)=      71.00        33.58       57.90
     TOTAL RAINFALL   (mm)=      73.00        73.00       73.00
     RUNOFF COEFFICIENT   =       0.97         0.46        0.79

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
```



```
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR( 0101)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 15.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.7800     1.0000
                          0.7800     0.0000   |   0.0000     0.0000

                               AREA     QPEAK      TPEAK        R.V.
                               (ha)     (cms)      (hrs)        (mm)
   INFLOW : ID= 2 (  0100)     23.000      3.150      2.75       57.90
   OUTFLOW: ID= 1 (  0101)     23.000      0.780      2.00       58.59

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 24.76
                  TIME SHIFT OF PEAK FLOW         (min)=-45.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.1881

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0200)|   Area    (ha)=  28.40
|ID= 1 DT=15.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      21.30         7.10
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     435.00        40.00
     Mannings n           =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      67.16        54.05
                over (min)       15.00        30.00
     Storage Coeff.  (min)=      11.95 (ii)   19.85 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.08         0.05
                                                       *TOTALS*
     PEAK FLOW       (cms)=       3.26         0.69       3.849 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00        2.75
     RUNOFF VOLUME    (mm)=      71.00        33.58       57.90
     TOTAL RAINFALL   (mm)=      73.00        73.00       73.00
     RUNOFF COEFFICIENT   =       0.97         0.46        0.79
```

```
***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  71.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0201)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 15.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.8700      1.2000
                          0.8700     0.0000   |   0.0000      0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0200)     28.400      3.849      2.75      57.90
   OUTFLOW: ID= 1 (  0201)     28.400      0.870      2.00      58.62

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 22.60
                   TIME SHIFT OF PEAK FLOW         (min)=-45.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.2488

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0001)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0101):    23.00   0.780     2.00    58.59
      + ID2= 2 (  0201):    28.40   0.870     2.00    58.62
        ==================================================
        ID = 3 (  0001):    51.40   1.650     2.00    58.61

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0300)|   Area    (ha)=  73.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  57.00   Dir. Conn.(%)=  47.00
--------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       41.61        31.39
     Dep. Storage     (mm)=        2.00         5.00
     Average Slope     (%)=        1.00         2.00
```



```
     Length           (m)=      692.00        40.00
     Mannings n          =       0.030        0.200

     Max.Eff.Inten.(mm/hr)=      67.16        44.18
               over (min)       15.00        30.00
     Storage Coeff.  (min)=      15.79 (ii)   24.35 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.07         0.04
                                                            *TOTALS*
     PEAK FLOW       (cms)=       5.76         2.30          7.639 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00           2.75
     RUNOFF VOLUME    (mm)=      71.00        31.04          49.82
     TOTAL RAINFALL   (mm)=      73.00        73.00          73.00
     RUNOFF COEFFICIENT   =       0.97         0.43           0.68


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0027)|   Area    (ha)=   2.30
|ID= 1 DT=10.0 min |   Total Imp(%)=  71.00   Dir. Conn.(%)=  71.00
--------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        1.63         0.67
     Dep. Storage     (mm)=        2.00         5.00
     Average Slope     (%)=        1.00         2.00
     Length           (m)=      123.83        40.00
     Mannings n          =       0.030        0.200

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 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
                 0.167     0.00 | 1.833   16.79 | 3.500   10.22 |  5.17    1.46
                 0.333     0.73 | 2.000   24.82 | 3.667   10.22 |  5.33    1.46
                 0.500     1.46 | 2.167   24.82 | 3.833    8.03 |  5.50    1.46
                 0.667     1.46 | 2.333   45.99 | 4.000    5.84 |  5.67    1.46
                 0.833     1.46 | 2.500   67.16 | 4.167    5.84 |  5.83    1.46
                 1.000     1.46 | 2.667   67.16 | 4.333    4.38 |  6.00    1.46
                 1.167     1.46 | 2.833   43.07 | 4.500    2.92 |  6.17    1.46
```



```
                 1.333     5.11 | 3.000   18.98 | 4.667    2.92 |  6.33    0.73
                 1.500     8.76 | 3.167   18.98 | 4.833    2.19 |
                 1.667     8.76 | 3.333   14.60 | 5.000    1.46 |

     Max.Eff.Inten.(mm/hr)=      67.16        26.49
               over (min)       10.00        20.00
     Storage Coeff.  (min)=       5.62 (ii)   16.13 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.14         0.06
                                                            *TOTALS*
     PEAK FLOW       (cms)=       0.30         0.04          0.333 (iii)
     TIME TO PEAK    (hrs)=       2.67         2.83           2.67
     RUNOFF VOLUME    (mm)=      71.00        26.92          58.21
     TOTAL RAINFALL   (mm)=      73.00        73.00          73.00
     RUNOFF COEFFICIENT   =       0.97         0.37           0.80

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  71.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0024)|   Area    (ha)=   1.24
|ID= 1 DT=10.0 min |   Total Imp(%)=  63.00   Dir. Conn.(%)=  63.00
--------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        0.78         0.46
     Dep. Storage     (mm)=        2.00         5.00
     Average Slope     (%)=        1.00         2.00
     Length           (m)=       90.92        40.00
     Mannings n          =       0.030        0.200

     Max.Eff.Inten.(mm/hr)=      67.16        26.49
               over (min)       10.00        20.00
     Storage Coeff.  (min)=       4.67 (ii)   15.18 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.15         0.07
                                                            *TOTALS*
     PEAK FLOW       (cms)=       0.15         0.03          0.167 (iii)
     TIME TO PEAK    (hrs)=       2.67         2.83           2.67
     RUNOFF VOLUME    (mm)=      71.00        26.92          54.69
     TOTAL RAINFALL   (mm)=      73.00        73.00          73.00
     RUNOFF COEFFICIENT   =       0.97         0.37           0.75
```



```
***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0037)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
     **** WARNING : FIRST OUTFLOW IS NOT ZERO.
                          0.1220     0.0000   |   0.1220      0.1000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0024)      1.240      0.167      2.67      54.69
   OUTFLOW: ID= 1 (  0037)      1.240      0.122      2.42      55.24

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 72.91
                   TIME SHIFT OF PEAK FLOW         (min)=-15.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.0035

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0002)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0001):    51.40   1.650     2.00    58.61
      + ID2= 2 (  0027):     2.30   0.333     2.67    58.21
        ==================================================
        ID = 3 (  0002):    53.70   1.983     2.67    58.70

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0002)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0002):    53.70   1.983     2.67    58.70
      + ID2= 2 (  0300):    73.00   7.639     2.75    49.82
        ==================================================
```

```
      ID = 1 (  0002):   126.70   8.917     2.67    53.59

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0002)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
      ID1= 1 (  0002):   126.70   8.917     2.67    53.59
    + ID2= 2 (  0037):     1.24   0.122     2.42    55.24
      ===================================================
      ID = 3 (  0002):   127.94   9.039     2.67    53.60

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0003)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 15.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.1900      1.9300
                          0.0500     0.4200   |   0.4700      2.6400
                          0.0800     0.8400   |   0.8500      3.3400
                          0.0900     1.3900   |   1.3200      3.7000
                          0.1000     1.6000   |   2.4600      4.2500

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
 INFLOW : ID= 2 (  0002)    127.940      9.039      2.67      53.60
 OUTFLOW: ID= 1 (  0003)    127.940      2.428      4.75      53.56

                 PEAK   FLOW   REDUCTION [Qout/Qin](%)= 26.86
                 TIME SHIFT OF PEAK FLOW         (min)=125.00
                 MAXIMUM  STORAGE   USED       (ha.m.)=  4.2351

   **** WARNING : SELECTED ROUTING TIME STEP DENIED.
-------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0004)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
      ID1= 1 (  0003):   127.94   2.428     4.75    53.56
    + ID2= 2 (  0401):     6.62   0.310     2.75    20.37
      ===================================================
      ID = 3 (  0004):   134.56   2.462     4.67    51.92
```



```
   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0402)|   Area    (ha)=   8.58
|ID= 1 DT=15.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  40.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
   Surface Area     (ha)=       4.29         4.29
   Dep. Storage     (mm)=       2.00         5.00
   Average Slope     (%)=       1.00         2.00
   Length            (m)=     239.17        40.00
   Mannings n          =      0.030        0.200

       NOTE:  RAINFALL WAS TRANSFORMED TO  15.0 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
              0.250    0.00 | 2.000   24.82 | 3.750   10.22 |  5.50    1.46
              0.500    1.46 | 2.250   24.82 | 4.000    5.84 |  5.75    1.46
              0.750    1.46 | 2.500   67.16 | 4.250    5.84 |  6.00    1.46
              1.000    1.46 | 2.750   67.16 | 4.500    2.92 |  6.25    1.46
              1.250    1.46 | 3.000   18.98 | 4.750    2.92 |
              1.500    8.76 | 3.250   18.98 | 5.000    1.46 |
              1.750    8.76 | 3.500   10.22 | 5.250    1.46 |

   Max.Eff.Inten.(mm/hr)=      67.16        42.31
              over (min)       15.00        30.00
   Storage Coeff.  (min)=       8.35 (ii)   17.06 (ii)
   Unit Hyd. Tpeak (min)=      15.00        30.00
   Unit Hyd. peak  (cms)=       0.09         0.05
                                                        *TOTALS*
   PEAK FLOW       (cms)=       0.63         0.34          0.919 (iii)
   TIME TO PEAK    (hrs)=       2.75         3.00           2.75
   RUNOFF VOLUME    (mm)=      71.00        30.51          46.71
   TOTAL RAINFALL   (mm)=      73.00        73.00          73.00
   RUNOFF COEFFICIENT   =       0.97         0.42           0.64

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
```



```
-------------------------------------------------------------------------------
--------------------
| DUHYD    (  0403)|
| Inlet Cap.= 0.740|
| #of Inlets=     1|
| Total(cms)=   0.7|     AREA     QPEAK     TPEAK     R.V.
--------------------     (ha)     (cms)     (hrs)     (mm)
   TOTAL HYD.(ID= 1):   8.58      0.92      2.75   46.71
   ==================================================
   MAJOR SYS.(ID= 2):   0.35      0.18      2.75   46.71
   MINOR SYS.(ID= 3):   8.23      0.74      2.75   46.71

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0005)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
      ID1= 1 (  0004):   134.56   2.462     4.67    51.92
    + ID2= 2 (  0403):     0.35   0.179     2.75    46.71
      ===================================================
      ID = 3 (  0005):   134.91   2.462     4.67    51.91

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0500)|   Area    (ha)=   6.76
|ID= 1 DT=15.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
   Surface Area     (ha)=       5.07         1.69
   Dep. Storage     (mm)=       2.00         5.00
   Average Slope     (%)=       1.00         2.00
   Length            (m)=     212.29        40.00
   Mannings n          =      0.030        0.200

   Max.Eff.Inten.(mm/hr)=      67.16        54.05
              over (min)       15.00        30.00
   Storage Coeff.  (min)=       7.77 (ii)   15.67 (ii)
   Unit Hyd. Tpeak (min)=      15.00        30.00
   Unit Hyd. peak  (cms)=       0.10         0.05
                                                        *TOTALS*
   PEAK FLOW       (cms)=       0.81         0.18          0.964 (iii)
   TIME TO PEAK    (hrs)=       2.75         3.00           2.75
   RUNOFF VOLUME    (mm)=      71.00        33.58          57.90
```



```
   TOTAL RAINFALL   (mm)=      73.00        73.00          73.00
   RUNOFF COEFFICIENT   =       0.97         0.46           0.79

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0600)|   Area    (ha)=  12.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  40.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
   Surface Area     (ha)=       6.00         6.00
   Dep. Storage     (mm)=       2.00         5.00
   Average Slope     (%)=       1.00         2.00
   Length            (m)=     270.00        40.00
   Mannings n          =      0.030        0.200

   Max.Eff.Inten.(mm/hr)=      67.16        42.31
              over (min)       15.00        30.00
   Storage Coeff.  (min)=       8.98 (ii)   17.69 (ii)
   Unit Hyd. Tpeak (min)=      15.00        30.00
   Unit Hyd. peak  (cms)=       0.09         0.05
                                                        *TOTALS*
   PEAK FLOW       (cms)=       0.88         0.47          1.275 (iii)
   TIME TO PEAK    (hrs)=       2.75         3.00           2.75
   RUNOFF VOLUME    (mm)=      71.00        30.51          46.71
   TOTAL RAINFALL   (mm)=      73.00        73.00          73.00
   RUNOFF COEFFICIENT   =       0.97         0.42           0.64

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0006)|
```

```
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0500):      6.76   0.964     2.75    57.90
     + ID2= 2 (  0600):     12.00   1.275     2.75    46.71
       ==================================================
       ID = 3 (  0006):     18.76   2.239     2.75    50.74

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0700)|   Area    (ha)=  12.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  55.00   Dir. Conn.(%)=  43.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       6.60         5.40
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     282.00        40.00
     Mannings n           =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      67.16        46.16
                over (min)       15.00        30.00
     Storage Coeff.  (min)=       9.22 (ii)   17.63 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.09         0.05
                                                             *TOTALS*
     PEAK FLOW       (cms)=       0.94         0.46           1.335 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00            2.75
     RUNOFF VOLUME    (mm)=      71.00        31.59           48.53
     TOTAL RAINFALL   (mm)=      73.00        73.00           73.00
     RUNOFF COEFFICIENT   =       0.97         0.43            0.66

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0006):     18.76   2.239     2.75    50.74
```



```
     + ID2= 2 (  0700):     12.00   1.335     2.75    48.53
       ==================================================
       ID = 3 (  0007):     30.76   3.574     2.75    49.88

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0008)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0403):      8.23   0.740     2.75    46.71
     + ID2= 2 (  0007):     30.76   3.574     2.75    49.88
       ==================================================
       ID = 3 (  0008):     38.99   4.314     2.75    49.21

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0800)|   Area    (ha)=   2.60
|ID= 1 DT=15.0 min |   Total Imp(%)=  60.00   Dir. Conn.(%)=  45.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.56         1.04
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     131.00        40.00
     Mannings n           =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      67.16        52.55
                over (min)       15.00        15.00
     Storage Coeff.  (min)=       5.82 (ii)   13.80 (ii)
     Unit Hyd. Tpeak (min)=      15.00        15.00
     Unit Hyd. peak  (cms)=       0.10         0.08
                                                             *TOTALS*
     PEAK FLOW       (cms)=       0.22         0.13           0.345 (iii)
     TIME TO PEAK    (hrs)=       2.75         2.75            2.75
     RUNOFF VOLUME    (mm)=      71.00        33.22           50.22
     TOTAL RAINFALL   (mm)=      73.00        73.00           73.00
     RUNOFF COEFFICIENT   =       0.97         0.46            0.69

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
```



```
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0009)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0008):     38.99   4.314     2.75    49.21
     + ID2= 2 (  0800):      2.60   0.345     2.75    50.22
       ==================================================
       ID = 3 (  0009):     41.59   4.658     2.75    49.27

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0010)|     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   |   0.9400     0.6210
                          0.0500     0.1950   |   2.6600     0.7760
                          0.0800     0.3860   |   4.0200     0.9110
                          0.1300     0.4750   |   0.0000     0.0000

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0009)     41.594      4.658      2.75      49.27
   OUTFLOW: ID= 1 (  0010)     41.594      3.135      3.00      49.25

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 67.29
                  TIME SHIFT OF PEAK FLOW         (min)= 15.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.8261

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0011)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0010):     41.59   3.135     3.00    49.25
     + ID2= 2 (  0005):    134.91   2.462     4.67    51.91
       ==================================================
       ID = 3 (  0011):    176.50   3.904     3.08    51.28

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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```



```
| CALIB            |
| STANDHYD (  0031)|   Area    (ha)=   1.03
|ID= 1 DT=10.0 min |   Total Imp(%)=  63.00   Dir. Conn.(%)=  63.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.65         0.38
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      82.87        40.00
     Mannings n           =      0.030        0.200

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 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
                0.167    0.00 | 1.833   16.79 | 3.500   10.22 |  5.17    1.46
                0.333    0.73 | 2.000   24.82 | 3.667   10.22 |  5.33    1.46
                0.500    1.46 | 2.167   24.82 | 3.833    8.03 |  5.50    1.46
                0.667    1.46 | 2.333   45.99 | 4.000    5.84 |  5.67    1.46
                0.833    1.46 | 2.500   67.16 | 4.167    5.84 |  5.83    1.46
                1.000    1.46 | 2.667   67.16 | 4.333    4.38 |  6.00    1.46
                1.167    1.46 | 2.833   43.07 | 4.500    2.92 |  6.17    1.46
                1.333    5.11 | 3.000   18.98 | 4.667    2.92 |  6.33    0.73
                1.500    8.76 | 3.167   18.98 | 4.833    2.19 |
                1.667    8.76 | 3.333   14.60 | 5.000    1.46 |

     Max.Eff.Inten.(mm/hr)=      67.16        26.49
                over (min)       10.00        20.00
     Storage Coeff.  (min)=       4.42 (ii)   14.92 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.15         0.07
                                                             *TOTALS*
     PEAK FLOW       (cms)=       0.12         0.02           0.139 (iii)
     TIME TO PEAK    (hrs)=       2.67         2.83            2.67
     RUNOFF VOLUME    (mm)=      71.00        26.92           54.68
     TOTAL RAINFALL   (mm)=      73.00        73.00           73.00
     RUNOFF COEFFICIENT   =       0.97         0.37            0.75

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
```

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====================================================================================
=======================

       V    V   I    SSSSS  U    U    A    L              (v 6.0.2000)
       V    V   I    SS     U    U   A A   L
        V  V    I     SS    U    U  AAAAA  L
        V  V    I      SS   U    U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H    H  Y   Y  M    M   OOO     TM
       O   O    T      T    H    H   Y Y   MM MM  O   O
       O   O    T      T    H    H    Y    M    M  O   O
        OOO     T      T    H    H    Y    M    M   OOO
Developed and Distributed by Civica Infrastructure
```



```
                  *****  D E T A I L E D   O U T P U T *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.0\VO2\voin.dat

  Output  filename:
C:\Users\kevin.lukawiecki\AppData\Local\Civica\VH5\a512d3b0-a6e7-43a6-99e8-d9354a433
349\a084fdeb-a948-469e-a763-2ebb8797
  Summary filename:
C:\Users\kevin.lukawiecki\AppData\Local\Civica\VH5\a512d3b0-a6e7-43a6-99e8-d9354a433
349\a084fdeb-a948-469e-a763-2ebb8797


DATE: 01/26/2022                          TIME: 11:36:44

USER:



COMMENTS: ____________________________________________________________

------------------------------------------------------------------------------------
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  **************************************************
  ** SIMULATION : Z5mm                            **
  **************************************************
```



```
--------------------
|    READ STORM     |    Filename: C:\Users\kevin.lukawiecki\AppD
|                   |              ata\Local\Temp\
|                   |              b7e32948-76cc-466b-a4e2-69ca27ada067\d25d2449
| Ptotal= 24.91 mm |    Comments: 25MM-4HR
--------------------
              TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
               hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
              0.03    0.30 |  1.03   10.80 |  2.03    4.62 |  3.03    2.04
              0.07    0.60 |  1.07   14.10 |  2.07    4.44 |  3.07    1.98
              0.10    0.90 |  1.10   17.40 |  2.10    4.26 |  3.10    1.92
              0.13    1.20 |  1.13   20.70 |  2.13    4.08 |  3.13    1.86
              0.17    1.50 |  1.17   24.00 |  2.17    3.90 |  3.17    1.80
              0.20    1.62 |  1.20   26.46 |  2.20    3.75 |  3.20    1.77
              0.23    1.74 |  1.23   28.92 |  2.23    3.60 |  3.23    1.74
              0.27    1.86 |  1.27   31.38 |  2.27    3.45 |  3.27    1.71
              0.30    1.98 |  1.30   33.84 |  2.30    3.30 |  3.30    1.68
              0.33    2.10 |  1.33   36.30 |  2.33    3.15 |  3.33    1.65
              0.37    2.13 |  1.37   33.75 |  2.37    3.09 |  3.37    1.65
              0.40    2.16 |  1.40   31.20 |  2.40    3.03 |  3.40    1.65
              0.43    2.19 |  1.43   28.65 |  2.43    2.97 |  3.43    1.65
              0.47    2.22 |  1.47   26.10 |  2.47    2.91 |  3.47    1.65
              0.50    2.25 |  1.50   23.55 |  2.50    2.85 |  3.50    1.65
              0.53    2.31 |  1.53   20.82 |  2.53    2.76 |  3.53    1.62
              0.57    2.37 |  1.57   18.09 |  2.57    2.67 |  3.57    1.59
              0.60    2.43 |  1.60   15.36 |  2.60    2.58 |  3.60    1.56
              0.63    2.49 |  1.63   12.63 |  2.63    2.49 |  3.63    1.53
              0.67    2.55 |  1.67    9.90 |  2.67    2.40 |  3.67    1.50
              0.70    2.85 |  1.70    9.18 |  2.70    2.37 |  3.70    1.41
              0.73    3.15 |  1.73    8.46 |  2.73    2.34 |  3.73    1.32
              0.77    3.45 |  1.77    7.74 |  2.77    2.31 |  3.77    1.23
              0.80    3.75 |  1.80    7.02 |  2.80    2.28 |  3.80    1.14
              0.83    4.05 |  1.83    6.30 |  2.83    2.25 |  3.83    1.05
              0.87    4.74 |  1.87    6.00 |  2.87    2.22 |  3.87    0.96
              0.90    5.43 |  1.90    5.70 |  2.90    2.19 |  3.90    0.87
              0.93    6.12 |  1.93    5.40 |  2.93    2.16 |  3.93    0.78
              0.97    6.81 |  1.97    5.10 |  2.97    2.13 |  3.97    0.69
              1.00    7.50 |  2.00    4.80 |  3.00    2.10 |  4.00    0.60

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--------------------
| CALIB             |
| NASHYD   (  0401)|   Area    (ha)=   6.62   Curve Number   (CN)= 63.0
|ID= 1 DT=15.0 min |   Ia      (mm)=   1.50   # of Linear Res.(N)= 2.00
--------------------   U.H. Tp(hrs)=   0.20

         NOTE:  RAINFALL WAS TRANSFORMED TO  15.0 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
            0.250    1.17 | 1.250   21.08 | 2.250    4.05 |  3.25    1.86
            0.500    2.13 | 1.500   30.54 | 2.500    3.07 |  3.50    1.66
            0.750    2.65 | 1.750   13.11 | 2.750    2.50 |  3.75    1.49
            1.000    5.35 | 2.000    5.89 | 3.000    2.20 |  4.00    0.89

     Unit Hyd Qpeak  (cms)=   0.859

     PEAK FLOW       (cms)=   0.040 (i)
     TIME TO PEAK    (hrs)=   1.750
     RUNOFF VOLUME    (mm)=   2.792
     TOTAL RAINFALL   (mm)=  24.910
     RUNOFF COEFFICIENT   =   0.112

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB             |
| STANDHYD (  0100)|   Area    (ha)=  23.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      17.25         5.75
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     390.00        40.00
     Mannings n           =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      30.54         6.72
                over (min)       15.00        45.00
     Storage Coeff.  (min)=      15.34 (ii)   33.52 (ii)
     Unit Hyd. Tpeak (min)=      15.00        45.00
     Unit Hyd. peak  (cms)=       0.07         0.03
                                                          *TOTALS*
     PEAK FLOW       (cms)=       1.01         0.06          1.024 (iii)
     TIME TO PEAK    (hrs)=       1.50         2.25           1.50
     RUNOFF VOLUME    (mm)=      22.91         4.77          16.56
     TOTAL RAINFALL   (mm)=      24.91        24.91          24.91
     RUNOFF COEFFICIENT   =       0.92         0.19           0.66


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
```



```
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0101)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 15.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.7800     1.0000
                          0.7800     0.0000   |   0.0000     0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0100)     23.000     1.024      1.50      16.56
   OUTFLOW: ID= 1 (  0101)     23.000     0.780      1.50      16.87

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 76.15
                  TIME SHIFT OF PEAK FLOW         (min)=  0.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0220

--------------------------------------------------------------------------------
--------------------
| CALIB             |
| STANDHYD (  0200)|   Area    (ha)=  28.40
|ID= 1 DT=15.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      21.30         7.10
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     435.00        40.00
     Mannings n           =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      30.54         6.72
                over (min)       15.00        45.00
     Storage Coeff.  (min)=      16.38 (ii)   34.56 (ii)
     Unit Hyd. Tpeak (min)=      15.00        45.00
     Unit Hyd. peak  (cms)=       0.07         0.03
                                                          *TOTALS*
     PEAK FLOW       (cms)=       1.22         0.07          1.234 (iii)
     TIME TO PEAK    (hrs)=       1.50         2.25           1.50
     RUNOFF VOLUME    (mm)=      22.91         4.77          16.56
     TOTAL RAINFALL   (mm)=      24.91        24.91          24.91
     RUNOFF COEFFICIENT   =       0.92         0.19           0.66
```

```
       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR( 0201)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 15.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.8700     1.2000
                          0.8700     0.0000   |   0.0000     0.0000

                                 AREA     QPEAK     TPEAK       R.V.
                                 (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0200)     28.400     1.234      1.50      16.56
   OUTFLOW: ID= 1 (  0201)     28.400     0.870      1.50      17.08

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 70.51
                   TIME SHIFT OF PEAK FLOW         (min)=  0.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.0328

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0001)|
|   1 +  2 =  3    |        AREA    QPEAK    TPEAK     R.V.
--------------------        (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0101):    23.00   0.780     1.50    16.87
      + ID2= 2 (  0201):    28.40   0.870     1.50    17.08
        ==================================================
        ID = 3 (  0001):    51.40   1.650     1.50    16.99

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0300)|   Area    (ha)=  73.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  57.00   Dir. Conn.(%)=  47.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      41.61        31.39
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     692.00        40.00
     Mannings n          =      0.030        0.200
```



```
     Max.Eff.Inten.(mm/hr)=      25.81         5.10
                over (min)       30.00        45.00
     Storage Coeff.  (min)=      23.15 (ii)   43.45 (ii)
     Unit Hyd. Tpeak (min)=      30.00        45.00
     Unit Hyd. peak  (cms)=       0.04         0.03
                                                            *TOTALS*
     PEAK FLOW       (cms)=       1.80         0.21          1.924 (iii)
     TIME TO PEAK    (hrs)=       1.75         2.25           1.75
     RUNOFF VOLUME    (mm)=      22.91         4.14          12.96
     TOTAL RAINFALL   (mm)=      24.91        24.91          24.91
     RUNOFF COEFFICIENT   =       0.92         0.17           0.52


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0027)|   Area    (ha)=   2.30
|ID= 1 DT=10.0 min |   Total Imp(%)=  71.00   Dir. Conn.(%)=  71.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.63         0.67
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     123.83        40.00
     Mannings n          =      0.030        0.200

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 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
               0.167    0.90 | 1.167   17.40 | 2.167    4.26 |  3.17    1.92
               0.333    1.86 | 1.333   31.38 | 2.333    3.45 |  3.33    1.71
               0.500    2.19 | 1.500   28.65 | 2.500    2.97 |  3.50    1.65
               0.667    2.43 | 1.667   15.36 | 2.667    2.58 |  3.67    1.56
               0.833    3.45 | 1.833    7.74 | 2.833    2.31 |  3.83    1.23
               1.000    6.12 | 2.000    5.40 | 3.000    2.16 |  4.00    0.78

     Max.Eff.Inten.(mm/hr)=      31.38         3.01
                over (min)       10.00        40.00
```



```
     Storage Coeff.  (min)=       7.63 (ii)   32.70 (ii)
     Unit Hyd. Tpeak (min)=      10.00        40.00
     Unit Hyd. peak  (cms)=       0.12         0.03
                                                            *TOTALS*
     PEAK FLOW       (cms)=       0.13         0.00          0.128 (iii)
     TIME TO PEAK    (hrs)=       1.50         2.17           1.50
     RUNOFF VOLUME    (mm)=      22.91         3.21          17.19
     TOTAL RAINFALL   (mm)=      24.91        24.91          24.91
     RUNOFF COEFFICIENT   =       0.92         0.13           0.69

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0024)|   Area    (ha)=   1.24
|ID= 1 DT=10.0 min |   Total Imp(%)=  63.00   Dir. Conn.(%)=  63.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.78         0.46
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      90.92        40.00
     Mannings n          =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      31.38         3.01
                over (min)       10.00        40.00
     Storage Coeff.  (min)=       6.34 (ii)   31.41 (ii)
     Unit Hyd. Tpeak (min)=      10.00        40.00
     Unit Hyd. peak  (cms)=       0.13         0.03
                                                            *TOTALS*
     PEAK FLOW       (cms)=       0.06         0.00          0.062 (iii)
     TIME TO PEAK    (hrs)=       1.50         2.17           1.50
     RUNOFF VOLUME    (mm)=      22.91         3.21          15.61
     TOTAL RAINFALL   (mm)=      24.91        24.91          24.91
     RUNOFF COEFFICIENT   =       0.92         0.13           0.63

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
```



```
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR( 0037)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
     **** WARNING : FIRST OUTFLOW IS NOT ZERO.
                          0.1220     0.0000   |   0.1220     0.1000

                                 AREA     QPEAK     TPEAK       R.V.
                                 (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0024)      1.240     0.062      1.50      15.61
   OUTFLOW: ID= 1 (  0037)      1.240     0.062      1.50      15.60

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=100.00
                   TIME SHIFT OF PEAK FLOW         (min)=  0.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.0000
                   MAXIMUM  STORAGE   USED       (cu.m.)=  0.000006

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0002)|
|   1 +  2 =  3    |        AREA    QPEAK    TPEAK     R.V.
--------------------        (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0001):    51.40   1.650     1.50    16.99
      + ID2= 2 (  0027):     2.30   0.128     1.50    17.19
        ==================================================
        ID = 3 (  0002):    53.70   1.778     1.50    16.91

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0002)|
|   3 +  2 =  1    |        AREA    QPEAK    TPEAK     R.V.
--------------------        (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0002):    53.70   1.778     1.50    16.91
      + ID2= 2 (  0300):    73.00   1.924     1.75    12.96
        ==================================================
        ID = 1 (  0002):   126.70   3.519     1.83    14.63

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
```

```
--------------------
| ADD HYD  (  0002)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0002):   126.70   3.519     1.83    14.63
     + ID2= 2 (  0037):     1.24   0.062     1.50    15.60
       ====================================================
       ID = 3 (  0002):   127.94   3.543     1.67    14.64

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0003)|      OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 15.0 min     |      OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------       (cms)     (ha.m.)   |   (cms)     (ha.m.)
                           0.0000     0.0000   |   0.1900     1.9300
                           0.0500     0.4200   |   0.4700     2.6400
                           0.0800     0.8400   |   0.8500     3.3400
                           0.0900     1.3900   |   1.3200     3.7000
                           0.1000     1.6000   |   2.4600     4.2500

                                  AREA     QPEAK     TPEAK       R.V.
                                  (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0002)    127.940      3.543      1.67      14.64
   OUTFLOW: ID= 1 (  0003)    127.940      0.136      4.58      14.62

                 PEAK   FLOW   REDUCTION [Qout/Qin](%)=  3.84
                 TIME SHIFT OF PEAK FLOW         (min)=175.00
                 MAXIMUM  STORAGE   USED       (ha.m.)=  1.7324

     **** WARNING : SELECTED ROUTING TIME STEP DENIED.
-------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0004)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0003):   127.94   0.136     4.58    14.62
     + ID2= 2 (  0401):     6.62   0.040     1.75     2.79
       ====================================================
       ID = 3 (  0004):   134.56   0.137     4.42    14.04

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0402)|   Area    (ha)=   8.58
```



```
|ID= 1 DT=15.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  40.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       4.29         4.29
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     239.17        40.00
     Mannings n          =      0.030        0.200

         NOTE:  RAINFALL WAS TRANSFORMED TO  15.0 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
               0.250    1.17 | 1.250   21.08 | 2.250    4.05 |  3.25    1.86
               0.500    2.13 | 1.500   30.54 | 2.500    3.07 |  3.50    1.66
               0.750    2.65 | 1.750   13.11 | 2.750    2.50 |  3.75    1.49
               1.000    5.35 | 2.000    5.89 | 3.000    2.20 |  4.00    0.89

     Max.Eff.Inten.(mm/hr)=      30.54         4.81
                over (min)       15.00        45.00
     Storage Coeff.  (min)=      11.44 (ii)   32.23 (ii)
     Unit Hyd. Tpeak (min)=      15.00        45.00
     Unit Hyd. peak  (cms)=       0.08         0.03
                                                          *TOTALS*
     PEAK FLOW      (cms)=        0.25         0.03          0.262 (iii)
     TIME TO PEAK    (hrs)=       1.50         2.25           1.50
     RUNOFF VOLUME    (mm)=      22.91         4.01          11.57
     TOTAL RAINFALL   (mm)=      24.91        24.91          24.91
     RUNOFF COEFFICIENT   =       0.92         0.16           0.46

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
--------------------
| DUHYD    (  0403)|
| Inlet Cap.= 0.740|
| #of Inlets=     1|
| Total(cms)=   0.7|      AREA     QPEAK     TPEAK     R.V.
--------------------      (ha)     (cms)     (hrs)     (mm)
     TOTAL HYD.(ID= 1):   8.58      0.26      1.50    11.57
```



```
     =====================================================
     MAJOR SYS.(ID= 2):   0.00      0.00      0.00    0.00
     MINOR SYS.(ID= 3):   8.58      0.26      1.50   11.57

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0005)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
*** W A R N I N G :  HYDROGRAPH   0403 <ID= 2> IS DRY.
*** W A R N I N G :  HYDROGRAPH   0003 = HYDROGRAPH 0001
       ID1= 1 (  0004):   134.56   0.137     4.42    14.04
     + ID2= 2 (  0403):     0.00   0.000     0.00     0.00
       ====================================================
       ID = 3 (  0005):   134.56   0.137     4.42    14.04

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0500)|   Area    (ha)=   6.76
|ID= 1 DT=15.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  65.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       5.07         1.69
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     212.29        40.00
     Mannings n          =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      30.54         6.72
                over (min)       15.00        30.00
     Storage Coeff.  (min)=      10.65 (ii)   28.83 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.09         0.04
                                                          *TOTALS*
     PEAK FLOW      (cms)=        0.33         0.02          0.340 (iii)
     TIME TO PEAK    (hrs)=       1.50         2.00           1.50
     RUNOFF VOLUME    (mm)=      22.91         4.77          16.56
     TOTAL RAINFALL   (mm)=      24.91        24.91          24.91
     RUNOFF COEFFICIENT   =       0.92         0.19           0.66

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
```



```
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0600)|   Area    (ha)=  12.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  40.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       6.00         6.00
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     270.00        40.00
     Mannings n          =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      30.54         4.81
                over (min)       15.00        45.00
     Storage Coeff.  (min)=      12.31 (ii)   33.09 (ii)
     Unit Hyd. Tpeak (min)=      15.00        45.00
     Unit Hyd. peak  (cms)=       0.08         0.03
                                                          *TOTALS*
     PEAK FLOW      (cms)=        0.35         0.04          0.359 (iii)
     TIME TO PEAK    (hrs)=       1.50         2.25           1.50
     RUNOFF VOLUME    (mm)=      22.91         4.01          11.57
     TOTAL RAINFALL   (mm)=      24.91        24.91          24.91
     RUNOFF COEFFICIENT   =       0.92         0.16           0.46

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0006)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0500):     6.76   0.340     1.50    16.56
     + ID2= 2 (  0600):    12.00   0.359     1.50    11.57
       ====================================================
       ID = 3 (  0006):    18.76   0.699     1.50    13.37
```

```
     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD ( 0700)|   Area    (ha)=  12.00
|ID= 1 DT=15.0 min |   Total Imp(%)=  55.00   Dir. Conn.(%)=  43.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       6.60         5.40
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     282.00        40.00
     Mannings n           =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      30.54         5.42
                over (min)       15.00        45.00
     Storage Coeff.  (min)=      12.63 (ii)   32.44 (ii)
     Unit Hyd. Tpeak (min)=      15.00        45.00
     Unit Hyd. peak  (cms)=       0.08         0.03
                                                            *TOTALS*
     PEAK FLOW       (cms)=       0.37         0.04          0.383 (iii)
     TIME TO PEAK    (hrs)=       1.50         2.25           1.50
     RUNOFF VOLUME    (mm)=      22.91         4.27          12.28
     TOTAL RAINFALL   (mm)=      24.91        24.91          24.91
     RUNOFF COEFFICIENT   =       0.92         0.17           0.49

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0006):    18.76   0.699     1.50    13.37
      + ID2= 2 (  0700):    12.00   0.383     1.50    12.28
        ==================================================
        ID = 3 (  0007):    30.76   1.082     1.50    12.95

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
```



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--------------------
| ADD HYD  (  0008)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0403):     8.58   0.262     1.50    11.57
      + ID2= 2 (  0007):    30.76   1.082     1.50    12.95
        ==================================================
        ID = 3 (  0008):    39.34   1.344     1.50    12.65

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD ( 0800)|   Area    (ha)=   2.60
|ID= 1 DT=15.0 min |   Total Imp(%)=  60.00   Dir. Conn.(%)=  45.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.56         1.04
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     131.00        40.00
     Mannings n           =      0.030        0.200

     Max.Eff.Inten.(mm/hr)=      30.54         6.47
                over (min)       15.00        30.00
     Storage Coeff.  (min)=       7.97 (ii)   26.43 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.10         0.04
                                                            *TOTALS*
     PEAK FLOW       (cms)=       0.09         0.01          0.099 (iii)
     TIME TO PEAK    (hrs)=       1.50         2.00           1.50
     RUNOFF VOLUME    (mm)=      22.91         4.68          12.88
     TOTAL RAINFALL   (mm)=      24.91        24.91          24.91
     RUNOFF COEFFICIENT   =       0.92         0.19           0.52

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0009)|
```


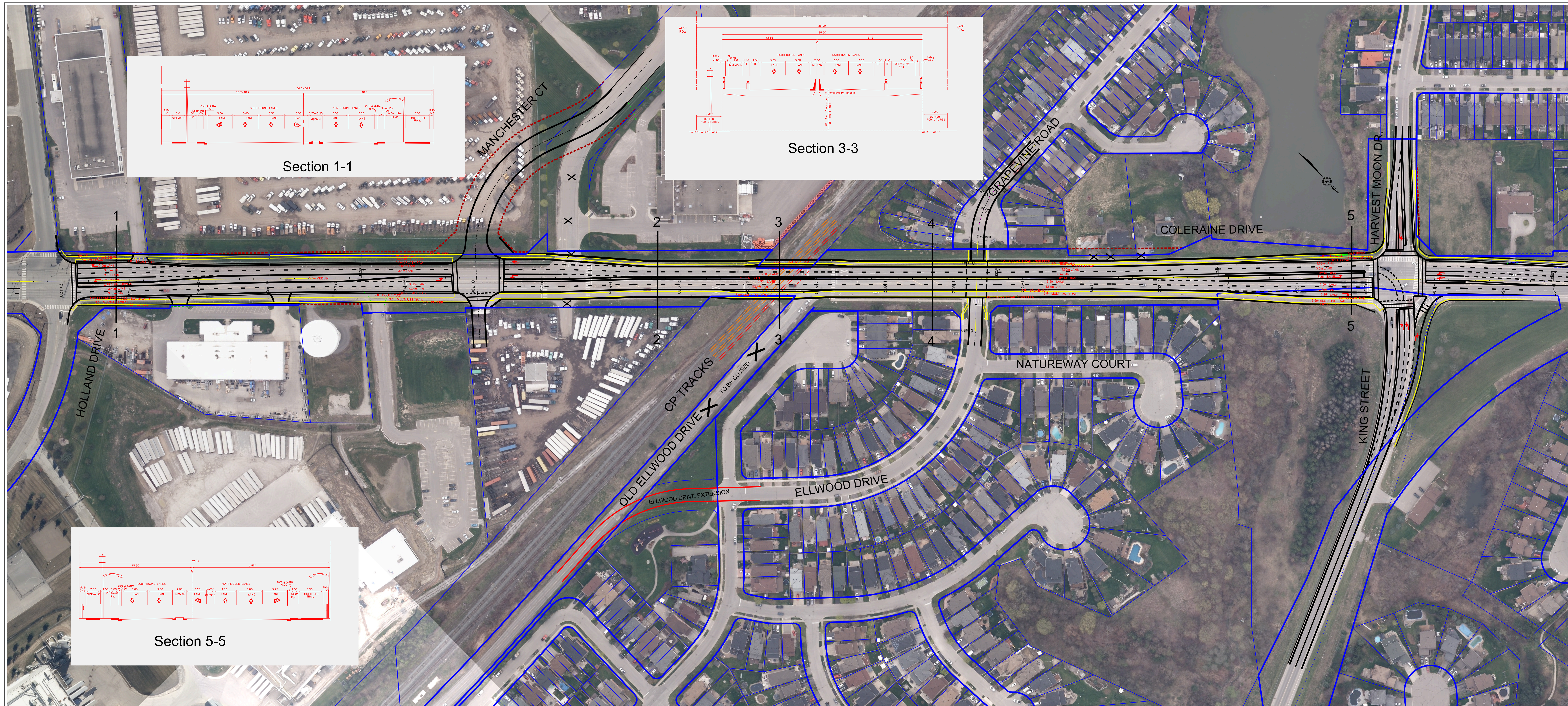

```
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0008):    39.34   1.344     1.50    12.65
      + ID2= 2 (  0800):     2.60   0.099     1.50    12.88
        ==================================================
        ID = 3 (  0009):    41.94   1.442     1.50    12.66

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0010)|     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   |   0.9400      0.6210
                          0.0500     0.1950   |   2.6600      0.7760
                          0.0800     0.3860   |   4.0200      0.9110
                          0.1300     0.4750   |   0.0000      0.0000

                                AREA     QPEAK      TPEAK       R.V.
                                (ha)     (cms)      (hrs)       (mm)
   INFLOW : ID= 2 (  0009)     41.940      1.442      1.50      12.66
   OUTFLOW: ID= 1 (  0010)     41.940      0.108      3.92      12.64

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  7.46
                  TIME SHIFT OF PEAK FLOW         (min)=145.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.4351

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0011)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0010):    41.94   0.108     3.92    12.64
      + ID2= 2 (  0005):   134.56   0.137     4.42    14.04
        ==================================================
        ID = 3 (  0011):   176.50   0.242     4.17    13.71

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD ( 0031)|   Area    (ha)=   1.03
|ID= 1 DT=10.0 min |   Total Imp(%)=  63.00   Dir. Conn.(%)=  63.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.65         0.38
```

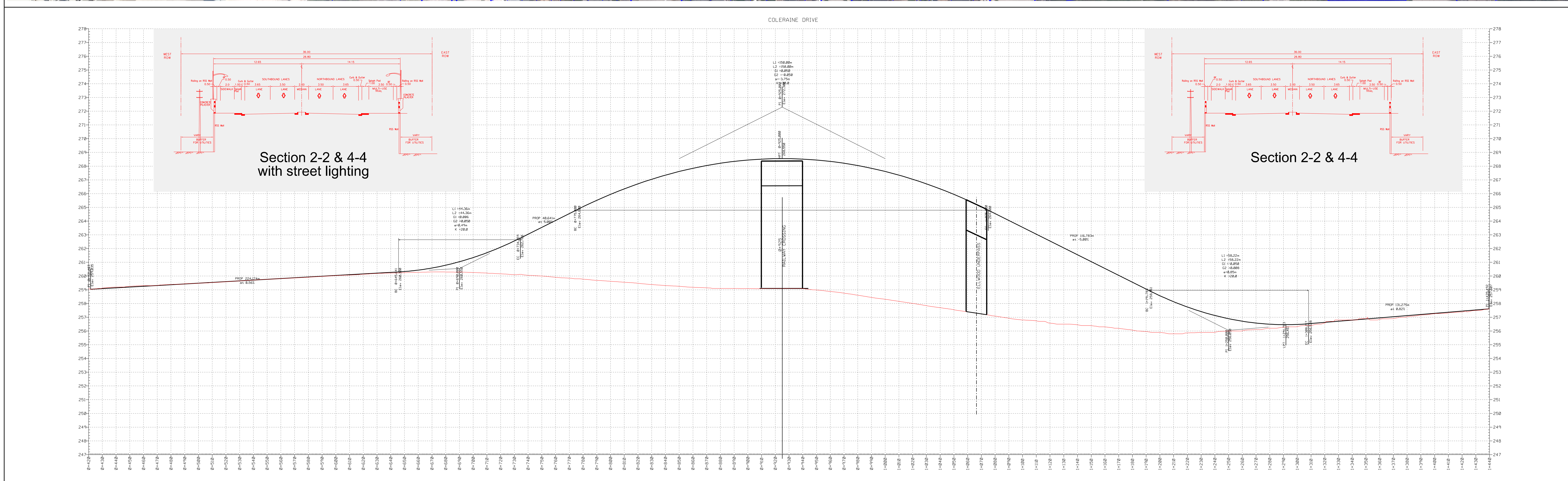


```
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      82.87        40.00
     Mannings n           =      0.030        0.200

         NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 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
                 0.167    0.90 | 1.167   17.40 | 2.167    4.26 |  3.17    1.92
                 0.333    1.86 | 1.333   31.38 | 2.333    3.45 |  3.33    1.71
                 0.500    2.19 | 1.500   28.65 | 2.500    2.97 |  3.50    1.65
                 0.667    2.43 | 1.667   15.36 | 2.667    2.58 |  3.67    1.56
                 0.833    3.45 | 1.833    7.74 | 2.833    2.31 |  3.83    1.23
                 1.000    6.12 | 2.000    5.40 | 3.000    2.16 |  4.00    0.78

     Max.Eff.Inten.(mm/hr)=      31.38         3.01
                over (min)       10.00        40.00
     Storage Coeff.  (min)=       5.99 (ii)   31.07 (ii)
     Unit Hyd. Tpeak (min)=      10.00        40.00
     Unit Hyd. peak  (cms)=       0.14         0.03
                                                            *TOTALS*
     PEAK FLOW       (cms)=       0.05         0.00          0.052 (iii)
     TIME TO PEAK    (hrs)=       1.50         2.17           1.50
     RUNOFF VOLUME    (mm)=      22.91         3.21          15.60
     TOTAL RAINFALL   (mm)=      24.91        24.91          24.91
     RUNOFF COEFFICIENT   =       0.92         0.13           0.63

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  71.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
```

D

Appendix D: Proposed Design Alternatives





SERVICE DATA

SERVICE	DATE	INIT.	SERVICE	DATE	INIT.

REVISIONS

DATE	DETAILS	INIT.
September 2019	ISSUED FOR REVIEW	S.K.
June 2020	REVISED FOR REVIEW	S.K.

KEY PLAN (N.T.S.)

General Notes

Designed by ______ Chkd. ______

Approved by ______

HORIZONTAL SCALE
SCALE 1:1000

VERTICAL SCALE

Region of Peel
Working for you

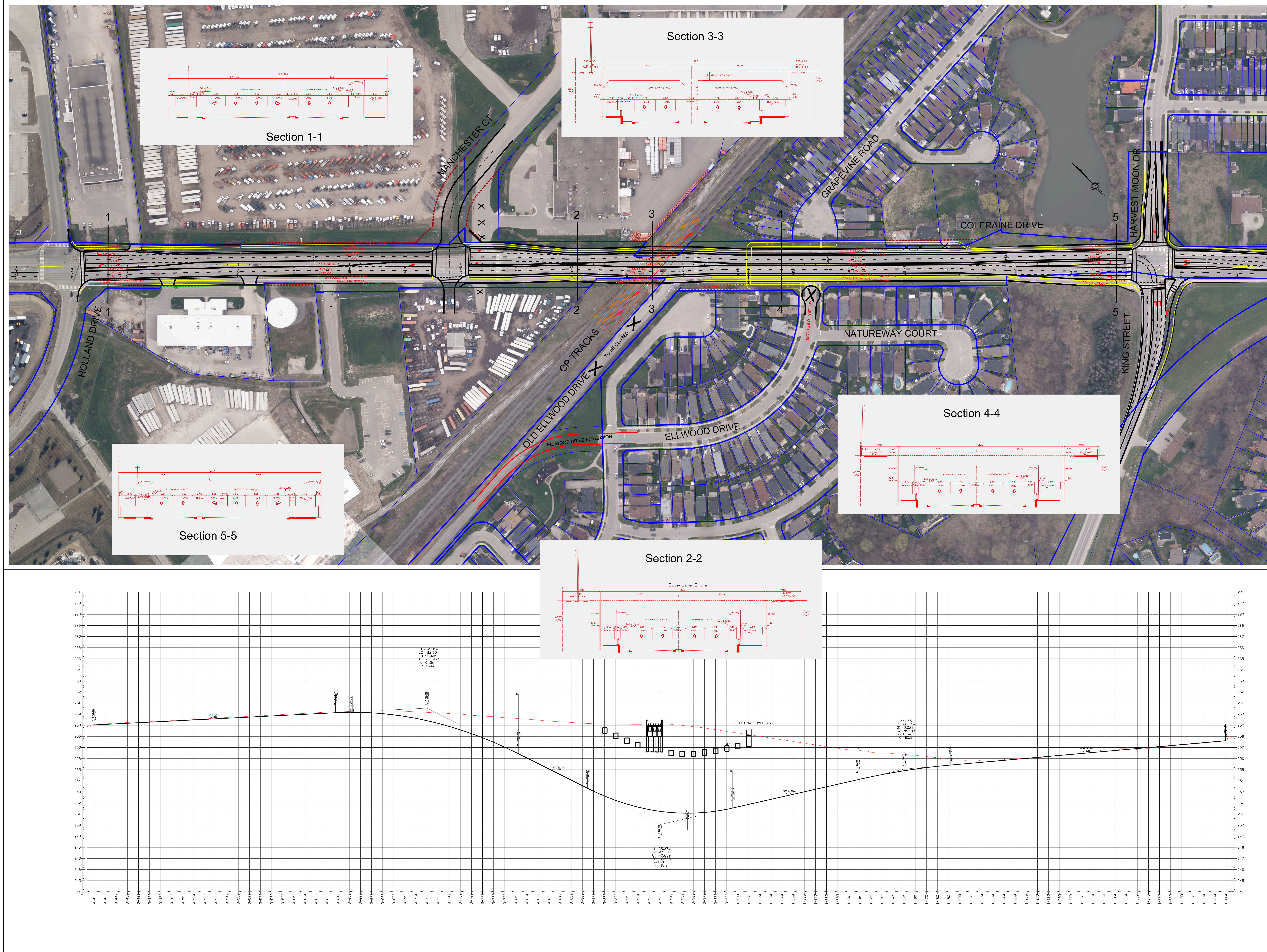
COLERAINE DRIVE

(HOLLAND DRIVE TO HARVEST MOON DRIVE)

ROAD OVER RAIL OPTION
PLAN & PROFILE

STA. 0+400 TO STA. 1+500

CAD Area	X-XX	Area	X-XX	Project No.	B000738
Checked by	S.K.	Drawn by	H.G.		
Date	June 2020	Sheet	2 of 8	Plan No.	0002-D



SERVICE DATA					
SERVICE	DATE	INIT.	SERVICE	DATE	INIT.

REVISIONS

DATE	DETAILS	INIT.
September 2019	ISSUED FOR REVIEW	S.K.
June 2020	REVISED FOR REVIEW	S.K.

KEY PLAN (N.T.S.)

General Notes

Designed by ______ Chkd. ______

Approved by ______

HORIZONTAL SCALE
SCALE 1:1000

VERTICAL SCALE

Region of Peel
Working for you

COLERAINE DRIVE

(HOLLAND DRIVE TO HARVEST MOON DRIVE)

RAIL OVER ROAD OPTION
PLAN & PROFILE

STA. 0+400 TO STA. 1+500

CAD Area	X-XX	Area	X-XX	Project No.	B000738
Checked by	S.K.	Drawn by	H.G.		
Date	June 2020	Sheet	4 of 8	Plan No.	0004-D

E

Appendix E: SWMP 9 Capacity Analysis, LID Water Balance Memos and Ecosystems Review of As Built Water Quality and Erosion Control SWMP 9

Memo

TO	**:**	Stephen Keen, P.Eng, (Project PM)
COPY TO	**:**	David Hiett, P.Eng,
FROM	**:**	Kevin Lukawiecki, EIT, Madhav Baral, P.Eng.
DATE	**:**	November 23, 2021
SUBJECT	**:**	B000738 Coleraine Drive Grade Separation EA SWMP 9 Capacity Analysis Memo

1. Background

The Regional Municipality of Peel has retained CIMA+ to complete a Schedule ‘C’ Municipal Class EA to investigate grade separation improvements at the Coleraine Drive and Canadian Pacific (C.P.) Railway crossing, located in the Community of Bolton.

The roadway improvements identified through this EA propose to collect stormwater drainage from Coleraine Drive and direct it to the existing Stormwater Management Pond 9 (SWMP 9) located southwest of the intersection of Harvest Moon Drive and Coleraine Drive. The SWMP is owned by the Town of Caledon and the Town’s approval will be required for the ponds use as a quality and quantity control. This memo has been completed to review the capacity of the existing SWMP 9 and confirm that the capacity can accommodate the anticipated additional flows.

All referenced documents can be found in the appendix of this memo.

2. Existing Conditions

The following analysis for existing conditions is based on the Falby Burnside and Associates Stormwater Management Report for the Heritage Hills Subdivision (Aug 1997). The related report and drawings are attached with this memo. The existing report references SWMP 9 as SWMP 5. Upon discussions with the Town of Caledon, this pond is SWMP 9 and will be referenced as such throughout this memo.

The existing SWMP 9 was designed to provide quantity and quality control for the 72 ha residential development (watershed 300) between Coleraine Drive, King Street and the C.P. Railway. There are two other drainage areas draining into the pond, which are a 23 ha area (watershed 100) and 28.4 ha (watershed 200) area of commercial development on the opposite side of the railway. Both drainage areas drain to their own SWMP before being released to enter

SWMP 9. These SWMP's provide all the required quantity and quality control for their drainage areas. The outlet from SWMP 9 discharges into the East Humber River watershed.

As per the 1998 MOE Certificate of Approval (CofA) provided for SWMP 9, the pond has a permanent pool volume of 17,000 m^3 and a quantity control volume of 58,000 m^3. During the Heritage Hills Subdivision Phase 2 Stormwater Management Report, dated August 1997, completed for a stormwater pond downstream of SWMP 9, a Visual OTTHYMO model was created which included SWMP 9 within the analysis. This analysis only included a stage storage chart of SWMP 9 up to a maximum volume of 42,500 m^3. Due to the lack of stage storage data from the CofA, the more conservative quantity storage volume of 42,500 m^3 will be used for the current analysis of the SWMP 9.

In 2010, a widening and reconstruction of Coleraine Drive was completed. While performing the reconstruction, storm sewers were added within watershed 402 along Coleraine Drive from just north of the C.P. Railway to the low point of Coleraine Drive just south of King Street West. This storm sewer flows directly into the existing SWMP 9, draining approximately 2.3 ha of watershed 402. This inlet is located adjacent to the SWMP quality outlet, which would bypass the main quality function of the SMWP.

The 2010 construction also affected predevelopment flows of watershed 500 south of the railway. Pre 2010, all flows in this catchment flowed northeast into watershed 600 and into the East Humber River watershed. The construction of storm sewers along Coleraine Drive south of the railway took minor roadway drainage south while allowing major flow to continue northeast as per existing conditions. This minor flow redirection would lead minor roadway flow to enter the West Humber River watershed.

In August of 2020, Ecosystems Recovery Inc completed a review of SWMP 9 as built water quality and erosion control. In this report, it was determined that the drainage area to the pond had increased from 72 ha with 49% impervious to 73 ha with 57% impervious. The report did not show a drainage map or specify if this increase included the additional roadway drainage. As such, it will be assumed that this change only affects the existing drainage area into the SWMP and does not include any roadway runoff.

3. Proposed Modifications

The proposed preferred alternative is to reconstruct Coleraine Drive to pass over the C.P. Railway. The proposed modification of Coleraine Drive will cause changes to the existing drainage flow paths and slightly increase the impervious area along the roadway due to the addition of active transportation. It is also proposed to direct the affected drainage area into SWMP 9, returning the flow paths to pre 2010 conditions outletting to the East Humber River watershed. The pond will provide quality and quantity control for the affected drainage areas. In order to complete this, it must be assured that the existing SWMP 9 is able to handle the increased drainage area.

4. Calculations

Three variables need to be checked to ensure that SWMP 9 has the required capacity to handle the increased drainage area:

- Quality Control: ensuring that the pond has the required permanent pool volume to provide adequate TSS removal for the added drainage area.
- Quantity Control: ensuring that the pond has the required quantity control volume to store the increased flow from the added drainage area.
- Erosion Control: ensuring that the pond has the required volume to store the 25 mm storm event and slowly drain this runoff over a drawdown period between 24-28 hours.

The total drainage area contribution to SWMP 9 is based on the 2020 Ecosystems Recovery Inc SWMP analysis, as well as the proposed added drainage areas for this project. The total drainage area includes the existing 73 ha, 57% impervious drainage area, as well as the two proposed roadway drainage areas, Catchment A1 of 2.30 ha and Catchment B1 of 1.24 ha with 90% imperviousness. With the addition of Catchments A1 and B1, the total drainage area of the pond will become 76.54 ha with 59% imperviousness.

4.1 Quality Control

The existing SWMP 9 has a permanent pool volume of 17,000 m^3. Per the MOE Stormwater Management Planning and Design Manual, 2003, the SWMP volume requirements are based on the required protection level, drainage area, impervious percentage of drainage area and type of pond. As the protection level is not specified in the MOE Certificate of Approval (CofA), it will be assumed that SWMP 9 was constructed to provide an enhanced level of quality control, removing 80% of TSS. As the two drainage areas south of the C.P. Railway already have SWMP's, their drainage areas will not be considered while calculating the permanent pool volume requirements.

Based on the above and using **Table 3.2** from the MECP Stormwater Management Planning and Design Manual, for a 76.54 ha area with 59% imperviousness, the SWMP 9 will require a permanent pool volume of 12,246 m^3, which is less than the existing available volume of 17,000 m^3. This meets the quality control volume requirement.

As the existing inlet to the pond from the Coleraine Drive storm sewer is located adjacent to the quality control outlet, measures should be taken during detailed design to provide quality control for the inlet storm water. As a high level analysis, the implementation of a wall to increase the flow path between the inlet and outlet, or the implementation of an Oil Grit Separator (OGS) at the inlet can be used to provide water quality treatment to the inlets flow. These options, along with any other solutions raised later in the project, should be analyzed during detailed design.

4.2 Quantity Control

A hydrology model was created in Visual Otthymo based on the Falby Burnside and Associates Stormwater Management Report for the Heritage Hills Subdivision (1997) to quantify the required extended detention from the existing SWMP 9, for both the existing drainage area and proposed roadway drainage. The existing quantity control volume provided by SWMP 9 as shown in the model is 42,500 m^3.

The model showed that with the existing and proposed drainage areas, SWMP 9 requires 44,224 m^3 of quantity control volume during the 100-year storm. Although the CofA has noted a total storage volume of 75,000 m^3 including the permanent pool (wet storage) volume of 17,000 m^3 leaving an acting storage volume of 58,000 m^3, the analysis in this memo has been completed considering an available active storge volume of 42,500 m^3 as shown in the stage-storage information of the Heritage Hills hydrology model.

4.3 Erosion Control

Erosion control criteria requirements within a stormwater management pond will ensure that during a 25 mm storm event, the pond is able to hold and slowly release the full volume of water over the period of 24 - 48 hours. When running the 25 mm storm event through the Visual Otthymo model, the model showed that the pond would require a volume of 17,324 m^3 of erosion control storage. This volume is the part of the active storage volume and will be held for longer than 24 hours, meeting the drawdown time requirements.

4.4 Required Controls

The existing permanent pool volume provided by SWMP 9 will provide sufficient quality control volume required for the proposed roadway improvements and no modifications are required.

The Heritage Hills Subdivision Phase 2 Stormwater Management Plan has used 42,500 m^3 as the total quantity control capacity in the stage-storage information of the existing SWMP 9. Considering the updated 100-year quantity control requirements, the proposed roadway modifications will lead to increased quantity control requirements.

Due to this lack of available quantity control volume, an analysis was carried out to determine the original (pre 2010 construction) and existing (post 2010 construction) total quantity control requirements of SWMP 9 and compared them with the proposed requirements. Refer **Table 1** for detailed calculation.

Table 1: Comparison of Original, Existing and Proposed SWMP 9 Volume Requirements

Parameters	Original Pre 2010	Existing Post 2010	Proposed
Erosion Control Volume (m^3)	15,780	17,159	17,324
100-Year Quantity Control Volume (m^3)	42,253	43,946	44,224
Total Quantity Control Volume Provided as per Stage-Storage Information (m^3)	42,500	42,500	42,500
Deficit Volume (m^3)	N/A	1,446	1,724
Excess Volume from Previous Condition (m^3)	-	1,446	278

As shown in the table above, as of the construction completed in 2010 the hydrology model of existing SWMP 9 has never been updated to provided enough quantity control volume to meet the

100-year quantity control requirements. In 2010 the total required pond storage increased to 43,946 m^3 for the 100-year event but no changes were made to the SWMP, creating a deficit of 1,446 m^3.

As the drainage of the roadway area of this project is proposed to be redirected into the SWMP 9, this will increase both the total drainage and impervious percentage of the area draining to SWMP 9. From the above analysis, it can be seen that a minimum additional quantity control volume of 278 m^3 must be provided in order to return to the existing (Post 2010) conditions.

A Low Impact Development (LID) facility is proposed in the northwest quadrant of the relocated Manchester Court and Coleraine Drive intersection, south of the railway. **Figure 5** shows the location of the proposed facility. The facility will receive all stormwater runoff from Coleraine Drive catchment B1, south of the proposed grade separation, providing quality and quantity control, as well as infiltration for water balance. Any runoff that does not enter the infiltration gallery under the LID will be conveyed through a minor storm sewer system to SWMP 9. This LID facility would provide quantity control during large (25+ year) storm events as the storm sewer draining it will be designed to convey the 10-year storm as per the Region's requirements. Once capacity within the storm sewer is available, all excess runoff held within the LID facility will be directed to SWMP 9. As such, the LID will remain dry apart from after a major storm event. During the detailed design stage, detailed sizing and outlet design of the LID facility must be completed to ensure that the LID has a storage capacity of greater than 278 m^3 for the 100-year storm event, providing the necessary additional quantity control to allow SWMP 9 to continue to function as it does in existing conditions.

5. Conclusions

As described above, an additional quantity control volume is required which will be provided by a LID facility in the northwest quadrant of the relocated Manchester Court and Coleraine Drive intersection, south of the railway. The facility will supplement the additional storage volume required due to the addition of Coleraine Drive roadway area into the SWMP 9, which will reduce the volume deficit of SWMP 9 and brings the pond capacity back to post 2010 condition. All numbers used in the calculations can be found in the attached reference documents.

Currently, the Town is undergoing an as-built assessment of SMWP 9 and maintenance recommendations will likely result from their findings. This assessment should be considered during detailed design.

If during future analysis or detailed design it is found that SWMP 9 has the quantity capacity of 58,000 m^3 as stated in the CofA, the quantity control requirements of the LID will not be required. Note that even if this occurs, drainage paths or storage will still be required to ensure the total runoff of the roadway will be directed to SWMP 9.

Appendix

Stormwater Management Report
Heritage Hills Subdivision Phase 2
August 1997

43M 1287

FB File: 9015.2

Prepared for:

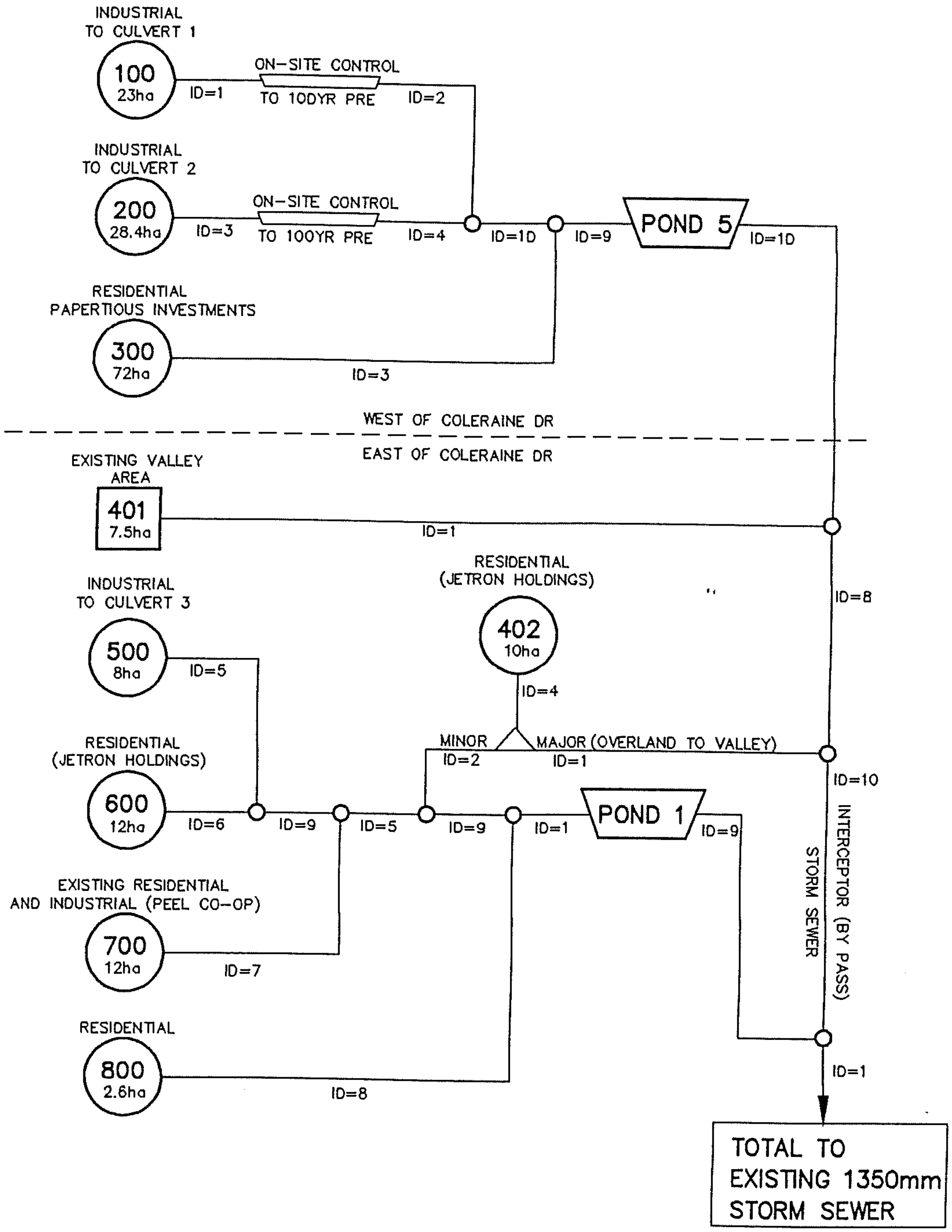
Jetron Investments Inc.
2 Holland Drive, Unit 1
Bolton, Ontario
L7E 5S6

Prepared by:

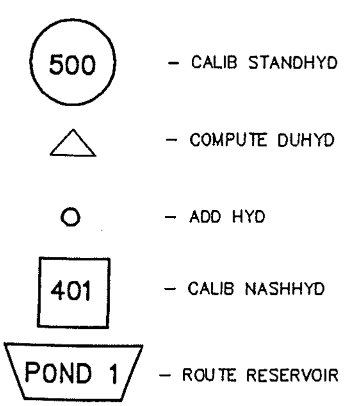
Falby Burnside & Associates Ltd.
8500 Torbram Road, Suite 56
Brampton, Ontario
L6T 5C6

FIGURE 3

INTERHYMO SCHEMATIC POST DEVELOPMENT



LEGEND



SOURCE: BOLTON SOUTHWEST SECTION MASTER DRAINAGE PLAN UPDATE

FALBY BURNSIDE & ASSOCIATES LTD.
ENGINEERS – HYDROGEOLOGISTS – ENVIRONMENTAL CONSULTANTS
DEVELOPMENT MANAGERS
8500 TORBRAM ROAD, SUITE 56, BRAMPTON, ONTARIO L6T 5C6
TELEPHONE: 905-793-9238 FAX: 905-793-5018

Appendix B

Updated Hydrologic Modelling

```
                                  AREA      QPEAK      TPEAK         R.V.
                                  (ha)      (cms)      (hrs)         (mm)
  INFLOW : ID= 3 (0200)          28.40      1.23       1.50         16.56
  OUTFLOW: ID= 4 (0201)          28.40       .87       1.50         17.08

              PEAK   FLOW   REDUCTION [Qout/Qin](%)= 70.505
              TIME SHIFT OF PEAK FLOW        (min)=   .000
              MAXIMUM  STORAGE   USED       (ha.m.)=   .103

-----------------------------------------------------------------------------
*#*************************************************************************
*#     ADD CATCHMENTS 100 & 200                                            *
*#*************************************************************************

--------------------
| ADD HYD   (0001) |
|  2 +  4 = 10     |          AREA     QPEAK     TPEAK      R.V.
--------------------          (ha)     (cms)     (hrs)      (mm)
           ID1= 2 (0101):    23.00       .78      1.50     16.87
         + ID2= 4 (0201):    28.40       .87      1.50     17.08
           ==================================================
           ID =10 (0001):    51.40      1.65      1.50     16.99

  NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-----------------------------------------------------------------------------
*#*************************************************************************
*#     RESIDENTIAL DEVELOPMENT - POLICY AREA A - WEST OF 6TH LINE          *
*#     CATCHMENT 300                                                       *
*#*************************************************************************
--------------------
| CALIB            |
| STANDHYD  (0300) |   Area    (ha)=  72.00
|ID= 3 DT=15.0 min |   Total Imp(%)=  49.00   Dir. Conn.(%)=  40.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
    Surface Area      (ha)=      35.28        36.72
    Dep. Storage      (mm)=       2.00         5.00
    Average Slope      (%)=       1.00         2.00
    Length             (m)=     692.00        40.00
    Mannings n            =       .030         .200

    Max.eff.Inten.(mm/hr)=       25.81         4.60
               over (min)        30.00        45.00
    Storage Coeff.  (min)=       23.15 (ii)   44.31 (ii)
    Unit Hyd. Tpeak (min)=       30.00        45.00
    Unit Hyd. peak  (cms)=         .04          .03
                                                            *TOTALS*
    PEAK FLOW       (cms)=        1.51          .22           1.64 (iii)
    TIME TO PEAK    (hrs)=        1.75         2.25           1.75
    RUNOFF VOLUME    (mm)=       22.91         3.92          11.52
    TOTAL RAINFALL   (mm)=       24.91        24.91          24.91
    RUNOFF COEFFICIENT   =         .92          .16            .46

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =   71.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-----------------------------------------------------------------------------
*#*************************************************************************
*#     ADD hydrographs 10 & 3                                              *
*#     TOTAL FLOW TO POND 5                                                *
```

```
*#****************************************************************************

 -------------------
| ADD HYD    (0002) |
| 10 +  3 =   9     |              AREA      QPEAK     TPEAK       R.V.
 -------------------               (ha)      (cms)     (hrs)       (mm)
          ID1=10 (0001):          51.40       1.65      1.50      16.99
        + ID2= 3 (0300):          72.00       1.64      1.75      11.52
          ===========================================================
          ID = 9 (0002):         123.40       3.29      1.75      13.80

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 -------------------------------------------------------------------------------
 #****************************************************************************
*#     POND 5      -    EROSION, QUALITY & PEAK FLOW CONTROL                    *
*#****************************************************************************
 -------------------
| RESERVOIR (0003) |
| IN= 9---> OUT=10 |
| DT= 15.0 min     |        OUTFLOW    STORAGE   |   OUTFLOW    STORAGE
 -------------------          (cms)    (ha.m.)   |    (cms)     (ha.m.)
                               .000       .000   |     .190      1.930
                               .050       .420   |     .470      2.640
                               .080       .840   |     .850      3.340
                               .090      1.390   |    1.320      3.700
                               .100      1.600   |    2.460      4.250

                                  AREA      QPEAK      TPEAK        R.V.
                                  (ha)      (cms)      (hrs)        (mm)
   INFLOW : ID= 9 (0002)        123.40       3.29       1.75       13.80
   OUTFLOW: ID=10 (0003)        123.40        .10       4.75       13.78

                 PEAK   FLOW   REDUCTION [Qout/Qin](%)=  3.009
                 TIME SHIFT OF PEAK FLOW          (min)=180.000
                 MAXIMUM  STORAGE   USED        (ha.m.)=  1.578

 -------------------------------------------------------------------------------
 -------------------
| PRINT HYD (0003) |   AREA        (ha)= 123.40
| ID=10    PCYC=  1 |   QPEAK      (cms)=    .10 (i)
| DT=15.0 min      |   TPEAK      (hrs)=   4.75
 -------------------   VOLUME      (mm)=  13.78

   (i)  PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
```

TIME hrs	FLOW cms	TIME hrs	FLOW cms	TIME hrs	FLOW cms	TIME hrs	FLOW cms	TIME hrs	FLOW cms
.00	.00	34.25	.07	68.50	.02	102.75	.00	137.00	.00
.25	.00	34.50	.07	68.75	.02	103.00	.00	137.25	.00
.50	.00	34.75	.07	69.00	.02	103.25	.00	137.50	.00
.75	.00	35.00	.07	69.25	.02	103.50	.00	137.75	.00
1.00	.00	35.25	.07	69.50	.02	103.75	.00	138.00	.00
1.25	.01	35.50	.07	69.75	.02	104.00	.00	138.25	.00
1.50	.04	35.75	.07	70.00	.02	104.25	.00	138.50	.00
1.75	.06	36.00	.07	70.25	.02	104.50	.00	138.75	.00
2.00	.08	36.25	.07	70.50	.02	104.75	.00	139.00	.00
2.25	.08	36.50	.07	70.75	.02	105.00	.00	139.25	.00
2.50	.09	36.75	.07	71.00	.02	105.25	.00	139.50	.00
2.75	.09	37.00	.06	71.25	.02	105.50	.00	139.75	.00
3.00	.09	37.25	.06	71.50	.02	105.75	.00	140.00	.00
3.25	.09	37.50	.06	71.75	.02	106.00	.00	140.25	.00
3.50	.09	37.75	.06	72.00	.02	106.25	.00	140.50	.00
3.75	.10	38.00	.06	72.25	.02	106.50	.00	140.75	.00
4.00	.10	38.25	.06	72.50	.02	106.75	.00	141.00	.00
4.25	.10	38.50	.06	72.75	.02	107.00	.00	141.25	.00

LEGEND

500 / 8ha — WATERSHED AREA

NOTE: BASE PLAN INFORMATION PREPARED IN COOPERATION WITH THE REGION OF PEEL

PREPARED BY:

FALBY BURNSIDE & ASSOCIATES LTD.
ENGINEERS – HYDROGEOLOGISTS – ENVIRONMENTAL CONSULTANTS
8500 TORBRAM ROAD, SUITE 56, BRAMPTON, ONTARIO L6T5C6
TELEPHONE: 905-793-9239 FAX: 905-793-5018
DATE JAN/1997 SCALE 1:7500 JOB No 9015-02

DRAINAGE TO POND 1

FIGURE 2

90152F02.DWG

43M 1324 [illegible] 9

Ministry of the Environment

Ministère de l'Environnement

Ontario

CERTIFICATE OF APPROVAL
SEWAGE
NUMBER 3-0578-98-006
Page 1 of 1

RECEIVED
JUN 26 1998
TOWN OF CALEDON
CLERK'S DEPT.

RECEIVED
JUL 2 1998
TOWN OF CALEDON
ENGINEERING DEPARTMENT

Papertious Investment Inc.
1700 Langstaff Road, Suite 2003
Concord, Ontario
L4K 3S3

You have applied in accordance with Section 53 of the Ontario Water Resources Act for approval of:

Construction of a stormwater management facility to serve Papertious Residential Subdivision (21T88071C) in the Town of Caledon.

As shown on Drawing No. A1-97638-SWM1 revised March 18, 1998, the stormwater management facility will be located west of King Street West on Block 307. Stormwater from the storm sewers of the Subdivision will enter the facility at the northwest corner of the site. The facility has a sediment forebay and a storage capacity of 75,000 cubic metres at Elevation 254.7 metres including wet storage of up to 17,000 cubic metres at Elevation 250.7 metres. Up to Elevation 252.40 metres outflows will be through a seepage outlet system consisting of a stone encased 1500mm vertical perforated drain. Stormwater would percolate through the vertical drain into a 375mm connection then to the Pond Outlet Control Chamber. Above Elevation 252.40 metres stormwater outflows will also through a 900mm sewer connection to the Pond Outlet Control Chamber. From the Pond Outlet Control Chamber the combined stormwater flows then discharges through a connection to an existing 1500mm culvert of Coleraine Drive.

all in accordance with the engineering plans and the *STORMWATER MANAGEMENT REPORT - Papertious Investors* - dated March, 1998 altogether as submitted by Proctor and Redfern Limited, Consulting Engineers.

The above noted sewage works are approved under Section 53 of the Ontario Water Resources Act.

DATED AT TORONTO this 22nd *day of* June, 1998.

THIS IS A TRUE COPY OF THE ORIGINAL CERTIFICATE MAILED

ON June 22 98

(Signed)

for

M. Dhalla, P.Eng.,
Director,
Section 53,
Ontario Water Resources Act.

FC/ld

Attn.: -Mr. R.L. Hooshley, Project Manager, Papertious Investment Inc.
cc: -Ms. M. Morden, Clerk, Town of Caledon
-Mr. J.C. Bourrie, P. Eng., Proctor and Redfern Limited
-District Manager, MOE Halton-Peel District Office

ecosystem recovery inc.
PROFESSIONAL ENGINEERS
171 Victoria St. N, Kitchener, Ontario, N2H 5C5
Tel 519.621.1500 ■ Fax 226.240.1080

Memorandum

To:	Cassie Schembri (Town of Caledon) Margi Sheth (Town of Caledon)	**Date:**	October 22, 2021
Prepared by:	Adam Spargo, B.Sc. Water Resources Specialist	**ERI Project No.:**	2019
Reviewed by:	Jeff Prince, P.Eng Senior Water Resources Engineer		
Re:	Pond 9 Review of As-built Water Quality and Erosion Control		

1. Introduction

Ecosystem Recovery Inc. (ERI) was retained by the Town of Caledon to complete a review of Pond 9 following concerns raised by the Toronto Region Conservation authority (TRCA) that the stormwater management facility (SWMF) is contributing to erosion in Jaffrey's Creek immediately downstream of the Pond 9 outlet. The objective of the review was to determine if Pond 9 has been constructed as per the approved design or if deviations from the design could contribute to downstream erosion.

The following documents were reviewed as part of the study:

- Ministry of the Environment Conservation and Parks (MECP). June 1998. Certificate of Approval 3-0578-98-006.
- Proctor & Redfern Limited. January 2006. Finalized As Record Drawings for Pond 9.
- Falby Burnside & Associates Ltd. August 1997. Stormwater Management Report Heritage Hills Subdivision Phase 2.

The original design report was not available for Pond 9, however, the Certificate of Approval and the Heritage Hills Subdivision Phase 2 report provide details regarding the design permanent pool volume and the extended detention discharge storage relationship. These documents have been used to review the current condition of Pond 9 against the design.

Additionally, ERI completed a field inspection and bathymetric survey of the facility in August 2020 which has been used to support the review of existing conditions.

2. Pond 9 Review

Pond 9 is located at the intersection of Coleraine Drive and Harvest Moon Drive in Bolton. The facility provides water quality, water quantity, and erosion control. The following sections provide a summary of the design and as-built review of the facility.

2.1 Catchment Area

The design catchment area identified in the Storm Drainage Plan (Proctor & Redfern Ltd, 2006) identifies Pond 9 as providing water quality, water quantity and erosion control to a 72 ha residential catchment developed by Papertious Investments. An additional 51.4 ha external catchment drains to the facility; however, this external area receives on-site controls up to the 100-year event and is not relevant to the current erosion concerns. This information is consistent with the Heritage Hills Subdivision Phase 2 Stormwater Management Report which includes the Pond 9 catchment area in the associated OTTHYMO model files and model schematic. The design imperviousness for the 72 ha catchment is identified as 49%.

ERI completed a review of the topographic data provided by the Town of Caledon (1 m contours) and determined the untreated catchment area draining to Pond 9 is 73 ha. The estimated imperviousness under current conditions is 57%.

2.2 Inlets

The design drawings identify three inlets to the facility. During the August 2020 survey, seven inlets were identified. The inlets are summarized in **Table 1**. Three of the inlets are located on the east side of the facility near the outlet structure and appear to service Coleraine Drive. Due to the close proximity to the outlet, adequate detention time for sediment deposition may not be occurring, leading to increased sediment discharge at the outlet from the road drainage.

Table 1. Description of Inlet Pipes

Inlet Number	Description	Inlet Shown on Drawing?
1	1,800 mm concrete pipe with headwall discharging into west forebay.	Yes
2	375 mm PVC pipe discharging into the south forebay east of the access road.	No
3	1,050 mm concrete pipe with headwall discharging into the south forebay.	Yes
4	750 mm concrete pipe discharging into south side of facility near forebay berm.	No
5	300 mm PVC pipe with concrete headwall discharging to east side of main cell.	No
6	450 mm PVC pipe with concrete headwall discharging to east side of main cell.	Yes
7	450 mm PVC pipe with concrete headwall discharging to east side of main cell.	No

2.3 Outlet Structure

The outlet structure consists of a low flow outlet and two high flow outlets. The low flow outlet is a perforated CSP riser with a rip rap jacket (shown in **Photo 1** and **Photo 2**). Flow is conveyed from the riser to the outlet control structure via a 375 mm PVC pipe. Flow into the riser is controlled by the perforations.

The first high flow outlet is a 900 mm diameter concrete pipe (shown in **Photo 3**) with an invert elevation of 252.3 m. This outlet pipe leads to a large concrete control structure located on the east bank of facility, adjacent to Coleraine Drive. The second high flow outlet is an open grate on top of the concrete control structure (shown in **Photo 4**). The grate elevation is 254.8 m. Water is then conveyed from the concrete outlet structure to Jaffrey's Creek east of Coleraine Drive via a 1500 mm diameter concrete pipe.

Photo 1: The top of the riser pipe with the flap open.

Photo 2: View inside the riser with the slotted outlet pipe at the bottom.

Photo 3: The high flow 900 mm diameter outlet pipe and headwall.

Photo 4: High flow outlet grate on top of the concrete control structure.

2.4 Permanent Pool

Pond 9 is intended to provide Enhanced Protection (80% suspended solids removal). This is achieved through the permanent pool and extended detention volume. The Certificate of Approval identifies a total design permanent pool volume of 17,000 m^3 at an elevation of 250.7 m. ERI completed a bathymetric survey of Pond 9 to determine the current permanent pool volume in the facility (i.e., above the accumulated sediment layer). A comparison of the design and as-built permanent pool volumes is provided in **Table 2**.

The analysis shows that the current permanent pool volume is 1,729 m^3 less than the volume identified in the Certificate of Approval, however, it is 3,980 m^3 greater than the volume required to provide Enhanced Protection to meet MECP water quality guidelines. Therefore, the facility is currently meeting the water quality design target.

Table 2. Permanent Pool Comparison

Parameter	Design Condition	Current Condition
Catchment Area	72 ha	73 ha
Imperviousness	49%	57%
MECP Table 3.2 Permanent Pool Required for Enhanced Protection	135 m^3/ha	155 m^3/ha
Permanent Pool Volume Required	9,720 m^3	11,291 m^3
Certificate of Approval Permanent Pool Volume	17,000 m^3	
Current Permanent Pool Volume based on August 2020 Survey	15,271 m^3	

2.5 Extended Detention and Erosion Control

The total extended detention volume is typically determined by the larger volume of either the extended detention water quality volume or the erosion control volume. The Pond 9 extended detention volume is assumed to be between the permanent pool elevation (250.7 m) and the invert of the 900 mm high flow outlet pipe (surveyed at 252.31 m). The design invert elevation of the 900 mm high flow outlet pipe is 252.4 m, suggesting that the as-built outlet pipe is 0.09 m lower than the design. The August 2020 survey was used to estimate the as-built stage storage curve for the extended detention volume. The design and as-built extended detention volumes are presented in **Table 3**. The current extended detention volume is 15,758 m^3.

The extended detention water quality volume is calculated as 40 m^3/ha based on MECP guidelines (2003). For Pond 9, based on the current catchment area, the extended detention water quality volume requirement is 2,920 m^3. The as-built extended detention volume accommodates this volume.

The extended detention erosion control volume is achieved by attenuating and discharging the 25 mm storm event over 48 hours. According to the Heritage Hills Subdivision Phase 2 Stormwater Management Report, the 25 mm event is attenuated over a period of 100 hours with the majority of volume discharged within 48 hours and the peak outflow occurring at 4.75 hours. The maximum storage used in Pond 9 during the 25 mm event is 15,780 m^3. Therefore, the as-built extended detention volume is sufficient to accommodate the design 25 mm storm event. However, the current catchment area draining to the facility is 1.0 ha greater than the design and the total imperviousness is estimated at 57% instead of the design imperviousness of 49%. The 25 mm event has not been modeled with the new catchment parameters; however, it can be assumed that the increase in imperviousness and small increase in catchment area will cause an increase in the runoff volume and peak flow to the pond. This will cause a short period (likely 1 to 2 hours) where the 25 mm event is discharged through the 900 mm outlet pipe and utilizes a portion of the water quantity control active storage volume. The OTTHYMO model identifies a peak discharge rate of 0.1 m^3/s during the 25 mm event. This may increase to between 0.2 m^3/s and 0.3 m^3/s while water is discharging through the 900 mm outlet pipe.

Table 3. Extended Detention Comparison

Parameter	Design Condition	Current Condition
Extended Detention Elevation (Invert of the 900 mm Outlet Pipe)	252.4 m	252.31 m
Extended Detention Volume	16,000 m^3	15,758 m^3
MECP Water Quality Extended Detention Volume Required (40 m^3/ha)	2,880 m^3	2,920 m^3
25 mm Event Extended Detention Volume (Heritage Hills Subdivision Phase 2 OTTHYMO Model)	15,780 m^3	Not modeled

3. Conclusion

The following conclusions were developed following the Pond 9 review of design and as-built conditions:

- The Pond 9 catchment area has increased from 72 ha to 73 ha.
- The imperviousness has increased from 49% to 57%.
- The current permanent pool volume (15,271 m^3) is smaller than the design volume (17,000 m^3), however, it is 3,980 m^3 greater than the MECP Table 3.2 requirement for Enhanced Protection (11,291 m^3). Therefore, the facility is providing adequate water quality control to meet MECP design requirements for Enhanced Protection.
- The extended detention volume is slightly less than the design volume due to the lower invert of the 900 mm high flow outlet pipe (0.09 m lower than the design).
- The as-constructed extended detention volume is sufficient to accommodate the design erosion control volume.
- The larger catchment area and greater imperviousness compared to the design will result in a larger runoff volume and peak flow to the facility during the 25 mm event. While this is expected to increase the peak discharge rate from the facility during the 25 mm event, it is not expected to significantly change the 25 mm event outflow hydrograph. Further modeling is required to confirm the exact change in the outflow hydrograph.

4. References

Falby Burnside & Associates Ltd. August 1997. Stormwater Management Report Heritage Hills Subdivision Phase 2.

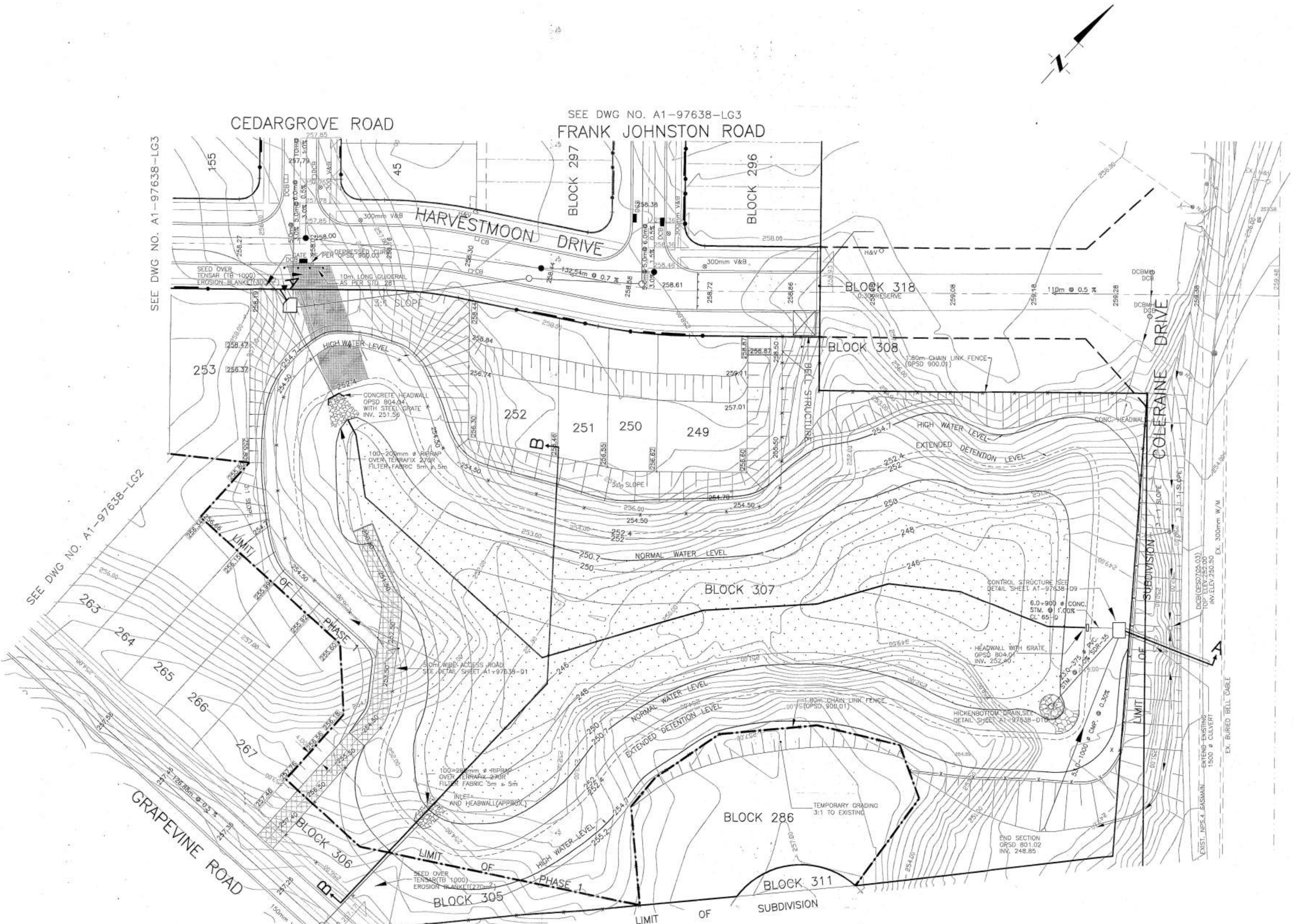
Ministry of the Environment Conservation and Parks (MECP). June 1998. Certificate of Approval 3-0578-98-006.

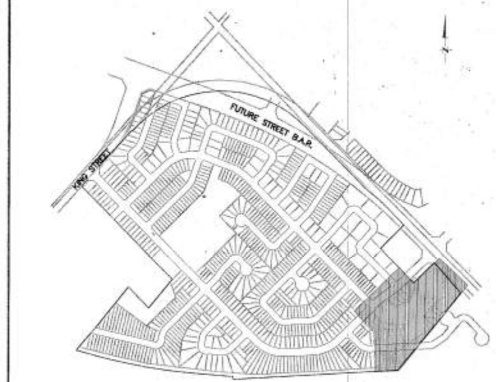
Ministry of the Environment Conservation and Parks (MECP). March 2003. Stormwater Management Planning and Design Manual.

Proctor & Redfern Limited. January 200. Finalized As Record Drawings for Pond 9.

Appendix A

Drawings





KEY PLAN

GENERAL

NOTES:

1. ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE NOTED.
2. ALL PIPE SIZES ARE IN MILLIMETRES.
3. SEE INDEX SHEET FOR LIST OF DRAWINGS.
4. SEE INDEX SHEET AND A1-97638-P1 FOR LISTS OF GENERAL NOTES.
5. CB's SHOWN AS ■ ARE TO BE CONSTRUCTED WITH IPEX TYPE 'A' INLET RESTRICTOR.
6. SIDE SLOPES: 246.0 – 252.0 4H:IV
252.0 – 254.5 3.5H:IV
254.5 – 255.2 3H:IV

No.	REVISIONS	Date	By	Approved
4	FINALIZED AS RECORD DRAWING	01-04-06	A.R.	
3	GENERAL REVISIONS	05-21-98	P.G.	
2	ISSUED FOR GRADING ONLY, NOT UNDERGROUNDS	04-20-98	P.G.	
1	SECOND SUBMISSION, NOT FOR CONSTRUCTION	03-18-98	P.G.	

BENCH MARK

EAST FACE AT THE SOUTH CORNER OF A WHITE BRICK HOUSE S.E. CORNER OF REGIONAL ROAD 9 AND COLERAINE DRIVE.
ELEV. 258.312m

03/04/06

DESIGNED BY | APPROVED

TOWN OF CALEDON
REGIONAL MUNICIPALITY OF PEEL

PAPERTIOUS INVESTORS

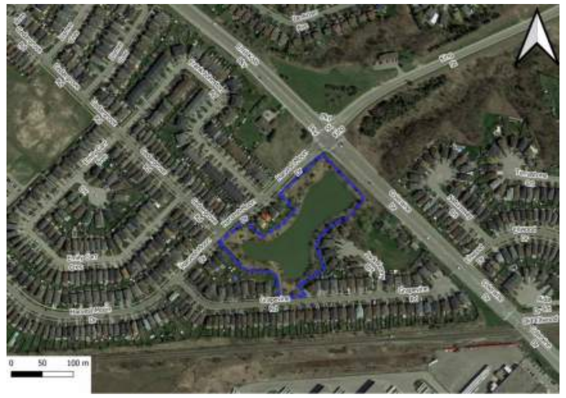
STORM WATER POND
Sheet 1 of 1

Proctor & Redfern Limited
Professional Consulting Services
Toronto, Ontario (416) 445-3600

Scale:	HL. 1:500	PHASE 1 21T-88071	Project No. 97638
Drawn By:	L.S.B.		Drawing No. A1-97638-SWM1
Designed By:	P.G.		
Checked By:	J.C.B.		
Date:	DECEMBER 1997		

Date: JAN 17,2000 Time: 12:45 P.M. Drawing File: P:\urban\97638\PHASE1\dwg

POND 9



LEGEND

MINOR CONTOUR

260.00 MAJOR CONTOUR

PERMANENT POOL

×292.00 SPOT ELEVATION

▴0.14 SEDIMENT DEPTH POINT

BATHYMETRIC SURVEY POINT

TOPOGRAPHIC SURVEY POINT

Low — High

Sediment Deposition Scale

2020 STORMWATER MANAGEMENT POND CLEANOUTS

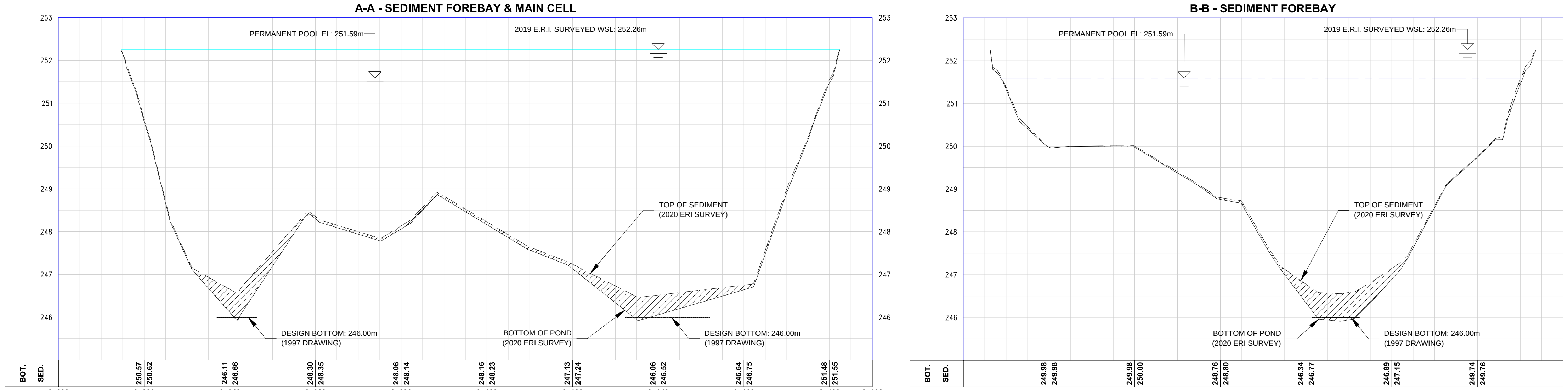
PROJECT #: 20-19
DRAWN: NY
CHECK: AS
DATE: 09/17/2020

PLAN SCALE: 1:1250 (11x17)
PROFILE SCALE: 1:1250 (11x17)

G:\Final Logo\jpeg (RGB)\EcosystemRecovery_col.jpg

A-A - SEDIMENT FOREBAY & MAIN CELL

B-B - SEDIMENT FOREBAY



Basic protection would only be acceptable where the receiving aquatic habitat is demonstrated to be insensitive to stormwater impacts and has little potential for immediate or long-term rehabilitation. Generally, basic protection may be applied in the following conditions:

- Areas where downstream aquatic habitat has adapted to high suspended solid loadings prior to anthropomorphic changes to the watershed (for example, aquatic habitat conditions that may be found naturally in areas of fine grained soils); and
- Downstream watercourses have been significantly altered (by urbanization or agricultural practices), hardened, or polluted, and there is little short or long-term potential for rehabilitation.

Proponents proposing basic treatment must seek approval from the appropriate agencies with fisheries and habitat management responsibilities with clear rational and site-specific supporting data collected from baseline studies or from existing resource management agency data bases (such as, fishery management plans, watershed management plans, etc.).

Agencies with fisheries responsibilities may also require habitat compensation where stormwater management design impacts are determined to result in harmful alteration, disruption, or destruction of fish habitat as defined in the *Fisheries Act*. Habitat compensation typically involves the replacing of damaged habitat with newly created habitat or improving the productive capacity of other aquatic habitat at or near the area of impact.

The levels of protection are based on a general relationship between the long-term average suspended solids removal of the end-of-pipe stormwater management facilities and the lethal and chronic effects of suspended solids on aquatic life. The levels of protection correspond to the following 'long-term average suspended solids removals' which refer to the removal by the SWM facility of suspended solids from the site runoff for the entire range of rainfall events on that site for a long period of time, at least 10 years. The use of a long-term average is to account for the variability in characteristics of rainfall events.

- Enhanced protection corresponds to the end-of-pipe storage volumes required for the long-term average removal of 80% of suspended solids.
- Normal protection corresponds to the end-of-pipe storage volumes required for the long-term average removal of 70% of suspended solids.
- Basic protection corresponds to the end-of-pipe storage volumes required for the long-term average removal of 60% of suspended solids.

For SWMPs designed with a by-pass, the calculation of long-term suspended solids removal must be based on both suspended solids removal in the facility plus suspended solids by-passed around the facility.

3.3.2 Water quality sizing criteria

The volumetric water quality criteria are presented in Table 3.2. The values are based on a 24 hour drawdown time and a design which conforms to the guidance provided in this manual. Requirements differ with SWMP type to reflect differences in removal efficiencies. Of the specified storage volume for wet facilities, 40 m^3/ha is extended detention, while the remainder represents the permanent pool.

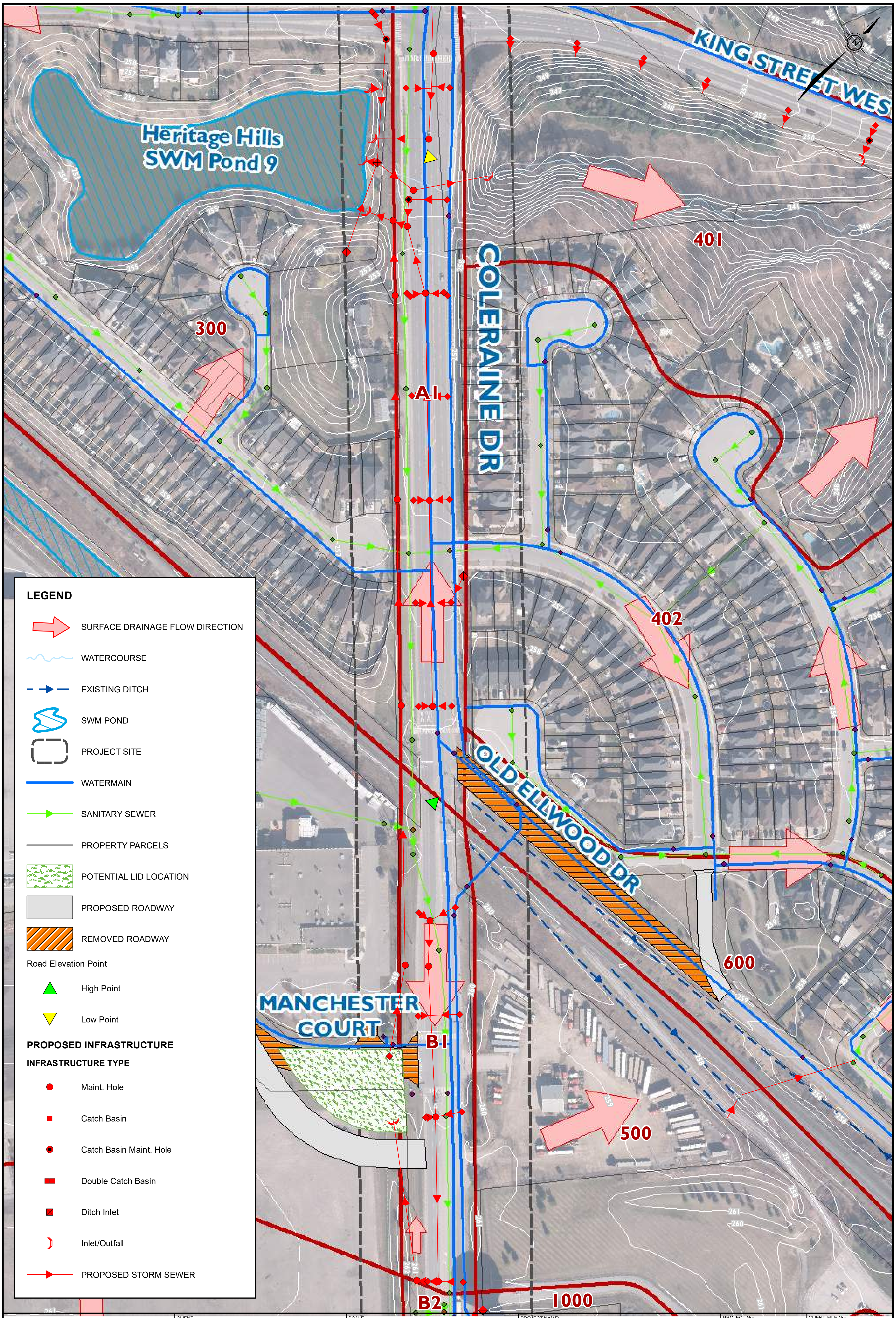
Table 3.2 Water Quality Storage Requirements based on Receiving Waters [1] , [2]

Protection Level	SWMP Type	Storage Volume (m^3/ha) for Impervious Level: 35%	Storage Volume (m^3/ha) for Impervious Level: 55%	Storage Volume (m^3/ha) for Impervious Level: 70%	Storage Volume (m^3/ha) for Impervious Level: 85%
Enhanced 80% long-term S.S. removal	Infiltration	25	30	35	40
Enhanced 80% long-term S.S. removal	Wetlands	80	105	120	140
Enhanced 80% long-term S.S. removal	Hybrid Wet Pond/Wetland	110	150	175	195
Enhanced 80% long-term S.S. removal	Wet Pond	140	190	225	250
Normal 70% long-term S.S. removal	Infiltration	20	20	25	30
Normal 70% long-term S.S. removal	Wetlands	60	70	80	90
Normal 70% long-term S.S. removal	Hybrid Wet Pond/Wetland	75	90	105	120
Normal 70% long-term S.S. removal	Wet Pond	90	110	130	150
Basic 60% long-term S.S. removal	Infiltration	20	20	20	20
Basic 60% long-term S.S. removal	Wetlands	60	60	60	60
Basic 60% long-term S.S. removal	Hybrid Wet Pond/Wetland	60	70	75	80
Basic 60% long-term S.S. removal	Wet Pond	60	70	85	95
Basic 60% long-term S.S. removal	Dry Pond (Continuous Flow)	90	150	200	240

For levels of imperviousness below 35%, required storage volumes may be obtained by extrapolating the values provided in Table 3.2. For levels of imperviousness between those included in Table 3.2, required storage volumes may be obtained by interpolation.

It should be noted that the total drainage area contributing to the facility should be included in sizing (lumped imperviousness or separate calculations for internal and external drainage areas is permissible) in most cases. The exception occurs when an external drainage area is itself controlled by a separate water quality facility (and erosion and quantity control are either not required or provided separately). Modelling studies (Marshall Macklin Monaghan Limited, 1997) indicate comparable combined long-term removal rates for ponds in series and separate parallel ponds. More frequent overflows will occur from the most downstream pond, but this can be compensated for by doubling the water quality active storage volume from 40 to 80 m^3/ha.

The volumetric criteria specified in Table 3.2 address only water quality, not erosion, baseflow or flooding concerns. Furthermore, the criteria were developed based on the removal of suspended solids via settling, and therefore, may not adequately address contaminants which must be removed by other mechanisms.



CIMA+	CLIENT Region of Peel Working for you	SCALE 0 5 10 20 30 40 50 meters 1:2,000	PROJECT NAME: COLERAINE DRIVE CP GRADE SEPARATION ENVIRONMENTAL ASSESSMENT SHEET TITLE: ALTERNATIVE 2 ROAD OVER RAILROAD	PROJECT No: B000738 DRAFTER: S. ELLIOTT DESIGNER: K. LUKAWIECKI APPROVER: R. CRESSMAN APPROVER: --- DATE: 9/17/2021	CLIENT FILE No: --- DRAWING No: FIG. 5 SHEET No: 1 of 1

Memo

TO	**:**	Stephen Keen, P.Eng, (Project PM)
COPY TO	**:**	David Hiett, P.Eng,
FROM	**:**	Kevin Lukawiecki, EIT, Madhav Baral, P.Eng.
DATE	**:**	November 23, 2021
SUBJECT	**:**	B000738 Coleraine Drive Grade Separation EA SWMP 9 Capacity Analysis Memo

1. Background

The Regional Municipality of Peel has retained CIMA+ to complete a Schedule 'C' Municipal Class EA to investigate grade separation improvements at the Coleraine Drive and Canadian Pacific (C.P.) Railway crossing, located in the Community of Bolton.

The roadway improvements identified through this EA propose to collect stormwater drainage from Coleraine Drive and direct it to the existing Stormwater Management Pond 9 (SWMP 9) located southwest of the intersection of Harvest Moon Drive and Coleraine Drive. The SWMP is owned by the Town of Caledon and the Town's approval will be required for the ponds use as a quality and quantity control. This memo has been completed to review the capacity of the existing SWMP 9 and confirm that the capacity can accommodate the anticipated additional flows.

All referenced documents can be found in the appendix of this memo.

2. Existing Conditions

The following analysis for existing conditions is based on the Falby Burnside and Associates Stormwater Management Report for the Heritage Hills Subdivision (Aug 1997). The related report and drawings are attached with this memo. The existing report references SWMP 9 as SWMP 5. Upon discussions with the Town of Caledon, this pond is SWMP 9 and will be referenced as such throughout this memo.

The existing SWMP 9 was designed to provide quantity and quality control for the 72 ha residential development (watershed 300) between Coleraine Drive, King Street and the C.P. Railway. There are two other drainage areas draining into the pond, which are a 23 ha area (watershed 100) and 28.4 ha (watershed 200) area of commercial development on the opposite side of the railway. Both drainage areas drain to their own SWMP before being released to enter

SWMP 9. These SWMP's provide all the required quantity and quality control for their drainage areas. The outlet from SWMP 9 discharges into the East Humber River watershed.

As per the 1998 MOE Certificate of Approval (CofA) provided for SWMP 9, the pond has a permanent pool volume of 17,000 m^3 and a quantity control volume of 58,000 m^3. During the Heritage Hills Subdivision Phase 2 Stormwater Management Report, dated August 1997, completed for a stormwater pond downstream of SWMP 9, a Visual OTTHYMO model was created which included SWMP 9 within the analysis. This analysis only included a stage storage chart of SWMP 9 up to a maximum volume of 42,500 m^3. Due to the lack of stage storage data from the CofA, the more conservative quantity storage volume of 42,500 m^3 will be used for the current analysis of the SWMP 9.

In 2010, a widening and reconstruction of Coleraine Drive was completed. While performing the reconstruction, storm sewers were added within watershed 402 along Coleraine Drive from just north of the C.P. Railway to the low point of Coleraine Drive just south of King Street West. This storm sewer flows directly into the existing SWMP 9, draining approximately 2.3 ha of watershed 402. This inlet is located adjacent to the SWMP quality outlet, which would bypass the main quality function of the SMWP.

The 2010 construction also affected predevelopment flows of watershed 500 south of the railway. Pre 2010, all flows in this catchment flowed northeast into watershed 600 and into the East Humber River watershed. The construction of storm sewers along Coleraine Drive south of the railway took minor roadway drainage south while allowing major flow to continue northeast as per existing conditions. This minor flow redirection would lead minor roadway flow to enter the West Humber River watershed.

In August of 2020, Ecosystems Recovery Inc completed a review of SWMP 9 as built water quality and erosion control. In this report, it was determined that the drainage area to the pond had increased from 72 ha with 49% impervious to 73 ha with 57% impervious. The report did not show a drainage map or specify if this increase included the additional roadway drainage. As such, it will be assumed that this change only affects the existing drainage area into the SWMP and does not include any roadway runoff.

3. Proposed Modifications

The proposed preferred alternative is to reconstruct Coleraine Drive to pass over the C.P. Railway. The proposed modification of Coleraine Drive will cause changes to the existing drainage flow paths and slightly increase the impervious area along the roadway due to the addition of active transportation. It is also proposed to direct the affected drainage area into SWMP 9, returning the flow paths to pre 2010 conditions outletting to the East Humber River watershed. The pond will provide quality and quantity control for the affected drainage areas. In order to complete this, it must be assured that the existing SWMP 9 is able to handle the increased drainage area.

4. Calculations

Three variables need to be checked to ensure that SWMP 9 has the required capacity to handle the increased drainage area:

- Quality Control: ensuring that the pond has the required permanent pool volume to provide adequate TSS removal for the added drainage area.
- Quantity Control: ensuring that the pond has the required quantity control volume to store the increased flow from the added drainage area.
- Erosion Control: ensuring that the pond has the required volume to store the 25 mm storm event and slowly drain this runoff over a drawdown period between 24-28 hours.

The total drainage area contribution to SWMP 9 is based on the 2020 Ecosystems Recovery Inc SWMP analysis, as well as the proposed added drainage areas for this project. The total drainage area includes the existing 73 ha, 57% impervious drainage area, as well as the two proposed roadway drainage areas, Catchment A1 of 2.30 ha and Catchment B1 of 1.24 ha with 90% imperviousness. With the addition of Catchments A1 and B1, the total drainage area of the pond will become 76.54 ha with 59% imperviousness.

4.1 Quality Control

The existing SWMP 9 has a permanent pool volume of 17,000 m^3. Per the MOE Stormwater Management Planning and Design Manual, 2003, the SWMP volume requirements are based on the required protection level, drainage area, impervious percentage of drainage area and type of pond. As the protection level is not specified in the MOE Certificate of Approval (CofA), it will be assumed that SWMP 9 was constructed to provide an enhanced level of quality control, removing 80% of TSS. As the two drainage areas south of the C.P. Railway already have SWMP's, their drainage areas will not be considered while calculating the permanent pool volume requirements.

Based on the above and using **Table 3.2** from the MECP Stormwater Management Planning and Design Manual, for a 76.54 ha area with 59% imperviousness, the SWMP 9 will require a permanent pool volume of 12,246 m^3, which is less than the existing available volume of 17,000 m^3. This meets the quality control volume requirement.

As the existing inlet to the pond from the Coleraine Drive storm sewer is located adjacent to the quality control outlet, measures should be taken during detailed design to provide quality control for the inlet storm water. As a high level analysis, the implementation of a wall to increase the flow path between the inlet and outlet, or the implementation of an Oil Grit Separator (OGS) at the inlet can be used to provide water quality treatment to the inlets flow. These options, along with any other solutions raised later in the project, should be analyzed during detailed design.

4.2 Quantity Control

A hydrology model was created in Visual Otthymo based on the Falby Burnside and Associates Stormwater Management Report for the Heritage Hills Subdivision (1997) to quantify the required extended detention from the existing SWMP 9, for both the existing drainage area and proposed roadway drainage. The existing quantity control volume provided by SWMP 9 as shown in the model is 42,500 m^3.

The model showed that with the existing and proposed drainage areas, SWMP 9 requires 44,224 m^3 of quantity control volume during the 100-year storm. Although the CofA has noted a total storage volume of 75,000 m^3 including the permanent pool (wet storage) volume of 17,000 m^3 leaving an acting storage volume of 58,000 m^3, the analysis in this memo has been completed considering an available active storge volume of 42,500 m^3 as shown in the stage-storage information of the Heritage Hills hydrology model.

4.3 Erosion Control

Erosion control criteria requirements within a stormwater management pond will ensure that during a 25 mm storm event, the pond is able to hold and slowly release the full volume of water over the period of 24 - 48 hours. When running the 25 mm storm event through the Visual Otthymo model, the model showed that the pond would require a volume of 17,324 m^3 of erosion control storage. This volume is the part of the active storage volume and will be held for longer than 24 hours, meeting the drawdown time requirements.

4.4 Required Controls

The existing permanent pool volume provided by SWMP 9 will provide sufficient quality control volume required for the proposed roadway improvements and no modifications are required.

The Heritage Hills Subdivision Phase 2 Stormwater Management Plan has used 42,500 m^3 as the total quantity control capacity in the stage-storage information of the existing SWMP 9. Considering the updated 100-year quantity control requirements, the proposed roadway modifications will lead to increased quantity control requirements.

Due to this lack of available quantity control volume, an analysis was carried out to determine the original (pre 2010 construction) and existing (post 2010 construction) total quantity control requirements of SWMP 9 and compared them with the proposed requirements. Refer **Table 1** for detailed calculation.

Table 1: Comparison of Original, Existing and Proposed SWMP 9 Volume Requirements

Parameters	Original Pre 2010	Existing Post 2010	Proposed
Erosion Control Volume (m^3)	15,780	17,159	17,324
100-Year Quantity Control Volume (m^3)	42,253	43,946	44,224
Total Quantity Control Volume Provided as per Stage-Storage Information (m^3)	42,500	42,500	42,500
Deficit Volume (m^3)	N/A	1,446	1,724
Excess Volume from Previous Condition (m^3)	-	1,446	278

As shown in the table above, as of the construction completed in 2010 the hydrology model of existing SWMP 9 has never been updated to provided enough quantity control volume to meet the

100-year quantity control requirements. In 2010 the total required pond storage increased to 43,946 m^3 for the 100-year event but no changes were made to the SWMP, creating a deficit of 1,446 m^3.

As the drainage of the roadway area of this project is proposed to be redirected into the SWMP 9, this will increase both the total drainage and impervious percentage of the area draining to SWMP 9. From the above analysis, it can be seen that a minimum additional quantity control volume of 278 m^3 must be provided in order to return to the existing (Post 2010) conditions.

A Low Impact Development (LID) facility is proposed in the northwest quadrant of the relocated Manchester Court and Coleraine Drive intersection, south of the railway. **Figure 5** shows the location of the proposed facility. The facility will receive all stormwater runoff from Coleraine Drive catchment B1, south of the proposed grade separation, providing quality and quantity control, as well as infiltration for water balance. Any runoff that does not enter the infiltration gallery under the LID will be conveyed through a minor storm sewer system to SWMP 9. This LID facility would provide quantity control during large (25+ year) storm events as the storm sewer draining it will be designed to convey the 10-year storm as per the Region's requirements. Once capacity within the storm sewer is available, all excess runoff held within the LID facility will be directed to SWMP 9. As such, the LID will remain dry apart from after a major storm event. During the detailed design stage, detailed sizing and outlet design of the LID facility must be completed to ensure that the LID has a storage capacity of greater than 278 m^3 for the 100-year storm event, providing the necessary additional quantity control to allow SWMP 9 to continue to function as it does in existing conditions.

5. Conclusions

As described above, an additional quantity control volume is required which will be provided by a LID facility in the northwest quadrant of the relocated Manchester Court and Coleraine Drive intersection, south of the railway. The facility will supplement the additional storage volume required due to the addition of Coleraine Drive roadway area into the SWMP 9, which will reduce the volume deficit of SWMP 9 and brings the pond capacity back to post 2010 condition. All numbers used in the calculations can be found in the attached reference documents.

Currently, the Town is undergoing an as-built assessment of SMWP 9 and maintenance recommendations will likely result from their findings. This assessment should be considered during detailed design.

If during future analysis or detailed design it is found that SWMP 9 has the quantity capacity of 58,000 m^3 as stated in the CofA, the quantity control requirements of the LID will not be required. Note that even if this occurs, drainage paths or storage will still be required to ensure the total runoff of the roadway will be directed to SWMP 9.

Appendix

Stormwater Management Report
Heritage Hills Subdivision Phase 2
August 1997

43M 1287

FB File: 9015.2

Prepared for:

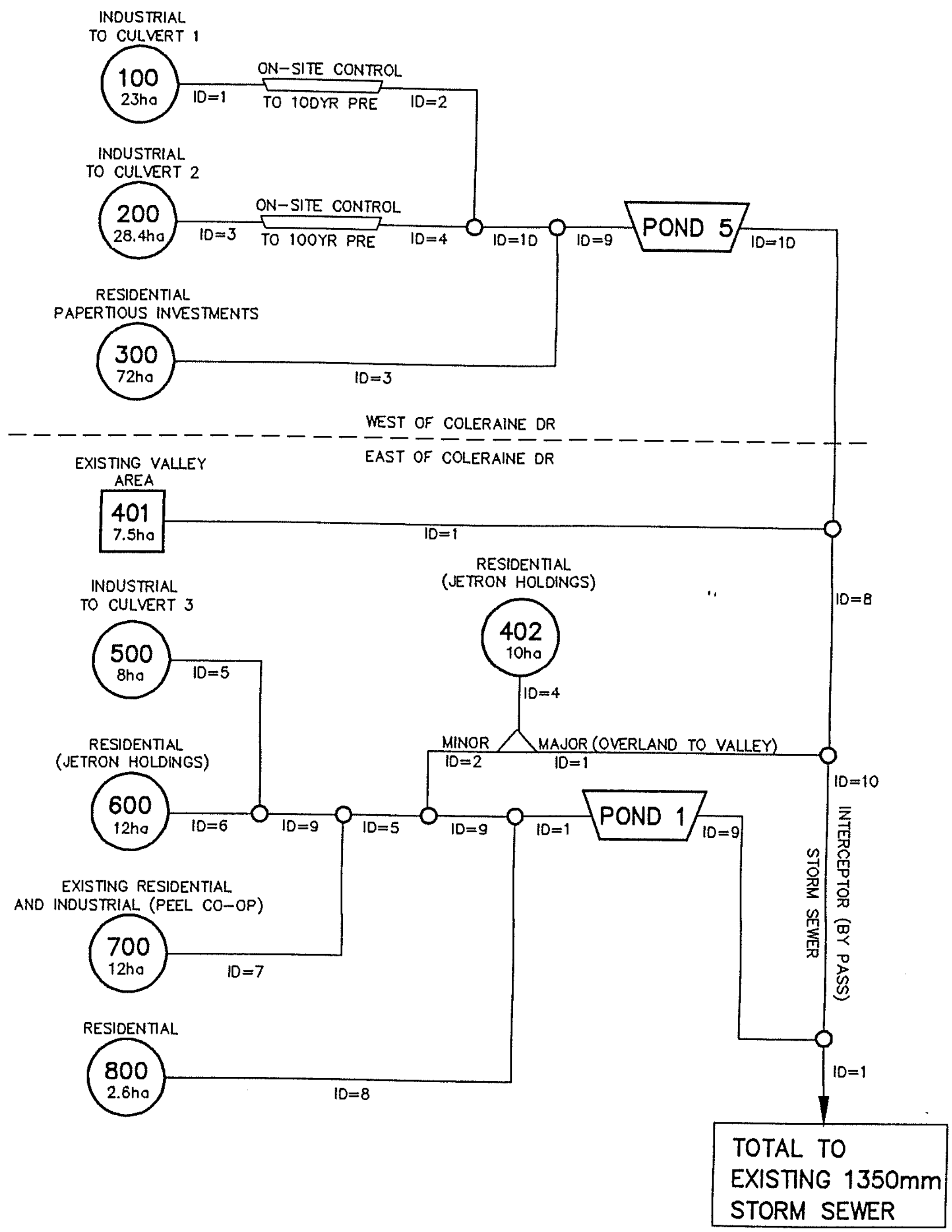
Jetron Investments Inc.
2 Holland Drive, Unit 1
Bolton, Ontario
L7E 5S6

Prepared by:

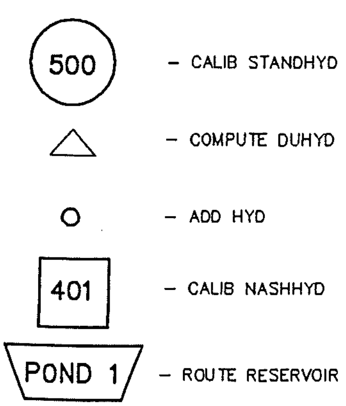
Falby Burnside & Associates Ltd.
8500 Torbram Road, Suite 56
Brampton, Ontario
L6T 5C6

FIGURE 3

INTERHYMO SCHEMATIC
POST DEVELOPMENT



LEGEND



SOURCE: BOLTON SOUTHWEST SECTION MASTER DRAINAGE PLAN UPDATE

FALBY BURNSIDE & ASSOCIATES LTD.
ENGINEERS - HYDROGEOLOGISTS - ENVIRONMENTAL CONSULTANTS
DEVELOPMENT MANAGERS
8500 TORBRAM ROAD, SUITE 56, BRAMPTON, ONTARIO L6T 5C6
TELEPHONE: 905-793-9238 FAX: 905-793-5018

90152FG3.DWG

Appendix B

Updated Hydrologic Modelling

```
                              AREA      QPEAK     TPEAK       R.V.
                              (ha)      (cms)     (hrs)       (mm)
 INFLOW : ID= 3 (0200)       28.40      1.23      1.50       16.56
 OUTFLOW: ID= 4 (0201)       28.40       .87      1.50       17.08

              PEAK   FLOW   REDUCTION [Qout/Qin](%)= 70.505
              TIME SHIFT OF PEAK FLOW        (min)=    .000
              MAXIMUM  STORAGE   USED      (ha.m.)=    .103

-----------------------------------------------------------------------------
*#**************************************************************************
*#     ADD CATCHMENTS 100 & 200                                             *
 #**************************************************************************

--------------------
| ADD HYD    (0001) |
   2 +  4 = 10      |       AREA     QPEAK     TPEAK       R.V.
--------------------        (ha)     (cms)     (hrs)       (mm)
          ID1= 2 (0101):    23.00      .78      1.50      16.87
        + ID2= 4 (0201):    28.40      .87      1.50      17.08
          ==================================================
          ID =10 (0001):    51.40     1.65      1.50      16.99

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-----------------------------------------------------------------------------
*#**************************************************************************
 #     RESIDENTIAL DEVELOPMENT - POLICY AREA A - WEST OF 6TH LINE           *
 #     CATCHMENT 300                                                        *
*#**************************************************************************
--------------------
 CALIB              |
 STANDHYD  (0300)   |   Area     (ha)=  72.00
|ID= 3 DT=15.0 min  |   Total Imp(%)=  49.00   Dir. Conn.(%)=  40.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
   Surface Area     (ha)=     35.28       36.72
   Dep. Storage     (mm)=      2.00        5.00
   Average Slope     (%)=      1.00        2.00
   Length            (m)=    692.00       40.00
   Mannings n           =      .030        .200

   Max.eff.Inten.(mm/hr)=     25.81        4.60
            over (min)        30.00       45.00
   Storage Coeff.  (min)=     23.15 (ii)  44.31 (ii)
   Unit Hyd. Tpeak (min)=     30.00       45.00
   Unit Hyd. peak  (cms)=       .04         .03
                                                          *TOTALS*
   PEAK FLOW       (cms)=      1.51         .22             1.64 (iii)
   TIME TO PEAK    (hrs)=      1.75        2.25             1.75
   RUNOFF VOLUME    (mm)=     22.91        3.92            11.52
   TOTAL RAINFALL   (mm)=     24.91       24.91            24.91
   RUNOFF COEFFICIENT   =       .92         .16              .46

     (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN*  =   71.0     Ia = Dep. Storage  (Above)
    (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
         THAN THE STORAGE COEFFICIENT.
   (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-----------------------------------------------------------------------------
 #**************************************************************************
*#     ADD hydrographs 10 & 3                                               *
       TOTAL FLOW TO POND 5                                                 *
```

```
*#***********************************************************************

 -----------------
| ADD HYD    (0002) |
|  10 +   3 =   9   |            AREA     QPEAK     TPEAK      R.V.
 -----------------                (ha)     (cms)     (hrs)      (mm)
          ID1=10 (0001):         51.40      1.65      1.50     16.99
        + ID2= 3 (0300):         72.00      1.64      1.75     11.52
          ===================================================
          ID = 9 (0002):        123.40      3.29      1.75     13.80

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
*#***********************************************************************
*#      POND 5      -     EROSION, QUALITY & PEAK FLOW CONTROL              *
*#***********************************************************************
 -----------------
| RESERVOIR (0003) |
| IN= 9---> OUT=10 |
| DT= 15.0 min     |          OUTFLOW    STORAGE   |    OUTFLOW    STORAGE
 -----------------              (cms)    (ha.m.)   |      (cms)    (ha.m.)
                                 .000       .000   |       .190      1.930
                                 .050       .420   |       .470      2.640
                                 .080       .840   |       .850      3.340
                                 .090      1.390   |      1.320      3.700
                                 .100      1.600   |      2.460      4.250

                                    AREA      QPEAK      TPEAK        R.V.
                                    (ha)      (cms)      (hrs)        (mm)
    INFLOW : ID= 9 (0002)        123.40       3.29       1.75       13.80
    OUTFLOW: ID=10 (0003)        123.40        .10       4.75       13.78

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  3.009
                  TIME SHIFT OF PEAK FLOW         (min)=180.000
                  MAXIMUM  STORAGE   USED       (ha.m.)=  1.578

-------------------------------------------------------------------------------
 -----------------
| PRINT HYD (0003) |     AREA       (ha)= 123.40
| ID=10    PCYC=  1|     QPEAK     (cms)=    .10 (i)
| DT=15.0 min      |     TPEAK     (hrs)=   4.75
 -----------------       VOLUME     (mm)=  13.78

   (i)  PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
```

TIME hrs	FLOW cms	TIME hrs	FLOW cms	TIME hrs	FLOW cms	TIME hrs	FLOW cms	TIME hrs	FLOW cms
.00	.00	34.25	.07	68.50	.02	102.75	.00	137.00	.00
.25	.00	34.50	.07	68.75	.02	103.00	.00	137.25	.00
.50	.00	34.75	.07	69.00	.02	103.25	.00	137.50	.00
.75	.00	35.00	.07	69.25	.02	103.50	.00	137.75	.00
1.00	.00	35.25	.07	69.50	.02	103.75	.00	138.00	.00
1.25	.01	35.50	.07	69.75	.02	104.00	.00	138.25	.00
1.50	.04	35.75	.07	70.00	.02	104.25	.00	138.50	.00
1.75	.06	36.00	.07	70.25	.02	104.50	.00	138.75	.00
2.00	.08	36.25	.07	70.50	.02	104.75	.00	139.00	.00
2.25	.08	36.50	.07	70.75	.02	105.00	.00	139.25	.00
2.50	.09	36.75	.07	71.00	.02	105.25	.00	139.50	.00
2.75	.09	37.00	.06	71.25	.02	105.50	.00	139.75	.00
3.00	.09	37.25	.06	71.50	.02	105.75	.00	140.00	.00
3.25	.09	37.50	.06	71.75	.02	106.00	.00	140.25	.00
3.50	.09	37.75	.06	72.00	.02	106.25	.00	140.50	.00
3.75	.10	38.00	.06	72.25	.02	106.50	.00	140.75	.00
4.00	.10	38.25	.06	72.50	.02	106.75	.00	141.00	.00
4.25	.10	38.50	.06	72.75	.02	107.00	.00	141.25	.00

LEGEND

500 / 8ha — WATERSHED AREA

NOTE: BASE PLAN INFORMATION PREPARED IN COOPERATION WITH THE REGION OF PEEL

PREPARED BY:

FALBY BURNSIDE & ASSOCIATES LTD.
ENGINEERS – HYDROGEOLOGISTS – ENVIRONMENTAL CONSULTANTS
8500 TORBRAM ROAD, SUITE 56, BRAMPTON, ONTARIO L6T5C6
TELEPHONE: 905-793-9239 FAX: 905-793-5018
DATE JAN/1997 SCALE 1:7500 JOB No 9015-02

DRAINAGE TO POND 1

FIGURE 2

90152F02.DWG

43M 1324 Pond 9

Ministry of the Environment

Ministère de l'Environnement

Ontario

CERTIFICATE OF APPROVAL
SEWAGE
NUMBER 3-0578-98-006
Page 1 of 1

RECEIVED
JUN 26 1998
TOWN OF CALEDON
CLERK'S DEPT.

RECEIVED
JUL 2 1998
TOWN OF CALEDON
ENGINEERING DEPARTMENT

Papertious Investment Inc.
1700 Langstaff Road, Suite 2003
Concord, Ontario
L4K 3S3

You have applied in accordance with Section 53 of the Ontario Water Resources Act for approval of:

Construction of a stormwater management facility to serve Papertious Residential Subdivision (21T88071C) in the Town of Caledon.

As shown on Drawing No. A1-97638-SWM1 revised March 18, 1998, the stormwater management facility will be located west of King Street West on Block 307. Stormwater from the storm sewers of the Subdivision will enter the facility at the northwest corner of the site. The facility has a sediment forebay and a storage capacity of 75,000 cubic metres at Elevation 254.7 metres including wet storage of up to 17,000 cubic metres at Elevation 250.7 metres. Up to Elevation 252.40 metres outflows will be through a seepage outlet system consisting of a stone encased 1500mm vertical perforated drain. Stormwater would percolate through the vertical drain into a 375mm connection then to the Pond Outlet Control Chamber. Above Elevation 252.40 metres stormwater outflows will also through a 900mm sewer connection to the Pond Outlet Control Chamber. From the Pond Outlet Control Chamber the combined stormwater flows then discharges through a connection to an existing 1500mm culvert of Coleraine Drive.

all in accordance with the engineering plans and the *STORMWATER MANAGEMENT REPORT - Papertious Investors* - dated March, 1998 altogether as submitted by Proctor and Redfern Limited, Consulting Engineers.

The above noted sewage works are approved under Section 53 of the Ontario Water Resources Act.

DATED AT TORONTO this 22nd *day of* June, 1998.

THIS IS A TRUE COPY OF THE ORIGINAL CERTIFICATE MAILED

ON June 22 98

(Signed)

for

M. Dhalla, P.Eng.,
Director,
Section 53,
Ontario Water Resources Act.

FC/ld

Attn.: -Mr. R.L. Hooshley, Project Manager, Papertious Investment Inc.
cc: -Ms. M. Morden, Clerk, Town of Caledon
-Mr. J.C. Bourrie, P. Eng., Proctor and Redfern Limited
-District Manager, MOE Halton-Peel District Office

ecosystem recovery inc.
PROFESSIONAL ENGINEERS

Memorandum

171 Victoria St. N, Kitchener, Ontario, N2H 5C5
Tel 519.621.1500 ■ Fax 226.240.1080

To:	Cassie Schembri (Town of Caledon) Margi Sheth (Town of Caledon)	**Date:**	October 22, 2021
Prepared by:	Adam Spargo, B.Sc. Water Resources Specialist	**ERI Project No.:**	2019
Reviewed by:	Jeff Prince, P.Eng Senior Water Resources Engineer		
Re:	Pond 9 Review of As-built Water Quality and Erosion Control		

1. Introduction

Ecosystem Recovery Inc. (ERI) was retained by the Town of Caledon to complete a review of Pond 9 following concerns raised by the Toronto Region Conservation authority (TRCA) that the stormwater management facility (SWMF) is contributing to erosion in Jaffrey's Creek immediately downstream of the Pond 9 outlet. The objective of the review was to determine if Pond 9 has been constructed as per the approved design or if deviations from the design could contribute to downstream erosion.

The following documents were reviewed as part of the study:

- Ministry of the Environment Conservation and Parks (MECP). June 1998. Certificate of Approval 3-0578-98-006.
- Proctor & Redfern Limited. January 2006. Finalized As Record Drawings for Pond 9.
- Falby Burnside & Associates Ltd. August 1997. Stormwater Management Report Heritage Hills Subdivision Phase 2.

The original design report was not available for Pond 9, however, the Certificate of Approval and the Heritage Hills Subdivision Phase 2 report provide details regarding the design permanent pool volume and the extended detention discharge storage relationship. These documents have been used to review the current condition of Pond 9 against the design.

Additionally, ERI completed a field inspection and bathymetric survey of the facility in August 2020 which has been used to support the review of existing conditions.

2. Pond 9 Review

Pond 9 is located at the intersection of Coleraine Drive and Harvest Moon Drive in Bolton. The facility provides water quality, water quantity, and erosion control. The following sections provide a summary of the design and as-built review of the facility.

2.1 Catchment Area

The design catchment area identified in the Storm Drainage Plan (Proctor & Redfern Ltd, 2006) identifies Pond 9 as providing water quality, water quantity and erosion control to a 72 ha residential catchment developed by Papertious Investments. An additional 51.4 ha external catchment drains to the facility; however, this external area receives on-site controls up to the 100-year event and is not relevant to the current erosion concerns. This information is consistent with the Heritage Hills Subdivision Phase 2 Stormwater Management Report which includes the Pond 9 catchment area in the associated OTTHYMO model files and model schematic. The design imperviousness for the 72 ha catchment is identified as 49%.

ERI completed a review of the topographic data provided by the Town of Caledon (1 m contours) and determined the untreated catchment area draining to Pond 9 is 73 ha. The estimated imperviousness under current conditions is 57%.

2.2 Inlets

The design drawings identify three inlets to the facility. During the August 2020 survey, seven inlets were identified. The inlets are summarized in **Table 1**. Three of the inlets are located on the east side of the facility near the outlet structure and appear to service Coleraine Drive. Due to the close proximity to the outlet, adequate detention time for sediment deposition may not be occurring, leading to increased sediment discharge at the outlet from the road drainage.

Table 1. Description of Inlet Pipes

Inlet Number	Description	Inlet Shown on Drawing?
1	1,800 mm concrete pipe with headwall discharging into west forebay.	Yes
2	375 mm PVC pipe discharging into the south forebay east of the access road.	No
3	1,050 mm concrete pipe with headwall discharging into the south forebay.	Yes
4	750 mm concrete pipe discharging into south side of facility near forebay berm.	No
5	300 mm PVC pipe with concrete headwall discharging to east side of main cell.	No
6	450 mm PVC pipe with concrete headwall discharging to east side of main cell.	Yes
7	450 mm PVC pipe with concrete headwall discharging to east side of main cell.	No

2.3 Outlet Structure

The outlet structure consists of a low flow outlet and two high flow outlets. The low flow outlet is a perforated CSP riser with a rip rap jacket (shown in **Photo 1** and **Photo 2**). Flow is conveyed from the riser to the outlet control structure via a 375 mm PVC pipe. Flow into the riser is controlled by the perforations.

The first high flow outlet is a 900 mm diameter concrete pipe (shown in **Photo 3**) with an invert elevation of 252.3 m. This outlet pipe leads to a large concrete control structure located on the east bank of facility, adjacent to Coleraine Drive. The second high flow outlet is an open grate on top of the concrete control structure (shown in **Photo 4**). The grate elevation is 254.8 m. Water is then conveyed from the concrete outlet structure to Jaffrey's Creek east of Coleraine Drive via a 1500 mm diameter concrete pipe.

Photo 1: The top of the riser pipe with the flap open.

Photo 2: View inside the riser with the slotted outlet pipe at the bottom.

Photo 3: The high flow 900 mm diameter outlet pipe and headwall.

Photo 4: High flow outlet grate on top of the concrete control structure.

2.4 Permanent Pool

Pond 9 is intended to provide Enhanced Protection (80% suspended solids removal). This is achieved through the permanent pool and extended detention volume. The Certificate of Approval identifies a total design permanent pool volume of 17,000 m^3 at an elevation of 250.7 m. ERI completed a bathymetric survey of Pond 9 to determine the current permanent pool volume in the facility (i.e., above the accumulated sediment layer). A comparison of the design and as-built permanent pool volumes is provided in **Table 2**.

The analysis shows that the current permanent pool volume is 1,729 m^3 less than the volume identified in the Certificate of Approval, however, it is 3,980 m^3 greater than the volume required to provide Enhanced Protection to meet MECP water quality guidelines. Therefore, the facility is currently meeting the water quality design target.

Table 2. Permanent Pool Comparison

Parameter	Design Condition	Current Condition
Catchment Area	72 ha	73 ha
Imperviousness	49%	57%
MECP Table 3.2 Permanent Pool Required for Enhanced Protection	135 m^3/ha	155 m^3/ha
Permanent Pool Volume Required	9,720 m^3	11,291 m^3
Certificate of Approval Permanent Pool Volume	17,000 m^3	
Current Permanent Pool Volume based on August 2020 Survey	15,271 m^3	

2.5 Extended Detention and Erosion Control

The total extended detention volume is typically determined by the larger volume of either the extended detention water quality volume or the erosion control volume. The Pond 9 extended detention volume is assumed to be between the permanent pool elevation (250.7 m) and the invert of the 900 mm high flow outlet pipe (surveyed at 252.31 m). The design invert elevation of the 900 mm high flow outlet pipe is 252.4 m, suggesting that the as-built outlet pipe is 0.09 m lower than the design. The August 2020 survey was used to estimate the as-built stage storage curve for the extended detention volume. The design and as-built extended detention volumes are presented in **Table 3**. The current extended detention volume is 15,758 m^3.

The extended detention water quality volume is calculated as 40 m^3/ha based on MECP guidelines (2003). For Pond 9, based on the current catchment area, the extended detention water quality volume requirement is 2,920 m^3. The as-built extended detention volume accommodates this volume.

The extended detention erosion control volume is achieved by attenuating and discharging the 25 mm storm event over 48 hours. According to the Heritage Hills Subdivision Phase 2 Stormwater Management Report, the 25 mm event is attenuated over a period of 100 hours with the majority of volume discharged within 48 hours and the peak outflow occurring at 4.75 hours. The maximum storage used in Pond 9 during the 25 mm event is 15,780 m^3. Therefore, the as-built extended detention volume is sufficient to accommodate the design 25 mm storm event. However, the current catchment area draining to the facility is 1.0 ha greater than the design and the total imperviousness is estimated at 57% instead of the design imperviousness of 49%. The 25 mm event has not been modeled with the new catchment parameters; however, it can be assumed that the increase in imperviousness and small increase in catchment area will cause an increase in the runoff volume and peak flow to the pond. This will cause a short period (likely 1 to 2 hours) where the 25 mm event is discharged through the 900 mm outlet pipe and utilizes a portion of the water quantity control active storage volume. The OTTHYMO model identifies a peak discharge rate of 0.1 m^3/s during the 25 mm event. This may increase to between 0.2 m^3/s and 0.3 m^3/s while water is discharging through the 900 mm outlet pipe.

Table 3. Extended Detention Comparison

Parameter	Design Condition	Current Condition
Extended Detention Elevation (Invert of the 900 mm Outlet Pipe)	252.4 m	252.31 m
Extended Detention Volume	16,000 m^3	15,758 m^3
MECP Water Quality Extended Detention Volume Required (40 m^3/ha)	2,880 m^3	2,920 m^3
25 mm Event Extended Detention Volume (Heritage Hills Subdivision Phase 2 OTTHYMO Model)	15,780 m^3	Not modeled

3. Conclusion

The following conclusions were developed following the Pond 9 review of design and as-built conditions:

- The Pond 9 catchment area has increased from 72 ha to 73 ha.
- The imperviousness has increased from 49% to 57%.
- The current permanent pool volume (15,271 m^3) is smaller than the design volume (17,000 m^3), however, it is 3,980 m^3 greater than the MECP Table 3.2 requirement for Enhanced Protection (11,291 m^3). Therefore, the facility is providing adequate water quality control to meet MECP design requirements for Enhanced Protection.
- The extended detention volume is slightly less than the design volume due to the lower invert of the 900 mm high flow outlet pipe (0.09 m lower than the design).
- The as-constructed extended detention volume is sufficient to accommodate the design erosion control volume.
- The larger catchment area and greater imperviousness compared to the design will result in a larger runoff volume and peak flow to the facility during the 25 mm event. While this is expected to increase the peak discharge rate from the facility during the 25 mm event, it is not expected to significantly change the 25 mm event outflow hydrograph. Further modeling is required to confirm the exact change in the outflow hydrograph.

4. References

Falby Burnside & Associates Ltd. August 1997. Stormwater Management Report Heritage Hills Subdivision Phase 2.

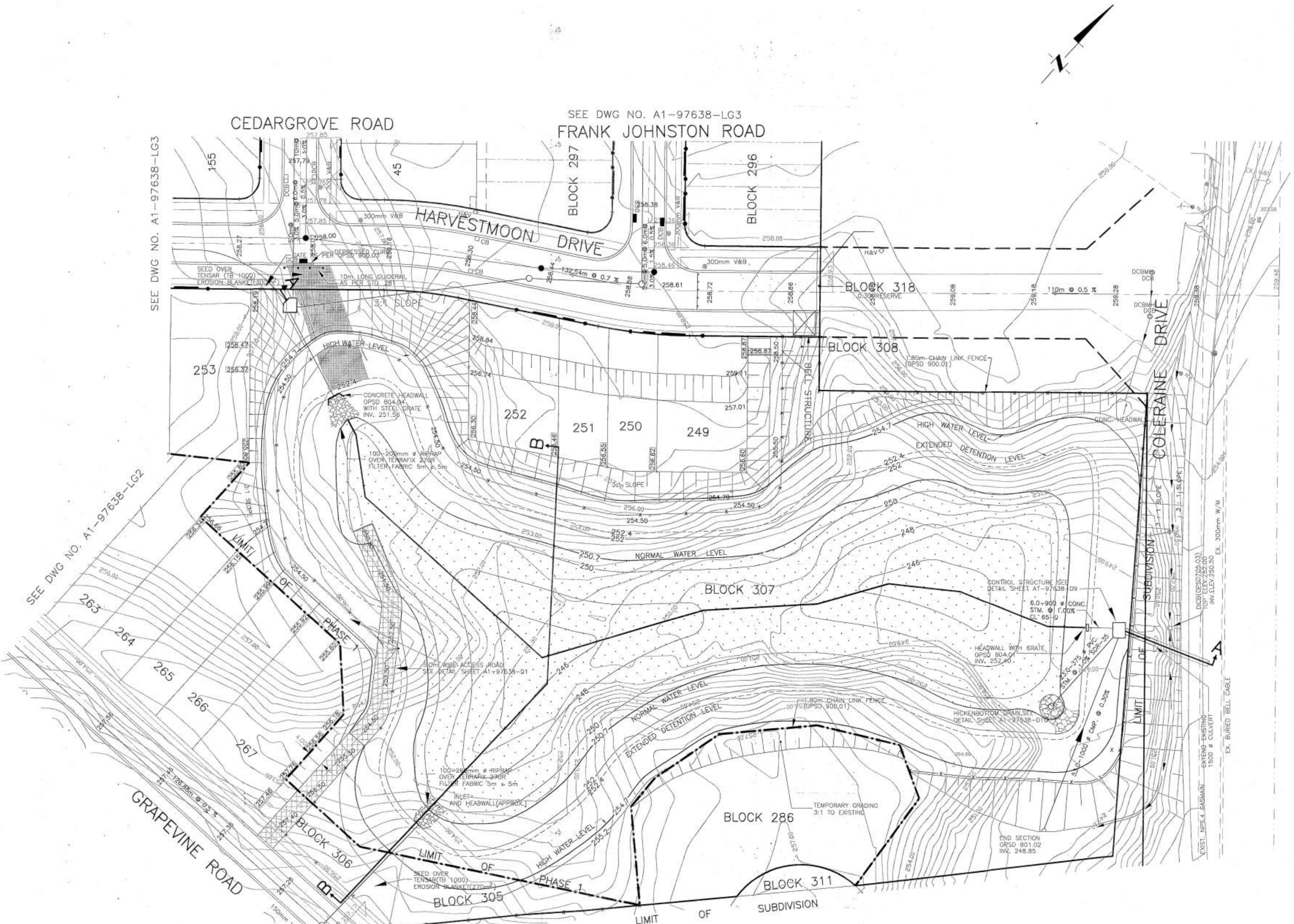
Ministry of the Environment Conservation and Parks (MECP). June 1998. Certificate of Approval 3-0578-98-006.

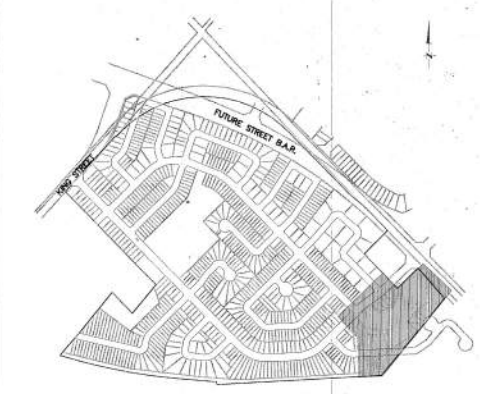
Ministry of the Environment Conservation and Parks (MECP). March 2003. Stormwater Management Planning and Design Manual.

Proctor & Redfern Limited. January 200. Finalized As Record Drawings for Pond 9.

Appendix A

Drawings





GENERAL

NOTES:

1. ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE NOTED.
2. ALL PIPE SIZES ARE IN MILLIMETRES.
3. SEE INDEX SHEET FOR LIST OF DRAWINGS.
4. SEE INDEX SHEET AND A1-97638-P1 FOR LISTS OF GENERAL NOTES.
5. CB's SHOWN AS ■ ARE TO BE CONSTRUCTED WITH IPEX TYPE 'A' INLET RESTRICTOR.
6. SIDE SLOPES: 246.0 – 252.0 4H:IV
   252.0 – 254.5 3.5H:IV
   254.5 – 255.2 3H:IV

No.	REVISIONS	Date	By	Approved
4	FINALIZED AS RECORD DRAWING	01-04-06	A.R.	
3	GENERAL REVISIONS	05-21-98	P.G.	
2	ISSUED FOR GRADING ONLY, NOT UNDERGROUNDS	04-20-98	P.G.	
1	SECOND SUBMISSION, NOT FOR CONSTRUCTION	03-18-98	P.G.	

BENCH MARK

EAST FACE AT THE SOUTH CORNER OF A WHITE BRICK HOUSE S.E. CORNER OF REGIONAL ROAD 9 AND COLERAINE DRIVE.
ELEV. 258.312m

03/02/06

DESIGNED BY | APPROVED

TOWN OF CALEDON
REGIONAL MUNICIPALITY OF PEEL

PAPERTIOUS INVESTORS

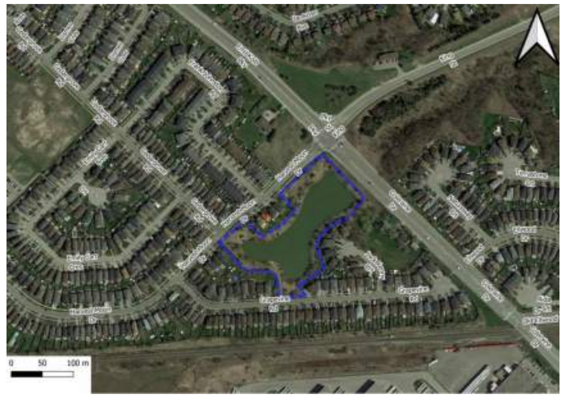
STORM WATER POND

Sheet 1 of 1

Proctor & Redfern Limited
Professional Consulting Services
Toronto, Ontario (416) 445-3600

Scale:	H.L. 1:500	PHASE 1 21T-88071	Project No. 97638
Drawn By:	L.S.B.		Drawing No.
Designed By:	P.G.		A1-97638-SWM1
Checked By:	J.C.B.		
Date:	DECEMBER 1997		

POND 9



LEGEND

MINOR CONTOUR

260.00 MAJOR CONTOUR

PERMANENT POOL

×292.00 SPOT ELEVATION

▴0.14 SEDIMENT DEPTH POINT

BATHYMETRIC SURVEY POINT

+ TOPOGRAPHIC SURVEY POINT

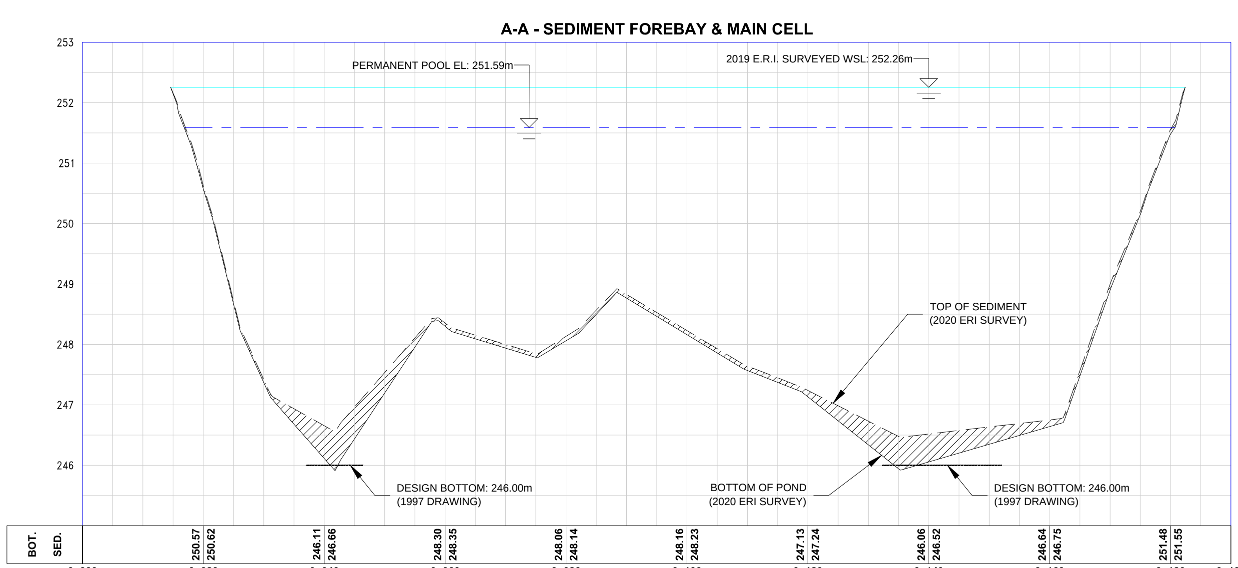
Low — High

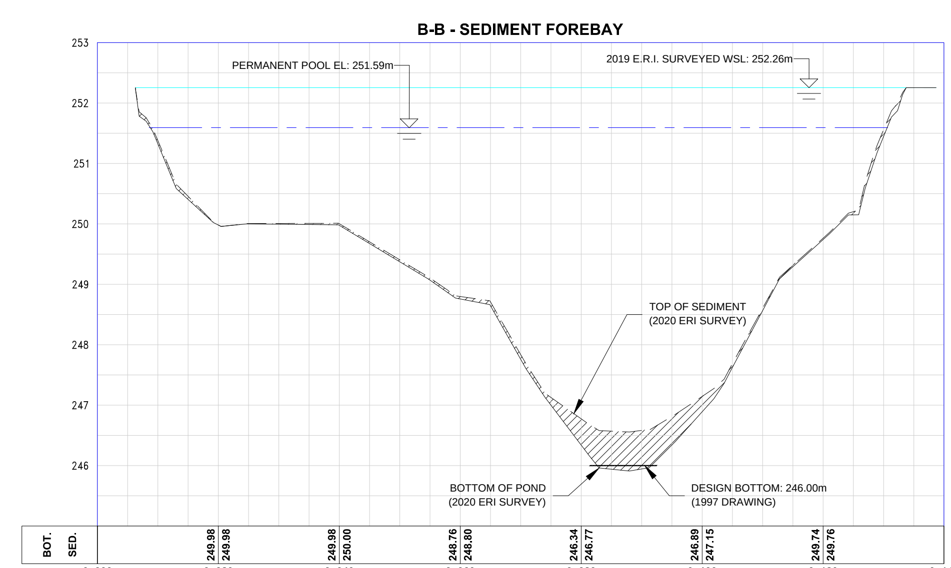
Sediment Deposition Scale

2020 STORMWATER MANAGEMENT POND CLEANOUTS

PROJECT #:	20-19
DRAWN:	NY
CHECK:	AS
DATE:	09/17/2020
PLAN SCALE:	1:1250 (11x17)
PROFILE SCALE:	1:1250 (11x17)

G:\Final Logo\jpeg (RGB)\EcosystemRecovery_col.jpg





Basic protection would only be acceptable where the receiving aquatic habitat is demonstrated to be insensitive to stormwater impacts and has little potential for immediate or long-term rehabilitation. Generally, basic protection may be applied in the following conditions:

- Areas where downstream aquatic habitat has adapted to high suspended solid loadings prior to anthropomorphic changes to the watershed (for example, aquatic habitat conditions that may be found naturally in areas of fine grained soils); and
- Downstream watercourses have been significantly altered (by urbanization or agricultural practices), hardened, or polluted, and there is little short or long-term potential for rehabilitation.

Proponents proposing basic treatment must seek approval from the appropriate agencies with fisheries and habitat management responsibilities with clear rational and site-specific supporting data collected from baseline studies or from existing resource management agency data bases (such as, fishery management plans, watershed management plans, etc.).

Agencies with fisheries responsibilities may also require habitat compensation where stormwater management design impacts are determined to result in harmful alteration, disruption, or destruction of fish habitat as defined in the *Fisheries Act*. Habitat compensation typically involves the replacing of damaged habitat with newly created habitat or improving the productive capacity of other aquatic habitat at or near the area of impact.

The levels of protection are based on a general relationship between the long-term average suspended solids removal of the end-of-pipe stormwater management facilities and the lethal and chronic effects of suspended solids on aquatic life. The levels of protection correspond to the following 'long-term average suspended solids removals' which refer to the removal by the SWM facility of suspended solids from the site runoff for the entire range of rainfall events on that site for a long period of time, at least 10 years. The use of a long-term average is to account for the variability in characteristics of rainfall events.

- Enhanced protection corresponds to the end-of-pipe storage volumes required for the long-term average removal of 80% of suspended solids.
- Normal protection corresponds to the end-of-pipe storage volumes required for the long-term average removal of 70% of suspended solids.
- Basic protection corresponds to the end-of-pipe storage volumes required for the long-term average removal of 60% of suspended solids.

For SWMPs designed with a by-pass, the calculation of long-term suspended solids removal must be based on both suspended solids removal in the facility plus suspended solids by-passed around the facility.

3.3.2 Water quality sizing criteria

The volumetric water quality criteria are presented in Table 3.2. The values are based on a 24 hour drawdown time and a design which conforms to the guidance provided in this manual. Requirements differ with SWMP type to reflect differences in removal efficiencies. Of the specified storage volume for wet facilities, 40 m^3/ha is extended detention, while the remainder represents the permanent pool.

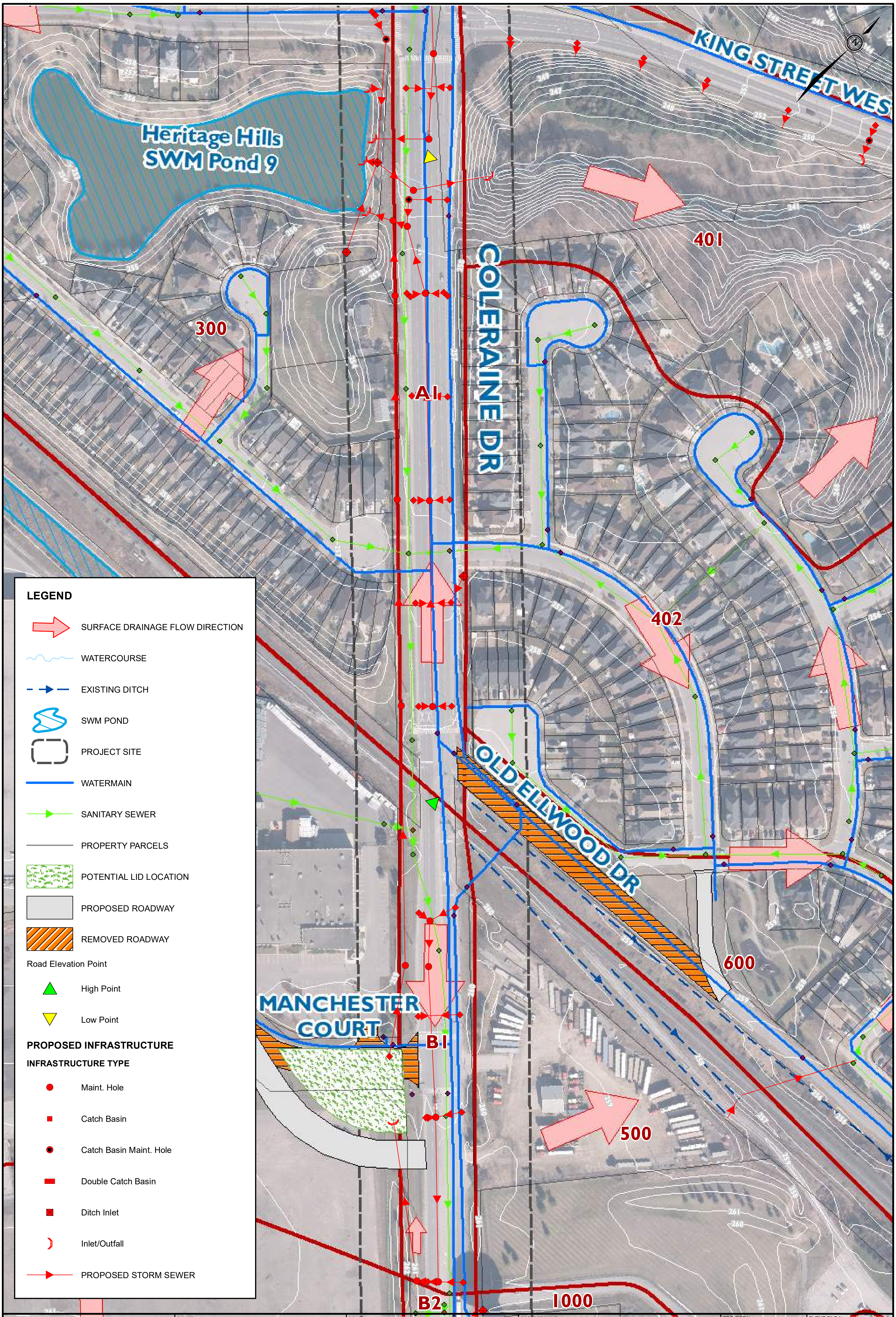
Table 3.2 Water Quality Storage Requirements based on Receiving Waters [1] , [2]

Protection Level	SWMP Type	Storage Volume (m^3/ha) for Impervious Level: 35%	Storage Volume (m^3/ha) for Impervious Level: 55%	Storage Volume (m^3/ha) for Impervious Level: 70%	Storage Volume (m^3/ha) for Impervious Level: 85%
Enhanced 80% long-term S.S. removal	Infiltration	25	30	35	40
Enhanced 80% long-term S.S. removal	Wetlands	80	105	120	140
Enhanced 80% long-term S.S. removal	Hybrid Wet Pond/Wetland	110	150	175	195
Enhanced 80% long-term S.S. removal	Wet Pond	140	190	225	250
Normal 70% long-term S.S. removal	Infiltration	20	20	25	30
Normal 70% long-term S.S. removal	Wetlands	60	70	80	90
Normal 70% long-term S.S. removal	Hybrid Wet Pond/Wetland	75	90	105	120
Normal 70% long-term S.S. removal	Wet Pond	90	110	130	150
Basic 60% long-term S.S. removal	Infiltration	20	20	20	20
Basic 60% long-term S.S. removal	Wetlands	60	60	60	60
Basic 60% long-term S.S. removal	Hybrid Wet Pond/Wetland	60	70	75	80
Basic 60% long-term S.S. removal	Wet Pond	60	70	85	95
Basic 60% long-term S.S. removal	Dry Pond (Continuous Flow)	90	150	200	240

For levels of imperviousness below 35%, required storage volumes may be obtained by extrapolating the values provided in Table 3.2. For levels of imperviousness between those included in Table 3.2, required storage volumes may be obtained by interpolation.

It should be noted that the total drainage area contributing to the facility should be included in sizing (lumped imperviousness or separate calculations for internal and external drainage areas is permissible) in most cases. The exception occurs when an external drainage area is itself controlled by a separate water quality facility (and erosion and quantity control are either not required or provided separately). Modelling studies (Marshall Macklin Monaghan Limited, 1997) indicate comparable combined long-term removal rates for ponds in series and separate parallel ponds. More frequent overflows will occur from the most downstream pond, but this can be compensated for by doubling the water quality active storage volume from 40 to 80 m^3/ha.

The volumetric criteria specified in Table 3.2 address only water quality, not erosion, baseflow or flooding concerns. Furthermore, the criteria were developed based on the removal of suspended solids via settling, and therefore, may not adequately address contaminants which must be removed by other mechanisms.



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				DRAFTER: S. ELLIOTT	DESIGNER K. LUKAWIECKI	DRAWING No: FIG. 5
			SHEET TITLE: ALTERNATIVE 2 ROAD OVER RAILROAD	APPROVER R. CRESSMAN	APPROVER ---	
				DATE: 9/17/2021		SHEET No: 1 of 1

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