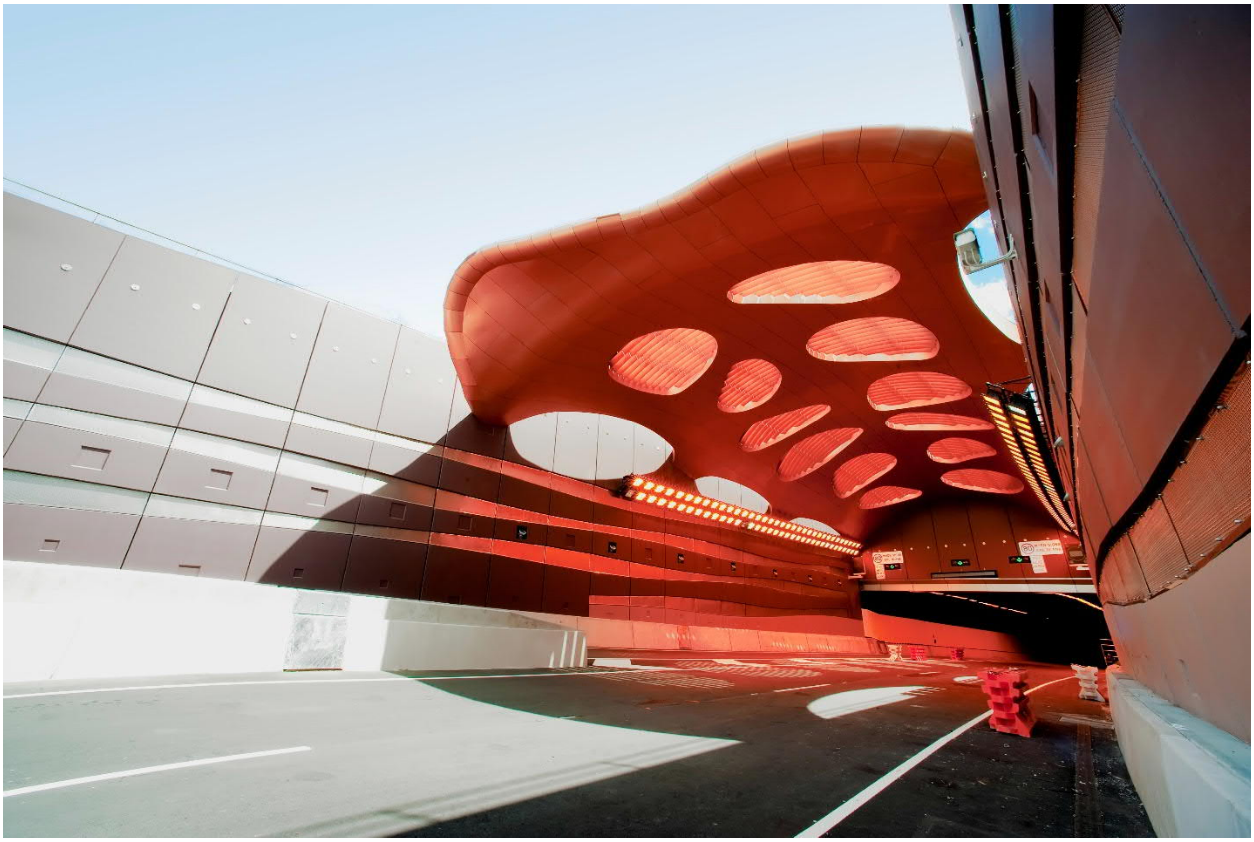
COLAND DEVELOPMENT CORPORATION
REPORT NUMBER: 18M-01130-00-WR1

STORMWATER MANAGEMENT REPORT

710 BALM BEACH ROAD, 1277 & 1337 SUNDOWNER ROAD, MIDLAND

PREPARED: MAY 06, 2019
UPDATED: OCTOBER 02, 2023



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0 EXECUTIVE

A Stormwater Management (SWM) report was prepared by WSP in May 2019 to support the proposed development of the property of 710 Balm Beach Road, 1277 and 1337 Sundowner Road in Town of Midland, ON. The proposed development consists of a commercial plaza with five office/retail buildings (A, B, C, D, and E) and associated parking lots. A comprehensive SWM plan, consisting of low impact development (LID) measures such as infiltration trenches, French drains and permeable pavements, oil/grit separator (OGS) unit, and a SWM dry pond, was proposed to mitigate the impacts of the subject development on water balance, water quality, and water quantity. The site is under construction as per the approved SWM report.

Coland Developments Corporation wishes to add two (2) storeys of residential units on top of one (1) storey commercial Building C & Building D. Amenity area is required with the addition of the residential uses. Therefore, the SWM dry pond constructed as per 2019 SWM report shall be removed to provide space for the amenity area. This SWM report is prepared to evaluate and recommend a preferred SWM alternatives to support the proposed revisions to the site plan on the subject property.

This SWM report is considered as an update to the 2019 version SWM report. The following revisions have been observed:

- ✓ Two-storey residential units have been added on top of one-storey commercial Building C and Building D.
- ✓ An amenity area and additional parking spots are added north of the Building D.
- ✓ An underground chamber system – ADS StormTech MC-4500 chamber system, is proposed to replace the SWM dry pond and provide required quantity control.
- ✓ The infiltration trench north of the Building D has been removed. The void storage within the clear stone foundation of the proposed underground chamber system shall provide water balance benefits.
- ✓ The on-site LID measures, except above mentioned infiltration trench, shall remain as is.

1 INTRODUCTION

1.1 SCOPE OF SWM REPORT

WSP Canada Inc. (WSP) has been retained by Coland Developments Corporation to prepare a stormwater management (SWM) report in support a Site Plan Approval (SPA) Application for the lands located at 710 Balm Beach Road, 1277 Sundowner Road, and 1337 Sundowner Road (hereafter referred to as the subject property) in the Town of Midland, Ontario.

Coland Development Corporation would like to develop a new commercial plaza with five office/retail buildings on the subject property. This SWM report shall examine impacts on water balance, water quality, and water quantity due to the proposed development, and summarize how each shall be addressed in compliance of the design criteria set by Town of Midland.

1.2 SITE LOCATION

The subject property is 3.09 ha in area and bounded by Balm Beach Road East to the south, Sundowner Road to the north and west, and commercial buildings to the east, in Town of Midland, Ontario.

The site location is presented in **Figure 1**.

1.3 SWM PLAN OBJECTIVES

The objectives of the SWM plan are as follows:

◊ Determine site specific SWM requirements to ensure that the development project is in conformance with Town of Midland's engineering guidelines manual;

◊ Evaluate various SWM practices that meet the requirements of the Town, and recommend a preferred strategy; and

◊ Prepare a SWM report documenting the strategy along with the technical information necessary for the sizing of the proposed SWM features.

1.4 BACKGROUND DOCUMENTS

The following documents have been reviewed in preparing this SWM report:

◊ *"Engineering Development Design Standards"*, Town of Midland, December 2012;

◊ *"Official Plan for the Town of Midland"*, January 2017;

◊ *"Severn Sound Source Protection Area Approved Assessment Report, Chapter 7: Town of Midland"*, South Georgian Bay Lake Simcoe Source Protection Committee, January 2015.

◊ *"Stormwater Management Planning and Design Manual"*, Ontario Ministry of the Environment, Conservation and Parks (MOECP), March 2003;

◊ *"Low Impact Development Stormwater Management Planning and Design Guide"*, Credit Valley Conservation (CVC) and Toronto and Region Conservation Authority (TRCA), 2010;

◊ *"Geotechnical Investigation for Proposed Commercial Site at 710 Balm Beach Road East and 1277 & 1337 Sundowner Road, Midland, Ontario"*, Peto MacCallum Ltd. (PML), November 2018.

@2018 Google - Map data @2018 Tele Atlas

0 0.1 0.2 0.3 0.4 0.5km

CLIENT COLAND DEVELOPMENT CORPORATION	wsp
TITLE 710 BALM BEACH ROAD, 1277 & 1337 SUNDOWNER ROAD, MIDLAND, ON SITE LOCATION	Checked: J.Z. Drawn: AutoCAD Date: OCTOBER 2023 Proj. No.: 18M–01130–00–SWM Scale: AS SHOWN Figure No.: 1 Gr.No.: 00

FIGURE 1.dwg - 710 Balm Beach Rd-1277 & 1337 Sundowner Rd - Site Location X:\DIV38\2018\18M-01130-00 710 Balm Beach Rd, 1277 & 1337 Sundowner Rd\FIGURES - SEPTEMBER 2023\ Oct 02, 2023 - 4:03pm

1.5 SWM DESIGN CRITERIA

The SWM criteria applicable to the subject development are set out in Town of Midland Engineering Development Design Standards (December 2012), Section 5, Office Plan for the Town of Midland (2014), and the MECP's Stormwater Management Planning and Design Manual (March 2003).

A summary of the applicable requirements is provided below.

◊ **Water Balance**

Per the Severn Sound Source Protection Area Approved Assessment Report dated January 2015, the subject site falls within WHPA-Q2, where a future reduction in groundwater recharge would significantly impact the area.

Therefore, the site is required to retain stormwater on-site, to the extent practicable, to maintain the pre-development infiltration and groundwater recharge.

◊ **Water Quality**

The site is required to provide an Enhance Level (Level 1) of Protection or 80% TSS removal on an annual loading basis, and to ensure that water discharged to the municipal storm sewers is following MECP's manual and all Town By-laws pertaining to water quality.

◊ **Water Quantity Control**

Post-development peak flow rates must be controlled to pre-development levels for the 2-year up to 100-year storm.

2 PRE-DEVELOPMENT CONDITIONS

2.1 GENERAL

The subject property is approximately 3.09 ha in area and is currently occupied by a 2-storey brick dwelling building in an area of 0.023 ha. The remainder area of the site is occupied by trees and vegetations. The subject site has an imperviousness of 1.4%, under pre-development conditions, as illustrated in **Figure 2**.

The site generally slopes from southwest to the northeast and there is approximately 7.0 m drop in grade from south to north. The stormwater conveyance system in front of the site along Sundowner Road are roadside ditches and culverts at the northeast side. The ditch in front of the site is 27 m in length, 15 - 30% side slope, and 2.0% longitudinal slope. The ditch ultimately drains into an existing 450 mm diameter storm sewer running on Sundowner approximately 324 m east of the northeast corner of the site.

2.2 PRE-DEVELOPMENT DRAINAGE PLAN

The subject site is represented with a single catchment (100). The site is a rural basin with an imperviousness of 1.4% (< 20%) and is modelled using the NASHYD command in Visual OTTHYMO model.

The hydrologic parameters used for modelling, including soil Curve Number (CN) and Time to Peak (T_P), were estimated based on available topographic, land use, soil map, and geotechnical investigation report. The upland method is used to obtain the Time of Concentration (T_C) and Time to Peak (T_P) for rural catchment.

Table 2.1 presents the modelling parameters under pre-development conditions. Refer to **Appendix A** for detailed calculations.

Table 2.1 Pre-development Condition Catchment Parameters

Catchment	Area (ha)	IMP (%)	CN	IA (mm)	TP (hr)	Command
100	3.094	1.4	40	5.0	0.30	NASHYD

2.3 RAINFALL INFORMATION

Visual OTTHYMO 6.2 hydrologic model (VO6) is used to simulate the pre- and post-development flow rates from the subject site, and to size and confirm the performance of the proposed SWM facilities.

The design storms with 24-hour Chicago distribution and SCS Type II distribution were developed using the rainfall Intensity – Duration – Frequency (IDF) data specified in the Town of Midland Engineering Development Design Standards and were used in the Visual OTTHYMO modeling.

LEGEND

- PROPERTY BOUNDARY
- SUB-CATCHMENT BOUNDARY
- 100 — SUB-CATCHMENT ID.
- 3.094 — DRAINAGE AREA (ha)

0 10 20 30 40 50m

CLIENT	COLAND DEVELOPMENT CORPORATION
TITLE	710 BALM BEACH ROAD, 1277 & 1337 SUNDOWNER ROAD, MIDLAND, ON PRE-DEVELOPMENT CONDITIONS

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The rainfall intensity for the subject site was calculated using the following equation:

$$I = \frac{A}{(B+T)^C}$$

Where,

I = Rainfall Intensity (mm/hour)

T = Time of Concentration (minutes)

A, B, C = Constant Coefficient

The coefficient for A, B, and C values used in the Town of Midland are defined in Section 5.2.5 of the Town of Midland Engineering Development Design Standards and are summarized in **Table 2.2**.

Table 2.2 Rainfall Parameters used by Town of Midland

Return Periods (Years)	A	B	C	24-hour Rainfall Amount (mm)
2	807.44	6.75	0.828	46.8
5	1135.40	7.50	0.841	59.9
10	1387.00	7.97	0.852	67.5
25	1676.20	8.30	0.858	78.1
50	1973.10	9.00	0.868	85.4
100	2193.10	9.04	0.871	92.9

2.4 PRE-DEVELOPMENT PEAK FLOW RATES

Visual OTTHYMO model was simulated for 24-hour Chicago Storm and 24-hour SCS Type II storm for 2-year up to 100-year events. The modelling results are summarized in **Table 2.3**. Refer to **Appendix B** for detailed model output.

As shown in **Table 2.3**, the SCS Type II distribution storm generates a lower peak flow rates for larger event (10 ~ 100 year) while a higher peak for smaller event (2 ~ 5 year). Anyhow, whichever is less shall be used as the quantity control target for the proposed development.

Table 2.3 Pre-Development Peak Flow Rates

Return Periods (Years)	Pre-Development Peak Flow Rates (m^3/s)		Allowable Peak Flow Rates (m^3/s)
	24-hour Chicago Storm	24-hour SCS Type II Storm	
2	0.027	0.030	0.027
5	0.047	0.050	0.047
10	0.063	0.063	0.063
25	0.086	0.084	0.084
50	0.106	0.100	0.100
100	0.126	0.118	0.118

3 PROPOSED CONDITIONS

3.1 GENERAL

The proposed development consists of a new commercial plaza with five office/retail/residential buildings on the subject property. The subject site has an imperviousness of 77.0% under proposed conditions. **Figure 3** illustrates the proposed conditions of the site.

Minor and major drainage system will be required within the site. The on-site minor storm drainage system is designed to convey the 1 in 5-year storm event, in accordance with the Town design guidelines. The major storm drainage system will be designed to convey flows in excess of the minor system flows by means of overland flow route. The major flow direction of post-development condition will be maintained to match the pre-development condition, towards the northeast corner of the property.

Low Impact Development (LID) practices such as French Drains, Infiltration Trenches, and Permeable Pavements, are proposed to enhance the infiltration and groundwater recharge. Void storage available within clear stone foundation of ADS StormTech MC-4500 chamber system also provides water balance benefits.

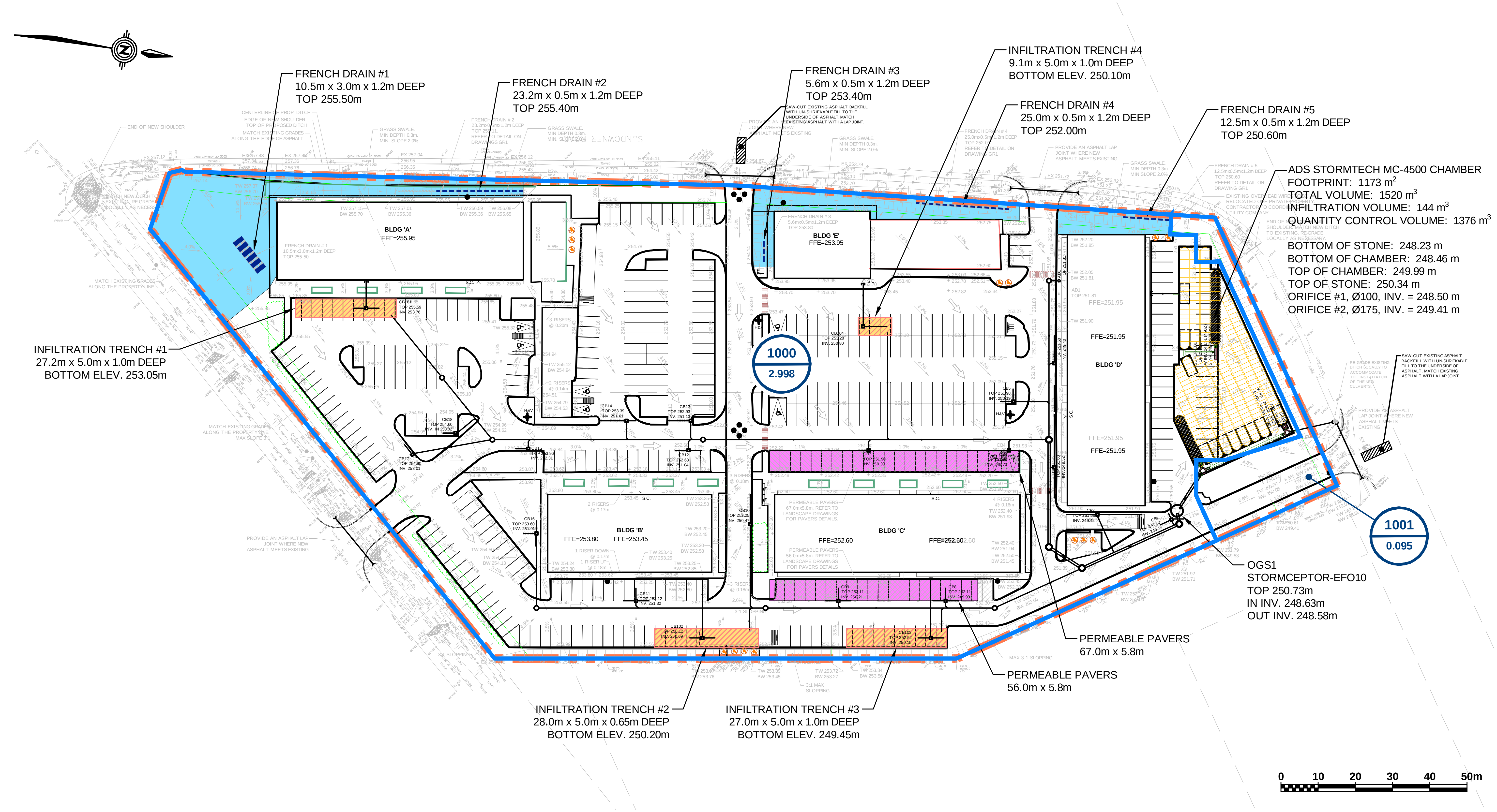
Quality control shall be addressed through treatment train approach with combination of CB shields, OGS unit, and Isolator Row Plus (IR+) incorporated within the ADS StormTech MC-4500 chamber system.

The subject site is delineated into two sub-catchments, based on the proposed grading and potential SWM practices. Runoff from catchment 1000 shall be conveyed to the ADS StormTech MC-4500 chamber system for quantity control, while runoff from catchment 1100 shall leave the site uncontrolled.

Table 3.1 presents the modelling parameters under post-development conditions. Refer to Appendix A for detailed calculations.

Table 3.1 Proposed Land Use Breakdown

Catchment	Area (ha)	IMP (%)	CN	IA (mm)	Command
1000	2.998	78.6	48	5.0	STANDHYD
1100	0.095	26.3	48	5.0	STANDHYD
Total	3.094	77.0			



LEGEND

- PROPERTY BOUNDARY
- SUB-CATCHMENT BOUNDARY
- 1000 — SUB-CATCHMENT ID.
- 2.998 — DRAINAGE AREA (ha)
- FRENCH DRAIN
- AREA DRAINING TO FRENCH DRAIN
- INFILTRATION TRENCH
- PERMEABLE PAVERS

CLIENT	COLAND DEVELOPMENT CORPORATION
TITLE	710 BALM BEACH ROAD, 1277 SUNDOWNER ROAD, 1337 SUNDOWNER ROAD PROPOSED CONDITIONS
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FIGURE 3.dwg - 710 Balm Beach Rd-1277 & 1337 Sundowner Rd - Proposed Conditions X:\DIV38\2018\18M-01130-00 710 Balm Beach Rd, 1277 & 1337 Sundowner Rd\FIGURES - OCTOBER 2023\ Oct 02, 2023 - 5:36pm

3.2 WATER BALANCE

The proposed re-development would increase the site imperiousness by converting pervious surface to impervious surface, resulting in less infiltration, less evaporation, and much more runoff from the site. LID practices, such as french drains, infiltration trenches, permeable pavements, and void storage within clear stone foundation of ADS StormTech underground chamber system, are proposed to enhance the infiltration and groundwater recharge.

An annual water balance analysis was conducted for the subject site both for pre-development and post-development conditions to evaluate the impact of the proposed re-development on the water balance.

3.2.1 Water Balance for Pre-Development Conditions

The subject site is a 3.094 ha parcel with an imperviousness of 1.4%. Of the total 3.094 ha area, 0.043 ha is impervious surface consisting of a residential building and associated driveway, and 3.051 ha is pervious area consisting of trees and vegetations.

Water balance analysis for pre-development conditions was carried out by defining the relationship for different type of surfaces and then weighted by the % of surface coverage to obtain the site wide water balance relationship.

Water balance relationship for the pervious area can be defined using the method developed by Thornthwaite and Mather in 1957 and following the example given in Section 3.2.3 in MECP's "Stormwater Management Planning and Design Manual".

1) The annual precipitation of the site shall be 1040.6 mm, as per Canadian Climate Normals Station Data for Midland Water Pollution Control Plant (ID: 6115217).
2) For surface with urban lawn and a site soil of fine sandy loam (HSG=B), 596.7 mm out of 1040.6 mm annual precipitation returns to the atmosphere as evapotranspiration (ET), leaving 443.9 mm as precipitation surplus.
3) Then, infiltration factors are used to determine the fraction of water surplus that infiltrates into the ground and the fraction runs off the site. The infiltration factor for the site pervious area is 0.62, by summing a factor for topography (0.12), soil (0.40), and surface cover (0.10). That is, 276.6 mm out of 443.9 mm water surplus infiltrates into the ground and 167.3 mm runs off the site.

To sum up, for the site pervious area, 26.6% of annual precipitation infiltrates into the ground, 57.3% returns to atmosphere as evapotranspiration, and 16.1% runs off the site.

It is assumed that the impervious area will accept 1 mm rainfall for subsequent evaporation prior to runoff generation due to the shallow depressions. Capturing 1.0 mm rainfall corresponds to a 12.5% of annual precipitation as per Figure 1a of City of Toronto's Wet Weather Flow Management Guidelines (WWFMGs). The remaining 87.5% of annual precipitation will leave the site as runoff. Thus, out of 1040.6 mm annual precipitation, 130.1 mm returns to atmosphere as evaporation (ET), 910.5 mm runs off, and none infiltrates.

The pre-development site wide water balance relationship is then determined by weighting the relationship for impervious and pervious area with corresponding % of land use coverage. Under pre-development conditions, of the total average annual rainfall, infiltration accounts for approximately 26.2%, evapotranspiration (ET) accounts for approximately 56.7%, and approximately 17.1% appears as runoff.

3.2.2 Water Balance for Post-Development Conditions without Mitigation Measures

Under proposed conditions, the site imperviousness increases from 1.4% to 77.0%. Of the total 3.094 ha area, 2.383 ha is impervious surface, and 0.711 ha is pervious area.

The water balance for post-development conditions without mitigation measures can be carried out following the procedure illustrated in above Section. Of the total average annual rainfall, infiltration accounts for approximately 6.2%, evapotranspiration (ET) accounts for approximately 22.8%, and there is approximately 71.0% runoff. Refer to Appendix A for detailed calculations.

Without any mitigation measures, the proposed development would result in reductions in ET and infiltration, and increase in surface runoff. Low Impact Development (LID) technology, such as french drains, infiltration trenches, permeable pavement and void storage within clear stone foundation of ADS StormTech underground chamber system, are proposed to enhance the groundwater recharge and minimize the impact on the water balance.

3.2.3 Infiltration Trenches

It is proposed to infiltrate the roof runoff from each of Building "A", "B", "C", and "E" via an underground infiltration trench. The roof drainage is conveyed to the trench by the roof leader. Since the runoff is relatively clear, pre-treatment is not needed.

Section 4.5.6 of 2003 MECP's SWMPDM provides guidance on the design of the infiltration trenches (soakaway pit). The information contained in the Geotechnical Investigation Report by PML (November 2018) (hereafter PML's Geo-Report) is used in evaluation of the feasibility, design, and configuration of the infiltration trenches.

The infiltration trenches should satisfy the minimum infiltration rate, groundwater table depth, and bedrock depth, minimum setback from building as per MECP's SWMPDM.

Percolation Rate of Underlain Soil

Generally, the site soil should have an infiltration rate greater than 15 mm/hr (coarse than loam) to be suitable for infiltration-based practices, such as infiltration trenches, as per MECP's SWMPDM.

The PML's Geo- Report indicated that the site subsurface profile comprised surficial topsoil or fill, overlying native deposits of silt, sand, sandy silt, and silty sand. In-situ tests in five test pits gives an infiltration rate ranging from 69 mm/hr to 96 mm/hr, which is greater than 15 mm/hr and suitable for infiltration trenches.

Design infiltration rate is obtained by applying a safety factor on the in-situ infiltration rate, as per CVC and TRCA's Low Impact Development Stormwater Management Planning and Design Guide. The factored infiltration rate ranges from 28 mm/hr to 31 mm/hr and a conservative value of 28 mm/hr shall be used to design and configurate the infiltrate trench.

Groundwater Table Depth

The seasonally high groundwater table depth should be > 1.0 m below the bottom of the infiltration trenches, as per MECP's SWMPDM.

The groundwater was not observed upon completion of all boreholes during the investigation. Therefore, it is conservative to use the bottom of the BHs to evaluate the groundwater table depth. All infiltration trenches meet the minimum 1 m separation from the bottom of the trenches to the seasonally high groundwater table. Refer to Section 3.3.4.2 of Appendix A for details.

Bedrock Depth

The depth to bedrock should be greater or equal to 1.0 m below the bottom of the infiltration trench to ensure adequate drainage/hydraulic potential, as per MECP's SWMPDM.

The bedrock was not encountered during the investigation. The bottom elevations of the BHs are used to evaluate the bedrock depth and all infiltration trenches satisfy the requirement for bedrock depth.

Storage Configuration

The depths of the infiltration trenches shall be sized to ensure a 24 to 48 hours drawdown of the stored water based on the design infiltration rate. The maximum depth which permits the infiltration trenches to drain in 48 hours is determined to be 1.30 m using Equation 4.2 in the MECP's SWMPDM. The proposed infiltration trenches shall have a depth of 1.0 m, which shall have a drawdown time of 37 hours.

The infiltration trenches are configured to provide sufficient storage volume to infiltration runoff from roof areas of each building during a 40 mm rainfall event. **Table 3.2** provide the required volume calculations and **Table 3.3** presents the configuration of the infiltration trenches. Refer to Appendix A for more detailed information.

As per Figure 1a of City of Toronto's Wet Weather Flow Management Guidelines (WWFMGs), 40 mm rainfall or below accounts for almost 100% of annual precipitation. Thus, for the roof areas, 12.5% of annual precipitation shall lost through surface wetting and subsequent evaporation. The remaining 87.5% of annual precipitation shall infiltrate through the proposed underground trenches.

Table 3.2 Storage Requirements of Proposed Infiltration Trenches

Building #	Area (m^3)	Rainfall Depth (mm)	Initial Abstraction (mm)	Runoff Depth (mm)	Retention Volume (m^3)
A	1,394	40.0	1.0	39.0	54.4
B	929	40.0	1.0	39.0	36.2
C	1,386	40.0	1.0	39.0	54.1
E	464	40.0	1.0	39.0	18.1
Total	4,173				162.7

Table 3.3 Configuration of Proposed Infiltration Trenches

Building #	Infiltration Trench #	Bottom Elevation (m)	Length (m)	Width (m)	Depth (m)	Provided Volume (m^3)
A	1	253.05	27.2	5.0	1.00	54.4
B	2	250.20	28.0	5.0	0.65	36.4
C	3	249.45	27.0	5.0	1.00	54.0
E	4	250.10	9.1	5.0	1.00	18.2
Total						163.0

** A void ratio of 0.40 is used to calculate the storage volume available within infiltration trenches.*

Location of Trench

The roof leader is extended underground to the infiltration trench which shall be located at least 4 metres away from the foundation of the building to prevent excessive foundation drainage.

Perforated pipe and Overflow By-pass

The extension of the roof leader shall be perforated to allow water to fill the trench along the length of pipe. The perforated pipe shall be located near the surface of the trench.

An overflow pipe should be installed from the roof leader that discharges to a splash pad. A removable filter shall be incorporated into the roof leader below the overflow pipe. The filter shall have a screened bottom to prevent leaves and debris from entering the infiltration trench.

3.2.4 French Drains

French drains are generally proposed for the pervious area along the west property limit to enhance infiltration and groundwater recharge. Along with surface ponding, it essentially eliminates runoff from these areas during a 100-year event, and thus there is no storm connections from site sewer system to capture runoff from these areas.

Feasibility of French Drains

Feasibility of the French drains are evaluated in the same manner as the infiltration trenches, in terms of soil infiltration rate, groundwater table depth, and bedrock depth.

Storage Configuration

The french drains are configured to capture and infiltrate runoff from a 20 mm rainfall event. As per Figure 1a of City of Toronto's Wet Weather Flow Management Guidelines (WWFMGs), 20 mm rainfall or below accounts for approximately 90% of annual precipitation. Thus, for the pervious area draining to French drains, 48.0% of annual precipitation shall be captured by 5 mm initial abstraction and lost through subsequent evaporation, 42.0% of annual precipitation shall infiltrate through the proposed french drains, leaving 10% of annual precipitation runs off the site.

Table 3.4 provide the required volume calculations and **Table 3.5** presents the configuration of the proposed French drains. Refer to Appendix A for more detailed information.

Table 3.4 Storage Requirements of Proposed French Drains

French Drain #	Area (m^3)	Rainfall Depth (mm)	Initial Abstraction (mm)	Runoff Depth (mm)	Retention Volume (m^3)
1	994	20.0	5.0	15.0	14.9
2	370	20.0	5.0	15.0	5.6
3	89	20.0	5.0	15.0	1.3
4	396	20.0	5.0	15.0	5.9
5	197	20.0	5.0	15.0	3.0
Total	2,046				30.7

Table 3.5 Configuration of Proposed French Drains

French Drain #	Length (m)	Width (m)	Depth (m)	Provided Volume (m^3)
1	10.5	3.00	1.20	15.1
2	23.2	0.50	1.20	5.6
3	5.6	0.50	1.20	1.3
4	25.0	0.50	1.20	6.0
5	12.5	0.50	1.20	3.0
Total				31.0

** A void ratio of 0.40 is used to calculate the storage volume available within French drains.*

3.2.5 PERMEABLE PAVEMENT

Permeable pavement is proposed for 715 m^2 parking area adjacent Building C. It allows stormwater to drain through and into a stone reservoir where it is temporarily detained or infiltrated into the underlain soil. The proposed permeable pavement shall provide water balance, quality, and quantity benefits. The pavement bedding layer acts as pre-treatment to the stone reservoir below. Hence, permeable pavement has low potential for soil and groundwater contamination.

The stone reservoir shall have a depth of 0.30 m, filled with clear crushed 50 mm diameter stone with void space ratio of 0.40. Essentially, the stone reservoir of the permeable pavement shall provide storage up to 120 mm over its footprint and eliminate runoff falling on it. The native soil has an infiltration soil greater than 15 mm/hr. Therefore, the proposed permeable pavements are designed for full infiltration and do not require perforated pipe underdrain. Refer to landscaping drawing for the details of the permeable pavement.

3.2.6 ADS STORMTECH MC-4500 CHAMBER SYSTEM

Total 144 m^3 storage volume are available within the voids of the clear stone foundation of the ADS StormTech MC-4500 chamber system which also provides water balance benefits. Refer to Appendix E for the ADS StormTech MC-4500 chamber system.

The bottom of the chamber system is 248.23 m. The ADS StormTech MC-4500 chamber system satisfies the minimum infiltration rate, groundwater table depth, and bedrock depth, minimum setback from building as per MECP's SWMPDM.

The infiltration volume within the MC-4500 chamber system can retain runoff from an 8.7 mm storm event from its contributing area which includes all impervious areas within sub-catchment 1000 with area draining to infiltration trenches and permeable pavement being excluded.

3.2.7 Water Balance for Post-Development Conditions with Mitigation Measures

Water balance analysis for post-development conditions was carried out by defining the relationship for different type of surfaces and then weighted by the % of surface coverage to obtain the site wide water balance relationship.

The water balance relationships for drainage to the proposed LID practices (infiltration trenches, French drains, permeable pavement, and ADS MC-4500 chamber system) have been established in Section 3.2.3 ~ Section 3.2.6. The water balance relationship for impervious and pervious area without LID practices are carried out following the procedure illustrated in Section 3.2.1.

The post-development site wide water balance relationship is determined by weighting the relationship for various surface types with corresponding % of land use coverage. Under post-development conditions with mitigation measures, of the total average annual rainfall, infiltration accounts for approximately 53.3%, evapotranspiration (ET) accounts for approximately 21.9%, and there is approximately 24.8% runoff.

3.2.8 Impacts on Water Balance

A summary of the water balance analysis results, both pre-development and post-development, have been shown in **Table 3.6**. It has been demonstrated that, with the proposed LID measures, the proposed development shall enhance the groundwater recharge and satisfy the water balance design criteria.

Table 3.6 Comparison of Water Balance under Various Scenario

Hydrologic Cycle Components	Pre-Development Conditions		Post-Development Conditions without Mitigation Measures		Post-Development Conditions with Mitigation Measures	
	Annual Depth (mm)	% of Annual Precipitation	Annual Depth (mm)	% of Annual Precipitation	Annual Depth (mm)	% of Annual Precipitation
Infiltration	272.8	26.2%	64.6	6.2%	555.0	53.3%
Evapotranspiration	590.3	56.7%	237.3	22.8%	227.8	21.9%
Runoff	177.5	17.1%	738.8	71.0%	257.8	24.8%
Precipitation	1040.6	100.0%	1040.6	100.0%	1040.6	100.0%

3.3 WATER QUALITY

The site is required to provide an Enhanced Level Protection or 80% TSS removal on an annual loading basis. Quality control shall be addressed through treatment train approach with combination of CB shields, OGS unit, and Isolator Row Plus (IR+) incorporated within the ADS StormTech MC-4500 chamber system.

CB shields can achieve a 50% TSS removal and are proposed at each catch basin (CB) as pre-treatment devices. An OGS unit, Stormceptor EFO10 shall be proposed at downstream of STM MH1. The Isolator Row Plus (IR+) is certified to have an 80% TSS removal and provides further water quality enhancement.

Refer to **Appendix C** for CB Shields, **Appendix D** for OGS Sizing Report, and **Appendix E** for the ADS StormTech MC-4500 chamber system.

3.4 WATER QUANTITY

An underground storage facility – ADS StormTech MC-4500 chamber system is proposed at the north limit of the property to detain runoff from catchment 1000 to ensure that total flow rates from the site are controlled to the allowable flow rates shown in **Table 2.3**.

3.4.1 STORAGE CONFIGURATION

The ADS StormTech MC-4500 chamber system is constructed with injection molded polypropylene surrounded by clean, crushed, angular stone, all wrapped with a non-woven geotextile. The ADS StormTech MC-4500 chamber system has a total depth of 2.11 m, with a 0.23 m clear stone foundation, 1.53 m tall chambers, and a 0.35 m stone cover.

Total 1,520 m^3 storage volume are provided within StormTech MC-4500 chamber system with a footprint of 1,173 m^2. Of the total storage volume, 144 m^3 is available within the voids of the clear stone foundation below the invert of outlet pipe (248.50 m) and shall be used for infiltration and groundwater recharge, and 1,376 m^3 is above the invert of the outlet pipe and shall be used for quantity control.

The layout of the chamber system is shown on **Figure 3** and **Appendix E**.

3.4.2 OUTLET STRUCTURE DESIGN

Two orifice tubes, a 100 mm orifice tube with invert of 248.50 m and a 175 mm orifice tube with invert of 249.41 m, are proposed to control the release rate from the underground chamber system.

Table 3.7 shows the stage – storage – discharge relationship for the proposed underground chamber system. The detailed calculations are included in **Appendix A**.

Table 3.7 Stage – Storage – Discharge Relationship for Underground Chamber System

Description	Stage (m)	Storage (m^3)	Discharge (m^3/s)
Invert of Orifice #1	248.50	0	0.000
	248.56	61	0.003
	248.67	158	0.010
	248.77	255	0.013
	248.87	350	0.016
	248.97	443	0.018
	249.07	535	0.020
	249.17	625	0.022
	249.28	713	0.024
Invert of Orifice #2 *	249.38	798	0.025
	249.48	880	0.039
	249.58	958	0.053
	249.68	1,032	0.066
	249.78	1,100	0.076
	249.89	1,159	0.086
Top of Chamber	249.99	1,209	0.093
	250.09	1,256	0.100
	250.19	1,304	0.107
Top of Stone Cover	250.34	1,376	0.115

* *Invert of Orifice Tube #2 = 249.41 m.*

3.4.3 OPERATION PERFORMANCE OF UNDERGROUND CHAMBER SYSTEM

Hydrologic model was simulated for 24-hour Chicago storm and 24-hour SCS Type II storm to determine the operation performance of the underground chamber system with proposed outlet structure. The modelling results are summarized in **Table 3.8** and **Table 3.9**. Refer to **Appendix B** for Visual OTTHYMO model output.

Table 3.8 Operation Performance of Underground Chamber System (24-hour Chicago Storm)

Storm Events	Inflow Rate (m^3/s)	Outflow Rate (m^3/s)	Utilized Storage (m^3)	Water Surface Elevation (m)
2-year	0.485	0.023	673	249.23
5-year	0.650	0.038	875	249.47
10-year	0.760	0.056	978	249.61
25-year	0.899	0.079	1,117	249.81
50-year	1.003	0.096	1,228	250.03
100-year	1.116	0.110	1,335	250.25

Table 3.9 Operation Performance of Underground Chamber System (24-hour SCS Storm)

Storm Events	Inflow Rate (m^3/s)	Outflow Rate (m^3/s)	Utilized Storage (m^3)	Water Surface Elevation (m)
2-year	0.339	0.022	629	249.18
5-year	0.440	0.029	819	249.41
10-year	0.500	0.043	904	249.51
25-year	0.585	0.064	1,023	249.67
50-year	0.644	0.077	1,108	249.79
100-year	0.705	0.091	1,196	249.96

3.4.4 COMPARISON OF PRE- AND POST-DEVELOPMENT PEAK FLOW RATES

A comparison of the pre- and post-development peak flow rates from the site is presented in **Table 3.10**. It shows the quantity control target is satisfied with proposed underground chamber system. Refer to **Appendix B** for detailed hydrologic modelling output.

Table 3.10 Comparison of Pre- and Post-Development Peak Flow Rates

Return Periods (Years)	Pre-Development Peak Flow Rates (m^3/s)		Post-Development Peak Flow Rates (m^3/s)	
	24-hour Chicago Storm	24-hour SCS Type II Storm	24-hour Chicago Storm	24-hour SCS Type II Storm
2	0.027	0.030	0.024	0.023
5	0.047	0.050	0.039	0.030
10	0.063	0.063	0.058	0.044
25	0.086	0.084	0.081	0.066
50	0.106	0.100	0.099	0.079
100	0.126	0.118	0.114	0.093

4 INSPECTION AND MAINTENANCE OF SWM FACILITIES

Monitoring SWM facilities are performed to determine if the facilities function as designed, and to determine what are required in terms of the maintenance. In order to ensure the SWM facilities continue to provide long-term quality, erosion, and flood control benefits, maintenance on a regular basis should be scheduled and implemented.

These section documents general inspection and maintenance requirements for the SWM facilities proposed for the subject development.

4.1 INFILTRATION TRENCHES

The proposed infiltration trenches accept only roof drainage, the potential for clogging is low as is the risk of groundwater quality degradation. However, inspection shall be carried out annually or after a heavy rainfall storm to ensure that the trenches operate as designed or determine maintenance requirement.

Frequent overflows to the surface during small storm events will indicate that roof leader filter has clogged or the infiltration trench storage media has become clogged. The filter should be checked for an accumulation of leaves and trigs. If the filter is clean, the infiltration trench need to be reconstructed to restore its performance.

4.2 FRENCH DRAINS

The french drains receive relatively clean water and require minimal maintenance. Trash removal shall be performed in the spring and then on an as-required basis based on any observations of trash build-up during the regular inspections.

4.3 PERMEABLE PAVEMENT

Annual inspections of permeable pavement should be conducted in the spring to ensure continued infiltration performance. Inspections should also be carried out after a heavy rainfall storm. These inspections should check for spilling or deterioration and whether water is draining between storms. The pavement reservoir should drain completely within 72 hours of the end of the storm event.

The surface of the permeable pavement functions as pre-treatment and should be maintained on a regular basis. The following maintenance procedures and preventative measures should be incorporated into the maintenance plan.

- Surface sweeping should occur once or twice a year with a commercial vacuum sweeping unit. Permeable pavement should not be washed with high pressure water systems or compressed air units.
- Impervious areas contributing to the permeable pavement should be regularly swept and kept clear of litter and debris.
- Trucks and other heavy vehicles can ground dirt into the porous surface and lead to clogging. Therefore, these vehicles should be prevented from tracking or spilling dirt onto the pavement.
- An uneven paver surface can be repaired by pulling up the pavers, redistributing the bedding layer, and then placing the pavers back. New filler stone will need to be swept into the replaced pavers.
- Sand should not be spread on permeable pavement as it can quickly lead to clogging. De-icers should only be used in moderation and only when needed because dissolved constituents are not removed by the pavement system.

- Groundwater contamination from chlorides is a concern for the subject site. Therefore, plowed snow piles and snow melt should not be directed to permeable paver.

4.4 ADS STORMTECH MC-4500 CHAMBER SYSTEM

The frequency of inspection and maintenance of the underground chamber system varies by location. A routine inspection schedule needs to be established for each individual location based upon site specific variables. The type of land use (i.e., industrial, commercial, residential), anticipated pollutant load, percent imperviousness, climate, etc. all play a critical role in determining the actual frequency of inspection and maintenance practices. Due to the existence of the pretreatment devices (CB Shields and OGS unit), it is expected that the ADS StormTech MC-4500 chamber system require less maintenance.

At a minimum, StormTech recommends annual inspections. Initially, the Isolator Row should be inspected every 6 months for the first year of operation. For subsequent years, the inspection should be adjusted based upon previous observation of sediment deposition.

The Isolator Row incorporates a combination of standard manhole(s) and strategically located inspection ports (as needed). The inspection ports allow for easy access to the system from the surface, eliminating the need to perform a confined space entry for inspection purposes.

If upon visual inspection it is found that sediment has accumulated, a stadia rod should be inserted to determine the depth of sediment. When the average depth of sediment exceeds 3 inches throughout the length of the Isolator Row, clean-out should be performed.

The Isolator Row was designed to reduce the cost of periodic maintenance. By “isolating” sediments to just one row, costs are dramatically reduced by eliminating the need to clean out each row of the entire storage bed. If inspection indicates the potential need for maintenance, access is provided via a manhole(s) located on the end(s) of the row for cleanout.

Maintenance is accomplished with the JetVac process. The JetVac process utilizes a high-pressure water nozzle to propel itself down the Isolator Row while scouring and suspending sediments. As the nozzle is retrieved, the captured pollutants are flushed back into the manhole for vacuuming.

Most sewer and pipe maintenance companies have vacuum/JetVac combination vehicles. Selection of an appropriate JetVac nozzle will improve maintenance efficiency. Fixed nozzles designed for culverts or large diameter pipe cleaning is preferable. Rear facing jets with an effective spread of at least 45” are best. Most JetVac reels have 400 feet of hose allowing maintenance of an Isolator Row up to 50 chambers long. The JetVac process shall only be performed on StormTech Isolator Rows that have AASHTO class 1 woven geotextile (as specified by StormTech) over their angular base stone.

Step by Step Maintenance Procedures for Isolator Rows are as follows:

STEP 1) Inspect Isolator Row for sediment.

A) Inspection ports (if present)

A1). Remove lid from floor box frame.

A2). Remove cap from inspection riser.

A3). Using a flashlight and stadia rod, measure depth of sediment and record results on maintenance log.

A4). If sediment is at or above 3-inch depth, proceed to Step 2. If not, proceed to Step 3.

B) All Isolator Rows

B1). Remove cover from manhole at upstream end of Isolator Row.

B2). Using a flashlight, inspect down Isolator Row through outlet pipe.

Mirrors on poles or cameras may be used to avoid a confined space entry.

Follow OSHA regulations for confined space entry if entering manhole.

If sediment is at or above the lower row of sidewall holes (approximately 3 inches), proceed to Step 2. If not, proceed to Step 3.

STEP 2) Clean out Isolator Row using the JetVac process.

A) A fixed floor cleaning nozzle with rear facing nozzle spread of 45 inches or more is preferable

B) Apply multiple passes of JetVac until backflush water is clean

C) Vacuum manhole sump as required

STEP 3) Replace all caps, lids and covers. Record observations and actions.

STEP 4) Inspect & clean catch basins and manholes upstream of the StormTech chamber system.

Refer to Appendix E for more information.

5 EROSION AND SEDIMENT CONTROL DURING CONSTRUCTION PERIOD

During construction, there is potential for short-term sediment wash-off from the site. To protect the downstream receiving sewer system and other natural features, on-site sediment control measures are necessary during construction.

As sediment and erosion control strategies focus on minimizing adverse environmental impacts by restricting the mobilization and transport of sediment, the following general practices will be observed:

- ◊ Sediment and erosion control works, as shown on the project's erosion and sedimentation control plans which will be provided during the detailed design stage, must be in place prior to the commencement of construction, and not removed until the end of the construction period, when the site has been stabilized.
- ◊ Construction phasing must be scheduled to minimize the extent and period to which disturbed soils are exposed to weathering. As such, all disturbed areas must be stabilized as quickly as possible. Stabilization of disturbed areas may be accomplished by sodding, seeding, mulching, hydro-seeding, planting, or covering of constructed slopes with appropriate material such as geotextile or jute mesh.
- ◊ Access to the construction site must be minimized.
- ◊ A continuous siltation fence must be constructed along the perimeter of the proposed development. The silt fence must be in place prior to the commencement of construction and must be removed at the end of the construction period.

6 CONCLUSIONS

A stormwater management plan has been prepared/updated in support of the Site Plan Revision Application for the proposed development at 710 Balm Beach Road, 1277 Sundowner Road, and 1337 Sundowner Road in the Town of Midland, ON.

The key components of the SWM plan are summarized below.

- **Water Balance**

  Water balance issues will be addressed through LID measures such as infiltration trenches, french drains, permeable pavement and void storage volume within clear stone foundation the ADS StormTech MC-4500 chamber system, to enhance infiltration and groundwater recharge.

- **Water Quality**

  Treatment Train Approach consisting of CB Shields and Stormceptor Unit (EFO10) is incorporated into the site plan to achieve Enhance Level of Protection or 80% TSS removal. The Isolator Row Plus (IR+) within the ADS StormTech MC-4500 chamber system shall provide further water quality enhancement.

- **Water Quantity**

  An underground storage facility – ADS StormTech MC-4500 chamber system, is proposed to detain stormwater runoff and outlet structures are designed to control the post-development peak flow rates from the site to pre-development levels for 2-year up to 100-year storm events.

The proposed SWM strategy described in this report addresses all stormwater management related impacts from the project and satisfies the intent of Town of Midland's Engineering Development Design Standards.

Respectively Submitted

WSP

APPENDIX

A STORMWATER MANAGEMENT CALCULATIONS

1.1 Background Information

1. Engineering Development Design Standards, Town of Midland, Revised December 2012
2. Stormwater Management Plannning and Design Manual (MOECP, 2003).

1.2 Stormwater Management Design Criteria

1. Provide an Enhanced evel (80% TSS Removal) of Stormwater Quality Control per MOECP guidelines.
2. Retain stormwater on-site, to the extent practicalbe, to match pre-development conditions.
3. Control the post-development runoff to pre-development levels for 2-year up to 100-year events.

1.3 Design Rainfall Event

Source: Section 5.2.5 of Town of Midland's Engineering Development Design Standards, 2012

Return Period (Years)	A	B	C	24 hour Rainfall Amount (mm)
2	807.44	6.75	0.828	46.8
5	1135.40	7.50	0.841	59.9
10	1387.00	7.97	0.852	67.5
25	1676.20	8.30	0.858	78.1
50	1973.10	9.00	0.868	85.4
100	2193.10	9.04	0.871	92.9

2.0 Pre-Development Drainage

2.1 Drainage Parameters

Catchment ID	Area (ha)	TIMP (%)	CN	IA (mm)	Tp (hrs)	Commend
100	3.094	1.4	48	5.0	0.30	NASHYD

2.1.1 Time of Peak (tp) Estimation

Time of concentration (tc) was calculated using Upland Method, then time to peak (tp) was determined using Equation tp=2/3*Tc. With Upland Method, the average overland flow velocity is determined for a catchment based on the catchment slope and ground type. Once the velocity has been determined, then the time of concentration is determined by dividing the catchment length by the overland flow velocity.

The velocity can be either read from a figure for Velocity vs. Slope or calculated from the following equation:

$$V = K\sqrt{S}$$

Where, V is average velocity;
S is slope in percentage (%); and
K (m/s) is an intercept Coefficient as shown in following table.

Flow Type	K
Overland Flow: Forest with Heavy Litter; Hay Meadow	0.80
Overland Flow: Woodland; Fallow or Minimum Tillage Cultivation, Contour or Strip Crop	1.50
Overland Flow: Pasture	2.10
Overland Flow: Cultivated Straight Row	2.70
Overland Flow: Nearly Bare Soil, Untilled	3.10
Grassed Waterway	4.60

Catchment	Flow Pattern & Ground Cover	L (m)	El (m)	E2 (m)	Sw	K	V (m/s)	Tc (min)	Tp hr)
100	Overland, Pasture	370	257.1	248.9	2.2%	1.5	0.22	27.4	0.30

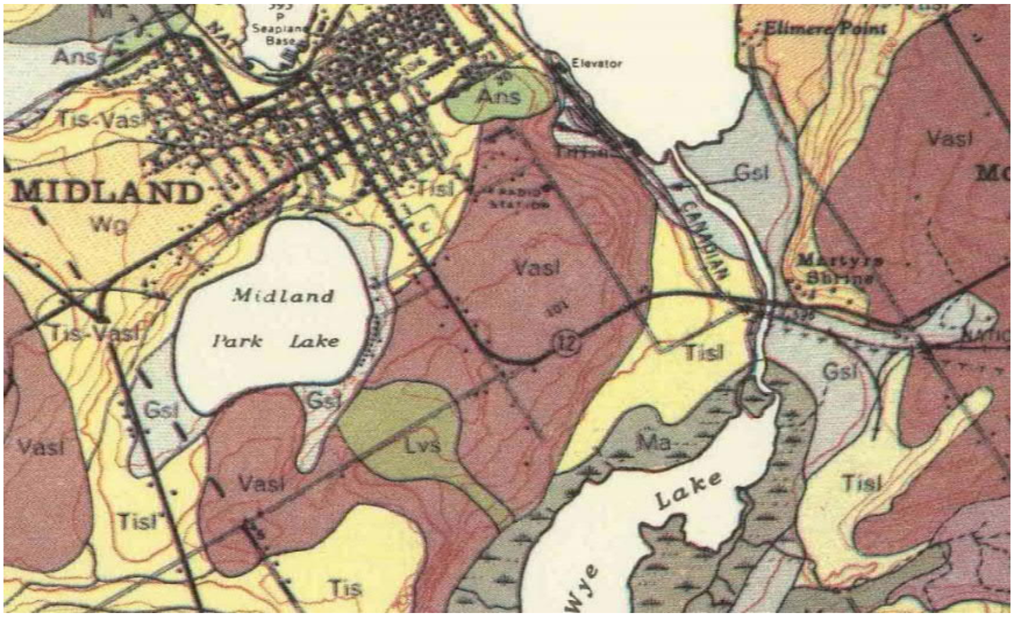
2.1.2 Modified Curve Number (Paul Wisner & Associates, 1982)

Site Location: Midland, ON
Subwatershed: Little Lake (North), Wye Marsh (South)
Soil Map and Report: Soil Survey Report #29 - Soil Map of Simcoe County (National Soil DataBase, NSDB)

Soil Symbol	Soil Series	Soil Type	Landuse or Cover	Hydrologic Conditions	HSG	CN
Tisl	Tioga	Loamy Sand	Woods	Pool	A	45
Vasl	Vasey	Sandy Loam	Woods	Pool	AB	56
						50

Step	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Parameter	IA* (mm)	CN (II)	CN (III)	P (mm)	S (mm)	IA (mm)	Q (mm)	S* (mm)	CN* (III)	CN* (II)
100	5	50	69.9	92.9	109.3	8.2	37.0	121.1	68	48

* Parameters with * will be parameters used in Modified Curve Number Method and model simulations.



(1). Select an appropriate IA for catchments being modelled (1.0 ~5.0 mm). Here IA=5 mm.

(2). Determine the SCS CN (AMC II Conditions) value from soils maps and/or calculations.

(3). Convert the CN (AMC II Conditions) to a CN (AMC III Conditions).

CN (II)	Factor (II >>> III)	CN (III)
40	1.50	60.0
50	1.40	70.0
60	1.30	78.0
70	1.21	84.7

(4). Determine the largest precipitation volume, P, for a rainfall event that would represent AMC III soil moisture conditions, say 100 year event.

(5). Calculate the soil storage S, based on the SCS Method using CN (III). S=25400/CN-255

(6). Calculate the IA based on the SCS method, where IA=0.2S.

(7). Determine the runoff volume, Q, based on the familiar: $Q=(P-IA)^2/(P-IA+S)$.

(8). Calculate S* using the above equation with IA* = 5 mm. $S=(P-IA^*)^2/Q-P+IA^*$.

(9). Calculate CN* (III) using CN*=25400/(S*+254).

(10). Convert CN* for AMC II conditions from AMC III conditions.

2.2 Pre-Development Peak Flow Rates

Rainfall Event (Years)	Pre-Development Peak Flow Rate (m^3/s)		Allowable Peak Flow Rates (m^3/s)
	24 hr Chicago	24 hr SCS	
2	0.027	0.030	0.027
5	0.047	0.050	0.047
10	0.063	0.063	0.063
25	0.086	0.084	0.084
50	0.106	0.100	0.100
100	0.126	0.118	0.118

3.0 Post-Development Drainage

3.1 Proposed Development & Stormwater Management Strategies

Runoff from majority of the site (catchment 1000) shall be conveyed to an underground chamber system for quantity control. Quality control shall be addressed through treatment train approach with combination of CB Shields, an OGS unit, and Isolator Row Plus (IR+) incorporated in the underground chamber system.

Runoff from catchment 1100 shall leave the site without quantity control.

3.2 Post-Development Area Breakdown and Hydrologic Modelling Parameters

3.2.1 Area Breakdown

Catchment	Land Use	Area (ha)	RC	IMP (%)
1000 Drainage Area to Proposed Dry Pond	Impervious Area	2.358	0.90	78.6
	Pervious Areas	0.641	0.25	
	Total	2.998	0.76	
1100 Uncontrolled Areas	Impervious Area	0.025	0.90	26.3
	Pervious Areas	0.070	0.25	
	Total	0.095	0.42	
Total		3.094		77.0

3.2.2 Drainage Parameters

The modelling parameters are presented in the following table

Catchment ID	Area (ha)	IMP (%)	CN	IA (mm)	Commend
1000	2.998	78.6	48	5.0	StandHyd
1100	0.095	26.3	48	5.0	StandHyd
Total	3.094	77.0			

3.3 Water Balance

The proposed development should demonstrate that infiltration amount under pre-development conditions be maintained. Low Impact Development (LID) measures such as French Drains, Permeable Pavement, and Underground Trenches are proposed to address water balance.

3.3.1 Climate Water Budget

Data Source: Environment and Climate Change Canada
Climate Station: Midland Water Pollution Control Plant
ID: 6115217 Elevation: 180.0 m
Latitude: 44º45'28" N Longitude: 79º52'31" W
Data: Climate Normal (1981 ~ 2010)

http://climate.weather.gc.ca/climate_normals/results_1981_2010_e.html?searchType=stnProv&lstProvince=ON&txtCentralLatMin=0&txtCentralLatSec=0&txtCentralLongMin=0&txtCentralLongSec=0&stnID=4474&dispBack=0

Month	Mean Temp. (ºC)	Heat Index	Potential ET (mm)	Daily Bright Sunshine* (hrs)	Days in Month (days)	Daylight Correction Value	Adjust Potential ET (mm)	Total Prec. (mm)	Surplus (mm)	Deficit (mm)
Jan	-8.5	0.0	0.00	8.9	31.0	0.77	0.0	109.8	109.8	0.0
Feb	-6.4	0.0	0.00	10.1	28.0	0.79	0.0	69.9	69.9	0.0
Mar	-1.9	0.0	0.00	10.7	31.0	0.92	0.0	65.7	65.7	0.0
Apr	5.8	1.3	25.83	13.5	30.0	1.13	29.1	65.1	36.0	0.0
May	12.2	3.8	58.52	14.3	31.0	1.23	72.1	92.8	20.7	0.0
Jun	18.1	7.0	90.31	15.0	30.0	1.25	112.9	89.5	0.0	23.4
Jul	20.8	8.6	105.24	14.9	31.0	1.28	135.0	72.7	0.0	62.3
Aug	19.9	8.1	100.24	14.3	30.0	1.19	119.5	77.9	0.0	41.6
Sep	15.9	5.7	78.32	11.7	31.0	1.01	78.9	99.1	20.2	0.0
Oct	9.3	2.6	43.42	10.6	30.0	0.88	38.4	90.1	51.7	0.0
Nov	3.2	0.5	13.43	9.5	31.0	0.82	11.0	103.6	92.6	0.0
Dec	-3.1	0.0	0.00	9.0	30.0	0.75	0.0	104.4	104.4	0.0
Total		37.5					596.7	1040.6	571.1	127.3

* From nearby station (Albion Field Centre) with available data.

Annual Water Surplus = 443.9 mm

Relevant Equations

$$E = 16C\left(10\frac{T_{mi}}{I}\right)^{a}$$

https://en.wikipedia.org/wiki/Potential_evaporation

Where, E = Potential Evapotranspiration (mm)

C = Daylight Coefficient

$$C = \left(\frac{H}{12}\right)\left(\frac{D}{30}\right)$$

H = Average Daily Length (Hours) of the Month being Calculated.

D = Number of Days in the Month being Calculated.

T_{mi} = Average Monthly Temperature (ºC)

a = an exponent derived from Heat Index (I) 1.09

$$a = 67.5\times10^{-8}I^{3} - 77.1\times10^{-6}I^{2} + 0.0179I + 0.492$$

I = Heat Index

$$I = \sum_{i=1}^{12}\left(\frac{T_{mi}}{5}\right)^{1.51}$$

for $T_{mi} > 0$

3.3.2 Pre-Development Site Wide Water Balance Analysis

Pre-development conditions water balance is analyzed to determin the infiltration amount.

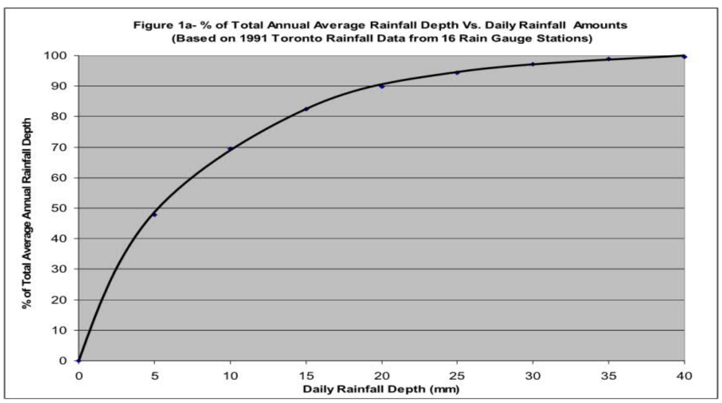
It is assumed that the impervious area will accept 1 mm rainfall prior to runoff generation due to the shallow depressions.

Water balance for pervious area shall follow the example given in Table 3.1 in 2003 MOECP SWMPDM.

3.3.2.1 Water Balance Relationship for the Impervious Area

Impervious Area= 0.043 ha

	(%)	(mm)	Comments/Assumptions:
Infiltration	0.0	0.0	...
Evapotranspiration	12.5	130.1	1 mm depression, refer to Figure 1a in City of Toronto WWFMGs.
Runoff	87.5	910.5	...
Precipitation	100.0	1,040.6	



3.3.2.2 Water Balance Relationship for the Pervious Area

Under pre-development conditions, 3.051 ha of the site is pervious area with urban lawn and sparse trees and shrubs.

The soil beneath the top soil is Sandy Loam (HSG "B")

Pervious Area= 3.051 ha

Section 3.2.3 of Stormwater Management Planning & Design Manual (SWMPDM, MOECP, 2003) gives a water balance example, which is for a basin in Southern Ontario with a latitude of 45° .

Average Annual Precipitation	1040.6	mm, or	31749	m^3
Annual Evapotranspiration	596.7	mm, or	18206	m^3
Available Water Surplus (or excess of precipitation over evapotranspiration)				
	443.9	mm, or	13542	m^3

Then, infiltration factors are used to determine the fraction of water surplus that infiltrates into the ground and the fraction that runs off the site. Infiltration factor is determined by summing a factor for topography, soil, and cover.

Table 3.1: Hydrologic Cycle Component Values

**This is the total infiltration of which some discharges back to the stream as base flow. The infiltration factor is determined by summing a factor for topography, soils and cover.*

Topography	Flat Land, average slope < 0.6 m/km	0.3
	Rolling Land, average slope 2.8 m to 3.8 m/km	0.2
	Hilly Land, average slope 28 m to 47 m/km	0.1
Soils	Tight impervious clay	0.1
	Medium combinations of clay and loam	0.2
	Open Sandy loam	0.4
Cover	Cultivated Land	0.1
	Woodland	0.2

SWM Planning & Design Manual - 3-4 - *Environmental Design Criteria*

Topography Factor	0.12				
High Point Elevation	257.14	m			
Low Point Elevation	248.85	m			
Length of Flow Path	369.50	m			
Slope	2.24%	or	22.4	m/km	
Soil Factor	0.40	for Sandy Loam			
Cover	0.10	for cultivated lands			

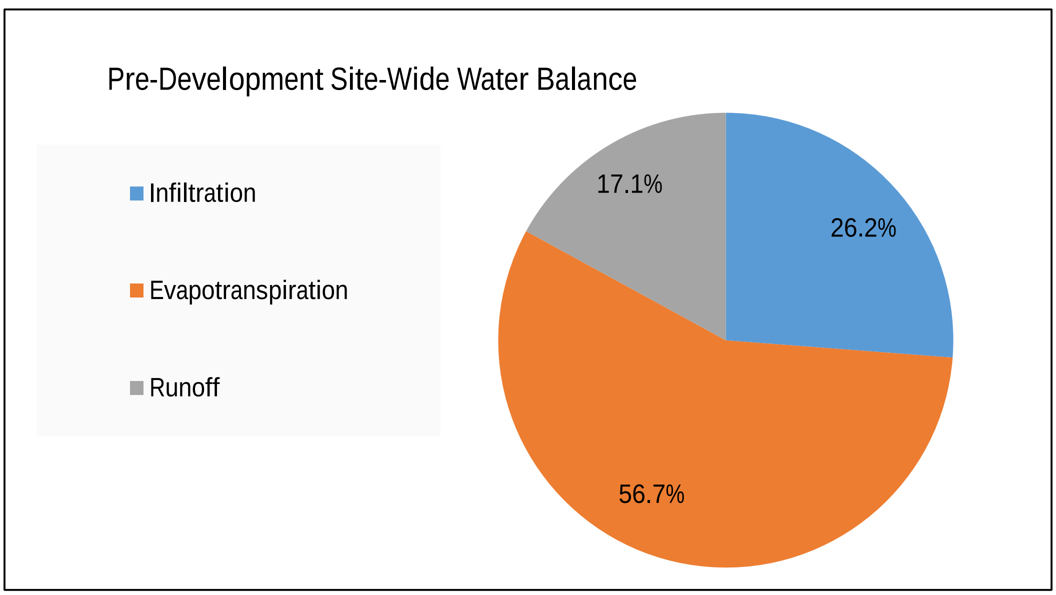
Therefore, the infiltration factor is 0.62

The annual infiltration amount is 276.6 mm, or 8439 m^3
and the annual runoff amount is 167.3 mm, or 5104 m^3

	(%)	(mm)	Comments/Assumptions:
Infiltration	26.6	276.6	...
Evapotranspiration	57.3	596.7	...
Runoff	16.1	167.3	...
Precipitation	100.0	1,040.6	

3.3.2.3 Pre-development Site Wide Water Balance Relationship

	Impervious Area	Pervious Area	Site-Wide	
% Land-Use Coverage	1.4%	98.6%	100.0%	
Infiltration	0.0	276.6	272.8	26.2%
Evapotranspiration	130.1	596.7	590.3	56.7%
Runoff	910.5	167.3	177.5	17.1%
Precipitation	1040.6	1040.6	1,040.6	100.0%



3.3.3 Post-development Site Wide Water Balance Analysis _ without Mitigation Measures

Water balance analysis for post-development conditions without mitigation measures is carried out to evaluate the impacts due to the proposed development. It follows the procedure illustrated in the pre-development water balance analysis.

3.3.3.1 Water Balance Relationship for the Impervious Area

2.383 ha or 77.0%

	(%)	(mm)	Comments/Assumptions:
Infiltration	0.0	0.0	...
Evapotranspiration	12.5	130.1	1 mm depression, refer to Figure 1a in City of Toronto WWFMGs.
Runoff	87.5	910.5	...
Precipitation	100.0	1040.6	

3.3.3.2 Water Balance Relationship for the Pervious Area

Under proposed conditions, 0.711 ha of the site is pervious area with Urban Lawn.
The soil beneath the top soil is Sandy Loam (HSG "B")

0.711 ha or 23.0%

Average Annual Precipitation	1040.6	mm, or	7396	m^3
Annual Evapotranspiration	596.7	mm, or	4241	m^3

Available Water Surplus (or excess of precipitation over evapotranspiration)

443.9 mm, or 3155 m^3

Then, infiltration factors are used to determine the fraction of water surplus that infiltrates into the ground and the fraction that runs off the site. Infiltration Factor is determined by summing a factor for topography, soil, and cover.

Topography Factor	0.13		
Slope	2.0%	or 20.0	m/km
Soil Factor	0.40	for Sandy Loam	
Cover	0.10	for cultivated land (urban lawn)	
Therefore, the infiltration factor is	0.63		

Therefore, the annual infiltration amount is	281.0	mm, or	1997	m^3
and the annual runoff amount is	162.9	mm, or	1158	m^3

	(%)	(mm)	Comments/Assumptions:
Infiltration	27.0	281.0	...
Evapotranspiration	57.3	596.7	...
Runoff	15.7	162.9	...
Precipitation	100.0	1,040.6	

3.3.3.3 Site Wide Water Balance Relationship _ Post-development without Mitigation Measures

	Impervious Area	Pervious Area	Site-Wide	
% Land-Use Coverage	77.0%	23.0%	100.0%	
Infiltration	0.0	281.0	64.6	6.2%
Evapotranspiration	130.1	596.7	237.3	22.8%
Runoff	910.5	162.9	738.8	71.0%
Precipitation	1040.6	1040.6	1,040.6	100.0%

3.3.4 Post-development Site Wide Water Balance Analysis _ with Mitigation Measures

Under proposed development conditions, 2.383 ha out of 3.094 ha would be impervious area or the imperviousness increased from 1.4% to 77.0%

Therefore, LID measures shall be incorporated into the site plan to enhance groundwater recharge.

3.3.4.1 Water Balance Strategies

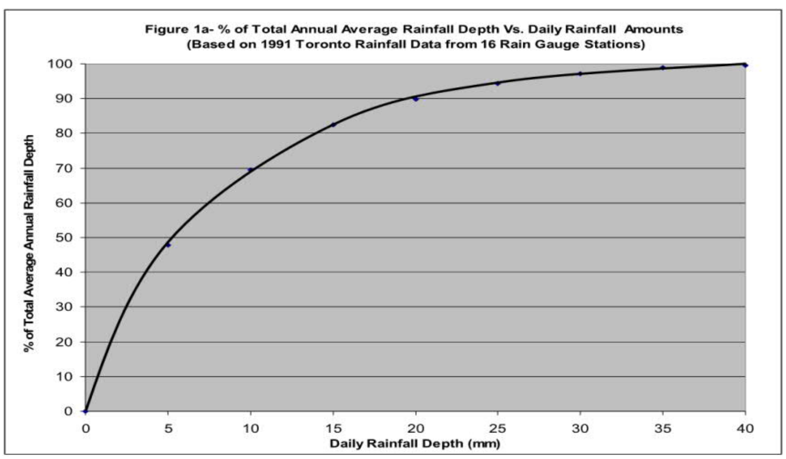
LID measures proposed for the subject development include:

1) Runoff from the building ("A", "B", "C" & "E") shall be directed to underground trench for infiltration. The roof runoff is considered clean and no pre-treatment measures are required.
2) French Drains are generally proposed for the pervious area along the west property limit to enhance infiltration and groundwater recharge.
3) Permeable pavement is proposed for the parking area adjacent Building C
4) The void storage available within the clear stone foundation of the ADS StormTech MC-4500 chamber system is used to temporarily store the surface runoff from contributing area for infiltration.

The following assumptions are applied in the analysis.

1) All pervious area will have an initial abstraction of 5 mm.
2) All impervious area shall accept 1 mm rainfall prior to runoff generation due to shallow depressions.
3) Water balance analysis for pervious areas without LID measures shall follow the method used in the analysis for pre-development pervious area.

Figure 1a in City of Toronto WWFMGs presents the relationship of the % of the total annual rainfall depth vs. the daily rainfall amounts. This relationship will be used to conduct the water balance analysis for the subject site from an annual basis.



3.3.4.2 Feasibility and Configuration of Infiltration Trench

Geo-technical Investigation Report prepared by PML (November 2018) shall be used to evaluate the feasibility of the Infiltration Trench in terms of infiltration rate of native soil, water table depth, bedrock depth, etc.

1) Percolation Rate of Native Soil

The site subsurface profile comprised surficial topsoil or fill, overlying native deposits of silt, sand, sandy silt, and silty sand. In-situ tests in five test pits gives an infiltration rate ranging from 69 mm/hr to 96 mm/hr, which is greater than 15 mm/hr and suitable for infiltration trenches

The underlain soil within the site is generally uniform and a safety factor of 2.5 is applied to calculate the design infiltration rate as per Table C2 in Appendix C of CVC's Low Impact Development SWMPDG.

Building #	Trench #	TP #	P_{Test} (mm/hr)	Fsafety	P_{Design} (mm/hr)
A	1	5	69	2.5	28
B	2	4	75	2.5	30
C	3	4	75	2.5	30
E	4	2	78	2.5	31

2) Groundwater Table Depth

The bottom of the infiltration trench is set approximately 2.0 m from the proposed ground elevation.

The depth from bottom of Infiltration Trench to the seasonal high groundwater table is calculated as follows.

Building #	Trench #	Bottom (m)	BH #	GW Table* (m)	GW Depth (m)	Bedrock Depth (m)
A	1	253.05	13	250.90	2.15	2.15
B	2	250.20	9	249.20	1.00	1.00
C	3	249.45	7, 9	247.15	2.30	2.30
E	4	250.10	5	248.30	1.80	1.80

* The groundwater was not observed upon completion of all boreholes during the investigation. Therefore, it is conservative to use the bottom of the BHs to evaluate the groundwater table depth.

3) Bedrock Depth

Bedrock was not encountered in the geotechnical investigation. Therefore, it is conservative to use the bottom of the BHs to evaluate the bedrock depth. Thus, the calculated bedrock depth is same as the groundwater table depth as shown in above table.

4) Maximum Allowable Storage Depth

Equation 4.2 in 2003 MOECP's SWMPDM is used to calculate the allowable depth of the Infiltration Trench.

$$d = \frac{PT}{1000}$$

Equation 4.2 in 2003 MOECP SWMPDM

Where, d = Maximum Allowable Depth of Infiltration Storage of the Trench 1.30 m

P = Percolation Rate 27.0 mm/hr

T = Drawdown Time 48.0 hours

or	for the depth of the proposed infiltration trenches	1.0	m
	the drawdown time shall be	37.0	hrs

5) Configuration of Infiltration Trench

The Infiltration Trench, along with initial abstraction, would retain runoff from a storm event with daily volume of 40 mm.This is equivalent to 100% of annual precipitation falling on roof areas.

100.0 % of annual precipitation

Building #	Area (m^2)	Rainfall Depth (mm)	Initial Abstraction (mm)	Runoff Depth (mm)	Retention Volume (m^3)
A	1,394	40.0	1.0	39.0	54.4
B	929	40.0	1.0	39.0	36.2
C	1,386	40.0	1.0	39.0	54.1
E	464	40.0	1.0	39.0	18.1
Total	4,173	40.0	1.0	39.0	162.7

Detailed configurations of infiltration trenches are as follows.

Building #	Trench #	Bottom (m)	Length (m)	Width (m)	Depth (m)	Infiltration Volume (m^3)
A	1	253.05	27.2	5.0	1.00	54.4
B	2	250.20	28.0	5.0	0.65	36.4
C	3	249.45	27.0	5.0	1.00	54.0
E	4	250.10	9.1	5.0	1.00	18.2
Total						163.0

3.3.4.3 Feasibility and Configuration of French Drain

1) Percolation Rate of Native Soil

As shown above Section 3.3.4.2, the site soil has an infiltration rate greater than 15 mm/hr and suitable for French Drains.

2) Groundwater Table Depth and 3) Bedrock Depth

The bottom of the french drain is set approximately 1.2 m from the proposed ground elevation.

The groundwater and beck rock were not encountered upon completion of all boreholes during the investigation. Thus, it is conservative to use the bottom of the BHs to evaluate the groundwater table depth and bedrock depth. The groundwater table depth and bedrock depth are calculated as follows.

French Drain #	Top (m)	Bottom (m)	BH #	GW Table* (m)	GW Depth (m)	Bedrock Depth (m)
1	255.50	254.30	13	250.90	3.40	3.40
2	255.40	254.20	11	251.10	3.10	3.10
3	253.40	252.20	6	249.80	2.40	2.40
4	252.00	250.80	5	248.30	2.50	2.50
5	250.60	249.40	2	245.70	3.70	3.70

3) Drawdown time

P = Percolation Rate	27.0	mm/hr
d = Depth of the proposed french drains	1.20	m
T = Drawdown Time	44.4	hrs

4) Drainage to French Drain and Required Volume

The proposed french drains, along with initial abstraction of the surface, would retain runoff from a storm event with daily volume of 20 mm.This is equivalent to 90% of annual precipitation falling on contributing area.

90.0 % of annual precipitation

FD #	Area (m^2)	Rainfall Depth (mm)	Initial Abstraction (mm)	Runoff Depth (mm)	Required Volume (m^3)
1	994	20.0	5.0	15.0	14.9
2	370	20.0	5.0	15.0	5.6
3	89	20.0	5.0	15.0	1.3
4	396	20.0	5.0	15.0	5.9
5	197	20.0	5.0	15.0	3.0
Total	2,046				30.7

5) Configuration of French Drain

FD #	Length (m)	Width (m)	Depth (m)	Provided Volume (m^3)
1	10.5	3.0	1.20	15.1
2	23.2	0.5	1.20	5.6
3	5.6	0.5	1.20	1.3
4	25.0	0.5	1.20	6.0
5	12.5	0.5	1.20	3.0
Total				31.0

The proposed french drains, along with surface ponding, could eliminate runoff up to 100-year event.

3.3.4.4 Feasibility and Configuration of Permeable Pavement

1) Percolation Rate of Native Soil

As shown above Section 3.3.4.2, the site soil has an infiltration rate greater than 15 mm/hr and suitable for Permeable Pavement

2) Groundwater Table Depth and 3) Bedrock Depth

The bottom of the stone reservoir of the permeable pavement is set approximately 0.5 m from the proposed ground elevation. The groundwater table depth and bedrock depth are calculated as follows.

Permeable Pavement	Top (m)	Bottom (m)	BH #	GW Table* (m)	GW Depth (m)	Bedrock Depth (m)
1	249.50	249.00	8	247.30	1.70	1.70
2	249.83	249.33	7, 9	247.15	2.18	2.18

3) Drawdown time

P = Percolation Rate	27.0	mm/hr
d = Depth of the proposed permeable pavement	0.30	m
T = Drawdown Time	11.1	hrs

4) Configuration of Permeable Pavement

Footprint of Permeable Pavement	715	m^2
Depth of clear stone layer	0.30	m
Void Ratio of Clear Stone	40%	
Provided Storage	85.8	m^3
Equivalent Rainfall Depth	120	mm
	100.0	% of annual precipitation

3.3.4.5 Feasibility and Configuration of Underground Chamber System

1) Percolation Rate of Native Soil

As shown above Section 3.3.4.2, the site soil has an infiltration rate greater than 15 mm/hr and suitable for infiltration volume available within the clear stone foundation of the ADS MC-4500 Chamber System.

2) Groundwater Table Depth and 3) Bedrock Depth

The bottom of the stone foundation of the ADS MC-4500 chamber system is set approximately 2.5 ~ 3.0 m from the proposed ground elevation. The groundwater table depth and bedrock depth are calculated as follows.

UG Chamber	Bottom (m)	BH #	GW Table* (m)	GW Depth (m)	Bedrock Depth (m)
MC-4500	248.23	1	244.60	3.63	3.63

3) Drawdown time

P = Percolation Rate	27.0	mm/hr
d = Depth of Infiltration Storage	0.27	m
T = Drawdown Time	10.0	hrs

4) Storage below Outlet Pipe

Footprint of ADS MC-4500 chamber system	1,173	m^2
Invert of Outlet Pipe	248.50	m
Provided Storage	144.0	m^3

Contributing Drainage Area (Total Impervious Area within Catchment 1000 minus Impervious Area to Infiltration Trenches and Permeable Pavement.

18,690 m^2

Area (m^2)	Rainfall Depth (mm)	Initial Abstraction (mm)	Runoff Depth (mm)	Retention Volume (m^3)
18,690	8.7	1.0	7.7	144.0

Rainfall Depth of 8.7 mm is equivalent to 65.5 % of annual precipitation

3.3.4.6 Proposed Site Plan _ Area Breakdown for Water Balance Analysis

Building Roof to Infiltration Trench	4,173	m^2
Surface Area to French Drain	2,046	m^2
Surface Area to Permeable Pavement	715	m^2
Impervious Area to UG Chamber	18,690	
Impervious Area without LID	250	m^2
Pervious Area without LID	5,061	m^2
Total Site Area	30,935	m^2

3.3.4.7 Define Individual Water Balance Relationships for Each Surface Type:

Average Annual Precipitation 1040.6 mm

1) Impervious Roof to Infiltration Trench

Refer to Section 3.3.4.2 above for configuration of Infiltration Trench.

The provided Infiltration Storage 163.0 m^3

The Infiltration Trench, along with initial abstraction, would retain runoff from a storm event with daily volume of 40 mm.This is equivalent to 100% of annual precipitation falling on roof areas.

		100.0	% of annual precipitation
	(%)	(mm)	Comments/Assumptions:
Infiltration	87.5	910.5	...
Evapotranspiration	12.5	130.1	1 mm depression
Runoff	0.0	0.0	...
Precipitation	100.0	1040.6	

2) Surface Area to French Drain (FR)

Refer to Section 3.3.4.3 above for configuration of French Drains.

The provided Infiltration Storage 31.0 m^3

The proposed french drains, along with initial abstraction of the surface, would retain runoff from a storm event with daily volume of 20 mm.This is equivalent to 90% of annual precipitation falling on contributing area.

		90.0	% of annual precipitation
	(%)	(mm)	Comments/Assumptions:
Infiltration	42.0	437.1	...
Evapotranspiration	48.0	499.5	5 mm depression
Runoff	10.0	104.1	...
Precipitation	100.0	1040.6	

3) Permeable Pavement

Refer to Section 3.3.4.4 above for configuration of Permeable Pavement

The provided Infiltration Storage 85.8 m^3

The proposed permeable pavement would retain runoff from a storm event with daily volume of 120 mm.This is equivalent to 100% of annual precipitation falling on contributing area.

		100.0	% of annual precipitation
	(%)	(mm)	Comments/Assumptions:
Infiltration	100.0	1,040.6	...
Evapotranspiration	0.0	0.0	1 mm depression
Runoff	0.0	0.0	...
Precipitation	100.0	1040.6	

4) Impervious Area to UG Chamber

	(%)	(mm)	Comments/Assumptions:
Infiltration	53.0	551.5	...
Evapotranspiration	12.5	130.1	1 mm depression
Runoff	34.5	359.0	...
Precipitation	100.0	1040.6	

5) Impervious Area without LID

	(%)	(mm)	Comments/Assumptions:
Infiltration	0.0	0.0	...
Evapotranspiration	12.5	130.1	1 mm depression
Runoff	87.5	910.5	...
Precipitation	100.0	1040.6	

6) Pervious Area without LID

	(%)	(mm)	Comments/Assumptions:
Infiltration	27.0	281.0	...
Evapotranspiration	57.3	596.7	...
Runoff	15.7	162.9	...
Precipitation	100.0	1,040.6	

Refer to following calculations

Average Annual Precipitation	1040.6	mm, or	5266	m^3
Annual Evapotranspiration	596.7	mm, or	3020	m^3

Available Water Surplus (or excess of precipitation over evapotranspiration)

	443.9	mm, or	2246	m^3

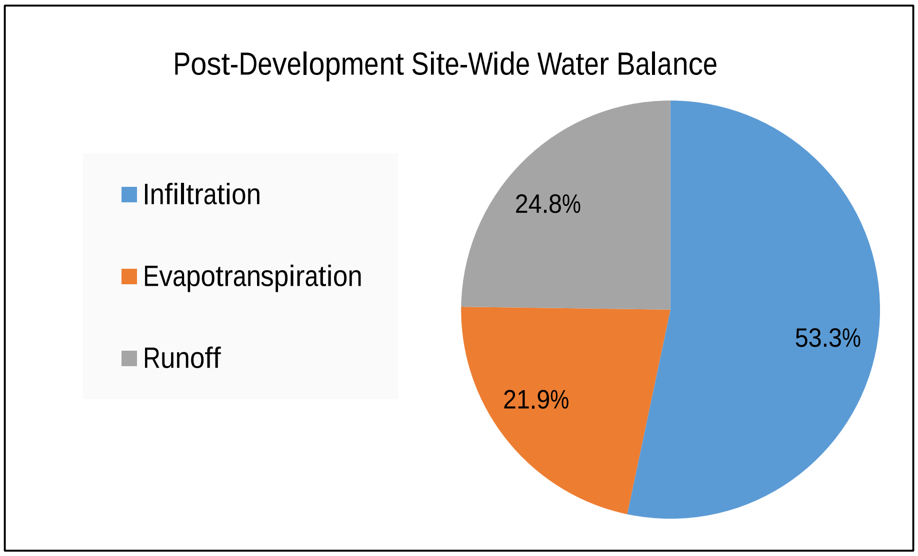
Then, infiltration factors are used to determine the fraction of water surplus that infiltrates into the ground and the fraction that runs off the site. Infiltration Factor is determined by summing a factor for topography, soil, and cover.

Topography Factor	0.13			
Slope	2.0%	or	20.0	m/km
Soil Factor	0.40	for Sandy Loam		
Cover	0.10	for cultivated land (urban lawn)		
Therefore, the infiltration factor is	0.63			

Therefore, the annual infiltration amount is	281.0	mm, or	1422	m^3
and the annual runoff amount is	162.9	mm, or	824	m^3

3.3.4.8 Site Wide Water Balance Relationship _ Post-development Conditions with Mitigation Measures

	Roof Runoff to Infiltration Trench	Surface Area to French Drain	Permeable Pavement	Impervious Area to UG Chamber	Impervious Area without LID	Pervious Area without LID	Site-Wide Water Balance	
							mm	%
% Land-Use Coverage	13.5%	6.6%	2.3%	60.4%	0.8%	16.4%	100.0%	
Infiltration	910.5	437.1	1,040.6	551.5	0.0	281.0	555.0	53.3%
Evapotranspiration	130.1	499.5	0.0	130.1	130.1	596.7	227.8	21.9%
Runoff	0.0	104.1	0.0	359.0	910.5	162.9	257.8	24.8%
Precipitation	1,041	1,041	1,041	1,041	1,041	1,041	1,041	100.0%



3.3.4.9 Post-development vs Pre-Development Water Balance

Hydrologic Cycle Components	Pre-Development Conditions		Post-Development Conditions			
			Without Mitigation Measures		With Mitigation Measures	
	mm	%	mm	%	mm	%
Infiltration	272.8	26.2%	64.6	6.2%	555.0	53.3%
Evapotranspiration	590.3	56.7%	237.3	22.8%	227.8	21.9%
Runoff	177.5	17.1%	738.8	71.0%	257.8	24.8%
Precipitation	1040.6	100.0%	1040.6	100.0%	1040.6	100.0%

3.4 Water Quality Treatment

3.4.1 Water Quality Design Criteria

Provide an Enhanced Level Protection or 80% TSS Removal as per 2003 MOECP Stormwater Management Planning and Design Manual (SWMPDM).

3.4.2 Water Quality Control Strategy

3.4.2.1 CB Shields

In 2019 SWM Plan, CB Shields are proposed for all CBs to compensate the deficiency of the OGS unit.

3.4.2.2 OGS Unit

An Oil/Grit Separator (OGS) Unit (Stormceptor EF010, or approved equivalent) is proposed to provide quality treatment for runoff from the parking lot.

Area (ha)	Imp (%)	TSS Removal (%)	Runoff Treated (%)
2.827	83.4	80	91

A TSS removal efficiency of 50% is accepted for OGS units certified by NJDEP, including VortSentry, Vortechs, High Efficiency CDS, Baysaver Separator System, Downstream Defender, Stormceptor, etc.

3.4.2.3 Isolator Row Plus (IR+) within ADS MC-4500 Chamber Sysrem

The Isolator Row Plus (IR+) within ADS MC-4500 Chamber Sysrem is certified by ETV with minimum 80% TSS removal.

3.5 Water Quantity Control

3.5.1 Configuration of ADS StormTech MC-4500 Chamber System

Refer to Appendix E.

Bottom of Stone	248.23	m
Bottom of MC-4500 Chamber	248.46	m
Top of MC-4500 Chamber	249.99	m
Top of Stone	250.34	m
Footprint of Chamber System	1173	m^2
Total Storage Volume	1520	m^3
Invert of Outlet Pipe	248.50	m
Infiltration Volume (below 248.50 m)	144	m^3
Quantity Control Volume (above 248.50 m)	1376	m^3

3.5.2 Stage - Storage Table

Refer to Appendix E for Cumulative Storage Table for MC-4500 Chamber System

Description	Elevation (m)	Total Storage (m^3)	Active Storage (m^3)
Bottom of Stone	248.23	0	
Bottom of Chamber	248.46	107	
Invert of Outlet	248.50	144	0
	248.56	205	61
	248.67	302	158
	248.77	399	255
	248.87	494	350
	248.97	587	443
	249.07	679	535
	249.17	769	625
	249.28	857	713
	249.38	942	798
	249.48	1024	880
	249.58	1102	958
	249.68	1176	1032
	249.78	1244	1100
	249.89	1303	1159
Top of Chamber	249.99	1353	1209
	250.09	1400	1256
	250.19	1448	1304
Top of Stone Cover	250.34	1520	1376

3.5.3 Control Structure

3.5.2.1 Orifice Plate for Low Flow Control up to 5-year Storm Event

An 100 mm orifice tube shall be proposed to control up to 5-year storm event

Orifice Discharge Equation is used to calculate the release rate from the 100 mm orifice Tube:

The invert of the Orifice Tube is set at 248.50 m

$$Q = CA\sqrt{2gh}$$

Where,

Q = Orifice Tube Flow Rate (m^3/s)	0.022	m^3/s
C = Flow Coefficient for Orifice Tube	0.80	
d = Diameter of Orifice Tube (mm)	100	mm
A = Cross-section Area of Orifice Tube (m^2)	0.0079	m^2
g = Gravity Acceleration (m/s^2)	9.81	m/s^2
h = Water Head above Centerline of Orifice Tube (m)	0.65	m

3.5.3.2 Orifice Tube for High Flow Control

A 175 mm orifice tube shall be proposed to control up to 100-year storm event

Orifice Discharge Equation is used to calculate the release rate from the 175 mm orifice Tube:

The invert of the Orifice Tube is set at 249.41 m

$$Q = CA\sqrt{2gh}$$

Where,

Q = Orifice Tube Flow Rate (m^3/s)	0.066	m^3/s
C = Flow Coefficient for Orifice Tube	0.80	
d = Diameter of Orifice Tube (mm)	175	mm
A = Cross-section Area of Orifice Tube (m^2)	0.0241	m^2
g = Gravity Acceleration (m/s^2)	9.81	m/s^2
h = Water Head above Centerline of Orifice Tube (m)	0.60	m

3.5.3 Storage - Discharge Relationship

Description	Elevation (m)	Orifice Tube[1]		Orifice Tube[2]		Total Flow (m^3/s)	Active Storage (ha.m)
		Depth (m)	Flow (m^3/s)	Depth (m)	Flow (m^3/s)		
Invert of Orifice #1	248.50	0.00	0.000			0.0000	0.0000
	248.56	0.06	0.003			0.0028	0.0061
	248.67	0.17	0.010			0.0096	0.0158
	248.77	0.27	0.013			0.0131	0.0255
	248.87	0.37	0.016			0.0157	0.0350
	248.97	0.47	0.018			0.0180	0.0443
	249.07	0.57	0.020			0.0201	0.0535
	249.17	0.67	0.022			0.0219	0.0625
	249.28	0.78	0.024			0.0238	0.0713
Invert of Orifice #2	249.38	0.88	0.025	0.00	0.000	0.0254	0.0798
	249.48	0.98	0.027	0.07	0.012	0.0391	0.0880
	249.58	1.08	0.028	0.17	0.024	0.0527	0.0958
	249.68	1.18	0.030	0.27	0.036	0.0660	0.1032
	249.78	1.28	0.031	0.37	0.045	0.0762	0.1100
	249.89	1.39	0.032	0.48	0.053	0.0856	0.1159
Top of Chamber	249.99	1.49	0.033	0.58	0.060	0.0932	0.1209
	250.09	1.59	0.035	0.68	0.066	0.1001	0.1256
	250.19	1.69	0.036	0.78	0.071	0.1066	0.1304
Top of Stone Cover	250.34	1.84	0.037	0.93	0.078	0.1155	0.1376

3.5.5 Quantity Control Performance of Underground Chamber System

3.5.5.1 Quantity Control Performance of Underground Chamber System (24 hour Chicago Storm)

Return Period (Years)	Run Sc. #	Q_{in} (m^3/s)	Q_{out} (m^3/s)	V (m^3)	WSE (m)
2	Run 01	0.485	0.023	673	249.23
5	Run 02	0.650	0.038	875	249.47
10	Run 03	0.760	0.056	978	249.61
25	Run 04	0.899	0.079	1117	249.81
50	Run 05	1.003	0.096	1228	250.03
100	Run 06	1.116	0.110	1335	250.25

3.5.5.2 Quantity Control Performance of Underground Chamber System (24 hour SCS Type II Storm)

Return Period (Years)	Run Sc. #	Q_{in} (m^3/s)	Q_{out} (m^3/s)	V (m^3)	WSE (m)
2	Run 07	0.339	0.022	629	249.18
5	Run 08	0.440	0.029	819	249.41
10	Run 09	0.500	0.043	904	249.51
25	Run 10	0.585	0.064	1023	249.67
50	Run 11	0.644	0.077	1108	249.79
100	Run 12	0.705	0.091	1196	249.96

3.5.6 Comparison of Pre- and Post-Development Peak Flow Rate from the Site

Rainfall Event (Years)	Pre-Development Peak Flow Rate (m^3/s)		Post-Development Peak Flow Rate (m^3/s)	
	24 hr Chicago	24 hr SCS	24 hr Chicago	24 hr SCS
2	0.027	0.030	0.024	0.023
5	0.047	0.050	0.039	0.030
10	0.063	0.063	0.058	0.044
25	0.086	0.084	0.081	0.066
50	0.106	0.100	0.099	0.079
100	0.126	0.118	0.114	0.093

APPENDIX

B VISUAL OTTHYMO MODEL OUTPUT

APPENDIX

B-1 *PRE-DEVELOPMENT CONDITIONS*

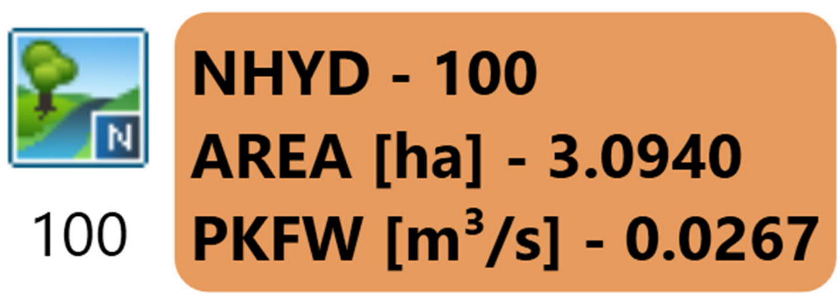


Figure B1
Visual OTTHYMO Model Schematic _ Pre-development Drainage

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

      V    V   I    SSSSS  U   U    A    L              (v 6.2.2001)
      V    V   I    SS     U   U   A A   L
       V  V    I     SS    U   U  AAAAA  L
       V  V    I      SS   U   U  A   A  L
        VV     I    SSSSS  UUUUU  A   A  LLLLL

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

Developed and Distributed by Smart City Water Inc

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

Input filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat

Output filename:
C:\Users\zhouj\AppData\Local\Civica\VH5\642fa701-08f9-4281-a674-e9ad409f1aac\5d93a74e-591c-407b-bb46-9200d7ac36bd\scenar

Summary filename:
C:\Users\zhouj\AppData\Local\Civica\VH5\642fa701-08f9-4281-a674-e9ad409f1aac\5d93a74e-591c-407b-bb46-9200d7ac36bd\scenar

DATE: 08-31-2023   TIME: 09:30:51

USER:

COMMENTS: ____

```
----------------------------------------------------------------------------------------------------
  **********************************************
  ** SIMULATION : Run 01                     **
  **********************************************

--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 807.440
| Ptotal= 46.83 mm |                          B=   6.750
--------------------                          C=   0.828
                        used in:   INTENSITY =  A / (t + B)^C

                        Duration of storm  = 24.00 hrs
                        Storm time step    = 10.00 min
                        Time to peak ratio =  0.33
```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	' TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.17	0.35	6.17	1.25	12.17	1.09	18.17	0.50
0.33	0.36	6.33	1.36	12.33	1.05	18.33	0.50
0.50	0.36	6.50	1.50	12.50	1.02	18.50	0.49

0.67	0.37	6.67	1.68	12.67	0.99	18.67	0.48
0.83	0.38	6.83	1.90	12.83	0.96	18.83	0.48
1.00	0.39	7.00	2.21	13.00	0.93	19.00	0.47
1.17	0.39	7.17	2.64	13.17	0.90	19.17	0.46
1.33	0.40	7.33	3.32	13.33	0.88	19.33	0.46
1.50	0.41	7.50	4.51	13.50	0.86	19.50	0.45
1.67	0.42	7.67	7.17	13.67	0.83	19.67	0.45
1.83	0.43	7.83	18.51	13.83	0.81	19.83	0.44
2.00	0.44	8.00	78.28	14.00	0.79	20.00	0.44
2.17	0.45	8.17	24.65	14.17	0.77	20.17	0.43
2.33	0.46	8.33	12.40	14.33	0.76	20.33	0.43
2.50	0.47	8.50	8.22	14.50	0.74	20.50	0.42
2.67	0.49	8.67	6.14	14.67	0.72	20.67	0.42
2.83	0.50	8.83	4.92	14.83	0.71	20.83	0.41
3.00	0.51	9.00	4.11	15.00	0.69	21.00	0.41
3.17	0.53	9.17	3.53	15.17	0.68	21.17	0.40
3.33	0.55	9.33	3.11	15.33	0.67	21.33	0.40
3.50	0.56	9.50	2.78	15.50	0.65	21.50	0.40
3.67	0.58	9.67	2.51	15.67	0.64	21.67	0.39
3.83	0.60	9.83	2.30	15.83	0.63	21.83	0.39
4.00	0.62	10.00	2.12	16.00	0.62	22.00	0.38
4.17	0.65	10.17	1.97	16.17	0.61	22.17	0.38
4.33	0.67	10.33	1.84	16.33	0.60	22.33	0.38
4.50	0.70	10.50	1.73	16.50	0.59	22.50	0.37
4.67	0.73	10.67	1.63	16.67	0.58	22.67	0.37
4.83	0.76	10.83	1.54	16.83	0.57	22.83	0.37
5.00	0.80	11.00	1.46	17.00	0.56	23.00	0.36
5.17	0.84	11.17	1.39	17.17	0.55	23.17	0.36
5.33	0.89	11.33	1.33	17.33	0.54	23.33	0.36
5.50	0.94	11.50	1.27	17.50	0.53	23.50	0.35
5.67	1.00	11.67	1.22	17.67	0.53	23.67	0.35
5.83	1.07	11.83	1.18	17.83	0.52	23.83	0.35
6.00	1.15	12.00	1.13	18.00	0.51	24.00	0.34

```
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--------------------
| CALIB            |
| NASHYD   (  0100)|   Area    (ha)=   3.09   Curve Number   (CN)= 48.0
|ID= 1 DT= 2.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.30
```

NOTE: RAINFALL WAS TRANSFORMED TO 2.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	' TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.033	0.35	6.033	1.25	12.033	1.09	18.03	0.50
0.067	0.35	6.067	1.25	12.067	1.09	18.07	0.50
0.100	0.35	6.100	1.25	12.100	1.09	18.10	0.50
0.133	0.35	6.133	1.25	12.133	1.09	18.13	0.50
0.167	0.35	6.167	1.25	12.167	1.09	18.17	0.50
0.200	0.36	6.200	1.36	12.200	1.05	18.20	0.50
0.233	0.36	6.233	1.36	12.233	1.05	18.23	0.50
0.267	0.36	6.267	1.36	12.267	1.05	18.27	0.50
0.300	0.36	6.300	1.36	12.300	1.05	18.30	0.50
0.333	0.36	6.333	1.36	12.333	1.05	18.33	0.50
0.367	0.36	6.367	1.50	12.367	1.02	18.37	0.49
0.400	0.36	6.400	1.50	12.400	1.02	18.40	0.49
0.433	0.36	6.433	1.50	12.433	1.02	18.43	0.49

0.467	0.36	6.467	1.50	12.467	1.02	18.47	0.49
0.500	0.36	6.500	1.50	12.500	1.02	18.50	0.49
0.533	0.37	6.533	1.68	12.533	0.99	18.53	0.48
0.567	0.37	6.567	1.68	12.567	0.99	18.57	0.48
0.600	0.37	6.600	1.68	12.600	0.99	18.60	0.48
0.633	0.37	6.633	1.68	12.633	0.99	18.63	0.48
0.667	0.37	6.667	1.68	12.667	0.99	18.67	0.48
0.700	0.38	6.700	1.90	12.700	0.96	18.70	0.48
0.733	0.38	6.733	1.90	12.733	0.96	18.73	0.48
0.767	0.38	6.767	1.90	12.767	0.96	18.77	0.48
0.800	0.38	6.800	1.90	12.800	0.96	18.80	0.48
0.833	0.38	6.833	1.90	12.833	0.96	18.83	0.48
0.867	0.39	6.867	2.21	12.867	0.93	18.87	0.47
0.900	0.39	6.900	2.21	12.900	0.93	18.90	0.47
0.933	0.39	6.933	2.21	12.933	0.93	18.93	0.47
0.967	0.39	6.967	2.21	12.967	0.93	18.97	0.47
1.000	0.39	7.000	2.21	13.000	0.93	19.00	0.47
1.033	0.39	7.033	2.64	13.033	0.90	19.03	0.46
1.067	0.39	7.067	2.64	13.067	0.90	19.07	0.46
1.100	0.39	7.100	2.64	13.100	0.90	19.10	0.46
1.133	0.39	7.133	2.64	13.133	0.90	19.13	0.46
1.167	0.39	7.167	2.64	13.167	0.90	19.17	0.46
1.200	0.40	7.200	3.32	13.200	0.88	19.20	0.46
1.233	0.40	7.233	3.32	13.233	0.88	19.23	0.46
1.267	0.40	7.267	3.32	13.267	0.88	19.27	0.46
1.300	0.40	7.300	3.32	13.300	0.88	19.30	0.46
1.333	0.40	7.333	3.32	13.333	0.88	19.33	0.46
1.367	0.41	7.367	4.51	13.367	0.86	19.37	0.45
1.400	0.41	7.400	4.51	13.400	0.86	19.40	0.45
1.433	0.41	7.433	4.51	13.433	0.86	19.43	0.45
1.467	0.41	7.467	4.51	13.467	0.86	19.47	0.45
1.500	0.41	7.500	4.51	13.500	0.86	19.50	0.45
1.533	0.42	7.533	7.17	13.533	0.83	19.53	0.45
1.567	0.42	7.567	7.17	13.567	0.83	19.57	0.45
1.600	0.42	7.600	7.17	13.600	0.83	19.60	0.45
1.633	0.42	7.633	7.17	13.633	0.83	19.63	0.45
1.667	0.42	7.667	7.17	13.667	0.83	19.67	0.45
1.700	0.43	7.700	18.51	13.700	0.81	19.70	0.44
1.733	0.43	7.733	18.51	13.733	0.81	19.73	0.44
1.767	0.43	7.767	18.51	13.767	0.81	19.77	0.44
1.800	0.43	7.800	18.51	13.800	0.81	19.80	0.44
1.833	0.43	7.833	18.51	13.833	0.81	19.83	0.44
1.867	0.44	7.867	78.26	13.867	0.79	19.87	0.44
1.900	0.44	7.900	78.28	13.900	0.79	19.90	0.44
1.933	0.44	7.933	78.28	13.933	0.79	19.93	0.44
1.967	0.44	7.967	78.28	13.967	0.79	19.97	0.44
2.000	0.44	8.000	78.28	14.000	0.79	20.00	0.44
2.033	0.45	8.033	24.66	14.033	0.77	20.03	0.43
2.067	0.45	8.067	24.65	14.067	0.77	20.07	0.43
2.100	0.45	8.100	24.65	14.100	0.77	20.10	0.43
2.133	0.45	8.133	24.65	14.133	0.77	20.13	0.43
2.167	0.45	8.167	24.65	14.167	0.77	20.17	0.43
2.200	0.46	8.200	12.41	14.200	0.76	20.20	0.43
2.233	0.46	8.233	12.40	14.233	0.76	20.23	0.43
2.267	0.46	8.267	12.40	14.267	0.76	20.27	0.43
2.300	0.46	8.300	12.40	14.300	0.76	20.30	0.43
2.333	0.46	8.333	12.40	14.333	0.76	20.33	0.43
2.367	0.47	8.367	8.22	14.367	0.74	20.37	0.42
2.400	0.47	8.400	8.22	14.400	0.74	20.40	0.42
2.433	0.47	8.433	8.22	14.433	0.74	20.43	0.42
2.467	0.47	8.467	8.22	14.467	0.74	20.47	0.42

2.500	0.47	8.500	8.22	14.500	0.74	20.50	0.42
2.533	0.49	8.533	6.14	14.533	0.72	20.53	0.42
2.567	0.49	8.567	6.14	14.567	0.72	20.57	0.42
2.600	0.49	8.600	6.14	14.600	0.72	20.60	0.42
2.633	0.49	8.633	6.14	14.633	0.72	20.63	0.42
2.667	0.49	8.667	6.14	14.667	0.72	20.67	0.42
2.700	0.50	8.700	4.92	14.700	0.71	20.70	0.41
2.733	0.50	8.733	4.92	14.733	0.71	20.73	0.41
2.767	0.50	8.767	4.92	14.767	0.71	20.77	0.41
2.800	0.50	8.800	4.92	14.800	0.71	20.80	0.41
2.833	0.50	8.833	4.92	14.833	0.71	20.83	0.41
2.867	0.51	8.867	4.11	14.867	0.69	20.87	0.41
2.900	0.51	8.900	4.11	14.900	0.69	20.90	0.41
2.933	0.51	8.933	4.11	14.933	0.69	20.93	0.41
2.967	0.51	8.967	4.11	14.967	0.69	20.97	0.41
3.000	0.51	9.000	4.11	15.000	0.69	21.00	0.41
3.033	0.53	9.033	3.53	15.033	0.68	21.03	0.40
3.067	0.53	9.067	3.53	15.067	0.68	21.07	0.40
3.100	0.53	9.100	3.53	15.100	0.68	21.10	0.40
3.133	0.53	9.133	3.53	15.133	0.68	21.13	0.40
3.167	0.53	9.167	3.53	15.167	0.68	21.17	0.40
3.200	0.55	9.200	3.11	15.200	0.67	21.20	0.40
3.233	0.55	9.233	3.11	15.233	0.67	21.23	0.40
3.267	0.55	9.267	3.11	15.267	0.67	21.27	0.40
3.300	0.55	9.300	3.11	15.300	0.67	21.30	0.40
3.333	0.55	9.333	3.11	15.333	0.67	21.33	0.40
3.367	0.56	9.367	2.78	15.367	0.65	21.37	0.40
3.400	0.56	9.400	2.78	15.400	0.65	21.40	0.40
3.433	0.56	9.433	2.78	15.433	0.65	21.43	0.40
3.467	0.56	9.467	2.78	15.467	0.65	21.47	0.40
3.500	0.56	9.500	2.78	15.500	0.65	21.50	0.40
3.533	0.58	9.533	2.51	15.533	0.64	21.53	0.39
3.567	0.58	9.567	2.51	15.567	0.64	21.57	0.39
3.600	0.58	9.600	2.51	15.600	0.64	21.60	0.39
3.633	0.58	9.633	2.51	15.633	0.64	21.63	0.39
3.667	0.58	9.667	2.51	15.667	0.64	21.67	0.39
3.700	0.60	9.700	2.30	15.700	0.63	21.70	0.39
3.733	0.60	9.733	2.30	15.733	0.63	21.73	0.39
3.767	0.60	9.767	2.30	15.767	0.63	21.77	0.39
3.800	0.60	9.800	2.30	15.800	0.63	21.80	0.39
3.833	0.60	9.833	2.30	15.833	0.63	21.83	0.39
3.867	0.62	9.867	2.12	15.867	0.62	21.87	0.38
3.900	0.62	9.900	2.12	15.900	0.62	21.90	0.38
3.933	0.62	9.933	2.12	15.933	0.62	21.93	0.38
3.967	0.62	9.967	2.12	15.967	0.62	21.97	0.38
4.000	0.62	10.000	2.12	16.000	0.62	22.00	0.38
4.033	0.65	10.033	1.97	16.033	0.61	22.03	0.38
4.067	0.65	10.067	1.97	16.067	0.61	22.07	0.38
4.100	0.65	10.100	1.97	16.100	0.61	22.10	0.38
4.133	0.65	10.133	1.97	16.133	0.61	22.13	0.38
4.167	0.65	10.167	1.97	16.167	0.61	22.17	0.38
4.200	0.67	10.200	1.84	16.200	0.60	22.20	0.38
4.233	0.67	10.233	1.84	16.233	0.60	22.23	0.38
4.267	0.67	10.267	1.84	16.267	0.60	22.27	0.38
4.300	0.67	10.300	1.84	16.300	0.60	22.30	0.38
4.333	0.67	10.333	1.84	16.333	0.60	22.33	0.38
4.367	0.70	10.367	1.73	16.367	0.59	22.37	0.37
4.400	0.70	10.400	1.73	16.400	0.59	22.40	0.37
4.433	0.70	10.433	1.73	16.433	0.59	22.43	0.37
4.467	0.70	10.467	1.73	16.467	0.59	22.47	0.37
4.500	0.70	10.500	1.73	16.500	0.59	22.50	0.37

4.533	0.73	10.533	1.63	16.533	0.58	22.53	0.37
4.567	0.73	10.567	1.63	16.567	0.58	22.57	0.37
4.600	0.73	10.600	1.63	16.600	0.58	22.60	0.37
4.633	0.73	10.633	1.63	16.633	0.58	22.63	0.37
4.667	0.73	10.667	1.63	16.667	0.58	22.67	0.37
4.700	0.76	10.700	1.54	16.700	0.57	22.70	0.37
4.733	0.76	10.733	1.54	16.733	0.57	22.73	0.37
4.767	0.76	10.767	1.54	16.767	0.57	22.77	0.37
4.800	0.76	10.800	1.54	16.800	0.57	22.80	0.37
4.833	0.76	10.833	1.54	16.833	0.57	22.83	0.37
4.867	0.80	10.867	1.46	16.867	0.56	22.87	0.36
4.900	0.80	10.900	1.46	16.900	0.56	22.90	0.36
4.933	0.80	10.933	1.46	16.933	0.56	22.93	0.36
4.967	0.80	10.967	1.46	16.967	0.56	22.97	0.36
5.000	0.80	11.000	1.46	17.000	0.56	23.00	0.36
5.033	0.84	11.033	1.39	17.033	0.55	23.03	0.36
5.067	0.84	11.067	1.39	17.067	0.55	23.07	0.36
5.100	0.84	11.100	1.39	17.100	0.55	23.10	0.36
5.133	0.84	11.133	1.39	17.133	0.55	23.13	0.36
5.167	0.84	11.167	1.39	17.167	0.55	23.17	0.36
5.200	0.89	11.200	1.33	17.200	0.54	23.20	0.36
5.233	0.89	11.233	1.33	17.233	0.54	23.23	0.36
5.267	0.89	11.267	1.33	17.267	0.54	23.27	0.36
5.300	0.89	11.300	1.33	17.300	0.54	23.30	0.36
5.333	0.89	11.333	1.33	17.333	0.54	23.33	0.36
5.367	0.94	11.367	1.27	17.367	0.53	23.37	0.35
5.400	0.94	11.400	1.27	17.400	0.53	23.40	0.35
5.433	0.94	11.433	1.27	17.433	0.53	23.43	0.35
5.467	0.94	11.467	1.27	17.467	0.53	23.47	0.35
5.500	0.94	11.500	1.27	17.500	0.53	23.50	0.35
5.533	1.00	11.533	1.22	17.533	0.53	23.53	0.35
5.567	1.00	11.567	1.22	17.567	0.53	23.57	0.35
5.600	1.00	11.600	1.22	17.600	0.53	23.60	0.35
5.633	1.00	11.633	1.22	17.633	0.53	23.63	0.35
5.667	1.00	11.667	1.22	17.667	0.53	23.67	0.35
5.700	1.07	11.700	1.18	17.700	0.52	23.70	0.35
5.733	1.07	11.733	1.18	17.733	0.52	23.73	0.35
5.767	1.07	11.767	1.18	17.767	0.52	23.77	0.35
5.800	1.07	11.800	1.18	17.800	0.52	23.80	0.35
5.833	1.07	11.833	1.18	17.833	0.52	23.83	0.35
5.867	1.15	11.867	1.13	17.867	0.51	23.87	0.34
5.900	1.15	11.900	1.13	17.900	0.51	23.90	0.34
5.933	1.15	11.933	1.13	17.933	0.51	23.93	0.34
5.967	1.15	11.967	1.13	17.967	0.51	23.97	0.34
6.000	1.15	12.000	1.13	18.000	0.51	24.00	0.34

```
    Unit Hyd Qpeak  (cms)=   0.394

    PEAK FLOW       (cms)=   0.027 (i)
    TIME TO PEAK    (hrs)=   8.333
    RUNOFF VOLUME    (mm)=   5.519
    TOTAL RAINFALL   (mm)=  46.829
    RUNOFF COEFFICIENT   =   0.118

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

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

       V    V   I    SSSSS  U    U    A    L              (v 6.2.2001)
```



```
      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 6.2\VO2\voin.dat

  Output  filename:
C:\Users\zhouj\AppData\Local\Civica\VH5\642fa701-08f9-4281-a674-e9ad409f1aac\656be6
32-309a-4f74-8b04-75e8abdd2c38\scenar
  Summary filename:
C:\Users\zhouj\AppData\Local\Civica\VH5\642fa701-08f9-4281-a674-e9ad409f1aac\656be6
32-309a-4f74-8b04-75e8abdd2c38\scenar


DATE: 08-31-2023                             TIME: 09:30:51

USER:


COMMENTS: ____________________________________________________________


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  **********************************************
  ** SIMULATION : Run 02                      **
  **********************************************

--------------------
| CHICAGO STORM    |    IDF curve parameters: A=1135.400
| Ptotal= 59.88 mm |                          B=   7.500
--------------------                          C=   0.841
                        used in:   INTENSITY =  A / (t + B)^C

                        Duration of storm  = 24.00 hrs
                        Storm time step    = 10.00 min
                        Time to peak ratio =  0.33
```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.17	0.42	6.17	1.53	12.17	1.33	18.17	0.60
0.33	0.42	6.33	1.67	12.33	1.29	18.33	0.59
0.50	0.43	6.50	1.85	12.50	1.24	18.50	0.59
0.67	0.44	6.67	2.07	12.67	1.20	18.67	0.58
0.83	0.45	6.83	2.37	12.83	1.17	18.83	0.57
1.00	0.46	7.00	2.76	13.00	1.13	19.00	0.56
1.17	0.47	7.17	3.33	13.17	1.10	19.17	0.56

1.33	0.48	7.33	4.21	13.33	1.07	19.33	0.55
1.50	0.49	7.50	5.79	13.50	1.04	19.50	0.54
1.67	0.50	7.67	9.38	13.67	1.01	19.67	0.54
1.83	0.51	7.83	24.78	13.83	0.98	19.83	0.53
2.00	0.52	8.00	102.27	14.00	0.96	20.00	0.52
2.17	0.54	8.17	33.10	14.17	0.94	20.17	0.52
2.33	0.55	8.33	16.50	14.33	0.92	20.33	0.51
2.50	0.57	8.50	10.79	14.50	0.89	20.50	0.50
2.67	0.58	8.67	7.99	14.67	0.87	20.67	0.50
2.83	0.60	8.83	6.34	14.83	0.86	20.83	0.49
3.00	0.62	9.00	5.26	15.00	0.84	21.00	0.49
3.17	0.63	9.17	4.50	15.17	0.82	21.17	0.48
3.33	0.65	9.33	3.94	15.33	0.80	21.33	0.48
3.50	0.68	9.50	3.50	15.50	0.79	21.50	0.47
3.67	0.70	9.67	3.16	15.67	0.77	21.67	0.47
3.83	0.72	9.83	2.88	15.83	0.76	21.83	0.46
4.00	0.75	10.00	2.65	16.00	0.74	22.00	0.46
4.17	0.78	10.17	2.45	16.17	0.73	22.17	0.45
4.33	0.81	10.33	2.29	16.33	0.72	22.33	0.45
4.50	0.85	10.50	2.14	16.50	0.71	22.50	0.44
4.67	0.88	10.67	2.01	16.67	0.69	22.67	0.44
4.83	0.92	10.83	1.90	16.83	0.68	22.83	0.43
5.00	0.97	11.00	1.80	17.00	0.67	23.00	0.43
5.17	1.02	11.17	1.72	17.17	0.66	23.17	0.43
5.33	1.08	11.33	1.64	17.33	0.65	23.33	0.42
5.50	1.15	11.50	1.56	17.50	0.64	23.50	0.42
5.67	1.22	11.67	1.50	17.67	0.63	23.67	0.41
5.83	1.31	11.83	1.44	17.83	0.62	23.83	0.41
6.00	1.41	12.00	1.38	18.00	0.61	24.00	0.41

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--------------------
| CALIB              |
| NASHYD   (  0100)|   Area    (ha)=   3.09   Curve Number   (CN)= 48.0
|ID= 1 DT= 2.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.30

         NOTE:  RAINFALL WAS TRANSFORMED TO   2.0 MIN. TIME STEP.
```

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.033	0.42	6.033	1.53	12.033	1.33	18.03	0.60
0.067	0.42	6.067	1.53	12.067	1.33	18.07	0.60
0.100	0.42	6.100	1.53	12.100	1.33	18.10	0.60
0.133	0.42	6.133	1.53	12.133	1.33	18.13	0.60
0.167	0.42	6.167	1.53	12.167	1.33	18.17	0.60
0.200	0.42	6.200	1.67	12.200	1.29	18.20	0.59
0.233	0.42	6.233	1.67	12.233	1.29	18.23	0.59
0.267	0.42	6.267	1.67	12.267	1.29	18.27	0.59
0.300	0.42	6.300	1.67	12.300	1.29	18.30	0.59
0.333	0.42	6.333	1.67	12.333	1.29	18.33	0.59
0.367	0.43	6.367	1.85	12.367	1.24	18.37	0.59
0.400	0.43	6.400	1.85	12.400	1.24	18.40	0.59
0.433	0.43	6.433	1.85	12.433	1.24	18.43	0.59
0.467	0.43	6.467	1.85	12.467	1.24	18.47	0.59
0.500	0.43	6.500	1.85	12.500	1.24	18.50	0.59
0.533	0.44	6.533	2.07	12.533	1.20	18.53	0.58
0.567	0.44	6.567	2.07	12.567	1.20	18.57	0.58

0.600	0.44	6.600	2.07	12.600	1.20	18.60	0.58
0.633	0.44	6.633	2.07	12.633	1.20	18.63	0.58
0.667	0.44	6.667	2.07	12.667	1.20	18.67	0.58
0.700	0.45	6.700	2.37	12.700	1.17	18.70	0.57
0.733	0.45	6.733	2.37	12.733	1.17	18.73	0.57
0.767	0.45	6.767	2.37	12.767	1.17	18.77	0.57
0.800	0.45	6.800	2.37	12.800	1.17	18.80	0.57
0.833	0.45	6.833	2.37	12.833	1.17	18.83	0.57
0.867	0.46	6.867	2.76	12.867	1.13	18.87	0.56
0.900	0.46	6.900	2.76	12.900	1.13	18.90	0.56
0.933	0.46	6.933	2.76	12.933	1.13	18.93	0.56
0.967	0.46	6.967	2.76	12.967	1.13	18.97	0.56
1.000	0.46	7.000	2.76	13.000	1.13	19.00	0.56
1.033	0.47	7.033	3.33	13.033	1.10	19.03	0.56
1.067	0.47	7.067	3.33	13.067	1.10	19.07	0.56
1.100	0.47	7.100	3.33	13.100	1.10	19.10	0.56
1.133	0.47	7.133	3.33	13.133	1.10	19.13	0.56
1.167	0.47	7.167	3.33	13.167	1.10	19.17	0.56
1.200	0.48	7.200	4.21	13.200	1.07	19.20	0.55
1.233	0.48	7.233	4.21	13.233	1.07	19.23	0.55
1.267	0.48	7.267	4.21	13.267	1.07	19.27	0.55
1.300	0.48	7.300	4.21	13.300	1.07	19.30	0.55
1.333	0.48	7.333	4.21	13.333	1.07	19.33	0.55
1.367	0.49	7.367	5.79	13.367	1.04	19.37	0.54
1.400	0.49	7.400	5.79	13.400	1.04	19.40	0.54
1.433	0.49	7.433	5.79	13.433	1.04	19.43	0.54
1.467	0.49	7.467	5.79	13.467	1.04	19.47	0.54
1.500	0.49	7.500	5.79	13.500	1.04	19.50	0.54
1.533	0.50	7.533	9.38	13.533	1.01	19.53	0.54
1.567	0.50	7.567	9.38	13.567	1.01	19.57	0.54
1.600	0.50	7.600	9.38	13.600	1.01	19.60	0.54
1.633	0.50	7.633	9.38	13.633	1.01	19.63	0.54
1.667	0.50	7.667	9.38	13.667	1.01	19.67	0.54
1.700	0.51	7.700	24.78	13.700	0.98	19.70	0.53
1.733	0.51	7.733	24.78	13.733	0.98	19.73	0.53
1.767	0.51	7.767	24.78	13.767	0.98	19.77	0.53
1.800	0.51	7.800	24.78	13.800	0.98	19.80	0.53
1.833	0.51	7.833	24.78	13.833	0.98	19.83	0.53
1.867	0.52	7.867	102.26	13.867	0.96	19.87	0.52
1.900	0.52	7.900	102.27	13.900	0.96	19.90	0.52
1.933	0.52	7.933	102.27	13.933	0.96	19.93	0.52
1.967	0.52	7.967	102.27	13.967	0.96	19.97	0.52
2.000	0.52	8.000	102.27	14.000	0.96	20.00	0.52
2.033	0.54	8.033	33.11	14.033	0.94	20.03	0.52
2.067	0.54	8.067	33.10	14.067	0.94	20.07	0.52
2.100	0.54	8.100	33.10	14.100	0.94	20.10	0.52
2.133	0.54	8.133	33.10	14.133	0.94	20.13	0.52
2.167	0.54	8.167	33.10	14.167	0.94	20.17	0.52
2.200	0.55	8.200	16.50	14.200	0.92	20.20	0.51
2.233	0.55	8.233	16.50	14.233	0.92	20.23	0.51
2.267	0.55	8.267	16.50	14.267	0.92	20.27	0.51
2.300	0.55	8.300	16.50	14.300	0.92	20.30	0.51
2.333	0.55	8.333	16.50	14.333	0.92	20.33	0.51
2.367	0.57	8.367	10.79	14.367	0.89	20.37	0.50
2.400	0.57	8.400	10.79	14.400	0.89	20.40	0.50
2.433	0.57	8.433	10.79	14.433	0.89	20.43	0.50
2.467	0.57	8.467	10.79	14.467	0.89	20.47	0.50
2.500	0.57	8.500	10.79	14.500	0.89	20.50	0.50
2.533	0.58	8.533	7.99	14.533	0.87	20.53	0.50
2.567	0.58	8.567	7.99	14.567	0.87	20.57	0.50
2.600	0.58	8.600	7.99	14.600	0.87	20.60	0.50

2.633	0.58	8.633	7.99	14.633	0.87	20.63	0.50
2.667	0.58	8.667	7.99	14.667	0.87	20.67	0.50
2.700	0.60	8.700	6.34	14.700	0.86	20.70	0.49
2.733	0.60	8.733	6.34	14.733	0.86	20.73	0.49
2.767	0.60	8.767	6.34	14.767	0.86	20.77	0.49
2.800	0.60	8.800	6.34	14.800	0.86	20.80	0.49
2.833	0.60	8.833	6.34	14.833	0.86	20.83	0.49
2.867	0.62	8.867	5.26	14.867	0.84	20.87	0.49
2.900	0.62	8.900	5.26	14.900	0.84	20.90	0.49
2.933	0.62	8.933	5.26	14.933	0.84	20.93	0.49
2.967	0.62	8.967	5.26	14.967	0.84	20.97	0.49
3.000	0.62	9.000	5.26	15.000	0.84	21.00	0.49
3.033	0.63	9.033	4.50	15.033	0.82	21.03	0.48
3.067	0.63	9.067	4.50	15.067	0.82	21.07	0.48
3.100	0.63	9.100	4.50	15.100	0.82	21.10	0.48
3.133	0.63	9.133	4.50	15.133	0.82	21.13	0.48
3.167	0.63	9.167	4.50	15.167	0.82	21.17	0.48
3.200	0.65	9.200	3.94	15.200	0.80	21.20	0.48
3.233	0.65	9.233	3.94	15.233	0.80	21.23	0.48
3.267	0.65	9.267	3.94	15.267	0.80	21.27	0.48
3.300	0.65	9.300	3.94	15.300	0.80	21.30	0.48
3.333	0.65	9.333	3.94	15.333	0.80	21.33	0.48
3.367	0.68	9.367	3.50	15.367	0.79	21.37	0.47
3.400	0.68	9.400	3.50	15.400	0.79	21.40	0.47
3.433	0.68	9.433	3.50	15.433	0.79	21.43	0.47
3.467	0.68	9.467	3.50	15.467	0.79	21.47	0.47
3.500	0.68	9.500	3.50	15.500	0.79	21.50	0.47
3.533	0.70	9.533	3.16	15.533	0.77	21.53	0.47
3.567	0.70	9.567	3.16	15.567	0.77	21.57	0.47
3.600	0.70	9.600	3.16	15.600	0.77	21.60	0.47
3.633	0.70	9.633	3.16	15.633	0.77	21.63	0.47
3.667	0.70	9.667	3.16	15.667	0.77	21.67	0.47
3.700	0.72	9.700	2.88	15.700	0.76	21.70	0.46
3.733	0.72	9.733	2.88	15.733	0.76	21.73	0.46
3.767	0.72	9.767	2.88	15.767	0.76	21.77	0.46
3.800	0.72	9.800	2.88	15.800	0.76	21.80	0.46
3.833	0.72	9.833	2.88	15.833	0.76	21.83	0.46
3.867	0.75	9.867	2.65	15.867	0.74	21.87	0.46
3.900	0.75	9.900	2.65	15.900	0.74	21.90	0.46
3.933	0.75	9.933	2.65	15.933	0.74	21.93	0.46
3.967	0.75	9.967	2.65	15.967	0.74	21.97	0.46
4.000	0.75	10.000	2.65	16.000	0.74	22.00	0.46
4.033	0.78	10.033	2.45	16.033	0.73	22.03	0.45
4.067	0.78	10.067	2.45	16.067	0.73	22.07	0.45
4.100	0.78	10.100	2.45	16.100	0.73	22.10	0.45
4.133	0.78	10.133	2.45	16.133	0.73	22.13	0.45
4.167	0.78	10.167	2.45	16.167	0.73	22.17	0.45
4.200	0.81	10.200	2.29	16.200	0.72	22.20	0.45
4.233	0.81	10.233	2.29	16.233	0.72	22.23	0.45
4.267	0.81	10.267	2.29	16.267	0.72	22.27	0.45
4.300	0.81	10.300	2.29	16.300	0.72	22.30	0.45
4.333	0.81	10.333	2.29	16.333	0.72	22.33	0.45
4.367	0.85	10.367	2.14	16.367	0.71	22.37	0.44
4.400	0.85	10.400	2.14	16.400	0.71	22.40	0.44
4.433	0.85	10.433	2.14	16.433	0.71	22.43	0.44
4.467	0.85	10.467	2.14	16.467	0.71	22.47	0.44
4.500	0.85	10.500	2.14	16.500	0.71	22.50	0.44
4.533	0.88	10.533	2.01	16.533	0.69	22.53	0.44
4.567	0.88	10.567	2.01	16.567	0.69	22.57	0.44
4.600	0.88	10.600	2.01	16.600	0.69	22.60	0.44
4.633	0.88	10.633	2.01	16.633	0.69	22.63	0.44

4.667	0.88	10.667	2.01	16.667	0.69	22.67	0.44
4.700	0.92	10.700	1.90	16.700	0.68	22.70	0.43
4.733	0.92	10.733	1.90	16.733	0.68	22.73	0.43
4.767	0.92	10.767	1.90	16.767	0.68	22.77	0.43
4.800	0.92	10.800	1.90	16.800	0.68	22.80	0.43
4.833	0.92	10.833	1.90	16.833	0.68	22.83	0.43
4.867	0.97	10.867	1.80	16.867	0.67	22.87	0.43
4.900	0.97	10.900	1.80	16.900	0.67	22.90	0.43
4.933	0.97	10.933	1.80	16.933	0.67	22.93	0.43
4.967	0.97	10.967	1.80	16.967	0.67	22.97	0.43
5.000	0.97	11.000	1.80	17.000	0.67	23.00	0.43
5.033	1.02	11.033	1.72	17.033	0.66	23.03	0.43
5.067	1.02	11.067	1.72	17.067	0.66	23.07	0.43
5.100	1.02	11.100	1.72	17.100	0.66	23.10	0.43
5.133	1.02	11.133	1.72	17.133	0.66	23.13	0.43
5.167	1.02	11.167	1.72	17.167	0.66	23.17	0.43
5.200	1.08	11.200	1.64	17.200	0.65	23.20	0.42
5.233	1.08	11.233	1.64	17.233	0.65	23.23	0.42
5.267	1.08	11.267	1.64	17.267	0.65	23.27	0.42
5.300	1.08	11.300	1.64	17.300	0.65	23.30	0.42
5.333	1.08	11.333	1.64	17.333	0.65	23.33	0.42
5.367	1.15	11.367	1.56	17.367	0.64	23.37	0.42
5.400	1.15	11.400	1.56	17.400	0.64	23.40	0.42
5.433	1.15	11.433	1.56	17.433	0.64	23.43	0.42
5.467	1.15	11.467	1.56	17.467	0.64	23.47	0.42
5.500	1.15	11.500	1.56	17.500	0.64	23.50	0.42
5.533	1.22	11.533	1.50	17.533	0.63	23.53	0.41
5.567	1.22	11.567	1.50	17.567	0.63	23.57	0.41
5.600	1.22	11.600	1.50	17.600	0.63	23.60	0.41
5.633	1.22	11.633	1.50	17.633	0.63	23.63	0.41
5.667	1.22	11.667	1.50	17.667	0.63	23.67	0.41
5.700	1.31	11.700	1.44	17.700	0.62	23.70	0.41
5.733	1.31	11.733	1.44	17.733	0.62	23.73	0.41
5.767	1.31	11.767	1.44	17.767	0.62	23.77	0.41
5.800	1.31	11.800	1.44	17.800	0.62	23.80	0.41
5.833	1.31	11.833	1.44	17.833	0.62	23.83	0.41
5.867	1.41	11.867	1.38	17.867	0.61	23.87	0.41
5.900	1.41	11.900	1.38	17.900	0.61	23.90	0.41
5.933	1.41	11.933	1.38	17.933	0.61	23.93	0.41
5.967	1.41	11.967	1.38	17.967	0.61	23.97	0.41
6.000	1.41	12.000	1.38	18.000	0.61	24.00	0.41

```
Unit Hyd Qpeak  (cms)=   0.394

PEAK FLOW       (cms)=   0.047 (i)
TIME TO PEAK    (hrs)=   8.333
RUNOFF VOLUME    (mm)=   9.125
TOTAL RAINFALL   (mm)=  59.879
RUNOFF COEFFICIENT   =   0.152

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

  V    V   I    SSSSS  U    U    A    L              (v 6.2.2001)
  V    V   I    SS     U    U   A A   L
   V  V    I     SS    U    U  AAAAA  L
   V  V    I      SS   U    U  A   A  L
    VV     I    SSSSS  UUUUU   A   A  LLLLL
```



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

Developed and Distributed by Smart City Water Inc

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

Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat

Output filename:
C:\Users\zhouj\AppData\Local\Civica\VH5\642fa701-08f9-4281-a674-e9ad409f1aac\5b820749-13ad-4720-a158-99f79a36a6bd\scenar
Summary filename:
C:\Users\zhouj\AppData\Local\Civica\VH5\642fa701-08f9-4281-a674-e9ad409f1aac\5b820749-13ad-4720-a158-99f79a36a6bd\scenar

DATE: 08-31-2023   TIME: 09:30:51

USER:

COMMENTS: ____

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  *********************************************
  ** SIMULATION : Run 03                     **
  *********************************************

--------------------
| CHICAGO STORM    |    IDF curve parameters: A=1387.000
| Ptotal= 67.50 mm |                          B=   7.970
--------------------                          C=   0.852
                        used in:   INTENSITY =  A / (t + B)^C

                        Duration of storm  = 24.00 hrs
                        Storm time step    = 10.00 min
                        Time to peak ratio =  0.33
```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.17	0.44	6.17	1.66	12.17	1.44	18.17	0.64
0.33	0.45	6.33	1.82	12.33	1.39	18.33	0.63
0.50	0.46	6.50	2.02	12.50	1.34	18.50	0.62
0.67	0.46	6.67	2.27	12.67	1.30	18.67	0.61
0.83	0.47	6.83	2.59	12.83	1.25	18.83	0.60
1.00	0.48	7.00	3.04	13.00	1.22	19.00	0.60
1.17	0.49	7.17	3.68	13.17	1.18	19.17	0.59
1.33	0.51	7.33	4.70	13.33	1.15	19.33	0.58
1.50	0.52	7.50	6.52	13.50	1.11	19.50	0.57
1.67	0.53	7.67	10.72	13.67	1.08	19.67	0.57
1.83	0.54	7.83	28.90	13.83	1.06	19.83	0.56

2.00	0.56	8.00	118.36	14.00	1.03	20.00	0.55
2.17	0.57	8.17	38.72	14.17	1.00	20.17	0.55
2.33	0.58	8.33	19.11	14.33	0.98	20.33	0.54
2.50	0.60	8.50	12.38	14.50	0.96	20.50	0.53
2.67	0.62	8.67	9.08	14.67	0.93	20.67	0.53
2.83	0.63	8.83	7.16	14.83	0.91	20.83	0.52
3.00	0.65	9.00	5.91	15.00	0.89	21.00	0.51
3.17	0.67	9.17	5.03	15.17	0.88	21.17	0.51
3.33	0.70	9.33	4.38	15.33	0.86	21.33	0.50
3.50	0.72	9.50	3.89	15.50	0.84	21.50	0.50
3.67	0.74	9.67	3.49	15.67	0.82	21.67	0.49
3.83	0.77	9.83	3.17	15.83	0.81	21.83	0.49
4.00	0.80	10.00	2.91	16.00	0.79	22.00	0.48
4.17	0.83	10.17	2.69	16.17	0.78	22.17	0.48
4.33	0.87	10.33	2.50	16.33	0.76	22.33	0.47
4.50	0.90	10.50	2.34	16.50	0.75	22.50	0.47
4.67	0.94	10.67	2.20	16.67	0.74	22.67	0.46
4.83	0.99	10.83	2.07	16.83	0.73	22.83	0.46
5.00	1.04	11.00	1.96	17.00	0.71	23.00	0.45
5.17	1.10	11.17	1.86	17.17	0.70	23.17	0.45
5.33	1.16	11.33	1.78	17.33	0.69	23.33	0.45
5.50	1.23	11.50	1.70	17.50	0.68	23.50	0.44
5.67	1.32	11.67	1.62	17.67	0.67	23.67	0.44
5.83	1.41	11.83	1.56	17.83	0.66	23.83	0.43
6.00	1.52	12.00	1.50	18.00	0.65	24.00	0.43

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| CALIB             |
| NASHYD   (  0100)|   Area    (ha)=   3.09   Curve Number   (CN)= 48.0
|ID= 1 DT= 2.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.30

         NOTE:  RAINFALL WAS TRANSFORMED TO   2.0 MIN. TIME STEP.
```

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.033	0.44	6.033	1.66	12.033	1.44	18.03	0.64
0.067	0.44	6.067	1.66	12.067	1.44	18.07	0.64
0.100	0.44	6.100	1.66	12.100	1.44	18.10	0.64
0.133	0.44	6.133	1.66	12.133	1.44	18.13	0.64
0.167	0.44	6.167	1.66	12.167	1.44	18.17	0.64
0.200	0.45	6.200	1.82	12.200	1.39	18.20	0.63
0.233	0.45	6.233	1.82	12.233	1.39	18.23	0.63
0.267	0.45	6.267	1.82	12.267	1.39	18.27	0.63
0.300	0.45	6.300	1.82	12.300	1.39	18.30	0.63
0.333	0.45	6.333	1.82	12.333	1.39	18.33	0.63
0.367	0.46	6.367	2.02	12.367	1.34	18.37	0.62
0.400	0.46	6.400	2.02	12.400	1.34	18.40	0.62
0.433	0.46	6.433	2.02	12.433	1.34	18.43	0.62
0.467	0.46	6.467	2.02	12.467	1.34	18.47	0.62
0.500	0.46	6.500	2.02	12.500	1.34	18.50	0.62
0.533	0.46	6.533	2.27	12.533	1.30	18.53	0.61
0.567	0.46	6.567	2.27	12.567	1.30	18.57	0.61
0.600	0.46	6.600	2.27	12.600	1.30	18.60	0.61
0.633	0.46	6.633	2.27	12.633	1.30	18.63	0.61
0.667	0.46	6.667	2.27	12.667	1.30	18.67	0.61
0.700	0.47	6.700	2.59	12.700	1.25	18.70	0.60

0.733	0.47	6.733	2.59	12.733	1.25	18.73	0.60
0.767	0.47	6.767	2.59	12.767	1.25	18.77	0.60
0.800	0.47	6.800	2.59	12.800	1.25	18.80	0.60
0.833	0.47	6.833	2.59	12.833	1.25	18.83	0.60
0.867	0.48	6.867	3.04	12.867	1.22	18.87	0.60
0.900	0.48	6.900	3.04	12.900	1.22	18.90	0.60
0.933	0.48	6.933	3.04	12.933	1.22	18.93	0.60
0.967	0.48	6.967	3.04	12.967	1.22	18.97	0.60
1.000	0.48	7.000	3.04	13.000	1.22	19.00	0.60
1.033	0.49	7.033	3.68	13.033	1.18	19.03	0.59
1.067	0.49	7.067	3.68	13.067	1.18	19.07	0.59
1.100	0.49	7.100	3.68	13.100	1.18	19.10	0.59
1.133	0.49	7.133	3.68	13.133	1.18	19.13	0.59
1.167	0.49	7.167	3.68	13.167	1.18	19.17	0.59
1.200	0.51	7.200	4.70	13.200	1.15	19.20	0.58
1.233	0.51	7.233	4.70	13.233	1.15	19.23	0.58
1.267	0.51	7.267	4.70	13.267	1.15	19.27	0.58
1.300	0.51	7.300	4.70	13.300	1.15	19.30	0.58
1.333	0.51	7.333	4.70	13.333	1.15	19.33	0.58
1.367	0.52	7.367	6.52	13.367	1.11	19.37	0.57
1.400	0.52	7.400	6.52	13.400	1.11	19.40	0.57
1.433	0.52	7.433	6.52	13.433	1.11	19.43	0.57
1.467	0.52	7.467	6.52	13.467	1.11	19.47	0.57
1.500	0.52	7.500	6.52	13.500	1.11	19.50	0.57
1.533	0.53	7.533	10.72	13.533	1.08	19.53	0.57
1.567	0.53	7.567	10.72	13.567	1.08	19.57	0.57
1.600	0.53	7.600	10.72	13.600	1.08	19.60	0.57
1.633	0.53	7.633	10.72	13.633	1.08	19.63	0.57
1.667	0.53	7.667	10.72	13.667	1.08	19.67	0.57
1.700	0.54	7.700	28.89	13.700	1.06	19.70	0.56
1.733	0.54	7.733	28.90	13.733	1.06	19.73	0.56
1.767	0.54	7.767	28.90	13.767	1.06	19.77	0.56
1.800	0.54	7.800	28.90	13.800	1.06	19.80	0.56
1.833	0.54	7.833	28.90	13.833	1.06	19.83	0.56
1.867	0.56	7.867	118.34	13.867	1.03	19.87	0.55
1.900	0.56	7.900	118.36	13.900	1.03	19.90	0.55
1.933	0.56	7.933	118.36	13.933	1.03	19.93	0.55
1.967	0.56	7.967	118.36	13.967	1.03	19.97	0.55
2.000	0.56	8.000	118.36	14.000	1.03	20.00	0.55
2.033	0.57	8.033	38.74	14.033	1.00	20.03	0.55
2.067	0.57	8.067	38.72	14.067	1.00	20.07	0.55
2.100	0.57	8.100	38.72	14.100	1.00	20.10	0.55
2.133	0.57	8.133	38.72	14.133	1.00	20.13	0.55
2.167	0.57	8.167	38.72	14.167	1.00	20.17	0.55
2.200	0.58	8.200	19.12	14.200	0.98	20.20	0.54
2.233	0.58	8.233	19.11	14.233	0.98	20.23	0.54
2.267	0.58	8.267	19.11	14.267	0.98	20.27	0.54
2.300	0.58	8.300	19.11	14.300	0.98	20.30	0.54
2.333	0.58	8.333	19.11	14.333	0.98	20.33	0.54
2.367	0.60	8.367	12.38	14.367	0.96	20.37	0.53
2.400	0.60	8.400	12.38	14.400	0.96	20.40	0.53
2.433	0.60	8.433	12.38	14.433	0.96	20.43	0.53
2.467	0.60	8.467	12.38	14.467	0.96	20.47	0.53
2.500	0.60	8.500	12.38	14.500	0.96	20.50	0.53
2.533	0.62	8.533	9.08	14.533	0.93	20.53	0.53
2.567	0.62	8.567	9.08	14.567	0.93	20.57	0.53
2.600	0.62	8.600	9.08	14.600	0.93	20.60	0.53
2.633	0.62	8.633	9.08	14.633	0.93	20.63	0.53
2.667	0.62	8.667	9.08	14.667	0.93	20.67	0.53
2.700	0.63	8.700	7.16	14.700	0.91	20.70	0.52
2.733	0.63	8.733	7.16	14.733	0.91	20.73	0.52

2.767	0.63	8.767	7.16	14.767	0.91	20.77	0.52
2.800	0.63	8.800	7.16	14.800	0.91	20.80	0.52
2.833	0.63	8.833	7.16	14.833	0.91	20.83	0.52
2.867	0.65	8.867	5.91	14.867	0.89	20.87	0.51
2.900	0.65	8.900	5.91	14.900	0.89	20.90	0.51
2.933	0.65	8.933	5.91	14.933	0.89	20.93	0.51
2.967	0.65	8.967	5.91	14.967	0.89	20.97	0.51
3.000	0.65	9.000	5.91	15.000	0.89	21.00	0.51
3.033	0.67	9.033	5.03	15.033	0.88	21.03	0.51
3.067	0.67	9.067	5.03	15.067	0.88	21.07	0.51
3.100	0.67	9.100	5.03	15.100	0.88	21.10	0.51
3.133	0.67	9.133	5.03	15.133	0.88	21.13	0.51
3.167	0.67	9.167	5.03	15.167	0.88	21.17	0.51
3.200	0.70	9.200	4.38	15.200	0.86	21.20	0.50
3.233	0.70	9.233	4.38	15.233	0.86	21.23	0.50
3.267	0.70	9.267	4.38	15.267	0.86	21.27	0.50
3.300	0.70	9.300	4.38	15.300	0.86	21.30	0.50
3.333	0.70	9.333	4.38	15.333	0.86	21.33	0.50
3.367	0.72	9.367	3.89	15.367	0.84	21.37	0.50
3.400	0.72	9.400	3.89	15.400	0.84	21.40	0.50
3.433	0.72	9.433	3.89	15.433	0.84	21.43	0.50
3.467	0.72	9.467	3.89	15.467	0.84	21.47	0.50
3.500	0.72	9.500	3.88	15.500	0.84	21.50	0.50
3.533	0.74	9.533	3.49	15.533	0.82	21.53	0.49
3.567	0.74	9.567	3.49	15.567	0.82	21.57	0.49
3.600	0.74	9.600	3.49	15.600	0.82	21.60	0.49
3.633	0.74	9.633	3.49	15.633	0.82	21.63	0.49
3.667	0.74	9.667	3.49	15.667	0.82	21.67	0.49
3.700	0.77	9.700	3.17	15.700	0.81	21.70	0.49
3.733	0.77	9.733	3.17	15.733	0.81	21.73	0.49
3.767	0.77	9.767	3.17	15.767	0.81	21.77	0.49
3.800	0.77	9.800	3.17	15.800	0.81	21.80	0.49
3.833	0.77	9.833	3.17	15.833	0.81	21.83	0.49
3.867	0.80	9.867	2.91	15.867	0.79	21.87	0.48
3.900	0.80	9.900	2.91	15.900	0.79	21.90	0.48
3.933	0.80	9.933	2.91	15.933	0.79	21.93	0.48
3.967	0.80	9.967	2.91	15.967	0.79	21.97	0.48
4.000	0.80	10.000	2.91	16.000	0.79	22.00	0.48
4.033	0.83	10.033	2.69	16.033	0.78	22.03	0.48
4.067	0.83	10.067	2.69	16.067	0.78	22.07	0.48
4.100	0.83	10.100	2.69	16.100	0.78	22.10	0.48
4.133	0.83	10.133	2.69	16.133	0.78	22.13	0.48
4.167	0.83	10.167	2.69	16.167	0.78	22.17	0.48
4.200	0.87	10.200	2.50	16.200	0.76	22.20	0.47
4.233	0.87	10.233	2.50	16.233	0.76	22.23	0.47
4.267	0.87	10.267	2.50	16.267	0.76	22.27	0.47
4.300	0.87	10.300	2.50	16.300	0.76	22.30	0.47
4.333	0.87	10.333	2.50	16.333	0.76	22.33	0.47
4.367	0.90	10.367	2.34	16.367	0.75	22.37	0.47
4.400	0.90	10.400	2.34	16.400	0.75	22.40	0.47
4.433	0.90	10.433	2.34	16.433	0.75	22.43	0.47
4.467	0.90	10.467	2.34	16.467	0.75	22.47	0.47
4.500	0.90	10.500	2.34	16.500	0.75	22.50	0.47
4.533	0.94	10.533	2.20	16.533	0.74	22.53	0.46
4.567	0.94	10.567	2.20	16.567	0.74	22.57	0.46
4.600	0.94	10.600	2.20	16.600	0.74	22.60	0.46
4.633	0.94	10.633	2.20	16.633	0.74	22.63	0.46
4.667	0.94	10.667	2.20	16.667	0.74	22.67	0.46
4.700	0.99	10.700	2.07	16.700	0.73	22.70	0.46
4.733	0.99	10.733	2.07	16.733	0.73	22.73	0.46
4.767	0.99	10.767	2.07	16.767	0.73	22.77	0.46

4.800	0.99	10.800	2.07	16.800	0.73	22.80	0.46
4.833	0.99	10.833	2.07	16.833	0.73	22.83	0.46
4.867	1.04	10.867	1.96	16.867	0.71	22.87	0.45
4.900	1.04	10.900	1.96	16.900	0.71	22.90	0.45
4.933	1.04	10.933	1.96	16.933	0.71	22.93	0.45
4.967	1.04	10.967	1.96	16.967	0.71	22.97	0.45
5.000	1.04	11.000	1.96	17.000	0.71	23.00	0.45
5.033	1.10	11.033	1.86	17.033	0.70	23.03	0.45
5.067	1.10	11.067	1.86	17.067	0.70	23.07	0.45
5.100	1.10	11.100	1.86	17.100	0.70	23.10	0.45
5.133	1.10	11.133	1.86	17.133	0.70	23.13	0.45
5.167	1.10	11.167	1.86	17.167	0.70	23.17	0.45
5.200	1.16	11.200	1.78	17.200	0.69	23.20	0.45
5.233	1.16	11.233	1.78	17.233	0.69	23.23	0.45
5.267	1.16	11.267	1.78	17.267	0.69	23.27	0.45
5.300	1.16	11.300	1.78	17.300	0.69	23.30	0.45
5.333	1.16	11.333	1.78	17.333	0.69	23.33	0.45
5.367	1.23	11.367	1.70	17.367	0.68	23.37	0.44
5.400	1.23	11.400	1.70	17.400	0.68	23.40	0.44
5.433	1.23	11.433	1.70	17.433	0.68	23.43	0.44
5.467	1.23	11.467	1.70	17.467	0.68	23.47	0.44
5.500	1.23	11.500	1.70	17.500	0.68	23.50	0.44
5.533	1.32	11.533	1.62	17.533	0.67	23.53	0.44
5.567	1.32	11.567	1.62	17.567	0.67	23.57	0.44
5.600	1.32	11.600	1.62	17.600	0.67	23.60	0.44
5.633	1.32	11.633	1.62	17.633	0.67	23.63	0.44
5.667	1.32	11.667	1.62	17.667	0.67	23.67	0.44
5.700	1.41	11.700	1.56	17.700	0.66	23.70	0.43
5.733	1.41	11.733	1.56	17.733	0.66	23.73	0.43
5.767	1.41	11.767	1.56	17.767	0.66	23.77	0.43
5.800	1.41	11.800	1.56	17.800	0.66	23.80	0.43
5.833	1.41	11.833	1.56	17.833	0.66	23.83	0.43
5.867	1.52	11.867	1.50	17.867	0.65	23.87	0.43
5.900	1.52	11.900	1.50	17.900	0.65	23.90	0.43
5.933	1.52	11.933	1.50	17.933	0.65	23.93	0.43
5.967	1.52	11.967	1.50	17.967	0.65	23.97	0.43
6.000	1.52	12.000	1.50	18.000	0.65	24.00	0.43

```
Unit Hyd Qpeak  (cms)=   0.394

PEAK FLOW       (cms)=   0.063 (i)
TIME TO PEAK    (hrs)=   8.333
RUNOFF VOLUME    (mm)=  11.569
TOTAL RAINFALL   (mm)=  67.502
RUNOFF COEFFICIENT   =   0.171

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
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```
   V    V   I    SSSSS  U   U    A    L               (v 6.2.2001)
   V    V   I    SS     U   U   A A   L
    V  V    I     SS    U   U  AAAAA  L
    V  V    I      SS   U   U  A   A  L
     VV     I    SSSSS  UUUUU  A   A  LLLLL

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



```
    OOO     T      T    H   H    Y    M   M   OOO
```

Developed and Distributed by Smart City Water Inc

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

Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat

Output filename:
C:\Users\zhouj\AppData\Local\Civica\VH5\642fa701-08f9-4281-a674-e9ad409f1aac\cd19d832-8bac-4494-8357-0ef5a0ebce1e\scenar
Summary filename:
C:\Users\zhouj\AppData\Local\Civica\VH5\642fa701-08f9-4281-a674-e9ad409f1aac\cd19d832-8bac-4494-8357-0ef5a0ebce1e\scenar

DATE: 08-31-2023   TIME: 09:30:51

USER:

COMMENTS: ____

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 **********************************************
 ** SIMULATION : Run 04                      **
 **********************************************

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| CHICAGO STORM    |    IDF curve parameters: A=1676.200
| Ptotal= 78.08 mm |                          B=   8.300
--------------------                          C=   0.858
                        used in:   INTENSITY =  A / (t + B)^C

                        Duration of storm  = 24.00 hrs
                        Storm time step    = 10.00 min
                        Time to peak ratio =  0.33
```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.17	0.49	6.17	1.87	12.17	1.62	18.17	0.72
0.33	0.50	6.33	2.06	12.33	1.57	18.33	0.70
0.50	0.51	6.50	2.29	12.50	1.51	18.50	0.69
0.67	0.52	6.67	2.58	12.67	1.46	18.67	0.69
0.83	0.53	6.83	2.95	12.83	1.41	18.83	0.68
1.00	0.54	7.00	3.47	13.00	1.37	19.00	0.67
1.17	0.55	7.17	4.22	13.17	1.33	19.17	0.66
1.33	0.56	7.33	5.41	13.33	1.29	19.33	0.65
1.50	0.58	7.50	7.56	13.50	1.25	19.50	0.64
1.67	0.59	7.67	12.52	13.67	1.22	19.67	0.63
1.83	0.60	7.83	34.10	13.83	1.19	19.83	0.62
2.00	0.62	8.00	138.40	14.00	1.16	20.00	0.62
2.17	0.64	8.17	45.75	14.17	1.13	20.17	0.61
2.33	0.65	8.33	22.49	14.33	1.10	20.33	0.60
2.50	0.67	8.50	14.49	14.50	1.07	20.50	0.59

2.67	0.69	8.67	10.58	14.67	1.05	20.67	0.59
2.83	0.71	8.83	8.31	14.83	1.03	20.83	0.58
3.00	0.73	9.00	6.83	15.00	1.00	21.00	0.57
3.17	0.75	9.17	5.80	15.17	0.98	21.17	0.57
3.33	0.78	9.33	5.04	15.33	0.96	21.33	0.56
3.50	0.80	9.50	4.46	15.50	0.94	21.50	0.56
3.67	0.83	9.67	4.00	15.67	0.92	21.67	0.55
3.83	0.86	9.83	3.63	15.83	0.91	21.83	0.54
4.00	0.90	10.00	3.32	16.00	0.89	22.00	0.54
4.17	0.93	10.17	3.07	16.17	0.87	22.17	0.53
4.33	0.97	10.33	2.85	16.33	0.86	22.33	0.53
4.50	1.01	10.50	2.66	16.50	0.84	22.50	0.52
4.67	1.06	10.67	2.50	16.67	0.83	22.67	0.52
4.83	1.11	10.83	2.35	16.83	0.81	22.83	0.51
5.00	1.17	11.00	2.23	17.00	0.80	23.00	0.51
5.17	1.23	11.17	2.11	17.17	0.79	23.17	0.50
5.33	1.31	11.33	2.01	17.33	0.77	23.33	0.50
5.50	1.39	11.50	1.92	17.50	0.76	23.50	0.49
5.67	1.48	11.67	1.83	17.67	0.75	23.67	0.49
5.83	1.59	11.83	1.76	17.83	0.74	23.83	0.48
6.00	1.72	12.00	1.69	18.00	0.73	24.00	0.48

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| CALIB              |
| NASHYD   (  0100)|    Area     (ha)=    3.09    Curve Number    (CN)= 48.0
|ID= 1 DT= 2.0 min |    Ia       (mm)=    5.00    # of Linear Res.(N)= 3.00
--------------------    U.H. Tp(hrs)=    0.30
```

NOTE: RAINFALL WAS TRANSFORMED TO 2.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	' TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.033	0.49	6.033	1.87	12.033	1.62	18.03	0.72
0.067	0.49	6.067	1.87	12.067	1.62	18.07	0.72
0.100	0.49	6.100	1.87	12.100	1.62	18.10	0.72
0.133	0.49	6.133	1.87	12.133	1.62	18.13	0.72
0.167	0.49	6.167	1.87	12.167	1.62	18.17	0.72
0.200	0.50	6.200	2.06	12.200	1.57	18.20	0.70
0.233	0.50	6.233	2.06	12.233	1.57	18.23	0.70
0.267	0.50	6.267	2.06	12.267	1.57	18.27	0.70
0.300	0.50	6.300	2.06	12.300	1.57	18.30	0.70
0.333	0.50	6.333	2.06	12.333	1.57	18.33	0.70
0.367	0.51	6.367	2.29	12.367	1.51	18.37	0.69
0.400	0.51	6.400	2.29	12.400	1.51	18.40	0.69
0.433	0.51	6.433	2.29	12.433	1.51	18.43	0.69
0.467	0.51	6.467	2.29	12.467	1.51	18.47	0.69
0.500	0.51	6.500	2.29	12.500	1.51	18.50	0.69
0.533	0.52	6.533	2.58	12.533	1.46	18.53	0.69
0.567	0.52	6.567	2.58	12.567	1.46	18.57	0.69
0.600	0.52	6.600	2.58	12.600	1.46	18.60	0.69
0.633	0.52	6.633	2.58	12.633	1.46	18.63	0.69
0.667	0.52	6.667	2.58	12.667	1.46	18.67	0.69
0.700	0.53	6.700	2.95	12.700	1.41	18.70	0.68
0.733	0.53	6.733	2.95	12.733	1.41	18.73	0.68
0.767	0.53	6.767	2.95	12.767	1.41	18.77	0.68
0.800	0.53	6.800	2.95	12.800	1.41	18.80	0.68
0.833	0.53	6.833	2.95	12.833	1.41	18.83	0.68

0.867	0.54	6.867	3.47	12.867	1.37	18.87	0.67
0.900	0.54	6.900	3.47	12.900	1.37	18.90	0.67
0.933	0.54	6.933	3.47	12.933	1.37	18.93	0.67
0.967	0.54	6.967	3.47	12.967	1.37	18.97	0.67
1.000	0.54	7.000	3.47	13.000	1.37	19.00	0.67
1.033	0.55	7.033	4.22	13.033	1.33	19.03	0.66
1.067	0.55	7.067	4.22	13.067	1.33	19.07	0.66
1.100	0.55	7.100	4.22	13.100	1.33	19.10	0.66
1.133	0.55	7.133	4.22	13.133	1.33	19.13	0.66
1.167	0.55	7.167	4.22	13.167	1.33	19.17	0.66
1.200	0.56	7.200	5.41	13.200	1.29	19.20	0.65
1.233	0.56	7.233	5.41	13.233	1.29	19.23	0.65
1.267	0.56	7.267	5.41	13.267	1.29	19.27	0.65
1.300	0.56	7.300	5.41	13.300	1.29	19.30	0.65
1.333	0.56	7.333	5.41	13.333	1.29	19.33	0.65
1.367	0.58	7.367	7.56	13.367	1.25	19.37	0.64
1.400	0.58	7.400	7.56	13.400	1.25	19.40	0.64
1.433	0.58	7.433	7.56	13.433	1.25	19.43	0.64
1.467	0.58	7.467	7.56	13.467	1.25	19.47	0.64
1.500	0.58	7.500	7.56	13.500	1.25	19.50	0.64
1.533	0.59	7.533	12.52	13.533	1.22	19.53	0.63
1.567	0.59	7.567	12.52	13.567	1.22	19.57	0.63
1.600	0.59	7.600	12.52	13.600	1.22	19.60	0.63
1.633	0.59	7.633	12.52	13.633	1.22	19.63	0.63
1.667	0.59	7.667	12.52	13.667	1.22	19.67	0.63
1.700	0.60	7.700	34.09	13.700	1.19	19.70	0.62
1.733	0.60	7.733	34.10	13.733	1.19	19.73	0.62
1.767	0.60	7.767	34.10	13.767	1.19	19.77	0.62
1.800	0.60	7.800	34.10	13.800	1.19	19.80	0.62
1.833	0.60	7.833	34.10	13.833	1.19	19.83	0.62
1.867	0.62	7.867	138.38	13.867	1.16	19.87	0.62
1.900	0.62	7.900	138.40	13.900	1.16	19.90	0.62
1.933	0.62	7.933	138.40	13.933	1.16	19.93	0.62
1.967	0.62	7.967	138.40	13.967	1.16	19.97	0.62
2.000	0.62	8.000	138.40	14.000	1.16	20.00	0.62
2.033	0.64	8.033	45.77	14.033	1.13	20.03	0.61
2.067	0.64	8.067	45.75	14.067	1.13	20.07	0.61
2.100	0.64	8.100	45.75	14.100	1.13	20.10	0.61
2.133	0.64	8.133	45.75	14.133	1.13	20.13	0.61
2.167	0.64	8.167	45.75	14.167	1.13	20.17	0.61
2.200	0.65	8.200	22.50	14.200	1.10	20.20	0.60
2.233	0.65	8.233	22.49	14.233	1.10	20.23	0.60
2.267	0.65	8.267	22.49	14.267	1.10	20.27	0.60
2.300	0.65	8.300	22.49	14.300	1.10	20.30	0.60
2.333	0.65	8.333	22.49	14.333	1.10	20.33	0.60
2.367	0.67	8.367	14.49	14.367	1.07	20.37	0.59
2.400	0.67	8.400	14.49	14.400	1.07	20.40	0.59
2.433	0.67	8.433	14.49	14.433	1.07	20.43	0.59
2.467	0.67	8.467	14.49	14.467	1.07	20.47	0.59
2.500	0.67	8.500	14.49	14.500	1.07	20.50	0.59
2.533	0.69	8.533	10.58	14.533	1.05	20.53	0.59
2.567	0.69	8.567	10.58	14.567	1.05	20.57	0.59
2.600	0.69	8.600	10.58	14.600	1.05	20.60	0.59
2.633	0.69	8.633	10.58	14.633	1.05	20.63	0.59
2.667	0.69	8.667	10.58	14.667	1.05	20.67	0.59
2.700	0.71	8.700	8.31	14.700	1.03	20.70	0.58
2.733	0.71	8.733	8.31	14.733	1.03	20.73	0.58
2.767	0.71	8.767	8.31	14.767	1.03	20.77	0.58
2.800	0.71	8.800	8.31	14.800	1.03	20.80	0.58
2.833	0.71	8.833	8.31	14.833	1.03	20.83	0.58
2.867	0.73	8.867	6.83	14.867	1.00	20.87	0.57

2.900	0.73	8.900	6.83	14.900	1.00	20.90	0.57
2.933	0.73	8.933	6.83	14.933	1.00	20.93	0.57
2.967	0.73	8.967	6.83	14.967	1.00	20.97	0.57
3.000	0.73	9.000	6.83	15.000	1.00	21.00	0.57
3.033	0.75	9.033	5.80	15.033	0.98	21.03	0.57
3.067	0.75	9.067	5.80	15.067	0.98	21.07	0.57
3.100	0.75	9.100	5.80	15.100	0.98	21.10	0.57
3.133	0.75	9.133	5.80	15.133	0.98	21.13	0.57
3.167	0.75	9.167	5.80	15.167	0.98	21.17	0.57
3.200	0.78	9.200	5.04	15.200	0.96	21.20	0.56
3.233	0.78	9.233	5.04	15.233	0.96	21.23	0.56
3.267	0.78	9.267	5.04	15.267	0.96	21.27	0.56
3.300	0.78	9.300	5.04	15.300	0.96	21.30	0.56
3.333	0.78	9.333	5.04	15.333	0.96	21.33	0.56
3.367	0.80	9.367	4.46	15.367	0.94	21.37	0.56
3.400	0.80	9.400	4.46	15.400	0.94	21.40	0.56
3.433	0.80	9.433	4.46	15.433	0.94	21.43	0.56
3.467	0.80	9.467	4.46	15.467	0.94	21.47	0.56
3.500	0.80	9.500	4.46	15.500	0.94	21.50	0.56
3.533	0.83	9.533	4.00	15.533	0.92	21.53	0.55
3.567	0.83	9.567	4.00	15.567	0.92	21.57	0.55
3.600	0.83	9.600	4.00	15.600	0.92	21.60	0.55
3.633	0.83	9.633	4.00	15.633	0.92	21.63	0.55
3.667	0.83	9.667	4.00	15.667	0.92	21.67	0.55
3.700	0.86	9.700	3.63	15.700	0.91	21.70	0.54
3.733	0.86	9.733	3.63	15.733	0.91	21.73	0.54
3.767	0.86	9.767	3.63	15.767	0.91	21.77	0.54
3.800	0.86	9.800	3.63	15.800	0.91	21.80	0.54
3.833	0.86	9.833	3.63	15.833	0.91	21.83	0.54
3.867	0.90	9.867	3.32	15.867	0.89	21.87	0.54
3.900	0.90	9.900	3.32	15.900	0.89	21.90	0.54
3.933	0.90	9.933	3.32	15.933	0.89	21.93	0.54
3.967	0.90	9.967	3.32	15.967	0.89	21.97	0.54
4.000	0.90	10.000	3.32	16.000	0.89	22.00	0.54
4.033	0.93	10.033	3.07	16.033	0.87	22.03	0.53
4.067	0.93	10.067	3.07	16.067	0.87	22.07	0.53
4.100	0.93	10.100	3.07	16.100	0.87	22.10	0.53
4.133	0.93	10.133	3.07	16.133	0.87	22.13	0.53
4.167	0.93	10.167	3.07	16.167	0.87	22.17	0.53
4.200	0.97	10.200	2.85	16.200	0.86	22.20	0.53
4.233	0.97	10.233	2.85	16.233	0.86	22.23	0.53
4.267	0.97	10.267	2.85	16.267	0.86	22.27	0.53
4.300	0.97	10.300	2.85	16.300	0.86	22.30	0.53
4.333	0.97	10.333	2.85	16.333	0.86	22.33	0.53
4.367	1.01	10.367	2.66	16.367	0.84	22.37	0.52
4.400	1.01	10.400	2.66	16.400	0.84	22.40	0.52
4.433	1.01	10.433	2.66	16.433	0.84	22.43	0.52
4.467	1.01	10.467	2.66	16.467	0.84	22.47	0.52
4.500	1.01	10.500	2.66	16.500	0.84	22.50	0.52
4.533	1.06	10.533	2.50	16.533	0.83	22.53	0.52
4.567	1.06	10.567	2.50	16.567	0.83	22.57	0.52
4.600	1.06	10.600	2.50	16.600	0.83	22.60	0.52
4.633	1.06	10.633	2.50	16.633	0.83	22.63	0.52
4.667	1.06	10.667	2.50	16.667	0.83	22.67	0.52
4.700	1.11	10.700	2.35	16.700	0.81	22.70	0.51
4.733	1.11	10.733	2.35	16.733	0.81	22.73	0.51
4.767	1.11	10.767	2.35	16.767	0.81	22.77	0.51
4.800	1.11	10.800	2.35	16.800	0.81	22.80	0.51
4.833	1.11	10.833	2.35	16.833	0.81	22.83	0.51
4.867	1.17	10.867	2.23	16.867	0.80	22.87	0.51
4.900	1.17	10.900	2.23	16.900	0.80	22.90	0.51

4.933	1.17	10.933	2.23	16.933	0.80	22.93	0.51
4.967	1.17	10.967	2.23	16.967	0.80	22.97	0.51
5.000	1.17	11.000	2.23	17.000	0.80	23.00	0.51
5.033	1.23	11.033	2.11	17.033	0.79	23.03	0.50
5.067	1.23	11.067	2.11	17.067	0.79	23.07	0.50
5.100	1.23	11.100	2.11	17.100	0.79	23.10	0.50
5.133	1.23	11.133	2.11	17.133	0.79	23.13	0.50
5.167	1.23	11.167	2.11	17.167	0.79	23.17	0.50
5.200	1.31	11.200	2.01	17.200	0.77	23.20	0.50
5.233	1.31	11.233	2.01	17.233	0.77	23.23	0.50
5.267	1.31	11.267	2.01	17.267	0.77	23.27	0.50
5.300	1.31	11.300	2.01	17.300	0.77	23.30	0.50
5.333	1.31	11.333	2.01	17.333	0.77	23.33	0.50
5.367	1.39	11.367	1.92	17.367	0.76	23.37	0.49
5.400	1.39	11.400	1.92	17.400	0.76	23.40	0.49
5.433	1.39	11.433	1.92	17.433	0.76	23.43	0.49
5.467	1.39	11.467	1.92	17.467	0.76	23.47	0.49
5.500	1.39	11.500	1.92	17.500	0.76	23.50	0.49
5.533	1.48	11.533	1.83	17.533	0.75	23.53	0.49
5.567	1.48	11.567	1.83	17.567	0.75	23.57	0.49
5.600	1.48	11.600	1.83	17.600	0.75	23.60	0.49
5.633	1.48	11.633	1.83	17.633	0.75	23.63	0.49
5.667	1.48	11.667	1.83	17.667	0.75	23.67	0.49
5.700	1.59	11.700	1.76	17.700	0.74	23.70	0.48
5.733	1.59	11.733	1.76	17.733	0.74	23.73	0.48
5.767	1.59	11.767	1.76	17.767	0.74	23.77	0.48
5.800	1.59	11.800	1.76	17.800	0.74	23.80	0.48
5.833	1.59	11.833	1.76	17.833	0.74	23.83	0.48
5.867	1.72	11.867	1.69	17.867	0.73	23.87	0.48
5.900	1.72	11.900	1.69	17.900	0.73	23.90	0.48
5.933	1.72	11.933	1.69	17.933	0.73	23.93	0.48
5.967	1.72	11.967	1.69	17.967	0.73	23.97	0.48
6.000	1.72	12.000	1.69	18.000	0.73	24.00	0.48

Unit Hyd Qpeak (cms)= 0.394

PEAK FLOW (cms)= 0.086 (i)
TIME TO PEAK (hrs)= 8.333
RUNOFF VOLUME (mm)= 15.334
TOTAL RAINFALL (mm)= 78.076
RUNOFF COEFFICIENT = 0.196

(i) 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 6.2.2001)
      V    V   I    SS     U   U   A A   L
       V  V    I     SS    U   U  AAAAA  L
       V  V    I      SS   U   U  A   A  L
        VV     I    SSSSS  UUUUU  A   A  LLLLL

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

Developed and Distributed by Smart City Water Inc

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

Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat

Output filename:
C:\Users\zhouj\AppData\Local\Civica\VH5\642fa701-08f9-4281-a674-e9ad409f1aac\cd630faa-3105-4979-8d0e-acb35d9c1c84\scenar
Summary filename:
C:\Users\zhouj\AppData\Local\Civica\VH5\642fa701-08f9-4281-a674-e9ad409f1aac\cd630faa-3105-4979-8d0e-acb35d9c1c84\scenar

DATE: 08-31-2023   TIME: 09:30:51

USER:

COMMENTS: ____

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  **********************************************
  ** SIMULATION : Run 05                      **
  **********************************************

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| CHICAGO STORM    |    IDF curve parameters: A=1973.100
| Ptotal= 85.42 mm |                          B=   9.000
--------------------                          C=   0.868
                        used in:   INTENSITY =  A / (t + B)^C

                        Duration of storm  = 24.00 hrs
                        Storm time step    = 10.00 min
                        Time to peak ratio =  0.33
```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.17	0.50	6.17	1.98	12.17	1.71	18.17	0.74
0.33	0.51	6.33	2.18	12.33	1.64	18.33	0.73
0.50	0.52	6.50	2.43	12.50	1.58	18.50	0.72
0.67	0.53	6.67	2.74	12.67	1.53	18.67	0.71
0.83	0.54	6.83	3.16	12.83	1.48	18.83	0.70
1.00	0.55	7.00	3.73	13.00	1.43	19.00	0.69
1.17	0.57	7.17	4.57	13.17	1.39	19.17	0.68
1.33	0.58	7.33	5.90	13.33	1.35	19.33	0.67
1.50	0.59	7.50	8.33	13.50	1.31	19.50	0.66
1.67	0.61	7.67	13.99	13.67	1.27	19.67	0.65
1.83	0.62	7.83	38.66	13.83	1.24	19.83	0.64
2.00	0.64	8.00	153.18	14.00	1.20	20.00	0.63
2.17	0.65	8.17	51.95	14.17	1.17	20.17	0.63
2.33	0.67	8.33	25.44	14.33	1.14	20.33	0.62
2.50	0.69	8.50	16.25	14.50	1.12	20.50	0.61
2.67	0.71	8.67	11.77	14.67	1.09	20.67	0.60
2.83	0.73	8.83	9.18	14.83	1.07	20.83	0.60
3.00	0.75	9.00	7.50	15.00	1.04	21.00	0.59
3.17	0.78	9.17	6.33	15.17	1.02	21.17	0.58

3.33	0.80	9.33	5.48	15.33	1.00	21.33	0.58
3.50	0.83	9.50	4.83	15.50	0.98	21.50	0.57
3.67	0.86	9.67	4.32	15.67	0.96	21.67	0.56
3.83	0.89	9.83	3.91	15.83	0.94	21.83	0.56
4.00	0.93	10.00	3.57	16.00	0.92	22.00	0.55
4.17	0.97	10.17	3.28	16.17	0.90	22.17	0.55
4.33	1.01	10.33	3.04	16.33	0.89	22.33	0.54
4.50	1.05	10.50	2.84	16.50	0.87	22.50	0.53
4.67	1.10	10.67	2.66	16.67	0.85	22.67	0.53
4.83	1.16	10.83	2.50	16.83	0.84	22.83	0.52
5.00	1.22	11.00	2.36	17.00	0.82	23.00	0.52
5.17	1.29	11.17	2.24	17.17	0.81	23.17	0.51
5.33	1.36	11.33	2.12	17.33	0.80	23.33	0.51
5.50	1.45	11.50	2.02	17.50	0.78	23.50	0.50
5.67	1.55	11.67	1.93	17.67	0.77	23.67	0.50
5.83	1.67	11.83	1.85	17.83	0.76	23.83	0.49
6.00	1.81	12.00	1.78	18.00	0.75	24.00	0.49

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| CALIB              |
| NASHYD   (  0100)|   Area    (ha)=   3.09   Curve Number   (CN)= 48.0
|ID= 1 DT= 2.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.30

         NOTE:  RAINFALL WAS TRANSFORMED TO   2.0 MIN. TIME STEP.
```

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.033	0.50	6.033	1.98	12.033	1.71	18.03	0.74
0.067	0.50	6.067	1.98	12.067	1.71	18.07	0.74
0.100	0.50	6.100	1.98	12.100	1.71	18.10	0.74
0.133	0.50	6.133	1.98	12.133	1.71	18.13	0.74
0.167	0.50	6.167	1.98	12.167	1.71	18.17	0.74
0.200	0.51	6.200	2.18	12.200	1.64	18.20	0.73
0.233	0.51	6.233	2.18	12.233	1.64	18.23	0.73
0.267	0.51	6.267	2.18	12.267	1.64	18.27	0.73
0.300	0.51	6.300	2.18	12.300	1.64	18.30	0.73
0.333	0.51	6.333	2.18	12.333	1.64	18.33	0.73
0.367	0.52	6.367	2.43	12.367	1.58	18.37	0.72
0.400	0.52	6.400	2.43	12.400	1.58	18.40	0.72
0.433	0.52	6.433	2.43	12.433	1.58	18.43	0.72
0.467	0.52	6.467	2.43	12.467	1.58	18.47	0.72
0.500	0.52	6.500	2.43	12.500	1.58	18.50	0.72
0.533	0.53	6.533	2.74	12.533	1.53	18.53	0.71
0.567	0.53	6.567	2.74	12.567	1.53	18.57	0.71
0.600	0.53	6.600	2.74	12.600	1.53	18.60	0.71
0.633	0.53	6.633	2.74	12.633	1.53	18.63	0.71
0.667	0.53	6.667	2.74	12.667	1.53	18.67	0.71
0.700	0.54	6.700	3.16	12.700	1.48	18.70	0.70
0.733	0.54	6.733	3.16	12.733	1.48	18.73	0.70
0.767	0.54	6.767	3.16	12.767	1.48	18.77	0.70
0.800	0.54	6.800	3.16	12.800	1.48	18.80	0.70
0.833	0.54	6.833	3.16	12.833	1.48	18.83	0.70
0.867	0.55	6.867	3.73	12.867	1.43	18.87	0.69
0.900	0.55	6.900	3.73	12.900	1.43	18.90	0.69
0.933	0.55	6.933	3.73	12.933	1.43	18.93	0.69
0.967	0.55	6.967	3.73	12.967	1.43	18.97	0.69

1.000	0.55	7.000	3.73	13.000	1.43	19.00	0.69
1.033	0.57	7.033	4.57	13.033	1.39	19.03	0.68
1.067	0.57	7.067	4.57	13.067	1.39	19.07	0.68
1.100	0.57	7.100	4.57	13.100	1.39	19.10	0.68
1.133	0.57	7.133	4.57	13.133	1.39	19.13	0.68
1.167	0.57	7.167	4.57	13.167	1.39	19.17	0.68
1.200	0.58	7.200	5.90	13.200	1.35	19.20	0.67
1.233	0.58	7.233	5.90	13.233	1.35	19.23	0.67
1.267	0.58	7.267	5.90	13.267	1.35	19.27	0.67
1.300	0.58	7.300	5.90	13.300	1.35	19.30	0.67
1.333	0.58	7.333	5.90	13.333	1.35	19.33	0.67
1.367	0.59	7.367	8.33	13.367	1.31	19.37	0.66
1.400	0.59	7.400	8.33	13.400	1.31	19.40	0.66
1.433	0.59	7.433	8.33	13.433	1.31	19.43	0.66
1.467	0.59	7.467	8.33	13.467	1.31	19.47	0.66
1.500	0.59	7.500	8.33	13.500	1.31	19.50	0.66
1.533	0.61	7.533	13.99	13.533	1.27	19.53	0.65
1.567	0.61	7.567	13.99	13.567	1.27	19.57	0.65
1.600	0.61	7.600	13.99	13.600	1.27	19.60	0.65
1.633	0.61	7.633	13.99	13.633	1.27	19.63	0.65
1.667	0.61	7.667	13.99	13.667	1.27	19.67	0.65
1.700	0.62	7.700	38.66	13.700	1.24	19.70	0.64
1.733	0.62	7.733	38.66	13.733	1.24	19.73	0.64
1.767	0.62	7.767	38.66	13.767	1.24	19.77	0.64
1.800	0.62	7.800	38.66	13.800	1.24	19.80	0.64
1.833	0.62	7.833	38.66	13.833	1.24	19.83	0.64
1.867	0.64	7.867	153.15	13.867	1.20	19.87	0.63
1.900	0.64	7.900	153.18	13.900	1.20	19.90	0.63
1.933	0.64	7.933	153.18	13.933	1.20	19.93	0.63
1.967	0.64	7.967	153.18	13.967	1.20	19.97	0.63
2.000	0.64	8.000	153.18	14.000	1.20	20.00	0.63
2.033	0.65	8.033	51.97	14.033	1.17	20.03	0.63
2.067	0.65	8.067	51.95	14.067	1.17	20.07	0.63
2.100	0.65	8.100	51.95	14.100	1.17	20.10	0.63
2.133	0.65	8.133	51.95	14.133	1.17	20.13	0.63
2.167	0.65	8.167	51.95	14.167	1.17	20.17	0.63
2.200	0.67	8.200	25.44	14.200	1.14	20.20	0.62
2.233	0.67	8.233	25.44	14.233	1.14	20.23	0.62
2.267	0.67	8.267	25.44	14.267	1.14	20.27	0.62
2.300	0.67	8.300	25.44	14.300	1.14	20.30	0.62
2.333	0.67	8.333	25.44	14.333	1.14	20.33	0.62
2.367	0.69	8.367	16.25	14.367	1.12	20.37	0.61
2.400	0.69	8.400	16.25	14.400	1.12	20.40	0.61
2.433	0.69	8.433	16.25	14.433	1.12	20.43	0.61
2.467	0.69	8.467	16.25	14.467	1.12	20.47	0.61
2.500	0.69	8.500	16.25	14.500	1.12	20.50	0.61
2.533	0.71	8.533	11.78	14.533	1.09	20.53	0.60
2.567	0.71	8.567	11.77	14.567	1.09	20.57	0.60
2.600	0.71	8.600	11.77	14.600	1.09	20.60	0.60
2.633	0.71	8.633	11.77	14.633	1.09	20.63	0.60
2.667	0.71	8.667	11.77	14.667	1.09	20.67	0.60
2.700	0.73	8.700	9.18	14.700	1.07	20.70	0.60
2.733	0.73	8.733	9.18	14.733	1.07	20.73	0.60
2.767	0.73	8.767	9.18	14.767	1.07	20.77	0.60
2.800	0.73	8.800	9.18	14.800	1.07	20.80	0.60
2.833	0.73	8.833	9.18	14.833	1.07	20.83	0.60
2.867	0.75	8.867	7.50	14.867	1.04	20.87	0.59
2.900	0.75	8.900	7.50	14.900	1.04	20.90	0.59
2.933	0.75	8.933	7.50	14.933	1.04	20.93	0.59
2.967	0.75	8.967	7.50	14.967	1.04	20.97	0.59
3.000	0.75	9.000	7.50	15.000	1.04	21.00	0.59

3.033	0.78	9.033	6.33	15.033	1.02	21.03	0.58
3.067	0.78	9.067	6.33	15.067	1.02	21.07	0.58
3.100	0.78	9.100	6.33	15.100	1.02	21.10	0.58
3.133	0.78	9.133	6.33	15.133	1.02	21.13	0.58
3.167	0.78	9.167	6.33	15.167	1.02	21.17	0.58
3.200	0.80	9.200	5.48	15.200	1.00	21.20	0.58
3.233	0.80	9.233	5.48	15.233	1.00	21.23	0.58
3.267	0.80	9.267	5.48	15.267	1.00	21.27	0.58
3.300	0.80	9.300	5.48	15.300	1.00	21.30	0.58
3.333	0.80	9.333	5.48	15.333	1.00	21.33	0.58
3.367	0.83	9.367	4.83	15.367	0.98	21.37	0.57
3.400	0.83	9.400	4.83	15.400	0.98	21.40	0.57
3.433	0.83	9.433	4.83	15.433	0.98	21.43	0.57
3.467	0.83	9.467	4.83	15.467	0.98	21.47	0.57
3.500	0.83	9.500	4.83	15.500	0.98	21.50	0.57
3.533	0.86	9.533	4.32	15.533	0.96	21.53	0.56
3.567	0.86	9.567	4.32	15.567	0.96	21.57	0.56
3.600	0.86	9.600	4.32	15.600	0.96	21.60	0.56
3.633	0.86	9.633	4.32	15.633	0.96	21.63	0.56
3.667	0.86	9.667	4.32	15.667	0.96	21.67	0.56
3.700	0.89	9.700	3.91	15.700	0.94	21.70	0.56
3.733	0.89	9.733	3.91	15.733	0.94	21.73	0.56
3.767	0.89	9.767	3.91	15.767	0.94	21.77	0.56
3.800	0.89	9.800	3.91	15.800	0.94	21.80	0.56
3.833	0.89	9.833	3.91	15.833	0.94	21.83	0.56
3.867	0.93	9.867	3.57	15.867	0.92	21.87	0.55
3.900	0.93	9.900	3.57	15.900	0.92	21.90	0.55
3.933	0.93	9.933	3.57	15.933	0.92	21.93	0.55
3.967	0.93	9.967	3.57	15.967	0.92	21.97	0.55
4.000	0.93	10.000	3.57	16.000	0.92	22.00	0.55
4.033	0.97	10.033	3.28	16.033	0.90	22.03	0.55
4.067	0.97	10.067	3.28	16.067	0.90	22.07	0.55
4.100	0.97	10.100	3.28	16.100	0.90	22.10	0.55
4.133	0.97	10.133	3.28	16.133	0.90	22.13	0.55
4.167	0.97	10.167	3.28	16.167	0.90	22.17	0.55
4.200	1.01	10.200	3.04	16.200	0.89	22.20	0.54
4.233	1.01	10.233	3.04	16.233	0.89	22.23	0.54
4.267	1.01	10.267	3.04	16.267	0.89	22.27	0.54
4.300	1.01	10.300	3.04	16.300	0.89	22.30	0.54
4.333	1.01	10.333	3.04	16.333	0.89	22.33	0.54
4.367	1.05	10.367	2.84	16.367	0.87	22.37	0.53
4.400	1.05	10.400	2.84	16.400	0.87	22.40	0.53
4.433	1.05	10.433	2.84	16.433	0.87	22.43	0.53
4.467	1.05	10.467	2.84	16.467	0.87	22.47	0.53
4.500	1.05	10.500	2.84	16.500	0.87	22.50	0.53
4.533	1.10	10.533	2.66	16.533	0.85	22.53	0.53
4.567	1.10	10.567	2.66	16.567	0.85	22.57	0.53
4.600	1.10	10.600	2.66	16.600	0.85	22.60	0.53
4.633	1.10	10.633	2.66	16.633	0.85	22.63	0.53
4.667	1.10	10.667	2.66	16.667	0.85	22.67	0.53
4.700	1.16	10.700	2.50	16.700	0.84	22.70	0.52
4.733	1.16	10.733	2.50	16.733	0.84	22.73	0.52
4.767	1.16	10.767	2.50	16.767	0.84	22.77	0.52
4.800	1.16	10.800	2.50	16.800	0.84	22.80	0.52
4.833	1.16	10.833	2.50	16.833	0.84	22.83	0.52
4.867	1.22	10.867	2.36	16.867	0.82	22.87	0.52
4.900	1.22	10.900	2.36	16.900	0.82	22.90	0.52
4.933	1.22	10.933	2.36	16.933	0.82	22.93	0.52
4.967	1.22	10.967	2.36	16.967	0.82	22.97	0.52
5.000	1.22	11.000	2.36	17.000	0.82	23.00	0.52
5.033	1.29	11.033	2.24	17.033	0.81	23.03	0.51

5.067	1.29	11.067	2.24	17.067	0.81	23.07	0.51
5.100	1.29	11.100	2.24	17.100	0.81	23.10	0.51
5.133	1.29	11.133	2.24	17.133	0.81	23.13	0.51
5.167	1.29	11.167	2.24	17.167	0.81	23.17	0.51
5.200	1.36	11.200	2.12	17.200	0.80	23.20	0.51
5.233	1.36	11.233	2.12	17.233	0.80	23.23	0.51
5.267	1.36	11.267	2.12	17.267	0.80	23.27	0.51
5.300	1.36	11.300	2.12	17.300	0.80	23.30	0.51
5.333	1.36	11.333	2.12	17.333	0.80	23.33	0.51
5.367	1.45	11.367	2.02	17.367	0.78	23.37	0.50
5.400	1.45	11.400	2.02	17.400	0.78	23.40	0.50
5.433	1.45	11.433	2.02	17.433	0.78	23.43	0.50
5.467	1.45	11.467	2.02	17.467	0.78	23.47	0.50
5.500	1.45	11.500	2.02	17.500	0.78	23.50	0.50
5.533	1.55	11.533	1.93	17.533	0.77	23.53	0.50
5.567	1.55	11.567	1.93	17.567	0.77	23.57	0.50
5.600	1.55	11.600	1.93	17.600	0.77	23.60	0.50
5.633	1.55	11.633	1.93	17.633	0.77	23.63	0.50
5.667	1.55	11.667	1.93	17.667	0.77	23.67	0.50
5.700	1.67	11.700	1.85	17.700	0.76	23.70	0.49
5.733	1.67	11.733	1.85	17.733	0.76	23.73	0.49
5.767	1.67	11.767	1.85	17.767	0.76	23.77	0.49
5.800	1.67	11.800	1.85	17.800	0.76	23.80	0.49
5.833	1.67	11.833	1.85	17.833	0.76	23.83	0.49
5.867	1.81	11.867	1.78	17.867	0.75	23.87	0.49
5.900	1.81	11.900	1.78	17.900	0.75	23.90	0.49
5.933	1.81	11.933	1.78	17.933	0.75	23.93	0.49
5.967	1.81	11.967	1.78	17.967	0.75	23.97	0.49
6.000	1.81	12.000	1.78	18.000	0.75	24.00	0.49

```
    Unit Hyd Qpeak  (cms)=   0.394

    PEAK FLOW       (cms)=   0.106 (i)
    TIME TO PEAK    (hrs)=   8.333
    RUNOFF VOLUME    (mm)=  18.187
    TOTAL RAINFALL   (mm)=  85.418
    RUNOFF COEFFICIENT   =   0.213

    (i) 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 6.2.2001)
      V    V   I    SS     U   U   A A   L
       V  V    I     SS    U   U  AAAAA  L
       V  V    I      SS   U   U  A   A  L
        VV     I    SSSSS  UUUUU  A   A  LLLLL

       OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
      O   O    T      T    H   H   Y Y   MM MM  O   O
      O   O    T      T    H   H    Y    M   M  O   O
       OOO     T      T    H   H    Y    M   M   OOO
Developed and Distributed by Smart City Water Inc
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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 6.2\VO2\voin.dat

  Output  filename:
C:\Users\zhouj\AppData\Local\Civica\VH5\642fa701-08f9-4281-a674-e9ad409f1aac\fb18e0
a8-c252-4ee4-89b2-0072c0b62d80\scenar
  Summary filename:
C:\Users\zhouj\AppData\Local\Civica\VH5\642fa701-08f9-4281-a674-e9ad409f1aac\fb18e0
a8-c252-4ee4-89b2-0072c0b62d80\scenar


DATE: 08-31-2023                         TIME: 09:30:51

USER:


COMMENTS: ____________________________________________________________


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  ************************************************
  ** SIMULATION : Run 06                        **
  ************************************************

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| CHICAGO STORM    |    IDF curve parameters: A=2193.100
| Ptotal= 92.89 mm |                          B=   9.040
--------------------                          C=   0.871
                        used in:   INTENSITY =  A / (t + B)^C

                        Duration of storm  = 24.00 hrs
                        Storm time step    = 10.00 min
                        Time to peak ratio =  0.33
```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	' TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.17	0.53	6.17	2.12	12.17	1.83	18.17	0.79
0.33	0.54	6.33	2.34	12.33	1.76	18.33	0.77
0.50	0.55	6.50	2.60	12.50	1.70	18.50	0.76
0.67	0.56	6.67	2.95	12.67	1.64	18.67	0.75
0.83	0.58	6.83	3.40	12.83	1.58	18.83	0.74
1.00	0.59	7.00	4.02	13.00	1.53	19.00	0.73
1.17	0.60	7.17	4.93	13.17	1.48	19.17	0.72
1.33	0.62	7.33	6.38	13.33	1.44	19.33	0.71
1.50	0.63	7.50	9.03	13.50	1.40	19.50	0.70
1.67	0.65	7.67	15.23	13.67	1.36	19.67	0.69
1.83	0.66	7.83	42.35	13.83	1.32	19.83	0.68
2.00	0.68	8.00	168.45	14.00	1.29	20.00	0.68
2.17	0.70	8.17	56.97	14.17	1.25	20.17	0.67
2.33	0.72	8.33	27.80	14.33	1.22	20.33	0.66
2.50	0.74	8.50	17.71	14.50	1.19	20.50	0.65
2.67	0.76	8.67	12.80	14.67	1.16	20.67	0.64
2.83	0.78	8.83	9.96	14.83	1.14	20.83	0.63
3.00	0.80	9.00	8.12	15.00	1.11	21.00	0.63
3.17	0.83	9.17	6.85	15.17	1.09	21.17	0.62
3.33	0.86	9.33	5.92	15.33	1.06	21.33	0.61
3.50	0.89	9.50	5.21	15.50	1.04	21.50	0.61
3.67	0.92	9.67	4.66	15.67	1.02	21.67	0.60
3.83	0.95	9.83	4.21	15.83	1.00	21.83	0.59

4.00	0.99	10.00	3.84	16.00	0.98	22.00	0.59
4.17	1.03	10.17	3.53	16.17	0.96	22.17	0.58
4.33	1.07	10.33	3.27	16.33	0.94	22.33	0.57
4.50	1.12	10.50	3.05	16.50	0.93	22.50	0.57
4.67	1.18	10.67	2.85	16.67	0.91	22.67	0.56
4.83	1.24	10.83	2.68	16.83	0.90	22.83	0.56
5.00	1.30	11.00	2.53	17.00	0.88	23.00	0.55
5.17	1.38	11.17	2.40	17.17	0.86	23.17	0.55
5.33	1.46	11.33	2.28	17.33	0.85	23.33	0.54
5.50	1.56	11.50	2.17	17.50	0.84	23.50	0.53
5.67	1.66	11.67	2.07	17.67	0.82	23.67	0.53
5.83	1.79	11.83	1.98	17.83	0.81	23.83	0.52
6.00	1.94	12.00	1.90	18.00	0.80	24.00	0.52

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| CALIB            |
| NASHYD   (  0100)|   Area    (ha)=   3.09   Curve Number   (CN)= 48.0
|ID= 1 DT= 2.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.30

         NOTE:  RAINFALL WAS TRANSFORMED TO   2.0 MIN. TIME STEP.
```

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	' TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.033	0.53	6.033	2.12	12.033	1.83	18.03	0.79
0.067	0.53	6.067	2.12	12.067	1.83	18.07	0.79
0.100	0.53	6.100	2.12	12.100	1.83	18.10	0.79
0.133	0.53	6.133	2.12	12.133	1.83	18.13	0.79
0.167	0.53	6.167	2.12	12.167	1.83	18.17	0.79
0.200	0.54	6.200	2.34	12.200	1.76	18.20	0.77
0.233	0.54	6.233	2.34	12.233	1.76	18.23	0.77
0.267	0.54	6.267	2.34	12.267	1.76	18.27	0.77
0.300	0.54	6.300	2.34	12.300	1.76	18.30	0.77
0.333	0.54	6.333	2.34	12.333	1.76	18.33	0.77
0.367	0.55	6.367	2.60	12.367	1.70	18.37	0.76
0.400	0.55	6.400	2.60	12.400	1.70	18.40	0.76
0.433	0.55	6.433	2.60	12.433	1.70	18.43	0.76
0.467	0.55	6.467	2.60	12.467	1.70	18.47	0.76
0.500	0.55	6.500	2.60	12.500	1.70	18.50	0.76
0.533	0.56	6.533	2.95	12.533	1.64	18.53	0.75
0.567	0.56	6.567	2.95	12.567	1.64	18.57	0.75
0.600	0.56	6.600	2.95	12.600	1.64	18.60	0.75
0.633	0.56	6.633	2.95	12.633	1.64	18.63	0.75
0.667	0.56	6.667	2.95	12.667	1.64	18.67	0.75
0.700	0.58	6.700	3.40	12.700	1.58	18.70	0.74
0.733	0.58	6.733	3.40	12.733	1.58	18.73	0.74
0.767	0.58	6.767	3.40	12.767	1.58	18.77	0.74
0.800	0.58	6.800	3.40	12.800	1.58	18.80	0.74
0.833	0.58	6.833	3.40	12.833	1.58	18.83	0.74
0.867	0.59	6.867	4.02	12.867	1.53	18.87	0.73
0.900	0.59	6.900	4.02	12.900	1.53	18.90	0.73
0.933	0.59	6.933	4.02	12.933	1.53	18.93	0.73
0.967	0.59	6.967	4.02	12.967	1.53	18.97	0.73
1.000	0.59	7.000	4.02	13.000	1.53	19.00	0.73
1.033	0.60	7.033	4.93	13.033	1.48	19.03	0.72
1.067	0.60	7.067	4.93	13.067	1.48	19.07	0.72
1.100	0.60	7.100	4.93	13.100	1.48	19.10	0.72

1.133	0.60	7.133	4.93	13.133	1.48	19.13	0.72
1.167	0.60	7.167	4.93	13.167	1.48	19.17	0.72
1.200	0.62	7.200	6.38	13.200	1.44	19.20	0.71
1.233	0.62	7.233	6.38	13.233	1.44	19.23	0.71
1.267	0.62	7.267	6.38	13.267	1.44	19.27	0.71
1.300	0.62	7.300	6.38	13.300	1.44	19.30	0.71
1.333	0.62	7.333	6.38	13.333	1.44	19.33	0.71
1.367	0.63	7.367	9.03	13.367	1.40	19.37	0.70
1.400	0.63	7.400	9.03	13.400	1.40	19.40	0.70
1.433	0.63	7.433	9.03	13.433	1.40	19.43	0.70
1.467	0.63	7.467	9.03	13.467	1.40	19.47	0.70
1.500	0.63	7.500	9.03	13.500	1.40	19.50	0.70
1.533	0.65	7.533	15.23	13.533	1.36	19.53	0.69
1.567	0.65	7.567	15.23	13.567	1.36	19.57	0.69
1.600	0.65	7.600	15.23	13.600	1.36	19.60	0.69
1.633	0.65	7.633	15.23	13.633	1.36	19.63	0.69
1.667	0.65	7.667	15.23	13.667	1.36	19.67	0.69
1.700	0.66	7.700	42.35	13.700	1.32	19.70	0.68
1.733	0.66	7.733	42.35	13.733	1.32	19.73	0.68
1.767	0.66	7.767	42.35	13.767	1.32	19.77	0.68
1.800	0.66	7.800	42.35	13.800	1.32	19.80	0.68
1.833	0.66	7.833	42.35	13.833	1.32	19.83	0.68
1.867	0.68	7.867	168.43	13.867	1.29	19.87	0.68
1.900	0.68	7.900	168.45	13.900	1.29	19.90	0.68
1.933	0.68	7.933	168.45	13.933	1.29	19.93	0.68
1.967	0.68	7.967	168.45	13.967	1.29	19.97	0.68
2.000	0.68	8.000	168.45	14.000	1.29	20.00	0.68
2.033	0.70	8.033	56.99	14.033	1.25	20.03	0.67
2.067	0.70	8.067	56.97	14.067	1.25	20.07	0.67
2.100	0.70	8.100	56.97	14.100	1.25	20.10	0.67
2.133	0.70	8.133	56.97	14.133	1.25	20.13	0.67
2.167	0.70	8.167	56.97	14.167	1.25	20.17	0.67
2.200	0.72	8.200	27.80	14.200	1.22	20.20	0.66
2.233	0.72	8.233	27.80	14.233	1.22	20.23	0.66
2.267	0.72	8.267	27.80	14.267	1.22	20.27	0.66
2.300	0.72	8.300	27.80	14.300	1.22	20.30	0.66
2.333	0.72	8.333	27.80	14.333	1.22	20.33	0.66
2.367	0.74	8.367	17.71	14.367	1.19	20.37	0.65
2.400	0.74	8.400	17.71	14.400	1.19	20.40	0.65
2.433	0.74	8.433	17.71	14.433	1.19	20.43	0.65
2.467	0.74	8.467	17.71	14.467	1.19	20.47	0.65
2.500	0.74	8.500	17.71	14.500	1.19	20.50	0.65
2.533	0.76	8.533	12.80	14.533	1.16	20.53	0.64
2.567	0.76	8.567	12.80	14.567	1.16	20.57	0.64
2.600	0.76	8.600	12.80	14.600	1.16	20.60	0.64
2.633	0.76	8.633	12.80	14.633	1.16	20.63	0.64
2.667	0.76	8.667	12.80	14.667	1.16	20.67	0.64
2.700	0.78	8.700	9.96	14.700	1.14	20.70	0.63
2.733	0.78	8.733	9.96	14.733	1.14	20.73	0.63
2.767	0.78	8.767	9.96	14.767	1.14	20.77	0.63
2.800	0.78	8.800	9.96	14.800	1.14	20.80	0.63
2.833	0.78	8.833	9.96	14.833	1.14	20.83	0.63
2.867	0.80	8.867	8.12	14.867	1.11	20.87	0.63
2.900	0.80	8.900	8.12	14.900	1.11	20.90	0.63
2.933	0.80	8.933	8.12	14.933	1.11	20.93	0.63
2.967	0.80	8.967	8.12	14.967	1.11	20.97	0.63
3.000	0.80	9.000	8.12	15.000	1.11	21.00	0.63
3.033	0.83	9.033	6.85	15.033	1.09	21.03	0.62
3.067	0.83	9.067	6.85	15.067	1.09	21.07	0.62
3.100	0.83	9.100	6.85	15.100	1.09	21.10	0.62
3.133	0.83	9.133	6.85	15.133	1.09	21.13	0.62

3.167	0.83	9.167	6.85	15.167	1.09	21.17	0.62
3.200	0.86	9.200	5.92	15.200	1.06	21.20	0.61
3.233	0.86	9.233	5.92	15.233	1.06	21.23	0.61
3.267	0.86	9.267	5.92	15.267	1.06	21.27	0.61
3.300	0.86	9.300	5.92	15.300	1.06	21.30	0.61
3.333	0.86	9.333	5.92	15.333	1.06	21.33	0.61
3.367	0.89	9.367	5.21	15.367	1.04	21.37	0.61
3.400	0.89	9.400	5.21	15.400	1.04	21.40	0.61
3.433	0.89	9.433	5.21	15.433	1.04	21.43	0.61
3.467	0.89	9.467	5.21	15.467	1.04	21.47	0.61
3.500	0.89	9.500	5.21	15.500	1.04	21.50	0.61
3.533	0.92	9.533	4.66	15.533	1.02	21.53	0.60
3.567	0.92	9.567	4.66	15.567	1.02	21.57	0.60
3.600	0.92	9.600	4.66	15.600	1.02	21.60	0.60
3.633	0.92	9.633	4.66	15.633	1.02	21.63	0.60
3.667	0.92	9.667	4.66	15.667	1.02	21.67	0.60
3.700	0.95	9.700	4.21	15.700	1.00	21.70	0.59
3.733	0.95	9.733	4.21	15.733	1.00	21.73	0.59
3.767	0.95	9.767	4.21	15.767	1.00	21.77	0.59
3.800	0.95	9.800	4.21	15.800	1.00	21.80	0.59
3.833	0.95	9.833	4.21	15.833	1.00	21.83	0.59
3.867	0.99	9.867	3.84	15.867	0.98	21.87	0.59
3.900	0.99	9.900	3.84	15.900	0.98	21.90	0.59
3.933	0.99	9.933	3.84	15.933	0.98	21.93	0.59
3.967	0.99	9.967	3.84	15.967	0.98	21.97	0.59
4.000	0.99	10.000	3.84	16.000	0.98	22.00	0.59
4.033	1.03	10.033	3.53	16.033	0.96	22.03	0.58
4.067	1.03	10.067	3.53	16.067	0.96	22.07	0.58
4.100	1.03	10.100	3.53	16.100	0.96	22.10	0.58
4.133	1.03	10.133	3.53	16.133	0.96	22.13	0.58
4.167	1.03	10.167	3.53	16.167	0.96	22.17	0.58
4.200	1.07	10.200	3.27	16.200	0.94	22.20	0.57
4.233	1.07	10.233	3.27	16.233	0.94	22.23	0.57
4.267	1.07	10.267	3.27	16.267	0.94	22.27	0.57
4.300	1.07	10.300	3.27	16.300	0.94	22.30	0.57
4.333	1.07	10.333	3.27	16.333	0.94	22.33	0.57
4.367	1.12	10.367	3.05	16.367	0.93	22.37	0.57
4.400	1.12	10.400	3.05	16.400	0.93	22.40	0.57
4.433	1.12	10.433	3.05	16.433	0.93	22.43	0.57
4.467	1.12	10.467	3.05	16.467	0.93	22.47	0.57
4.500	1.12	10.500	3.05	16.500	0.93	22.50	0.57
4.533	1.18	10.533	2.85	16.533	0.91	22.53	0.56
4.567	1.18	10.567	2.85	16.567	0.91	22.57	0.56
4.600	1.18	10.600	2.85	16.600	0.91	22.60	0.56
4.633	1.18	10.633	2.85	16.633	0.91	22.63	0.56
4.667	1.18	10.667	2.85	16.667	0.91	22.67	0.56
4.700	1.24	10.700	2.68	16.700	0.90	22.70	0.56
4.733	1.24	10.733	2.68	16.733	0.90	22.73	0.56
4.767	1.24	10.767	2.68	16.767	0.90	22.77	0.56
4.800	1.24	10.800	2.68	16.800	0.90	22.80	0.56
4.833	1.24	10.833	2.68	16.833	0.90	22.83	0.56
4.867	1.30	10.867	2.53	16.867	0.88	22.87	0.55
4.900	1.30	10.900	2.53	16.900	0.88	22.90	0.55
4.933	1.30	10.933	2.53	16.933	0.88	22.93	0.55
4.967	1.30	10.967	2.53	16.967	0.88	22.97	0.55
5.000	1.30	11.000	2.53	17.000	0.88	23.00	0.55
5.033	1.38	11.033	2.40	17.033	0.86	23.03	0.55
5.067	1.38	11.067	2.40	17.067	0.86	23.07	0.55
5.100	1.38	11.100	2.40	17.100	0.86	23.10	0.55
5.133	1.38	11.133	2.40	17.133	0.86	23.13	0.55
5.167	1.38	11.167	2.40	17.167	0.86	23.17	0.55

5.200	1.46	11.200	2.28	17.200	0.85	23.20	0.54
5.233	1.46	11.233	2.28	17.233	0.85	23.23	0.54
5.267	1.46	11.267	2.28	17.267	0.85	23.27	0.54
5.300	1.46	11.300	2.28	17.300	0.85	23.30	0.54
5.333	1.46	11.333	2.28	17.333	0.85	23.33	0.54
5.367	1.56	11.367	2.17	17.367	0.84	23.37	0.53
5.400	1.56	11.400	2.17	17.400	0.84	23.40	0.53
5.433	1.56	11.433	2.17	17.433	0.84	23.43	0.53
5.467	1.56	11.467	2.17	17.467	0.84	23.47	0.53
5.500	1.56	11.500	2.17	17.500	0.84	23.50	0.53
5.533	1.66	11.533	2.07	17.533	0.82	23.53	0.53
5.567	1.66	11.567	2.07	17.567	0.82	23.57	0.53
5.600	1.66	11.600	2.07	17.600	0.82	23.60	0.53
5.633	1.66	11.633	2.07	17.633	0.82	23.63	0.53
5.667	1.66	11.667	2.07	17.667	0.82	23.67	0.53
5.700	1.79	11.700	1.98	17.700	0.81	23.70	0.52
5.733	1.79	11.733	1.98	17.733	0.81	23.73	0.52
5.767	1.79	11.767	1.98	17.767	0.81	23.77	0.52
5.800	1.79	11.800	1.98	17.800	0.81	23.80	0.52
5.833	1.79	11.833	1.98	17.833	0.81	23.83	0.52
5.867	1.94	11.867	1.90	17.867	0.80	23.87	0.52
5.900	1.94	11.900	1.90	17.900	0.80	23.90	0.52
5.933	1.94	11.933	1.90	17.933	0.80	23.93	0.52
5.967	1.94	11.967	1.90	17.967	0.80	23.97	0.52
6.000	1.94	12.000	1.90	18.000	0.80	24.00	0.52

```
    Unit Hyd Qpeak  (cms)=   0.394

    PEAK FLOW       (cms)=   0.126 (i)
    TIME TO PEAK    (hrs)=   8.333
    RUNOFF VOLUME    (mm)=  21.276
    TOTAL RAINFALL   (mm)=  92.889
    RUNOFF COEFFICIENT   =   0.229

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

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```
       V    V   I    SSSSS  U   U    A    L              (v 6.2.2001)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

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

Developed and Distributed by Smart City Water Inc

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

Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat

Output filename:

C:\Users\zhouj\AppData\Local\Civica\VH5\642fa701-08f9-4281-a674-e9ad409f1aac\a99fd14e-3cb5-4c60-acb2-a45c4eff9b6f\scenar
Summary filename:
C:\Users\zhouj\AppData\Local\Civica\VH5\642fa701-08f9-4281-a674-e9ad409f1aac\a99fd14e-3cb5-4c60-acb2-a45c4eff9b6f\scenar

DATE: 08-31-2023   TIME: 09:30:51

USER:

COMMENTS: ____

```
  **********************************************
  ** SIMULATION : Run 07                      **
  **********************************************

--------------------
|    READ STORM    |    Filename: C:\Users\zhouj\AppD
|                  |              ata\Local\Temp\
|                  |              6c87efa1-8108-4792-a019-7735996b59b2\f6b04b53
| Ptotal= 46.77 mm |    Comments: 2yr24hrSCS_Midland
--------------------
```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	' TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	0.51	6.25	0.94	12.25	6.74	18.25	0.84
0.50	0.51	6.50	0.94	12.50	6.74	18.50	0.84
0.75	0.51	6.75	0.94	12.75	3.46	18.75	0.84
1.00	0.51	7.00	0.94	13.00	3.46	19.00	0.84
1.25	0.51	7.25	0.94	13.25	0.66	19.25	0.84
1.50	0.51	7.50	0.94	13.50	0.66	19.50	0.84
1.75	0.51	7.75	0.94	13.75	3.84	19.75	0.84
2.00	0.51	8.00	0.94	14.00	3.84	20.00	0.84
2.25	0.61	8.25	1.26	14.25	1.40	20.25	0.56
2.50	0.61	8.50	1.26	14.50	1.40	20.50	0.56
2.75	0.61	8.75	1.26	14.75	1.40	20.75	0.56
3.00	0.61	9.00	1.26	15.00	1.40	21.00	0.56
3.25	0.61	9.25	1.50	15.25	1.40	21.25	0.56
3.50	0.61	9.50	1.50	15.50	1.40	21.50	0.56
3.75	0.61	9.75	1.68	15.75	1.40	21.75	0.56
4.00	0.61	10.00	1.68	16.00	1.40	22.00	0.56
4.25	0.75	10.25	2.15	16.25	0.84	22.25	0.56
4.50	0.75	10.50	2.15	16.50	0.84	22.50	0.56
4.75	0.75	10.75	2.90	16.75	0.84	22.75	0.56
5.00	0.75	11.00	2.90	17.00	0.84	23.00	0.56
5.25	0.75	11.25	4.49	17.25	0.84	23.25	0.56
5.50	0.75	11.50	4.49	17.50	0.84	23.50	0.56
5.75	0.75	11.75	19.47	17.75	0.84	23.75	0.56
6.00	0.75	12.00	51.67	18.00	0.84	24.00	0.56

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| CALIB            |
| NASHYD   (  0100)|   Area    (ha)=    3.09   Curve Number   (CN)= 48.0
```



```
|ID= 1 DT= 2.0 min |   Ia      (mm)=    5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=    0.30

        NOTE:  RAINFALL WAS TRANSFORMED TO   2.0 MIN. TIME STEP.
```

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	' TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.033	0.51	6.033	0.94	12.033	6.74	18.03	0.84
0.067	0.51	6.067	0.94	12.067	6.74	18.07	0.84
0.100	0.51	6.100	0.94	12.100	6.74	18.10	0.84
0.133	0.51	6.133	0.94	12.133	6.74	18.13	0.84
0.167	0.51	6.167	0.94	12.167	6.74	18.17	0.84
0.200	0.51	6.200	0.94	12.200	6.74	18.20	0.84
0.233	0.51	6.233	0.94	12.233	6.74	18.23	0.84
0.267	0.51	6.267	0.94	12.267	6.74	18.27	0.84
0.300	0.51	6.300	0.94	12.300	6.74	18.30	0.84
0.333	0.51	6.333	0.94	12.333	6.74	18.33	0.84
0.367	0.51	6.367	0.94	12.367	6.74	18.37	0.84
0.400	0.51	6.400	0.94	12.400	6.74	18.40	0.84
0.433	0.51	6.433	0.94	12.433	6.74	18.43	0.84
0.467	0.51	6.467	0.94	12.467	6.74	18.47	0.84
0.500	0.51	6.500	0.94	12.500	6.73	18.50	0.84
0.533	0.51	6.533	0.94	12.533	3.46	18.53	0.84
0.567	0.51	6.567	0.94	12.567	3.46	18.57	0.84
0.600	0.51	6.600	0.94	12.600	3.46	18.60	0.84
0.633	0.51	6.633	0.94	12.633	3.46	18.63	0.84
0.667	0.51	6.667	0.94	12.667	3.46	18.67	0.84
0.700	0.51	6.700	0.94	12.700	3.46	18.70	0.84
0.733	0.51	6.733	0.94	12.733	3.46	18.73	0.84
0.767	0.51	6.767	0.94	12.767	3.46	18.77	0.84
0.800	0.51	6.800	0.94	12.800	3.46	18.80	0.84
0.833	0.51	6.833	0.94	12.833	3.46	18.83	0.84
0.867	0.51	6.867	0.94	12.867	3.46	18.87	0.84
0.900	0.51	6.900	0.94	12.900	3.46	18.90	0.84
0.933	0.51	6.933	0.94	12.933	3.46	18.93	0.84
0.967	0.51	6.967	0.94	12.967	3.46	18.97	0.84
1.000	0.51	7.000	0.94	13.000	3.45	19.00	0.84
1.033	0.51	7.033	0.94	13.033	0.66	19.03	0.84
1.067	0.51	7.067	0.94	13.067	0.66	19.07	0.84
1.100	0.51	7.100	0.94	13.100	0.66	19.10	0.84
1.133	0.51	7.133	0.94	13.133	0.66	19.13	0.84
1.167	0.51	7.167	0.94	13.167	0.66	19.17	0.84
1.200	0.51	7.200	0.94	13.200	0.66	19.20	0.84
1.233	0.51	7.233	0.94	13.233	0.66	19.23	0.84
1.267	0.51	7.267	0.94	13.267	0.66	19.27	0.84
1.300	0.51	7.300	0.94	13.300	0.66	19.30	0.84
1.333	0.51	7.333	0.94	13.333	0.66	19.33	0.84
1.367	0.51	7.367	0.94	13.367	0.66	19.37	0.84
1.400	0.51	7.400	0.94	13.400	0.66	19.40	0.84
1.433	0.51	7.433	0.94	13.433	0.66	19.43	0.84
1.467	0.51	7.467	0.94	13.467	0.66	19.47	0.84
1.500	0.51	7.500	0.94	13.500	0.67	19.50	0.84
1.533	0.51	7.533	0.94	13.533	3.84	19.53	0.84
1.567	0.51	7.567	0.94	13.567	3.84	19.57	0.84
1.600	0.51	7.600	0.94	13.600	3.84	19.60	0.84
1.633	0.51	7.633	0.94	13.633	3.84	19.63	0.84
1.667	0.51	7.667	0.94	13.667	3.84	19.67	0.84
1.700	0.51	7.700	0.94	13.700	3.84	19.70	0.84
1.733	0.51	7.733	0.94	13.733	3.84	19.73	0.84

1.767	0.51	7.767	0.94	13.767	3.84	19.77	0.84
1.800	0.51	7.800	0.94	13.800	3.84	19.80	0.84
1.833	0.51	7.833	0.94	13.833	3.84	19.83	0.84
1.867	0.51	7.867	0.94	13.867	3.84	19.87	0.84
1.900	0.51	7.900	0.94	13.900	3.84	19.90	0.84
1.933	0.51	7.933	0.94	13.933	3.84	19.93	0.84
1.967	0.51	7.967	0.94	13.967	3.84	19.97	0.84
2.000	0.51	8.000	0.94	14.000	3.83	20.00	0.84
2.033	0.61	8.033	1.26	14.033	1.40	20.03	0.56
2.067	0.61	8.067	1.26	14.067	1.40	20.07	0.56
2.100	0.61	8.100	1.26	14.100	1.40	20.10	0.56
2.133	0.61	8.133	1.26	14.133	1.40	20.13	0.56
2.167	0.61	8.167	1.26	14.167	1.40	20.17	0.56
2.200	0.61	8.200	1.26	14.200	1.40	20.20	0.56
2.233	0.61	8.233	1.26	14.233	1.40	20.23	0.56
2.267	0.61	8.267	1.26	14.267	1.40	20.27	0.56
2.300	0.61	8.300	1.26	14.300	1.40	20.30	0.56
2.333	0.61	8.333	1.26	14.333	1.40	20.33	0.56
2.367	0.61	8.367	1.26	14.367	1.40	20.37	0.56
2.400	0.61	8.400	1.26	14.400	1.40	20.40	0.56
2.433	0.61	8.433	1.26	14.433	1.40	20.43	0.56
2.467	0.61	8.467	1.26	14.467	1.40	20.47	0.56
2.500	0.61	8.500	1.26	14.500	1.40	20.50	0.56
2.533	0.61	8.533	1.26	14.533	1.40	20.53	0.56
2.567	0.61	8.567	1.26	14.567	1.40	20.57	0.56
2.600	0.61	8.600	1.26	14.600	1.40	20.60	0.56
2.633	0.61	8.633	1.26	14.633	1.40	20.63	0.56
2.667	0.61	8.667	1.26	14.667	1.40	20.67	0.56
2.700	0.61	8.700	1.26	14.700	1.40	20.70	0.56
2.733	0.61	8.733	1.26	14.733	1.40	20.73	0.56
2.767	0.61	8.767	1.26	14.767	1.40	20.77	0.56
2.800	0.61	8.800	1.26	14.800	1.40	20.80	0.56
2.833	0.61	8.833	1.26	14.833	1.40	20.83	0.56
2.867	0.61	8.867	1.26	14.867	1.40	20.87	0.56
2.900	0.61	8.900	1.26	14.900	1.40	20.90	0.56
2.933	0.61	8.933	1.26	14.933	1.40	20.93	0.56
2.967	0.61	8.967	1.26	14.967	1.40	20.97	0.56
3.000	0.61	9.000	1.26	15.000	1.40	21.00	0.56
3.033	0.61	9.033	1.50	15.033	1.40	21.03	0.56
3.067	0.61	9.067	1.50	15.067	1.40	21.07	0.56
3.100	0.61	9.100	1.50	15.100	1.40	21.10	0.56
3.133	0.61	9.133	1.50	15.133	1.40	21.13	0.56
3.167	0.61	9.167	1.50	15.167	1.40	21.17	0.56
3.200	0.61	9.200	1.50	15.200	1.40	21.20	0.56
3.233	0.61	9.233	1.50	15.233	1.40	21.23	0.56
3.267	0.61	9.267	1.50	15.267	1.40	21.27	0.56
3.300	0.61	9.300	1.50	15.300	1.40	21.30	0.56
3.333	0.61	9.333	1.50	15.333	1.40	21.33	0.56
3.367	0.61	9.367	1.50	15.367	1.40	21.37	0.56
3.400	0.61	9.400	1.50	15.400	1.40	21.40	0.56
3.433	0.61	9.433	1.50	15.433	1.40	21.43	0.56
3.467	0.61	9.467	1.50	15.467	1.40	21.47	0.56
3.500	0.61	9.500	1.50	15.500	1.40	21.50	0.56
3.533	0.61	9.533	1.68	15.533	1.40	21.53	0.56
3.567	0.61	9.567	1.68	15.567	1.40	21.57	0.56
3.600	0.61	9.600	1.68	15.600	1.40	21.60	0.56
3.633	0.61	9.633	1.68	15.633	1.40	21.63	0.56
3.667	0.61	9.667	1.68	15.667	1.40	21.67	0.56
3.700	0.61	9.700	1.68	15.700	1.40	21.70	0.56
3.733	0.61	9.733	1.68	15.733	1.40	21.73	0.56
3.767	0.61	9.767	1.68	15.767	1.40	21.77	0.56

3.800	0.61	9.800	1.68	15.800	1.40	21.80	0.56
3.833	0.61	9.833	1.68	15.833	1.40	21.83	0.56
3.867	0.61	9.867	1.68	15.867	1.40	21.87	0.56
3.900	0.61	9.900	1.68	15.900	1.40	21.90	0.56
3.933	0.61	9.933	1.68	15.933	1.40	21.93	0.56
3.967	0.61	9.967	1.68	15.967	1.40	21.97	0.56
4.000	0.61	10.000	1.68	16.000	1.40	22.00	0.56
4.033	0.75	10.033	2.15	16.033	0.84	22.03	0.56
4.067	0.75	10.067	2.15	16.067	0.84	22.07	0.56
4.100	0.75	10.100	2.15	16.100	0.84	22.10	0.56
4.133	0.75	10.133	2.15	16.133	0.84	22.13	0.56
4.167	0.75	10.167	2.15	16.167	0.84	22.17	0.56
4.200	0.75	10.200	2.15	16.200	0.84	22.20	0.56
4.233	0.75	10.233	2.15	16.233	0.84	22.23	0.56
4.267	0.75	10.267	2.15	16.267	0.84	22.27	0.56
4.300	0.75	10.300	2.15	16.300	0.84	22.30	0.56
4.333	0.75	10.333	2.15	16.333	0.84	22.33	0.56
4.367	0.75	10.367	2.15	16.367	0.84	22.37	0.56
4.400	0.75	10.400	2.15	16.400	0.84	22.40	0.56
4.433	0.75	10.433	2.15	16.433	0.84	22.43	0.56
4.467	0.75	10.467	2.15	16.467	0.84	22.47	0.56
4.500	0.75	10.500	2.15	16.500	0.84	22.50	0.56
4.533	0.75	10.533	2.90	16.533	0.84	22.53	0.56
4.567	0.75	10.567	2.90	16.567	0.84	22.57	0.56
4.600	0.75	10.600	2.90	16.600	0.84	22.60	0.56
4.633	0.75	10.633	2.90	16.633	0.84	22.63	0.56
4.667	0.75	10.667	2.90	16.667	0.84	22.67	0.56
4.700	0.75	10.700	2.90	16.700	0.84	22.70	0.56
4.733	0.75	10.733	2.90	16.733	0.84	22.73	0.56
4.767	0.75	10.767	2.90	16.767	0.84	22.77	0.56
4.800	0.75	10.800	2.90	16.800	0.84	22.80	0.56
4.833	0.75	10.833	2.90	16.833	0.84	22.83	0.56
4.867	0.75	10.867	2.90	16.867	0.84	22.87	0.56
4.900	0.75	10.900	2.90	16.900	0.84	22.90	0.56
4.933	0.75	10.933	2.90	16.933	0.84	22.93	0.56
4.967	0.75	10.967	2.90	16.967	0.84	22.97	0.56
5.000	0.75	11.000	2.90	17.000	0.84	23.00	0.56
5.033	0.75	11.033	4.49	17.033	0.84	23.03	0.56
5.067	0.75	11.067	4.49	17.067	0.84	23.07	0.56
5.100	0.75	11.100	4.49	17.100	0.84	23.10	0.56
5.133	0.75	11.133	4.49	17.133	0.84	23.13	0.56
5.167	0.75	11.167	4.49	17.167	0.84	23.17	0.56
5.200	0.75	11.200	4.49	17.200	0.84	23.20	0.56
5.233	0.75	11.233	4.49	17.233	0.84	23.23	0.56
5.267	0.75	11.267	4.49	17.267	0.84	23.27	0.56
5.300	0.75	11.300	4.49	17.300	0.84	23.30	0.56
5.333	0.75	11.333	4.49	17.333	0.84	23.33	0.56
5.367	0.75	11.367	4.49	17.367	0.84	23.37	0.56
5.400	0.75	11.400	4.49	17.400	0.84	23.40	0.56
5.433	0.75	11.433	4.49	17.433	0.84	23.43	0.56
5.467	0.75	11.467	4.49	17.467	0.84	23.47	0.56
5.500	0.75	11.500	4.51	17.500	0.84	23.50	0.56
5.533	0.75	11.533	19.47	17.533	0.84	23.53	0.56
5.567	0.75	11.567	19.47	17.567	0.84	23.57	0.56
5.600	0.75	11.600	19.47	17.600	0.84	23.60	0.56
5.633	0.75	11.633	19.47	17.633	0.84	23.63	0.56
5.667	0.75	11.667	19.47	17.667	0.84	23.67	0.56
5.700	0.75	11.700	19.47	17.700	0.84	23.70	0.56
5.733	0.75	11.733	19.47	17.733	0.84	23.73	0.56
5.767	0.75	11.767	35.61	17.767	0.84	23.77	0.56
5.800	0.75	11.800	51.67	17.800	0.84	23.80	0.56

5.833	0.75	11.833	51.67	17.833	0.84	23.83	0.56
5.867	0.75	11.867	51.67	17.867	0.84	23.87	0.56
5.900	0.75	11.900	51.67	17.900	0.84	23.90	0.56
5.933	0.75	11.933	51.67	17.933	0.84	23.93	0.56
5.967	0.75	11.967	51.67	17.967	0.84	23.97	0.56
6.000	0.75	12.000	51.61	18.000	0.84	24.00	0.56

```
    Unit Hyd Qpeak  (cms)=   0.394

    PEAK FLOW       (cms)=   0.029 (i)
    TIME TO PEAK    (hrs)=  12.200
    RUNOFF VOLUME    (mm)=   5.506
    TOTAL RAINFALL   (mm)=  46.775
    RUNOFF COEFFICIENT   =   0.118

    (i) 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 6.2.2001)
     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 6.2\VO2\voin.dat

  Output  filename:
C:\Users\zhouj\AppData\Local\Civica\VH5\642fa701-08f9-4281-a674-e9ad409f1aac\e79e7d
ef-898e-4f7b-8f4b-4141eafcaeca\scenar
  Summary filename:
C:\Users\zhouj\AppData\Local\Civica\VH5\642fa701-08f9-4281-a674-e9ad409f1aac\e79e7d
ef-898e-4f7b-8f4b-4141eafcaeca\scenar


DATE: 08-31-2023                           TIME: 09:30:52

USER:


COMMENTS: ____________________________________________________________


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  ** SIMULATION : Run 08                           **
  ************************************************


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|    READ STORM     |    Filename: C:\Users\zhouj\AppD
|                   |              ata\Local\Temp\
|                   |              6c87efa1-8108-4792-a019-7735996b59b2\c20b8fe9
| Ptotal= 59.94 mm  |    Comments: 5yr24hrSCS_Midland
--------------------
```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	' TIME ' hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	0.66	6.25	1.20	12.25	8.63	18.25	1.08
0.50	0.66	6.50	1.20	12.50	8.63	18.50	1.08
0.75	0.66	6.75	1.20	12.75	4.43	18.75	1.08
1.00	0.66	7.00	1.20	13.00	4.43	19.00	1.08
1.25	0.66	7.25	1.20	13.25	0.84	19.25	1.08
1.50	0.66	7.50	1.20	13.50	0.84	19.50	1.08
1.75	0.66	7.75	1.20	13.75	4.91	19.75	1.08
2.00	0.66	8.00	1.20	14.00	4.91	20.00	1.08
2.25	0.78	8.25	1.62	14.25	1.80	20.25	0.72
2.50	0.78	8.50	1.62	14.50	1.80	20.50	0.72
2.75	0.78	8.75	1.62	14.75	1.80	20.75	0.72
3.00	0.78	9.00	1.62	15.00	1.80	21.00	0.72
3.25	0.78	9.25	1.92	15.25	1.80	21.25	0.72
3.50	0.78	9.50	1.92	15.50	1.80	21.50	0.72
3.75	0.78	9.75	2.16	15.75	1.80	21.75	0.72
4.00	0.78	10.00	2.16	16.00	1.80	22.00	0.72
4.25	0.96	10.25	2.76	16.25	1.08	22.25	0.72
4.50	0.96	10.50	2.76	16.50	1.08	22.50	0.72
4.75	0.96	10.75	3.71	16.75	1.08	22.75	0.72
5.00	0.96	11.00	3.71	17.00	1.08	23.00	0.72
5.25	0.96	11.25	5.75	17.25	1.08	23.25	0.72
5.50	0.96	11.50	5.75	17.50	1.08	23.50	0.72
5.75	0.96	11.75	24.92	17.75	1.08	23.75	0.72
6.00	0.96	12.00	66.13	18.00	1.08	24.00	0.72

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| CALIB             |
| NASHYD   (  0100)|   Area     (ha)=   3.09   Curve Number   (CN)= 48.0
|ID= 1 DT= 2.0 min |   Ia       (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.30

        NOTE:  RAINFALL WAS TRANSFORMED TO   2.0 MIN. TIME STEP.
```

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	' TIME ' hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.033	0.66	6.033	1.20	12.033	8.63	18.03	1.08
0.067	0.66	6.067	1.20	12.067	8.63	18.07	1.08
0.100	0.66	6.100	1.20	12.100	8.63	18.10	1.08
0.133	0.66	6.133	1.20	12.133	8.63	18.13	1.08
0.167	0.66	6.167	1.20	12.167	8.63	18.17	1.08
0.200	0.66	6.200	1.20	12.200	8.63	18.20	1.08
0.233	0.66	6.233	1.20	12.233	8.63	18.23	1.08
0.267	0.66	6.267	1.20	12.267	8.63	18.27	1.08
0.300	0.66	6.300	1.20	12.300	8.63	18.30	1.08
0.333	0.66	6.333	1.20	12.333	8.63	18.33	1.08

0.367	0.66	6.367	1.20	12.367	8.63	18.37	1.08
0.400	0.66	6.400	1.20	12.400	8.63	18.40	1.08
0.433	0.66	6.433	1.20	12.433	8.63	18.43	1.08
0.467	0.66	6.467	1.20	12.467	8.63	18.47	1.08
0.500	0.66	6.500	1.20	12.500	8.62	18.50	1.08
0.533	0.66	6.533	1.20	12.533	4.43	18.53	1.08
0.567	0.66	6.567	1.20	12.567	4.43	18.57	1.08
0.600	0.66	6.600	1.20	12.600	4.43	18.60	1.08
0.633	0.66	6.633	1.20	12.633	4.43	18.63	1.08
0.667	0.66	6.667	1.20	12.667	4.43	18.67	1.08
0.700	0.66	6.700	1.20	12.700	4.43	18.70	1.08
0.733	0.66	6.733	1.20	12.733	4.43	18.73	1.08
0.767	0.66	6.767	1.20	12.767	4.43	18.77	1.08
0.800	0.66	6.800	1.20	12.800	4.43	18.80	1.08
0.833	0.66	6.833	1.20	12.833	4.43	18.83	1.08
0.867	0.66	6.867	1.20	12.867	4.43	18.87	1.08
0.900	0.66	6.900	1.20	12.900	4.43	18.90	1.08
0.933	0.66	6.933	1.20	12.933	4.43	18.93	1.08
0.967	0.66	6.967	1.20	12.967	4.43	18.97	1.08
1.000	0.66	7.000	1.20	13.000	4.42	19.00	1.08
1.033	0.66	7.033	1.20	13.033	0.84	19.03	1.08
1.067	0.66	7.067	1.20	13.067	0.84	19.07	1.08
1.100	0.66	7.100	1.20	13.100	0.84	19.10	1.08
1.133	0.66	7.133	1.20	13.133	0.84	19.13	1.08
1.167	0.66	7.167	1.20	13.167	0.84	19.17	1.08
1.200	0.66	7.200	1.20	13.200	0.84	19.20	1.08
1.233	0.66	7.233	1.20	13.233	0.84	19.23	1.08
1.267	0.66	7.267	1.20	13.267	0.84	19.27	1.08
1.300	0.66	7.300	1.20	13.300	0.84	19.30	1.08
1.333	0.66	7.333	1.20	13.333	0.84	19.33	1.08
1.367	0.66	7.367	1.20	13.367	0.84	19.37	1.08
1.400	0.66	7.400	1.20	13.400	0.84	19.40	1.08
1.433	0.66	7.433	1.20	13.433	0.84	19.43	1.08
1.467	0.66	7.467	1.20	13.467	0.84	19.47	1.08
1.500	0.66	7.500	1.20	13.500	0.85	19.50	1.08
1.533	0.66	7.533	1.20	13.533	4.91	19.53	1.08
1.567	0.66	7.567	1.20	13.567	4.91	19.57	1.08
1.600	0.66	7.600	1.20	13.600	4.91	19.60	1.08
1.633	0.66	7.633	1.20	13.633	4.91	19.63	1.08
1.667	0.66	7.667	1.20	13.667	4.91	19.67	1.08
1.700	0.66	7.700	1.20	13.700	4.91	19.70	1.08
1.733	0.66	7.733	1.20	13.733	4.91	19.73	1.08
1.767	0.66	7.767	1.20	13.767	4.91	19.77	1.08
1.800	0.66	7.800	1.20	13.800	4.91	19.80	1.08
1.833	0.66	7.833	1.20	13.833	4.91	19.83	1.08
1.867	0.66	7.867	1.20	13.867	4.91	19.87	1.08
1.900	0.66	7.900	1.20	13.900	4.91	19.90	1.08
1.933	0.66	7.933	1.20	13.933	4.91	19.93	1.08
1.967	0.66	7.967	1.20	13.967	4.91	19.97	1.08
2.000	0.66	8.000	1.20	14.000	4.90	20.00	1.08
2.033	0.78	8.033	1.62	14.033	1.80	20.03	0.72
2.067	0.78	8.067	1.62	14.067	1.80	20.07	0.72
2.100	0.78	8.100	1.62	14.100	1.80	20.10	0.72
2.133	0.78	8.133	1.62	14.133	1.80	20.13	0.72
2.167	0.78	8.167	1.62	14.167	1.80	20.17	0.72
2.200	0.78	8.200	1.62	14.200	1.80	20.20	0.72
2.233	0.78	8.233	1.62	14.233	1.80	20.23	0.72
2.267	0.78	8.267	1.62	14.267	1.80	20.27	0.72
2.300	0.78	8.300	1.62	14.300	1.80	20.30	0.72
2.333	0.78	8.333	1.62	14.333	1.80	20.33	0.72
2.367	0.78	8.367	1.62	14.367	1.80	20.37	0.72

2.400	0.78	8.400	1.62	14.400	1.80	20.40	0.72
2.433	0.78	8.433	1.62	14.433	1.80	20.43	0.72
2.467	0.78	8.467	1.62	14.467	1.80	20.47	0.72
2.500	0.78	8.500	1.62	14.500	1.80	20.50	0.72
2.533	0.78	8.533	1.62	14.533	1.80	20.53	0.72
2.567	0.78	8.567	1.62	14.567	1.80	20.57	0.72
2.600	0.78	8.600	1.62	14.600	1.80	20.60	0.72
2.633	0.78	8.633	1.62	14.633	1.80	20.63	0.72
2.667	0.78	8.667	1.62	14.667	1.80	20.67	0.72
2.700	0.78	8.700	1.62	14.700	1.80	20.70	0.72
2.733	0.78	8.733	1.62	14.733	1.80	20.73	0.72
2.767	0.78	8.767	1.62	14.767	1.80	20.77	0.72
2.800	0.78	8.800	1.62	14.800	1.80	20.80	0.72
2.833	0.78	8.833	1.62	14.833	1.80	20.83	0.72
2.867	0.78	8.867	1.62	14.867	1.80	20.87	0.72
2.900	0.78	8.900	1.62	14.900	1.80	20.90	0.72
2.933	0.78	8.933	1.62	14.933	1.80	20.93	0.72
2.967	0.78	8.967	1.62	14.967	1.80	20.97	0.72
3.000	0.78	9.000	1.62	15.000	1.80	21.00	0.72
3.033	0.78	9.033	1.92	15.033	1.80	21.03	0.72
3.067	0.78	9.067	1.92	15.067	1.80	21.07	0.72
3.100	0.78	9.100	1.92	15.100	1.80	21.10	0.72
3.133	0.78	9.133	1.92	15.133	1.80	21.13	0.72
3.167	0.78	9.167	1.92	15.167	1.80	21.17	0.72
3.200	0.78	9.200	1.92	15.200	1.80	21.20	0.72
3.233	0.78	9.233	1.92	15.233	1.80	21.23	0.72
3.267	0.78	9.267	1.92	15.267	1.80	21.27	0.72
3.300	0.78	9.300	1.92	15.300	1.80	21.30	0.72
3.333	0.78	9.333	1.92	15.333	1.80	21.33	0.72
3.367	0.78	9.367	1.92	15.367	1.80	21.37	0.72
3.400	0.78	9.400	1.92	15.400	1.80	21.40	0.72
3.433	0.78	9.433	1.92	15.433	1.80	21.43	0.72
3.467	0.78	9.467	1.92	15.467	1.80	21.47	0.72
3.500	0.78	9.500	1.92	15.500	1.80	21.50	0.72
3.533	0.78	9.533	2.16	15.533	1.80	21.53	0.72
3.567	0.78	9.567	2.16	15.567	1.80	21.57	0.72
3.600	0.78	9.600	2.16	15.600	1.80	21.60	0.72
3.633	0.78	9.633	2.16	15.633	1.80	21.63	0.72
3.667	0.78	9.667	2.16	15.667	1.80	21.67	0.72
3.700	0.78	9.700	2.16	15.700	1.80	21.70	0.72
3.733	0.78	9.733	2.16	15.733	1.80	21.73	0.72
3.767	0.78	9.767	2.16	15.767	1.80	21.77	0.72
3.800	0.78	9.800	2.16	15.800	1.80	21.80	0.72
3.833	0.78	9.833	2.16	15.833	1.80	21.83	0.72
3.867	0.78	9.867	2.16	15.867	1.80	21.87	0.72
3.900	0.78	9.900	2.16	15.900	1.80	21.90	0.72
3.933	0.78	9.933	2.16	15.933	1.80	21.93	0.72
3.967	0.78	9.967	2.16	15.967	1.80	21.97	0.72
4.000	0.78	10.000	2.16	16.000	1.80	22.00	0.72
4.033	0.96	10.033	2.76	16.033	1.08	22.03	0.72
4.067	0.96	10.067	2.76	16.067	1.08	22.07	0.72
4.100	0.96	10.100	2.76	16.100	1.08	22.10	0.72
4.133	0.96	10.133	2.76	16.133	1.08	22.13	0.72
4.167	0.96	10.167	2.76	16.167	1.08	22.17	0.72
4.200	0.96	10.200	2.76	16.200	1.08	22.20	0.72
4.233	0.96	10.233	2.76	16.233	1.08	22.23	0.72
4.267	0.96	10.267	2.76	16.267	1.08	22.27	0.72
4.300	0.96	10.300	2.76	16.300	1.08	22.30	0.72
4.333	0.96	10.333	2.76	16.333	1.08	22.33	0.72
4.367	0.96	10.367	2.76	16.367	1.08	22.37	0.72
4.400	0.96	10.400	2.76	16.400	1.08	22.40	0.72

4.433	0.96	10.433	2.76	16.433	1.08	22.43	0.72
4.467	0.96	10.467	2.76	16.467	1.08	22.47	0.72
4.500	0.96	10.500	2.76	16.500	1.08	22.50	0.72
4.533	0.96	10.533	3.71	16.533	1.08	22.53	0.72
4.567	0.96	10.567	3.71	16.567	1.08	22.57	0.72
4.600	0.96	10.600	3.71	16.600	1.08	22.60	0.72
4.633	0.96	10.633	3.71	16.633	1.08	22.63	0.72
4.667	0.96	10.667	3.71	16.667	1.08	22.67	0.72
4.700	0.96	10.700	3.71	16.700	1.08	22.70	0.72
4.733	0.96	10.733	3.71	16.733	1.08	22.73	0.72
4.767	0.96	10.767	3.71	16.767	1.08	22.77	0.72
4.800	0.96	10.800	3.71	16.800	1.08	22.80	0.72
4.833	0.96	10.833	3.71	16.833	1.08	22.83	0.72
4.867	0.96	10.867	3.71	16.867	1.08	22.87	0.72
4.900	0.96	10.900	3.71	16.900	1.08	22.90	0.72
4.933	0.96	10.933	3.71	16.933	1.08	22.93	0.72
4.967	0.96	10.967	3.71	16.967	1.08	22.97	0.72
5.000	0.96	11.000	3.71	17.000	1.08	23.00	0.72
5.033	0.96	11.033	5.75	17.033	1.08	23.03	0.72
5.067	0.96	11.067	5.75	17.067	1.08	23.07	0.72
5.100	0.96	11.100	5.75	17.100	1.08	23.10	0.72
5.133	0.96	11.133	5.75	17.133	1.08	23.13	0.72
5.167	0.96	11.167	5.75	17.167	1.08	23.17	0.72
5.200	0.96	11.200	5.75	17.200	1.08	23.20	0.72
5.233	0.96	11.233	5.75	17.233	1.08	23.23	0.72
5.267	0.96	11.267	5.75	17.267	1.08	23.27	0.72
5.300	0.96	11.300	5.75	17.300	1.08	23.30	0.72
5.333	0.96	11.333	5.75	17.333	1.08	23.33	0.72
5.367	0.96	11.367	5.75	17.367	1.08	23.37	0.72
5.400	0.96	11.400	5.75	17.400	1.08	23.40	0.72
5.433	0.96	11.433	5.75	17.433	1.08	23.43	0.72
5.467	0.96	11.467	5.75	17.467	1.08	23.47	0.72
5.500	0.96	11.500	5.77	17.500	1.08	23.50	0.72
5.533	0.96	11.533	24.92	17.533	1.08	23.53	0.72
5.567	0.96	11.567	24.92	17.567	1.08	23.57	0.72
5.600	0.96	11.600	24.92	17.600	1.08	23.60	0.72
5.633	0.96	11.633	24.92	17.633	1.08	23.63	0.72
5.667	0.96	11.667	24.92	17.667	1.08	23.67	0.72
5.700	0.96	11.700	24.92	17.700	1.08	23.70	0.72
5.733	0.96	11.733	24.92	17.733	1.08	23.73	0.72
5.767	0.96	11.767	45.58	17.767	1.08	23.77	0.72
5.800	0.96	11.800	66.13	17.800	1.08	23.80	0.72
5.833	0.96	11.833	66.13	17.833	1.08	23.83	0.72
5.867	0.96	11.867	66.13	17.867	1.08	23.87	0.72
5.900	0.96	11.900	66.13	17.900	1.08	23.90	0.72
5.933	0.96	11.933	66.13	17.933	1.08	23.93	0.72
5.967	0.96	11.967	66.13	17.967	1.08	23.97	0.72
6.000	0.96	12.000	66.05	18.000	1.08	24.00	0.72

```
Unit Hyd Qpeak  (cms)=   0.394

PEAK FLOW       (cms)=   0.050 (i)
TIME TO PEAK    (hrs)=  12.200
RUNOFF VOLUME    (mm)=   9.143
TOTAL RAINFALL   (mm)=  59.937
RUNOFF COEFFICIENT   =   0.153

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

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      V    V   I    SSSSS  U   U    A    L              (v 6.2.2001)
      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 6.2\VO2\voin.dat

  Output  filename:
C:\Users\zhouj\AppData\Local\Civica\VH5\642fa701-08f9-4281-a674-e9ad409f1aac\56d57c
8a-e219-4bd5-ba70-b97fc13723f8\scenar
  Summary filename:
C:\Users\zhouj\AppData\Local\Civica\VH5\642fa701-08f9-4281-a674-e9ad409f1aac\56d57c
8a-e219-4bd5-ba70-b97fc13723f8\scenar


DATE: 08-31-2023                           TIME: 09:30:51

USER:


COMMENTS: ____________________________________________________________


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  **********************************************
  ** SIMULATION : Run 09                      **
  **********************************************


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|    READ STORM    |    Filename: C:\Users\zhouj\AppD
|                  |              ata\Local\Temp\
|                  |              6c87efa1-8108-4792-a019-7735996b59b2\eea38120
| Ptotal= 67.54 mm |    Comments: 10yr24hrSCS_Midland
--------------------
```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	0.74	6.25	1.35	12.25	9.72	18.25	1.22
0.50	0.74	6.50	1.35	12.50	9.72	18.50	1.22
0.75	0.74	6.75	1.35	12.75	5.00	18.75	1.22
1.00	0.74	7.00	1.35	13.00	5.00	19.00	1.22
1.25	0.74	7.25	1.35	13.25	0.95	19.25	1.22
1.50	0.74	7.50	1.35	13.50	0.95	19.50	1.22
1.75	0.74	7.75	1.35	13.75	5.54	19.75	1.22

2.00	0.74	8.00	1.35	14.00	5.54	20.00	1.22
2.25	0.88	8.25	1.82	14.25	2.03	20.25	0.81
2.50	0.88	8.50	1.82	14.50	2.03	20.50	0.81
2.75	0.88	8.75	1.82	14.75	2.03	20.75	0.81
3.00	0.88	9.00	1.82	15.00	2.03	21.00	0.81
3.25	0.88	9.25	2.16	15.25	2.03	21.25	0.81
3.50	0.88	9.50	2.16	15.50	2.03	21.50	0.81
3.75	0.88	9.75	2.43	15.75	2.03	21.75	0.81
4.00	0.88	10.00	2.43	16.00	2.03	22.00	0.81
4.25	1.08	10.25	3.11	16.25	1.22	22.25	0.81
4.50	1.08	10.50	3.11	16.50	1.22	22.50	0.81
4.75	1.08	10.75	4.19	16.75	1.22	22.75	0.81
5.00	1.08	11.00	4.19	17.00	1.22	23.00	0.81
5.25	1.08	11.25	6.48	17.25	1.22	23.25	0.81
5.50	1.08	11.50	6.48	17.50	1.22	23.50	0.81
5.75	1.08	11.75	28.08	17.75	1.22	23.75	0.81
6.00	1.08	12.00	74.52	18.00	1.22	24.00	0.81

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| CALIB              |
| NASHYD   (  0100)|   Area    (ha)=   3.09   Curve Number   (CN)= 48.0
|ID= 1 DT= 2.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.30
```

NOTE: RAINFALL WAS TRANSFORMED TO 2.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	' TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.033	0.74	6.033	1.35	12.033	9.72	18.03	1.22
0.067	0.74	6.067	1.35	12.067	9.72	18.07	1.22
0.100	0.74	6.100	1.35	12.100	9.72	18.10	1.22
0.133	0.74	6.133	1.35	12.133	9.72	18.13	1.22
0.167	0.74	6.167	1.35	12.167	9.72	18.17	1.22
0.200	0.74	6.200	1.35	12.200	9.72	18.20	1.22
0.233	0.74	6.233	1.35	12.233	9.72	18.23	1.22
0.267	0.74	6.267	1.35	12.267	9.72	18.27	1.22
0.300	0.74	6.300	1.35	12.300	9.72	18.30	1.22
0.333	0.74	6.333	1.35	12.333	9.72	18.33	1.22
0.367	0.74	6.367	1.35	12.367	9.72	18.37	1.22
0.400	0.74	6.400	1.35	12.400	9.72	18.40	1.22
0.433	0.74	6.433	1.35	12.433	9.72	18.43	1.22
0.467	0.74	6.467	1.35	12.467	9.72	18.47	1.22
0.500	0.74	6.500	1.35	12.500	9.71	18.50	1.22
0.533	0.74	6.533	1.35	12.533	5.00	18.53	1.22
0.567	0.74	6.567	1.35	12.567	5.00	18.57	1.22
0.600	0.74	6.600	1.35	12.600	5.00	18.60	1.22
0.633	0.74	6.633	1.35	12.633	5.00	18.63	1.22
0.667	0.74	6.667	1.35	12.667	5.00	18.67	1.22
0.700	0.74	6.700	1.35	12.700	5.00	18.70	1.22
0.733	0.74	6.733	1.35	12.733	5.00	18.73	1.22
0.767	0.74	6.767	1.35	12.767	5.00	18.77	1.22
0.800	0.74	6.800	1.35	12.800	5.00	18.80	1.22
0.833	0.74	6.833	1.35	12.833	5.00	18.83	1.22
0.867	0.74	6.867	1.35	12.867	5.00	18.87	1.22
0.900	0.74	6.900	1.35	12.900	5.00	18.90	1.22
0.933	0.74	6.933	1.35	12.933	5.00	18.93	1.22
0.967	0.74	6.967	1.35	12.967	5.00	18.97	1.22

1.000	0.74	7.000	1.35	13.000	4.99	19.00	1.22
1.033	0.74	7.033	1.35	13.033	0.95	19.03	1.22
1.067	0.74	7.067	1.35	13.067	0.95	19.07	1.22
1.100	0.74	7.100	1.35	13.100	0.95	19.10	1.22
1.133	0.74	7.133	1.35	13.133	0.95	19.13	1.22
1.167	0.74	7.167	1.35	13.167	0.95	19.17	1.22
1.200	0.74	7.200	1.35	13.200	0.95	19.20	1.22
1.233	0.74	7.233	1.35	13.233	0.95	19.23	1.22
1.267	0.74	7.267	1.35	13.267	0.95	19.27	1.22
1.300	0.74	7.300	1.35	13.300	0.95	19.30	1.22
1.333	0.74	7.333	1.35	13.333	0.95	19.33	1.22
1.367	0.74	7.367	1.35	13.367	0.95	19.37	1.22
1.400	0.74	7.400	1.35	13.400	0.95	19.40	1.22
1.433	0.74	7.433	1.35	13.433	0.95	19.43	1.22
1.467	0.74	7.467	1.35	13.467	0.95	19.47	1.22
1.500	0.74	7.500	1.35	13.500	0.96	19.50	1.22
1.533	0.74	7.533	1.35	13.533	5.54	19.53	1.22
1.567	0.74	7.567	1.35	13.567	5.54	19.57	1.22
1.600	0.74	7.600	1.35	13.600	5.54	19.60	1.22
1.633	0.74	7.633	1.35	13.633	5.54	19.63	1.22
1.667	0.74	7.667	1.35	13.667	5.54	19.67	1.22
1.700	0.74	7.700	1.35	13.700	5.54	19.70	1.22
1.733	0.74	7.733	1.35	13.733	5.54	19.73	1.22
1.767	0.74	7.767	1.35	13.767	5.54	19.77	1.22
1.800	0.74	7.800	1.35	13.800	5.54	19.80	1.22
1.833	0.74	7.833	1.35	13.833	5.54	19.83	1.22
1.867	0.74	7.867	1.35	13.867	5.54	19.87	1.22
1.900	0.74	7.900	1.35	13.900	5.54	19.90	1.22
1.933	0.74	7.933	1.35	13.933	5.54	19.93	1.22
1.967	0.74	7.967	1.35	13.967	5.54	19.97	1.22
2.000	0.74	8.000	1.35	14.000	5.53	20.00	1.22
2.033	0.88	8.033	1.82	14.033	2.03	20.03	0.81
2.067	0.88	8.067	1.82	14.067	2.03	20.07	0.81
2.100	0.88	8.100	1.82	14.100	2.03	20.10	0.81
2.133	0.88	8.133	1.82	14.133	2.03	20.13	0.81
2.167	0.88	8.167	1.82	14.167	2.03	20.17	0.81
2.200	0.88	8.200	1.82	14.200	2.03	20.20	0.81
2.233	0.88	8.233	1.82	14.233	2.03	20.23	0.81
2.267	0.88	8.267	1.82	14.267	2.03	20.27	0.81
2.300	0.88	8.300	1.82	14.300	2.03	20.30	0.81
2.333	0.88	8.333	1.82	14.333	2.03	20.33	0.81
2.367	0.88	8.367	1.82	14.367	2.03	20.37	0.81
2.400	0.88	8.400	1.82	14.400	2.03	20.40	0.81
2.433	0.88	8.433	1.82	14.433	2.03	20.43	0.81
2.467	0.88	8.467	1.82	14.467	2.03	20.47	0.81
2.500	0.88	8.500	1.82	14.500	2.03	20.50	0.81
2.533	0.88	8.533	1.82	14.533	2.03	20.53	0.81
2.567	0.88	8.567	1.82	14.567	2.03	20.57	0.81
2.600	0.88	8.600	1.82	14.600	2.03	20.60	0.81
2.633	0.88	8.633	1.82	14.633	2.03	20.63	0.81
2.667	0.88	8.667	1.82	14.667	2.03	20.67	0.81
2.700	0.88	8.700	1.82	14.700	2.03	20.70	0.81
2.733	0.88	8.733	1.82	14.733	2.03	20.73	0.81
2.767	0.88	8.767	1.82	14.767	2.03	20.77	0.81
2.800	0.88	8.800	1.82	14.800	2.03	20.80	0.81
2.833	0.88	8.833	1.82	14.833	2.03	20.83	0.81
2.867	0.88	8.867	1.82	14.867	2.03	20.87	0.81
2.900	0.88	8.900	1.82	14.900	2.03	20.90	0.81
2.933	0.88	8.933	1.82	14.933	2.03	20.93	0.81
2.967	0.88	8.967	1.82	14.967	2.03	20.97	0.81
3.000	0.88	9.000	1.82	15.000	2.03	21.00	0.81

3.033	0.88	9.033	2.16	15.033	2.03	21.03	0.81
3.067	0.88	9.067	2.16	15.067	2.03	21.07	0.81
3.100	0.88	9.100	2.16	15.100	2.03	21.10	0.81
3.133	0.88	9.133	2.16	15.133	2.03	21.13	0.81
3.167	0.88	9.167	2.16	15.167	2.03	21.17	0.81
3.200	0.88	9.200	2.16	15.200	2.03	21.20	0.81
3.233	0.88	9.233	2.16	15.233	2.03	21.23	0.81
3.267	0.88	9.267	2.16	15.267	2.03	21.27	0.81
3.300	0.88	9.300	2.16	15.300	2.03	21.30	0.81
3.333	0.88	9.333	2.16	15.333	2.03	21.33	0.81
3.367	0.88	9.367	2.16	15.367	2.03	21.37	0.81
3.400	0.88	9.400	2.16	15.400	2.03	21.40	0.81
3.433	0.88	9.433	2.16	15.433	2.03	21.43	0.81
3.467	0.88	9.467	2.16	15.467	2.03	21.47	0.81
3.500	0.88	9.500	2.16	15.500	2.03	21.50	0.81
3.533	0.88	9.533	2.43	15.533	2.03	21.53	0.81
3.567	0.88	9.567	2.43	15.567	2.03	21.57	0.81
3.600	0.88	9.600	2.43	15.600	2.03	21.60	0.81
3.633	0.88	9.633	2.43	15.633	2.03	21.63	0.81
3.667	0.88	9.667	2.43	15.667	2.03	21.67	0.81
3.700	0.88	9.700	2.43	15.700	2.03	21.70	0.81
3.733	0.88	9.733	2.43	15.733	2.03	21.73	0.81
3.767	0.88	9.767	2.43	15.767	2.03	21.77	0.81
3.800	0.88	9.800	2.43	15.800	2.03	21.80	0.81
3.833	0.88	9.833	2.43	15.833	2.03	21.83	0.81
3.867	0.88	9.867	2.43	15.867	2.03	21.87	0.81
3.900	0.88	9.900	2.43	15.900	2.03	21.90	0.81
3.933	0.88	9.933	2.43	15.933	2.03	21.93	0.81
3.967	0.88	9.967	2.43	15.967	2.03	21.97	0.81
4.000	0.88	10.000	2.43	16.000	2.03	22.00	0.81
4.033	1.08	10.033	3.11	16.033	1.22	22.03	0.81
4.067	1.08	10.067	3.11	16.067	1.22	22.07	0.81
4.100	1.08	10.100	3.11	16.100	1.22	22.10	0.81
4.133	1.08	10.133	3.11	16.133	1.22	22.13	0.81
4.167	1.08	10.167	3.11	16.167	1.22	22.17	0.81
4.200	1.08	10.200	3.11	16.200	1.22	22.20	0.81
4.233	1.08	10.233	3.11	16.233	1.22	22.23	0.81
4.267	1.08	10.267	3.11	16.267	1.22	22.27	0.81
4.300	1.08	10.300	3.11	16.300	1.22	22.30	0.81
4.333	1.08	10.333	3.11	16.333	1.22	22.33	0.81
4.367	1.08	10.367	3.11	16.367	1.22	22.37	0.81
4.400	1.08	10.400	3.11	16.400	1.22	22.40	0.81
4.433	1.08	10.433	3.11	16.433	1.22	22.43	0.81
4.467	1.08	10.467	3.11	16.467	1.22	22.47	0.81
4.500	1.08	10.500	3.11	16.500	1.22	22.50	0.81
4.533	1.08	10.533	4.19	16.533	1.22	22.53	0.81
4.567	1.08	10.567	4.19	16.567	1.22	22.57	0.81
4.600	1.08	10.600	4.19	16.600	1.22	22.60	0.81
4.633	1.08	10.633	4.19	16.633	1.22	22.63	0.81
4.667	1.08	10.667	4.19	16.667	1.22	22.67	0.81
4.700	1.08	10.700	4.19	16.700	1.22	22.70	0.81
4.733	1.08	10.733	4.19	16.733	1.22	22.73	0.81
4.767	1.08	10.767	4.19	16.767	1.22	22.77	0.81
4.800	1.08	10.800	4.19	16.800	1.22	22.80	0.81
4.833	1.08	10.833	4.19	16.833	1.22	22.83	0.81
4.867	1.08	10.867	4.19	16.867	1.22	22.87	0.81
4.900	1.08	10.900	4.19	16.900	1.22	22.90	0.81
4.933	1.08	10.933	4.19	16.933	1.22	22.93	0.81
4.967	1.08	10.967	4.19	16.967	1.22	22.97	0.81
5.000	1.08	11.000	4.19	17.000	1.22	23.00	0.81
5.033	1.08	11.033	6.48	17.033	1.22	23.03	0.81

5.067	1.08	11.067	6.48	17.067	1.22	23.07	0.81
5.100	1.08	11.100	6.48	17.100	1.22	23.10	0.81
5.133	1.08	11.133	6.48	17.133	1.22	23.13	0.81
5.167	1.08	11.167	6.48	17.167	1.22	23.17	0.81
5.200	1.08	11.200	6.48	17.200	1.22	23.20	0.81
5.233	1.08	11.233	6.48	17.233	1.22	23.23	0.81
5.267	1.08	11.267	6.48	17.267	1.22	23.27	0.81
5.300	1.08	11.300	6.48	17.300	1.22	23.30	0.81
5.333	1.08	11.333	6.48	17.333	1.22	23.33	0.81
5.367	1.08	11.367	6.48	17.367	1.22	23.37	0.81
5.400	1.08	11.400	6.48	17.400	1.22	23.40	0.81
5.433	1.08	11.433	6.48	17.433	1.22	23.43	0.81
5.467	1.08	11.467	6.48	17.467	1.22	23.47	0.81
5.500	1.08	11.500	6.51	17.500	1.22	23.50	0.81
5.533	1.08	11.533	28.08	17.533	1.22	23.53	0.81
5.567	1.08	11.567	28.08	17.567	1.22	23.57	0.81
5.600	1.08	11.600	28.08	17.600	1.22	23.60	0.81
5.633	1.08	11.633	28.08	17.633	1.22	23.63	0.81
5.667	1.08	11.667	28.08	17.667	1.22	23.67	0.81
5.700	1.08	11.700	28.08	17.700	1.22	23.70	0.81
5.733	1.08	11.733	28.08	17.733	1.22	23.73	0.81
5.767	1.08	11.767	51.36	17.767	1.22	23.77	0.81
5.800	1.08	11.800	74.52	17.800	1.22	23.80	0.81
5.833	1.08	11.833	74.52	17.833	1.22	23.83	0.81
5.867	1.08	11.867	74.52	17.867	1.22	23.87	0.81
5.900	1.08	11.900	74.52	17.900	1.22	23.90	0.81
5.933	1.08	11.933	74.52	17.933	1.22	23.93	0.81
5.967	1.08	11.967	74.52	17.967	1.22	23.97	0.81
6.000	1.08	12.000	74.43	18.000	1.22	24.00	0.81

```
Unit Hyd Qpeak  (cms)=   0.394

PEAK FLOW       (cms)=   0.063 (i)
TIME TO PEAK    (hrs)=  12.200
RUNOFF VOLUME    (mm)=  11.581
TOTAL RAINFALL   (mm)=  67.540
RUNOFF COEFFICIENT   =   0.171

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

------------------------------------------------------------------------------
================================================================================
======================

     V    V   I    SSSSS  U   U    A    L             (v 6.2.2001)
     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 6.2\VO2\voin.dat

Output filename:
C:\Users\zhouj\AppData\Local\Civica\VH5\642fa701-08f9-4281-a674-e9ad409f1aac\314f734b-024d-45ee-b381-c2903c4233e9\scenar
Summary filename:
C:\Users\zhouj\AppData\Local\Civica\VH5\642fa701-08f9-4281-a674-e9ad409f1aac\314f734b-024d-45ee-b381-c2903c4233e9\scenar

DATE: 08-31-2023 TIME: 09:30:51

USER:

COMMENTS: ____

****
** SIMULATION : Run 10 **
****

| READ STORM | Filename: C:\Users\zhouj\AppData\Local\Temp\6c87efa1-8108-4792-a019-7735996b59b2\05bef237
| Ptotal= 78.13 mm | Comments: 25yr24hrSCS_Midland

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	0.86	6.25	1.56	12.25	11.25	18.25	1.41
0.50	0.86	6.50	1.56	12.50	11.25	18.50	1.41
0.75	0.86	6.75	1.56	12.75	5.78	18.75	1.41
1.00	0.86	7.00	1.56	13.00	5.78	19.00	1.41
1.25	0.86	7.25	1.56	13.25	1.09	19.25	1.41
1.50	0.86	7.50	1.56	13.50	1.09	19.50	1.41
1.75	0.86	7.75	1.56	13.75	6.40	19.75	1.41
2.00	0.86	8.00	1.56	14.00	6.40	20.00	1.41
2.25	1.02	8.25	2.11	14.25	2.34	20.25	0.94
2.50	1.02	8.50	2.11	14.50	2.34	20.50	0.94
2.75	1.02	8.75	2.11	14.75	2.34	20.75	0.94
3.00	1.02	9.00	2.11	15.00	2.34	21.00	0.94
3.25	1.02	9.25	2.50	15.25	2.34	21.25	0.94
3.50	1.02	9.50	2.50	15.50	2.34	21.50	0.94
3.75	1.02	9.75	2.81	15.75	2.34	21.75	0.94
4.00	1.02	10.00	2.81	16.00	2.34	22.00	0.94
4.25	1.25	10.25	3.59	16.25	1.41	22.25	0.94
4.50	1.25	10.50	3.59	16.50	1.41	22.50	0.94
4.75	1.25	10.75	4.84	16.75	1.41	22.75	0.94
5.00	1.25	11.00	4.84	17.00	1.41	23.00	0.94
5.25	1.25	11.25	7.50	17.25	1.41	23.25	0.94
5.50	1.25	11.50	7.50	17.50	1.41	23.50	0.94
5.75	1.25	11.75	32.49	17.75	1.41	23.75	0.94
6.00	1.25	12.00	86.22	18.00	1.41	24.00	0.94

| CALIB |
| NASHYD (0100)| Area (ha)= 3.09 Curve Number (CN)= 48.0
|ID= 1 DT= 2.0 min | Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
-------------------- U.H. Tp(hrs)= 0.30

NOTE: RAINFALL WAS TRANSFORMED TO 2.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.033	0.86	6.033	1.56	12.033	11.25	18.03	1.41
0.067	0.86	6.067	1.56	12.067	11.25	18.07	1.41
0.100	0.86	6.100	1.56	12.100	11.25	18.10	1.41
0.133	0.86	6.133	1.56	12.133	11.25	18.13	1.41
0.167	0.86	6.167	1.56	12.167	11.25	18.17	1.41
0.200	0.86	6.200	1.56	12.200	11.25	18.20	1.41
0.233	0.86	6.233	1.56	12.233	11.25	18.23	1.41
0.267	0.86	6.267	1.56	12.267	11.25	18.27	1.41
0.300	0.86	6.300	1.56	12.300	11.25	18.30	1.41
0.333	0.86	6.333	1.56	12.333	11.25	18.33	1.41
0.367	0.86	6.367	1.56	12.367	11.25	18.37	1.41
0.400	0.86	6.400	1.56	12.400	11.25	18.40	1.41
0.433	0.86	6.433	1.56	12.433	11.25	18.43	1.41
0.467	0.86	6.467	1.56	12.467	11.25	18.47	1.41
0.500	0.86	6.500	1.56	12.500	11.24	18.50	1.41
0.533	0.86	6.533	1.56	12.533	5.78	18.53	1.41
0.567	0.86	6.567	1.56	12.567	5.78	18.57	1.41
0.600	0.86	6.600	1.56	12.600	5.78	18.60	1.41
0.633	0.86	6.633	1.56	12.633	5.78	18.63	1.41
0.667	0.86	6.667	1.56	12.667	5.78	18.67	1.41
0.700	0.86	6.700	1.56	12.700	5.78	18.70	1.41
0.733	0.86	6.733	1.56	12.733	5.78	18.73	1.41
0.767	0.86	6.767	1.56	12.767	5.78	18.77	1.41
0.800	0.86	6.800	1.56	12.800	5.78	18.80	1.41
0.833	0.86	6.833	1.56	12.833	5.78	18.83	1.41
0.867	0.86	6.867	1.56	12.867	5.78	18.87	1.41
0.900	0.86	6.900	1.56	12.900	5.78	18.90	1.41
0.933	0.86	6.933	1.56	12.933	5.78	18.93	1.41
0.967	0.86	6.967	1.56	12.967	5.78	18.97	1.41
1.000	0.86	7.000	1.56	13.000	5.77	19.00	1.41
1.033	0.86	7.033	1.56	13.033	1.09	19.03	1.41
1.067	0.86	7.067	1.56	13.067	1.09	19.07	1.41
1.100	0.86	7.100	1.56	13.100	1.09	19.10	1.41
1.133	0.86	7.133	1.56	13.133	1.09	19.13	1.41
1.167	0.86	7.167	1.56	13.167	1.09	19.17	1.41
1.200	0.86	7.200	1.56	13.200	1.09	19.20	1.41
1.233	0.86	7.233	1.56	13.233	1.09	19.23	1.41
1.267	0.86	7.267	1.56	13.267	1.09	19.27	1.41
1.300	0.86	7.300	1.56	13.300	1.09	19.30	1.41
1.333	0.86	7.333	1.56	13.333	1.09	19.33	1.41
1.367	0.86	7.367	1.56	13.367	1.09	19.37	1.41
1.400	0.86	7.400	1.56	13.400	1.09	19.40	1.41
1.433	0.86	7.433	1.56	13.433	1.09	19.43	1.41
1.467	0.86	7.467	1.56	13.467	1.09	19.47	1.41
1.500	0.86	7.500	1.56	13.500	1.10	19.50	1.41
1.533	0.86	7.533	1.56	13.533	6.40	19.53	1.41
1.567	0.86	7.567	1.56	13.567	6.40	19.57	1.41
1.600	0.86	7.600	1.56	13.600	6.40	19.60	1.41

1.633	0.86	7.633	1.56	13.633	6.40	19.63	1.41
1.667	0.86	7.667	1.56	13.667	6.40	19.67	1.41
1.700	0.86	7.700	1.56	13.700	6.40	19.70	1.41
1.733	0.86	7.733	1.56	13.733	6.40	19.73	1.41
1.767	0.86	7.767	1.56	13.767	6.40	19.77	1.41
1.800	0.86	7.800	1.56	13.800	6.40	19.80	1.41
1.833	0.86	7.833	1.56	13.833	6.40	19.83	1.41
1.867	0.86	7.867	1.56	13.867	6.40	19.87	1.41
1.900	0.86	7.900	1.56	13.900	6.40	19.90	1.41
1.933	0.86	7.933	1.56	13.933	6.40	19.93	1.41
1.967	0.86	7.967	1.56	13.967	6.40	19.97	1.41
2.000	0.86	8.000	1.56	14.000	6.39	20.00	1.41
2.033	1.02	8.033	2.11	14.033	2.34	20.03	0.94
2.067	1.02	8.067	2.11	14.067	2.34	20.07	0.94
2.100	1.02	8.100	2.11	14.100	2.34	20.10	0.94
2.133	1.02	8.133	2.11	14.133	2.34	20.13	0.94
2.167	1.02	8.167	2.11	14.167	2.34	20.17	0.94
2.200	1.02	8.200	2.11	14.200	2.34	20.20	0.94
2.233	1.02	8.233	2.11	14.233	2.34	20.23	0.94
2.267	1.02	8.267	2.11	14.267	2.34	20.27	0.94
2.300	1.02	8.300	2.11	14.300	2.34	20.30	0.94
2.333	1.02	8.333	2.11	14.333	2.34	20.33	0.94
2.367	1.02	8.367	2.11	14.367	2.34	20.37	0.94
2.400	1.02	8.400	2.11	14.400	2.34	20.40	0.94
2.433	1.02	8.433	2.11	14.433	2.34	20.43	0.94
2.467	1.02	8.467	2.11	14.467	2.34	20.47	0.94
2.500	1.02	8.500	2.11	14.500	2.34	20.50	0.94
2.533	1.02	8.533	2.11	14.533	2.34	20.53	0.94
2.567	1.02	8.567	2.11	14.567	2.34	20.57	0.94
2.600	1.02	8.600	2.11	14.600	2.34	20.60	0.94
2.633	1.02	8.633	2.11	14.633	2.34	20.63	0.94
2.667	1.02	8.667	2.11	14.667	2.34	20.67	0.94
2.700	1.02	8.700	2.11	14.700	2.34	20.70	0.94
2.733	1.02	8.733	2.11	14.733	2.34	20.73	0.94
2.767	1.02	8.767	2.11	14.767	2.34	20.77	0.94
2.800	1.02	8.800	2.11	14.800	2.34	20.80	0.94
2.833	1.02	8.833	2.11	14.833	2.34	20.83	0.94
2.867	1.02	8.867	2.11	14.867	2.34	20.87	0.94
2.900	1.02	8.900	2.11	14.900	2.34	20.90	0.94
2.933	1.02	8.933	2.11	14.933	2.34	20.93	0.94
2.967	1.02	8.967	2.11	14.967	2.34	20.97	0.94
3.000	1.02	9.000	2.11	15.000	2.34	21.00	0.94
3.033	1.02	9.033	2.50	15.033	2.34	21.03	0.94
3.067	1.02	9.067	2.50	15.067	2.34	21.07	0.94
3.100	1.02	9.100	2.50	15.100	2.34	21.10	0.94
3.133	1.02	9.133	2.50	15.133	2.34	21.13	0.94
3.167	1.02	9.167	2.50	15.167	2.34	21.17	0.94
3.200	1.02	9.200	2.50	15.200	2.34	21.20	0.94
3.233	1.02	9.233	2.50	15.233	2.34	21.23	0.94
3.267	1.02	9.267	2.50	15.267	2.34	21.27	0.94
3.300	1.02	9.300	2.50	15.300	2.34	21.30	0.94
3.333	1.02	9.333	2.50	15.333	2.34	21.33	0.94
3.367	1.02	9.367	2.50	15.367	2.34	21.37	0.94
3.400	1.02	9.400	2.50	15.400	2.34	21.40	0.94
3.433	1.02	9.433	2.50	15.433	2.34	21.43	0.94
3.467	1.02	9.467	2.50	15.467	2.34	21.47	0.94
3.500	1.02	9.500	2.50	15.500	2.34	21.50	0.94
3.533	1.02	9.533	2.81	15.533	2.34	21.53	0.94
3.567	1.02	9.567	2.81	15.567	2.34	21.57	0.94
3.600	1.02	9.600	2.81	15.600	2.34	21.60	0.94
3.633	1.02	9.633	2.81	15.633	2.34	21.63	0.94

3.667	1.02	9.667	2.81	15.667	2.34	21.67	0.94
3.700	1.02	9.700	2.81	15.700	2.34	21.70	0.94
3.733	1.02	9.733	2.81	15.733	2.34	21.73	0.94
3.767	1.02	9.767	2.81	15.767	2.34	21.77	0.94
3.800	1.02	9.800	2.81	15.800	2.34	21.80	0.94
3.833	1.02	9.833	2.81	15.833	2.34	21.83	0.94
3.867	1.02	9.867	2.81	15.867	2.34	21.87	0.94
3.900	1.02	9.900	2.81	15.900	2.34	21.90	0.94
3.933	1.02	9.933	2.81	15.933	2.34	21.93	0.94
3.967	1.02	9.967	2.81	15.967	2.34	21.97	0.94
4.000	1.02	10.000	2.81	16.000	2.34	22.00	0.94
4.033	1.25	10.033	3.59	16.033	1.41	22.03	0.94
4.067	1.25	10.067	3.59	16.067	1.41	22.07	0.94
4.100	1.25	10.100	3.59	16.100	1.41	22.10	0.94
4.133	1.25	10.133	3.59	16.133	1.41	22.13	0.94
4.167	1.25	10.167	3.59	16.167	1.41	22.17	0.94
4.200	1.25	10.200	3.59	16.200	1.41	22.20	0.94
4.233	1.25	10.233	3.59	16.233	1.41	22.23	0.94
4.267	1.25	10.267	3.59	16.267	1.41	22.27	0.94
4.300	1.25	10.300	3.59	16.300	1.41	22.30	0.94
4.333	1.25	10.333	3.59	16.333	1.41	22.33	0.94
4.367	1.25	10.367	3.59	16.367	1.41	22.37	0.94
4.400	1.25	10.400	3.59	16.400	1.41	22.40	0.94
4.433	1.25	10.433	3.59	16.433	1.41	22.43	0.94
4.467	1.25	10.467	3.59	16.467	1.41	22.47	0.94
4.500	1.25	10.500	3.59	16.500	1.41	22.50	0.94
4.533	1.25	10.533	4.84	16.533	1.41	22.53	0.94
4.567	1.25	10.567	4.84	16.567	1.41	22.57	0.94
4.600	1.25	10.600	4.84	16.600	1.41	22.60	0.94
4.633	1.25	10.633	4.84	16.633	1.41	22.63	0.94
4.667	1.25	10.667	4.84	16.667	1.41	22.67	0.94
4.700	1.25	10.700	4.84	16.700	1.41	22.70	0.94
4.733	1.25	10.733	4.84	16.733	1.41	22.73	0.94
4.767	1.25	10.767	4.84	16.767	1.41	22.77	0.94
4.800	1.25	10.800	4.84	16.800	1.41	22.80	0.94
4.833	1.25	10.833	4.84	16.833	1.41	22.83	0.94
4.867	1.25	10.867	4.84	16.867	1.41	22.87	0.94
4.900	1.25	10.900	4.84	16.900	1.41	22.90	0.94
4.933	1.25	10.933	4.84	16.933	1.41	22.93	0.94
4.967	1.25	10.967	4.84	16.967	1.41	22.97	0.94
5.000	1.25	11.000	4.84	17.000	1.41	23.00	0.94
5.033	1.25	11.033	7.50	17.033	1.41	23.03	0.94
5.067	1.25	11.067	7.50	17.067	1.41	23.07	0.94
5.100	1.25	11.100	7.50	17.100	1.41	23.10	0.94
5.133	1.25	11.133	7.50	17.133	1.41	23.13	0.94
5.167	1.25	11.167	7.50	17.167	1.41	23.17	0.94
5.200	1.25	11.200	7.50	17.200	1.41	23.20	0.94
5.233	1.25	11.233	7.50	17.233	1.41	23.23	0.94
5.267	1.25	11.267	7.50	17.267	1.41	23.27	0.94
5.300	1.25	11.300	7.50	17.300	1.41	23.30	0.94
5.333	1.25	11.333	7.50	17.333	1.41	23.33	0.94
5.367	1.25	11.367	7.50	17.367	1.41	23.37	0.94
5.400	1.25	11.400	7.50	17.400	1.41	23.40	0.94
5.433	1.25	11.433	7.50	17.433	1.41	23.43	0.94
5.467	1.25	11.467	7.50	17.467	1.41	23.47	0.94
5.500	1.25	11.500	7.53	17.500	1.41	23.50	0.94
5.533	1.25	11.533	32.49	17.533	1.41	23.53	0.94
5.567	1.25	11.567	32.49	17.567	1.41	23.57	0.94
5.600	1.25	11.600	32.49	17.600	1.41	23.60	0.94
5.633	1.25	11.633	32.49	17.633	1.41	23.63	0.94
5.667	1.25	11.667	32.49	17.667	1.41	23.67	0.94

5.700	1.25	11.700	32.49	17.700	1.41	23.70	0.94
5.733	1.25	11.733	32.49	17.733	1.41	23.73	0.94
5.767	1.25	11.767	59.43	17.767	1.41	23.77	0.94
5.800	1.25	11.800	86.22	17.800	1.41	23.80	0.94
5.833	1.25	11.833	86.22	17.833	1.41	23.83	0.94
5.867	1.25	11.867	86.22	17.867	1.41	23.87	0.94
5.900	1.25	11.900	86.22	17.900	1.41	23.90	0.94
5.933	1.25	11.933	86.22	17.933	1.41	23.93	0.94
5.967	1.25	11.967	86.22	17.967	1.41	23.97	0.94
6.000	1.25	12.000	86.12	18.000	1.41	24.00	0.94

Unit Hyd Qpeak (cms)= 0.394

PEAK FLOW (cms)= 0.084 (i)
TIME TO PEAK (hrs)= 12.200
RUNOFF VOLUME (mm)= 15.353
TOTAL RAINFALL (mm)= 78.127
RUNOFF COEFFICIENT = 0.197

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

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V     V   I    SSSSS  U    U    A     L               (v 6.2.2001)
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 6.2\VO2\voin.dat

Output filename:
C:\Users\zhouj\AppData\Local\Civica\VH5\642fa701-08f9-4281-a674-e9ad409f1aac\f95b81e0-4bf2-402a-b75e-32419aa8133b\scenar
Summary filename:
C:\Users\zhouj\AppData\Local\Civica\VH5\642fa701-08f9-4281-a674-e9ad409f1aac\f95b81e0-4bf2-402a-b75e-32419aa8133b\scenar

DATE: 08-31-2023 TIME: 09:30:52

USER:

COMMENTS: ____

****
** SIMULATION : Run 11 **
****

READ STORM	Filename: C:\Users\zhouj\AppData\Local\Temp\6c87efa1-8108-4792-a019-7735996b59b2\23d5b20f
Ptotal= 85.40 mm	Comments: 50yr24hrSCS_Midland

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	0.94	6.25	1.71	12.25	12.30	18.25	1.54
0.50	0.94	6.50	1.71	12.50	12.30	18.50	1.54
0.75	0.94	6.75	1.71	12.75	6.32	18.75	1.54
1.00	0.94	7.00	1.71	13.00	6.32	19.00	1.54
1.25	0.94	7.25	1.71	13.25	1.20	19.25	1.54
1.50	0.94	7.50	1.71	13.50	1.20	19.50	1.54
1.75	0.94	7.75	1.71	13.75	7.00	19.75	1.54
2.00	0.94	8.00	1.71	14.00	7.00	20.00	1.54
2.25	1.11	8.25	2.31	14.25	2.56	20.25	1.02
2.50	1.11	8.50	2.31	14.50	2.56	20.50	1.02
2.75	1.11	8.75	2.31	14.75	2.56	20.75	1.02
3.00	1.11	9.00	2.31	15.00	2.56	21.00	1.02
3.25	1.11	9.25	2.73	15.25	2.56	21.25	1.02
3.50	1.11	9.50	2.73	15.50	2.56	21.50	1.02
3.75	1.11	9.75	3.07	15.75	2.56	21.75	1.02
4.00	1.11	10.00	3.07	16.00	2.56	22.00	1.02
4.25	1.37	10.25	3.93	16.25	1.54	22.25	1.02
4.50	1.37	10.50	3.93	16.50	1.54	22.50	1.02
4.75	1.37	10.75	5.29	16.75	1.54	22.75	1.02
5.00	1.37	11.00	5.29	17.00	1.54	23.00	1.02
5.25	1.37	11.25	8.20	17.25	1.54	23.25	1.02
5.50	1.37	11.50	8.20	17.50	1.54	23.50	1.02
5.75	1.37	11.75	35.53	17.75	1.54	23.75	1.02
6.00	1.37	12.00	94.28	18.00	1.54	24.00	1.02

CALIB NASHYD (0100) ID= 1 DT= 2.0 min	
Area (ha)= 3.09	Curve Number (CN)= 48.0
Ia (mm)= 5.00	# of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.30	

NOTE: RAINFALL WAS TRANSFORMED TO 2.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.033	0.94	6.033	1.71	12.033	12.30	18.03	1.54
0.067	0.94	6.067	1.71	12.067	12.30	18.07	1.54
0.100	0.94	6.100	1.71	12.100	12.30	18.10	1.54
0.133	0.94	6.133	1.71	12.133	12.30	18.13	1.54
0.167	0.94	6.167	1.71	12.167	12.30	18.17	1.54
0.200	0.94	6.200	1.71	12.200	12.30	18.20	1.54

0.233	0.94	6.233	1.71	12.233	12.30	18.23	1.54
0.267	0.94	6.267	1.71	12.267	12.30	18.27	1.54
0.300	0.94	6.300	1.71	12.300	12.30	18.30	1.54
0.333	0.94	6.333	1.71	12.333	12.30	18.33	1.54
0.367	0.94	6.367	1.71	12.367	12.30	18.37	1.54
0.400	0.94	6.400	1.71	12.400	12.30	18.40	1.54
0.433	0.94	6.433	1.71	12.433	12.30	18.43	1.54
0.467	0.94	6.467	1.71	12.467	12.30	18.47	1.54
0.500	0.94	6.500	1.71	12.500	12.29	18.50	1.54
0.533	0.94	6.533	1.71	12.533	6.32	18.53	1.54
0.567	0.94	6.567	1.71	12.567	6.32	18.57	1.54
0.600	0.94	6.600	1.71	12.600	6.32	18.60	1.54
0.633	0.94	6.633	1.71	12.633	6.32	18.63	1.54
0.667	0.94	6.667	1.71	12.667	6.32	18.67	1.54
0.700	0.94	6.700	1.71	12.700	6.32	18.70	1.54
0.733	0.94	6.733	1.71	12.733	6.32	18.73	1.54
0.767	0.94	6.767	1.71	12.767	6.32	18.77	1.54
0.800	0.94	6.800	1.71	12.800	6.32	18.80	1.54
0.833	0.94	6.833	1.71	12.833	6.32	18.83	1.54
0.867	0.94	6.867	1.71	12.867	6.32	18.87	1.54
0.900	0.94	6.900	1.71	12.900	6.32	18.90	1.54
0.933	0.94	6.933	1.71	12.933	6.32	18.93	1.54
0.967	0.94	6.967	1.71	12.967	6.32	18.97	1.54
1.000	0.94	7.000	1.71	13.000	6.31	19.00	1.54
1.033	0.94	7.033	1.71	13.033	1.20	19.03	1.54
1.067	0.94	7.067	1.71	13.067	1.20	19.07	1.54
1.100	0.94	7.100	1.71	13.100	1.20	19.10	1.54
1.133	0.94	7.133	1.71	13.133	1.20	19.13	1.54
1.167	0.94	7.167	1.71	13.167	1.20	19.17	1.54
1.200	0.94	7.200	1.71	13.200	1.20	19.20	1.54
1.233	0.94	7.233	1.71	13.233	1.20	19.23	1.54
1.267	0.94	7.267	1.71	13.267	1.20	19.27	1.54
1.300	0.94	7.300	1.71	13.300	1.20	19.30	1.54
1.333	0.94	7.333	1.71	13.333	1.20	19.33	1.54
1.367	0.94	7.367	1.71	13.367	1.20	19.37	1.54
1.400	0.94	7.400	1.71	13.400	1.20	19.40	1.54
1.433	0.94	7.433	1.71	13.433	1.20	19.43	1.54
1.467	0.94	7.467	1.71	13.467	1.20	19.47	1.54
1.500	0.94	7.500	1.71	13.500	1.21	19.50	1.54
1.533	0.94	7.533	1.71	13.533	7.00	19.53	1.54
1.567	0.94	7.567	1.71	13.567	7.00	19.57	1.54
1.600	0.94	7.600	1.71	13.600	7.00	19.60	1.54
1.633	0.94	7.633	1.71	13.633	7.00	19.63	1.54
1.667	0.94	7.667	1.71	13.667	7.00	19.67	1.54
1.700	0.94	7.700	1.71	13.700	7.00	19.70	1.54
1.733	0.94	7.733	1.71	13.733	7.00	19.73	1.54
1.767	0.94	7.767	1.71	13.767	7.00	19.77	1.54
1.800	0.94	7.800	1.71	13.800	7.00	19.80	1.54
1.833	0.94	7.833	1.71	13.833	7.00	19.83	1.54
1.867	0.94	7.867	1.71	13.867	7.00	19.87	1.54
1.900	0.94	7.900	1.71	13.900	7.00	19.90	1.54
1.933	0.94	7.933	1.71	13.933	7.00	19.93	1.54
1.967	0.94	7.967	1.71	13.967	7.00	19.97	1.54
2.000	0.94	8.000	1.71	14.000	6.99	20.00	1.54
2.033	1.11	8.033	2.31	14.033	2.56	20.03	1.02
2.067	1.11	8.067	2.31	14.067	2.56	20.07	1.02
2.100	1.11	8.100	2.31	14.100	2.56	20.10	1.02
2.133	1.11	8.133	2.31	14.133	2.56	20.13	1.02
2.167	1.11	8.167	2.31	14.167	2.56	20.17	1.02
2.200	1.11	8.200	2.31	14.200	2.56	20.20	1.02
2.233	1.11	8.233	2.31	14.233	2.56	20.23	1.02

2.267	1.11	8.267	2.31	14.267	2.56	20.27	1.02
2.300	1.11	8.300	2.31	14.300	2.56	20.30	1.02
2.333	1.11	8.333	2.31	14.333	2.56	20.33	1.02
2.367	1.11	8.367	2.31	14.367	2.56	20.37	1.02
2.400	1.11	8.400	2.31	14.400	2.56	20.40	1.02
2.433	1.11	8.433	2.31	14.433	2.56	20.43	1.02
2.467	1.11	8.467	2.31	14.467	2.56	20.47	1.02
2.500	1.11	8.500	2.31	14.500	2.56	20.50	1.02
2.533	1.11	8.533	2.31	14.533	2.56	20.53	1.02
2.567	1.11	8.567	2.31	14.567	2.56	20.57	1.02
2.600	1.11	8.600	2.31	14.600	2.56	20.60	1.02
2.633	1.11	8.633	2.31	14.633	2.56	20.63	1.02
2.667	1.11	8.667	2.31	14.667	2.56	20.67	1.02
2.700	1.11	8.700	2.31	14.700	2.56	20.70	1.02
2.733	1.11	8.733	2.31	14.733	2.56	20.73	1.02
2.767	1.11	8.767	2.31	14.767	2.56	20.77	1.02
2.800	1.11	8.800	2.31	14.800	2.56	20.80	1.02
2.833	1.11	8.833	2.31	14.833	2.56	20.83	1.02
2.867	1.11	8.867	2.31	14.867	2.56	20.87	1.02
2.900	1.11	8.900	2.31	14.900	2.56	20.90	1.02
2.933	1.11	8.933	2.31	14.933	2.56	20.93	1.02
2.967	1.11	8.967	2.31	14.967	2.56	20.97	1.02
3.000	1.11	9.000	2.31	15.000	2.56	21.00	1.02
3.033	1.11	9.033	2.73	15.033	2.56	21.03	1.02
3.067	1.11	9.067	2.73	15.067	2.56	21.07	1.02
3.100	1.11	9.100	2.73	15.100	2.56	21.10	1.02
3.133	1.11	9.133	2.73	15.133	2.56	21.13	1.02
3.167	1.11	9.167	2.73	15.167	2.56	21.17	1.02
3.200	1.11	9.200	2.73	15.200	2.56	21.20	1.02
3.233	1.11	9.233	2.73	15.233	2.56	21.23	1.02
3.267	1.11	9.267	2.73	15.267	2.56	21.27	1.02
3.300	1.11	9.300	2.73	15.300	2.56	21.30	1.02
3.333	1.11	9.333	2.73	15.333	2.56	21.33	1.02
3.367	1.11	9.367	2.73	15.367	2.56	21.37	1.02
3.400	1.11	9.400	2.73	15.400	2.56	21.40	1.02
3.433	1.11	9.433	2.73	15.433	2.56	21.43	1.02
3.467	1.11	9.467	2.73	15.467	2.56	21.47	1.02
3.500	1.11	9.500	2.73	15.500	2.56	21.50	1.02
3.533	1.11	9.533	3.07	15.533	2.56	21.53	1.02
3.567	1.11	9.567	3.07	15.567	2.56	21.57	1.02
3.600	1.11	9.600	3.07	15.600	2.56	21.60	1.02
3.633	1.11	9.633	3.07	15.633	2.56	21.63	1.02
3.667	1.11	9.667	3.07	15.667	2.56	21.67	1.02
3.700	1.11	9.700	3.07	15.700	2.56	21.70	1.02
3.733	1.11	9.733	3.07	15.733	2.56	21.73	1.02
3.767	1.11	9.767	3.07	15.767	2.56	21.77	1.02
3.800	1.11	9.800	3.07	15.800	2.56	21.80	1.02
3.833	1.11	9.833	3.07	15.833	2.56	21.83	1.02
3.867	1.11	9.867	3.07	15.867	2.56	21.87	1.02
3.900	1.11	9.900	3.07	15.900	2.56	21.90	1.02
3.933	1.11	9.933	3.07	15.933	2.56	21.93	1.02
3.967	1.11	9.967	3.07	15.967	2.56	21.97	1.02
4.000	1.11	10.000	3.07	16.000	2.56	22.00	1.02
4.033	1.37	10.033	3.93	16.033	1.54	22.03	1.02
4.067	1.37	10.067	3.93	16.067	1.54	22.07	1.02
4.100	1.37	10.100	3.93	16.100	1.54	22.10	1.02
4.133	1.37	10.133	3.93	16.133	1.54	22.13	1.02
4.167	1.37	10.167	3.93	16.167	1.54	22.17	1.02
4.200	1.37	10.200	3.93	16.200	1.54	22.20	1.02
4.233	1.37	10.233	3.93	16.233	1.54	22.23	1.02
4.267	1.37	10.267	3.93	16.267	1.54	22.27	1.02

4.300	1.37	10.300	3.93	16.300	1.54	22.30	1.02
4.333	1.37	10.333	3.93	16.333	1.54	22.33	1.02
4.367	1.37	10.367	3.93	16.367	1.54	22.37	1.02
4.400	1.37	10.400	3.93	16.400	1.54	22.40	1.02
4.433	1.37	10.433	3.93	16.433	1.54	22.43	1.02
4.467	1.37	10.467	3.93	16.467	1.54	22.47	1.02
4.500	1.37	10.500	3.93	16.500	1.54	22.50	1.02
4.533	1.37	10.533	5.29	16.533	1.54	22.53	1.02
4.567	1.37	10.567	5.29	16.567	1.54	22.57	1.02
4.600	1.37	10.600	5.29	16.600	1.54	22.60	1.02
4.633	1.37	10.633	5.29	16.633	1.54	22.63	1.02
4.667	1.37	10.667	5.29	16.667	1.54	22.67	1.02
4.700	1.37	10.700	5.29	16.700	1.54	22.70	1.02
4.733	1.37	10.733	5.29	16.733	1.54	22.73	1.02
4.767	1.37	10.767	5.29	16.767	1.54	22.77	1.02
4.800	1.37	10.800	5.29	16.800	1.54	22.80	1.02
4.833	1.37	10.833	5.29	16.833	1.54	22.83	1.02
4.867	1.37	10.867	5.29	16.867	1.54	22.87	1.02
4.900	1.37	10.900	5.29	16.900	1.54	22.90	1.02
4.933	1.37	10.933	5.29	16.933	1.54	22.93	1.02
4.967	1.37	10.967	5.29	16.967	1.54	22.97	1.02
5.000	1.37	11.000	5.29	17.000	1.54	23.00	1.02
5.033	1.37	11.033	8.20	17.033	1.54	23.03	1.02
5.067	1.37	11.067	8.20	17.067	1.54	23.07	1.02
5.100	1.37	11.100	8.20	17.100	1.54	23.10	1.02
5.133	1.37	11.133	8.20	17.133	1.54	23.13	1.02
5.167	1.37	11.167	8.20	17.167	1.54	23.17	1.02
5.200	1.37	11.200	8.20	17.200	1.54	23.20	1.02
5.233	1.37	11.233	8.20	17.233	1.54	23.23	1.02
5.267	1.37	11.267	8.20	17.267	1.54	23.27	1.02
5.300	1.37	11.300	8.20	17.300	1.54	23.30	1.02
5.333	1.37	11.333	8.20	17.333	1.54	23.33	1.02
5.367	1.37	11.367	8.20	17.367	1.54	23.37	1.02
5.400	1.37	11.400	8.20	17.400	1.54	23.40	1.02
5.433	1.37	11.433	8.20	17.433	1.54	23.43	1.02
5.467	1.37	11.467	8.20	17.467	1.54	23.47	1.02
5.500	1.37	11.500	8.23	17.500	1.54	23.50	1.02
5.533	1.37	11.533	35.53	17.533	1.54	23.53	1.02
5.567	1.37	11.567	35.53	17.567	1.54	23.57	1.02
5.600	1.37	11.600	35.53	17.600	1.54	23.60	1.02
5.633	1.37	11.633	35.53	17.633	1.54	23.63	1.02
5.667	1.37	11.667	35.53	17.667	1.54	23.67	1.02
5.700	1.37	11.700	35.53	17.700	1.54	23.70	1.02
5.733	1.37	11.733	35.53	17.733	1.54	23.73	1.02
5.767	1.37	11.767	64.98	17.767	1.54	23.77	1.02
5.800	1.37	11.800	94.28	17.800	1.54	23.80	1.02
5.833	1.37	11.833	94.28	17.833	1.54	23.83	1.02
5.867	1.37	11.867	94.28	17.867	1.54	23.87	1.02
5.900	1.37	11.900	94.28	17.900	1.54	23.90	1.02
5.933	1.37	11.933	94.28	17.933	1.54	23.93	1.02
5.967	1.37	11.967	94.28	17.967	1.54	23.97	1.02
6.000	1.37	12.000	94.17	18.000	1.54	24.00	1.02

```
Unit Hyd Qpeak  (cms)=   0.394

PEAK FLOW       (cms)=   0.100 (i)
TIME TO PEAK    (hrs)=  12.200
RUNOFF VOLUME    (mm)=  18.180
TOTAL RAINFALL   (mm)=  85.402
RUNOFF COEFFICIENT   =   0.213
```



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

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

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

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2001)
       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 6.2\VO2\voin.dat

  Output  filename:
C:\Users\zhouj\AppData\Local\Civica\VH5\642fa701-08f9-4281-a674-e9ad409f1aac\3fec3a
69-915c-4ef2-82fd-e68590ee5c24\scenar
  Summary filename:
C:\Users\zhouj\AppData\Local\Civica\VH5\642fa701-08f9-4281-a674-e9ad409f1aac\3fec3a
69-915c-4ef2-82fd-e68590ee5c24\scenar


DATE: 08-31-2023                              TIME: 09:30:51

USER:


COMMENTS: ____________________________________________________________


-----------------------------------------------------------------------------------------
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  **********************************************
  ** SIMULATION : Run 12                      **
  **********************************************


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|    READ STORM      |    Filename: C:\Users\zhouj\AppD
|                    |              ata\Local\Temp\
|                    |              6c87efa1-8108-4792-a019-7735996b59b2\0711d3e4
| Ptotal= 92.89 mm   |    Comments: 100yr24hrSCS_Midland
 --------------------
```


TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	1.02	6.25	1.86	12.25	13.38	18.25	1.67
0.50	1.02	6.50	1.86	12.50	13.38	18.50	1.67
0.75	1.02	6.75	1.86	12.75	6.87	18.75	1.67
1.00	1.02	7.00	1.86	13.00	6.87	19.00	1.67
1.25	1.02	7.25	1.86	13.25	1.30	19.25	1.67
1.50	1.02	7.50	1.86	13.50	1.30	19.50	1.67
1.75	1.02	7.75	1.86	13.75	7.62	19.75	1.67
2.00	1.02	8.00	1.86	14.00	7.62	20.00	1.67
2.25	1.21	8.25	2.51	14.25	2.79	20.25	1.11
2.50	1.21	8.50	2.51	14.50	2.79	20.50	1.11
2.75	1.21	8.75	2.51	14.75	2.79	20.75	1.11
3.00	1.21	9.00	2.51	15.00	2.79	21.00	1.11
3.25	1.21	9.25	2.97	15.25	2.79	21.25	1.11
3.50	1.21	9.50	2.97	15.50	2.79	21.50	1.11
3.75	1.21	9.75	3.34	15.75	2.79	21.75	1.11
4.00	1.21	10.00	3.34	16.00	2.79	22.00	1.11
4.25	1.49	10.25	4.27	16.25	1.67	22.25	1.11
4.50	1.49	10.50	4.27	16.50	1.67	22.50	1.11
4.75	1.49	10.75	5.76	16.75	1.67	22.75	1.11
5.00	1.49	11.00	5.76	17.00	1.67	23.00	1.11
5.25	1.49	11.25	8.92	17.25	1.67	23.25	1.11
5.50	1.49	11.50	8.92	17.50	1.67	23.50	1.11
5.75	1.49	11.75	38.65	17.75	1.67	23.75	1.11
6.00	1.49	12.00	102.56	18.00	1.67	24.00	1.11

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

 --------------------
| CALIB              |
| NASHYD   (  0100)  |   Area    (ha)=   3.09   Curve Number   (CN)= 48.0
|ID= 1 DT= 2.0 min   |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
 --------------------    U.H. Tp(hrs)=   0.30

        NOTE:  RAINFALL WAS TRANSFORMED TO   2.0 MIN. TIME STEP.
```

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.033	1.02	6.033	1.86	12.033	13.38	18.03	1.67
0.067	1.02	6.067	1.86	12.067	13.38	18.07	1.67
0.100	1.02	6.100	1.86	12.100	13.38	18.10	1.67
0.133	1.02	6.133	1.86	12.133	13.38	18.13	1.67
0.167	1.02	6.167	1.86	12.167	13.38	18.17	1.67
0.200	1.02	6.200	1.86	12.200	13.38	18.20	1.67
0.233	1.02	6.233	1.86	12.233	13.38	18.23	1.67
0.267	1.02	6.267	1.86	12.267	13.38	18.27	1.67
0.300	1.02	6.300	1.86	12.300	13.38	18.30	1.67
0.333	1.02	6.333	1.86	12.333	13.38	18.33	1.67
0.367	1.02	6.367	1.86	12.367	13.38	18.37	1.67
0.400	1.02	6.400	1.86	12.400	13.38	18.40	1.67
0.433	1.02	6.433	1.86	12.433	13.38	18.43	1.67
0.467	1.02	6.467	1.86	12.467	13.38	18.47	1.67
0.500	1.02	6.500	1.86	12.500	13.37	18.50	1.67
0.533	1.02	6.533	1.86	12.533	6.87	18.53	1.67
0.567	1.02	6.567	1.86	12.567	6.87	18.57	1.67
0.600	1.02	6.600	1.86	12.600	6.87	18.60	1.67
0.633	1.02	6.633	1.86	12.633	6.87	18.63	1.67
0.667	1.02	6.667	1.86	12.667	6.87	18.67	1.67

0.700	1.02	6.700	1.86	12.700	6.87	18.70	1.67
0.733	1.02	6.733	1.86	12.733	6.87	18.73	1.67
0.767	1.02	6.767	1.86	12.767	6.87	18.77	1.67
0.800	1.02	6.800	1.86	12.800	6.87	18.80	1.67
0.833	1.02	6.833	1.86	12.833	6.87	18.83	1.67
0.867	1.02	6.867	1.86	12.867	6.87	18.87	1.67
0.900	1.02	6.900	1.86	12.900	6.87	18.90	1.67
0.933	1.02	6.933	1.86	12.933	6.87	18.93	1.67
0.967	1.02	6.967	1.86	12.967	6.87	18.97	1.67
1.000	1.02	7.000	1.86	13.000	6.86	19.00	1.67
1.033	1.02	7.033	1.86	13.033	1.30	19.03	1.67
1.067	1.02	7.067	1.86	13.067	1.30	19.07	1.67
1.100	1.02	7.100	1.86	13.100	1.30	19.10	1.67
1.133	1.02	7.133	1.86	13.133	1.30	19.13	1.67
1.167	1.02	7.167	1.86	13.167	1.30	19.17	1.67
1.200	1.02	7.200	1.86	13.200	1.30	19.20	1.67
1.233	1.02	7.233	1.86	13.233	1.30	19.23	1.67
1.267	1.02	7.267	1.86	13.267	1.30	19.27	1.67
1.300	1.02	7.300	1.86	13.300	1.30	19.30	1.67
1.333	1.02	7.333	1.86	13.333	1.30	19.33	1.67
1.367	1.02	7.367	1.86	13.367	1.30	19.37	1.67
1.400	1.02	7.400	1.86	13.400	1.30	19.40	1.67
1.433	1.02	7.433	1.86	13.433	1.30	19.43	1.67
1.467	1.02	7.467	1.86	13.467	1.30	19.47	1.67
1.500	1.02	7.500	1.86	13.500	1.31	19.50	1.67
1.533	1.02	7.533	1.86	13.533	7.62	19.53	1.67
1.567	1.02	7.567	1.86	13.567	7.62	19.57	1.67
1.600	1.02	7.600	1.86	13.600	7.62	19.60	1.67
1.633	1.02	7.633	1.86	13.633	7.62	19.63	1.67
1.667	1.02	7.667	1.86	13.667	7.62	19.67	1.67
1.700	1.02	7.700	1.86	13.700	7.62	19.70	1.67
1.733	1.02	7.733	1.86	13.733	7.62	19.73	1.67
1.767	1.02	7.767	1.86	13.767	7.62	19.77	1.67
1.800	1.02	7.800	1.86	13.800	7.62	19.80	1.67
1.833	1.02	7.833	1.86	13.833	7.62	19.83	1.67
1.867	1.02	7.867	1.86	13.867	7.62	19.87	1.67
1.900	1.02	7.900	1.86	13.900	7.62	19.90	1.67
1.933	1.02	7.933	1.86	13.933	7.62	19.93	1.67
1.967	1.02	7.967	1.86	13.967	7.62	19.97	1.67
2.000	1.02	8.000	1.86	14.000	7.61	20.00	1.67
2.033	1.21	8.033	2.51	14.033	2.79	20.03	1.11
2.067	1.21	8.067	2.51	14.067	2.79	20.07	1.11
2.100	1.21	8.100	2.51	14.100	2.79	20.10	1.11
2.133	1.21	8.133	2.51	14.133	2.79	20.13	1.11
2.167	1.21	8.167	2.51	14.167	2.79	20.17	1.11
2.200	1.21	8.200	2.51	14.200	2.79	20.20	1.11
2.233	1.21	8.233	2.51	14.233	2.79	20.23	1.11
2.267	1.21	8.267	2.51	14.267	2.79	20.27	1.11
2.300	1.21	8.300	2.51	14.300	2.79	20.30	1.11
2.333	1.21	8.333	2.51	14.333	2.79	20.33	1.11
2.367	1.21	8.367	2.51	14.367	2.79	20.37	1.11
2.400	1.21	8.400	2.51	14.400	2.79	20.40	1.11
2.433	1.21	8.433	2.51	14.433	2.79	20.43	1.11
2.467	1.21	8.467	2.51	14.467	2.79	20.47	1.11
2.500	1.21	8.500	2.51	14.500	2.79	20.50	1.11
2.533	1.21	8.533	2.51	14.533	2.79	20.53	1.11
2.567	1.21	8.567	2.51	14.567	2.79	20.57	1.11
2.600	1.21	8.600	2.51	14.600	2.79	20.60	1.11
2.633	1.21	8.633	2.51	14.633	2.79	20.63	1.11
2.667	1.21	8.667	2.51	14.667	2.79	20.67	1.11
2.700	1.21	8.700	2.51	14.700	2.79	20.70	1.11

2.733	1.21	8.733	2.51	14.733	2.79	20.73	1.11
2.767	1.21	8.767	2.51	14.767	2.79	20.77	1.11
2.800	1.21	8.800	2.51	14.800	2.79	20.80	1.11
2.833	1.21	8.833	2.51	14.833	2.79	20.83	1.11
2.867	1.21	8.867	2.51	14.867	2.79	20.87	1.11
2.900	1.21	8.900	2.51	14.900	2.79	20.90	1.11
2.933	1.21	8.933	2.51	14.933	2.79	20.93	1.11
2.967	1.21	8.967	2.51	14.967	2.79	20.97	1.11
3.000	1.21	9.000	2.51	15.000	2.79	21.00	1.11
3.033	1.21	9.033	2.97	15.033	2.79	21.03	1.11
3.067	1.21	9.067	2.97	15.067	2.79	21.07	1.11
3.100	1.21	9.100	2.97	15.100	2.79	21.10	1.11
3.133	1.21	9.133	2.97	15.133	2.79	21.13	1.11
3.167	1.21	9.167	2.97	15.167	2.79	21.17	1.11
3.200	1.21	9.200	2.97	15.200	2.79	21.20	1.11
3.233	1.21	9.233	2.97	15.233	2.79	21.23	1.11
3.267	1.21	9.267	2.97	15.267	2.79	21.27	1.11
3.300	1.21	9.300	2.97	15.300	2.79	21.30	1.11
3.333	1.21	9.333	2.97	15.333	2.79	21.33	1.11
3.367	1.21	9.367	2.97	15.367	2.79	21.37	1.11
3.400	1.21	9.400	2.97	15.400	2.79	21.40	1.11
3.433	1.21	9.433	2.97	15.433	2.79	21.43	1.11
3.467	1.21	9.467	2.97	15.467	2.79	21.47	1.11
3.500	1.21	9.500	2.97	15.500	2.79	21.50	1.11
3.533	1.21	9.533	3.34	15.533	2.79	21.53	1.11
3.567	1.21	9.567	3.34	15.567	2.79	21.57	1.11
3.600	1.21	9.600	3.34	15.600	2.79	21.60	1.11
3.633	1.21	9.633	3.34	15.633	2.79	21.63	1.11
3.667	1.21	9.667	3.34	15.667	2.79	21.67	1.11
3.700	1.21	9.700	3.34	15.700	2.79	21.70	1.11
3.733	1.21	9.733	3.34	15.733	2.79	21.73	1.11
3.767	1.21	9.767	3.34	15.767	2.79	21.77	1.11
3.800	1.21	9.800	3.34	15.800	2.79	21.80	1.11
3.833	1.21	9.833	3.34	15.833	2.79	21.83	1.11
3.867	1.21	9.867	3.34	15.867	2.79	21.87	1.11
3.900	1.21	9.900	3.34	15.900	2.79	21.90	1.11
3.933	1.21	9.933	3.34	15.933	2.79	21.93	1.11
3.967	1.21	9.967	3.34	15.967	2.79	21.97	1.11
4.000	1.21	10.000	3.34	16.000	2.79	22.00	1.11
4.033	1.49	10.033	4.27	16.033	1.67	22.03	1.11
4.067	1.49	10.067	4.27	16.067	1.67	22.07	1.11
4.100	1.49	10.100	4.27	16.100	1.67	22.10	1.11
4.133	1.49	10.133	4.27	16.133	1.67	22.13	1.11
4.167	1.49	10.167	4.27	16.167	1.67	22.17	1.11
4.200	1.49	10.200	4.27	16.200	1.67	22.20	1.11
4.233	1.49	10.233	4.27	16.233	1.67	22.23	1.11
4.267	1.49	10.267	4.27	16.267	1.67	22.27	1.11
4.300	1.49	10.300	4.27	16.300	1.67	22.30	1.11
4.333	1.49	10.333	4.27	16.333	1.67	22.33	1.11
4.367	1.49	10.367	4.27	16.367	1.67	22.37	1.11
4.400	1.49	10.400	4.27	16.400	1.67	22.40	1.11
4.433	1.49	10.433	4.27	16.433	1.67	22.43	1.11
4.467	1.49	10.467	4.27	16.467	1.67	22.47	1.11
4.500	1.49	10.500	4.27	16.500	1.67	22.50	1.11
4.533	1.49	10.533	5.76	16.533	1.67	22.53	1.11
4.567	1.49	10.567	5.76	16.567	1.67	22.57	1.11
4.600	1.49	10.600	5.76	16.600	1.67	22.60	1.11
4.633	1.49	10.633	5.76	16.633	1.67	22.63	1.11
4.667	1.49	10.667	5.76	16.667	1.67	22.67	1.11
4.700	1.49	10.700	5.76	16.700	1.67	22.70	1.11
4.733	1.49	10.733	5.76	16.733	1.67	22.73	1.11

4.767	1.49	10.767	5.76	16.767	1.67	22.77	1.11
4.800	1.49	10.800	5.76	16.800	1.67	22.80	1.11
4.833	1.49	10.833	5.76	16.833	1.67	22.83	1.11
4.867	1.49	10.867	5.76	16.867	1.67	22.87	1.11
4.900	1.49	10.900	5.76	16.900	1.67	22.90	1.11
4.933	1.49	10.933	5.76	16.933	1.67	22.93	1.11
4.967	1.49	10.967	5.76	16.967	1.67	22.97	1.11
5.000	1.49	11.000	5.76	17.000	1.67	23.00	1.11
5.033	1.49	11.033	8.92	17.033	1.67	23.03	1.11
5.067	1.49	11.067	8.92	17.067	1.67	23.07	1.11
5.100	1.49	11.100	8.92	17.100	1.67	23.10	1.11
5.133	1.49	11.133	8.92	17.133	1.67	23.13	1.11
5.167	1.49	11.167	8.92	17.167	1.67	23.17	1.11
5.200	1.49	11.200	8.92	17.200	1.67	23.20	1.11
5.233	1.49	11.233	8.92	17.233	1.67	23.23	1.11
5.267	1.49	11.267	8.92	17.267	1.67	23.27	1.11
5.300	1.49	11.300	8.92	17.300	1.67	23.30	1.11
5.333	1.49	11.333	8.92	17.333	1.67	23.33	1.11
5.367	1.49	11.367	8.92	17.367	1.67	23.37	1.11
5.400	1.49	11.400	8.92	17.400	1.67	23.40	1.11
5.433	1.49	11.433	8.92	17.433	1.67	23.43	1.11
5.467	1.49	11.467	8.92	17.467	1.67	23.47	1.11
5.500	1.49	11.500	8.96	17.500	1.67	23.50	1.11
5.533	1.49	11.533	38.65	17.533	1.67	23.53	1.11
5.567	1.49	11.567	38.65	17.567	1.67	23.57	1.11
5.600	1.49	11.600	38.65	17.600	1.67	23.60	1.11
5.633	1.49	11.633	38.65	17.633	1.67	23.63	1.11
5.667	1.49	11.667	38.65	17.667	1.67	23.67	1.11
5.700	1.49	11.700	38.65	17.700	1.67	23.70	1.11
5.733	1.49	11.733	38.65	17.733	1.67	23.73	1.11
5.767	1.49	11.767	70.69	17.767	1.67	23.77	1.11
5.800	1.49	11.800	102.56	17.800	1.67	23.80	1.11
5.833	1.49	11.833	102.56	17.833	1.67	23.83	1.11
5.867	1.49	11.867	102.56	17.867	1.67	23.87	1.11
5.900	1.49	11.900	102.56	17.900	1.67	23.90	1.11
5.933	1.49	11.933	102.56	17.933	1.67	23.93	1.11
5.967	1.49	11.967	102.56	17.967	1.67	23.97	1.11
6.000	1.49	12.000	102.44	18.000	1.67	24.00	1.11

Unit Hyd Qpeak (cms)= 0.394

PEAK FLOW (cms)= 0.118 (i)
TIME TO PEAK (hrs)= 12.200
RUNOFF VOLUME (mm)= 21.275
TOTAL RAINFALL (mm)= 92.887
RUNOFF COEFFICIENT = 0.229

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

APPENDIX

B-2 POST-DEVELOPMENT CONDITIONS

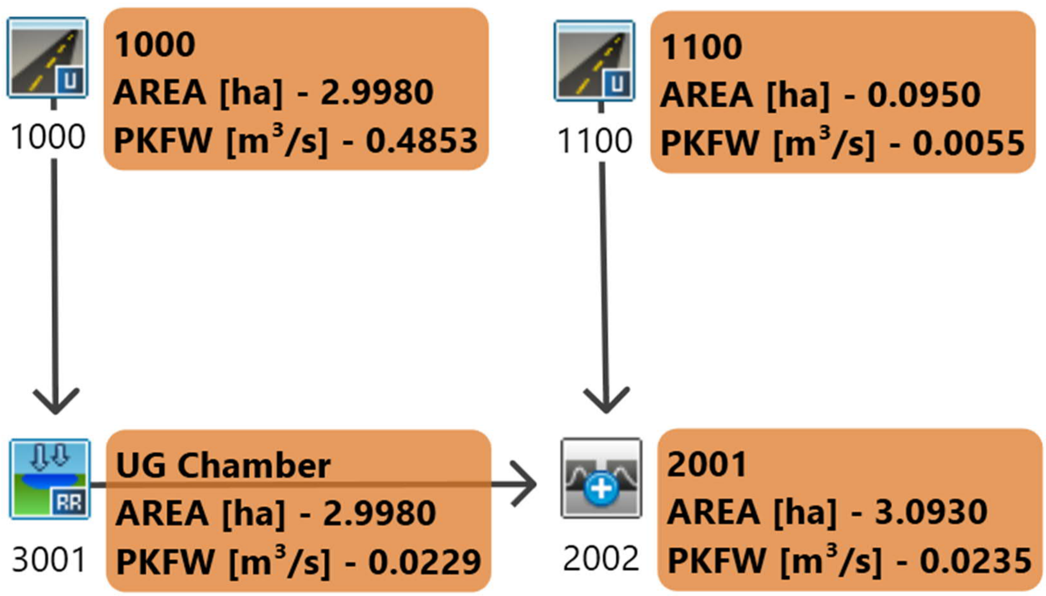

Figure B2
Visual OTTHYMO Model Schematic _ Post-development Drainage

```
==================================================================================================
        V    V   I    SSSSS  U   U    A    L             (v 6.2.2001)
        V    V   I    SS     U   U   A A   L
         V  V    I     SS    U   U  AAAAA  L
         V  V    I      SS   U   U  A   A  L
          VV     I    SSSSS  UUUUU  A   A  LLLLL

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

Developed and Distributed by Smart City Water Inc

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

Input filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat

Output filename:
C:\Users\zhouj\AppData\Local\Civica\VH5\642fa701-08f9-4281-a674-e9ad409f1aac\190873af-77eb-471a-a965-975381923dc8\scenar

Summary filename:
C:\Users\zhouj\AppData\Local\Civica\VH5\642fa701-08f9-4281-a674-e9ad409f1aac\190873af-77eb-471a-a965-975381923dc8\scenar

DATE: 09-13-2023   TIME: 11:19:06

USER:

COMMENTS: ____

```
--------------------------------------------------------------------------------------------------
  ************************************************
  ** SIMULATION : Run 01                        **
  ************************************************

--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 807.440
| Ptotal= 46.83 mm |                          B=   6.750
--------------------                          C=   0.828
                        used in:   INTENSITY =  A / (t + B)^C

                        Duration of storm  = 24.00 hrs
                        Storm time step    = 10.00 min
                        Time to peak ratio =  0.33
```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.17	0.35	6.17	1.25	12.17	1.09	18.17	0.50
0.33	0.36	6.33	1.36	12.33	1.05	18.33	0.50
0.50	0.36	6.50	1.50	12.50	1.02	18.50	0.49

0.67	0.37	6.67	1.68	12.67	0.99	18.67	0.48
0.83	0.38	6.83	1.90	12.83	0.96	18.83	0.48
1.00	0.39	7.00	2.21	13.00	0.93	19.00	0.47
1.17	0.39	7.17	2.64	13.17	0.90	19.17	0.46
1.33	0.40	7.33	3.32	13.33	0.88	19.33	0.46
1.50	0.41	7.50	4.51	13.50	0.86	19.50	0.45
1.67	0.42	7.67	7.17	13.67	0.83	19.67	0.45
1.83	0.43	7.83	18.51	13.83	0.81	19.83	0.44
2.00	0.44	8.00	78.28	14.00	0.79	20.00	0.44
2.17	0.45	8.17	24.65	14.17	0.77	20.17	0.43
2.33	0.46	8.33	12.40	14.33	0.76	20.33	0.43
2.50	0.47	8.50	8.22	14.50	0.74	20.50	0.42
2.67	0.49	8.67	6.14	14.67	0.72	20.67	0.42
2.83	0.50	8.83	4.92	14.83	0.71	20.83	0.41
3.00	0.51	9.00	4.11	15.00	0.69	21.00	0.41
3.17	0.53	9.17	3.53	15.17	0.68	21.17	0.40
3.33	0.55	9.33	3.11	15.33	0.67	21.33	0.40
3.50	0.56	9.50	2.78	15.50	0.65	21.50	0.40
3.67	0.58	9.67	2.51	15.67	0.64	21.67	0.39
3.83	0.60	9.83	2.30	15.83	0.63	21.83	0.39
4.00	0.62	10.00	2.12	16.00	0.62	22.00	0.38
4.17	0.65	10.17	1.97	16.17	0.61	22.17	0.38
4.33	0.67	10.33	1.84	16.33	0.60	22.33	0.38
4.50	0.70	10.50	1.73	16.50	0.59	22.50	0.37
4.67	0.73	10.67	1.63	16.67	0.58	22.67	0.37
4.83	0.76	10.83	1.54	16.83	0.57	22.83	0.37
5.00	0.80	11.00	1.46	17.00	0.56	23.00	0.36
5.17	0.84	11.17	1.39	17.17	0.55	23.17	0.36
5.33	0.89	11.33	1.33	17.33	0.54	23.33	0.36
5.50	0.94	11.50	1.27	17.50	0.53	23.50	0.35
5.67	1.00	11.67	1.22	17.67	0.53	23.67	0.35
5.83	1.07	11.83	1.18	17.83	0.52	23.83	0.35
6.00	1.15	12.00	1.13	18.00	0.51	24.00	0.34

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--------------------------------------------------------------------------------------------------
| CALIB              |
| STANDHYD (  1000)|   Area    (ha)=   3.00
|ID= 1 DT= 2.0 min |   Total Imp(%)=  78.60   Dir. Conn.(%)=  78.60
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.36          0.64
     Dep. Storage     (mm)=       1.00          5.00
     Average Slope     (%)=       1.00          2.00
     Length            (m)=     141.37         40.00
     Mannings n          =       0.013         0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   2.0 MIN. TIME STEP.
```

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.033	0.35	6.033	1.25	12.033	1.09	18.03	0.50
0.067	0.35	6.067	1.25	12.067	1.09	18.07	0.50
0.100	0.35	6.100	1.25	12.100	1.09	18.10	0.50
0.133	0.35	6.133	1.25	12.133	1.09	18.13	0.50
0.167	0.35	6.167	1.25	12.167	1.09	18.17	0.50
0.200	0.36	6.200	1.36	12.200	1.05	18.20	0.50
0.233	0.36	6.233	1.36	12.233	1.05	18.23	0.50

0.267	0.36	6.267	1.36	12.267	1.05	18.27	0.50
0.300	0.36	6.300	1.36	12.300	1.05	18.30	0.50
0.333	0.36	6.333	1.36	12.333	1.05	18.33	0.50
0.367	0.36	6.367	1.50	12.367	1.02	18.37	0.49
0.400	0.36	6.400	1.50	12.400	1.02	18.40	0.49
0.433	0.36	6.433	1.50	12.433	1.02	18.43	0.49
0.467	0.36	6.467	1.50	12.467	1.02	18.47	0.49
0.500	0.36	6.500	1.50	12.500	1.02	18.50	0.49
0.533	0.37	6.533	1.68	12.533	0.99	18.53	0.48
0.567	0.37	6.567	1.68	12.567	0.99	18.57	0.48
0.600	0.37	6.600	1.68	12.600	0.99	18.60	0.48
0.633	0.37	6.633	1.68	12.633	0.99	18.63	0.48
0.667	0.37	6.667	1.68	12.667	0.99	18.67	0.48
0.700	0.38	6.700	1.90	12.700	0.96	18.70	0.48
0.733	0.38	6.733	1.90	12.733	0.96	18.73	0.48
0.767	0.38	6.767	1.90	12.767	0.96	18.77	0.48
0.800	0.38	6.800	1.90	12.800	0.96	18.80	0.48
0.833	0.38	6.833	1.90	12.833	0.96	18.83	0.48
0.867	0.39	6.867	2.21	12.867	0.93	18.87	0.47
0.900	0.39	6.900	2.21	12.900	0.93	18.90	0.47
0.933	0.39	6.933	2.21	12.933	0.93	18.93	0.47
0.967	0.39	6.967	2.21	12.967	0.93	18.97	0.47
1.000	0.39	7.000	2.21	13.000	0.93	19.00	0.47
1.033	0.39	7.033	2.64	13.033	0.90	19.03	0.46
1.067	0.39	7.067	2.64	13.067	0.90	19.07	0.46
1.100	0.39	7.100	2.64	13.100	0.90	19.10	0.46
1.133	0.39	7.133	2.64	13.133	0.90	19.13	0.46
1.167	0.39	7.167	2.64	13.167	0.90	19.17	0.46
1.200	0.40	7.200	3.32	13.200	0.88	19.20	0.46
1.233	0.40	7.233	3.32	13.233	0.88	19.23	0.46
1.267	0.40	7.267	3.32	13.267	0.88	19.27	0.46
1.300	0.40	7.300	3.32	13.300	0.88	19.30	0.46
1.333	0.40	7.333	3.32	13.333	0.88	19.33	0.46
1.367	0.41	7.367	4.51	13.367	0.86	19.37	0.45
1.400	0.41	7.400	4.51	13.400	0.86	19.40	0.45
1.433	0.41	7.433	4.51	13.433	0.86	19.43	0.45
1.467	0.41	7.467	4.51	13.467	0.86	19.47	0.45
1.500	0.41	7.500	4.51	13.500	0.86	19.50	0.45
1.533	0.42	7.533	7.17	13.533	0.83	19.53	0.45
1.567	0.42	7.567	7.17	13.567	0.83	19.57	0.45
1.600	0.42	7.600	7.17	13.600	0.83	19.60	0.45
1.633	0.42	7.633	7.17	13.633	0.83	19.63	0.45
1.667	0.42	7.667	7.17	13.667	0.83	19.67	0.45
1.700	0.43	7.700	18.51	13.700	0.81	19.70	0.44
1.733	0.43	7.733	18.51	13.733	0.81	19.73	0.44
1.767	0.43	7.767	18.51	13.767	0.81	19.77	0.44
1.800	0.43	7.800	18.51	13.800	0.81	19.80	0.44
1.833	0.43	7.833	18.51	13.833	0.81	19.83	0.44
1.867	0.44	7.867	78.26	13.867	0.79	19.87	0.44
1.900	0.44	7.900	78.28	13.900	0.79	19.90	0.44
1.933	0.44	7.933	78.28	13.933	0.79	19.93	0.44
1.967	0.44	7.967	78.28	13.967	0.79	19.97	0.44
2.000	0.44	8.000	78.28	14.000	0.79	20.00	0.44
2.033	0.45	8.033	24.66	14.033	0.77	20.03	0.43
2.067	0.45	8.067	24.65	14.067	0.77	20.07	0.43
2.100	0.45	8.100	24.65	14.100	0.77	20.10	0.43
2.133	0.45	8.133	24.65	14.133	0.77	20.13	0.43
2.167	0.45	8.167	24.65	14.167	0.77	20.17	0.43
2.200	0.46	8.200	12.41	14.200	0.76	20.20	0.43
2.233	0.46	8.233	12.40	14.233	0.76	20.23	0.43
2.267	0.46	8.267	12.40	14.267	0.76	20.27	0.43

2.300	0.46	8.300	12.40	14.300	0.76	20.30	0.43
2.333	0.46	8.333	12.40	14.333	0.76	20.33	0.43
2.367	0.47	8.367	8.22	14.367	0.74	20.37	0.42
2.400	0.47	8.400	8.22	14.400	0.74	20.40	0.42
2.433	0.47	8.433	8.22	14.433	0.74	20.43	0.42
2.467	0.47	8.467	8.22	14.467	0.74	20.47	0.42
2.500	0.47	8.500	8.22	14.500	0.74	20.50	0.42
2.533	0.49	8.533	6.14	14.533	0.72	20.53	0.42
2.567	0.49	8.567	6.14	14.567	0.72	20.57	0.42
2.600	0.49	8.600	6.14	14.600	0.72	20.60	0.42
2.633	0.49	8.633	6.14	14.633	0.72	20.63	0.42
2.667	0.49	8.667	6.14	14.667	0.72	20.67	0.42
2.700	0.50	8.700	4.92	14.700	0.71	20.70	0.41
2.733	0.50	8.733	4.92	14.733	0.71	20.73	0.41
2.767	0.50	8.767	4.92	14.767	0.71	20.77	0.41
2.800	0.50	8.800	4.92	14.800	0.71	20.80	0.41
2.833	0.50	8.833	4.92	14.833	0.71	20.83	0.41
2.867	0.51	8.867	4.11	14.867	0.69	20.87	0.41
2.900	0.51	8.900	4.11	14.900	0.69	20.90	0.41
2.933	0.51	8.933	4.11	14.933	0.69	20.93	0.41
2.967	0.51	8.967	4.11	14.967	0.69	20.97	0.41
3.000	0.51	9.000	4.11	15.000	0.69	21.00	0.41
3.033	0.53	9.033	3.53	15.033	0.68	21.03	0.40
3.067	0.53	9.067	3.53	15.067	0.68	21.07	0.40
3.100	0.53	9.100	3.53	15.100	0.68	21.10	0.40
3.133	0.53	9.133	3.53	15.133	0.68	21.13	0.40
3.167	0.53	9.167	3.53	15.167	0.68	21.17	0.40
3.200	0.55	9.200	3.11	15.200	0.67	21.20	0.40
3.233	0.55	9.233	3.11	15.233	0.67	21.23	0.40
3.267	0.55	9.267	3.11	15.267	0.67	21.27	0.40
3.300	0.55	9.300	3.11	15.300	0.67	21.30	0.40
3.333	0.55	9.333	3.11	15.333	0.67	21.33	0.40
3.367	0.56	9.367	2.78	15.367	0.65	21.37	0.40
3.400	0.56	9.400	2.78	15.400	0.65	21.40	0.40
3.433	0.56	9.433	2.78	15.433	0.65	21.43	0.40
3.467	0.56	9.467	2.78	15.467	0.65	21.47	0.40
3.500	0.56	9.500	2.78	15.500	0.65	21.50	0.40
3.533	0.58	9.533	2.51	15.533	0.64	21.53	0.39
3.567	0.58	9.567	2.51	15.567	0.64	21.57	0.39
3.600	0.58	9.600	2.51	15.600	0.64	21.60	0.39
3.633	0.58	9.633	2.51	15.633	0.64	21.63	0.39
3.667	0.58	9.667	2.51	15.667	0.64	21.67	0.39
3.700	0.60	9.700	2.30	15.700	0.63	21.70	0.39
3.733	0.60	9.733	2.30	15.733	0.63	21.73	0.39
3.767	0.60	9.767	2.30	15.767	0.63	21.77	0.39
3.800	0.60	9.800	2.30	15.800	0.63	21.80	0.39
3.833	0.60	9.833	2.30	15.833	0.63	21.83	0.39
3.867	0.62	9.867	2.12	15.867	0.62	21.87	0.38
3.900	0.62	9.900	2.12	15.900	0.62	21.90	0.38
3.933	0.62	9.933	2.12	15.933	0.62	21.93	0.38
3.967	0.62	9.967	2.12	15.967	0.62	21.97	0.38
4.000	0.62	10.000	2.12	16.000	0.62	22.00	0.38
4.033	0.65	10.033	1.97	16.033	0.61	22.03	0.38
4.067	0.65	10.067	1.97	16.067	0.61	22.07	0.38
4.100	0.65	10.100	1.97	16.100	0.61	22.10	0.38
4.133	0.65	10.133	1.97	16.133	0.61	22.13	0.38
4.167	0.65	10.167	1.97	16.167	0.61	22.17	0.38
4.200	0.67	10.200	1.84	16.200	0.60	22.20	0.38
4.233	0.67	10.233	1.84	16.233	0.60	22.23	0.38
4.267	0.67	10.267	1.84	16.267	0.60	22.27	0.38
4.300	0.67	10.300	1.84	16.300	0.60	22.30	0.38

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 4.333    0.67 |10.333    1.84 |16.333    0.60 | 22.33    0.38
 4.367    0.70 |10.367    1.73 |16.367    0.59 | 22.37    0.37
 4.400    0.70 |10.400    1.73 |16.400    0.59 | 22.40    0.37
 4.433    0.70 |10.433    1.73 |16.433    0.59 | 22.43    0.37
 4.467    0.70 |10.467    1.73 |16.467    0.59 | 22.47    0.37
 4.500    0.70 |10.500    1.73 |16.500    0.59 | 22.50    0.37
 4.533    0.73 |10.533    1.63 |16.533    0.58 | 22.53    0.37
 4.567    0.73 |10.567    1.63 |16.567    0.58 | 22.57    0.37
 4.600    0.73 |10.600    1.63 |16.600    0.58 | 22.60    0.37
 4.633    0.73 |10.633    1.63 |16.633    0.58 | 22.63    0.37
 4.667    0.73 |10.667    1.63 |16.667    0.58 | 22.67    0.37
 4.700    0.76 |10.700    1.54 |16.700    0.57 | 22.70    0.37
 4.733    0.76 |10.733    1.54 |16.733    0.57 | 22.73    0.37
 4.767    0.76 |10.767    1.54 |16.767    0.57 | 22.77    0.37
 4.800    0.76 |10.800    1.54 |16.800    0.57 | 22.80    0.37
 4.833    0.76 |10.833    1.54 |16.833    0.57 | 22.83    0.37
 4.867    0.80 |10.867    1.46 |16.867    0.56 | 22.87    0.36
 4.900    0.80 |10.900    1.46 |16.900    0.56 | 22.90    0.36
 4.933    0.80 |10.933    1.46 |16.933    0.56 | 22.93    0.36
 4.967    0.80 |10.967    1.46 |16.967    0.56 | 22.97    0.36
 5.000    0.80 |11.000    1.46 |17.000    0.56 | 23.00    0.36
 5.033    0.84 |11.033    1.39 |17.033    0.55 | 23.03    0.36
 5.067    0.84 |11.067    1.39 |17.067    0.55 | 23.07    0.36
 5.100    0.84 |11.100    1.39 |17.100    0.55 | 23.10    0.36
 5.133    0.84 |11.133    1.39 |17.133    0.55 | 23.13    0.36
 5.167    0.84 |11.167    1.39 |17.167    0.55 | 23.17    0.36
 5.200    0.89 |11.200    1.33 |17.200    0.54 | 23.20    0.36
 5.233    0.89 |11.233    1.33 |17.233    0.54 | 23.23    0.36
 5.267    0.89 |11.267    1.33 |17.267    0.54 | 23.27    0.36
 5.300    0.89 |11.300    1.33 |17.300    0.54 | 23.30    0.36
 5.333    0.89 |11.333    1.33 |17.333    0.54 | 23.33    0.36
 5.367    0.94 |11.367    1.27 |17.367    0.53 | 23.37    0.35
 5.400    0.94 |11.400    1.27 |17.400    0.53 | 23.40    0.35
 5.433    0.94 |11.433    1.27 |17.433    0.53 | 23.43    0.35
 5.467    0.94 |11.467    1.27 |17.467    0.53 | 23.47    0.35
 5.500    0.94 |11.500    1.27 |17.500    0.53 | 23.50    0.35
 5.533    1.00 |11.533    1.22 |17.533    0.53 | 23.53    0.35
 5.567    1.00 |11.567    1.22 |17.567    0.53 | 23.57    0.35
 5.600    1.00 |11.600    1.22 |17.600    0.53 | 23.60    0.35
 5.633    1.00 |11.633    1.22 |17.633    0.53 | 23.63    0.35
 5.667    1.00 |11.667    1.22 |17.667    0.53 | 23.67    0.35
 5.700    1.07 |11.700    1.18 |17.700    0.52 | 23.70    0.35
 5.733    1.07 |11.733    1.18 |17.733    0.52 | 23.73    0.35
 5.767    1.07 |11.767    1.18 |17.767    0.52 | 23.77    0.35
 5.800    1.07 |11.800    1.18 |17.800    0.52 | 23.80    0.35
 5.833    1.07 |11.833    1.18 |17.833    0.52 | 23.83    0.35
 5.867    1.15 |11.867    1.13 |17.867    0.51 | 23.87    0.34
 5.900    1.15 |11.900    1.13 |17.900    0.51 | 23.90    0.34
 5.933    1.15 |11.933    1.13 |17.933    0.51 | 23.93    0.34
 5.967    1.15 |11.967    1.13 |17.967    0.51 | 23.97    0.34
 6.000    1.15 |12.000    1.13 |18.000    0.51 | 24.00    0.34

Max.Eff.Inten.(mm/hr)=       78.28          6.74
           over (min)         5.00         10.00
Storage Coeff.  (min)=        3.47 (ii)     8.09 (ii)
Unit Hyd. Tpeak (min)=        4.00         10.00
Unit Hyd. peak  (cms)=        0.31          0.13
                                                      *TOTALS*
PEAK FLOW       (cms)=        0.48          0.01        0.485 (iii)
TIME TO PEAK    (hrs)=        8.00          8.13         8.00
RUNOFF VOLUME    (mm)=       45.83          5.52        37.20
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     TOTAL RAINFALL   (mm)=      46.83        46.83          46.83
     RUNOFF COEFFICIENT   =       0.98         0.12           0.79


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  48.0    Ia = Dep. 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(  3001)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  2.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0391      0.0880
                          0.0028     0.0061   |   0.0527      0.0958
                          0.0096     0.0158   |   0.0660      0.1032
                          0.0131     0.0255   |   0.0762      0.1100
                          0.0157     0.0350   |   0.0856      0.1159
                          0.0180     0.0443   |   0.0932      0.1209
                          0.0201     0.0535   |   0.1001      0.1256
                          0.0219     0.0625   |   0.1066      0.1304
                          0.0238     0.0713   |   0.1155      0.1376
                          0.0254     0.0798   |   0.0000      0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  1000)      2.998     0.485      8.00      37.20
   OUTFLOW: ID= 1 (  3001)      2.998     0.023      9.23      37.02

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  4.73
                  TIME SHIFT OF PEAK FLOW        (min)= 74.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0673

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| CALIB            |
| STANDHYD (  1100)|   Area    (ha)=   0.09
|ID= 1 DT= 2.0 min |   Total Imp(%)=  26.30   Dir. Conn.(%)=  26.30
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                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.02          0.07
     Dep. Storage     (mm)=       1.00          5.00
     Average Slope     (%)=       1.00          2.00
     Length            (m)=      25.17         40.00
     Mannings n          =       0.013         0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   2.0 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
               0.033    0.35 | 6.033    1.25 |12.033    1.09 | 18.03    0.50
               0.067    0.35 | 6.067    1.25 |12.067    1.09 | 18.07    0.50
               0.100    0.35 | 6.100    1.25 |12.100    1.09 | 18.10    0.50
               0.133    0.35 | 6.133    1.25 |12.133    1.09 | 18.13    0.50
               0.167    0.35 | 6.167    1.25 |12.167    1.09 | 18.17    0.50
               0.200    0.36 | 6.200    1.36 |12.200    1.05 | 18.20    0.50
```



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 0.233    0.36 | 6.233    1.36 |12.233    1.05 | 18.23    0.50
 0.267    0.36 | 6.267    1.36 |12.267    1.05 | 18.27    0.50
 0.300    0.36 | 6.300    1.36 |12.300    1.05 | 18.30    0.50
 0.333    0.36 | 6.333    1.36 |12.333    1.05 | 18.33    0.50
 0.367    0.36 | 6.367    1.50 |12.367    1.02 | 18.37    0.49
 0.400    0.36 | 6.400    1.50 |12.400    1.02 | 18.40    0.49
 0.433    0.36 | 6.433    1.50 |12.433    1.02 | 18.43    0.49
 0.467    0.36 | 6.467    1.50 |12.467    1.02 | 18.47    0.49
 0.500    0.36 | 6.500    1.50 |12.500    1.02 | 18.50    0.49
 0.533    0.37 | 6.533    1.68 |12.533    0.99 | 18.53    0.48
 0.567    0.37 | 6.567    1.68 |12.567    0.99 | 18.57    0.48
 0.600    0.37 | 6.600    1.68 |12.600    0.99 | 18.60    0.48
 0.633    0.37 | 6.633    1.68 |12.633    0.99 | 18.63    0.48
 0.667    0.37 | 6.667    1.68 |12.667    0.99 | 18.67    0.48
 0.700    0.38 | 6.700    1.90 |12.700    0.96 | 18.70    0.48
 0.733    0.38 | 6.733    1.90 |12.733    0.96 | 18.73    0.48
 0.767    0.38 | 6.767    1.90 |12.767    0.96 | 18.77    0.48
 0.800    0.38 | 6.800    1.90 |12.800    0.96 | 18.80    0.48
 0.833    0.38 | 6.833    1.90 |12.833    0.96 | 18.83    0.48
 0.867    0.39 | 6.867    2.21 |12.867    0.93 | 18.87    0.47
 0.900    0.39 | 6.900    2.21 |12.900    0.93 | 18.90    0.47
 0.933    0.39 | 6.933    2.21 |12.933    0.93 | 18.93    0.47
 0.967    0.39 | 6.967    2.21 |12.967    0.93 | 18.97    0.47
 1.000    0.39 | 7.000    2.21 |13.000    0.93 | 19.00    0.47
 1.033    0.39 | 7.033    2.64 |13.033    0.90 | 19.03    0.46
 1.067    0.39 | 7.067    2.64 |13.067    0.90 | 19.07    0.46
 1.100    0.39 | 7.100    2.64 |13.100    0.90 | 19.10    0.46
 1.133    0.39 | 7.133    2.64 |13.133    0.90 | 19.13    0.46
 1.167    0.39 | 7.167    2.64 |13.167    0.90 | 19.17    0.46
 1.200    0.40 | 7.200    3.32 |13.200    0.88 | 19.20    0.46
 1.233    0.40 | 7.233    3.32 |13.233    0.88 | 19.23    0.46
 1.267    0.40 | 7.267    3.32 |13.267    0.88 | 19.27    0.46
 1.300    0.40 | 7.300    3.32 |13.300    0.88 | 19.30    0.46
 1.333    0.40 | 7.333    3.32 |13.333    0.88 | 19.33    0.46
 1.367    0.41 | 7.367    4.51 |13.367    0.86 | 19.37    0.45
 1.400    0.41 | 7.400    4.51 |13.400    0.86 | 19.40    0.45
 1.433    0.41 | 7.433    4.51 |13.433    0.86 | 19.43    0.45
 1.467    0.41 | 7.467    4.51 |13.467    0.86 | 19.47    0.45
 1.500    0.41 | 7.500    4.51 |13.500    0.86 | 19.50    0.45
 1.533    0.42 | 7.533    7.17 |13.533    0.83 | 19.53    0.45
 1.567    0.42 | 7.567    7.17 |13.567    0.83 | 19.57    0.45
 1.600    0.42 | 7.600    7.17 |13.600    0.83 | 19.60    0.45
 1.633    0.42 | 7.633    7.17 |13.633    0.83 | 19.63    0.45
 1.667    0.42 | 7.667    7.17 |13.667    0.83 | 19.67    0.45
 1.700    0.43 | 7.700   18.51 |13.700    0.81 | 19.70    0.44
 1.733    0.43 | 7.733   18.51 |13.733    0.81 | 19.73    0.44
 1.767    0.43 | 7.767   18.51 |13.767    0.81 | 19.77    0.44
 1.800    0.43 | 7.800   18.51 |13.800    0.81 | 19.80    0.44
 1.833    0.43 | 7.833   18.51 |13.833    0.81 | 19.83    0.44
 1.867    0.44 | 7.867   78.26 |13.867    0.79 | 19.87    0.44
 1.900    0.44 | 7.900   78.28 |13.900    0.79 | 19.90    0.44
 1.933    0.44 | 7.933   78.28 |13.933    0.79 | 19.93    0.44
 1.967    0.44 | 7.967   78.28 |13.967    0.79 | 19.97    0.44
 2.000    0.44 | 8.000   78.28 |14.000    0.79 | 20.00    0.44
 2.033    0.45 | 8.033   24.66 |14.033    0.77 | 20.03    0.43
 2.067    0.45 | 8.067   24.65 |14.067    0.77 | 20.07    0.43
 2.100    0.45 | 8.100   24.65 |14.100    0.77 | 20.10    0.43
 2.133    0.45 | 8.133   24.65 |14.133    0.77 | 20.13    0.43
 2.167    0.45 | 8.167   24.65 |14.167    0.77 | 20.17    0.43
 2.200    0.46 | 8.200   12.41 |14.200    0.76 | 20.20    0.43
 2.233    0.46 | 8.233   12.40 |14.233    0.76 | 20.23    0.43
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 2.267    0.46 | 8.267   12.40 |14.267    0.76 | 20.27    0.43
 2.300    0.46 | 8.300   12.40 |14.300    0.76 | 20.30    0.43
 2.333    0.46 | 8.333   12.40 |14.333    0.76 | 20.33    0.43
 2.367    0.47 | 8.367    8.22 |14.367    0.74 | 20.37    0.42
 2.400    0.47 | 8.400    8.22 |14.400    0.74 | 20.40    0.42
 2.433    0.47 | 8.433    8.22 |14.433    0.74 | 20.43    0.42
 2.467    0.47 | 8.467    8.22 |14.467    0.74 | 20.47    0.42
 2.500    0.47 | 8.500    8.22 |14.500    0.74 | 20.50    0.42
 2.533    0.49 | 8.533    6.14 |14.533    0.72 | 20.53    0.42
 2.567    0.49 | 8.567    6.14 |14.567    0.72 | 20.57    0.42
 2.600    0.49 | 8.600    6.14 |14.600    0.72 | 20.60    0.42
 2.633    0.49 | 8.633    6.14 |14.633    0.72 | 20.63    0.42
 2.667    0.49 | 8.667    6.14 |14.667    0.72 | 20.67    0.42
 2.700    0.50 | 8.700    4.92 |14.700    0.71 | 20.70    0.41
 2.733    0.50 | 8.733    4.92 |14.733    0.71 | 20.73    0.41
 2.767    0.50 | 8.767    4.92 |14.767    0.71 | 20.77    0.41
 2.800    0.50 | 8.800    4.92 |14.800    0.71 | 20.80    0.41
 2.833    0.50 | 8.833    4.92 |14.833    0.71 | 20.83    0.41
 2.867    0.51 | 8.867    4.11 |14.867    0.69 | 20.87    0.41
 2.900    0.51 | 8.900    4.11 |14.900    0.69 | 20.90    0.41
 2.933    0.51 | 8.933    4.11 |14.933    0.69 | 20.93    0.41
 2.967    0.51 | 8.967    4.11 |14.967    0.69 | 20.97    0.41
 3.000    0.51 | 9.000    4.11 |15.000    0.69 | 21.00    0.41
 3.033    0.53 | 9.033    3.53 |15.033    0.68 | 21.03    0.40
 3.067    0.53 | 9.067    3.53 |15.067    0.68 | 21.07    0.40
 3.100    0.53 | 9.100    3.53 |15.100    0.68 | 21.10    0.40
 3.133    0.53 | 9.133    3.53 |15.133    0.68 | 21.13    0.40
 3.167    0.53 | 9.167    3.53 |15.167    0.68 | 21.17    0.40
 3.200    0.55 | 9.200    3.11 |15.200    0.67 | 21.20    0.40
 3.233    0.55 | 9.233    3.11 |15.233    0.67 | 21.23    0.40
 3.267    0.55 | 9.267    3.11 |15.267    0.67 | 21.27    0.40
 3.300    0.55 | 9.300    3.11 |15.300    0.67 | 21.30    0.40
 3.333    0.55 | 9.333    3.11 |15.333    0.67 | 21.33    0.40
 3.367    0.56 | 9.367    2.78 |15.367    0.65 | 21.37    0.40
 3.400    0.56 | 9.400    2.78 |15.400    0.65 | 21.40    0.40
 3.433    0.56 | 9.433    2.78 |15.433    0.65 | 21.43    0.40
 3.467    0.56 | 9.467    2.78 |15.467    0.65 | 21.47    0.40
 3.500    0.56 | 9.500    2.78 |15.500    0.65 | 21.50    0.40
 3.533    0.58 | 9.533    2.51 |15.533    0.64 | 21.53    0.39
 3.567    0.58 | 9.567    2.51 |15.567    0.64 | 21.57    0.39
 3.600    0.58 | 9.600    2.51 |15.600    0.64 | 21.60    0.39
 3.633    0.58 | 9.633    2.51 |15.633    0.64 | 21.63    0.39
 3.667    0.58 | 9.667    2.51 |15.667    0.64 | 21.67    0.39
 3.700    0.60 | 9.700    2.30 |15.700    0.63 | 21.70    0.39
 3.733    0.60 | 9.733    2.30 |15.733    0.63 | 21.73    0.39
 3.767    0.60 | 9.767    2.30 |15.767    0.63 | 21.77    0.39
 3.800    0.60 | 9.800    2.30 |15.800    0.63 | 21.80    0.39
 3.833    0.60 | 9.833    2.30 |15.833    0.63 | 21.83    0.39
 3.867    0.62 | 9.867    2.12 |15.867    0.62 | 21.87    0.38
 3.900    0.62 | 9.900    2.12 |15.900    0.62 | 21.90    0.38
 3.933    0.62 | 9.933    2.12 |15.933    0.62 | 21.93    0.38
 3.967    0.62 | 9.967    2.12 |15.967    0.62 | 21.97    0.38
 4.000    0.62 |10.000    2.12 |16.000    0.62 | 22.00    0.38
 4.033    0.65 |10.033    1.97 |16.033    0.61 | 22.03    0.38
 4.067    0.65 |10.067    1.97 |16.067    0.61 | 22.07    0.38
 4.100    0.65 |10.100    1.97 |16.100    0.61 | 22.10    0.38
 4.133    0.65 |10.133    1.97 |16.133    0.61 | 22.13    0.38
 4.167    0.65 |10.167    1.97 |16.167    0.61 | 22.17    0.38
 4.200    0.67 |10.200    1.84 |16.200    0.60 | 22.20    0.38
 4.233    0.67 |10.233    1.84 |16.233    0.60 | 22.23    0.38
 4.267    0.67 |10.267    1.84 |16.267    0.60 | 22.27    0.38
```

4.300	0.67	10.300	1.84	16.300	0.60	22.30	0.38
4.333	0.67	10.333	1.84	16.333	0.60	22.33	0.38
4.367	0.70	10.367	1.73	16.367	0.59	22.37	0.37
4.400	0.70	10.400	1.73	16.400	0.59	22.40	0.37
4.433	0.70	10.433	1.73	16.433	0.59	22.43	0.37
4.467	0.70	10.467	1.73	16.467	0.59	22.47	0.37
4.500	0.70	10.500	1.73	16.500	0.59	22.50	0.37
4.533	0.73	10.533	1.63	16.533	0.58	22.53	0.37
4.567	0.73	10.567	1.63	16.567	0.58	22.57	0.37
4.600	0.73	10.600	1.63	16.600	0.58	22.60	0.37
4.633	0.73	10.633	1.63	16.633	0.58	22.63	0.37
4.667	0.73	10.667	1.63	16.667	0.58	22.67	0.37
4.700	0.76	10.700	1.54	16.700	0.57	22.70	0.37
4.733	0.76	10.733	1.54	16.733	0.57	22.73	0.37
4.767	0.76	10.767	1.54	16.767	0.57	22.77	0.37
4.800	0.76	10.800	1.54	16.800	0.57	22.80	0.37
4.833	0.76	10.833	1.54	16.833	0.57	22.83	0.37
4.867	0.80	10.867	1.46	16.867	0.56	22.87	0.36
4.900	0.80	10.900	1.46	16.900	0.56	22.90	0.36
4.933	0.80	10.933	1.46	16.933	0.56	22.93	0.36
4.967	0.80	10.967	1.46	16.967	0.56	22.97	0.36
5.000	0.80	11.000	1.46	17.000	0.56	23.00	0.36
5.033	0.84	11.033	1.39	17.033	0.55	23.03	0.36
5.067	0.84	11.067	1.39	17.067	0.55	23.07	0.36
5.100	0.84	11.100	1.39	17.100	0.55	23.10	0.36
5.133	0.84	11.133	1.39	17.133	0.55	23.13	0.36
5.167	0.84	11.167	1.39	17.167	0.55	23.17	0.36
5.200	0.89	11.200	1.33	17.200	0.54	23.20	0.36
5.233	0.89	11.233	1.33	17.233	0.54	23.23	0.36
5.267	0.89	11.267	1.33	17.267	0.54	23.27	0.36
5.300	0.89	11.300	1.33	17.300	0.54	23.30	0.36
5.333	0.89	11.333	1.33	17.333	0.54	23.33	0.36
5.367	0.94	11.367	1.27	17.367	0.53	23.37	0.35
5.400	0.94	11.400	1.27	17.400	0.53	23.40	0.35
5.433	0.94	11.433	1.27	17.433	0.53	23.43	0.35
5.467	0.94	11.467	1.27	17.467	0.53	23.47	0.35
5.500	0.94	11.500	1.27	17.500	0.53	23.50	0.35
5.533	1.00	11.533	1.22	17.533	0.53	23.53	0.35
5.567	1.00	11.567	1.22	17.567	0.53	23.57	0.35
5.600	1.00	11.600	1.22	17.600	0.53	23.60	0.35
5.633	1.00	11.633	1.22	17.633	0.53	23.63	0.35
5.667	1.00	11.667	1.22	17.667	0.53	23.67	0.35
5.700	1.07	11.700	1.18	17.700	0.52	23.70	0.35
5.733	1.07	11.733	1.18	17.733	0.52	23.73	0.35
5.767	1.07	11.767	1.18	17.767	0.52	23.77	0.35
5.800	1.07	11.800	1.18	17.800	0.52	23.80	0.35
5.833	1.07	11.833	1.18	17.833	0.52	23.83	0.35
5.867	1.15	11.867	1.13	17.867	0.51	23.87	0.34
5.900	1.15	11.900	1.13	17.900	0.51	23.90	0.34
5.933	1.15	11.933	1.13	17.933	0.51	23.93	0.34
5.967	1.15	11.967	1.13	17.967	0.51	23.97	0.34
6.000	1.15	12.000	1.13	18.000	0.51	24.00	0.34

```
Max.Eff.Inten.(mm/hr)=      78.28         4.35
          over (min)         5.00        26.00
Storage Coeff.  (min)=       1.23 (ii)   25.98 (ii)
Unit Hyd. Tpeak (min)=       4.00        26.00
Unit Hyd. peak  (cms)=       0.49         0.04
                                                      *TOTALS*
PEAK FLOW       (cms)=       0.01         0.00          0.006 (iii)
TIME TO PEAK    (hrs)=       8.00         8.40          8.00
```



```
     RUNOFF VOLUME    (mm)=      45.83          5.52          13.66
     TOTAL RAINFALL   (mm)=      46.83         46.83          46.83
     RUNOFF COEFFICIENT   =       0.98          0.12           0.29

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  48.0    Ia = Dep. 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  (  2002)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  1100):     0.09   0.006     8.00    13.66
      + ID2= 2 (  3001):     3.00   0.023     9.23    37.02
        ===============================================
        ID = 3 (  2002):     3.09   0.023     8.87    36.30

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

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2001)
       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 6.2\VO2\voin.dat

Output filename:
C:\Users\zhouj\AppData\Local\Civica\VH5\642fa701-08f9-4281-a674-e9ad409f1aac\867dbd90-b8e0-4884-9aeb-df4dea9bb32d\scenar

Summary filename:
C:\Users\zhouj\AppData\Local\Civica\VH5\642fa701-08f9-4281-a674-e9ad409f1aac\867dbd90-b8e0-4884-9aeb-df4dea9bb32d\scenar

DATE: 09-13-2023   TIME: 11:19:07

USER:

COMMENTS: ____

```
---------------------------------------------------------------------------------
------------------------
  **********************************************
  ** SIMULATION : Run 02                       **
  **********************************************

--------------------
| CHICAGO STORM    |     IDF curve parameters: A=1135.400
| Ptotal= 59.88 mm |                           B=   7.500
--------------------                           C=   0.841
                         used in:   INTENSITY =  A / (t + B)^C

                         Duration of storm  = 24.00 hrs
                         Storm time step    = 10.00 min
                         Time to peak ratio =  0.33
```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.17	0.42	6.17	1.53	12.17	1.33	18.17	0.60
0.33	0.42	6.33	1.67	12.33	1.29	18.33	0.59
0.50	0.43	6.50	1.85	12.50	1.24	18.50	0.59
0.67	0.44	6.67	2.07	12.67	1.20	18.67	0.58
0.83	0.45	6.83	2.37	12.83	1.17	18.83	0.57
1.00	0.46	7.00	2.76	13.00	1.13	19.00	0.56
1.17	0.47	7.17	3.33	13.17	1.10	19.17	0.56
1.33	0.48	7.33	4.21	13.33	1.07	19.33	0.55
1.50	0.49	7.50	5.79	13.50	1.04	19.50	0.54
1.67	0.50	7.67	9.38	13.67	1.01	19.67	0.54
1.83	0.51	7.83	24.78	13.83	0.98	19.83	0.53
2.00	0.52	8.00	102.27	14.00	0.96	20.00	0.52
2.17	0.54	8.17	33.10	14.17	0.94	20.17	0.52
2.33	0.55	8.33	16.50	14.33	0.92	20.33	0.51
2.50	0.57	8.50	10.79	14.50	0.89	20.50	0.50
2.67	0.58	8.67	7.99	14.67	0.87	20.67	0.50
2.83	0.60	8.83	6.34	14.83	0.86	20.83	0.49
3.00	0.62	9.00	5.26	15.00	0.84	21.00	0.49
3.17	0.63	9.17	4.50	15.17	0.82	21.17	0.48
3.33	0.65	9.33	3.94	15.33	0.80	21.33	0.48
3.50	0.68	9.50	3.50	15.50	0.79	21.50	0.47
3.67	0.70	9.67	3.16	15.67	0.77	21.67	0.47
3.83	0.72	9.83	2.88	15.83	0.76	21.83	0.46
4.00	0.75	10.00	2.65	16.00	0.74	22.00	0.46
4.17	0.78	10.17	2.45	16.17	0.73	22.17	0.45
4.33	0.81	10.33	2.29	16.33	0.72	22.33	0.45
4.50	0.85	10.50	2.14	16.50	0.71	22.50	0.44
4.67	0.88	10.67	2.01	16.67	0.69	22.67	0.44
4.83	0.92	10.83	1.90	16.83	0.68	22.83	0.43
5.00	0.97	11.00	1.80	17.00	0.67	23.00	0.43
5.17	1.02	11.17	1.72	17.17	0.66	23.17	0.43
5.33	1.08	11.33	1.64	17.33	0.65	23.33	0.42
5.50	1.15	11.50	1.56	17.50	0.64	23.50	0.42
5.67	1.22	11.67	1.50	17.67	0.63	23.67	0.41
5.83	1.31	11.83	1.44	17.83	0.62	23.83	0.41
6.00	1.41	12.00	1.38	18.00	0.61	24.00	0.41

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--------------------
| CALIB            |
| STANDHYD (  1000)|   Area    (ha)=   3.00
|ID= 1 DT= 2.0 min |   Total Imp(%)=  78.60   Dir. Conn.(%)=  78.60
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      2.36          0.64
     Dep. Storage     (mm)=      1.00          5.00
     Average Slope     (%)=      1.00          2.00
     Length            (m)=    141.37         40.00
     Mannings n          =      0.013         0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   2.0 MIN. TIME STEP.
```

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.033	0.42	6.033	1.53	12.033	1.33	18.03	0.60
0.067	0.42	6.067	1.53	12.067	1.33	18.07	0.60
0.100	0.42	6.100	1.53	12.100	1.33	18.10	0.60
0.133	0.42	6.133	1.53	12.133	1.33	18.13	0.60
0.167	0.42	6.167	1.53	12.167	1.33	18.17	0.60
0.200	0.42	6.200	1.67	12.200	1.29	18.20	0.59
0.233	0.42	6.233	1.67	12.233	1.29	18.23	0.59
0.267	0.42	6.267	1.67	12.267	1.29	18.27	0.59
0.300	0.42	6.300	1.67	12.300	1.29	18.30	0.59
0.333	0.42	6.333	1.67	12.333	1.29	18.33	0.59
0.367	0.43	6.367	1.85	12.367	1.24	18.37	0.59
0.400	0.43	6.400	1.85	12.400	1.24	18.40	0.59
0.433	0.43	6.433	1.85	12.433	1.24	18.43	0.59
0.467	0.43	6.467	1.85	12.467	1.24	18.47	0.59
0.500	0.43	6.500	1.85	12.500	1.24	18.50	0.59
0.533	0.44	6.533	2.07	12.533	1.20	18.53	0.58
0.567	0.44	6.567	2.07	12.567	1.20	18.57	0.58
0.600	0.44	6.600	2.07	12.600	1.20	18.60	0.58
0.633	0.44	6.633	2.07	12.633	1.20	18.63	0.58
0.667	0.44	6.667	2.07	12.667	1.20	18.67	0.58
0.700	0.45	6.700	2.37	12.700	1.17	18.70	0.57
0.733	0.45	6.733	2.37	12.733	1.17	18.73	0.57
0.767	0.45	6.767	2.37	12.767	1.17	18.77	0.57
0.800	0.45	6.800	2.37	12.800	1.17	18.80	0.57
0.833	0.45	6.833	2.37	12.833	1.17	18.83	0.57
0.867	0.46	6.867	2.76	12.867	1.13	18.87	0.56
0.900	0.46	6.900	2.76	12.900	1.13	18.90	0.56
0.933	0.46	6.933	2.76	12.933	1.13	18.93	0.56
0.967	0.46	6.967	2.76	12.967	1.13	18.97	0.56
1.000	0.46	7.000	2.76	13.000	1.13	19.00	0.56
1.033	0.47	7.033	3.33	13.033	1.10	19.03	0.56
1.067	0.47	7.067	3.33	13.067	1.10	19.07	0.56
1.100	0.47	7.100	3.33	13.100	1.10	19.10	0.56
1.133	0.47	7.133	3.33	13.133	1.10	19.13	0.56
1.167	0.47	7.167	3.33	13.167	1.10	19.17	0.56
1.200	0.48	7.200	4.21	13.200	1.07	19.20	0.55
1.233	0.48	7.233	4.21	13.233	1.07	19.23	0.55
1.267	0.48	7.267	4.21	13.267	1.07	19.27	0.55
1.300	0.48	7.300	4.21	13.300	1.07	19.30	0.55
1.333	0.48	7.333	4.21	13.333	1.07	19.33	0.55
1.367	0.49	7.367	5.79	13.367	1.04	19.37	0.54
1.400	0.49	7.400	5.79	13.400	1.04	19.40	0.54
1.433	0.49	7.433	5.79	13.433	1.04	19.43	0.54

1.467	0.49	7.467	5.79	13.467	1.04	19.47	0.54
1.500	0.49	7.500	5.79	13.500	1.04	19.50	0.54
1.533	0.50	7.533	9.38	13.533	1.01	19.53	0.54
1.567	0.50	7.567	9.38	13.567	1.01	19.57	0.54
1.600	0.50	7.600	9.38	13.600	1.01	19.60	0.54
1.633	0.50	7.633	9.38	13.633	1.01	19.63	0.54
1.667	0.50	7.667	9.38	13.667	1.01	19.67	0.54
1.700	0.51	7.700	24.78	13.700	0.98	19.70	0.53
1.733	0.51	7.733	24.78	13.733	0.98	19.73	0.53
1.767	0.51	7.767	24.78	13.767	0.98	19.77	0.53
1.800	0.51	7.800	24.78	13.800	0.98	19.80	0.53
1.833	0.51	7.833	24.78	13.833	0.98	19.83	0.53
1.867	0.52	7.867	102.26	13.867	0.96	19.87	0.52
1.900	0.52	7.900	102.27	13.900	0.96	19.90	0.52
1.933	0.52	7.933	102.27	13.933	0.96	19.93	0.52
1.967	0.52	7.967	102.27	13.967	0.96	19.97	0.52
2.000	0.52	8.000	102.27	14.000	0.96	20.00	0.52
2.033	0.54	8.033	33.11	14.033	0.94	20.03	0.52
2.067	0.54	8.067	33.10	14.067	0.94	20.07	0.52
2.100	0.54	8.100	33.10	14.100	0.94	20.10	0.52
2.133	0.54	8.133	33.10	14.133	0.94	20.13	0.52
2.167	0.54	8.167	33.10	14.167	0.94	20.17	0.52
2.200	0.55	8.200	16.50	14.200	0.92	20.20	0.51
2.233	0.55	8.233	16.50	14.233	0.92	20.23	0.51
2.267	0.55	8.267	16.50	14.267	0.92	20.27	0.51
2.300	0.55	8.300	16.50	14.300	0.92	20.30	0.51
2.333	0.55	8.333	16.50	14.333	0.92	20.33	0.51
2.367	0.57	8.367	10.79	14.367	0.89	20.37	0.50
2.400	0.57	8.400	10.79	14.400	0.89	20.40	0.50
2.433	0.57	8.433	10.79	14.433	0.89	20.43	0.50
2.467	0.57	8.467	10.79	14.467	0.89	20.47	0.50
2.500	0.57	8.500	10.79	14.500	0.89	20.50	0.50
2.533	0.58	8.533	7.99	14.533	0.87	20.53	0.50
2.567	0.58	8.567	7.99	14.567	0.87	20.57	0.50
2.600	0.58	8.600	7.99	14.600	0.87	20.60	0.50
2.633	0.58	8.633	7.99	14.633	0.87	20.63	0.50
2.667	0.58	8.667	7.99	14.667	0.87	20.67	0.50
2.700	0.60	8.700	6.34	14.700	0.86	20.70	0.49
2.733	0.60	8.733	6.34	14.733	0.86	20.73	0.49
2.767	0.60	8.767	6.34	14.767	0.86	20.77	0.49
2.800	0.60	8.800	6.34	14.800	0.86	20.80	0.49
2.833	0.60	8.833	6.34	14.833	0.86	20.83	0.49
2.867	0.62	8.867	5.26	14.867	0.84	20.87	0.49
2.900	0.62	8.900	5.26	14.900	0.84	20.90	0.49
2.933	0.62	8.933	5.26	14.933	0.84	20.93	0.49
2.967	0.62	8.967	5.26	14.967	0.84	20.97	0.49
3.000	0.62	9.000	5.26	15.000	0.84	21.00	0.49
3.033	0.63	9.033	4.50	15.033	0.82	21.03	0.48
3.067	0.63	9.067	4.50	15.067	0.82	21.07	0.48
3.100	0.63	9.100	4.50	15.100	0.82	21.10	0.48
3.133	0.63	9.133	4.50	15.133	0.82	21.13	0.48
3.167	0.63	9.167	4.50	15.167	0.82	21.17	0.48
3.200	0.65	9.200	3.94	15.200	0.80	21.20	0.48
3.233	0.65	9.233	3.94	15.233	0.80	21.23	0.48
3.267	0.65	9.267	3.94	15.267	0.80	21.27	0.48
3.300	0.65	9.300	3.94	15.300	0.80	21.30	0.48
3.333	0.65	9.333	3.94	15.333	0.80	21.33	0.48
3.367	0.68	9.367	3.50	15.367	0.79	21.37	0.47
3.400	0.68	9.400	3.50	15.400	0.79	21.40	0.47
3.433	0.68	9.433	3.50	15.433	0.79	21.43	0.47
3.467	0.68	9.467	3.50	15.467	0.79	21.47	0.47

3.500	0.68	9.500	3.50	15.500	0.79	21.50	0.47
3.533	0.70	9.533	3.16	15.533	0.77	21.53	0.47
3.567	0.70	9.567	3.16	15.567	0.77	21.57	0.47
3.600	0.70	9.600	3.16	15.600	0.77	21.60	0.47
3.633	0.70	9.633	3.16	15.633	0.77	21.63	0.47
3.667	0.70	9.667	3.16	15.667	0.77	21.67	0.47
3.700	0.72	9.700	2.88	15.700	0.76	21.70	0.46
3.733	0.72	9.733	2.88	15.733	0.76	21.73	0.46
3.767	0.72	9.767	2.88	15.767	0.76	21.77	0.46
3.800	0.72	9.800	2.88	15.800	0.76	21.80	0.46
3.833	0.72	9.833	2.88	15.833	0.76	21.83	0.46
3.867	0.75	9.867	2.65	15.867	0.74	21.87	0.46
3.900	0.75	9.900	2.65	15.900	0.74	21.90	0.46
3.933	0.75	9.933	2.65	15.933	0.74	21.93	0.46
3.967	0.75	9.967	2.65	15.967	0.74	21.97	0.46
4.000	0.75	10.000	2.65	16.000	0.74	22.00	0.46
4.033	0.78	10.033	2.45	16.033	0.73	22.03	0.45
4.067	0.78	10.067	2.45	16.067	0.73	22.07	0.45
4.100	0.78	10.100	2.45	16.100	0.73	22.10	0.45
4.133	0.78	10.133	2.45	16.133	0.73	22.13	0.45
4.167	0.78	10.167	2.45	16.167	0.73	22.17	0.45
4.200	0.81	10.200	2.29	16.200	0.72	22.20	0.45
4.233	0.81	10.233	2.29	16.233	0.72	22.23	0.45
4.267	0.81	10.267	2.29	16.267	0.72	22.27	0.45
4.300	0.81	10.300	2.29	16.300	0.72	22.30	0.45
4.333	0.81	10.333	2.29	16.333	0.72	22.33	0.45
4.367	0.85	10.367	2.14	16.367	0.71	22.37	0.44
4.400	0.85	10.400	2.14	16.400	0.71	22.40	0.44
4.433	0.85	10.433	2.14	16.433	0.71	22.43	0.44
4.467	0.85	10.467	2.14	16.467	0.71	22.47	0.44
4.500	0.85	10.500	2.14	16.500	0.71	22.50	0.44
4.533	0.88	10.533	2.01	16.533	0.69	22.53	0.44
4.567	0.88	10.567	2.01	16.567	0.69	22.57	0.44
4.600	0.88	10.600	2.01	16.600	0.69	22.60	0.44
4.633	0.88	10.633	2.01	16.633	0.69	22.63	0.44
4.667	0.88	10.667	2.01	16.667	0.69	22.67	0.44
4.700	0.92	10.700	1.90	16.700	0.68	22.70	0.43
4.733	0.92	10.733	1.90	16.733	0.68	22.73	0.43
4.767	0.92	10.767	1.90	16.767	0.68	22.77	0.43
4.800	0.92	10.800	1.90	16.800	0.68	22.80	0.43
4.833	0.92	10.833	1.90	16.833	0.68	22.83	0.43
4.867	0.97	10.867	1.80	16.867	0.67	22.87	0.43
4.900	0.97	10.900	1.80	16.900	0.67	22.90	0.43
4.933	0.97	10.933	1.80	16.933	0.67	22.93	0.43
4.967	0.97	10.967	1.80	16.967	0.67	22.97	0.43
5.000	0.97	11.000	1.80	17.000	0.67	23.00	0.43
5.033	1.02	11.033	1.72	17.033	0.66	23.03	0.43
5.067	1.02	11.067	1.72	17.067	0.66	23.07	0.43
5.100	1.02	11.100	1.72	17.100	0.66	23.10	0.43
5.133	1.02	11.133	1.72	17.133	0.66	23.13	0.43
5.167	1.02	11.167	1.72	17.167	0.66	23.17	0.43
5.200	1.08	11.200	1.64	17.200	0.65	23.20	0.42
5.233	1.08	11.233	1.64	17.233	0.65	23.23	0.42
5.267	1.08	11.267	1.64	17.267	0.65	23.27	0.42
5.300	1.08	11.300	1.64	17.300	0.65	23.30	0.42
5.333	1.08	11.333	1.64	17.333	0.65	23.33	0.42
5.367	1.15	11.367	1.56	17.367	0.64	23.37	0.42
5.400	1.15	11.400	1.56	17.400	0.64	23.40	0.42
5.433	1.15	11.433	1.56	17.433	0.64	23.43	0.42
5.467	1.15	11.467	1.56	17.467	0.64	23.47	0.42
5.500	1.15	11.500	1.56	17.500	0.64	23.50	0.42

5.533	1.22	11.533	1.50	17.533	0.63	23.53	0.41
5.567	1.22	11.567	1.50	17.567	0.63	23.57	0.41
5.600	1.22	11.600	1.50	17.600	0.63	23.60	0.41
5.633	1.22	11.633	1.50	17.633	0.63	23.63	0.41
5.667	1.22	11.667	1.50	17.667	0.63	23.67	0.41
5.700	1.31	11.700	1.44	17.700	0.62	23.70	0.41
5.733	1.31	11.733	1.44	17.733	0.62	23.73	0.41
5.767	1.31	11.767	1.44	17.767	0.62	23.77	0.41
5.800	1.31	11.800	1.44	17.800	0.62	23.80	0.41
5.833	1.31	11.833	1.44	17.833	0.62	23.83	0.41
5.867	1.41	11.867	1.38	17.867	0.61	23.87	0.41
5.900	1.41	11.900	1.38	17.900	0.61	23.90	0.41
5.933	1.41	11.933	1.38	17.933	0.61	23.93	0.41
5.967	1.41	11.967	1.38	17.967	0.61	23.97	0.41
6.000	1.41	12.000	1.38	18.000	0.61	24.00	0.41

```
Max.Eff.Inten.(mm/hr)=     102.27        11.94
           over (min)        5.00         8.00
Storage Coeff.  (min)=       3.12 (ii)    7.27 (ii)
Unit Hyd. Tpeak (min)=       4.00         8.00
Unit Hyd. peak  (cms)=       0.33         0.15
                                                    *TOTALS*
PEAK FLOW       (cms)=       0.64         0.02        0.650 (iii)
TIME TO PEAK    (hrs)=       8.00         8.10         8.00
RUNOFF VOLUME    (mm)=      58.88         9.12        48.23
TOTAL RAINFALL   (mm)=      59.88        59.88        59.88
RUNOFF COEFFICIENT   =       0.98         0.15         0.81


  (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
      CN*  =  48.0    Ia = Dep. 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( 3001)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  2.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000    0.0000    |   0.0391    0.0880
                          0.0028    0.0061    |   0.0527    0.0958
                          0.0096    0.0158    |   0.0660    0.1032
                          0.0131    0.0255    |   0.0762    0.1100
                          0.0157    0.0350    |   0.0856    0.1159
                          0.0180    0.0443    |   0.0932    0.1209
                          0.0201    0.0535    |   0.1001    0.1256
                          0.0219    0.0625    |   0.1066    0.1304
                          0.0238    0.0713    |   0.1155    0.1376
                          0.0254    0.0798    |   0.0000    0.0000

                             AREA     QPEAK     TPEAK       R.V.
                             (ha)     (cms)     (hrs)       (mm)
  INFLOW : ID= 2 (  1000)    2.998     0.650      8.00      48.23
  OUTFLOW: ID= 1 (  3001)    2.998     0.038      8.97      48.05

              PEAK   FLOW   REDUCTION [Qout/Qin](%)=  5.88
              TIME SHIFT OF PEAK FLOW        (min)= 58.00
              MAXIMUM  STORAGE   USED       (ha.m.)=  0.0875
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-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  1100)|   Area    (ha)=   0.09
|ID= 1 DT= 2.0 min |   Total Imp(%)=  26.30   Dir. Conn.(%)=  26.30
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      0.02          0.07
     Dep. Storage     (mm)=      1.00          5.00
     Average Slope     (%)=      1.00          2.00
     Length            (m)=     25.17         40.00
     Mannings n          =      0.013         0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   2.0 MIN. TIME STEP.


                         ---- TRANSFORMED HYETOGRAPH ----
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TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	' TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.033	0.42	6.033	1.53	12.033	1.33	18.03	0.60
0.067	0.42	6.067	1.53	12.067	1.33	18.07	0.60
0.100	0.42	6.100	1.53	12.100	1.33	18.10	0.60
0.133	0.42	6.133	1.53	12.133	1.33	18.13	0.60
0.167	0.42	6.167	1.53	12.167	1.33	18.17	0.60
0.200	0.42	6.200	1.67	12.200	1.29	18.20	0.59
0.233	0.42	6.233	1.67	12.233	1.29	18.23	0.59
0.267	0.42	6.267	1.67	12.267	1.29	18.27	0.59
0.300	0.42	6.300	1.67	12.300	1.29	18.30	0.59
0.333	0.42	6.333	1.67	12.333	1.29	18.33	0.59
0.367	0.43	6.367	1.85	12.367	1.24	18.37	0.59
0.400	0.43	6.400	1.85	12.400	1.24	18.40	0.59
0.433	0.43	6.433	1.85	12.433	1.24	18.43	0.59
0.467	0.43	6.467	1.85	12.467	1.24	18.47	0.59
0.500	0.43	6.500	1.85	12.500	1.24	18.50	0.59
0.533	0.44	6.533	2.07	12.533	1.20	18.53	0.58
0.567	0.44	6.567	2.07	12.567	1.20	18.57	0.58
0.600	0.44	6.600	2.07	12.600	1.20	18.60	0.58
0.633	0.44	6.633	2.07	12.633	1.20	18.63	0.58
0.667	0.44	6.667	2.07	12.667	1.20	18.67	0.58
0.700	0.45	6.700	2.37	12.700	1.17	18.70	0.57
0.733	0.45	6.733	2.37	12.733	1.17	18.73	0.57
0.767	0.45	6.767	2.37	12.767	1.17	18.77	0.57
0.800	0.45	6.800	2.37	12.800	1.17	18.80	0.57
0.833	0.45	6.833	2.37	12.833	1.17	18.83	0.57
0.867	0.46	6.867	2.76	12.867	1.13	18.87	0.56
0.900	0.46	6.900	2.76	12.900	1.13	18.90	0.56
0.933	0.46	6.933	2.76	12.933	1.13	18.93	0.56
0.967	0.46	6.967	2.76	12.967	1.13	18.97	0.56
1.000	0.46	7.000	2.76	13.000	1.13	19.00	0.56
1.033	0.47	7.033	3.33	13.033	1.10	19.03	0.56
1.067	0.47	7.067	3.33	13.067	1.10	19.07	0.56
1.100	0.47	7.100	3.33	13.100	1.10	19.10	0.56
1.133	0.47	7.133	3.33	13.133	1.10	19.13	0.56
1.167	0.47	7.167	3.33	13.167	1.10	19.17	0.56
1.200	0.48	7.200	4.21	13.200	1.07	19.20	0.55
1.233	0.48	7.233	4.21	13.233	1.07	19.23	0.55
1.267	0.48	7.267	4.21	13.267	1.07	19.27	0.55
1.300	0.48	7.300	4.21	13.300	1.07	19.30	0.55
1.333	0.48	7.333	4.21	13.333	1.07	19.33	0.55
1.367	0.49	7.367	5.79	13.367	1.04	19.37	0.54
1.400	0.49	7.400	5.79	13.400	1.04	19.40	0.54

1.433	0.49	7.433	5.79	13.433	1.04	19.43	0.54
1.467	0.49	7.467	5.79	13.467	1.04	19.47	0.54
1.500	0.49	7.500	5.79	13.500	1.04	19.50	0.54
1.533	0.50	7.533	9.38	13.533	1.01	19.53	0.54
1.567	0.50	7.567	9.38	13.567	1.01	19.57	0.54
1.600	0.50	7.600	9.38	13.600	1.01	19.60	0.54
1.633	0.50	7.633	9.38	13.633	1.01	19.63	0.54
1.667	0.50	7.667	9.38	13.667	1.01	19.67	0.54
1.700	0.51	7.700	24.78	13.700	0.98	19.70	0.53
1.733	0.51	7.733	24.78	13.733	0.98	19.73	0.53
1.767	0.51	7.767	24.78	13.767	0.98	19.77	0.53
1.800	0.51	7.800	24.78	13.800	0.98	19.80	0.53
1.833	0.51	7.833	24.78	13.833	0.98	19.83	0.53
1.867	0.52	7.867	102.26	13.867	0.96	19.87	0.52
1.900	0.52	7.900	102.27	13.900	0.96	19.90	0.52
1.933	0.52	7.933	102.27	13.933	0.96	19.93	0.52
1.967	0.52	7.967	102.27	13.967	0.96	19.97	0.52
2.000	0.52	8.000	102.27	14.000	0.96	20.00	0.52
2.033	0.54	8.033	33.11	14.033	0.94	20.03	0.52
2.067	0.54	8.067	33.10	14.067	0.94	20.07	0.52
2.100	0.54	8.100	33.10	14.100	0.94	20.10	0.52
2.133	0.54	8.133	33.10	14.133	0.94	20.13	0.52
2.167	0.54	8.167	33.10	14.167	0.94	20.17	0.52
2.200	0.55	8.200	16.50	14.200	0.92	20.20	0.51
2.233	0.55	8.233	16.50	14.233	0.92	20.23	0.51
2.267	0.55	8.267	16.50	14.267	0.92	20.27	0.51
2.300	0.55	8.300	16.50	14.300	0.92	20.30	0.51
2.333	0.55	8.333	16.50	14.333	0.92	20.33	0.51
2.367	0.57	8.367	10.79	14.367	0.89	20.37	0.50
2.400	0.57	8.400	10.79	14.400	0.89	20.40	0.50
2.433	0.57	8.433	10.79	14.433	0.89	20.43	0.50
2.467	0.57	8.467	10.79	14.467	0.89	20.47	0.50
2.500	0.57	8.500	10.79	14.500	0.89	20.50	0.50
2.533	0.58	8.533	7.99	14.533	0.87	20.53	0.50
2.567	0.58	8.567	7.99	14.567	0.87	20.57	0.50
2.600	0.58	8.600	7.99	14.600	0.87	20.60	0.50
2.633	0.58	8.633	7.99	14.633	0.87	20.63	0.50
2.667	0.58	8.667	7.99	14.667	0.87	20.67	0.50
2.700	0.60	8.700	6.34	14.700	0.86	20.70	0.49
2.733	0.60	8.733	6.34	14.733	0.86	20.73	0.49
2.767	0.60	8.767	6.34	14.767	0.86	20.77	0.49
2.800	0.60	8.800	6.34	14.800	0.86	20.80	0.49
2.833	0.60	8.833	6.34	14.833	0.86	20.83	0.49
2.867	0.62	8.867	5.26	14.867	0.84	20.87	0.49
2.900	0.62	8.900	5.26	14.900	0.84	20.90	0.49
2.933	0.62	8.933	5.26	14.933	0.84	20.93	0.49
2.967	0.62	8.967	5.26	14.967	0.84	20.97	0.49
3.000	0.62	9.000	5.26	15.000	0.84	21.00	0.49
3.033	0.63	9.033	4.50	15.033	0.82	21.03	0.48
3.067	0.63	9.067	4.50	15.067	0.82	21.07	0.48
3.100	0.63	9.100	4.50	15.100	0.82	21.10	0.48
3.133	0.63	9.133	4.50	15.133	0.82	21.13	0.48
3.167	0.63	9.167	4.50	15.167	0.82	21.17	0.48
3.200	0.65	9.200	3.94	15.200	0.80	21.20	0.48
3.233	0.65	9.233	3.94	15.233	0.80	21.23	0.48
3.267	0.65	9.267	3.94	15.267	0.80	21.27	0.48
3.300	0.65	9.300	3.94	15.300	0.80	21.30	0.48
3.333	0.65	9.333	3.94	15.333	0.80	21.33	0.48
3.367	0.68	9.367	3.50	15.367	0.79	21.37	0.47
3.400	0.68	9.400	3.50	15.400	0.79	21.40	0.47
3.433	0.68	9.433	3.50	15.433	0.79	21.43	0.47

3.467	0.68	9.467	3.50	15.467	0.79	21.47	0.47
3.500	0.68	9.500	3.50	15.500	0.79	21.50	0.47
3.533	0.70	9.533	3.16	15.533	0.77	21.53	0.47
3.567	0.70	9.567	3.16	15.567	0.77	21.57	0.47
3.600	0.70	9.600	3.16	15.600	0.77	21.60	0.47
3.633	0.70	9.633	3.16	15.633	0.77	21.63	0.47
3.667	0.70	9.667	3.16	15.667	0.77	21.67	0.47
3.700	0.72	9.700	2.88	15.700	0.76	21.70	0.46
3.733	0.72	9.733	2.88	15.733	0.76	21.73	0.46
3.767	0.72	9.767	2.88	15.767	0.76	21.77	0.46
3.800	0.72	9.800	2.88	15.800	0.76	21.80	0.46
3.833	0.72	9.833	2.88	15.833	0.76	21.83	0.46
3.867	0.75	9.867	2.65	15.867	0.74	21.87	0.46
3.900	0.75	9.900	2.65	15.900	0.74	21.90	0.46
3.933	0.75	9.933	2.65	15.933	0.74	21.93	0.46
3.967	0.75	9.967	2.65	15.967	0.74	21.97	0.46
4.000	0.75	10.000	2.65	16.000	0.74	22.00	0.46
4.033	0.78	10.033	2.45	16.033	0.73	22.03	0.45
4.067	0.78	10.067	2.45	16.067	0.73	22.07	0.45
4.100	0.78	10.100	2.45	16.100	0.73	22.10	0.45
4.133	0.78	10.133	2.45	16.133	0.73	22.13	0.45
4.167	0.78	10.167	2.45	16.167	0.73	22.17	0.45
4.200	0.81	10.200	2.29	16.200	0.72	22.20	0.45
4.233	0.81	10.233	2.29	16.233	0.72	22.23	0.45
4.267	0.81	10.267	2.29	16.267	0.72	22.27	0.45
4.300	0.81	10.300	2.29	16.300	0.72	22.30	0.45
4.333	0.81	10.333	2.29	16.333	0.72	22.33	0.45
4.367	0.85	10.367	2.14	16.367	0.71	22.37	0.44
4.400	0.85	10.400	2.14	16.400	0.71	22.40	0.44
4.433	0.85	10.433	2.14	16.433	0.71	22.43	0.44
4.467	0.85	10.467	2.14	16.467	0.71	22.47	0.44
4.500	0.85	10.500	2.14	16.500	0.71	22.50	0.44
4.533	0.88	10.533	2.01	16.533	0.69	22.53	0.44
4.567	0.88	10.567	2.01	16.567	0.69	22.57	0.44
4.600	0.88	10.600	2.01	16.600	0.69	22.60	0.44
4.633	0.88	10.633	2.01	16.633	0.69	22.63	0.44
4.667	0.88	10.667	2.01	16.667	0.69	22.67	0.44
4.700	0.92	10.700	1.90	16.700	0.68	22.70	0.43
4.733	0.92	10.733	1.90	16.733	0.68	22.73	0.43
4.767	0.92	10.767	1.90	16.767	0.68	22.77	0.43
4.800	0.92	10.800	1.90	16.800	0.68	22.80	0.43
4.833	0.92	10.833	1.90	16.833	0.68	22.83	0.43
4.867	0.97	10.867	1.80	16.867	0.67	22.87	0.43
4.900	0.97	10.900	1.80	16.900	0.67	22.90	0.43
4.933	0.97	10.933	1.80	16.933	0.67	22.93	0.43
4.967	0.97	10.967	1.80	16.967	0.67	22.97	0.43
5.000	0.97	11.000	1.80	17.000	0.67	23.00	0.43
5.033	1.02	11.033	1.72	17.033	0.66	23.03	0.43
5.067	1.02	11.067	1.72	17.067	0.66	23.07	0.43
5.100	1.02	11.100	1.72	17.100	0.66	23.10	0.43
5.133	1.02	11.133	1.72	17.133	0.66	23.13	0.43
5.167	1.02	11.167	1.72	17.167	0.66	23.17	0.43
5.200	1.08	11.200	1.64	17.200	0.65	23.20	0.42
5.233	1.08	11.233	1.64	17.233	0.65	23.23	0.42
5.267	1.08	11.267	1.64	17.267	0.65	23.27	0.42
5.300	1.08	11.300	1.64	17.300	0.65	23.30	0.42
5.333	1.08	11.333	1.64	17.333	0.65	23.33	0.42
5.367	1.15	11.367	1.56	17.367	0.64	23.37	0.42
5.400	1.15	11.400	1.56	17.400	0.64	23.40	0.42
5.433	1.15	11.433	1.56	17.433	0.64	23.43	0.42
5.467	1.15	11.467	1.56	17.467	0.64	23.47	0.42

5.500	1.15	11.500	1.56	17.500	0.64	23.50	0.42
5.533	1.22	11.533	1.50	17.533	0.63	23.53	0.41
5.567	1.22	11.567	1.50	17.567	0.63	23.57	0.41
5.600	1.22	11.600	1.50	17.600	0.63	23.60	0.41
5.633	1.22	11.633	1.50	17.633	0.63	23.63	0.41
5.667	1.22	11.667	1.50	17.667	0.63	23.67	0.41
5.700	1.31	11.700	1.44	17.700	0.62	23.70	0.41
5.733	1.31	11.733	1.44	17.733	0.62	23.73	0.41
5.767	1.31	11.767	1.44	17.767	0.62	23.77	0.41
5.800	1.31	11.800	1.44	17.800	0.62	23.80	0.41
5.833	1.31	11.833	1.44	17.833	0.62	23.83	0.41
5.867	1.41	11.867	1.38	17.867	0.61	23.87	0.41
5.900	1.41	11.900	1.38	17.900	0.61	23.90	0.41
5.933	1.41	11.933	1.38	17.933	0.61	23.93	0.41
5.967	1.41	11.967	1.38	17.967	0.61	23.97	0.41
6.000	1.41	12.000	1.38	18.000	0.61	24.00	0.41

```
    Max.Eff.Inten.(mm/hr)=     102.27          8.98
               over (min)        5.00         20.00
    Storage Coeff.  (min)=       1.11 (ii)    19.62 (ii)
    Unit Hyd. Tpeak (min)=       4.00         20.00
    Unit Hyd. peak  (cms)=       0.50          0.06
                                                          *TOTALS*
    PEAK FLOW       (cms)=       0.01          0.00          0.007 (iii)
    TIME TO PEAK    (hrs)=       8.00          8.30           8.00
    RUNOFF VOLUME    (mm)=      58.88          9.13          19.88
    TOTAL RAINFALL   (mm)=      59.88         59.88          59.88
    RUNOFF COEFFICIENT   =       0.98          0.15           0.33

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

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  48.0    Ia = Dep. 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  (  2002)|
|  1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  1100):      0.09   0.007     8.00    19.88
      + ID2= 2 (  3001):      3.00   0.038     8.97    48.05
        ==================================================
        ID = 3 (  2002):      3.09   0.039     8.90    47.18

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

       V    V   I    SSSSS  U   U    A    L               (v 6.2.2001)
       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 6.2\VO2\voin.dat

  Output  filename:
C:\Users\zhouj\AppData\Local\Civica\VH5\642fa701-08f9-4281-a674-e9ad409f1aac\413223
73-9cfd-44ab-8a44-e2abd856c330\scenar
  Summary filename:
C:\Users\zhouj\AppData\Local\Civica\VH5\642fa701-08f9-4281-a674-e9ad409f1aac\413223
73-9cfd-44ab-8a44-e2abd856c330\scenar


DATE: 09-13-2023                            TIME: 11:19:06

USER:


COMMENTS: _____________________________________________________________


------------------------------------------------------------------------------------
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  **********************************************
  ** SIMULATION : Run 03                       **
  **********************************************

--------------------
| CHICAGO STORM    |    IDF curve parameters: A=1387.000
| Ptotal= 67.50 mm |                          B=   7.970
--------------------                          C=   0.852
                        used in:   INTENSITY =  A / (t + B)^C

                        Duration of storm  = 24.00 hrs
                        Storm time step    = 10.00 min
                        Time to peak ratio =  0.33
```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.17	0.44	6.17	1.66	12.17	1.44	18.17	0.64
0.33	0.45	6.33	1.82	12.33	1.39	18.33	0.63
0.50	0.46	6.50	2.02	12.50	1.34	18.50	0.62
0.67	0.46	6.67	2.27	12.67	1.30	18.67	0.61
0.83	0.47	6.83	2.59	12.83	1.25	18.83	0.60
1.00	0.48	7.00	3.04	13.00	1.22	19.00	0.60
1.17	0.49	7.17	3.68	13.17	1.18	19.17	0.59
1.33	0.51	7.33	4.70	13.33	1.15	19.33	0.58
1.50	0.52	7.50	6.52	13.50	1.11	19.50	0.57
1.67	0.53	7.67	10.72	13.67	1.08	19.67	0.57
1.83	0.54	7.83	28.90	13.83	1.06	19.83	0.56
2.00	0.56	8.00	118.36	14.00	1.03	20.00	0.55
2.17	0.57	8.17	38.72	14.17	1.00	20.17	0.55
2.33	0.58	8.33	19.11	14.33	0.98	20.33	0.54

2.50	0.60	8.50	12.38	14.50	0.96	20.50	0.53
2.67	0.62	8.67	9.08	14.67	0.93	20.67	0.53
2.83	0.63	8.83	7.16	14.83	0.91	20.83	0.52
3.00	0.65	9.00	5.91	15.00	0.89	21.00	0.51
3.17	0.67	9.17	5.03	15.17	0.88	21.17	0.51
3.33	0.70	9.33	4.38	15.33	0.86	21.33	0.50
3.50	0.72	9.50	3.89	15.50	0.84	21.50	0.50
3.67	0.74	9.67	3.49	15.67	0.82	21.67	0.49
3.83	0.77	9.83	3.17	15.83	0.81	21.83	0.49
4.00	0.80	10.00	2.91	16.00	0.79	22.00	0.48
4.17	0.83	10.17	2.69	16.17	0.78	22.17	0.48
4.33	0.87	10.33	2.50	16.33	0.76	22.33	0.47
4.50	0.90	10.50	2.34	16.50	0.75	22.50	0.47
4.67	0.94	10.67	2.20	16.67	0.74	22.67	0.46
4.83	0.99	10.83	2.07	16.83	0.73	22.83	0.46
5.00	1.04	11.00	1.96	17.00	0.71	23.00	0.45
5.17	1.10	11.17	1.86	17.17	0.70	23.17	0.45
5.33	1.16	11.33	1.78	17.33	0.69	23.33	0.45
5.50	1.23	11.50	1.70	17.50	0.68	23.50	0.44
5.67	1.32	11.67	1.62	17.67	0.67	23.67	0.44
5.83	1.41	11.83	1.56	17.83	0.66	23.83	0.43
6.00	1.52	12.00	1.50	18.00	0.65	24.00	0.43

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-------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD ( 1000)|   Area    (ha)=   3.00
|ID= 1 DT= 2.0 min |   Total Imp(%)=  78.60   Dir. Conn.(%)=  78.60
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      2.36          0.64
     Dep. Storage     (mm)=      1.00          5.00
     Average Slope     (%)=      1.00          2.00
     Length            (m)=    141.37         40.00
     Mannings n          =      0.013         0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   2.0 MIN. TIME STEP.
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---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	' TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.033	0.44	6.033	1.66	12.033	1.44	18.03	0.64
0.067	0.44	6.067	1.66	12.067	1.44	18.07	0.64
0.100	0.44	6.100	1.66	12.100	1.44	18.10	0.64
0.133	0.44	6.133	1.66	12.133	1.44	18.13	0.64
0.167	0.44	6.167	1.66	12.167	1.44	18.17	0.64
0.200	0.45	6.200	1.82	12.200	1.39	18.20	0.63
0.233	0.45	6.233	1.82	12.233	1.39	18.23	0.63
0.267	0.45	6.267	1.82	12.267	1.39	18.27	0.63
0.300	0.45	6.300	1.82	12.300	1.39	18.30	0.63
0.333	0.45	6.333	1.82	12.333	1.39	18.33	0.63
0.367	0.46	6.367	2.02	12.367	1.34	18.37	0.62
0.400	0.46	6.400	2.02	12.400	1.34	18.40	0.62
0.433	0.46	6.433	2.02	12.433	1.34	18.43	0.62
0.467	0.46	6.467	2.02	12.467	1.34	18.47	0.62
0.500	0.46	6.500	2.02	12.500	1.34	18.50	0.62
0.533	0.46	6.533	2.27	12.533	1.30	18.53	0.61
0.567	0.46	6.567	2.27	12.567	1.30	18.57	0.61
0.600	0.46	6.600	2.27	12.600	1.30	18.60	0.61

0.633	0.46	6.633	2.27	12.633	1.30	18.63	0.61
0.667	0.46	6.667	2.27	12.667	1.30	18.67	0.61
0.700	0.47	6.700	2.59	12.700	1.25	18.70	0.60
0.733	0.47	6.733	2.59	12.733	1.25	18.73	0.60
0.767	0.47	6.767	2.59	12.767	1.25	18.77	0.60
0.800	0.47	6.800	2.59	12.800	1.25	18.80	0.60
0.833	0.47	6.833	2.59	12.833	1.25	18.83	0.60
0.867	0.48	6.867	3.04	12.867	1.22	18.87	0.60
0.900	0.48	6.900	3.04	12.900	1.22	18.90	0.60
0.933	0.48	6.933	3.04	12.933	1.22	18.93	0.60
0.967	0.48	6.967	3.04	12.967	1.22	18.97	0.60
1.000	0.48	7.000	3.04	13.000	1.22	19.00	0.60
1.033	0.49	7.033	3.68	13.033	1.18	19.03	0.59
1.067	0.49	7.067	3.68	13.067	1.18	19.07	0.59
1.100	0.49	7.100	3.68	13.100	1.18	19.10	0.59
1.133	0.49	7.133	3.68	13.133	1.18	19.13	0.59
1.167	0.49	7.167	3.68	13.167	1.18	19.17	0.59
1.200	0.51	7.200	4.70	13.200	1.15	19.20	0.58
1.233	0.51	7.233	4.70	13.233	1.15	19.23	0.58
1.267	0.51	7.267	4.70	13.267	1.15	19.27	0.58
1.300	0.51	7.300	4.70	13.300	1.15	19.30	0.58
1.333	0.51	7.333	4.70	13.333	1.15	19.33	0.58
1.367	0.52	7.367	6.52	13.367	1.11	19.37	0.57
1.400	0.52	7.400	6.52	13.400	1.11	19.40	0.57
1.433	0.52	7.433	6.52	13.433	1.11	19.43	0.57
1.467	0.52	7.467	6.52	13.467	1.11	19.47	0.57
1.500	0.52	7.500	6.52	13.500	1.11	19.50	0.57
1.533	0.53	7.533	10.72	13.533	1.08	19.53	0.57
1.567	0.53	7.567	10.72	13.567	1.08	19.57	0.57
1.600	0.53	7.600	10.72	13.600	1.08	19.60	0.57
1.633	0.53	7.633	10.72	13.633	1.08	19.63	0.57
1.667	0.53	7.667	10.72	13.667	1.08	19.67	0.57
1.700	0.54	7.700	28.89	13.700	1.06	19.70	0.56
1.733	0.54	7.733	28.90	13.733	1.06	19.73	0.56
1.767	0.54	7.767	28.90	13.767	1.06	19.77	0.56
1.800	0.54	7.800	28.90	13.800	1.06	19.80	0.56
1.833	0.54	7.833	28.90	13.833	1.06	19.83	0.56
1.867	0.56	7.867	118.34	13.867	1.03	19.87	0.55
1.900	0.56	7.900	118.36	13.900	1.03	19.90	0.55
1.933	0.56	7.933	118.36	13.933	1.03	19.93	0.55
1.967	0.56	7.967	118.36	13.967	1.03	19.97	0.55
2.000	0.56	8.000	118.36	14.000	1.03	20.00	0.55
2.033	0.57	8.033	38.74	14.033	1.00	20.03	0.55
2.067	0.57	8.067	38.72	14.067	1.00	20.07	0.55
2.100	0.57	8.100	38.72	14.100	1.00	20.10	0.55
2.133	0.57	8.133	38.72	14.133	1.00	20.13	0.55
2.167	0.57	8.167	38.72	14.167	1.00	20.17	0.55
2.200	0.58	8.200	19.12	14.200	0.98	20.20	0.54
2.233	0.58	8.233	19.11	14.233	0.98	20.23	0.54
2.267	0.58	8.267	19.11	14.267	0.98	20.27	0.54
2.300	0.58	8.300	19.11	14.300	0.98	20.30	0.54
2.333	0.58	8.333	19.11	14.333	0.98	20.33	0.54
2.367	0.60	8.367	12.38	14.367	0.96	20.37	0.53
2.400	0.60	8.400	12.38	14.400	0.96	20.40	0.53
2.433	0.60	8.433	12.38	14.433	0.96	20.43	0.53
2.467	0.60	8.467	12.38	14.467	0.96	20.47	0.53
2.500	0.60	8.500	12.38	14.500	0.96	20.50	0.53
2.533	0.62	8.533	9.08	14.533	0.93	20.53	0.53
2.567	0.62	8.567	9.08	14.567	0.93	20.57	0.53
2.600	0.62	8.600	9.08	14.600	0.93	20.60	0.53
2.633	0.62	8.633	9.08	14.633	0.93	20.63	0.53

2.667	0.62	8.667	9.08	14.667	0.93	20.67	0.53
2.700	0.63	8.700	7.16	14.700	0.91	20.70	0.52
2.733	0.63	8.733	7.16	14.733	0.91	20.73	0.52
2.767	0.63	8.767	7.16	14.767	0.91	20.77	0.52
2.800	0.63	8.800	7.16	14.800	0.91	20.80	0.52
2.833	0.63	8.833	7.16	14.833	0.91	20.83	0.52
2.867	0.65	8.867	5.91	14.867	0.89	20.87	0.51
2.900	0.65	8.900	5.91	14.900	0.89	20.90	0.51
2.933	0.65	8.933	5.91	14.933	0.89	20.93	0.51
2.967	0.65	8.967	5.91	14.967	0.89	20.97	0.51
3.000	0.65	9.000	5.91	15.000	0.89	21.00	0.51
3.033	0.67	9.033	5.03	15.033	0.88	21.03	0.51
3.067	0.67	9.067	5.03	15.067	0.88	21.07	0.51
3.100	0.67	9.100	5.03	15.100	0.88	21.10	0.51
3.133	0.67	9.133	5.03	15.133	0.88	21.13	0.51
3.167	0.67	9.167	5.03	15.167	0.88	21.17	0.51
3.200	0.70	9.200	4.38	15.200	0.86	21.20	0.50
3.233	0.70	9.233	4.38	15.233	0.86	21.23	0.50
3.267	0.70	9.267	4.38	15.267	0.86	21.27	0.50
3.300	0.70	9.300	4.38	15.300	0.86	21.30	0.50
3.333	0.70	9.333	4.38	15.333	0.86	21.33	0.50
3.367	0.72	9.367	3.89	15.367	0.84	21.37	0.50
3.400	0.72	9.400	3.89	15.400	0.84	21.40	0.50
3.433	0.72	9.433	3.89	15.433	0.84	21.43	0.50
3.467	0.72	9.467	3.89	15.467	0.84	21.47	0.50
3.500	0.72	9.500	3.88	15.500	0.84	21.50	0.50
3.533	0.74	9.533	3.49	15.533	0.82	21.53	0.49
3.567	0.74	9.567	3.49	15.567	0.82	21.57	0.49
3.600	0.74	9.600	3.49	15.600	0.82	21.60	0.49
3.633	0.74	9.633	3.49	15.633	0.82	21.63	0.49
3.667	0.74	9.667	3.49	15.667	0.82	21.67	0.49
3.700	0.77	9.700	3.17	15.700	0.81	21.70	0.49
3.733	0.77	9.733	3.17	15.733	0.81	21.73	0.49
3.767	0.77	9.767	3.17	15.767	0.81	21.77	0.49
3.800	0.77	9.800	3.17	15.800	0.81	21.80	0.49
3.833	0.77	9.833	3.17	15.833	0.81	21.83	0.49
3.867	0.80	9.867	2.91	15.867	0.79	21.87	0.48
3.900	0.80	9.900	2.91	15.900	0.79	21.90	0.48
3.933	0.80	9.933	2.91	15.933	0.79	21.93	0.48
3.967	0.80	9.967	2.91	15.967	0.79	21.97	0.48
4.000	0.80	10.000	2.91	16.000	0.79	22.00	0.48
4.033	0.83	10.033	2.69	16.033	0.78	22.03	0.48
4.067	0.83	10.067	2.69	16.067	0.78	22.07	0.48
4.100	0.83	10.100	2.69	16.100	0.78	22.10	0.48
4.133	0.83	10.133	2.69	16.133	0.78	22.13	0.48
4.167	0.83	10.167	2.69	16.167	0.78	22.17	0.48
4.200	0.87	10.200	2.50	16.200	0.76	22.20	0.47
4.233	0.87	10.233	2.50	16.233	0.76	22.23	0.47
4.267	0.87	10.267	2.50	16.267	0.76	22.27	0.47
4.300	0.87	10.300	2.50	16.300	0.76	22.30	0.47
4.333	0.87	10.333	2.50	16.333	0.76	22.33	0.47
4.367	0.90	10.367	2.34	16.367	0.75	22.37	0.47
4.400	0.90	10.400	2.34	16.400	0.75	22.40	0.47
4.433	0.90	10.433	2.34	16.433	0.75	22.43	0.47
4.467	0.90	10.467	2.34	16.467	0.75	22.47	0.47
4.500	0.90	10.500	2.34	16.500	0.75	22.50	0.47
4.533	0.94	10.533	2.20	16.533	0.74	22.53	0.46
4.567	0.94	10.567	2.20	16.567	0.74	22.57	0.46
4.600	0.94	10.600	2.20	16.600	0.74	22.60	0.46
4.633	0.94	10.633	2.20	16.633	0.74	22.63	0.46
4.667	0.94	10.667	2.20	16.667	0.74	22.67	0.46

4.700	0.99	10.700	2.07	16.700	0.73	22.70	0.46
4.733	0.99	10.733	2.07	16.733	0.73	22.73	0.46
4.767	0.99	10.767	2.07	16.767	0.73	22.77	0.46
4.800	0.99	10.800	2.07	16.800	0.73	22.80	0.46
4.833	0.99	10.833	2.07	16.833	0.73	22.83	0.46
4.867	1.04	10.867	1.96	16.867	0.71	22.87	0.45
4.900	1.04	10.900	1.96	16.900	0.71	22.90	0.45
4.933	1.04	10.933	1.96	16.933	0.71	22.93	0.45
4.967	1.04	10.967	1.96	16.967	0.71	22.97	0.45
5.000	1.04	11.000	1.96	17.000	0.71	23.00	0.45
5.033	1.10	11.033	1.86	17.033	0.70	23.03	0.45
5.067	1.10	11.067	1.86	17.067	0.70	23.07	0.45
5.100	1.10	11.100	1.86	17.100	0.70	23.10	0.45
5.133	1.10	11.133	1.86	17.133	0.70	23.13	0.45
5.167	1.10	11.167	1.86	17.167	0.70	23.17	0.45
5.200	1.16	11.200	1.78	17.200	0.69	23.20	0.45
5.233	1.16	11.233	1.78	17.233	0.69	23.23	0.45
5.267	1.16	11.267	1.78	17.267	0.69	23.27	0.45
5.300	1.16	11.300	1.78	17.300	0.69	23.30	0.45
5.333	1.16	11.333	1.78	17.333	0.69	23.33	0.45
5.367	1.23	11.367	1.70	17.367	0.68	23.37	0.44
5.400	1.23	11.400	1.70	17.400	0.68	23.40	0.44
5.433	1.23	11.433	1.70	17.433	0.68	23.43	0.44
5.467	1.23	11.467	1.70	17.467	0.68	23.47	0.44
5.500	1.23	11.500	1.70	17.500	0.68	23.50	0.44
5.533	1.32	11.533	1.62	17.533	0.67	23.53	0.44
5.567	1.32	11.567	1.62	17.567	0.67	23.57	0.44
5.600	1.32	11.600	1.62	17.600	0.67	23.60	0.44
5.633	1.32	11.633	1.62	17.633	0.67	23.63	0.44
5.667	1.32	11.667	1.62	17.667	0.67	23.67	0.44
5.700	1.41	11.700	1.56	17.700	0.66	23.70	0.43
5.733	1.41	11.733	1.56	17.733	0.66	23.73	0.43
5.767	1.41	11.767	1.56	17.767	0.66	23.77	0.43
5.800	1.41	11.800	1.56	17.800	0.66	23.80	0.43
5.833	1.41	11.833	1.56	17.833	0.66	23.83	0.43
5.867	1.52	11.867	1.50	17.867	0.65	23.87	0.43
5.900	1.52	11.900	1.50	17.900	0.65	23.90	0.43
5.933	1.52	11.933	1.50	17.933	0.65	23.93	0.43
5.967	1.52	11.967	1.50	17.967	0.65	23.97	0.43
6.000	1.52	12.000	1.50	18.000	0.65	24.00	0.43

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     Max.Eff.Inten.(mm/hr)=     118.36        15.89
                over (min)        5.00         8.00
     Storage Coeff.  (min)=       2.94 (ii)    6.86 (ii)
     Unit Hyd. Tpeak (min)=       4.00         8.00
     Unit Hyd. peak  (cms)=       0.34         0.16
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.74         0.02         0.760 (iii)
     TIME TO PEAK    (hrs)=       8.00         8.07          8.00
     RUNOFF VOLUME    (mm)=      66.50        11.57         54.75
     TOTAL RAINFALL   (mm)=      67.50        67.50         67.50
     RUNOFF COEFFICIENT   =       0.99         0.17          0.81

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  48.0    Ia = Dep. 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( 3001)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  2.0 min     |     OUTFLOW    STORAGE   |   OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |    (cms)     (ha.m.)
                          0.0000     0.0000   |    0.0391     0.0880
                          0.0028     0.0061   |    0.0527     0.0958
                          0.0096     0.0158   |    0.0660     0.1032
                          0.0131     0.0255   |    0.0762     0.1100
                          0.0157     0.0350   |    0.0856     0.1159
                          0.0180     0.0443   |    0.0932     0.1209
                          0.0201     0.0535   |    0.1001     0.1256
                          0.0219     0.0625   |    0.1066     0.1304
                          0.0238     0.0713   |    0.1155     0.1376
                          0.0254     0.0798   |    0.0000     0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  1000)      2.998     0.760      8.00      54.75
   OUTFLOW: ID= 1 (  3001)      2.998     0.056      8.73      54.56

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=  7.41
                   TIME SHIFT OF PEAK FLOW         (min)= 44.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.0978

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| CALIB            |
| STANDHYD ( 1100)|   Area    (ha)=   0.09
|ID= 1 DT= 2.0 min |   Total Imp(%)=  26.30   Dir. Conn.(%)=  26.30
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                                IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.02          0.07
     Dep. Storage     (mm)=       1.00          5.00
     Average Slope     (%)=       1.00          2.00
     Length            (m)=      25.17         40.00
     Mannings n          =       0.013         0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   2.0 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
                0.033    0.44 | 6.033    1.66 |12.033    1.44 | 18.03    0.64
                0.067    0.44 | 6.067    1.66 |12.067    1.44 | 18.07    0.64
                0.100    0.44 | 6.100    1.66 |12.100    1.44 | 18.10    0.64
                0.133    0.44 | 6.133    1.66 |12.133    1.44 | 18.13    0.64
                0.167    0.44 | 6.167    1.66 |12.167    1.44 | 18.17    0.64
                0.200    0.45 | 6.200    1.82 |12.200    1.39 | 18.20    0.63
                0.233    0.45 | 6.233    1.82 |12.233    1.39 | 18.23    0.63
                0.267    0.45 | 6.267    1.82 |12.267    1.39 | 18.27    0.63
                0.300    0.45 | 6.300    1.82 |12.300    1.39 | 18.30    0.63
                0.333    0.45 | 6.333    1.82 |12.333    1.39 | 18.33    0.63
                0.367    0.46 | 6.367    2.02 |12.367    1.34 | 18.37    0.62
                0.400    0.46 | 6.400    2.02 |12.400    1.34 | 18.40    0.62
                0.433    0.46 | 6.433    2.02 |12.433    1.34 | 18.43    0.62
                0.467    0.46 | 6.467    2.02 |12.467    1.34 | 18.47    0.62
                0.500    0.46 | 6.500    2.02 |12.500    1.34 | 18.50    0.62
                0.533    0.46 | 6.533    2.27 |12.533    1.30 | 18.53    0.61
                0.567    0.46 | 6.567    2.27 |12.567    1.30 | 18.57    0.61
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                0.600    0.46 | 6.600    2.27 |12.600    1.30 | 18.60    0.61
                0.633    0.46 | 6.633    2.27 |12.633    1.30 | 18.63    0.61
                0.667    0.46 | 6.667    2.27 |12.667    1.30 | 18.67    0.61
                0.700    0.47 | 6.700    2.59 |12.700    1.25 | 18.70    0.60
                0.733    0.47 | 6.733    2.59 |12.733    1.25 | 18.73    0.60
                0.767    0.47 | 6.767    2.59 |12.767    1.25 | 18.77    0.60
                0.800    0.47 | 6.800    2.59 |12.800    1.25 | 18.80    0.60
                0.833    0.47 | 6.833    2.59 |12.833    1.25 | 18.83    0.60
                0.867    0.48 | 6.867    3.04 |12.867    1.22 | 18.87    0.60
                0.900    0.48 | 6.900    3.04 |12.900    1.22 | 18.90    0.60
                0.933    0.48 | 6.933    3.04 |12.933    1.22 | 18.93    0.60
                0.967    0.48 | 6.967    3.04 |12.967    1.22 | 18.97    0.60
                1.000    0.48 | 7.000    3.04 |13.000    1.22 | 19.00    0.60
                1.033    0.49 | 7.033    3.68 |13.033    1.18 | 19.03    0.59
                1.067    0.49 | 7.067    3.68 |13.067    1.18 | 19.07    0.59
                1.100    0.49 | 7.100    3.68 |13.100    1.18 | 19.10    0.59
                1.133    0.49 | 7.133    3.68 |13.133    1.18 | 19.13    0.59
                1.167    0.49 | 7.167    3.68 |13.167    1.18 | 19.17    0.59
                1.200    0.51 | 7.200    4.70 |13.200    1.15 | 19.20    0.58
                1.233    0.51 | 7.233    4.70 |13.233    1.15 | 19.23    0.58
                1.267    0.51 | 7.267    4.70 |13.267    1.15 | 19.27    0.58
                1.300    0.51 | 7.300    4.70 |13.300    1.15 | 19.30    0.58
                1.333    0.51 | 7.333    4.70 |13.333    1.15 | 19.33    0.58
                1.367    0.52 | 7.367    6.52 |13.367    1.11 | 19.37    0.57
                1.400    0.52 | 7.400    6.52 |13.400    1.11 | 19.40    0.57
                1.433    0.52 | 7.433    6.52 |13.433    1.11 | 19.43    0.57
                1.467    0.52 | 7.467    6.52 |13.467    1.11 | 19.47    0.57
                1.500    0.52 | 7.500    6.52 |13.500    1.11 | 19.50    0.57
                1.533    0.53 | 7.533   10.72 |13.533    1.08 | 19.53    0.57
                1.567    0.53 | 7.567   10.72 |13.567    1.08 | 19.57    0.57
                1.600    0.53 | 7.600   10.72 |13.600    1.08 | 19.60    0.57
                1.633    0.53 | 7.633   10.72 |13.633    1.08 | 19.63    0.57
                1.667    0.53 | 7.667   10.72 |13.667    1.08 | 19.67    0.57
                1.700    0.54 | 7.700   28.89 |13.700    1.06 | 19.70    0.56
                1.733    0.54 | 7.733   28.90 |13.733    1.06 | 19.73    0.56
                1.767    0.54 | 7.767   28.90 |13.767    1.06 | 19.77    0.56
                1.800    0.54 | 7.800   28.90 |13.800    1.06 | 19.80    0.56
                1.833    0.54 | 7.833   28.90 |13.833    1.06 | 19.83    0.56
                1.867    0.56 | 7.867  118.34 |13.867    1.03 | 19.87    0.55
                1.900    0.56 | 7.900  118.36 |13.900    1.03 | 19.90    0.55
                1.933    0.56 | 7.933  118.36 |13.933    1.03 | 19.93    0.55
                1.967    0.56 | 7.967  118.36 |13.967    1.03 | 19.97    0.55
                2.000    0.56 | 8.000  118.36 |14.000    1.03 | 20.00    0.55
                2.033    0.57 | 8.033   38.74 |14.033    1.00 | 20.03    0.55
                2.067    0.57 | 8.067   38.72 |14.067    1.00 | 20.07    0.55
                2.100    0.57 | 8.100   38.72 |14.100    1.00 | 20.10    0.55
                2.133    0.57 | 8.133   38.72 |14.133    1.00 | 20.13    0.55
                2.167    0.57 | 8.167   38.72 |14.167    1.00 | 20.17    0.55
                2.200    0.58 | 8.200   19.12 |14.200    0.98 | 20.20    0.54
                2.233    0.58 | 8.233   19.11 |14.233    0.98 | 20.23    0.54
                2.267    0.58 | 8.267   19.11 |14.267    0.98 | 20.27    0.54
                2.300    0.58 | 8.300   19.11 |14.300    0.98 | 20.30    0.54
                2.333    0.58 | 8.333   19.11 |14.333    0.98 | 20.33    0.54
                2.367    0.60 | 8.367   12.38 |14.367    0.96 | 20.37    0.53
                2.400    0.60 | 8.400   12.38 |14.400    0.96 | 20.40    0.53
                2.433    0.60 | 8.433   12.38 |14.433    0.96 | 20.43    0.53
                2.467    0.60 | 8.467   12.38 |14.467    0.96 | 20.47    0.53
                2.500    0.60 | 8.500   12.38 |14.500    0.96 | 20.50    0.53
                2.533    0.62 | 8.533    9.08 |14.533    0.93 | 20.53    0.53
                2.567    0.62 | 8.567    9.08 |14.567    0.93 | 20.57    0.53
                2.600    0.62 | 8.600    9.08 |14.600    0.93 | 20.60    0.53
```



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                2.633    0.62 | 8.633    9.08 |14.633    0.93 | 20.63    0.53
                2.667    0.62 | 8.667    9.08 |14.667    0.93 | 20.67    0.53
                2.700    0.63 | 8.700    7.16 |14.700    0.91 | 20.70    0.52
                2.733    0.63 | 8.733    7.16 |14.733    0.91 | 20.73    0.52
                2.767    0.63 | 8.767    7.16 |14.767    0.91 | 20.77    0.52
                2.800    0.63 | 8.800    7.16 |14.800    0.91 | 20.80    0.52
                2.833    0.63 | 8.833    7.16 |14.833    0.91 | 20.83    0.52
                2.867    0.65 | 8.867    5.91 |14.867    0.89 | 20.87    0.51
                2.900    0.65 | 8.900    5.91 |14.900    0.89 | 20.90    0.51
                2.933    0.65 | 8.933    5.91 |14.933    0.89 | 20.93    0.51
                2.967    0.65 | 8.967    5.91 |14.967    0.89 | 20.97    0.51
                3.000    0.65 | 9.000    5.91 |15.000    0.89 | 21.00    0.51
                3.033    0.67 | 9.033    5.03 |15.033    0.88 | 21.03    0.51
                3.067    0.67 | 9.067    5.03 |15.067    0.88 | 21.07    0.51
                3.100    0.67 | 9.100    5.03 |15.100    0.88 | 21.10    0.51
                3.133    0.67 | 9.133    5.03 |15.133    0.88 | 21.13    0.51
                3.167    0.67 | 9.167    5.03 |15.167    0.88 | 21.17    0.51
                3.200    0.70 | 9.200    4.38 |15.200    0.86 | 21.20    0.50
                3.233    0.70 | 9.233    4.38 |15.233    0.86 | 21.23    0.50
                3.267    0.70 | 9.267    4.38 |15.267    0.86 | 21.27    0.50
                3.300    0.70 | 9.300    4.38 |15.300    0.86 | 21.30    0.50
                3.333    0.70 | 9.333    4.38 |15.333    0.86 | 21.33    0.50
                3.367    0.72 | 9.367    3.89 |15.367    0.84 | 21.37    0.50
                3.400    0.72 | 9.400    3.89 |15.400    0.84 | 21.40    0.50
                3.433    0.72 | 9.433    3.89 |15.433    0.84 | 21.43    0.50
                3.467    0.72 | 9.467    3.89 |15.467    0.84 | 21.47    0.50
                3.500    0.72 | 9.500    3.88 |15.500    0.84 | 21.50    0.50
                3.533    0.74 | 9.533    3.49 |15.533    0.82 | 21.53    0.49
                3.567    0.74 | 9.567    3.49 |15.567    0.82 | 21.57    0.49
                3.600    0.74 | 9.600    3.49 |15.600    0.82 | 21.60    0.49
                3.633    0.74 | 9.633    3.49 |15.633    0.82 | 21.63    0.49
                3.667    0.74 | 9.667    3.49 |15.667    0.82 | 21.67    0.49
                3.700    0.77 | 9.700    3.17 |15.700    0.81 | 21.70    0.49
                3.733    0.77 | 9.733    3.17 |15.733    0.81 | 21.73    0.49
                3.767    0.77 | 9.767    3.17 |15.767    0.81 | 21.77    0.49
                3.800    0.77 | 9.800    3.17 |15.800    0.81 | 21.80    0.49
                3.833    0.77 | 9.833    3.17 |15.833    0.81 | 21.83    0.49
                3.867    0.80 | 9.867    2.91 |15.867    0.79 | 21.87    0.48
                3.900    0.80 | 9.900    2.91 |15.900    0.79 | 21.90    0.48
                3.933    0.80 | 9.933    2.91 |15.933    0.79 | 21.93    0.48
                3.967    0.80 | 9.967    2.91 |15.967    0.79 | 21.97    0.48
                4.000    0.80 |10.000    2.91 |16.000    0.79 | 22.00    0.48
                4.033    0.83 |10.033    2.69 |16.033    0.78 | 22.03    0.48
                4.067    0.83 |10.067    2.69 |16.067    0.78 | 22.07    0.48
                4.100    0.83 |10.100    2.69 |16.100    0.78 | 22.10    0.48
                4.133    0.83 |10.133    2.69 |16.133    0.78 | 22.13    0.48
                4.167    0.83 |10.167    2.69 |16.167    0.78 | 22.17    0.48
                4.200    0.87 |10.200    2.50 |16.200    0.76 | 22.20    0.47
                4.233    0.87 |10.233    2.50 |16.233    0.76 | 22.23    0.47
                4.267    0.87 |10.267    2.50 |16.267    0.76 | 22.27    0.47
                4.300    0.87 |10.300    2.50 |16.300    0.76 | 22.30    0.47
                4.333    0.87 |10.333    2.50 |16.333    0.76 | 22.33    0.47
                4.367    0.90 |10.367    2.34 |16.367    0.75 | 22.37    0.47
                4.400    0.90 |10.400    2.34 |16.400    0.75 | 22.40    0.47
                4.433    0.90 |10.433    2.34 |16.433    0.75 | 22.43    0.47
                4.467    0.90 |10.467    2.34 |16.467    0.75 | 22.47    0.47
                4.500    0.90 |10.500    2.34 |16.500    0.75 | 22.50    0.47
                4.533    0.94 |10.533    2.20 |16.533    0.74 | 22.53    0.46
                4.567    0.94 |10.567    2.20 |16.567    0.74 | 22.57    0.46
                4.600    0.94 |10.600    2.20 |16.600    0.74 | 22.60    0.46
                4.633    0.94 |10.633    2.20 |16.633    0.74 | 22.63    0.46
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                4.667    0.94 |10.667    2.20 |16.667    0.74 | 22.67    0.46
                4.700    0.99 |10.700    2.07 |16.700    0.73 | 22.70    0.46
                4.733    0.99 |10.733    2.07 |16.733    0.73 | 22.73    0.46
                4.767    0.99 |10.767    2.07 |16.767    0.73 | 22.77    0.46
                4.800    0.99 |10.800    2.07 |16.800    0.73 | 22.80    0.46
                4.833    0.99 |10.833    2.07 |16.833    0.73 | 22.83    0.46
                4.867    1.04 |10.867    1.96 |16.867    0.71 | 22.87    0.45
                4.900    1.04 |10.900    1.96 |16.900    0.71 | 22.90    0.45
                4.933    1.04 |10.933    1.96 |16.933    0.71 | 22.93    0.45
                4.967    1.04 |10.967    1.96 |16.967    0.71 | 22.97    0.45
                5.000    1.04 |11.000    1.96 |17.000    0.71 | 23.00    0.45
                5.033    1.10 |11.033    1.86 |17.033    0.70 | 23.03    0.45
                5.067    1.10 |11.067    1.86 |17.067    0.70 | 23.07    0.45
                5.100    1.10 |11.100    1.86 |17.100    0.70 | 23.10    0.45
                5.133    1.10 |11.133    1.86 |17.133    0.70 | 23.13    0.45
                5.167    1.10 |11.167    1.86 |17.167    0.70 | 23.17    0.45
                5.200    1.16 |11.200    1.78 |17.200    0.69 | 23.20    0.45
                5.233    1.16 |11.233    1.78 |17.233    0.69 | 23.23    0.45
                5.267    1.16 |11.267    1.78 |17.267    0.69 | 23.27    0.45
                5.300    1.16 |11.300    1.78 |17.300    0.69 | 23.30    0.45
                5.333    1.16 |11.333    1.78 |17.333    0.69 | 23.33    0.45
                5.367    1.23 |11.367    1.70 |17.367    0.68 | 23.37    0.44
                5.400    1.23 |11.400    1.70 |17.400    0.68 | 23.40    0.44
                5.433    1.23 |11.433    1.70 |17.433    0.68 | 23.43    0.44
                5.467    1.23 |11.467    1.70 |17.467    0.68 | 23.47    0.44
                5.500    1.23 |11.500    1.70 |17.500    0.68 | 23.50    0.44
                5.533    1.32 |11.533    1.62 |17.533    0.67 | 23.53    0.44
                5.567    1.32 |11.567    1.62 |17.567    0.67 | 23.57    0.44
                5.600    1.32 |11.600    1.62 |17.600    0.67 | 23.60    0.44
                5.633    1.32 |11.633    1.62 |17.633    0.67 | 23.63    0.44
                5.667    1.32 |11.667    1.62 |17.667    0.67 | 23.67    0.44
                5.700    1.41 |11.700    1.56 |17.700    0.66 | 23.70    0.43
                5.733    1.41 |11.733    1.56 |17.733    0.66 | 23.73    0.43
                5.767    1.41 |11.767    1.56 |17.767    0.66 | 23.77    0.43
                5.800    1.41 |11.800    1.56 |17.800    0.66 | 23.80    0.43
                5.833    1.41 |11.833    1.56 |17.833    0.66 | 23.83    0.43
                5.867    1.52 |11.867    1.50 |17.867    0.65 | 23.87    0.43
                5.900    1.52 |11.900    1.50 |17.900    0.65 | 23.90    0.43
                5.933    1.52 |11.933    1.50 |17.933    0.65 | 23.93    0.43
                5.967    1.52 |11.967    1.50 |17.967    0.65 | 23.97    0.43
                6.000    1.52 |12.000    1.50 |18.000    0.65 | 24.00    0.43

     Max.Eff.Inten.(mm/hr)=     118.36        12.33
               over (min)         5.00        18.00
     Storage Coeff.  (min)=       1.04 (ii)   17.35 (ii)
     Unit Hyd. Tpeak (min)=       4.00        18.00
     Unit Hyd. peak  (cms)=       0.51         0.06
                                                             *TOTALS*
     PEAK FLOW       (cms)=       0.01         0.00           0.009 (iii)
     TIME TO PEAK    (hrs)=       8.00         8.27            8.00
     RUNOFF VOLUME    (mm)=      66.50        11.57           23.85
     TOTAL RAINFALL   (mm)=      67.50        67.50           67.50
     RUNOFF COEFFICIENT   =       0.99         0.17            0.35

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

         (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
              CN*  =  48.0    Ia = Dep. 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  (  2002)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK      R.V.
--------------------          (ha)    (cms)    (hrs)      (mm)
        ID1= 1 (  1100):      0.09   0.009     8.00     23.85
      + ID2= 2 (  3001):      3.00   0.056     8.73     54.56
        ===================================================
        ID = 3 (  2002):      3.09   0.058     8.70     53.62

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

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2001)
       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 6.2\VO2\voin.dat

  Output  filename:
C:\Users\zhouj\AppData\Local\Civica\VH5\642fa701-08f9-4281-a674-e9ad409f1aac\3dd8ba
a1-2c34-41e4-ac7c-fa84519e1be7\scenar
  Summary filename:
C:\Users\zhouj\AppData\Local\Civica\VH5\642fa701-08f9-4281-a674-e9ad409f1aac\3dd8ba
a1-2c34-41e4-ac7c-fa84519e1be7\scenar


DATE: 09-13-2023                           TIME: 11:19:06

USER:


COMMENTS: ____________________________________________________________


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  **********************************************
  ** SIMULATION : Run 04                       **
  **********************************************

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```
| CHICAGO STORM    |    IDF curve parameters: A=1676.200
| Ptotal= 78.08 mm |                          B=   8.300
--------------------                          C=   0.858
                        used in:   INTENSITY =  A / (t + B)^C

                        Duration of storm  = 24.00 hrs
                        Storm time step    = 10.00 min
                        Time to peak ratio =  0.33
```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.17	0.49	6.17	1.87	12.17	1.62	18.17	0.72
0.33	0.50	6.33	2.06	12.33	1.57	18.33	0.70
0.50	0.51	6.50	2.29	12.50	1.51	18.50	0.69
0.67	0.52	6.67	2.58	12.67	1.46	18.67	0.69
0.83	0.53	6.83	2.95	12.83	1.41	18.83	0.68
1.00	0.54	7.00	3.47	13.00	1.37	19.00	0.67
1.17	0.55	7.17	4.22	13.17	1.33	19.17	0.66
1.33	0.56	7.33	5.41	13.33	1.29	19.33	0.65
1.50	0.58	7.50	7.56	13.50	1.25	19.50	0.64
1.67	0.59	7.67	12.52	13.67	1.22	19.67	0.63
1.83	0.60	7.83	34.10	13.83	1.19	19.83	0.62
2.00	0.62	8.00	138.40	14.00	1.16	20.00	0.62
2.17	0.64	8.17	45.75	14.17	1.13	20.17	0.61
2.33	0.65	8.33	22.49	14.33	1.10	20.33	0.60
2.50	0.67	8.50	14.49	14.50	1.07	20.50	0.59
2.67	0.69	8.67	10.58	14.67	1.05	20.67	0.59
2.83	0.71	8.83	8.31	14.83	1.03	20.83	0.58
3.00	0.73	9.00	6.83	15.00	1.00	21.00	0.57
3.17	0.75	9.17	5.80	15.17	0.98	21.17	0.57
3.33	0.78	9.33	5.04	15.33	0.96	21.33	0.56
3.50	0.80	9.50	4.46	15.50	0.94	21.50	0.56
3.67	0.83	9.67	4.00	15.67	0.92	21.67	0.55
3.83	0.86	9.83	3.63	15.83	0.91	21.83	0.54
4.00	0.90	10.00	3.32	16.00	0.89	22.00	0.54
4.17	0.93	10.17	3.07	16.17	0.87	22.17	0.53
4.33	0.97	10.33	2.85	16.33	0.86	22.33	0.53
4.50	1.01	10.50	2.66	16.50	0.84	22.50	0.52
4.67	1.06	10.67	2.50	16.67	0.83	22.67	0.52
4.83	1.11	10.83	2.35	16.83	0.81	22.83	0.51
5.00	1.17	11.00	2.23	17.00	0.80	23.00	0.51
5.17	1.23	11.17	2.11	17.17	0.79	23.17	0.50
5.33	1.31	11.33	2.01	17.33	0.77	23.33	0.50
5.50	1.39	11.50	1.92	17.50	0.76	23.50	0.49
5.67	1.48	11.67	1.83	17.67	0.75	23.67	0.49
5.83	1.59	11.83	1.76	17.83	0.74	23.83	0.48
6.00	1.72	12.00	1.69	18.00	0.73	24.00	0.48

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--------------------
| CALIB            |
| STANDHYD (  1000)|   Area    (ha)=   3.00
|ID= 1 DT= 2.0 min |   Total Imp(%)=  78.60   Dir. Conn.(%)=  78.60
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      2.36          0.64
     Dep. Storage     (mm)=      1.00          5.00
     Average Slope     (%)=      1.00          2.00
     Length            (m)=    141.37         40.00
     Mannings n           =     0.013         0.250
```


NOTE: RAINFALL WAS TRANSFORMED TO   2.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.033	0.49	6.033	1.87	12.033	1.62	18.03	0.72
0.067	0.49	6.067	1.87	12.067	1.62	18.07	0.72
0.100	0.49	6.100	1.87	12.100	1.62	18.10	0.72
0.133	0.49	6.133	1.87	12.133	1.62	18.13	0.72
0.167	0.49	6.167	1.87	12.167	1.62	18.17	0.72
0.200	0.50	6.200	2.06	12.200	1.57	18.20	0.70
0.233	0.50	6.233	2.06	12.233	1.57	18.23	0.70
0.267	0.50	6.267	2.06	12.267	1.57	18.27	0.70
0.300	0.50	6.300	2.06	12.300	1.57	18.30	0.70
0.333	0.50	6.333	2.06	12.333	1.57	18.33	0.70
0.367	0.51	6.367	2.29	12.367	1.51	18.37	0.69
0.400	0.51	6.400	2.29	12.400	1.51	18.40	0.69
0.433	0.51	6.433	2.29	12.433	1.51	18.43	0.69
0.467	0.51	6.467	2.29	12.467	1.51	18.47	0.69
0.500	0.51	6.500	2.29	12.500	1.51	18.50	0.69
0.533	0.52	6.533	2.58	12.533	1.46	18.53	0.69
0.567	0.52	6.567	2.58	12.567	1.46	18.57	0.69
0.600	0.52	6.600	2.58	12.600	1.46	18.60	0.69
0.633	0.52	6.633	2.58	12.633	1.46	18.63	0.69
0.667	0.52	6.667	2.58	12.667	1.46	18.67	0.69
0.700	0.53	6.700	2.95	12.700	1.41	18.70	0.68
0.733	0.53	6.733	2.95	12.733	1.41	18.73	0.68
0.767	0.53	6.767	2.95	12.767	1.41	18.77	0.68
0.800	0.53	6.800	2.95	12.800	1.41	18.80	0.68
0.833	0.53	6.833	2.95	12.833	1.41	18.83	0.68
0.867	0.54	6.867	3.47	12.867	1.37	18.87	0.67
0.900	0.54	6.900	3.47	12.900	1.37	18.90	0.67
0.933	0.54	6.933	3.47	12.933	1.37	18.93	0.67
0.967	0.54	6.967	3.47	12.967	1.37	18.97	0.67
1.000	0.54	7.000	3.47	13.000	1.37	19.00	0.67
1.033	0.55	7.033	4.22	13.033	1.33	19.03	0.66
1.067	0.55	7.067	4.22	13.067	1.33	19.07	0.66
1.100	0.55	7.100	4.22	13.100	1.33	19.10	0.66
1.133	0.55	7.133	4.22	13.133	1.33	19.13	0.66
1.167	0.55	7.167	4.22	13.167	1.33	19.17	0.66
1.200	0.56	7.200	5.41	13.200	1.29	19.20	0.65
1.233	0.56	7.233	5.41	13.233	1.29	19.23	0.65
1.267	0.56	7.267	5.41	13.267	1.29	19.27	0.65
1.300	0.56	7.300	5.41	13.300	1.29	19.30	0.65
1.333	0.56	7.333	5.41	13.333	1.29	19.33	0.65
1.367	0.58	7.367	7.56	13.367	1.25	19.37	0.64
1.400	0.58	7.400	7.56	13.400	1.25	19.40	0.64
1.433	0.58	7.433	7.56	13.433	1.25	19.43	0.64
1.467	0.58	7.467	7.56	13.467	1.25	19.47	0.64
1.500	0.58	7.500	7.56	13.500	1.25	19.50	0.64
1.533	0.59	7.533	12.52	13.533	1.22	19.53	0.63
1.567	0.59	7.567	12.52	13.567	1.22	19.57	0.63
1.600	0.59	7.600	12.52	13.600	1.22	19.60	0.63
1.633	0.59	7.633	12.52	13.633	1.22	19.63	0.63
1.667	0.59	7.667	12.52	13.667	1.22	19.67	0.63
1.700	0.60	7.700	34.09	13.700	1.19	19.70	0.62
1.733	0.60	7.733	34.10	13.733	1.19	19.73	0.62
1.767	0.60	7.767	34.10	13.767	1.19	19.77	0.62
1.800	0.60	7.800	34.10	13.800	1.19	19.80	0.62

1.833	0.60	7.833	34.10	13.833	1.19	19.83	0.62
1.867	0.62	7.867	138.38	13.867	1.16	19.87	0.62
1.900	0.62	7.900	138.40	13.900	1.16	19.90	0.62
1.933	0.62	7.933	138.40	13.933	1.16	19.93	0.62
1.967	0.62	7.967	138.40	13.967	1.16	19.97	0.62
2.000	0.62	8.000	138.40	14.000	1.16	20.00	0.62
2.033	0.64	8.033	45.77	14.033	1.13	20.03	0.61
2.067	0.64	8.067	45.75	14.067	1.13	20.07	0.61
2.100	0.64	8.100	45.75	14.100	1.13	20.10	0.61
2.133	0.64	8.133	45.75	14.133	1.13	20.13	0.61
2.167	0.64	8.167	45.75	14.167	1.13	20.17	0.61
2.200	0.65	8.200	22.50	14.200	1.10	20.20	0.60
2.233	0.65	8.233	22.49	14.233	1.10	20.23	0.60
2.267	0.65	8.267	22.49	14.267	1.10	20.27	0.60
2.300	0.65	8.300	22.49	14.300	1.10	20.30	0.60
2.333	0.65	8.333	22.49	14.333	1.10	20.33	0.60
2.367	0.67	8.367	14.49	14.367	1.07	20.37	0.59
2.400	0.67	8.400	14.49	14.400	1.07	20.40	0.59
2.433	0.67	8.433	14.49	14.433	1.07	20.43	0.59
2.467	0.67	8.467	14.49	14.467	1.07	20.47	0.59
2.500	0.67	8.500	14.49	14.500	1.07	20.50	0.59
2.533	0.69	8.533	10.58	14.533	1.05	20.53	0.59
2.567	0.69	8.567	10.58	14.567	1.05	20.57	0.59
2.600	0.69	8.600	10.58	14.600	1.05	20.60	0.59
2.633	0.69	8.633	10.58	14.633	1.05	20.63	0.59
2.667	0.69	8.667	10.58	14.667	1.05	20.67	0.59
2.700	0.71	8.700	8.31	14.700	1.03	20.70	0.58
2.733	0.71	8.733	8.31	14.733	1.03	20.73	0.58
2.767	0.71	8.767	8.31	14.767	1.03	20.77	0.58
2.800	0.71	8.800	8.31	14.800	1.03	20.80	0.58
2.833	0.71	8.833	8.31	14.833	1.03	20.83	0.58
2.867	0.73	8.867	6.83	14.867	1.00	20.87	0.57
2.900	0.73	8.900	6.83	14.900	1.00	20.90	0.57
2.933	0.73	8.933	6.83	14.933	1.00	20.93	0.57
2.967	0.73	8.967	6.83	14.967	1.00	20.97	0.57
3.000	0.73	9.000	6.83	15.000	1.00	21.00	0.57
3.033	0.75	9.033	5.80	15.033	0.98	21.03	0.57
3.067	0.75	9.067	5.80	15.067	0.98	21.07	0.57
3.100	0.75	9.100	5.80	15.100	0.98	21.10	0.57
3.133	0.75	9.133	5.80	15.133	0.98	21.13	0.57
3.167	0.75	9.167	5.80	15.167	0.98	21.17	0.57
3.200	0.78	9.200	5.04	15.200	0.96	21.20	0.56
3.233	0.78	9.233	5.04	15.233	0.96	21.23	0.56
3.267	0.78	9.267	5.04	15.267	0.96	21.27	0.56
3.300	0.78	9.300	5.04	15.300	0.96	21.30	0.56
3.333	0.78	9.333	5.04	15.333	0.96	21.33	0.56
3.367	0.80	9.367	4.46	15.367	0.94	21.37	0.56
3.400	0.80	9.400	4.46	15.400	0.94	21.40	0.56
3.433	0.80	9.433	4.46	15.433	0.94	21.43	0.56
3.467	0.80	9.467	4.46	15.467	0.94	21.47	0.56
3.500	0.80	9.500	4.46	15.500	0.94	21.50	0.56
3.533	0.83	9.533	4.00	15.533	0.92	21.53	0.55
3.567	0.83	9.567	4.00	15.567	0.92	21.57	0.55
3.600	0.83	9.600	4.00	15.600	0.92	21.60	0.55
3.633	0.83	9.633	4.00	15.633	0.92	21.63	0.55
3.667	0.83	9.667	4.00	15.667	0.92	21.67	0.55
3.700	0.86	9.700	3.63	15.700	0.91	21.70	0.54
3.733	0.86	9.733	3.63	15.733	0.91	21.73	0.54
3.767	0.86	9.767	3.63	15.767	0.91	21.77	0.54
3.800	0.86	9.800	3.63	15.800	0.91	21.80	0.54
3.833	0.86	9.833	3.63	15.833	0.91	21.83	0.54

3.867	0.90	9.867	3.32	15.867	0.89	21.87	0.54
3.900	0.90	9.900	3.32	15.900	0.89	21.90	0.54
3.933	0.90	9.933	3.32	15.933	0.89	21.93	0.54
3.967	0.90	9.967	3.32	15.967	0.89	21.97	0.54
4.000	0.90	10.000	3.32	16.000	0.89	22.00	0.54
4.033	0.93	10.033	3.07	16.033	0.87	22.03	0.53
4.067	0.93	10.067	3.07	16.067	0.87	22.07	0.53
4.100	0.93	10.100	3.07	16.100	0.87	22.10	0.53
4.133	0.93	10.133	3.07	16.133	0.87	22.13	0.53
4.167	0.93	10.167	3.07	16.167	0.87	22.17	0.53
4.200	0.97	10.200	2.85	16.200	0.86	22.20	0.53
4.233	0.97	10.233	2.85	16.233	0.86	22.23	0.53
4.267	0.97	10.267	2.85	16.267	0.86	22.27	0.53
4.300	0.97	10.300	2.85	16.300	0.86	22.30	0.53
4.333	0.97	10.333	2.85	16.333	0.86	22.33	0.53
4.367	1.01	10.367	2.66	16.367	0.84	22.37	0.52
4.400	1.01	10.400	2.66	16.400	0.84	22.40	0.52
4.433	1.01	10.433	2.66	16.433	0.84	22.43	0.52
4.467	1.01	10.467	2.66	16.467	0.84	22.47	0.52
4.500	1.01	10.500	2.66	16.500	0.84	22.50	0.52
4.533	1.06	10.533	2.50	16.533	0.83	22.53	0.52
4.567	1.06	10.567	2.50	16.567	0.83	22.57	0.52
4.600	1.06	10.600	2.50	16.600	0.83	22.60	0.52
4.633	1.06	10.633	2.50	16.633	0.83	22.63	0.52
4.667	1.06	10.667	2.50	16.667	0.83	22.67	0.52
4.700	1.11	10.700	2.35	16.700	0.81	22.70	0.51
4.733	1.11	10.733	2.35	16.733	0.81	22.73	0.51
4.767	1.11	10.767	2.35	16.767	0.81	22.77	0.51
4.800	1.11	10.800	2.35	16.800	0.81	22.80	0.51
4.833	1.11	10.833	2.35	16.833	0.81	22.83	0.51
4.867	1.17	10.867	2.23	16.867	0.80	22.87	0.51
4.900	1.17	10.900	2.23	16.900	0.80	22.90	0.51
4.933	1.17	10.933	2.23	16.933	0.80	22.93	0.51
4.967	1.17	10.967	2.23	16.967	0.80	22.97	0.51
5.000	1.17	11.000	2.23	17.000	0.80	23.00	0.51
5.033	1.23	11.033	2.11	17.033	0.79	23.03	0.50
5.067	1.23	11.067	2.11	17.067	0.79	23.07	0.50
5.100	1.23	11.100	2.11	17.100	0.79	23.10	0.50
5.133	1.23	11.133	2.11	17.133	0.79	23.13	0.50
5.167	1.23	11.167	2.11	17.167	0.79	23.17	0.50
5.200	1.31	11.200	2.01	17.200	0.77	23.20	0.50
5.233	1.31	11.233	2.01	17.233	0.77	23.23	0.50
5.267	1.31	11.267	2.01	17.267	0.77	23.27	0.50
5.300	1.31	11.300	2.01	17.300	0.77	23.30	0.50
5.333	1.31	11.333	2.01	17.333	0.77	23.33	0.50
5.367	1.39	11.367	1.92	17.367	0.76	23.37	0.49
5.400	1.39	11.400	1.92	17.400	0.76	23.40	0.49
5.433	1.39	11.433	1.92	17.433	0.76	23.43	0.49
5.467	1.39	11.467	1.92	17.467	0.76	23.47	0.49
5.500	1.39	11.500	1.92	17.500	0.76	23.50	0.49
5.533	1.48	11.533	1.83	17.533	0.75	23.53	0.49
5.567	1.48	11.567	1.83	17.567	0.75	23.57	0.49
5.600	1.48	11.600	1.83	17.600	0.75	23.60	0.49
5.633	1.48	11.633	1.83	17.633	0.75	23.63	0.49
5.667	1.48	11.667	1.83	17.667	0.75	23.67	0.49
5.700	1.59	11.700	1.76	17.700	0.74	23.70	0.48
5.733	1.59	11.733	1.76	17.733	0.74	23.73	0.48
5.767	1.59	11.767	1.76	17.767	0.74	23.77	0.48
5.800	1.59	11.800	1.76	17.800	0.74	23.80	0.48
5.833	1.59	11.833	1.76	17.833	0.74	23.83	0.48
5.867	1.72	11.867	1.69	17.867	0.73	23.87	0.48

5.900	1.72	11.900	1.69	17.900	0.73	23.90	0.48
5.933	1.72	11.933	1.69	17.933	0.73	23.93	0.48
5.967	1.72	11.967	1.69	17.967	0.73	23.97	0.48
6.000	1.72	12.000	1.69	18.000	0.73	24.00	0.48

Max.Eff.Inten.(mm/hr)=	138.40	21.77	
over (min)	5.00	8.00	
Storage Coeff. (min)=	2.76 (ii)	6.44 (ii)	
Unit Hyd. Tpeak (min)=	4.00	8.00	
Unit Hyd. peak (cms)=	0.35	0.16	
			TOTALS
PEAK FLOW (cms)=	0.88	0.03	0.899 (iii)
TIME TO PEAK (hrs)=	8.00	8.07	8.00
RUNOFF VOLUME (mm)=	77.07	15.33	63.86
TOTAL RAINFALL (mm)=	78.08	78.08	78.08
RUNOFF COEFFICIENT =	0.99	0.20	0.82

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 48.0 Ia = Dep. 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(3001)|
| IN= 2---> OUT= 1 |
| DT= 2.0 min |

OVERFLOW IS OFF

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.0391	0.0880
0.0028	0.0061	0.0527	0.0958
0.0096	0.0158	0.0660	0.1032
0.0131	0.0255	0.0762	0.1100
0.0157	0.0350	0.0856	0.1159
0.0180	0.0443	0.0932	0.1209
0.0201	0.0535	0.1001	0.1256
0.0219	0.0625	0.1066	0.1304
0.0238	0.0713	0.1155	0.1376
0.0254	0.0798	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (1000)	2.998	0.899	8.00	63.86
OUTFLOW: ID= 1 (3001)	2.998	0.079	8.63	63.68

PEAK FLOW REDUCTION [Qout/Qin](%)= 8.76
TIME SHIFT OF PEAK FLOW (min)= 38.00
MAXIMUM STORAGE USED (ha.m.)= 0.1117

| CALIB |
| STANDHYD (1100)| Area (ha)= 0.09
|ID= 1 DT= 2.0 min | Total Imp(%)= 26.30 Dir. Conn.(%)= 26.30

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	0.02	0.07
Dep. Storage (mm)=	1.00	5.00
Average Slope (%)=	1.00	2.00
Length (m)=	25.17	40.00

Mannings n = 0.013 0.250

NOTE: RAINFALL WAS TRANSFORMED TO 2.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	' TIME ' hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.033	0.49	6.033	1.87	12.033	1.62	18.03	0.72
0.067	0.49	6.067	1.87	12.067	1.62	18.07	0.72
0.100	0.49	6.100	1.87	12.100	1.62	18.10	0.72
0.133	0.49	6.133	1.87	12.133	1.62	18.13	0.72
0.167	0.49	6.167	1.87	12.167	1.62	18.17	0.72
0.200	0.50	6.200	2.06	12.200	1.57	18.20	0.70
0.233	0.50	6.233	2.06	12.233	1.57	18.23	0.70
0.267	0.50	6.267	2.06	12.267	1.57	18.27	0.70
0.300	0.50	6.300	2.06	12.300	1.57	18.30	0.70
0.333	0.50	6.333	2.06	12.333	1.57	18.33	0.70
0.367	0.51	6.367	2.29	12.367	1.51	18.37	0.69
0.400	0.51	6.400	2.29	12.400	1.51	18.40	0.69
0.433	0.51	6.433	2.29	12.433	1.51	18.43	0.69
0.467	0.51	6.467	2.29	12.467	1.51	18.47	0.69
0.500	0.51	6.500	2.29	12.500	1.51	18.50	0.69
0.533	0.52	6.533	2.58	12.533	1.46	18.53	0.69
0.567	0.52	6.567	2.58	12.567	1.46	18.57	0.69
0.600	0.52	6.600	2.58	12.600	1.46	18.60	0.69
0.633	0.52	6.633	2.58	12.633	1.46	18.63	0.69
0.667	0.52	6.667	2.58	12.667	1.46	18.67	0.69
0.700	0.53	6.700	2.95	12.700	1.41	18.70	0.68
0.733	0.53	6.733	2.95	12.733	1.41	18.73	0.68
0.767	0.53	6.767	2.95	12.767	1.41	18.77	0.68
0.800	0.53	6.800	2.95	12.800	1.41	18.80	0.68
0.833	0.53	6.833	2.95	12.833	1.41	18.83	0.68
0.867	0.54	6.867	3.47	12.867	1.37	18.87	0.67
0.900	0.54	6.900	3.47	12.900	1.37	18.90	0.67
0.933	0.54	6.933	3.47	12.933	1.37	18.93	0.67
0.967	0.54	6.967	3.47	12.967	1.37	18.97	0.67
1.000	0.54	7.000	3.47	13.000	1.37	19.00	0.67
1.033	0.55	7.033	4.22	13.033	1.33	19.03	0.66
1.067	0.55	7.067	4.22	13.067	1.33	19.07	0.66
1.100	0.55	7.100	4.22	13.100	1.33	19.10	0.66
1.133	0.55	7.133	4.22	13.133	1.33	19.13	0.66
1.167	0.55	7.167	4.22	13.167	1.33	19.17	0.66
1.200	0.56	7.200	5.41	13.200	1.29	19.20	0.65
1.233	0.56	7.233	5.41	13.233	1.29	19.23	0.65
1.267	0.56	7.267	5.41	13.267	1.29	19.27	0.65
1.300	0.56	7.300	5.41	13.300	1.29	19.30	0.65
1.333	0.56	7.333	5.41	13.333	1.29	19.33	0.65
1.367	0.58	7.367	7.56	13.367	1.25	19.37	0.64
1.400	0.58	7.400	7.56	13.400	1.25	19.40	0.64
1.433	0.58	7.433	7.56	13.433	1.25	19.43	0.64
1.467	0.58	7.467	7.56	13.467	1.25	19.47	0.64
1.500	0.58	7.500	7.56	13.500	1.25	19.50	0.64
1.533	0.59	7.533	12.52	13.533	1.22	19.53	0.63
1.567	0.59	7.567	12.52	13.567	1.22	19.57	0.63
1.600	0.59	7.600	12.52	13.600	1.22	19.60	0.63
1.633	0.59	7.633	12.52	13.633	1.22	19.63	0.63
1.667	0.59	7.667	12.52	13.667	1.22	19.67	0.63
1.700	0.60	7.700	34.09	13.700	1.19	19.70	0.62
1.733	0.60	7.733	34.10	13.733	1.19	19.73	0.62
1.767	0.60	7.767	34.10	13.767	1.19	19.77	0.62

1.800	0.60	7.800	34.10	13.800	1.19	19.80	0.62
1.833	0.60	7.833	34.10	13.833	1.19	19.83	0.62
1.867	0.62	7.867	138.38	13.867	1.16	19.87	0.62
1.900	0.62	7.900	138.40	13.900	1.16	19.90	0.62
1.933	0.62	7.933	138.40	13.933	1.16	19.93	0.62
1.967	0.62	7.967	138.40	13.967	1.16	19.97	0.62
2.000	0.62	8.000	138.40	14.000	1.16	20.00	0.62
2.033	0.64	8.033	45.77	14.033	1.13	20.03	0.61
2.067	0.64	8.067	45.75	14.067	1.13	20.07	0.61
2.100	0.64	8.100	45.75	14.100	1.13	20.10	0.61
2.133	0.64	8.133	45.75	14.133	1.13	20.13	0.61
2.167	0.64	8.167	45.75	14.167	1.13	20.17	0.61
2.200	0.65	8.200	22.50	14.200	1.10	20.20	0.60
2.233	0.65	8.233	22.49	14.233	1.10	20.23	0.60
2.267	0.65	8.267	22.49	14.267	1.10	20.27	0.60
2.300	0.65	8.300	22.49	14.300	1.10	20.30	0.60
2.333	0.65	8.333	22.49	14.333	1.10	20.33	0.60
2.367	0.67	8.367	14.49	14.367	1.07	20.37	0.59
2.400	0.67	8.400	14.49	14.400	1.07	20.40	0.59
2.433	0.67	8.433	14.49	14.433	1.07	20.43	0.59
2.467	0.67	8.467	14.49	14.467	1.07	20.47	0.59
2.500	0.67	8.500	14.49	14.500	1.07	20.50	0.59
2.533	0.69	8.533	10.58	14.533	1.05	20.53	0.59
2.567	0.69	8.567	10.58	14.567	1.05	20.57	0.59
2.600	0.69	8.600	10.58	14.600	1.05	20.60	0.59
2.633	0.69	8.633	10.58	14.633	1.05	20.63	0.59
2.667	0.69	8.667	10.58	14.667	1.05	20.67	0.59
2.700	0.71	8.700	8.31	14.700	1.03	20.70	0.58
2.733	0.71	8.733	8.31	14.733	1.03	20.73	0.58
2.767	0.71	8.767	8.31	14.767	1.03	20.77	0.58
2.800	0.71	8.800	8.31	14.800	1.03	20.80	0.58
2.833	0.71	8.833	8.31	14.833	1.03	20.83	0.58
2.867	0.73	8.867	6.83	14.867	1.00	20.87	0.57
2.900	0.73	8.900	6.83	14.900	1.00	20.90	0.57
2.933	0.73	8.933	6.83	14.933	1.00	20.93	0.57
2.967	0.73	8.967	6.83	14.967	1.00	20.97	0.57
3.000	0.73	9.000	6.83	15.000	1.00	21.00	0.57
3.033	0.75	9.033	5.80	15.033	0.98	21.03	0.57
3.067	0.75	9.067	5.80	15.067	0.98	21.07	0.57
3.100	0.75	9.100	5.80	15.100	0.98	21.10	0.57
3.133	0.75	9.133	5.80	15.133	0.98	21.13	0.57
3.167	0.75	9.167	5.80	15.167	0.98	21.17	0.57
3.200	0.78	9.200	5.04	15.200	0.96	21.20	0.56
3.233	0.78	9.233	5.04	15.233	0.96	21.23	0.56
3.267	0.78	9.267	5.04	15.267	0.96	21.27	0.56
3.300	0.78	9.300	5.04	15.300	0.96	21.30	0.56
3.333	0.78	9.333	5.04	15.333	0.96	21.33	0.56
3.367	0.80	9.367	4.46	15.367	0.94	21.37	0.56
3.400	0.80	9.400	4.46	15.400	0.94	21.40	0.56
3.433	0.80	9.433	4.46	15.433	0.94	21.43	0.56
3.467	0.80	9.467	4.46	15.467	0.94	21.47	0.56
3.500	0.80	9.500	4.46	15.500	0.94	21.50	0.56
3.533	0.83	9.533	4.00	15.533	0.92	21.53	0.55
3.567	0.83	9.567	4.00	15.567	0.92	21.57	0.55
3.600	0.83	9.600	4.00	15.600	0.92	21.60	0.55
3.633	0.83	9.633	4.00	15.633	0.92	21.63	0.55
3.667	0.83	9.667	4.00	15.667	0.92	21.67	0.55
3.700	0.86	9.700	3.63	15.700	0.91	21.70	0.54
3.733	0.86	9.733	3.63	15.733	0.91	21.73	0.54
3.767	0.86	9.767	3.63	15.767	0.91	21.77	0.54
3.800	0.86	9.800	3.63	15.800	0.91	21.80	0.54

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 3.833    0.86 | 9.833    3.63 |15.833    0.91 | 21.83    0.54
 3.867    0.90 | 9.867    3.32 |15.867    0.89 | 21.87    0.54
 3.900    0.90 | 9.900    3.32 |15.900    0.89 | 21.90    0.54
 3.933    0.90 | 9.933    3.32 |15.933    0.89 | 21.93    0.54
 3.967    0.90 | 9.967    3.32 |15.967    0.89 | 21.97    0.54
 4.000    0.90 |10.000    3.32 |16.000    0.89 | 22.00    0.54
 4.033    0.93 |10.033    3.07 |16.033    0.87 | 22.03    0.53
 4.067    0.93 |10.067    3.07 |16.067    0.87 | 22.07    0.53
 4.100    0.93 |10.100    3.07 |16.100    0.87 | 22.10    0.53
 4.133    0.93 |10.133    3.07 |16.133    0.87 | 22.13    0.53
 4.167    0.93 |10.167    3.07 |16.167    0.87 | 22.17    0.53
 4.200    0.97 |10.200    2.85 |16.200    0.86 | 22.20    0.53
 4.233    0.97 |10.233    2.85 |16.233    0.86 | 22.23    0.53
 4.267    0.97 |10.267    2.85 |16.267    0.86 | 22.27    0.53
 4.300    0.97 |10.300    2.85 |16.300    0.86 | 22.30    0.53
 4.333    0.97 |10.333    2.85 |16.333    0.86 | 22.33    0.53
 4.367    1.01 |10.367    2.66 |16.367    0.84 | 22.37    0.52
 4.400    1.01 |10.400    2.66 |16.400    0.84 | 22.40    0.52
 4.433    1.01 |10.433    2.66 |16.433    0.84 | 22.43    0.52
 4.467    1.01 |10.467    2.66 |16.467    0.84 | 22.47    0.52
 4.500    1.01 |10.500    2.66 |16.500    0.84 | 22.50    0.52
 4.533    1.06 |10.533    2.50 |16.533    0.83 | 22.53    0.52
 4.567    1.06 |10.567    2.50 |16.567    0.83 | 22.57    0.52
 4.600    1.06 |10.600    2.50 |16.600    0.83 | 22.60    0.52
 4.633    1.06 |10.633    2.50 |16.633    0.83 | 22.63    0.52
 4.667    1.06 |10.667    2.50 |16.667    0.83 | 22.67    0.52
 4.700    1.11 |10.700    2.35 |16.700    0.81 | 22.70    0.51
 4.733    1.11 |10.733    2.35 |16.733    0.81 | 22.73    0.51
 4.767    1.11 |10.767    2.35 |16.767    0.81 | 22.77    0.51
 4.800    1.11 |10.800    2.35 |16.800    0.81 | 22.80    0.51
 4.833    1.11 |10.833    2.35 |16.833    0.81 | 22.83    0.51
 4.867    1.17 |10.867    2.23 |16.867    0.80 | 22.87    0.51
 4.900    1.17 |10.900    2.23 |16.900    0.80 | 22.90    0.51
 4.933    1.17 |10.933    2.23 |16.933    0.80 | 22.93    0.51
 4.967    1.17 |10.967    2.23 |16.967    0.80 | 22.97    0.51
 5.000    1.17 |11.000    2.23 |17.000    0.80 | 23.00    0.51
 5.033    1.23 |11.033    2.11 |17.033    0.79 | 23.03    0.50
 5.067    1.23 |11.067    2.11 |17.067    0.79 | 23.07    0.50
 5.100    1.23 |11.100    2.11 |17.100    0.79 | 23.10    0.50
 5.133    1.23 |11.133    2.11 |17.133    0.79 | 23.13    0.50
 5.167    1.23 |11.167    2.11 |17.167    0.79 | 23.17    0.50
 5.200    1.31 |11.200    2.01 |17.200    0.77 | 23.20    0.50
 5.233    1.31 |11.233    2.01 |17.233    0.77 | 23.23    0.50
 5.267    1.31 |11.267    2.01 |17.267    0.77 | 23.27    0.50
 5.300    1.31 |11.300    2.01 |17.300    0.77 | 23.30    0.50
 5.333    1.31 |11.333    2.01 |17.333    0.77 | 23.33    0.50
 5.367    1.39 |11.367    1.92 |17.367    0.76 | 23.37    0.49
 5.400    1.39 |11.400    1.92 |17.400    0.76 | 23.40    0.49
 5.433    1.39 |11.433    1.92 |17.433    0.76 | 23.43    0.49
 5.467    1.39 |11.467    1.92 |17.467    0.76 | 23.47    0.49
 5.500    1.39 |11.500    1.92 |17.500    0.76 | 23.50    0.49
 5.533    1.48 |11.533    1.83 |17.533    0.75 | 23.53    0.49
 5.567    1.48 |11.567    1.83 |17.567    0.75 | 23.57    0.49
 5.600    1.48 |11.600    1.83 |17.600    0.75 | 23.60    0.49
 5.633    1.48 |11.633    1.83 |17.633    0.75 | 23.63    0.49
 5.667    1.48 |11.667    1.83 |17.667    0.75 | 23.67    0.49
 5.700    1.59 |11.700    1.76 |17.700    0.74 | 23.70    0.48
 5.733    1.59 |11.733    1.76 |17.733    0.74 | 23.73    0.48
 5.767    1.59 |11.767    1.76 |17.767    0.74 | 23.77    0.48
 5.800    1.59 |11.800    1.76 |17.800    0.74 | 23.80    0.48
 5.833    1.59 |11.833    1.76 |17.833    0.74 | 23.83    0.48
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 5.867    1.72 |11.867    1.69 |17.867    0.73 | 23.87    0.48
 5.900    1.72 |11.900    1.69 |17.900    0.73 | 23.90    0.48
 5.933    1.72 |11.933    1.69 |17.933    0.73 | 23.93    0.48
 5.967    1.72 |11.967    1.69 |17.967    0.73 | 23.97    0.48
 6.000    1.72 |12.000    1.69 |18.000    0.73 | 24.00    0.48

     Max.Eff.Inten.(mm/hr)=     138.40        18.52
                over (min)        5.00        16.00
     Storage Coeff.  (min)=       0.98 (ii)   14.84 (ii)
     Unit Hyd. Tpeak (min)=       4.00        16.00
     Unit Hyd. peak  (cms)=       0.52         0.07
                                                       *TOTALS*
     PEAK FLOW       (cms)=       0.01         0.00      0.010 (iii)
     TIME TO PEAK    (hrs)=       8.00         8.23        8.00
     RUNOFF VOLUME    (mm)=      77.08        15.33       29.76
     TOTAL RAINFALL   (mm)=      78.08        78.08       78.08
     RUNOFF COEFFICIENT   =       0.99         0.20        0.38

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  48.0    Ia = Dep. 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  (  2002)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  1100):     0.09    0.010     8.00    29.76
      + ID2= 2 (  3001):     3.00    0.079     8.63    63.68
        ==================================================
        ID = 3 (  2002):     3.09    0.081     8.60    62.64

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

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2001)
       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 6.2\VO2\voin.dat
```



```
  Output  filename:
C:\Users\zhouj\AppData\Local\Civica\VH5\642fa701-08f9-4281-a674-e9ad409f1aac\a92579
ec-bc32-4a33-92cc-64283f350c2b\scenar
  Summary filename:
C:\Users\zhouj\AppData\Local\Civica\VH5\642fa701-08f9-4281-a674-e9ad409f1aac\a92579
ec-bc32-4a33-92cc-64283f350c2b\scenar


DATE: 09-13-2023                           TIME: 11:19:07

USER:


COMMENTS: ____________________________________________________________

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  ************************************************
  ** SIMULATION : Run 05                        **
  ************************************************


--------------------
| CHICAGO STORM    |     IDF curve parameters: A=1973.100
| Ptotal= 85.42 mm |                           B=   9.000
--------------------                           C=   0.868
                         used in:   INTENSITY =  A / (t + B)^C

                         Duration of storm  = 24.00 hrs
                         Storm time step    = 10.00 min
                         Time to peak ratio =  0.33

                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                 0.17    0.50 |  6.17    1.98 | 12.17    1.71 | 18.17    0.74
                 0.33    0.51 |  6.33    2.18 | 12.33    1.64 | 18.33    0.73
                 0.50    0.52 |  6.50    2.43 | 12.50    1.58 | 18.50    0.72
                 0.67    0.53 |  6.67    2.74 | 12.67    1.53 | 18.67    0.71
                 0.83    0.54 |  6.83    3.16 | 12.83    1.48 | 18.83    0.70
                 1.00    0.55 |  7.00    3.73 | 13.00    1.43 | 19.00    0.69
                 1.17    0.57 |  7.17    4.57 | 13.17    1.39 | 19.17    0.68
                 1.33    0.58 |  7.33    5.90 | 13.33    1.35 | 19.33    0.67
                 1.50    0.59 |  7.50    8.33 | 13.50    1.31 | 19.50    0.66
                 1.67    0.61 |  7.67   13.99 | 13.67    1.27 | 19.67    0.65
                 1.83    0.62 |  7.83   38.66 | 13.83    1.24 | 19.83    0.64
                 2.00    0.64 |  8.00  153.18 | 14.00    1.20 | 20.00    0.63
                 2.17    0.65 |  8.17   51.95 | 14.17    1.17 | 20.17    0.63
                 2.33    0.67 |  8.33   25.44 | 14.33    1.14 | 20.33    0.62
                 2.50    0.69 |  8.50   16.25 | 14.50    1.12 | 20.50    0.61
                 2.67    0.71 |  8.67   11.77 | 14.67    1.09 | 20.67    0.60
                 2.83    0.73 |  8.83    9.18 | 14.83    1.07 | 20.83    0.60
                 3.00    0.75 |  9.00    7.50 | 15.00    1.04 | 21.00    0.59
                 3.17    0.78 |  9.17    6.33 | 15.17    1.02 | 21.17    0.58
                 3.33    0.80 |  9.33    5.48 | 15.33    1.00 | 21.33    0.58
                 3.50    0.83 |  9.50    4.83 | 15.50    0.98 | 21.50    0.57
                 3.67    0.86 |  9.67    4.32 | 15.67    0.96 | 21.67    0.56
                 3.83    0.89 |  9.83    3.91 | 15.83    0.94 | 21.83    0.56
                 4.00    0.93 | 10.00    3.57 | 16.00    0.92 | 22.00    0.55
                 4.17    0.97 | 10.17    3.28 | 16.17    0.90 | 22.17    0.55
```



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                 4.33    1.01 | 10.33    3.04 | 16.33    0.89 | 22.33    0.54
                 4.50    1.05 | 10.50    2.84 | 16.50    0.87 | 22.50    0.53
                 4.67    1.10 | 10.67    2.66 | 16.67    0.85 | 22.67    0.53
                 4.83    1.16 | 10.83    2.50 | 16.83    0.84 | 22.83    0.52
                 5.00    1.22 | 11.00    2.36 | 17.00    0.82 | 23.00    0.52
                 5.17    1.29 | 11.17    2.24 | 17.17    0.81 | 23.17    0.51
                 5.33    1.36 | 11.33    2.12 | 17.33    0.80 | 23.33    0.51
                 5.50    1.45 | 11.50    2.02 | 17.50    0.78 | 23.50    0.50
                 5.67    1.55 | 11.67    1.93 | 17.67    0.77 | 23.67    0.50
                 5.83    1.67 | 11.83    1.85 | 17.83    0.76 | 23.83    0.49
                 6.00    1.81 | 12.00    1.78 | 18.00    0.75 | 24.00    0.49


-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  1000)|   Area    (ha)=   3.00
|ID= 1 DT= 2.0 min |   Total Imp(%)=  78.60   Dir. Conn.(%)=  78.60
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.36         0.64
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     141.37        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   2.0 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
                0.033    0.50 | 6.033    1.98 |12.033    1.71 | 18.03    0.74
                0.067    0.50 | 6.067    1.98 |12.067    1.71 | 18.07    0.74
                0.100    0.50 | 6.100    1.98 |12.100    1.71 | 18.10    0.74
                0.133    0.50 | 6.133    1.98 |12.133    1.71 | 18.13    0.74
                0.167    0.50 | 6.167    1.98 |12.167    1.71 | 18.17    0.74
                0.200    0.51 | 6.200    2.18 |12.200    1.64 | 18.20    0.73
                0.233    0.51 | 6.233    2.18 |12.233    1.64 | 18.23    0.73
                0.267    0.51 | 6.267    2.18 |12.267    1.64 | 18.27    0.73
                0.300    0.51 | 6.300    2.18 |12.300    1.64 | 18.30    0.73
                0.333    0.51 | 6.333    2.18 |12.333    1.64 | 18.33    0.73
                0.367    0.52 | 6.367    2.43 |12.367    1.58 | 18.37    0.72
                0.400    0.52 | 6.400    2.43 |12.400    1.58 | 18.40    0.72
                0.433    0.52 | 6.433    2.43 |12.433    1.58 | 18.43    0.72
                0.467    0.52 | 6.467    2.43 |12.467    1.58 | 18.47    0.72
                0.500    0.52 | 6.500    2.43 |12.500    1.58 | 18.50    0.72
                0.533    0.53 | 6.533    2.74 |12.533    1.53 | 18.53    0.71
                0.567    0.53 | 6.567    2.74 |12.567    1.53 | 18.57    0.71
                0.600    0.53 | 6.600    2.74 |12.600    1.53 | 18.60    0.71
                0.633    0.53 | 6.633    2.74 |12.633    1.53 | 18.63    0.71
                0.667    0.53 | 6.667    2.74 |12.667    1.53 | 18.67    0.71
                0.700    0.54 | 6.700    3.16 |12.700    1.48 | 18.70    0.70
                0.733    0.54 | 6.733    3.16 |12.733    1.48 | 18.73    0.70
                0.767    0.54 | 6.767    3.16 |12.767    1.48 | 18.77    0.70
                0.800    0.54 | 6.800    3.16 |12.800    1.48 | 18.80    0.70
                0.833    0.54 | 6.833    3.16 |12.833    1.48 | 18.83    0.70
                0.867    0.55 | 6.867    3.73 |12.867    1.43 | 18.87    0.69
                0.900    0.55 | 6.900    3.73 |12.900    1.43 | 18.90    0.69
                0.933    0.55 | 6.933    3.73 |12.933    1.43 | 18.93    0.69
                0.967    0.55 | 6.967    3.73 |12.967    1.43 | 18.97    0.69
```

1.000	0.55	7.000	3.73	13.000	1.43	19.00	0.69
1.033	0.57	7.033	4.57	13.033	1.39	19.03	0.68
1.067	0.57	7.067	4.57	13.067	1.39	19.07	0.68
1.100	0.57	7.100	4.57	13.100	1.39	19.10	0.68
1.133	0.57	7.133	4.57	13.133	1.39	19.13	0.68
1.167	0.57	7.167	4.57	13.167	1.39	19.17	0.68
1.200	0.58	7.200	5.90	13.200	1.35	19.20	0.67
1.233	0.58	7.233	5.90	13.233	1.35	19.23	0.67
1.267	0.58	7.267	5.90	13.267	1.35	19.27	0.67
1.300	0.58	7.300	5.90	13.300	1.35	19.30	0.67
1.333	0.58	7.333	5.90	13.333	1.35	19.33	0.67
1.367	0.59	7.367	8.33	13.367	1.31	19.37	0.66
1.400	0.59	7.400	8.33	13.400	1.31	19.40	0.66
1.433	0.59	7.433	8.33	13.433	1.31	19.43	0.66
1.467	0.59	7.467	8.33	13.467	1.31	19.47	0.66
1.500	0.59	7.500	8.33	13.500	1.31	19.50	0.66
1.533	0.61	7.533	13.99	13.533	1.27	19.53	0.65
1.567	0.61	7.567	13.99	13.567	1.27	19.57	0.65
1.600	0.61	7.600	13.99	13.600	1.27	19.60	0.65
1.633	0.61	7.633	13.99	13.633	1.27	19.63	0.65
1.667	0.61	7.667	13.99	13.667	1.27	19.67	0.65
1.700	0.62	7.700	38.66	13.700	1.24	19.70	0.64
1.733	0.62	7.733	38.66	13.733	1.24	19.73	0.64
1.767	0.62	7.767	38.66	13.767	1.24	19.77	0.64
1.800	0.62	7.800	38.66	13.800	1.24	19.80	0.64
1.833	0.62	7.833	38.66	13.833	1.24	19.83	0.64
1.867	0.64	7.867	153.15	13.867	1.20	19.87	0.63
1.900	0.64	7.900	153.18	13.900	1.20	19.90	0.63
1.933	0.64	7.933	153.18	13.933	1.20	19.93	0.63
1.967	0.64	7.967	153.18	13.967	1.20	19.97	0.63
2.000	0.64	8.000	153.18	14.000	1.20	20.00	0.63
2.033	0.65	8.033	51.97	14.033	1.17	20.03	0.63
2.067	0.65	8.067	51.95	14.067	1.17	20.07	0.63
2.100	0.65	8.100	51.95	14.100	1.17	20.10	0.63
2.133	0.65	8.133	51.95	14.133	1.17	20.13	0.63
2.167	0.65	8.167	51.95	14.167	1.17	20.17	0.63
2.200	0.67	8.200	25.44	14.200	1.14	20.20	0.62
2.233	0.67	8.233	25.44	14.233	1.14	20.23	0.62
2.267	0.67	8.267	25.44	14.267	1.14	20.27	0.62
2.300	0.67	8.300	25.44	14.300	1.14	20.30	0.62
2.333	0.67	8.333	25.44	14.333	1.14	20.33	0.62
2.367	0.69	8.367	16.25	14.367	1.12	20.37	0.61
2.400	0.69	8.400	16.25	14.400	1.12	20.40	0.61
2.433	0.69	8.433	16.25	14.433	1.12	20.43	0.61
2.467	0.69	8.467	16.25	14.467	1.12	20.47	0.61
2.500	0.69	8.500	16.25	14.500	1.12	20.50	0.61
2.533	0.71	8.533	11.78	14.533	1.09	20.53	0.60
2.567	0.71	8.567	11.77	14.567	1.09	20.57	0.60
2.600	0.71	8.600	11.77	14.600	1.09	20.60	0.60
2.633	0.71	8.633	11.77	14.633	1.09	20.63	0.60
2.667	0.71	8.667	11.77	14.667	1.09	20.67	0.60
2.700	0.73	8.700	9.18	14.700	1.07	20.70	0.60
2.733	0.73	8.733	9.18	14.733	1.07	20.73	0.60
2.767	0.73	8.767	9.18	14.767	1.07	20.77	0.60
2.800	0.73	8.800	9.18	14.800	1.07	20.80	0.60
2.833	0.73	8.833	9.18	14.833	1.07	20.83	0.60
2.867	0.75	8.867	7.50	14.867	1.04	20.87	0.59
2.900	0.75	8.900	7.50	14.900	1.04	20.90	0.59
2.933	0.75	8.933	7.50	14.933	1.04	20.93	0.59
2.967	0.75	8.967	7.50	14.967	1.04	20.97	0.59
3.000	0.75	9.000	7.50	15.000	1.04	21.00	0.59

3.033	0.78	9.033	6.33	15.033	1.02	21.03	0.58
3.067	0.78	9.067	6.33	15.067	1.02	21.07	0.58
3.100	0.78	9.100	6.33	15.100	1.02	21.10	0.58
3.133	0.78	9.133	6.33	15.133	1.02	21.13	0.58
3.167	0.78	9.167	6.33	15.167	1.02	21.17	0.58
3.200	0.80	9.200	5.48	15.200	1.00	21.20	0.58
3.233	0.80	9.233	5.48	15.233	1.00	21.23	0.58
3.267	0.80	9.267	5.48	15.267	1.00	21.27	0.58
3.300	0.80	9.300	5.48	15.300	1.00	21.30	0.58
3.333	0.80	9.333	5.48	15.333	1.00	21.33	0.58
3.367	0.83	9.367	4.83	15.367	0.98	21.37	0.57
3.400	0.83	9.400	4.83	15.400	0.98	21.40	0.57
3.433	0.83	9.433	4.83	15.433	0.98	21.43	0.57
3.467	0.83	9.467	4.83	15.467	0.98	21.47	0.57
3.500	0.83	9.500	4.83	15.500	0.98	21.50	0.57
3.533	0.86	9.533	4.32	15.533	0.96	21.53	0.56
3.567	0.86	9.567	4.32	15.567	0.96	21.57	0.56
3.600	0.86	9.600	4.32	15.600	0.96	21.60	0.56
3.633	0.86	9.633	4.32	15.633	0.96	21.63	0.56
3.667	0.86	9.667	4.32	15.667	0.96	21.67	0.56
3.700	0.89	9.700	3.91	15.700	0.94	21.70	0.56
3.733	0.89	9.733	3.91	15.733	0.94	21.73	0.56
3.767	0.89	9.767	3.91	15.767	0.94	21.77	0.56
3.800	0.89	9.800	3.91	15.800	0.94	21.80	0.56
3.833	0.89	9.833	3.91	15.833	0.94	21.83	0.56
3.867	0.93	9.867	3.57	15.867	0.92	21.87	0.55
3.900	0.93	9.900	3.57	15.900	0.92	21.90	0.55
3.933	0.93	9.933	3.57	15.933	0.92	21.93	0.55
3.967	0.93	9.967	3.57	15.967	0.92	21.97	0.55
4.000	0.93	10.000	3.57	16.000	0.92	22.00	0.55
4.033	0.97	10.033	3.28	16.033	0.90	22.03	0.55
4.067	0.97	10.067	3.28	16.067	0.90	22.07	0.55
4.100	0.97	10.100	3.28	16.100	0.90	22.10	0.55
4.133	0.97	10.133	3.28	16.133	0.90	22.13	0.55
4.167	0.97	10.167	3.28	16.167	0.90	22.17	0.55
4.200	1.01	10.200	3.04	16.200	0.89	22.20	0.54
4.233	1.01	10.233	3.04	16.233	0.89	22.23	0.54
4.267	1.01	10.267	3.04	16.267	0.89	22.27	0.54
4.300	1.01	10.300	3.04	16.300	0.89	22.30	0.54
4.333	1.01	10.333	3.04	16.333	0.89	22.33	0.54
4.367	1.05	10.367	2.84	16.367	0.87	22.37	0.53
4.400	1.05	10.400	2.84	16.400	0.87	22.40	0.53
4.433	1.05	10.433	2.84	16.433	0.87	22.43	0.53
4.467	1.05	10.467	2.84	16.467	0.87	22.47	0.53
4.500	1.05	10.500	2.84	16.500	0.87	22.50	0.53
4.533	1.10	10.533	2.66	16.533	0.85	22.53	0.53
4.567	1.10	10.567	2.66	16.567	0.85	22.57	0.53
4.600	1.10	10.600	2.66	16.600	0.85	22.60	0.53
4.633	1.10	10.633	2.66	16.633	0.85	22.63	0.53
4.667	1.10	10.667	2.66	16.667	0.85	22.67	0.53
4.700	1.16	10.700	2.50	16.700	0.84	22.70	0.52
4.733	1.16	10.733	2.50	16.733	0.84	22.73	0.52
4.767	1.16	10.767	2.50	16.767	0.84	22.77	0.52
4.800	1.16	10.800	2.50	16.800	0.84	22.80	0.52
4.833	1.16	10.833	2.50	16.833	0.84	22.83	0.52
4.867	1.22	10.867	2.36	16.867	0.82	22.87	0.52
4.900	1.22	10.900	2.36	16.900	0.82	22.90	0.52
4.933	1.22	10.933	2.36	16.933	0.82	22.93	0.52
4.967	1.22	10.967	2.36	16.967	0.82	22.97	0.52
5.000	1.22	11.000	2.36	17.000	0.82	23.00	0.52
5.033	1.29	11.033	2.24	17.033	0.81	23.03	0.51

5.067	1.29	11.067	2.24	17.067	0.81	23.07	0.51
5.100	1.29	11.100	2.24	17.100	0.81	23.10	0.51
5.133	1.29	11.133	2.24	17.133	0.81	23.13	0.51
5.167	1.29	11.167	2.24	17.167	0.81	23.17	0.51
5.200	1.36	11.200	2.12	17.200	0.80	23.20	0.51
5.233	1.36	11.233	2.12	17.233	0.80	23.23	0.51
5.267	1.36	11.267	2.12	17.267	0.80	23.27	0.51
5.300	1.36	11.300	2.12	17.300	0.80	23.30	0.51
5.333	1.36	11.333	2.12	17.333	0.80	23.33	0.51
5.367	1.45	11.367	2.02	17.367	0.78	23.37	0.50
5.400	1.45	11.400	2.02	17.400	0.78	23.40	0.50
5.433	1.45	11.433	2.02	17.433	0.78	23.43	0.50
5.467	1.45	11.467	2.02	17.467	0.78	23.47	0.50
5.500	1.45	11.500	2.02	17.500	0.78	23.50	0.50
5.533	1.55	11.533	1.93	17.533	0.77	23.53	0.50
5.567	1.55	11.567	1.93	17.567	0.77	23.57	0.50
5.600	1.55	11.600	1.93	17.600	0.77	23.60	0.50
5.633	1.55	11.633	1.93	17.633	0.77	23.63	0.50
5.667	1.55	11.667	1.93	17.667	0.77	23.67	0.50
5.700	1.67	11.700	1.85	17.700	0.76	23.70	0.49
5.733	1.67	11.733	1.85	17.733	0.76	23.73	0.49
5.767	1.67	11.767	1.85	17.767	0.76	23.77	0.49
5.800	1.67	11.800	1.85	17.800	0.76	23.80	0.49
5.833	1.67	11.833	1.85	17.833	0.76	23.83	0.49
5.867	1.81	11.867	1.78	17.867	0.75	23.87	0.49
5.900	1.81	11.900	1.78	17.900	0.75	23.90	0.49
5.933	1.81	11.933	1.78	17.933	0.75	23.93	0.49
5.967	1.81	11.967	1.78	17.967	0.75	23.97	0.49
6.000	1.81	12.000	1.78	18.000	0.75	24.00	0.49

```
Max.Eff.Inten.(mm/hr)=     153.18         26.48
           over (min)        5.00          8.00
Storage Coeff.  (min)=       2.65 (ii)     6.19 (ii)
Unit Hyd. Tpeak (min)=       4.00          8.00
Unit Hyd. peak  (cms)=       0.36          0.17
                                                     *TOTALS*
PEAK FLOW       (cms)=       0.97          0.04        1.003 (iii)
TIME TO PEAK    (hrs)=       8.00          8.07         8.00
RUNOFF VOLUME    (mm)=      84.42         18.19        70.24
TOTAL RAINFALL   (mm)=      85.42         85.42        85.42
RUNOFF COEFFICIENT   =       0.99          0.21         0.82


  (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
       CN*  =  48.0    Ia = Dep. 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(  3001)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  2.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
```

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.0391	0.0880
0.0028	0.0061	0.0527	0.0958
0.0096	0.0158	0.0660	0.1032
0.0131	0.0255	0.0762	0.1100
0.0157	0.0350	0.0856	0.1159
0.0180	0.0443	0.0932	0.1209

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0201	0.0535	0.1001	0.1256
0.0219	0.0625	0.1066	0.1304
0.0238	0.0713	0.1155	0.1376
0.0254	0.0798	0.0000	0.0000

```
                             AREA     QPEAK     TPEAK       R.V.
                             (ha)     (cms)     (hrs)       (mm)
INFLOW : ID= 2 (  1000)      2.998     1.003      8.00      70.24
OUTFLOW: ID= 1 (  3001)      2.998     0.096      8.57      70.06

              PEAK   FLOW   REDUCTION [Qout/Qin](%)=  9.56
              TIME SHIFT OF PEAK FLOW         (min)= 34.00
              MAXIMUM  STORAGE   USED       (ha.m.)=  0.1228

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--------------------
| CALIB            |
| STANDHYD (  1100)|   Area    (ha)=   0.09
|ID= 1 DT= 2.0 min |   Total Imp(%)=  26.30   Dir. Conn.(%)=  26.30
--------------------
                          IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=      0.02          0.07
    Dep. Storage     (mm)=      1.00          5.00
    Average Slope     (%)=      1.00          2.00
    Length            (m)=     25.17         40.00
    Mannings n          =      0.013         0.250

        NOTE:  RAINFALL WAS TRANSFORMED TO   2.0 MIN. TIME STEP.
```

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	' TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.033	0.50	6.033	1.98	12.033	1.71	18.03	0.74
0.067	0.50	6.067	1.98	12.067	1.71	18.07	0.74
0.100	0.50	6.100	1.98	12.100	1.71	18.10	0.74
0.133	0.50	6.133	1.98	12.133	1.71	18.13	0.74
0.167	0.50	6.167	1.98	12.167	1.71	18.17	0.74
0.200	0.51	6.200	2.18	12.200	1.64	18.20	0.73
0.233	0.51	6.233	2.18	12.233	1.64	18.23	0.73
0.267	0.51	6.267	2.18	12.267	1.64	18.27	0.73
0.300	0.51	6.300	2.18	12.300	1.64	18.30	0.73
0.333	0.51	6.333	2.18	12.333	1.64	18.33	0.73
0.367	0.52	6.367	2.43	12.367	1.58	18.37	0.72
0.400	0.52	6.400	2.43	12.400	1.58	18.40	0.72
0.433	0.52	6.433	2.43	12.433	1.58	18.43	0.72
0.467	0.52	6.467	2.43	12.467	1.58	18.47	0.72
0.500	0.52	6.500	2.43	12.500	1.58	18.50	0.72
0.533	0.53	6.533	2.74	12.533	1.53	18.53	0.71
0.567	0.53	6.567	2.74	12.567	1.53	18.57	0.71
0.600	0.53	6.600	2.74	12.600	1.53	18.60	0.71
0.633	0.53	6.633	2.74	12.633	1.53	18.63	0.71
0.667	0.53	6.667	2.74	12.667	1.53	18.67	0.71
0.700	0.54	6.700	3.16	12.700	1.48	18.70	0.70
0.733	0.54	6.733	3.16	12.733	1.48	18.73	0.70
0.767	0.54	6.767	3.16	12.767	1.48	18.77	0.70
0.800	0.54	6.800	3.16	12.800	1.48	18.80	0.70
0.833	0.54	6.833	3.16	12.833	1.48	18.83	0.70
0.867	0.55	6.867	3.73	12.867	1.43	18.87	0.69
0.900	0.55	6.900	3.73	12.900	1.43	18.90	0.69
0.933	0.55	6.933	3.73	12.933	1.43	18.93	0.69

0.967	0.55	6.967	3.73	12.967	1.43	18.97	0.69
1.000	0.55	7.000	3.73	13.000	1.43	19.00	0.69
1.033	0.57	7.033	4.57	13.033	1.39	19.03	0.68
1.067	0.57	7.067	4.57	13.067	1.39	19.07	0.68
1.100	0.57	7.100	4.57	13.100	1.39	19.10	0.68
1.133	0.57	7.133	4.57	13.133	1.39	19.13	0.68
1.167	0.57	7.167	4.57	13.167	1.39	19.17	0.68
1.200	0.58	7.200	5.90	13.200	1.35	19.20	0.67
1.233	0.58	7.233	5.90	13.233	1.35	19.23	0.67
1.267	0.58	7.267	5.90	13.267	1.35	19.27	0.67
1.300	0.58	7.300	5.90	13.300	1.35	19.30	0.67
1.333	0.58	7.333	5.90	13.333	1.35	19.33	0.67
1.367	0.59	7.367	8.33	13.367	1.31	19.37	0.66
1.400	0.59	7.400	8.33	13.400	1.31	19.40	0.66
1.433	0.59	7.433	8.33	13.433	1.31	19.43	0.66
1.467	0.59	7.467	8.33	13.467	1.31	19.47	0.66
1.500	0.59	7.500	8.33	13.500	1.31	19.50	0.66
1.533	0.61	7.533	13.99	13.533	1.27	19.53	0.65
1.567	0.61	7.567	13.99	13.567	1.27	19.57	0.65
1.600	0.61	7.600	13.99	13.600	1.27	19.60	0.65
1.633	0.61	7.633	13.99	13.633	1.27	19.63	0.65
1.667	0.61	7.667	13.99	13.667	1.27	19.67	0.65
1.700	0.62	7.700	38.66	13.700	1.24	19.70	0.64
1.733	0.62	7.733	38.66	13.733	1.24	19.73	0.64
1.767	0.62	7.767	38.66	13.767	1.24	19.77	0.64
1.800	0.62	7.800	38.66	13.800	1.24	19.80	0.64
1.833	0.62	7.833	38.66	13.833	1.24	19.83	0.64
1.867	0.64	7.867	153.15	13.867	1.20	19.87	0.63
1.900	0.64	7.900	153.18	13.900	1.20	19.90	0.63
1.933	0.64	7.933	153.18	13.933	1.20	19.93	0.63
1.967	0.64	7.967	153.18	13.967	1.20	19.97	0.63
2.000	0.64	8.000	153.18	14.000	1.20	20.00	0.63
2.033	0.65	8.033	51.97	14.033	1.17	20.03	0.63
2.067	0.65	8.067	51.95	14.067	1.17	20.07	0.63
2.100	0.65	8.100	51.95	14.100	1.17	20.10	0.63
2.133	0.65	8.133	51.95	14.133	1.17	20.13	0.63
2.167	0.65	8.167	51.95	14.167	1.17	20.17	0.63
2.200	0.67	8.200	25.44	14.200	1.14	20.20	0.62
2.233	0.67	8.233	25.44	14.233	1.14	20.23	0.62
2.267	0.67	8.267	25.44	14.267	1.14	20.27	0.62
2.300	0.67	8.300	25.44	14.300	1.14	20.30	0.62
2.333	0.67	8.333	25.44	14.333	1.14	20.33	0.62
2.367	0.69	8.367	16.25	14.367	1.12	20.37	0.61
2.400	0.69	8.400	16.25	14.400	1.12	20.40	0.61
2.433	0.69	8.433	16.25	14.433	1.12	20.43	0.61
2.467	0.69	8.467	16.25	14.467	1.12	20.47	0.61
2.500	0.69	8.500	16.25	14.500	1.12	20.50	0.61
2.533	0.71	8.533	11.78	14.533	1.09	20.53	0.60
2.567	0.71	8.567	11.77	14.567	1.09	20.57	0.60
2.600	0.71	8.600	11.77	14.600	1.09	20.60	0.60
2.633	0.71	8.633	11.77	14.633	1.09	20.63	0.60
2.667	0.71	8.667	11.77	14.667	1.09	20.67	0.60
2.700	0.73	8.700	9.18	14.700	1.07	20.70	0.60
2.733	0.73	8.733	9.18	14.733	1.07	20.73	0.60
2.767	0.73	8.767	9.18	14.767	1.07	20.77	0.60
2.800	0.73	8.800	9.18	14.800	1.07	20.80	0.60
2.833	0.73	8.833	9.18	14.833	1.07	20.83	0.60
2.867	0.75	8.867	7.50	14.867	1.04	20.87	0.59
2.900	0.75	8.900	7.50	14.900	1.04	20.90	0.59
2.933	0.75	8.933	7.50	14.933	1.04	20.93	0.59
2.967	0.75	8.967	7.50	14.967	1.04	20.97	0.59

3.000	0.75	9.000	7.50	15.000	1.04	21.00	0.59
3.033	0.78	9.033	6.33	15.033	1.02	21.03	0.58
3.067	0.78	9.067	6.33	15.067	1.02	21.07	0.58
3.100	0.78	9.100	6.33	15.100	1.02	21.10	0.58
3.133	0.78	9.133	6.33	15.133	1.02	21.13	0.58
3.167	0.78	9.167	6.33	15.167	1.02	21.17	0.58
3.200	0.80	9.200	5.48	15.200	1.00	21.20	0.58
3.233	0.80	9.233	5.48	15.233	1.00	21.23	0.58
3.267	0.80	9.267	5.48	15.267	1.00	21.27	0.58
3.300	0.80	9.300	5.48	15.300	1.00	21.30	0.58
3.333	0.80	9.333	5.48	15.333	1.00	21.33	0.58
3.367	0.83	9.367	4.83	15.367	0.98	21.37	0.57
3.400	0.83	9.400	4.83	15.400	0.98	21.40	0.57
3.433	0.83	9.433	4.83	15.433	0.98	21.43	0.57
3.467	0.83	9.467	4.83	15.467	0.98	21.47	0.57
3.500	0.83	9.500	4.83	15.500	0.98	21.50	0.57
3.533	0.86	9.533	4.32	15.533	0.96	21.53	0.56
3.567	0.86	9.567	4.32	15.567	0.96	21.57	0.56
3.600	0.86	9.600	4.32	15.600	0.96	21.60	0.56
3.633	0.86	9.633	4.32	15.633	0.96	21.63	0.56
3.667	0.86	9.667	4.32	15.667	0.96	21.67	0.56
3.700	0.89	9.700	3.91	15.700	0.94	21.70	0.56
3.733	0.89	9.733	3.91	15.733	0.94	21.73	0.56
3.767	0.89	9.767	3.91	15.767	0.94	21.77	0.56
3.800	0.89	9.800	3.91	15.800	0.94	21.80	0.56
3.833	0.89	9.833	3.91	15.833	0.94	21.83	0.56
3.867	0.93	9.867	3.57	15.867	0.92	21.87	0.55
3.900	0.93	9.900	3.57	15.900	0.92	21.90	0.55
3.933	0.93	9.933	3.57	15.933	0.92	21.93	0.55
3.967	0.93	9.967	3.57	15.967	0.92	21.97	0.55
4.000	0.93	10.000	3.57	16.000	0.92	22.00	0.55
4.033	0.97	10.033	3.28	16.033	0.90	22.03	0.55
4.067	0.97	10.067	3.28	16.067	0.90	22.07	0.55
4.100	0.97	10.100	3.28	16.100	0.90	22.10	0.55
4.133	0.97	10.133	3.28	16.133	0.90	22.13	0.55
4.167	0.97	10.167	3.28	16.167	0.90	22.17	0.55
4.200	1.01	10.200	3.04	16.200	0.89	22.20	0.54
4.233	1.01	10.233	3.04	16.233	0.89	22.23	0.54
4.267	1.01	10.267	3.04	16.267	0.89	22.27	0.54
4.300	1.01	10.300	3.04	16.300	0.89	22.30	0.54
4.333	1.01	10.333	3.04	16.333	0.89	22.33	0.54
4.367	1.05	10.367	2.84	16.367	0.87	22.37	0.53
4.400	1.05	10.400	2.84	16.400	0.87	22.40	0.53
4.433	1.05	10.433	2.84	16.433	0.87	22.43	0.53
4.467	1.05	10.467	2.84	16.467	0.87	22.47	0.53
4.500	1.05	10.500	2.84	16.500	0.87	22.50	0.53
4.533	1.10	10.533	2.66	16.533	0.85	22.53	0.53
4.567	1.10	10.567	2.66	16.567	0.85	22.57	0.53
4.600	1.10	10.600	2.66	16.600	0.85	22.60	0.53
4.633	1.10	10.633	2.66	16.633	0.85	22.63	0.53
4.667	1.10	10.667	2.66	16.667	0.85	22.67	0.53
4.700	1.16	10.700	2.50	16.700	0.84	22.70	0.52
4.733	1.16	10.733	2.50	16.733	0.84	22.73	0.52
4.767	1.16	10.767	2.50	16.767	0.84	22.77	0.52
4.800	1.16	10.800	2.50	16.800	0.84	22.80	0.52
4.833	1.16	10.833	2.50	16.833	0.84	22.83	0.52
4.867	1.22	10.867	2.36	16.867	0.82	22.87	0.52
4.900	1.22	10.900	2.36	16.900	0.82	22.90	0.52
4.933	1.22	10.933	2.36	16.933	0.82	22.93	0.52
4.967	1.22	10.967	2.36	16.967	0.82	22.97	0.52
5.000	1.22	11.000	2.36	17.000	0.82	23.00	0.52

5.033	1.29	11.033	2.24	17.033	0.81	23.03	0.51
5.067	1.29	11.067	2.24	17.067	0.81	23.07	0.51
5.100	1.29	11.100	2.24	17.100	0.81	23.10	0.51
5.133	1.29	11.133	2.24	17.133	0.81	23.13	0.51
5.167	1.29	11.167	2.24	17.167	0.81	23.17	0.51
5.200	1.36	11.200	2.12	17.200	0.80	23.20	0.51
5.233	1.36	11.233	2.12	17.233	0.80	23.23	0.51
5.267	1.36	11.267	2.12	17.267	0.80	23.27	0.51
5.300	1.36	11.300	2.12	17.300	0.80	23.30	0.51
5.333	1.36	11.333	2.12	17.333	0.80	23.33	0.51
5.367	1.45	11.367	2.02	17.367	0.78	23.37	0.50
5.400	1.45	11.400	2.02	17.400	0.78	23.40	0.50
5.433	1.45	11.433	2.02	17.433	0.78	23.43	0.50
5.467	1.45	11.467	2.02	17.467	0.78	23.47	0.50
5.500	1.45	11.500	2.02	17.500	0.78	23.50	0.50
5.533	1.55	11.533	1.93	17.533	0.77	23.53	0.50
5.567	1.55	11.567	1.93	17.567	0.77	23.57	0.50
5.600	1.55	11.600	1.93	17.600	0.77	23.60	0.50
5.633	1.55	11.633	1.93	17.633	0.77	23.63	0.50
5.667	1.55	11.667	1.93	17.667	0.77	23.67	0.50
5.700	1.67	11.700	1.85	17.700	0.76	23.70	0.49
5.733	1.67	11.733	1.85	17.733	0.76	23.73	0.49
5.767	1.67	11.767	1.85	17.767	0.76	23.77	0.49
5.800	1.67	11.800	1.85	17.800	0.76	23.80	0.49
5.833	1.67	11.833	1.85	17.833	0.76	23.83	0.49
5.867	1.81	11.867	1.78	17.867	0.75	23.87	0.49
5.900	1.81	11.900	1.78	17.900	0.75	23.90	0.49
5.933	1.81	11.933	1.78	17.933	0.75	23.93	0.49
5.967	1.81	11.967	1.78	17.967	0.75	23.97	0.49
6.000	1.81	12.000	1.78	18.000	0.75	24.00	0.49

```
     Max.Eff.Inten.(mm/hr)=     153.18        22.59
                over (min)        5.00        14.00
     Storage Coeff.  (min)=       0.94 (ii)   13.74 (ii)
     Unit Hyd. Tpeak (min)=       4.00        14.00
     Unit Hyd. peak  (cms)=       0.52         0.08
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.01         0.00       0.012 (iii)
     TIME TO PEAK    (hrs)=       8.00         8.20        8.00
     RUNOFF VOLUME    (mm)=      84.42        18.19       33.97
     TOTAL RAINFALL   (mm)=      85.42        85.42       85.42
     RUNOFF COEFFICIENT   =       0.99         0.21        0.40

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  48.0    Ia = Dep. 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  (  2002)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  1100):      0.09    0.012     8.00    33.97
      + ID2= 2 (  3001):      3.00    0.096     8.57    70.06
        ===============================================
        ID = 3 (  2002):      3.09    0.099     8.53    68.95
```



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

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2001)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
Developed and Distributed by Smart City Water Inc
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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 6.2\VO2\voin.dat

  Output  filename:
C:\Users\zhouj\AppData\Local\Civica\VH5\642fa701-08f9-4281-a674-e9ad409f1aac\b56b8d
d7-45c7-4679-949e-f80b4b409022\scenar
  Summary filename:
C:\Users\zhouj\AppData\Local\Civica\VH5\642fa701-08f9-4281-a674-e9ad409f1aac\b56b8d
d7-45c7-4679-949e-f80b4b409022\scenar


DATE: 09-13-2023                         TIME: 11:19:07

USER:



COMMENTS: ____________________________________________________________


------------------------------------------------------------------------------------
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  **********************************************
  ** SIMULATION : Run 06                      **
  **********************************************

--------------------
| CHICAGO STORM    |    IDF curve parameters: A=2193.100
| Ptotal= 92.89 mm |                          B=   9.040
--------------------                          C=   0.871
                        used in:   INTENSITY =  A / (t + B)^C

                        Duration of storm  = 24.00 hrs
                        Storm time step    = 10.00 min
                        Time to peak ratio =  0.33

                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
```

0.17	0.53	6.17	2.12	12.17	1.83	18.17	0.79
0.33	0.54	6.33	2.34	12.33	1.76	18.33	0.77
0.50	0.55	6.50	2.60	12.50	1.70	18.50	0.76
0.67	0.56	6.67	2.95	12.67	1.64	18.67	0.75
0.83	0.58	6.83	3.40	12.83	1.58	18.83	0.74
1.00	0.59	7.00	4.02	13.00	1.53	19.00	0.73
1.17	0.60	7.17	4.93	13.17	1.48	19.17	0.72
1.33	0.62	7.33	6.38	13.33	1.44	19.33	0.71
1.50	0.63	7.50	9.03	13.50	1.40	19.50	0.70
1.67	0.65	7.67	15.23	13.67	1.36	19.67	0.69
1.83	0.66	7.83	42.35	13.83	1.32	19.83	0.68
2.00	0.68	8.00	168.45	14.00	1.29	20.00	0.68
2.17	0.70	8.17	56.97	14.17	1.25	20.17	0.67
2.33	0.72	8.33	27.80	14.33	1.22	20.33	0.66
2.50	0.74	8.50	17.71	14.50	1.19	20.50	0.65
2.67	0.76	8.67	12.80	14.67	1.16	20.67	0.64
2.83	0.78	8.83	9.96	14.83	1.14	20.83	0.63
3.00	0.80	9.00	8.12	15.00	1.11	21.00	0.63
3.17	0.83	9.17	6.85	15.17	1.09	21.17	0.62
3.33	0.86	9.33	5.92	15.33	1.06	21.33	0.61
3.50	0.89	9.50	5.21	15.50	1.04	21.50	0.61
3.67	0.92	9.67	4.66	15.67	1.02	21.67	0.60
3.83	0.95	9.83	4.21	15.83	1.00	21.83	0.59
4.00	0.99	10.00	3.84	16.00	0.98	22.00	0.59
4.17	1.03	10.17	3.53	16.17	0.96	22.17	0.58
4.33	1.07	10.33	3.27	16.33	0.94	22.33	0.57
4.50	1.12	10.50	3.05	16.50	0.93	22.50	0.57
4.67	1.18	10.67	2.85	16.67	0.91	22.67	0.56
4.83	1.24	10.83	2.68	16.83	0.90	22.83	0.56
5.00	1.30	11.00	2.53	17.00	0.88	23.00	0.55
5.17	1.38	11.17	2.40	17.17	0.86	23.17	0.55
5.33	1.46	11.33	2.28	17.33	0.85	23.33	0.54
5.50	1.56	11.50	2.17	17.50	0.84	23.50	0.53
5.67	1.66	11.67	2.07	17.67	0.82	23.67	0.53
5.83	1.79	11.83	1.98	17.83	0.81	23.83	0.52
6.00	1.94	12.00	1.90	18.00	0.80	24.00	0.52

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-------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD ( 1000)|   Area    (ha)=   3.00
|ID= 1 DT= 2.0 min |   Total Imp(%)=  78.60   Dir. Conn.(%)=  78.60
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      2.36          0.64
     Dep. Storage     (mm)=      1.00          5.00
     Average Slope     (%)=      1.00          2.00
     Length            (m)=    141.37         40.00
     Mannings n          =      0.013         0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   2.0 MIN. TIME STEP.
```

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	' TIME ' hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.033	0.53	6.033	2.12	12.033	1.83	18.03	0.79
0.067	0.53	6.067	2.12	12.067	1.83	18.07	0.79
0.100	0.53	6.100	2.12	12.100	1.83	18.10	0.79
0.133	0.53	6.133	2.12	12.133	1.83	18.13	0.79

0.167	0.53	6.167	2.12	12.167	1.83	18.17	0.79
0.200	0.54	6.200	2.34	12.200	1.76	18.20	0.77
0.233	0.54	6.233	2.34	12.233	1.76	18.23	0.77
0.267	0.54	6.267	2.34	12.267	1.76	18.27	0.77
0.300	0.54	6.300	2.34	12.300	1.76	18.30	0.77
0.333	0.54	6.333	2.34	12.333	1.76	18.33	0.77
0.367	0.55	6.367	2.60	12.367	1.70	18.37	0.76
0.400	0.55	6.400	2.60	12.400	1.70	18.40	0.76
0.433	0.55	6.433	2.60	12.433	1.70	18.43	0.76
0.467	0.55	6.467	2.60	12.467	1.70	18.47	0.76
0.500	0.55	6.500	2.60	12.500	1.70	18.50	0.76
0.533	0.56	6.533	2.95	12.533	1.64	18.53	0.75
0.567	0.56	6.567	2.95	12.567	1.64	18.57	0.75
0.600	0.56	6.600	2.95	12.600	1.64	18.60	0.75
0.633	0.56	6.633	2.95	12.633	1.64	18.63	0.75
0.667	0.56	6.667	2.95	12.667	1.64	18.67	0.75
0.700	0.58	6.700	3.40	12.700	1.58	18.70	0.74
0.733	0.58	6.733	3.40	12.733	1.58	18.73	0.74
0.767	0.58	6.767	3.40	12.767	1.58	18.77	0.74
0.800	0.58	6.800	3.40	12.800	1.58	18.80	0.74
0.833	0.58	6.833	3.40	12.833	1.58	18.83	0.74
0.867	0.59	6.867	4.02	12.867	1.53	18.87	0.73
0.900	0.59	6.900	4.02	12.900	1.53	18.90	0.73
0.933	0.59	6.933	4.02	12.933	1.53	18.93	0.73
0.967	0.59	6.967	4.02	12.967	1.53	18.97	0.73
1.000	0.59	7.000	4.02	13.000	1.53	19.00	0.73
1.033	0.60	7.033	4.93	13.033	1.48	19.03	0.72
1.067	0.60	7.067	4.93	13.067	1.48	19.07	0.72
1.100	0.60	7.100	4.93	13.100	1.48	19.10	0.72
1.133	0.60	7.133	4.93	13.133	1.48	19.13	0.72
1.167	0.60	7.167	4.93	13.167	1.48	19.17	0.72
1.200	0.62	7.200	6.38	13.200	1.44	19.20	0.71
1.233	0.62	7.233	6.38	13.233	1.44	19.23	0.71
1.267	0.62	7.267	6.38	13.267	1.44	19.27	0.71
1.300	0.62	7.300	6.38	13.300	1.44	19.30	0.71
1.333	0.62	7.333	6.38	13.333	1.44	19.33	0.71
1.367	0.63	7.367	9.03	13.367	1.40	19.37	0.70
1.400	0.63	7.400	9.03	13.400	1.40	19.40	0.70
1.433	0.63	7.433	9.03	13.433	1.40	19.43	0.70
1.467	0.63	7.467	9.03	13.467	1.40	19.47	0.70
1.500	0.63	7.500	9.03	13.500	1.40	19.50	0.70
1.533	0.65	7.533	15.23	13.533	1.36	19.53	0.69
1.567	0.65	7.567	15.23	13.567	1.36	19.57	0.69
1.600	0.65	7.600	15.23	13.600	1.36	19.60	0.69
1.633	0.65	7.633	15.23	13.633	1.36	19.63	0.69
1.667	0.65	7.667	15.23	13.667	1.36	19.67	0.69
1.700	0.66	7.700	42.35	13.700	1.32	19.70	0.68
1.733	0.66	7.733	42.35	13.733	1.32	19.73	0.68
1.767	0.66	7.767	42.35	13.767	1.32	19.77	0.68
1.800	0.66	7.800	42.35	13.800	1.32	19.80	0.68
1.833	0.66	7.833	42.35	13.833	1.32	19.83	0.68
1.867	0.68	7.867	168.43	13.867	1.29	19.87	0.68
1.900	0.68	7.900	168.45	13.900	1.29	19.90	0.68
1.933	0.68	7.933	168.45	13.933	1.29	19.93	0.68
1.967	0.68	7.967	168.45	13.967	1.29	19.97	0.68
2.000	0.68	8.000	168.45	14.000	1.29	20.00	0.68
2.033	0.70	8.033	56.99	14.033	1.25	20.03	0.67
2.067	0.70	8.067	56.97	14.067	1.25	20.07	0.67
2.100	0.70	8.100	56.97	14.100	1.25	20.10	0.67
2.133	0.70	8.133	56.97	14.133	1.25	20.13	0.67
2.167	0.70	8.167	56.97	14.167	1.25	20.17	0.67

2.200	0.72	8.200	27.80	14.200	1.22	20.20	0.66
2.233	0.72	8.233	27.80	14.233	1.22	20.23	0.66
2.267	0.72	8.267	27.80	14.267	1.22	20.27	0.66
2.300	0.72	8.300	27.80	14.300	1.22	20.30	0.66
2.333	0.72	8.333	27.80	14.333	1.22	20.33	0.66
2.367	0.74	8.367	17.71	14.367	1.19	20.37	0.65
2.400	0.74	8.400	17.71	14.400	1.19	20.40	0.65
2.433	0.74	8.433	17.71	14.433	1.19	20.43	0.65
2.467	0.74	8.467	17.71	14.467	1.19	20.47	0.65
2.500	0.74	8.500	17.71	14.500	1.19	20.50	0.65
2.533	0.76	8.533	12.80	14.533	1.16	20.53	0.64
2.567	0.76	8.567	12.80	14.567	1.16	20.57	0.64
2.600	0.76	8.600	12.80	14.600	1.16	20.60	0.64
2.633	0.76	8.633	12.80	14.633	1.16	20.63	0.64
2.667	0.76	8.667	12.80	14.667	1.16	20.67	0.64
2.700	0.78	8.700	9.96	14.700	1.14	20.70	0.63
2.733	0.78	8.733	9.96	14.733	1.14	20.73	0.63
2.767	0.78	8.767	9.96	14.767	1.14	20.77	0.63
2.800	0.78	8.800	9.96	14.800	1.14	20.80	0.63
2.833	0.78	8.833	9.96	14.833	1.14	20.83	0.63
2.867	0.80	8.867	8.12	14.867	1.11	20.87	0.63
2.900	0.80	8.900	8.12	14.900	1.11	20.90	0.63
2.933	0.80	8.933	8.12	14.933	1.11	20.93	0.63
2.967	0.80	8.967	8.12	14.967	1.11	20.97	0.63
3.000	0.80	9.000	8.12	15.000	1.11	21.00	0.63
3.033	0.83	9.033	6.85	15.033	1.09	21.03	0.62
3.067	0.83	9.067	6.85	15.067	1.09	21.07	0.62
3.100	0.83	9.100	6.85	15.100	1.09	21.10	0.62
3.133	0.83	9.133	6.85	15.133	1.09	21.13	0.62
3.167	0.83	9.167	6.85	15.167	1.09	21.17	0.62
3.200	0.86	9.200	5.92	15.200	1.06	21.20	0.61
3.233	0.86	9.233	5.92	15.233	1.06	21.23	0.61
3.267	0.86	9.267	5.92	15.267	1.06	21.27	0.61
3.300	0.86	9.300	5.92	15.300	1.06	21.30	0.61
3.333	0.86	9.333	5.92	15.333	1.06	21.33	0.61
3.367	0.89	9.367	5.21	15.367	1.04	21.37	0.61
3.400	0.89	9.400	5.21	15.400	1.04	21.40	0.61
3.433	0.89	9.433	5.21	15.433	1.04	21.43	0.61
3.467	0.89	9.467	5.21	15.467	1.04	21.47	0.61
3.500	0.89	9.500	5.21	15.500	1.04	21.50	0.61
3.533	0.92	9.533	4.66	15.533	1.02	21.53	0.60
3.567	0.92	9.567	4.66	15.567	1.02	21.57	0.60
3.600	0.92	9.600	4.66	15.600	1.02	21.60	0.60
3.633	0.92	9.633	4.66	15.633	1.02	21.63	0.60
3.667	0.92	9.667	4.66	15.667	1.02	21.67	0.60
3.700	0.95	9.700	4.21	15.700	1.00	21.70	0.59
3.733	0.95	9.733	4.21	15.733	1.00	21.73	0.59
3.767	0.95	9.767	4.21	15.767	1.00	21.77	0.59
3.800	0.95	9.800	4.21	15.800	1.00	21.80	0.59
3.833	0.95	9.833	4.21	15.833	1.00	21.83	0.59
3.867	0.99	9.867	3.84	15.867	0.98	21.87	0.59
3.900	0.99	9.900	3.84	15.900	0.98	21.90	0.59
3.933	0.99	9.933	3.84	15.933	0.98	21.93	0.59
3.967	0.99	9.967	3.84	15.967	0.98	21.97	0.59
4.000	0.99	10.000	3.84	16.000	0.98	22.00	0.59
4.033	1.03	10.033	3.53	16.033	0.96	22.03	0.58
4.067	1.03	10.067	3.53	16.067	0.96	22.07	0.58
4.100	1.03	10.100	3.53	16.100	0.96	22.10	0.58
4.133	1.03	10.133	3.53	16.133	0.96	22.13	0.58
4.167	1.03	10.167	3.53	16.167	0.96	22.17	0.58
4.200	1.07	10.200	3.27	16.200	0.94	22.20	0.57

4.233	1.07	10.233	3.27	16.233	0.94	22.23	0.57
4.267	1.07	10.267	3.27	16.267	0.94	22.27	0.57
4.300	1.07	10.300	3.27	16.300	0.94	22.30	0.57
4.333	1.07	10.333	3.27	16.333	0.94	22.33	0.57
4.367	1.12	10.367	3.05	16.367	0.93	22.37	0.57
4.400	1.12	10.400	3.05	16.400	0.93	22.40	0.57
4.433	1.12	10.433	3.05	16.433	0.93	22.43	0.57
4.467	1.12	10.467	3.05	16.467	0.93	22.47	0.57
4.500	1.12	10.500	3.05	16.500	0.93	22.50	0.57
4.533	1.18	10.533	2.85	16.533	0.91	22.53	0.56
4.567	1.18	10.567	2.85	16.567	0.91	22.57	0.56
4.600	1.18	10.600	2.85	16.600	0.91	22.60	0.56
4.633	1.18	10.633	2.85	16.633	0.91	22.63	0.56
4.667	1.18	10.667	2.85	16.667	0.91	22.67	0.56
4.700	1.24	10.700	2.68	16.700	0.90	22.70	0.56
4.733	1.24	10.733	2.68	16.733	0.90	22.73	0.56
4.767	1.24	10.767	2.68	16.767	0.90	22.77	0.56
4.800	1.24	10.800	2.68	16.800	0.90	22.80	0.56
4.833	1.24	10.833	2.68	16.833	0.90	22.83	0.56
4.867	1.30	10.867	2.53	16.867	0.88	22.87	0.55
4.900	1.30	10.900	2.53	16.900	0.88	22.90	0.55
4.933	1.30	10.933	2.53	16.933	0.88	22.93	0.55
4.967	1.30	10.967	2.53	16.967	0.88	22.97	0.55
5.000	1.30	11.000	2.53	17.000	0.88	23.00	0.55
5.033	1.38	11.033	2.40	17.033	0.86	23.03	0.55
5.067	1.38	11.067	2.40	17.067	0.86	23.07	0.55
5.100	1.38	11.100	2.40	17.100	0.86	23.10	0.55
5.133	1.38	11.133	2.40	17.133	0.86	23.13	0.55
5.167	1.38	11.167	2.40	17.167	0.86	23.17	0.55
5.200	1.46	11.200	2.28	17.200	0.85	23.20	0.54
5.233	1.46	11.233	2.28	17.233	0.85	23.23	0.54
5.267	1.46	11.267	2.28	17.267	0.85	23.27	0.54
5.300	1.46	11.300	2.28	17.300	0.85	23.30	0.54
5.333	1.46	11.333	2.28	17.333	0.85	23.33	0.54
5.367	1.56	11.367	2.17	17.367	0.84	23.37	0.53
5.400	1.56	11.400	2.17	17.400	0.84	23.40	0.53
5.433	1.56	11.433	2.17	17.433	0.84	23.43	0.53
5.467	1.56	11.467	2.17	17.467	0.84	23.47	0.53
5.500	1.56	11.500	2.17	17.500	0.84	23.50	0.53
5.533	1.66	11.533	2.07	17.533	0.82	23.53	0.53
5.567	1.66	11.567	2.07	17.567	0.82	23.57	0.53
5.600	1.66	11.600	2.07	17.600	0.82	23.60	0.53
5.633	1.66	11.633	2.07	17.633	0.82	23.63	0.53
5.667	1.66	11.667	2.07	17.667	0.82	23.67	0.53
5.700	1.79	11.700	1.98	17.700	0.81	23.70	0.52
5.733	1.79	11.733	1.98	17.733	0.81	23.73	0.52
5.767	1.79	11.767	1.98	17.767	0.81	23.77	0.52
5.800	1.79	11.800	1.98	17.800	0.81	23.80	0.52
5.833	1.79	11.833	1.98	17.833	0.81	23.83	0.52
5.867	1.94	11.867	1.90	17.867	0.80	23.87	0.52
5.900	1.94	11.900	1.90	17.900	0.80	23.90	0.52
5.933	1.94	11.933	1.90	17.933	0.80	23.93	0.52
5.967	1.94	11.967	1.90	17.967	0.80	23.97	0.52
6.000	1.94	12.000	1.90	18.000	0.80	24.00	0.52

```
Max.Eff.Inten.(mm/hr)=     168.45          31.71
           over (min)        5.00           6.00
Storage Coeff.  (min)=       2.55 (ii)      5.96 (ii)
Unit Hyd. Tpeak (min)=       4.00           6.00
Unit Hyd. peak  (cms)=       0.36           0.19
                                                       *TOTALS*
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    PEAK FLOW        (cms)=      1.07         0.05          1.116 (iii)
    TIME TO PEAK     (hrs)=      8.00         8.03           8.00
    RUNOFF VOLUME     (mm)=     91.89        21.28          76.78
    TOTAL RAINFALL    (mm)=     92.89        92.89          92.89
    RUNOFF COEFFICIENT   =       0.99         0.23           0.83

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  48.0    Ia = Dep. 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(  3001)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  2.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0391     0.0880
                          0.0028     0.0061   |   0.0527     0.0958
                          0.0096     0.0158   |   0.0660     0.1032
                          0.0131     0.0255   |   0.0762     0.1100
                          0.0157     0.0350   |   0.0856     0.1159
                          0.0180     0.0443   |   0.0932     0.1209
                          0.0201     0.0535   |   0.1001     0.1256
                          0.0219     0.0625   |   0.1066     0.1304
                          0.0238     0.0713   |   0.1155     0.1376
                          0.0254     0.0798   |   0.0000     0.0000

                             AREA     QPEAK     TPEAK       R.V.
                             (ha)     (cms)     (hrs)       (mm)
  INFLOW : ID= 2 (  1000)    2.998     1.116      8.00      76.78
  OUTFLOW: ID= 1 (  3001)    2.998     0.110      8.57      76.59

              PEAK   FLOW   REDUCTION [Qout/Qin](%)=  9.90
              TIME SHIFT OF PEAK FLOW         (min)= 34.00
              MAXIMUM  STORAGE   USED       (ha.m.)=  0.1335

-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  1100)|   Area    (ha)=   0.09
|ID= 1 DT= 2.0 min |   Total Imp(%)=  26.30   Dir. Conn.(%)=  26.30
--------------------
                             IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=      0.02          0.07
    Dep. Storage     (mm)=      1.00          5.00
    Average Slope     (%)=      1.00          2.00
    Length            (m)=     25.17         40.00
    Mannings n           =     0.013         0.250

        NOTE:  RAINFALL WAS TRANSFORMED TO   2.0 MIN. TIME STEP.
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---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.033	0.53	6.033	2.12	12.033	1.83	18.03	0.79
0.067	0.53	6.067	2.12	12.067	1.83	18.07	0.79
0.100	0.53	6.100	2.12	12.100	1.83	18.10	0.79

0.133	0.53	6.133	2.12	12.133	1.83	18.13	0.79
0.167	0.53	6.167	2.12	12.167	1.83	18.17	0.79
0.200	0.54	6.200	2.34	12.200	1.76	18.20	0.77
0.233	0.54	6.233	2.34	12.233	1.76	18.23	0.77
0.267	0.54	6.267	2.34	12.267	1.76	18.27	0.77
0.300	0.54	6.300	2.34	12.300	1.76	18.30	0.77
0.333	0.54	6.333	2.34	12.333	1.76	18.33	0.77
0.367	0.55	6.367	2.60	12.367	1.70	18.37	0.76
0.400	0.55	6.400	2.60	12.400	1.70	18.40	0.76
0.433	0.55	6.433	2.60	12.433	1.70	18.43	0.76
0.467	0.55	6.467	2.60	12.467	1.70	18.47	0.76
0.500	0.55	6.500	2.60	12.500	1.70	18.50	0.76
0.533	0.56	6.533	2.95	12.533	1.64	18.53	0.75
0.567	0.56	6.567	2.95	12.567	1.64	18.57	0.75
0.600	0.56	6.600	2.95	12.600	1.64	18.60	0.75
0.633	0.56	6.633	2.95	12.633	1.64	18.63	0.75
0.667	0.56	6.667	2.95	12.667	1.64	18.67	0.75
0.700	0.58	6.700	3.40	12.700	1.58	18.70	0.74
0.733	0.58	6.733	3.40	12.733	1.58	18.73	0.74
0.767	0.58	6.767	3.40	12.767	1.58	18.77	0.74
0.800	0.58	6.800	3.40	12.800	1.58	18.80	0.74
0.833	0.58	6.833	3.40	12.833	1.58	18.83	0.74
0.867	0.59	6.867	4.02	12.867	1.53	18.87	0.73
0.900	0.59	6.900	4.02	12.900	1.53	18.90	0.73
0.933	0.59	6.933	4.02	12.933	1.53	18.93	0.73
0.967	0.59	6.967	4.02	12.967	1.53	18.97	0.73
1.000	0.59	7.000	4.02	13.000	1.53	19.00	0.73
1.033	0.60	7.033	4.93	13.033	1.48	19.03	0.72
1.067	0.60	7.067	4.93	13.067	1.48	19.07	0.72
1.100	0.60	7.100	4.93	13.100	1.48	19.10	0.72
1.133	0.60	7.133	4.93	13.133	1.48	19.13	0.72
1.167	0.60	7.167	4.93	13.167	1.48	19.17	0.72
1.200	0.62	7.200	6.38	13.200	1.44	19.20	0.71
1.233	0.62	7.233	6.38	13.233	1.44	19.23	0.71
1.267	0.62	7.267	6.38	13.267	1.44	19.27	0.71
1.300	0.62	7.300	6.38	13.300	1.44	19.30	0.71
1.333	0.62	7.333	6.38	13.333	1.44	19.33	0.71
1.367	0.63	7.367	9.03	13.367	1.40	19.37	0.70
1.400	0.63	7.400	9.03	13.400	1.40	19.40	0.70
1.433	0.63	7.433	9.03	13.433	1.40	19.43	0.70
1.467	0.63	7.467	9.03	13.467	1.40	19.47	0.70
1.500	0.63	7.500	9.03	13.500	1.40	19.50	0.70
1.533	0.65	7.533	15.23	13.533	1.36	19.53	0.69
1.567	0.65	7.567	15.23	13.567	1.36	19.57	0.69
1.600	0.65	7.600	15.23	13.600	1.36	19.60	0.69
1.633	0.65	7.633	15.23	13.633	1.36	19.63	0.69
1.667	0.65	7.667	15.23	13.667	1.36	19.67	0.69
1.700	0.66	7.700	42.35	13.700	1.32	19.70	0.68
1.733	0.66	7.733	42.35	13.733	1.32	19.73	0.68
1.767	0.66	7.767	42.35	13.767	1.32	19.77	0.68
1.800	0.66	7.800	42.35	13.800	1.32	19.80	0.68
1.833	0.66	7.833	42.35	13.833	1.32	19.83	0.68
1.867	0.68	7.867	168.43	13.867	1.29	19.87	0.68
1.900	0.68	7.900	168.45	13.900	1.29	19.90	0.68
1.933	0.68	7.933	168.45	13.933	1.29	19.93	0.68
1.967	0.68	7.967	168.45	13.967	1.29	19.97	0.68
2.000	0.68	8.000	168.45	14.000	1.29	20.00	0.68
2.033	0.70	8.033	56.99	14.033	1.25	20.03	0.67
2.067	0.70	8.067	56.97	14.067	1.25	20.07	0.67
2.100	0.70	8.100	56.97	14.100	1.25	20.10	0.67
2.133	0.70	8.133	56.97	14.133	1.25	20.13	0.67

2.167	0.70	8.167	56.97	14.167	1.25	20.17	0.67
2.200	0.72	8.200	27.80	14.200	1.22	20.20	0.66
2.233	0.72	8.233	27.80	14.233	1.22	20.23	0.66
2.267	0.72	8.267	27.80	14.267	1.22	20.27	0.66
2.300	0.72	8.300	27.80	14.300	1.22	20.30	0.66
2.333	0.72	8.333	27.80	14.333	1.22	20.33	0.66
2.367	0.74	8.367	17.71	14.367	1.19	20.37	0.65
2.400	0.74	8.400	17.71	14.400	1.19	20.40	0.65
2.433	0.74	8.433	17.71	14.433	1.19	20.43	0.65
2.467	0.74	8.467	17.71	14.467	1.19	20.47	0.65
2.500	0.74	8.500	17.71	14.500	1.19	20.50	0.65
2.533	0.76	8.533	12.80	14.533	1.16	20.53	0.64
2.567	0.76	8.567	12.80	14.567	1.16	20.57	0.64
2.600	0.76	8.600	12.80	14.600	1.16	20.60	0.64
2.633	0.76	8.633	12.80	14.633	1.16	20.63	0.64
2.667	0.76	8.667	12.80	14.667	1.16	20.67	0.64
2.700	0.78	8.700	9.96	14.700	1.14	20.70	0.63
2.733	0.78	8.733	9.96	14.733	1.14	20.73	0.63
2.767	0.78	8.767	9.96	14.767	1.14	20.77	0.63
2.800	0.78	8.800	9.96	14.800	1.14	20.80	0.63
2.833	0.78	8.833	9.96	14.833	1.14	20.83	0.63
2.867	0.80	8.867	8.12	14.867	1.11	20.87	0.63
2.900	0.80	8.900	8.12	14.900	1.11	20.90	0.63
2.933	0.80	8.933	8.12	14.933	1.11	20.93	0.63
2.967	0.80	8.967	8.12	14.967	1.11	20.97	0.63
3.000	0.80	9.000	8.12	15.000	1.11	21.00	0.63
3.033	0.83	9.033	6.85	15.033	1.09	21.03	0.62
3.067	0.83	9.067	6.85	15.067	1.09	21.07	0.62
3.100	0.83	9.100	6.85	15.100	1.09	21.10	0.62
3.133	0.83	9.133	6.85	15.133	1.09	21.13	0.62
3.167	0.83	9.167	6.85	15.167	1.09	21.17	0.62
3.200	0.86	9.200	5.92	15.200	1.06	21.20	0.61
3.233	0.86	9.233	5.92	15.233	1.06	21.23	0.61
3.267	0.86	9.267	5.92	15.267	1.06	21.27	0.61
3.300	0.86	9.300	5.92	15.300	1.06	21.30	0.61
3.333	0.86	9.333	5.92	15.333	1.06	21.33	0.61
3.367	0.89	9.367	5.21	15.367	1.04	21.37	0.61
3.400	0.89	9.400	5.21	15.400	1.04	21.40	0.61
3.433	0.89	9.433	5.21	15.433	1.04	21.43	0.61
3.467	0.89	9.467	5.21	15.467	1.04	21.47	0.61
3.500	0.89	9.500	5.21	15.500	1.04	21.50	0.61
3.533	0.92	9.533	4.66	15.533	1.02	21.53	0.60
3.567	0.92	9.567	4.66	15.567	1.02	21.57	0.60
3.600	0.92	9.600	4.66	15.600	1.02	21.60	0.60
3.633	0.92	9.633	4.66	15.633	1.02	21.63	0.60
3.667	0.92	9.667	4.66	15.667	1.02	21.67	0.60
3.700	0.95	9.700	4.21	15.700	1.00	21.70	0.59
3.733	0.95	9.733	4.21	15.733	1.00	21.73	0.59
3.767	0.95	9.767	4.21	15.767	1.00	21.77	0.59
3.800	0.95	9.800	4.21	15.800	1.00	21.80	0.59
3.833	0.95	9.833	4.21	15.833	1.00	21.83	0.59
3.867	0.99	9.867	3.84	15.867	0.98	21.87	0.59
3.900	0.99	9.900	3.84	15.900	0.98	21.90	0.59
3.933	0.99	9.933	3.84	15.933	0.98	21.93	0.59
3.967	0.99	9.967	3.84	15.967	0.98	21.97	0.59
4.000	0.99	10.000	3.84	16.000	0.98	22.00	0.59
4.033	1.03	10.033	3.53	16.033	0.96	22.03	0.58
4.067	1.03	10.067	3.53	16.067	0.96	22.07	0.58
4.100	1.03	10.100	3.53	16.100	0.96	22.10	0.58
4.133	1.03	10.133	3.53	16.133	0.96	22.13	0.58
4.167	1.03	10.167	3.53	16.167	0.96	22.17	0.58

4.200	1.07	10.200	3.27	16.200	0.94	22.20	0.57
4.233	1.07	10.233	3.27	16.233	0.94	22.23	0.57
4.267	1.07	10.267	3.27	16.267	0.94	22.27	0.57
4.300	1.07	10.300	3.27	16.300	0.94	22.30	0.57
4.333	1.07	10.333	3.27	16.333	0.94	22.33	0.57
4.367	1.12	10.367	3.05	16.367	0.93	22.37	0.57
4.400	1.12	10.400	3.05	16.400	0.93	22.40	0.57
4.433	1.12	10.433	3.05	16.433	0.93	22.43	0.57
4.467	1.12	10.467	3.05	16.467	0.93	22.47	0.57
4.500	1.12	10.500	3.05	16.500	0.93	22.50	0.57
4.533	1.18	10.533	2.85	16.533	0.91	22.53	0.56
4.567	1.18	10.567	2.85	16.567	0.91	22.57	0.56
4.600	1.18	10.600	2.85	16.600	0.91	22.60	0.56
4.633	1.18	10.633	2.85	16.633	0.91	22.63	0.56
4.667	1.18	10.667	2.85	16.667	0.91	22.67	0.56
4.700	1.24	10.700	2.68	16.700	0.90	22.70	0.56
4.733	1.24	10.733	2.68	16.733	0.90	22.73	0.56
4.767	1.24	10.767	2.68	16.767	0.90	22.77	0.56
4.800	1.24	10.800	2.68	16.800	0.90	22.80	0.56
4.833	1.24	10.833	2.68	16.833	0.90	22.83	0.56
4.867	1.30	10.867	2.53	16.867	0.88	22.87	0.55
4.900	1.30	10.900	2.53	16.900	0.88	22.90	0.55
4.933	1.30	10.933	2.53	16.933	0.88	22.93	0.55
4.967	1.30	10.967	2.53	16.967	0.88	22.97	0.55
5.000	1.30	11.000	2.53	17.000	0.88	23.00	0.55
5.033	1.38	11.033	2.40	17.033	0.86	23.03	0.55
5.067	1.38	11.067	2.40	17.067	0.86	23.07	0.55
5.100	1.38	11.100	2.40	17.100	0.86	23.10	0.55
5.133	1.38	11.133	2.40	17.133	0.86	23.13	0.55
5.167	1.38	11.167	2.40	17.167	0.86	23.17	0.55
5.200	1.46	11.200	2.28	17.200	0.85	23.20	0.54
5.233	1.46	11.233	2.28	17.233	0.85	23.23	0.54
5.267	1.46	11.267	2.28	17.267	0.85	23.27	0.54
5.300	1.46	11.300	2.28	17.300	0.85	23.30	0.54
5.333	1.46	11.333	2.28	17.333	0.85	23.33	0.54
5.367	1.56	11.367	2.17	17.367	0.84	23.37	0.53
5.400	1.56	11.400	2.17	17.400	0.84	23.40	0.53
5.433	1.56	11.433	2.17	17.433	0.84	23.43	0.53
5.467	1.56	11.467	2.17	17.467	0.84	23.47	0.53
5.500	1.56	11.500	2.17	17.500	0.84	23.50	0.53
5.533	1.66	11.533	2.07	17.533	0.82	23.53	0.53
5.567	1.66	11.567	2.07	17.567	0.82	23.57	0.53
5.600	1.66	11.600	2.07	17.600	0.82	23.60	0.53
5.633	1.66	11.633	2.07	17.633	0.82	23.63	0.53
5.667	1.66	11.667	2.07	17.667	0.82	23.67	0.53
5.700	1.79	11.700	1.98	17.700	0.81	23.70	0.52
5.733	1.79	11.733	1.98	17.733	0.81	23.73	0.52
5.767	1.79	11.767	1.98	17.767	0.81	23.77	0.52
5.800	1.79	11.800	1.98	17.800	0.81	23.80	0.52
5.833	1.79	11.833	1.98	17.833	0.81	23.83	0.52
5.867	1.94	11.867	1.90	17.867	0.80	23.87	0.52
5.900	1.94	11.900	1.90	17.900	0.80	23.90	0.52
5.933	1.94	11.933	1.90	17.933	0.80	23.93	0.52
5.967	1.94	11.967	1.90	17.967	0.80	23.97	0.52
6.000	1.94	12.000	1.90	18.000	0.80	24.00	0.52

```
Max.Eff.Inten.(mm/hr)=     168.45        28.93
           over (min)        5.00        14.00
Storage Coeff.  (min)=       0.91 (ii)   12.50 (ii)
Unit Hyd. Tpeak (min)=       4.00        14.00
Unit Hyd. peak  (cms)=       0.52         0.09
```

				TOTALS
PEAK FLOW	(cms)=	0.01	0.00	0.013 (iii)
TIME TO PEAK	(hrs)=	8.00	8.20	8.00
RUNOFF VOLUME	(mm)=	91.89	21.28	38.57
TOTAL RAINFALL	(mm)=	92.89	92.89	92.89
RUNOFF COEFFICIENT	=	0.99	0.23	0.42

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 48.0 Ia = Dep. 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 (2002) 1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (1100):	0.09	0.013	8.00	38.57
+ ID2= 2 (3001):	3.00	0.110	8.57	76.59
ID = 3 (2002):	3.09	0.114	8.50	75.43

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```
 V   V  I   SSSSS  U   U    A    L             (v 6.2.2001)
 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 6.2\VO2\voin.dat

Output filename:
C:\Users\zhouj\AppData\Local\Civica\VH5\642fa701-08f9-4281-a674-e9ad409f1aac\150abf6a-e111-4b9e-8836-30a019aec30b\scenar
Summary filename:
C:\Users\zhouj\AppData\Local\Civica\VH5\642fa701-08f9-4281-a674-e9ad409f1aac\150abf6a-e111-4b9e-8836-30a019aec30b\scenar

DATE: 09-13-2023 TIME: 11:19:06

USER:

COMMENTS: ____

```
**********************************************
** SIMULATION : Run 07                      **
**********************************************
```

READ STORM	Filename: C:\Users\zhouj\AppData\Local\Temp\8a0057db-68f2-4cf6-9613-b4e66717427d\f6b04b53
Ptotal= 46.77 mm	Comments: 2yr24hrSCS_Midland

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	0.51	6.25	0.94	12.25	6.74	18.25	0.84
0.50	0.51	6.50	0.94	12.50	6.74	18.50	0.84
0.75	0.51	6.75	0.94	12.75	3.46	18.75	0.84
1.00	0.51	7.00	0.94	13.00	3.46	19.00	0.84
1.25	0.51	7.25	0.94	13.25	0.66	19.25	0.84
1.50	0.51	7.50	0.94	13.50	0.66	19.50	0.84
1.75	0.51	7.75	0.94	13.75	3.84	19.75	0.84
2.00	0.51	8.00	0.94	14.00	3.84	20.00	0.84
2.25	0.61	8.25	1.26	14.25	1.40	20.25	0.56
2.50	0.61	8.50	1.26	14.50	1.40	20.50	0.56
2.75	0.61	8.75	1.26	14.75	1.40	20.75	0.56
3.00	0.61	9.00	1.26	15.00	1.40	21.00	0.56
3.25	0.61	9.25	1.50	15.25	1.40	21.25	0.56
3.50	0.61	9.50	1.50	15.50	1.40	21.50	0.56
3.75	0.61	9.75	1.68	15.75	1.40	21.75	0.56
4.00	0.61	10.00	1.68	16.00	1.40	22.00	0.56
4.25	0.75	10.25	2.15	16.25	0.84	22.25	0.56
4.50	0.75	10.50	2.15	16.50	0.84	22.50	0.56
4.75	0.75	10.75	2.90	16.75	0.84	22.75	0.56
5.00	0.75	11.00	2.90	17.00	0.84	23.00	0.56
5.25	0.75	11.25	4.49	17.25	0.84	23.25	0.56
5.50	0.75	11.50	4.49	17.50	0.84	23.50	0.56
5.75	0.75	11.75	19.47	17.75	0.84	23.75	0.56
6.00	0.75	12.00	51.67	18.00	0.84	24.00	0.56

CALIB STANDHYD (1000) ID= 1 DT= 2.0 min	Area (ha)= 3.00 Total Imp(%)= 78.60 Dir. Conn.(%)= 78.60

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	2.36	0.64
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	141.37	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 2.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.033	0.51	6.033	0.94	12.033	6.74	18.03	0.84
0.067	0.51	6.067	0.94	12.067	6.74	18.07	0.84
0.100	0.51	6.100	0.94	12.100	6.74	18.10	0.84
0.133	0.51	6.133	0.94	12.133	6.74	18.13	0.84
0.167	0.51	6.167	0.94	12.167	6.74	18.17	0.84
0.200	0.51	6.200	0.94	12.200	6.74	18.20	0.84
0.233	0.51	6.233	0.94	12.233	6.74	18.23	0.84
0.267	0.51	6.267	0.94	12.267	6.74	18.27	0.84
0.300	0.51	6.300	0.94	12.300	6.74	18.30	0.84
0.333	0.51	6.333	0.94	12.333	6.74	18.33	0.84
0.367	0.51	6.367	0.94	12.367	6.74	18.37	0.84
0.400	0.51	6.400	0.94	12.400	6.74	18.40	0.84
0.433	0.51	6.433	0.94	12.433	6.74	18.43	0.84
0.467	0.51	6.467	0.94	12.467	6.74	18.47	0.84
0.500	0.51	6.500	0.94	12.500	6.73	18.50	0.84
0.533	0.51	6.533	0.94	12.533	3.46	18.53	0.84
0.567	0.51	6.567	0.94	12.567	3.46	18.57	0.84
0.600	0.51	6.600	0.94	12.600	3.46	18.60	0.84
0.633	0.51	6.633	0.94	12.633	3.46	18.63	0.84
0.667	0.51	6.667	0.94	12.667	3.46	18.67	0.84
0.700	0.51	6.700	0.94	12.700	3.46	18.70	0.84
0.733	0.51	6.733	0.94	12.733	3.46	18.73	0.84
0.767	0.51	6.767	0.94	12.767	3.46	18.77	0.84
0.800	0.51	6.800	0.94	12.800	3.46	18.80	0.84
0.833	0.51	6.833	0.94	12.833	3.46	18.83	0.84
0.867	0.51	6.867	0.94	12.867	3.46	18.87	0.84
0.900	0.51	6.900	0.94	12.900	3.46	18.90	0.84
0.933	0.51	6.933	0.94	12.933	3.46	18.93	0.84
0.967	0.51	6.967	0.94	12.967	3.46	18.97	0.84
1.000	0.51	7.000	0.94	13.000	3.45	19.00	0.84
1.033	0.51	7.033	0.94	13.033	0.66	19.03	0.84
1.067	0.51	7.067	0.94	13.067	0.66	19.07	0.84
1.100	0.51	7.100	0.94	13.100	0.66	19.10	0.84
1.133	0.51	7.133	0.94	13.133	0.66	19.13	0.84
1.167	0.51	7.167	0.94	13.167	0.66	19.17	0.84
1.200	0.51	7.200	0.94	13.200	0.66	19.20	0.84
1.233	0.51	7.233	0.94	13.233	0.66	19.23	0.84
1.267	0.51	7.267	0.94	13.267	0.66	19.27	0.84
1.300	0.51	7.300	0.94	13.300	0.66	19.30	0.84
1.333	0.51	7.333	0.94	13.333	0.66	19.33	0.84
1.367	0.51	7.367	0.94	13.367	0.66	19.37	0.84
1.400	0.51	7.400	0.94	13.400	0.66	19.40	0.84
1.433	0.51	7.433	0.94	13.433	0.66	19.43	0.84
1.467	0.51	7.467	0.94	13.467	0.66	19.47	0.84
1.500	0.51	7.500	0.94	13.500	0.67	19.50	0.84
1.533	0.51	7.533	0.94	13.533	3.84	19.53	0.84
1.567	0.51	7.567	0.94	13.567	3.84	19.57	0.84
1.600	0.51	7.600	0.94	13.600	3.84	19.60	0.84
1.633	0.51	7.633	0.94	13.633	3.84	19.63	0.84
1.667	0.51	7.667	0.94	13.667	3.84	19.67	0.84
1.700	0.51	7.700	0.94	13.700	3.84	19.70	0.84
1.733	0.51	7.733	0.94	13.733	3.84	19.73	0.84
1.767	0.51	7.767	0.94	13.767	3.84	19.77	0.84
1.800	0.51	7.800	0.94	13.800	3.84	19.80	0.84
1.833	0.51	7.833	0.94	13.833	3.84	19.83	0.84

1.867	0.51	7.867	0.94	13.867	3.84	19.87	0.84
1.900	0.51	7.900	0.94	13.900	3.84	19.90	0.84
1.933	0.51	7.933	0.94	13.933	3.84	19.93	0.84
1.967	0.51	7.967	0.94	13.967	3.84	19.97	0.84
2.000	0.51	8.000	0.94	14.000	3.83	20.00	0.84
2.033	0.61	8.033	1.26	14.033	1.40	20.03	0.56
2.067	0.61	8.067	1.26	14.067	1.40	20.07	0.56
2.100	0.61	8.100	1.26	14.100	1.40	20.10	0.56
2.133	0.61	8.133	1.26	14.133	1.40	20.13	0.56
2.167	0.61	8.167	1.26	14.167	1.40	20.17	0.56
2.200	0.61	8.200	1.26	14.200	1.40	20.20	0.56
2.233	0.61	8.233	1.26	14.233	1.40	20.23	0.56
2.267	0.61	8.267	1.26	14.267	1.40	20.27	0.56
2.300	0.61	8.300	1.26	14.300	1.40	20.30	0.56
2.333	0.61	8.333	1.26	14.333	1.40	20.33	0.56
2.367	0.61	8.367	1.26	14.367	1.40	20.37	0.56
2.400	0.61	8.400	1.26	14.400	1.40	20.40	0.56
2.433	0.61	8.433	1.26	14.433	1.40	20.43	0.56
2.467	0.61	8.467	1.26	14.467	1.40	20.47	0.56
2.500	0.61	8.500	1.26	14.500	1.40	20.50	0.56
2.533	0.61	8.533	1.26	14.533	1.40	20.53	0.56
2.567	0.61	8.567	1.26	14.567	1.40	20.57	0.56
2.600	0.61	8.600	1.26	14.600	1.40	20.60	0.56
2.633	0.61	8.633	1.26	14.633	1.40	20.63	0.56
2.667	0.61	8.667	1.26	14.667	1.40	20.67	0.56
2.700	0.61	8.700	1.26	14.700	1.40	20.70	0.56
2.733	0.61	8.733	1.26	14.733	1.40	20.73	0.56
2.767	0.61	8.767	1.26	14.767	1.40	20.77	0.56
2.800	0.61	8.800	1.26	14.800	1.40	20.80	0.56
2.833	0.61	8.833	1.26	14.833	1.40	20.83	0.56
2.867	0.61	8.867	1.26	14.867	1.40	20.87	0.56
2.900	0.61	8.900	1.26	14.900	1.40	20.90	0.56
2.933	0.61	8.933	1.26	14.933	1.40	20.93	0.56
2.967	0.61	8.967	1.26	14.967	1.40	20.97	0.56
3.000	0.61	9.000	1.26	15.000	1.40	21.00	0.56
3.033	0.61	9.033	1.50	15.033	1.40	21.03	0.56
3.067	0.61	9.067	1.50	15.067	1.40	21.07	0.56
3.100	0.61	9.100	1.50	15.100	1.40	21.10	0.56
3.133	0.61	9.133	1.50	15.133	1.40	21.13	0.56
3.167	0.61	9.167	1.50	15.167	1.40	21.17	0.56
3.200	0.61	9.200	1.50	15.200	1.40	21.20	0.56
3.233	0.61	9.233	1.50	15.233	1.40	21.23	0.56
3.267	0.61	9.267	1.50	15.267	1.40	21.27	0.56
3.300	0.61	9.300	1.50	15.300	1.40	21.30	0.56
3.333	0.61	9.333	1.50	15.333	1.40	21.33	0.56
3.367	0.61	9.367	1.50	15.367	1.40	21.37	0.56
3.400	0.61	9.400	1.50	15.400	1.40	21.40	0.56
3.433	0.61	9.433	1.50	15.433	1.40	21.43	0.56
3.467	0.61	9.467	1.50	15.467	1.40	21.47	0.56
3.500	0.61	9.500	1.50	15.500	1.40	21.50	0.56
3.533	0.61	9.533	1.68	15.533	1.40	21.53	0.56
3.567	0.61	9.567	1.68	15.567	1.40	21.57	0.56
3.600	0.61	9.600	1.68	15.600	1.40	21.60	0.56
3.633	0.61	9.633	1.68	15.633	1.40	21.63	0.56
3.667	0.61	9.667	1.68	15.667	1.40	21.67	0.56
3.700	0.61	9.700	1.68	15.700	1.40	21.70	0.56
3.733	0.61	9.733	1.68	15.733	1.40	21.73	0.56
3.767	0.61	9.767	1.68	15.767	1.40	21.77	0.56
3.800	0.61	9.800	1.68	15.800	1.40	21.80	0.56
3.833	0.61	9.833	1.68	15.833	1.40	21.83	0.56
3.867	0.61	9.867	1.68	15.867	1.40	21.87	0.56

3.900	0.61	9.900	1.68	15.900	1.40	21.90	0.56
3.933	0.61	9.933	1.68	15.933	1.40	21.93	0.56
3.967	0.61	9.967	1.68	15.967	1.40	21.97	0.56
4.000	0.61	10.000	1.68	16.000	1.40	22.00	0.56
4.033	0.75	10.033	2.15	16.033	0.84	22.03	0.56
4.067	0.75	10.067	2.15	16.067	0.84	22.07	0.56
4.100	0.75	10.100	2.15	16.100	0.84	22.10	0.56
4.133	0.75	10.133	2.15	16.133	0.84	22.13	0.56
4.167	0.75	10.167	2.15	16.167	0.84	22.17	0.56
4.200	0.75	10.200	2.15	16.200	0.84	22.20	0.56
4.233	0.75	10.233	2.15	16.233	0.84	22.23	0.56
4.267	0.75	10.267	2.15	16.267	0.84	22.27	0.56
4.300	0.75	10.300	2.15	16.300	0.84	22.30	0.56
4.333	0.75	10.333	2.15	16.333	0.84	22.33	0.56
4.367	0.75	10.367	2.15	16.367	0.84	22.37	0.56
4.400	0.75	10.400	2.15	16.400	0.84	22.40	0.56
4.433	0.75	10.433	2.15	16.433	0.84	22.43	0.56
4.467	0.75	10.467	2.15	16.467	0.84	22.47	0.56
4.500	0.75	10.500	2.15	16.500	0.84	22.50	0.56
4.533	0.75	10.533	2.90	16.533	0.84	22.53	0.56
4.567	0.75	10.567	2.90	16.567	0.84	22.57	0.56
4.600	0.75	10.600	2.90	16.600	0.84	22.60	0.56
4.633	0.75	10.633	2.90	16.633	0.84	22.63	0.56
4.667	0.75	10.667	2.90	16.667	0.84	22.67	0.56
4.700	0.75	10.700	2.90	16.700	0.84	22.70	0.56
4.733	0.75	10.733	2.90	16.733	0.84	22.73	0.56
4.767	0.75	10.767	2.90	16.767	0.84	22.77	0.56
4.800	0.75	10.800	2.90	16.800	0.84	22.80	0.56
4.833	0.75	10.833	2.90	16.833	0.84	22.83	0.56
4.867	0.75	10.867	2.90	16.867	0.84	22.87	0.56
4.900	0.75	10.900	2.90	16.900	0.84	22.90	0.56
4.933	0.75	10.933	2.90	16.933	0.84	22.93	0.56
4.967	0.75	10.967	2.90	16.967	0.84	22.97	0.56
5.000	0.75	11.000	2.90	17.000	0.84	23.00	0.56
5.033	0.75	11.033	4.49	17.033	0.84	23.03	0.56
5.067	0.75	11.067	4.49	17.067	0.84	23.07	0.56
5.100	0.75	11.100	4.49	17.100	0.84	23.10	0.56
5.133	0.75	11.133	4.49	17.133	0.84	23.13	0.56
5.167	0.75	11.167	4.49	17.167	0.84	23.17	0.56
5.200	0.75	11.200	4.49	17.200	0.84	23.20	0.56
5.233	0.75	11.233	4.49	17.233	0.84	23.23	0.56
5.267	0.75	11.267	4.49	17.267	0.84	23.27	0.56
5.300	0.75	11.300	4.49	17.300	0.84	23.30	0.56
5.333	0.75	11.333	4.49	17.333	0.84	23.33	0.56
5.367	0.75	11.367	4.49	17.367	0.84	23.37	0.56
5.400	0.75	11.400	4.49	17.400	0.84	23.40	0.56
5.433	0.75	11.433	4.49	17.433	0.84	23.43	0.56
5.467	0.75	11.467	4.49	17.467	0.84	23.47	0.56
5.500	0.75	11.500	4.51	17.500	0.84	23.50	0.56
5.533	0.75	11.533	19.47	17.533	0.84	23.53	0.56
5.567	0.75	11.567	19.47	17.567	0.84	23.57	0.56
5.600	0.75	11.600	19.47	17.600	0.84	23.60	0.56
5.633	0.75	11.633	19.47	17.633	0.84	23.63	0.56
5.667	0.75	11.667	19.47	17.667	0.84	23.67	0.56
5.700	0.75	11.700	19.47	17.700	0.84	23.70	0.56
5.733	0.75	11.733	19.47	17.733	0.84	23.73	0.56
5.767	0.75	11.767	35.61	17.767	0.84	23.77	0.56
5.800	0.75	11.800	51.67	17.800	0.84	23.80	0.56
5.833	0.75	11.833	51.67	17.833	0.84	23.83	0.56
5.867	0.75	11.867	51.67	17.867	0.84	23.87	0.56
5.900	0.75	11.900	51.67	17.900	0.84	23.90	0.56

5.933	0.75	11.933	51.67	17.933	0.84	23.93	0.56
5.967	0.75	11.967	51.67	17.967	0.84	23.97	0.56
6.000	0.75	12.000	51.61	18.000	0.84	24.00	0.56

Max.Eff.Inten.(mm/hr)=	51.67	7.27	
over (min)	5.00	10.00	
Storage Coeff. (min)=	4.10 (ii)	9.56 (ii)	
Unit Hyd. Tpeak (min)=	4.00	10.00	
Unit Hyd. peak (cms)=	0.28	0.12	
			TOTALS
PEAK FLOW (cms)=	0.33	0.01	0.339 (iii)
TIME TO PEAK (hrs)=	12.00	12.07	12.00
RUNOFF VOLUME (mm)=	45.77	5.51	37.16
TOTAL RAINFALL (mm)=	46.77	46.77	46.77
RUNOFF COEFFICIENT =	0.98	0.12	0.79

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 48.0 Ia = Dep. 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(3001)|
| IN= 2---> OUT= 1 |
| DT= 2.0 min |

OVERFLOW IS OFF

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.0391	0.0880
0.0028	0.0061	0.0527	0.0958
0.0096	0.0158	0.0660	0.1032
0.0131	0.0255	0.0762	0.1100
0.0157	0.0350	0.0856	0.1159
0.0180	0.0443	0.0932	0.1209
0.0201	0.0535	0.1001	0.1256
0.0219	0.0625	0.1066	0.1304
0.0238	0.0713	0.1155	0.1376
0.0254	0.0798	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (1000)	2.998	0.339	12.00	37.16
OUTFLOW: ID= 1 (3001)	2.998	0.022	13.03	36.97

PEAK FLOW REDUCTION [Qout/Qin](%)= 6.49
TIME SHIFT OF PEAK FLOW (min)= 62.00
MAXIMUM STORAGE USED (ha.m.)= 0.0629

| CALIB |
| STANDHYD (1100)|
|ID= 1 DT= 2.0 min |

Area (ha)= 0.09
Total Imp(%)= 26.30 Dir. Conn.(%)= 26.30

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	0.02	0.07
Dep. Storage (mm)=	1.00	5.00
Average Slope (%)=	1.00	2.00
Length (m)=	25.17	40.00
Mannings n =	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 2.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.033	0.51	6.033	0.94	12.033	6.74	18.03	0.84
0.067	0.51	6.067	0.94	12.067	6.74	18.07	0.84
0.100	0.51	6.100	0.94	12.100	6.74	18.10	0.84
0.133	0.51	6.133	0.94	12.133	6.74	18.13	0.84
0.167	0.51	6.167	0.94	12.167	6.74	18.17	0.84
0.200	0.51	6.200	0.94	12.200	6.74	18.20	0.84
0.233	0.51	6.233	0.94	12.233	6.74	18.23	0.84
0.267	0.51	6.267	0.94	12.267	6.74	18.27	0.84
0.300	0.51	6.300	0.94	12.300	6.74	18.30	0.84
0.333	0.51	6.333	0.94	12.333	6.74	18.33	0.84
0.367	0.51	6.367	0.94	12.367	6.74	18.37	0.84
0.400	0.51	6.400	0.94	12.400	6.74	18.40	0.84
0.433	0.51	6.433	0.94	12.433	6.74	18.43	0.84
0.467	0.51	6.467	0.94	12.467	6.74	18.47	0.84
0.500	0.51	6.500	0.94	12.500	6.73	18.50	0.84
0.533	0.51	6.533	0.94	12.533	3.46	18.53	0.84
0.567	0.51	6.567	0.94	12.567	3.46	18.57	0.84
0.600	0.51	6.600	0.94	12.600	3.46	18.60	0.84
0.633	0.51	6.633	0.94	12.633	3.46	18.63	0.84
0.667	0.51	6.667	0.94	12.667	3.46	18.67	0.84
0.700	0.51	6.700	0.94	12.700	3.46	18.70	0.84
0.733	0.51	6.733	0.94	12.733	3.46	18.73	0.84
0.767	0.51	6.767	0.94	12.767	3.46	18.77	0.84
0.800	0.51	6.800	0.94	12.800	3.46	18.80	0.84
0.833	0.51	6.833	0.94	12.833	3.46	18.83	0.84
0.867	0.51	6.867	0.94	12.867	3.46	18.87	0.84
0.900	0.51	6.900	0.94	12.900	3.46	18.90	0.84
0.933	0.51	6.933	0.94	12.933	3.46	18.93	0.84
0.967	0.51	6.967	0.94	12.967	3.46	18.97	0.84
1.000	0.51	7.000	0.94	13.000	3.45	19.00	0.84
1.033	0.51	7.033	0.94	13.033	0.66	19.03	0.84
1.067	0.51	7.067	0.94	13.067	0.66	19.07	0.84
1.100	0.51	7.100	0.94	13.100	0.66	19.10	0.84
1.133	0.51	7.133	0.94	13.133	0.66	19.13	0.84
1.167	0.51	7.167	0.94	13.167	0.66	19.17	0.84
1.200	0.51	7.200	0.94	13.200	0.66	19.20	0.84
1.233	0.51	7.233	0.94	13.233	0.66	19.23	0.84
1.267	0.51	7.267	0.94	13.267	0.66	19.27	0.84
1.300	0.51	7.300	0.94	13.300	0.66	19.30	0.84
1.333	0.51	7.333	0.94	13.333	0.66	19.33	0.84
1.367	0.51	7.367	0.94	13.367	0.66	19.37	0.84
1.400	0.51	7.400	0.94	13.400	0.66	19.40	0.84
1.433	0.51	7.433	0.94	13.433	0.66	19.43	0.84
1.467	0.51	7.467	0.94	13.467	0.66	19.47	0.84
1.500	0.51	7.500	0.94	13.500	0.67	19.50	0.84
1.533	0.51	7.533	0.94	13.533	3.84	19.53	0.84
1.567	0.51	7.567	0.94	13.567	3.84	19.57	0.84
1.600	0.51	7.600	0.94	13.600	3.84	19.60	0.84
1.633	0.51	7.633	0.94	13.633	3.84	19.63	0.84
1.667	0.51	7.667	0.94	13.667	3.84	19.67	0.84
1.700	0.51	7.700	0.94	13.700	3.84	19.70	0.84
1.733	0.51	7.733	0.94	13.733	3.84	19.73	0.84
1.767	0.51	7.767	0.94	13.767	3.84	19.77	0.84
1.800	0.51	7.800	0.94	13.800	3.84	19.80	0.84

1.833	0.51	7.833	0.94	13.833	3.84	19.83	0.84
1.867	0.51	7.867	0.94	13.867	3.84	19.87	0.84
1.900	0.51	7.900	0.94	13.900	3.84	19.90	0.84
1.933	0.51	7.933	0.94	13.933	3.84	19.93	0.84
1.967	0.51	7.967	0.94	13.967	3.84	19.97	0.84
2.000	0.51	8.000	0.94	14.000	3.83	20.00	0.84
2.033	0.61	8.033	1.26	14.033	1.40	20.03	0.56
2.067	0.61	8.067	1.26	14.067	1.40	20.07	0.56
2.100	0.61	8.100	1.26	14.100	1.40	20.10	0.56
2.133	0.61	8.133	1.26	14.133	1.40	20.13	0.56
2.167	0.61	8.167	1.26	14.167	1.40	20.17	0.56
2.200	0.61	8.200	1.26	14.200	1.40	20.20	0.56
2.233	0.61	8.233	1.26	14.233	1.40	20.23	0.56
2.267	0.61	8.267	1.26	14.267	1.40	20.27	0.56
2.300	0.61	8.300	1.26	14.300	1.40	20.30	0.56
2.333	0.61	8.333	1.26	14.333	1.40	20.33	0.56
2.367	0.61	8.367	1.26	14.367	1.40	20.37	0.56
2.400	0.61	8.400	1.26	14.400	1.40	20.40	0.56
2.433	0.61	8.433	1.26	14.433	1.40	20.43	0.56
2.467	0.61	8.467	1.26	14.467	1.40	20.47	0.56
2.500	0.61	8.500	1.26	14.500	1.40	20.50	0.56
2.533	0.61	8.533	1.26	14.533	1.40	20.53	0.56
2.567	0.61	8.567	1.26	14.567	1.40	20.57	0.56
2.600	0.61	8.600	1.26	14.600	1.40	20.60	0.56
2.633	0.61	8.633	1.26	14.633	1.40	20.63	0.56
2.667	0.61	8.667	1.26	14.667	1.40	20.67	0.56
2.700	0.61	8.700	1.26	14.700	1.40	20.70	0.56
2.733	0.61	8.733	1.26	14.733	1.40	20.73	0.56
2.767	0.61	8.767	1.26	14.767	1.40	20.77	0.56
2.800	0.61	8.800	1.26	14.800	1.40	20.80	0.56
2.833	0.61	8.833	1.26	14.833	1.40	20.83	0.56
2.867	0.61	8.867	1.26	14.867	1.40	20.87	0.56
2.900	0.61	8.900	1.26	14.900	1.40	20.90	0.56
2.933	0.61	8.933	1.26	14.933	1.40	20.93	0.56
2.967	0.61	8.967	1.26	14.967	1.40	20.97	0.56
3.000	0.61	9.000	1.26	15.000	1.40	21.00	0.56
3.033	0.61	9.033	1.50	15.033	1.40	21.03	0.56
3.067	0.61	9.067	1.50	15.067	1.40	21.07	0.56
3.100	0.61	9.100	1.50	15.100	1.40	21.10	0.56
3.133	0.61	9.133	1.50	15.133	1.40	21.13	0.56
3.167	0.61	9.167	1.50	15.167	1.40	21.17	0.56
3.200	0.61	9.200	1.50	15.200	1.40	21.20	0.56
3.233	0.61	9.233	1.50	15.233	1.40	21.23	0.56
3.267	0.61	9.267	1.50	15.267	1.40	21.27	0.56
3.300	0.61	9.300	1.50	15.300	1.40	21.30	0.56
3.333	0.61	9.333	1.50	15.333	1.40	21.33	0.56
3.367	0.61	9.367	1.50	15.367	1.40	21.37	0.56
3.400	0.61	9.400	1.50	15.400	1.40	21.40	0.56
3.433	0.61	9.433	1.50	15.433	1.40	21.43	0.56
3.467	0.61	9.467	1.50	15.467	1.40	21.47	0.56
3.500	0.61	9.500	1.50	15.500	1.40	21.50	0.56
3.533	0.61	9.533	1.68	15.533	1.40	21.53	0.56
3.567	0.61	9.567	1.68	15.567	1.40	21.57	0.56
3.600	0.61	9.600	1.68	15.600	1.40	21.60	0.56
3.633	0.61	9.633	1.68	15.633	1.40	21.63	0.56
3.667	0.61	9.667	1.68	15.667	1.40	21.67	0.56
3.700	0.61	9.700	1.68	15.700	1.40	21.70	0.56
3.733	0.61	9.733	1.68	15.733	1.40	21.73	0.56
3.767	0.61	9.767	1.68	15.767	1.40	21.77	0.56
3.800	0.61	9.800	1.68	15.800	1.40	21.80	0.56
3.833	0.61	9.833	1.68	15.833	1.40	21.83	0.56

3.867	0.61	9.867	1.68	15.867	1.40	21.87	0.56
3.900	0.61	9.900	1.68	15.900	1.40	21.90	0.56
3.933	0.61	9.933	1.68	15.933	1.40	21.93	0.56
3.967	0.61	9.967	1.68	15.967	1.40	21.97	0.56
4.000	0.61	10.000	1.68	16.000	1.40	22.00	0.56
4.033	0.75	10.033	2.15	16.033	0.84	22.03	0.56
4.067	0.75	10.067	2.15	16.067	0.84	22.07	0.56
4.100	0.75	10.100	2.15	16.100	0.84	22.10	0.56
4.133	0.75	10.133	2.15	16.133	0.84	22.13	0.56
4.167	0.75	10.167	2.15	16.167	0.84	22.17	0.56
4.200	0.75	10.200	2.15	16.200	0.84	22.20	0.56
4.233	0.75	10.233	2.15	16.233	0.84	22.23	0.56
4.267	0.75	10.267	2.15	16.267	0.84	22.27	0.56
4.300	0.75	10.300	2.15	16.300	0.84	22.30	0.56
4.333	0.75	10.333	2.15	16.333	0.84	22.33	0.56
4.367	0.75	10.367	2.15	16.367	0.84	22.37	0.56
4.400	0.75	10.400	2.15	16.400	0.84	22.40	0.56
4.433	0.75	10.433	2.15	16.433	0.84	22.43	0.56
4.467	0.75	10.467	2.15	16.467	0.84	22.47	0.56
4.500	0.75	10.500	2.15	16.500	0.84	22.50	0.56
4.533	0.75	10.533	2.90	16.533	0.84	22.53	0.56
4.567	0.75	10.567	2.90	16.567	0.84	22.57	0.56
4.600	0.75	10.600	2.90	16.600	0.84	22.60	0.56
4.633	0.75	10.633	2.90	16.633	0.84	22.63	0.56
4.667	0.75	10.667	2.90	16.667	0.84	22.67	0.56
4.700	0.75	10.700	2.90	16.700	0.84	22.70	0.56
4.733	0.75	10.733	2.90	16.733	0.84	22.73	0.56
4.767	0.75	10.767	2.90	16.767	0.84	22.77	0.56
4.800	0.75	10.800	2.90	16.800	0.84	22.80	0.56
4.833	0.75	10.833	2.90	16.833	0.84	22.83	0.56
4.867	0.75	10.867	2.90	16.867	0.84	22.87	0.56
4.900	0.75	10.900	2.90	16.900	0.84	22.90	0.56
4.933	0.75	10.933	2.90	16.933	0.84	22.93	0.56
4.967	0.75	10.967	2.90	16.967	0.84	22.97	0.56
5.000	0.75	11.000	2.90	17.000	0.84	23.00	0.56
5.033	0.75	11.033	4.49	17.033	0.84	23.03	0.56
5.067	0.75	11.067	4.49	17.067	0.84	23.07	0.56
5.100	0.75	11.100	4.49	17.100	0.84	23.10	0.56
5.133	0.75	11.133	4.49	17.133	0.84	23.13	0.56
5.167	0.75	11.167	4.49	17.167	0.84	23.17	0.56
5.200	0.75	11.200	4.49	17.200	0.84	23.20	0.56
5.233	0.75	11.233	4.49	17.233	0.84	23.23	0.56
5.267	0.75	11.267	4.49	17.267	0.84	23.27	0.56
5.300	0.75	11.300	4.49	17.300	0.84	23.30	0.56
5.333	0.75	11.333	4.49	17.333	0.84	23.33	0.56
5.367	0.75	11.367	4.49	17.367	0.84	23.37	0.56
5.400	0.75	11.400	4.49	17.400	0.84	23.40	0.56
5.433	0.75	11.433	4.49	17.433	0.84	23.43	0.56
5.467	0.75	11.467	4.49	17.467	0.84	23.47	0.56
5.500	0.75	11.500	4.51	17.500	0.84	23.50	0.56
5.533	0.75	11.533	19.47	17.533	0.84	23.53	0.56
5.567	0.75	11.567	19.47	17.567	0.84	23.57	0.56
5.600	0.75	11.600	19.47	17.600	0.84	23.60	0.56
5.633	0.75	11.633	19.47	17.633	0.84	23.63	0.56
5.667	0.75	11.667	19.47	17.667	0.84	23.67	0.56
5.700	0.75	11.700	19.47	17.700	0.84	23.70	0.56
5.733	0.75	11.733	19.47	17.733	0.84	23.73	0.56
5.767	0.75	11.767	35.61	17.767	0.84	23.77	0.56
5.800	0.75	11.800	51.67	17.800	0.84	23.80	0.56
5.833	0.75	11.833	51.67	17.833	0.84	23.83	0.56
5.867	0.75	11.867	51.67	17.867	0.84	23.87	0.56

5.900	0.75	11.900	51.67	17.900	0.84	23.90	0.56
5.933	0.75	11.933	51.67	17.933	0.84	23.93	0.56
5.967	0.75	11.967	51.67	17.967	0.84	23.97	0.56
6.000	0.75	12.000	51.61	18.000	0.84	24.00	0.56

```
     Max.Eff.Inten.(mm/hr)=      51.67         4.71
                over (min)        5.00        26.00
     Storage Coeff.  (min)=       1.45 (ii)   25.41 (ii)
     Unit Hyd. Tpeak (min)=       4.00        26.00
     Unit Hyd. peak  (cms)=       0.46         0.04
                                                           *TOTALS*
     PEAK FLOW       (cms)=       0.00         0.00          0.004 (iii)
     TIME TO PEAK    (hrs)=      11.97        12.33         12.00
     RUNOFF VOLUME    (mm)=      45.78         5.51         13.86
     TOTAL RAINFALL   (mm)=      46.77        46.77         46.77
     RUNOFF COEFFICIENT   =       0.98         0.12          0.30

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  48.0    Ia = Dep. 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  (  2002)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  1100):      0.09   0.004    12.00    13.86
      + ID2= 2 (  3001):      3.00   0.022    13.03    36.97
        ===================================================
        ID = 3 (  2002):      3.09   0.023    12.50    36.26

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

       V    V   I    SSSSS  U   U    A    L               (v 6.2.2001)
       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 6.2\VO2\voin.dat

Output filename:
C:\Users\zhouj\AppData\Local\Civica\VH5\642fa701-08f9-4281-a674-e9ad409f1aac\aff73637-34af-49cf-aac3-ec66752ab0c6\scenar
Summary filename:
C:\Users\zhouj\AppData\Local\Civica\VH5\642fa701-08f9-4281-a674-e9ad409f1aac\aff73637-34af-49cf-aac3-ec66752ab0c6\scenar

DATE: 09-13-2023   TIME: 11:19:07

USER:

COMMENTS: ____

```
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------------------------
  **********************************************
  ** SIMULATION : Run 08                      **
  **********************************************

--------------------
|    READ STORM    |    Filename: C:\Users\zhouj\AppD
|                  |              ata\Local\Temp\
|                  |              8a0057db-68f2-4cf6-9613-b4e66717427d\c20b8fe9
| Ptotal= 59.94 mm |    Comments: 5yr24hrSCS_Midland
--------------------
```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	' TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	0.66	6.25	1.20	12.25	8.63	18.25	1.08
0.50	0.66	6.50	1.20	12.50	8.63	18.50	1.08
0.75	0.66	6.75	1.20	12.75	4.43	18.75	1.08
1.00	0.66	7.00	1.20	13.00	4.43	19.00	1.08
1.25	0.66	7.25	1.20	13.25	0.84	19.25	1.08
1.50	0.66	7.50	1.20	13.50	0.84	19.50	1.08
1.75	0.66	7.75	1.20	13.75	4.91	19.75	1.08
2.00	0.66	8.00	1.20	14.00	4.91	20.00	1.08
2.25	0.78	8.25	1.62	14.25	1.80	20.25	0.72
2.50	0.78	8.50	1.62	14.50	1.80	20.50	0.72
2.75	0.78	8.75	1.62	14.75	1.80	20.75	0.72
3.00	0.78	9.00	1.62	15.00	1.80	21.00	0.72
3.25	0.78	9.25	1.92	15.25	1.80	21.25	0.72
3.50	0.78	9.50	1.92	15.50	1.80	21.50	0.72
3.75	0.78	9.75	2.16	15.75	1.80	21.75	0.72
4.00	0.78	10.00	2.16	16.00	1.80	22.00	0.72
4.25	0.96	10.25	2.76	16.25	1.08	22.25	0.72
4.50	0.96	10.50	2.76	16.50	1.08	22.50	0.72
4.75	0.96	10.75	3.71	16.75	1.08	22.75	0.72
5.00	0.96	11.00	3.71	17.00	1.08	23.00	0.72
5.25	0.96	11.25	5.75	17.25	1.08	23.25	0.72
5.50	0.96	11.50	5.75	17.50	1.08	23.50	0.72
5.75	0.96	11.75	24.92	17.75	1.08	23.75	0.72
6.00	0.96	12.00	66.13	18.00	1.08	24.00	0.72

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| CALIB            |
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```
| STANDHYD (  1000)|   Area    (ha)=   3.00
|ID= 1 DT= 2.0 min |   Total Imp(%)=  78.60   Dir. Conn.(%)=  78.60
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      2.36         0.64
     Dep. Storage     (mm)=      1.00         5.00
     Average Slope     (%)=      1.00         2.00
     Length            (m)=    141.37        40.00
     Mannings n          =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   2.0 MIN. TIME STEP.
```

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	' TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.033	0.66	6.033	1.20	12.033	8.63	18.03	1.08
0.067	0.66	6.067	1.20	12.067	8.63	18.07	1.08
0.100	0.66	6.100	1.20	12.100	8.63	18.10	1.08
0.133	0.66	6.133	1.20	12.133	8.63	18.13	1.08
0.167	0.66	6.167	1.20	12.167	8.63	18.17	1.08
0.200	0.66	6.200	1.20	12.200	8.63	18.20	1.08
0.233	0.66	6.233	1.20	12.233	8.63	18.23	1.08
0.267	0.66	6.267	1.20	12.267	8.63	18.27	1.08
0.300	0.66	6.300	1.20	12.300	8.63	18.30	1.08
0.333	0.66	6.333	1.20	12.333	8.63	18.33	1.08
0.367	0.66	6.367	1.20	12.367	8.63	18.37	1.08
0.400	0.66	6.400	1.20	12.400	8.63	18.40	1.08
0.433	0.66	6.433	1.20	12.433	8.63	18.43	1.08
0.467	0.66	6.467	1.20	12.467	8.63	18.47	1.08
0.500	0.66	6.500	1.20	12.500	8.63	18.50	1.08
0.533	0.66	6.533	1.20	12.533	4.43	18.53	1.08
0.567	0.66	6.567	1.20	12.567	4.43	18.57	1.08
0.600	0.66	6.600	1.20	12.600	4.43	18.60	1.08
0.633	0.66	6.633	1.20	12.633	4.43	18.63	1.08
0.667	0.66	6.667	1.20	12.667	4.43	18.67	1.08
0.700	0.66	6.700	1.20	12.700	4.43	18.70	1.08
0.733	0.66	6.733	1.20	12.733	4.43	18.73	1.08
0.767	0.66	6.767	1.20	12.767	4.43	18.77	1.08
0.800	0.66	6.800	1.20	12.800	4.43	18.80	1.08
0.833	0.66	6.833	1.20	12.833	4.43	18.83	1.08
0.867	0.66	6.867	1.20	12.867	4.43	18.87	1.08
0.900	0.66	6.900	1.20	12.900	4.43	18.90	1.08
0.933	0.66	6.933	1.20	12.933	4.43	18.93	1.08
0.967	0.66	6.967	1.20	12.967	4.43	18.97	1.08
1.000	0.66	7.000	1.20	13.000	4.42	19.00	1.08
1.033	0.66	7.033	1.20	13.033	0.84	19.03	1.08
1.067	0.66	7.067	1.20	13.067	0.84	19.07	1.08
1.100	0.66	7.100	1.20	13.100	0.84	19.10	1.08
1.133	0.66	7.133	1.20	13.133	0.84	19.13	1.08
1.167	0.66	7.167	1.20	13.167	0.84	19.17	1.08
1.200	0.66	7.200	1.20	13.200	0.84	19.20	1.08
1.233	0.66	7.233	1.20	13.233	0.84	19.23	1.08
1.267	0.66	7.267	1.20	13.267	0.84	19.27	1.08
1.300	0.66	7.300	1.20	13.300	0.84	19.30	1.08
1.333	0.66	7.333	1.20	13.333	0.84	19.33	1.08
1.367	0.66	7.367	1.20	13.367	0.84	19.37	1.08
1.400	0.66	7.400	1.20	13.400	0.84	19.40	1.08
1.433	0.66	7.433	1.20	13.433	0.84	19.43	1.08
1.467	0.66	7.467	1.20	13.467	0.84	19.47	1.08
1.500	0.66	7.500	1.20	13.500	0.85	19.50	1.08

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1.533    0.66 | 7.533    1.20 |13.533    4.91 | 19.53    1.08
1.567    0.66 | 7.567    1.20 |13.567    4.91 | 19.57    1.08
1.600    0.66 | 7.600    1.20 |13.600    4.91 | 19.60    1.08
1.633    0.66 | 7.633    1.20 |13.633    4.91 | 19.63    1.08
1.667    0.66 | 7.667    1.20 |13.667    4.91 | 19.67    1.08
1.700    0.66 | 7.700    1.20 |13.700    4.91 | 19.70    1.08
1.733    0.66 | 7.733    1.20 |13.733    4.91 | 19.73    1.08
1.767    0.66 | 7.767    1.20 |13.767    4.91 | 19.77    1.08
1.800    0.66 | 7.800    1.20 |13.800    4.91 | 19.80    1.08
1.833    0.66 | 7.833    1.20 |13.833    4.91 | 19.83    1.08
1.867    0.66 | 7.867    1.20 |13.867    4.91 | 19.87    1.08
1.900    0.66 | 7.900    1.20 |13.900    4.91 | 19.90    1.08
1.933    0.66 | 7.933    1.20 |13.933    4.91 | 19.93    1.08
1.967    0.66 | 7.967    1.20 |13.967    4.91 | 19.97    1.08
2.000    0.66 | 8.000    1.20 |14.000    4.90 | 20.00    1.08
2.033    0.78 | 8.033    1.62 |14.033    1.80 | 20.03    0.72
2.067    0.78 | 8.067    1.62 |14.067    1.80 | 20.07    0.72
2.100    0.78 | 8.100    1.62 |14.100    1.80 | 20.10    0.72
2.133    0.78 | 8.133    1.62 |14.133    1.80 | 20.13    0.72
2.167    0.78 | 8.167    1.62 |14.167    1.80 | 20.17    0.72
2.200    0.78 | 8.200    1.62 |14.200    1.80 | 20.20    0.72
2.233    0.78 | 8.233    1.62 |14.233    1.80 | 20.23    0.72
2.267    0.78 | 8.267    1.62 |14.267    1.80 | 20.27    0.72
2.300    0.78 | 8.300    1.62 |14.300    1.80 | 20.30    0.72
2.333    0.78 | 8.333    1.62 |14.333    1.80 | 20.33    0.72
2.367    0.78 | 8.367    1.62 |14.367    1.80 | 20.37    0.72
2.400    0.78 | 8.400    1.62 |14.400    1.80 | 20.40    0.72
2.433    0.78 | 8.433    1.62 |14.433    1.80 | 20.43    0.72
2.467    0.78 | 8.467    1.62 |14.467    1.80 | 20.47    0.72
2.500    0.78 | 8.500    1.62 |14.500    1.80 | 20.50    0.72
2.533    0.78 | 8.533    1.62 |14.533    1.80 | 20.53    0.72
2.567    0.78 | 8.567    1.62 |14.567    1.80 | 20.57    0.72
2.600    0.78 | 8.600    1.62 |14.600    1.80 | 20.60    0.72
2.633    0.78 | 8.633    1.62 |14.633    1.80 | 20.63    0.72
2.667    0.78 | 8.667    1.62 |14.667    1.80 | 20.67    0.72
2.700    0.78 | 8.700    1.62 |14.700    1.80 | 20.70    0.72
2.733    0.78 | 8.733    1.62 |14.733    1.80 | 20.73    0.72
2.767    0.78 | 8.767    1.62 |14.767    1.80 | 20.77    0.72
2.800    0.78 | 8.800    1.62 |14.800    1.80 | 20.80    0.72
2.833    0.78 | 8.833    1.62 |14.833    1.80 | 20.83    0.72
2.867    0.78 | 8.867    1.62 |14.867    1.80 | 20.87    0.72
2.900    0.78 | 8.900    1.62 |14.900    1.80 | 20.90    0.72
2.933    0.78 | 8.933    1.62 |14.933    1.80 | 20.93    0.72
2.967    0.78 | 8.967    1.62 |14.967    1.80 | 20.97    0.72
3.000    0.78 | 9.000    1.62 |15.000    1.80 | 21.00    0.72
3.033    0.78 | 9.033    1.92 |15.033    1.80 | 21.03    0.72
3.067    0.78 | 9.067    1.92 |15.067    1.80 | 21.07    0.72
3.100    0.78 | 9.100    1.92 |15.100    1.80 | 21.10    0.72
3.133    0.78 | 9.133    1.92 |15.133    1.80 | 21.13    0.72
3.167    0.78 | 9.167    1.92 |15.167    1.80 | 21.17    0.72
3.200    0.78 | 9.200    1.92 |15.200    1.80 | 21.20    0.72
3.233    0.78 | 9.233    1.92 |15.233    1.80 | 21.23    0.72
3.267    0.78 | 9.267    1.92 |15.267    1.80 | 21.27    0.72
3.300    0.78 | 9.300    1.92 |15.300    1.80 | 21.30    0.72
3.333    0.78 | 9.333    1.92 |15.333    1.80 | 21.33    0.72
3.367    0.78 | 9.367    1.92 |15.367    1.80 | 21.37    0.72
3.400    0.78 | 9.400    1.92 |15.400    1.80 | 21.40    0.72
3.433    0.78 | 9.433    1.92 |15.433    1.80 | 21.43    0.72
3.467    0.78 | 9.467    1.92 |15.467    1.80 | 21.47    0.72
3.500    0.78 | 9.500    1.92 |15.500    1.80 | 21.50    0.72
3.533    0.78 | 9.533    2.16 |15.533    1.80 | 21.53    0.72
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3.567    0.78 | 9.567    2.16 |15.567    1.80 | 21.57    0.72
3.600    0.78 | 9.600    2.16 |15.600    1.80 | 21.60    0.72
3.633    0.78 | 9.633    2.16 |15.633    1.80 | 21.63    0.72
3.667    0.78 | 9.667    2.16 |15.667    1.80 | 21.67    0.72
3.700    0.78 | 9.700    2.16 |15.700    1.80 | 21.70    0.72
3.733    0.78 | 9.733    2.16 |15.733    1.80 | 21.73    0.72
3.767    0.78 | 9.767    2.16 |15.767    1.80 | 21.77    0.72
3.800    0.78 | 9.800    2.16 |15.800    1.80 | 21.80    0.72
3.833    0.78 | 9.833    2.16 |15.833    1.80 | 21.83    0.72
3.867    0.78 | 9.867    2.16 |15.867    1.80 | 21.87    0.72
3.900    0.78 | 9.900    2.16 |15.900    1.80 | 21.90    0.72
3.933    0.78 | 9.933    2.16 |15.933    1.80 | 21.93    0.72
3.967    0.78 | 9.967    2.16 |15.967    1.80 | 21.97    0.72
4.000    0.78 |10.000    2.16 |16.000    1.80 | 22.00    0.72
4.033    0.96 |10.033    2.76 |16.033    1.08 | 22.03    0.72
4.067    0.96 |10.067    2.76 |16.067    1.08 | 22.07    0.72
4.100    0.96 |10.100    2.76 |16.100    1.08 | 22.10    0.72
4.133    0.96 |10.133    2.76 |16.133    1.08 | 22.13    0.72
4.167    0.96 |10.167    2.76 |16.167    1.08 | 22.17    0.72
4.200    0.96 |10.200    2.76 |16.200    1.08 | 22.20    0.72
4.233    0.96 |10.233    2.76 |16.233    1.08 | 22.23    0.72
4.267    0.96 |10.267    2.76 |16.267    1.08 | 22.27    0.72
4.300    0.96 |10.300    2.76 |16.300    1.08 | 22.30    0.72
4.333    0.96 |10.333    2.76 |16.333    1.08 | 22.33    0.72
4.367    0.96 |10.367    2.76 |16.367    1.08 | 22.37    0.72
4.400    0.96 |10.400    2.76 |16.400    1.08 | 22.40    0.72
4.433    0.96 |10.433    2.76 |16.433    1.08 | 22.43    0.72
4.467    0.96 |10.467    2.76 |16.467    1.08 | 22.47    0.72
4.500    0.96 |10.500    2.76 |16.500    1.08 | 22.50    0.72
4.533    0.96 |10.533    3.71 |16.533    1.08 | 22.53    0.72
4.567    0.96 |10.567    3.71 |16.567    1.08 | 22.57    0.72
4.600    0.96 |10.600    3.71 |16.600    1.08 | 22.60    0.72
4.633    0.96 |10.633    3.71 |16.633    1.08 | 22.63    0.72
4.667    0.96 |10.667    3.71 |16.667    1.08 | 22.67    0.72
4.700    0.96 |10.700    3.71 |16.700    1.08 | 22.70    0.72
4.733    0.96 |10.733    3.71 |16.733    1.08 | 22.73    0.72
4.767    0.96 |10.767    3.71 |16.767    1.08 | 22.77    0.72
4.800    0.96 |10.800    3.71 |16.800    1.08 | 22.80    0.72
4.833    0.96 |10.833    3.71 |16.833    1.08 | 22.83    0.72
4.867    0.96 |10.867    3.71 |16.867    1.08 | 22.87    0.72
4.900    0.96 |10.900    3.71 |16.900    1.08 | 22.90    0.72
4.933    0.96 |10.933    3.71 |16.933    1.08 | 22.93    0.72
4.967    0.96 |10.967    3.71 |16.967    1.08 | 22.97    0.72
5.000    0.96 |11.000    3.71 |17.000    1.08 | 23.00    0.72
5.033    0.96 |11.033    5.75 |17.033    1.08 | 23.03    0.72
5.067    0.96 |11.067    5.75 |17.067    1.08 | 23.07    0.72
5.100    0.96 |11.100    5.75 |17.100    1.08 | 23.10    0.72
5.133    0.96 |11.133    5.75 |17.133    1.08 | 23.13    0.72
5.167    0.96 |11.167    5.75 |17.167    1.08 | 23.17    0.72
5.200    0.96 |11.200    5.75 |17.200    1.08 | 23.20    0.72
5.233    0.96 |11.233    5.75 |17.233    1.08 | 23.23    0.72
5.267    0.96 |11.267    5.75 |17.267    1.08 | 23.27    0.72
5.300    0.96 |11.300    5.75 |17.300    1.08 | 23.30    0.72
5.333    0.96 |11.333    5.75 |17.333    1.08 | 23.33    0.72
5.367    0.96 |11.367    5.75 |17.367    1.08 | 23.37    0.72
5.400    0.96 |11.400    5.75 |17.400    1.08 | 23.40    0.72
5.433    0.96 |11.433    5.75 |17.433    1.08 | 23.43    0.72
5.467    0.96 |11.467    5.75 |17.467    1.08 | 23.47    0.72
5.500    0.96 |11.500    5.77 |17.500    1.08 | 23.50    0.72
5.533    0.96 |11.533   24.92 |17.533    1.08 | 23.53    0.72
5.567    0.96 |11.567   24.92 |17.567    1.08 | 23.57    0.72
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5.600    0.96 |11.600   24.92 |17.600    1.08 | 23.60    0.72
5.633    0.96 |11.633   24.92 |17.633    1.08 | 23.63    0.72
5.667    0.96 |11.667   24.92 |17.667    1.08 | 23.67    0.72
5.700    0.96 |11.700   24.92 |17.700    1.08 | 23.70    0.72
5.733    0.96 |11.733   24.92 |17.733    1.08 | 23.73    0.72
5.767    0.96 |11.767   45.58 |17.767    1.08 | 23.77    0.72
5.800    0.96 |11.800   66.13 |17.800    1.08 | 23.80    0.72
5.833    0.96 |11.833   66.13 |17.833    1.08 | 23.83    0.72
5.867    0.96 |11.867   66.13 |17.867    1.08 | 23.87    0.72
5.900    0.96 |11.900   66.13 |17.900    1.08 | 23.90    0.72
5.933    0.96 |11.933   66.13 |17.933    1.08 | 23.93    0.72
5.967    0.96 |11.967   66.13 |17.967    1.08 | 23.97    0.72
6.000    0.96 |12.000   66.05 |18.000    1.08 | 24.00    0.72

Max.Eff.Inten.(mm/hr)=      66.13        12.07
           over (min)        5.00        10.00
Storage Coeff.  (min)=       3.71 (ii)    8.66 (ii)
Unit Hyd. Tpeak (min)=       4.00        10.00
Unit Hyd. peak  (cms)=       0.29         0.12
                                                    *TOTALS*
PEAK FLOW       (cms)=       0.43         0.02        0.440 (iii)
TIME TO PEAK    (hrs)=      12.00        12.07        12.00
RUNOFF VOLUME    (mm)=      58.94         9.14        48.28
TOTAL RAINFALL   (mm)=      59.94        59.94        59.94
RUNOFF COEFFICIENT   =       0.98         0.15         0.81


  (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
       CN*  =  48.0    Ia = Dep. 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( 3001)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  2.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                         0.0000     0.0000    |  0.0391     0.0880
                         0.0028     0.0061    |  0.0527     0.0958
                         0.0096     0.0158    |  0.0660     0.1032
                         0.0131     0.0255    |  0.0762     0.1100
                         0.0157     0.0350    |  0.0856     0.1159
                         0.0180     0.0443    |  0.0932     0.1209
                         0.0201     0.0535    |  0.1001     0.1256
                         0.0219     0.0625    |  0.1066     0.1304
                         0.0238     0.0713    |  0.1155     0.1376
                         0.0254     0.0798    |  0.0000     0.0000

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
  INFLOW : ID= 2 (  1000)      2.998     0.440     12.00      48.28
  OUTFLOW: ID= 1 (  3001)      2.998     0.029     13.03      48.10

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  6.55
                  TIME SHIFT OF PEAK FLOW         (min)= 62.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0819

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| CALIB              |
| STANDHYD (  1100)|   Area    (ha)=   0.09
|ID= 1 DT= 2.0 min |   Total Imp(%)=  26.30   Dir. Conn.(%)=  26.30
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=     0.02        0.07
     Dep. Storage     (mm)=     1.00        5.00
     Average Slope     (%)=     1.00        2.00
     Length            (m)=    25.17       40.00
     Mannings n          =    0.013       0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   2.0 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
               0.033     0.66 | 6.033     1.20 |12.033     8.63 | 18.03    1.08
               0.067     0.66 | 6.067     1.20 |12.067     8.63 | 18.07    1.08
               0.100     0.66 | 6.100     1.20 |12.100     8.63 | 18.10    1.08
               0.133     0.66 | 6.133     1.20 |12.133     8.63 | 18.13    1.08
               0.167     0.66 | 6.167     1.20 |12.167     8.63 | 18.17    1.08
               0.200     0.66 | 6.200     1.20 |12.200     8.63 | 18.20    1.08
               0.233     0.66 | 6.233     1.20 |12.233     8.63 | 18.23    1.08
               0.267     0.66 | 6.267     1.20 |12.267     8.63 | 18.27    1.08
               0.300     0.66 | 6.300     1.20 |12.300     8.63 | 18.30    1.08
               0.333     0.66 | 6.333     1.20 |12.333     8.63 | 18.33    1.08
               0.367     0.66 | 6.367     1.20 |12.367     8.63 | 18.37    1.08
               0.400     0.66 | 6.400     1.20 |12.400     8.63 | 18.40    1.08
               0.433     0.66 | 6.433     1.20 |12.433     8.63 | 18.43    1.08
               0.467     0.66 | 6.467     1.20 |12.467     8.63 | 18.47    1.08
               0.500     0.66 | 6.500     1.20 |12.500     8.62 | 18.50    1.08
               0.533     0.66 | 6.533     1.20 |12.533     4.43 | 18.53    1.08
               0.567     0.66 | 6.567     1.20 |12.567     4.43 | 18.57    1.08
               0.600     0.66 | 6.600     1.20 |12.600     4.43 | 18.60    1.08
               0.633     0.66 | 6.633     1.20 |12.633     4.43 | 18.63    1.08
               0.667     0.66 | 6.667     1.20 |12.667     4.43 | 18.67    1.08
               0.700     0.66 | 6.700     1.20 |12.700     4.43 | 18.70    1.08
               0.733     0.66 | 6.733     1.20 |12.733     4.43 | 18.73    1.08
               0.767     0.66 | 6.767     1.20 |12.767     4.43 | 18.77    1.08
               0.800     0.66 | 6.800     1.20 |12.800     4.43 | 18.80    1.08
               0.833     0.66 | 6.833     1.20 |12.833     4.43 | 18.83    1.08
               0.867     0.66 | 6.867     1.20 |12.867     4.43 | 18.87    1.08
               0.900     0.66 | 6.900     1.20 |12.900     4.43 | 18.90    1.08
               0.933     0.66 | 6.933     1.20 |12.933     4.43 | 18.93    1.08
               0.967     0.66 | 6.967     1.20 |12.967     4.43 | 18.97    1.08
               1.000     0.66 | 7.000     1.20 |13.000     4.42 | 19.00    1.08
               1.033     0.66 | 7.033     1.20 |13.033     0.84 | 19.03    1.08
               1.067     0.66 | 7.067     1.20 |13.067     0.84 | 19.07    1.08
               1.100     0.66 | 7.100     1.20 |13.100     0.84 | 19.10    1.08
               1.133     0.66 | 7.133     1.20 |13.133     0.84 | 19.13    1.08
               1.167     0.66 | 7.167     1.20 |13.167     0.84 | 19.17    1.08
               1.200     0.66 | 7.200     1.20 |13.200     0.84 | 19.20    1.08
               1.233     0.66 | 7.233     1.20 |13.233     0.84 | 19.23    1.08
               1.267     0.66 | 7.267     1.20 |13.267     0.84 | 19.27    1.08
               1.300     0.66 | 7.300     1.20 |13.300     0.84 | 19.30    1.08
               1.333     0.66 | 7.333     1.20 |13.333     0.84 | 19.33    1.08
               1.367     0.66 | 7.367     1.20 |13.367     0.84 | 19.37    1.08
               1.400     0.66 | 7.400     1.20 |13.400     0.84 | 19.40    1.08
               1.433     0.66 | 7.433     1.20 |13.433     0.84 | 19.43    1.08
               1.467     0.66 | 7.467     1.20 |13.467     0.84 | 19.47    1.08
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1.500	0.66	7.500	1.20	13.500	0.85	19.50	1.08
1.533	0.66	7.533	1.20	13.533	4.91	19.53	1.08
1.567	0.66	7.567	1.20	13.567	4.91	19.57	1.08
1.600	0.66	7.600	1.20	13.600	4.91	19.60	1.08
1.633	0.66	7.633	1.20	13.633	4.91	19.63	1.08
1.667	0.66	7.667	1.20	13.667	4.91	19.67	1.08
1.700	0.66	7.700	1.20	13.700	4.91	19.70	1.08
1.733	0.66	7.733	1.20	13.733	4.91	19.73	1.08
1.767	0.66	7.767	1.20	13.767	4.91	19.77	1.08
1.800	0.66	7.800	1.20	13.800	4.91	19.80	1.08
1.833	0.66	7.833	1.20	13.833	4.91	19.83	1.08
1.867	0.66	7.867	1.20	13.867	4.91	19.87	1.08
1.900	0.66	7.900	1.20	13.900	4.91	19.90	1.08
1.933	0.66	7.933	1.20	13.933	4.91	19.93	1.08
1.967	0.66	7.967	1.20	13.967	4.91	19.97	1.08
2.000	0.66	8.000	1.20	14.000	4.90	20.00	1.08
2.033	0.78	8.033	1.62	14.033	1.80	20.03	0.72
2.067	0.78	8.067	1.62	14.067	1.80	20.07	0.72
2.100	0.78	8.100	1.62	14.100	1.80	20.10	0.72
2.133	0.78	8.133	1.62	14.133	1.80	20.13	0.72
2.167	0.78	8.167	1.62	14.167	1.80	20.17	0.72
2.200	0.78	8.200	1.62	14.200	1.80	20.20	0.72
2.233	0.78	8.233	1.62	14.233	1.80	20.23	0.72
2.267	0.78	8.267	1.62	14.267	1.80	20.27	0.72
2.300	0.78	8.300	1.62	14.300	1.80	20.30	0.72
2.333	0.78	8.333	1.62	14.333	1.80	20.33	0.72
2.367	0.78	8.367	1.62	14.367	1.80	20.37	0.72
2.400	0.78	8.400	1.62	14.400	1.80	20.40	0.72
2.433	0.78	8.433	1.62	14.433	1.80	20.43	0.72
2.467	0.78	8.467	1.62	14.467	1.80	20.47	0.72
2.500	0.78	8.500	1.62	14.500	1.80	20.50	0.72
2.533	0.78	8.533	1.62	14.533	1.80	20.53	0.72
2.567	0.78	8.567	1.62	14.567	1.80	20.57	0.72
2.600	0.78	8.600	1.62	14.600	1.80	20.60	0.72
2.633	0.78	8.633	1.62	14.633	1.80	20.63	0.72
2.667	0.78	8.667	1.62	14.667	1.80	20.67	0.72
2.700	0.78	8.700	1.62	14.700	1.80	20.70	0.72
2.733	0.78	8.733	1.62	14.733	1.80	20.73	0.72
2.767	0.78	8.767	1.62	14.767	1.80	20.77	0.72
2.800	0.78	8.800	1.62	14.800	1.80	20.80	0.72
2.833	0.78	8.833	1.62	14.833	1.80	20.83	0.72
2.867	0.78	8.867	1.62	14.867	1.80	20.87	0.72
2.900	0.78	8.900	1.62	14.900	1.80	20.90	0.72
2.933	0.78	8.933	1.62	14.933	1.80	20.93	0.72
2.967	0.78	8.967	1.62	14.967	1.80	20.97	0.72
3.000	0.78	9.000	1.62	15.000	1.80	21.00	0.72
3.033	0.78	9.033	1.92	15.033	1.80	21.03	0.72
3.067	0.78	9.067	1.92	15.067	1.80	21.07	0.72
3.100	0.78	9.100	1.92	15.100	1.80	21.10	0.72
3.133	0.78	9.133	1.92	15.133	1.80	21.13	0.72
3.167	0.78	9.167	1.92	15.167	1.80	21.17	0.72
3.200	0.78	9.200	1.92	15.200	1.80	21.20	0.72
3.233	0.78	9.233	1.92	15.233	1.80	21.23	0.72
3.267	0.78	9.267	1.92	15.267	1.80	21.27	0.72
3.300	0.78	9.300	1.92	15.300	1.80	21.30	0.72
3.333	0.78	9.333	1.92	15.333	1.80	21.33	0.72
3.367	0.78	9.367	1.92	15.367	1.80	21.37	0.72
3.400	0.78	9.400	1.92	15.400	1.80	21.40	0.72
3.433	0.78	9.433	1.92	15.433	1.80	21.43	0.72
3.467	0.78	9.467	1.92	15.467	1.80	21.47	0.72
3.500	0.78	9.500	1.92	15.500	1.80	21.50	0.72

3.533	0.78	9.533	2.16	15.533	1.80	21.53	0.72
3.567	0.78	9.567	2.16	15.567	1.80	21.57	0.72
3.600	0.78	9.600	2.16	15.600	1.80	21.60	0.72
3.633	0.78	9.633	2.16	15.633	1.80	21.63	0.72
3.667	0.78	9.667	2.16	15.667	1.80	21.67	0.72
3.700	0.78	9.700	2.16	15.700	1.80	21.70	0.72
3.733	0.78	9.733	2.16	15.733	1.80	21.73	0.72
3.767	0.78	9.767	2.16	15.767	1.80	21.77	0.72
3.800	0.78	9.800	2.16	15.800	1.80	21.80	0.72
3.833	0.78	9.833	2.16	15.833	1.80	21.83	0.72
3.867	0.78	9.867	2.16	15.867	1.80	21.87	0.72
3.900	0.78	9.900	2.16	15.900	1.80	21.90	0.72
3.933	0.78	9.933	2.16	15.933	1.80	21.93	0.72
3.967	0.78	9.967	2.16	15.967	1.80	21.97	0.72
4.000	0.78	10.000	2.16	16.000	1.80	22.00	0.72
4.033	0.96	10.033	2.76	16.033	1.08	22.03	0.72
4.067	0.96	10.067	2.76	16.067	1.08	22.07	0.72
4.100	0.96	10.100	2.76	16.100	1.08	22.10	0.72
4.133	0.96	10.133	2.76	16.133	1.08	22.13	0.72
4.167	0.96	10.167	2.76	16.167	1.08	22.17	0.72
4.200	0.96	10.200	2.76	16.200	1.08	22.20	0.72
4.233	0.96	10.233	2.76	16.233	1.08	22.23	0.72
4.267	0.96	10.267	2.76	16.267	1.08	22.27	0.72
4.300	0.96	10.300	2.76	16.300	1.08	22.30	0.72
4.333	0.96	10.333	2.76	16.333	1.08	22.33	0.72
4.367	0.96	10.367	2.76	16.367	1.08	22.37	0.72
4.400	0.96	10.400	2.76	16.400	1.08	22.40	0.72
4.433	0.96	10.433	2.76	16.433	1.08	22.43	0.72
4.467	0.96	10.467	2.76	16.467	1.08	22.47	0.72
4.500	0.96	10.500	2.76	16.500	1.08	22.50	0.72
4.533	0.96	10.533	3.71	16.533	1.08	22.53	0.72
4.567	0.96	10.567	3.71	16.567	1.08	22.57	0.72
4.600	0.96	10.600	3.71	16.600	1.08	22.60	0.72
4.633	0.96	10.633	3.71	16.633	1.08	22.63	0.72
4.667	0.96	10.667	3.71	16.667	1.08	22.67	0.72
4.700	0.96	10.700	3.71	16.700	1.08	22.70	0.72
4.733	0.96	10.733	3.71	16.733	1.08	22.73	0.72
4.767	0.96	10.767	3.71	16.767	1.08	22.77	0.72
4.800	0.96	10.800	3.71	16.800	1.08	22.80	0.72
4.833	0.96	10.833	3.71	16.833	1.08	22.83	0.72
4.867	0.96	10.867	3.71	16.867	1.08	22.87	0.72
4.900	0.96	10.900	3.71	16.900	1.08	22.90	0.72
4.933	0.96	10.933	3.71	16.933	1.08	22.93	0.72
4.967	0.96	10.967	3.71	16.967	1.08	22.97	0.72
5.000	0.96	11.000	3.71	17.000	1.08	23.00	0.72
5.033	0.96	11.033	5.75	17.033	1.08	23.03	0.72
5.067	0.96	11.067	5.75	17.067	1.08	23.07	0.72
5.100	0.96	11.100	5.75	17.100	1.08	23.10	0.72
5.133	0.96	11.133	5.75	17.133	1.08	23.13	0.72
5.167	0.96	11.167	5.75	17.167	1.08	23.17	0.72
5.200	0.96	11.200	5.75	17.200	1.08	23.20	0.72
5.233	0.96	11.233	5.75	17.233	1.08	23.23	0.72
5.267	0.96	11.267	5.75	17.267	1.08	23.27	0.72
5.300	0.96	11.300	5.75	17.300	1.08	23.30	0.72
5.333	0.96	11.333	5.75	17.333	1.08	23.33	0.72
5.367	0.96	11.367	5.75	17.367	1.08	23.37	0.72
5.400	0.96	11.400	5.75	17.400	1.08	23.40	0.72
5.433	0.96	11.433	5.75	17.433	1.08	23.43	0.72
5.467	0.96	11.467	5.75	17.467	1.08	23.47	0.72
5.500	0.96	11.500	5.77	17.500	1.08	23.50	0.72
5.533	0.96	11.533	24.92	17.533	1.08	23.53	0.72

5.567	0.96	11.567	24.92	17.567	1.08	23.57	0.72
5.600	0.96	11.600	24.92	17.600	1.08	23.60	0.72
5.633	0.96	11.633	24.92	17.633	1.08	23.63	0.72
5.667	0.96	11.667	24.92	17.667	1.08	23.67	0.72
5.700	0.96	11.700	24.92	17.700	1.08	23.70	0.72
5.733	0.96	11.733	24.92	17.733	1.08	23.73	0.72
5.767	0.96	11.767	45.58	17.767	1.08	23.77	0.72
5.800	0.96	11.800	66.13	17.800	1.08	23.80	0.72
5.833	0.96	11.833	66.13	17.833	1.08	23.83	0.72
5.867	0.96	11.867	66.13	17.867	1.08	23.87	0.72
5.900	0.96	11.900	66.13	17.900	1.08	23.90	0.72
5.933	0.96	11.933	66.13	17.933	1.08	23.93	0.72
5.967	0.96	11.967	66.13	17.967	1.08	23.97	0.72
6.000	0.96	12.000	66.05	18.000	1.08	24.00	0.72

```
     Max.Eff.Inten.(mm/hr)=      66.13          9.70
                over (min)        5.00         20.00
     Storage Coeff.  (min)=       1.32 (ii)    19.27 (ii)
     Unit Hyd. Tpeak (min)=       4.00         20.00
     Unit Hyd. peak  (cms)=       0.48          0.06
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.00          0.00        0.005 (iii)
     TIME TO PEAK    (hrs)=      11.97         12.23       12.00
     RUNOFF VOLUME    (mm)=      58.94          9.14       20.91
     TOTAL RAINFALL   (mm)=      59.94         59.94       59.94
     RUNOFF COEFFICIENT   =       0.98          0.15        0.35

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  48.0    Ia = Dep. 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  (  2002)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  1100):      0.09    0.005    12.00    20.91
      + ID2= 2 (  3001):      3.00    0.029    13.03    48.10
        ==================================================
        ID = 3 (  2002):      3.09    0.029    13.00    47.26

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

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2001)
       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 6.2\VO2\voin.dat

  Output  filename:
C:\Users\zhouj\AppData\Local\Civica\VH5\642fa701-08f9-4281-a674-e9ad409f1aac\003577
df-d69a-4d86-971c-0f17339d47ce\scenar
  Summary filename:
C:\Users\zhouj\AppData\Local\Civica\VH5\642fa701-08f9-4281-a674-e9ad409f1aac\003577
df-d69a-4d86-971c-0f17339d47ce\scenar

DATE: 09-13-2023                            TIME: 11:19:06

USER:

COMMENTS: ____________________________________________________________

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  **********************************************
  ** SIMULATION : Run 09                      **
  **********************************************

--------------------
|    READ STORM    |    Filename: C:\Users\zhouj\AppD
|                  |              ata\Local\Temp\
|                  |              8a0057db-68f2-4cf6-9613-b4e66717427d\eea38120
| Ptotal= 67.54 mm |    Comments: 10yr24hrSCS_Midland
--------------------
```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	0.74	6.25	1.35	12.25	9.72	18.25	1.22
0.50	0.74	6.50	1.35	12.50	9.72	18.50	1.22
0.75	0.74	6.75	1.35	12.75	5.00	18.75	1.22
1.00	0.74	7.00	1.35	13.00	5.00	19.00	1.22
1.25	0.74	7.25	1.35	13.25	0.95	19.25	1.22
1.50	0.74	7.50	1.35	13.50	0.95	19.50	1.22
1.75	0.74	7.75	1.35	13.75	5.54	19.75	1.22
2.00	0.74	8.00	1.35	14.00	5.54	20.00	1.22
2.25	0.88	8.25	1.82	14.25	2.03	20.25	0.81
2.50	0.88	8.50	1.82	14.50	2.03	20.50	0.81
2.75	0.88	8.75	1.82	14.75	2.03	20.75	0.81
3.00	0.88	9.00	1.82	15.00	2.03	21.00	0.81
3.25	0.88	9.25	2.16	15.25	2.03	21.25	0.81
3.50	0.88	9.50	2.16	15.50	2.03	21.50	0.81
3.75	0.88	9.75	2.43	15.75	2.03	21.75	0.81
4.00	0.88	10.00	2.43	16.00	2.03	22.00	0.81
4.25	1.08	10.25	3.11	16.25	1.22	22.25	0.81
4.50	1.08	10.50	3.11	16.50	1.22	22.50	0.81
4.75	1.08	10.75	4.19	16.75	1.22	22.75	0.81

5.00	1.08	11.00	4.19	17.00	1.22	23.00	0.81
5.25	1.08	11.25	6.48	17.25	1.22	23.25	0.81
5.50	1.08	11.50	6.48	17.50	1.22	23.50	0.81
5.75	1.08	11.75	28.08	17.75	1.22	23.75	0.81
6.00	1.08	12.00	74.52	18.00	1.22	24.00	0.81

| CALIB |
| STANDHYD (1000)| Area (ha)= 3.00
|ID= 1 DT= 2.0 min | Total Imp(%)= 78.60 Dir. Conn.(%)= 78.60

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	2.36	0.64
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	141.37	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 2.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.033	0.74	6.033	1.35	12.033	9.72	18.03	1.22
0.067	0.74	6.067	1.35	12.067	9.72	18.07	1.22
0.100	0.74	6.100	1.35	12.100	9.72	18.10	1.22
0.133	0.74	6.133	1.35	12.133	9.72	18.13	1.22
0.167	0.74	6.167	1.35	12.167	9.72	18.17	1.22
0.200	0.74	6.200	1.35	12.200	9.72	18.20	1.22
0.233	0.74	6.233	1.35	12.233	9.72	18.23	1.22
0.267	0.74	6.267	1.35	12.267	9.72	18.27	1.22
0.300	0.74	6.300	1.35	12.300	9.72	18.30	1.22
0.333	0.74	6.333	1.35	12.333	9.72	18.33	1.22
0.367	0.74	6.367	1.35	12.367	9.72	18.37	1.22
0.400	0.74	6.400	1.35	12.400	9.72	18.40	1.22
0.433	0.74	6.433	1.35	12.433	9.72	18.43	1.22
0.467	0.74	6.467	1.35	12.467	9.72	18.47	1.22
0.500	0.74	6.500	1.35	12.500	9.71	18.50	1.22
0.533	0.74	6.533	1.35	12.533	5.00	18.53	1.22
0.567	0.74	6.567	1.35	12.567	5.00	18.57	1.22
0.600	0.74	6.600	1.35	12.600	5.00	18.60	1.22
0.633	0.74	6.633	1.35	12.633	5.00	18.63	1.22
0.667	0.74	6.667	1.35	12.667	5.00	18.67	1.22
0.700	0.74	6.700	1.35	12.700	5.00	18.70	1.22
0.733	0.74	6.733	1.35	12.733	5.00	18.73	1.22
0.767	0.74	6.767	1.35	12.767	5.00	18.77	1.22
0.800	0.74	6.800	1.35	12.800	5.00	18.80	1.22
0.833	0.74	6.833	1.35	12.833	5.00	18.83	1.22
0.867	0.74	6.867	1.35	12.867	5.00	18.87	1.22
0.900	0.74	6.900	1.35	12.900	5.00	18.90	1.22
0.933	0.74	6.933	1.35	12.933	5.00	18.93	1.22
0.967	0.74	6.967	1.35	12.967	5.00	18.97	1.22
1.000	0.74	7.000	1.35	13.000	4.99	19.00	1.22
1.033	0.74	7.033	1.35	13.033	0.95	19.03	1.22
1.067	0.74	7.067	1.35	13.067	0.95	19.07	1.22
1.100	0.74	7.100	1.35	13.100	0.95	19.10	1.22
1.133	0.74	7.133	1.35	13.133	0.95	19.13	1.22
1.167	0.74	7.167	1.35	13.167	0.95	19.17	1.22

1.200	0.74	7.200	1.35	13.200	0.95	19.20	1.22
1.233	0.74	7.233	1.35	13.233	0.95	19.23	1.22
1.267	0.74	7.267	1.35	13.267	0.95	19.27	1.22
1.300	0.74	7.300	1.35	13.300	0.95	19.30	1.22
1.333	0.74	7.333	1.35	13.333	0.95	19.33	1.22
1.367	0.74	7.367	1.35	13.367	0.95	19.37	1.22
1.400	0.74	7.400	1.35	13.400	0.95	19.40	1.22
1.433	0.74	7.433	1.35	13.433	0.95	19.43	1.22
1.467	0.74	7.467	1.35	13.467	0.95	19.47	1.22
1.500	0.74	7.500	1.35	13.500	0.96	19.50	1.22
1.533	0.74	7.533	1.35	13.533	5.54	19.53	1.22
1.567	0.74	7.567	1.35	13.567	5.54	19.57	1.22
1.600	0.74	7.600	1.35	13.600	5.54	19.60	1.22
1.633	0.74	7.633	1.35	13.633	5.54	19.63	1.22
1.667	0.74	7.667	1.35	13.667	5.54	19.67	1.22
1.700	0.74	7.700	1.35	13.700	5.54	19.70	1.22
1.733	0.74	7.733	1.35	13.733	5.54	19.73	1.22
1.767	0.74	7.767	1.35	13.767	5.54	19.77	1.22
1.800	0.74	7.800	1.35	13.800	5.54	19.80	1.22
1.833	0.74	7.833	1.35	13.833	5.54	19.83	1.22
1.867	0.74	7.867	1.35	13.867	5.54	19.87	1.22
1.900	0.74	7.900	1.35	13.900	5.54	19.90	1.22
1.933	0.74	7.933	1.35	13.933	5.54	19.93	1.22
1.967	0.74	7.967	1.35	13.967	5.54	19.97	1.22
2.000	0.74	8.000	1.35	14.000	5.53	20.00	1.22
2.033	0.88	8.033	1.82	14.033	2.03	20.03	0.81
2.067	0.88	8.067	1.82	14.067	2.03	20.07	0.81
2.100	0.88	8.100	1.82	14.100	2.03	20.10	0.81
2.133	0.88	8.133	1.82	14.133	2.03	20.13	0.81
2.167	0.88	8.167	1.82	14.167	2.03	20.17	0.81
2.200	0.88	8.200	1.82	14.200	2.03	20.20	0.81
2.233	0.88	8.233	1.82	14.233	2.03	20.23	0.81
2.267	0.88	8.267	1.82	14.267	2.03	20.27	0.81
2.300	0.88	8.300	1.82	14.300	2.03	20.30	0.81
2.333	0.88	8.333	1.82	14.333	2.03	20.33	0.81
2.367	0.88	8.367	1.82	14.367	2.03	20.37	0.81
2.400	0.88	8.400	1.82	14.400	2.03	20.40	0.81
2.433	0.88	8.433	1.82	14.433	2.03	20.43	0.81
2.467	0.88	8.467	1.82	14.467	2.03	20.47	0.81
2.500	0.88	8.500	1.82	14.500	2.03	20.50	0.81
2.533	0.88	8.533	1.82	14.533	2.03	20.53	0.81
2.567	0.88	8.567	1.82	14.567	2.03	20.57	0.81
2.600	0.88	8.600	1.82	14.600	2.03	20.60	0.81
2.633	0.88	8.633	1.82	14.633	2.03	20.63	0.81
2.667	0.88	8.667	1.82	14.667	2.03	20.67	0.81
2.700	0.88	8.700	1.82	14.700	2.03	20.70	0.81
2.733	0.88	8.733	1.82	14.733	2.03	20.73	0.81
2.767	0.88	8.767	1.82	14.767	2.03	20.77	0.81
2.800	0.88	8.800	1.82	14.800	2.03	20.80	0.81
2.833	0.88	8.833	1.82	14.833	2.03	20.83	0.81
2.867	0.88	8.867	1.82	14.867	2.03	20.87	0.81
2.900	0.88	8.900	1.82	14.900	2.03	20.90	0.81
2.933	0.88	8.933	1.82	14.933	2.03	20.93	0.81
2.967	0.88	8.967	1.82	14.967	2.03	20.97	0.81
3.000	0.88	9.000	1.82	15.000	2.03	21.00	0.81
3.033	0.88	9.033	2.16	15.033	2.03	21.03	0.81
3.067	0.88	9.067	2.16	15.067	2.03	21.07	0.81
3.100	0.88	9.100	2.16	15.100	2.03	21.10	0.81
3.133	0.88	9.133	2.16	15.133	2.03	21.13	0.81
3.167	0.88	9.167	2.16	15.167	2.03	21.17	0.81
3.200	0.88	9.200	2.16	15.200	2.03	21.20	0.81

3.233	0.88	9.233	2.16	15.233	2.03	21.23	0.81
3.267	0.88	9.267	2.16	15.267	2.03	21.27	0.81
3.300	0.88	9.300	2.16	15.300	2.03	21.30	0.81
3.333	0.88	9.333	2.16	15.333	2.03	21.33	0.81
3.367	0.88	9.367	2.16	15.367	2.03	21.37	0.81
3.400	0.88	9.400	2.16	15.400	2.03	21.40	0.81
3.433	0.88	9.433	2.16	15.433	2.03	21.43	0.81
3.467	0.88	9.467	2.16	15.467	2.03	21.47	0.81
3.500	0.88	9.500	2.16	15.500	2.03	21.50	0.81
3.533	0.88	9.533	2.43	15.533	2.03	21.53	0.81
3.567	0.88	9.567	2.43	15.567	2.03	21.57	0.81
3.600	0.88	9.600	2.43	15.600	2.03	21.60	0.81
3.633	0.88	9.633	2.43	15.633	2.03	21.63	0.81
3.667	0.88	9.667	2.43	15.667	2.03	21.67	0.81
3.700	0.88	9.700	2.43	15.700	2.03	21.70	0.81
3.733	0.88	9.733	2.43	15.733	2.03	21.73	0.81
3.767	0.88	9.767	2.43	15.767	2.03	21.77	0.81
3.800	0.88	9.800	2.43	15.800	2.03	21.80	0.81
3.833	0.88	9.833	2.43	15.833	2.03	21.83	0.81
3.867	0.88	9.867	2.43	15.867	2.03	21.87	0.81
3.900	0.88	9.900	2.43	15.900	2.03	21.90	0.81
3.933	0.88	9.933	2.43	15.933	2.03	21.93	0.81
3.967	0.88	9.967	2.43	15.967	2.03	21.97	0.81
4.000	0.88	10.000	2.43	16.000	2.03	22.00	0.81
4.033	1.08	10.033	3.11	16.033	1.22	22.03	0.81
4.067	1.08	10.067	3.11	16.067	1.22	22.07	0.81
4.100	1.08	10.100	3.11	16.100	1.22	22.10	0.81
4.133	1.08	10.133	3.11	16.133	1.22	22.13	0.81
4.167	1.08	10.167	3.11	16.167	1.22	22.17	0.81
4.200	1.08	10.200	3.11	16.200	1.22	22.20	0.81
4.233	1.08	10.233	3.11	16.233	1.22	22.23	0.81
4.267	1.08	10.267	3.11	16.267	1.22	22.27	0.81
4.300	1.08	10.300	3.11	16.300	1.22	22.30	0.81
4.333	1.08	10.333	3.11	16.333	1.22	22.33	0.81
4.367	1.08	10.367	3.11	16.367	1.22	22.37	0.81
4.400	1.08	10.400	3.11	16.400	1.22	22.40	0.81
4.433	1.08	10.433	3.11	16.433	1.22	22.43	0.81
4.467	1.08	10.467	3.11	16.467	1.22	22.47	0.81
4.500	1.08	10.500	3.11	16.500	1.22	22.50	0.81
4.533	1.08	10.533	4.19	16.533	1.22	22.53	0.81
4.567	1.08	10.567	4.19	16.567	1.22	22.57	0.81
4.600	1.08	10.600	4.19	16.600	1.22	22.60	0.81
4.633	1.08	10.633	4.19	16.633	1.22	22.63	0.81
4.667	1.08	10.667	4.19	16.667	1.22	22.67	0.81
4.700	1.08	10.700	4.19	16.700	1.22	22.70	0.81
4.733	1.08	10.733	4.19	16.733	1.22	22.73	0.81
4.767	1.08	10.767	4.19	16.767	1.22	22.77	0.81
4.800	1.08	10.800	4.19	16.800	1.22	22.80	0.81
4.833	1.08	10.833	4.19	16.833	1.22	22.83	0.81
4.867	1.08	10.867	4.19	16.867	1.22	22.87	0.81
4.900	1.08	10.900	4.19	16.900	1.22	22.90	0.81
4.933	1.08	10.933	4.19	16.933	1.22	22.93	0.81
4.967	1.08	10.967	4.19	16.967	1.22	22.97	0.81
5.000	1.08	11.000	4.19	17.000	1.22	23.00	0.81
5.033	1.08	11.033	6.48	17.033	1.22	23.03	0.81
5.067	1.08	11.067	6.48	17.067	1.22	23.07	0.81
5.100	1.08	11.100	6.48	17.100	1.22	23.10	0.81
5.133	1.08	11.133	6.48	17.133	1.22	23.13	0.81
5.167	1.08	11.167	6.48	17.167	1.22	23.17	0.81
5.200	1.08	11.200	6.48	17.200	1.22	23.20	0.81
5.233	1.08	11.233	6.48	17.233	1.22	23.23	0.81

5.267	1.08	11.267	6.48	17.267	1.22	23.27	0.81
5.300	1.08	11.300	6.48	17.300	1.22	23.30	0.81
5.333	1.08	11.333	6.48	17.333	1.22	23.33	0.81
5.367	1.08	11.367	6.48	17.367	1.22	23.37	0.81
5.400	1.08	11.400	6.48	17.400	1.22	23.40	0.81
5.433	1.08	11.433	6.48	17.433	1.22	23.43	0.81
5.467	1.08	11.467	6.48	17.467	1.22	23.47	0.81
5.500	1.08	11.500	6.51	17.500	1.22	23.50	0.81
5.533	1.08	11.533	28.08	17.533	1.22	23.53	0.81
5.567	1.08	11.567	28.08	17.567	1.22	23.57	0.81
5.600	1.08	11.600	28.08	17.600	1.22	23.60	0.81
5.633	1.08	11.633	28.08	17.633	1.22	23.63	0.81
5.667	1.08	11.667	28.08	17.667	1.22	23.67	0.81
5.700	1.08	11.700	28.08	17.700	1.22	23.70	0.81
5.733	1.08	11.733	28.08	17.733	1.22	23.73	0.81
5.767	1.08	11.767	51.36	17.767	1.22	23.77	0.81
5.800	1.08	11.800	74.52	17.800	1.22	23.80	0.81
5.833	1.08	11.833	74.52	17.833	1.22	23.83	0.81
5.867	1.08	11.867	74.52	17.867	1.22	23.87	0.81
5.900	1.08	11.900	74.52	17.900	1.22	23.90	0.81
5.933	1.08	11.933	74.52	17.933	1.22	23.93	0.81
5.967	1.08	11.967	74.52	17.967	1.22	23.97	0.81
6.000	1.08	12.000	74.43	18.000	1.22	24.00	0.81

				TOTALS
Max.Eff.Inten.(mm/hr)=	74.52	15.29		
over (min)	5.00	10.00		
Storage Coeff. (min)=	3.54 (ii)	8.26 (ii)		
Unit Hyd. Tpeak (min)=	4.00	10.00		
Unit Hyd. peak (cms)=	0.30	0.13		
PEAK FLOW (cms)=	0.48	0.02		0.500 (iii)
TIME TO PEAK (hrs)=	12.00	12.07		12.00
RUNOFF VOLUME (mm)=	66.54	11.58		54.78
TOTAL RAINFALL (mm)=	67.54	67.54		67.54
RUNOFF COEFFICIENT =	0.99	0.17		0.81

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 48.0 Ia = Dep. 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(3001)|
| IN= 2---> OUT= 1 |
| DT= 2.0 min |

OVERFLOW IS OFF

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.0391	0.0880
0.0028	0.0061	0.0527	0.0958
0.0096	0.0158	0.0660	0.1032
0.0131	0.0255	0.0762	0.1100
0.0157	0.0350	0.0856	0.1159
0.0180	0.0443	0.0932	0.1209
0.0201	0.0535	0.1001	0.1256
0.0219	0.0625	0.1066	0.1304
0.0238	0.0713	0.1155	0.1376
0.0254	0.0798	0.0000	0.0000

AREA QPEAK TPEAK R.V.

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                                  (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  1000)      2.998      0.500     12.00      54.78
   OUTFLOW: ID= 1 (  3001)      2.998      0.043     12.63      54.59

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  8.65
                  TIME SHIFT OF PEAK FLOW          (min)= 38.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0904

-------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  1100)|   Area    (ha)=   0.09
|ID= 1 DT= 2.0 min |   Total Imp(%)=  26.30   Dir. Conn.(%)=  26.30
--------------------
                                IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        0.02          0.07
     Dep. Storage     (mm)=        1.00          5.00
     Average Slope     (%)=        1.00          2.00
     Length            (m)=       25.17         40.00
     Mannings n           =       0.013         0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   2.0 MIN. TIME STEP.
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---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.033	0.74	6.033	1.35	12.033	9.72	18.03	1.22
0.067	0.74	6.067	1.35	12.067	9.72	18.07	1.22
0.100	0.74	6.100	1.35	12.100	9.72	18.10	1.22
0.133	0.74	6.133	1.35	12.133	9.72	18.13	1.22
0.167	0.74	6.167	1.35	12.167	9.72	18.17	1.22
0.200	0.74	6.200	1.35	12.200	9.72	18.20	1.22
0.233	0.74	6.233	1.35	12.233	9.72	18.23	1.22
0.267	0.74	6.267	1.35	12.267	9.72	18.27	1.22
0.300	0.74	6.300	1.35	12.300	9.72	18.30	1.22
0.333	0.74	6.333	1.35	12.333	9.72	18.33	1.22
0.367	0.74	6.367	1.35	12.367	9.72	18.37	1.22
0.400	0.74	6.400	1.35	12.400	9.72	18.40	1.22
0.433	0.74	6.433	1.35	12.433	9.72	18.43	1.22
0.467	0.74	6.467	1.35	12.467	9.72	18.47	1.22
0.500	0.74	6.500	1.35	12.500	9.71	18.50	1.22
0.533	0.74	6.533	1.35	12.533	5.00	18.53	1.22
0.567	0.74	6.567	1.35	12.567	5.00	18.57	1.22
0.600	0.74	6.600	1.35	12.600	5.00	18.60	1.22
0.633	0.74	6.633	1.35	12.633	5.00	18.63	1.22
0.667	0.74	6.667	1.35	12.667	5.00	18.67	1.22
0.700	0.74	6.700	1.35	12.700	5.00	18.70	1.22
0.733	0.74	6.733	1.35	12.733	5.00	18.73	1.22
0.767	0.74	6.767	1.35	12.767	5.00	18.77	1.22
0.800	0.74	6.800	1.35	12.800	5.00	18.80	1.22
0.833	0.74	6.833	1.35	12.833	5.00	18.83	1.22
0.867	0.74	6.867	1.35	12.867	5.00	18.87	1.22
0.900	0.74	6.900	1.35	12.900	5.00	18.90	1.22
0.933	0.74	6.933	1.35	12.933	5.00	18.93	1.22
0.967	0.74	6.967	1.35	12.967	5.00	18.97	1.22
1.000	0.74	7.000	1.35	13.000	4.99	19.00	1.22
1.033	0.74	7.033	1.35	13.033	0.95	19.03	1.22
1.067	0.74	7.067	1.35	13.067	0.95	19.07	1.22
1.100	0.74	7.100	1.35	13.100	0.95	19.10	1.22
1.133	0.74	7.133	1.35	13.133	0.95	19.13	1.22

1.167	0.74	7.167	1.35	13.167	0.95	19.17	1.22
1.200	0.74	7.200	1.35	13.200	0.95	19.20	1.22
1.233	0.74	7.233	1.35	13.233	0.95	19.23	1.22
1.267	0.74	7.267	1.35	13.267	0.95	19.27	1.22
1.300	0.74	7.300	1.35	13.300	0.95	19.30	1.22
1.333	0.74	7.333	1.35	13.333	0.95	19.33	1.22
1.367	0.74	7.367	1.35	13.367	0.95	19.37	1.22
1.400	0.74	7.400	1.35	13.400	0.95	19.40	1.22
1.433	0.74	7.433	1.35	13.433	0.95	19.43	1.22
1.467	0.74	7.467	1.35	13.467	0.95	19.47	1.22
1.500	0.74	7.500	1.35	13.500	0.96	19.50	1.22
1.533	0.74	7.533	1.35	13.533	5.54	19.53	1.22
1.567	0.74	7.567	1.35	13.567	5.54	19.57	1.22
1.600	0.74	7.600	1.35	13.600	5.54	19.60	1.22
1.633	0.74	7.633	1.35	13.633	5.54	19.63	1.22
1.667	0.74	7.667	1.35	13.667	5.54	19.67	1.22
1.700	0.74	7.700	1.35	13.700	5.54	19.70	1.22
1.733	0.74	7.733	1.35	13.733	5.54	19.73	1.22
1.767	0.74	7.767	1.35	13.767	5.54	19.77	1.22
1.800	0.74	7.800	1.35	13.800	5.54	19.80	1.22
1.833	0.74	7.833	1.35	13.833	5.54	19.83	1.22
1.867	0.74	7.867	1.35	13.867	5.54	19.87	1.22
1.900	0.74	7.900	1.35	13.900	5.54	19.90	1.22
1.933	0.74	7.933	1.35	13.933	5.54	19.93	1.22
1.967	0.74	7.967	1.35	13.967	5.54	19.97	1.22
2.000	0.74	8.000	1.35	14.000	5.53	20.00	1.22
2.033	0.88	8.033	1.82	14.033	2.03	20.03	0.81
2.067	0.88	8.067	1.82	14.067	2.03	20.07	0.81
2.100	0.88	8.100	1.82	14.100	2.03	20.10	0.81
2.133	0.88	8.133	1.82	14.133	2.03	20.13	0.81
2.167	0.88	8.167	1.82	14.167	2.03	20.17	0.81
2.200	0.88	8.200	1.82	14.200	2.03	20.20	0.81
2.233	0.88	8.233	1.82	14.233	2.03	20.23	0.81
2.267	0.88	8.267	1.82	14.267	2.03	20.27	0.81
2.300	0.88	8.300	1.82	14.300	2.03	20.30	0.81
2.333	0.88	8.333	1.82	14.333	2.03	20.33	0.81
2.367	0.88	8.367	1.82	14.367	2.03	20.37	0.81
2.400	0.88	8.400	1.82	14.400	2.03	20.40	0.81
2.433	0.88	8.433	1.82	14.433	2.03	20.43	0.81
2.467	0.88	8.467	1.82	14.467	2.03	20.47	0.81
2.500	0.88	8.500	1.82	14.500	2.03	20.50	0.81
2.533	0.88	8.533	1.82	14.533	2.03	20.53	0.81
2.567	0.88	8.567	1.82	14.567	2.03	20.57	0.81
2.600	0.88	8.600	1.82	14.600	2.03	20.60	0.81
2.633	0.88	8.633	1.82	14.633	2.03	20.63	0.81
2.667	0.88	8.667	1.82	14.667	2.03	20.67	0.81
2.700	0.88	8.700	1.82	14.700	2.03	20.70	0.81
2.733	0.88	8.733	1.82	14.733	2.03	20.73	0.81
2.767	0.88	8.767	1.82	14.767	2.03	20.77	0.81
2.800	0.88	8.800	1.82	14.800	2.03	20.80	0.81
2.833	0.88	8.833	1.82	14.833	2.03	20.83	0.81
2.867	0.88	8.867	1.82	14.867	2.03	20.87	0.81
2.900	0.88	8.900	1.82	14.900	2.03	20.90	0.81
2.933	0.88	8.933	1.82	14.933	2.03	20.93	0.81
2.967	0.88	8.967	1.82	14.967	2.03	20.97	0.81
3.000	0.88	9.000	1.82	15.000	2.03	21.00	0.81
3.033	0.88	9.033	2.16	15.033	2.03	21.03	0.81
3.067	0.88	9.067	2.16	15.067	2.03	21.07	0.81
3.100	0.88	9.100	2.16	15.100	2.03	21.10	0.81
3.133	0.88	9.133	2.16	15.133	2.03	21.13	0.81
3.167	0.88	9.167	2.16	15.167	2.03	21.17	0.81

3.200	0.88	9.200	2.16	15.200	2.03	21.20	0.81
3.233	0.88	9.233	2.16	15.233	2.03	21.23	0.81
3.267	0.88	9.267	2.16	15.267	2.03	21.27	0.81
3.300	0.88	9.300	2.16	15.300	2.03	21.30	0.81
3.333	0.88	9.333	2.16	15.333	2.03	21.33	0.81
3.367	0.88	9.367	2.16	15.367	2.03	21.37	0.81
3.400	0.88	9.400	2.16	15.400	2.03	21.40	0.81
3.433	0.88	9.433	2.16	15.433	2.03	21.43	0.81
3.467	0.88	9.467	2.16	15.467	2.03	21.47	0.81
3.500	0.88	9.500	2.16	15.500	2.03	21.50	0.81
3.533	0.88	9.533	2.43	15.533	2.03	21.53	0.81
3.567	0.88	9.567	2.43	15.567	2.03	21.57	0.81
3.600	0.88	9.600	2.43	15.600	2.03	21.60	0.81
3.633	0.88	9.633	2.43	15.633	2.03	21.63	0.81
3.667	0.88	9.667	2.43	15.667	2.03	21.67	0.81
3.700	0.88	9.700	2.43	15.700	2.03	21.70	0.81
3.733	0.88	9.733	2.43	15.733	2.03	21.73	0.81
3.767	0.88	9.767	2.43	15.767	2.03	21.77	0.81
3.800	0.88	9.800	2.43	15.800	2.03	21.80	0.81
3.833	0.88	9.833	2.43	15.833	2.03	21.83	0.81
3.867	0.88	9.867	2.43	15.867	2.03	21.87	0.81
3.900	0.88	9.900	2.43	15.900	2.03	21.90	0.81
3.933	0.88	9.933	2.43	15.933	2.03	21.93	0.81
3.967	0.88	9.967	2.43	15.967	2.03	21.97	0.81
4.000	0.88	10.000	2.43	16.000	2.03	22.00	0.81
4.033	1.08	10.033	3.11	16.033	1.22	22.03	0.81
4.067	1.08	10.067	3.11	16.067	1.22	22.07	0.81
4.100	1.08	10.100	3.11	16.100	1.22	22.10	0.81
4.133	1.08	10.133	3.11	16.133	1.22	22.13	0.81
4.167	1.08	10.167	3.11	16.167	1.22	22.17	0.81
4.200	1.08	10.200	3.11	16.200	1.22	22.20	0.81
4.233	1.08	10.233	3.11	16.233	1.22	22.23	0.81
4.267	1.08	10.267	3.11	16.267	1.22	22.27	0.81
4.300	1.08	10.300	3.11	16.300	1.22	22.30	0.81
4.333	1.08	10.333	3.11	16.333	1.22	22.33	0.81
4.367	1.08	10.367	3.11	16.367	1.22	22.37	0.81
4.400	1.08	10.400	3.11	16.400	1.22	22.40	0.81
4.433	1.08	10.433	3.11	16.433	1.22	22.43	0.81
4.467	1.08	10.467	3.11	16.467	1.22	22.47	0.81
4.500	1.08	10.500	3.11	16.500	1.22	22.50	0.81
4.533	1.08	10.533	4.19	16.533	1.22	22.53	0.81
4.567	1.08	10.567	4.19	16.567	1.22	22.57	0.81
4.600	1.08	10.600	4.19	16.600	1.22	22.60	0.81
4.633	1.08	10.633	4.19	16.633	1.22	22.63	0.81
4.667	1.08	10.667	4.19	16.667	1.22	22.67	0.81
4.700	1.08	10.700	4.19	16.700	1.22	22.70	0.81
4.733	1.08	10.733	4.19	16.733	1.22	22.73	0.81
4.767	1.08	10.767	4.19	16.767	1.22	22.77	0.81
4.800	1.08	10.800	4.19	16.800	1.22	22.80	0.81
4.833	1.08	10.833	4.19	16.833	1.22	22.83	0.81
4.867	1.08	10.867	4.19	16.867	1.22	22.87	0.81
4.900	1.08	10.900	4.19	16.900	1.22	22.90	0.81
4.933	1.08	10.933	4.19	16.933	1.22	22.93	0.81
4.967	1.08	10.967	4.19	16.967	1.22	22.97	0.81
5.000	1.08	11.000	4.19	17.000	1.22	23.00	0.81
5.033	1.08	11.033	6.48	17.033	1.22	23.03	0.81
5.067	1.08	11.067	6.48	17.067	1.22	23.07	0.81
5.100	1.08	11.100	6.48	17.100	1.22	23.10	0.81
5.133	1.08	11.133	6.48	17.133	1.22	23.13	0.81
5.167	1.08	11.167	6.48	17.167	1.22	23.17	0.81
5.200	1.08	11.200	6.48	17.200	1.22	23.20	0.81

5.233	1.08	11.233	6.48	17.233	1.22	23.23	0.81
5.267	1.08	11.267	6.48	17.267	1.22	23.27	0.81
5.300	1.08	11.300	6.48	17.300	1.22	23.30	0.81
5.333	1.08	11.333	6.48	17.333	1.22	23.33	0.81
5.367	1.08	11.367	6.48	17.367	1.22	23.37	0.81
5.400	1.08	11.400	6.48	17.400	1.22	23.40	0.81
5.433	1.08	11.433	6.48	17.433	1.22	23.43	0.81
5.467	1.08	11.467	6.48	17.467	1.22	23.47	0.81
5.500	1.08	11.500	6.51	17.500	1.22	23.50	0.81
5.533	1.08	11.533	28.08	17.533	1.22	23.53	0.81
5.567	1.08	11.567	28.08	17.567	1.22	23.57	0.81
5.600	1.08	11.600	28.08	17.600	1.22	23.60	0.81
5.633	1.08	11.633	28.08	17.633	1.22	23.63	0.81
5.667	1.08	11.667	28.08	17.667	1.22	23.67	0.81
5.700	1.08	11.700	28.08	17.700	1.22	23.70	0.81
5.733	1.08	11.733	28.08	17.733	1.22	23.73	0.81
5.767	1.08	11.767	51.36	17.767	1.22	23.77	0.81
5.800	1.08	11.800	74.52	17.800	1.22	23.80	0.81
5.833	1.08	11.833	74.52	17.833	1.22	23.83	0.81
5.867	1.08	11.867	74.52	17.867	1.22	23.87	0.81
5.900	1.08	11.900	74.52	17.900	1.22	23.90	0.81
5.933	1.08	11.933	74.52	17.933	1.22	23.93	0.81
5.967	1.08	11.967	74.52	17.967	1.22	23.97	0.81
6.000	1.08	12.000	74.43	18.000	1.22	24.00	0.81

```
     Max.Eff.Inten.(mm/hr)=      74.52        13.41
                over (min)        5.00        18.00
     Storage Coeff.  (min)=       1.26 (ii)   17.02 (ii)
     Unit Hyd. Tpeak (min)=       4.00        18.00
     Unit Hyd. peak  (cms)=       0.48         0.07
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.01         0.00         0.006 (iii)
     TIME TO PEAK    (hrs)=      11.97        12.20         12.00
     RUNOFF VOLUME    (mm)=      66.54        11.58         25.95
     TOTAL RAINFALL   (mm)=      67.54        67.54         67.54
     RUNOFF COEFFICIENT   =       0.99         0.17          0.38

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  48.0    Ia = Dep. 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  (  2002)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  1100):     0.09    0.006    12.00    25.95
      + ID2= 2 (  3001):     3.00    0.043    12.63    54.59
        ================================================
        ID = 3 (  2002):     3.09    0.044    12.60    53.71

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

```
 V    V   I    SSSSS  U   U    A    L                (v 6.2.2001)
 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 6.2\VO2\voin.dat

Output filename:
C:\Users\zhouj\AppData\Local\Civica\VH5\642fa701-08f9-4281-a674-e9ad409f1aac\55aa84a9-bcd5-401d-bc91-c2c0efe52e13\scenar
Summary filename:
C:\Users\zhouj\AppData\Local\Civica\VH5\642fa701-08f9-4281-a674-e9ad409f1aac\55aa84a9-bcd5-401d-bc91-c2c0efe52e13\scenar

DATE: 09-13-2023   TIME: 11:19:06

USER:

COMMENTS: ____

```
--------------------------------------------------------------------------------------------
  ************************************************
  ** SIMULATION : Run 10                        **
  ************************************************

--------------------
|    READ STORM    |    Filename: C:\Users\zhouj\AppD
|                  |              ata\Local\Temp\
|                  |              8a0057db-68f2-4cf6-9613-b4e66717427d\05bef237
| Ptotal= 78.13 mm |    Comments: 25yr24hrSCS_Midland
--------------------
```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	0.86	6.25	1.56	12.25	11.25	18.25	1.41
0.50	0.86	6.50	1.56	12.50	11.25	18.50	1.41
0.75	0.86	6.75	1.56	12.75	5.78	18.75	1.41
1.00	0.86	7.00	1.56	13.00	5.78	19.00	1.41
1.25	0.86	7.25	1.56	13.25	1.09	19.25	1.41
1.50	0.86	7.50	1.56	13.50	1.09	19.50	1.41
1.75	0.86	7.75	1.56	13.75	6.40	19.75	1.41
2.00	0.86	8.00	1.56	14.00	6.40	20.00	1.41
2.25	1.02	8.25	2.11	14.25	2.34	20.25	0.94

2.50	1.02	8.50	2.11	14.50	2.34	20.50	0.94
2.75	1.02	8.75	2.11	14.75	2.34	20.75	0.94
3.00	1.02	9.00	2.11	15.00	2.34	21.00	0.94
3.25	1.02	9.25	2.50	15.25	2.34	21.25	0.94
3.50	1.02	9.50	2.50	15.50	2.34	21.50	0.94
3.75	1.02	9.75	2.81	15.75	2.34	21.75	0.94
4.00	1.02	10.00	2.81	16.00	2.34	22.00	0.94
4.25	1.25	10.25	3.59	16.25	1.41	22.25	0.94
4.50	1.25	10.50	3.59	16.50	1.41	22.50	0.94
4.75	1.25	10.75	4.84	16.75	1.41	22.75	0.94
5.00	1.25	11.00	4.84	17.00	1.41	23.00	0.94
5.25	1.25	11.25	7.50	17.25	1.41	23.25	0.94
5.50	1.25	11.50	7.50	17.50	1.41	23.50	0.94
5.75	1.25	11.75	32.49	17.75	1.41	23.75	0.94
6.00	1.25	12.00	86.22	18.00	1.41	24.00	0.94

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--------------------
| CALIB            |
| STANDHYD (  1000)|   Area    (ha)=   3.00
|ID= 1 DT= 2.0 min |   Total Imp(%)=  78.60   Dir. Conn.(%)=  78.60
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.36          0.64
     Dep. Storage     (mm)=       1.00          5.00
     Average Slope     (%)=       1.00          2.00
     Length            (m)=     141.37         40.00
     Mannings n          =      0.013         0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   2.0 MIN. TIME STEP.
```

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.033	0.86	6.033	1.56	12.033	11.25	18.03	1.41
0.067	0.86	6.067	1.56	12.067	11.25	18.07	1.41
0.100	0.86	6.100	1.56	12.100	11.25	18.10	1.41
0.133	0.86	6.133	1.56	12.133	11.25	18.13	1.41
0.167	0.86	6.167	1.56	12.167	11.25	18.17	1.41
0.200	0.86	6.200	1.56	12.200	11.25	18.20	1.41
0.233	0.86	6.233	1.56	12.233	11.25	18.23	1.41
0.267	0.86	6.267	1.56	12.267	11.25	18.27	1.41
0.300	0.86	6.300	1.56	12.300	11.25	18.30	1.41
0.333	0.86	6.333	1.56	12.333	11.25	18.33	1.41
0.367	0.86	6.367	1.56	12.367	11.25	18.37	1.41
0.400	0.86	6.400	1.56	12.400	11.25	18.40	1.41
0.433	0.86	6.433	1.56	12.433	11.25	18.43	1.41
0.467	0.86	6.467	1.56	12.467	11.25	18.47	1.41
0.500	0.86	6.500	1.56	12.500	11.24	18.50	1.41
0.533	0.86	6.533	1.56	12.533	5.78	18.53	1.41
0.567	0.86	6.567	1.56	12.567	5.78	18.57	1.41
0.600	0.86	6.600	1.56	12.600	5.78	18.60	1.41
0.633	0.86	6.633	1.56	12.633	5.78	18.63	1.41
0.667	0.86	6.667	1.56	12.667	5.78	18.67	1.41
0.700	0.86	6.700	1.56	12.700	5.78	18.70	1.41
0.733	0.86	6.733	1.56	12.733	5.78	18.73	1.41
0.767	0.86	6.767	1.56	12.767	5.78	18.77	1.41
0.800	0.86	6.800	1.56	12.800	5.78	18.80	1.41
0.833	0.86	6.833	1.56	12.833	5.78	18.83	1.41

0.867	0.86	6.867	1.56	12.867	5.78	18.87	1.41
0.900	0.86	6.900	1.56	12.900	5.78	18.90	1.41
0.933	0.86	6.933	1.56	12.933	5.78	18.93	1.41
0.967	0.86	6.967	1.56	12.967	5.78	18.97	1.41
1.000	0.86	7.000	1.56	13.000	5.77	19.00	1.41
1.033	0.86	7.033	1.56	13.033	1.09	19.03	1.41
1.067	0.86	7.067	1.56	13.067	1.09	19.07	1.41
1.100	0.86	7.100	1.56	13.100	1.09	19.10	1.41
1.133	0.86	7.133	1.56	13.133	1.09	19.13	1.41
1.167	0.86	7.167	1.56	13.167	1.09	19.17	1.41
1.200	0.86	7.200	1.56	13.200	1.09	19.20	1.41
1.233	0.86	7.233	1.56	13.233	1.09	19.23	1.41
1.267	0.86	7.267	1.56	13.267	1.09	19.27	1.41
1.300	0.86	7.300	1.56	13.300	1.09	19.30	1.41
1.333	0.86	7.333	1.56	13.333	1.09	19.33	1.41
1.367	0.86	7.367	1.56	13.367	1.09	19.37	1.41
1.400	0.86	7.400	1.56	13.400	1.09	19.40	1.41
1.433	0.86	7.433	1.56	13.433	1.09	19.43	1.41
1.467	0.86	7.467	1.56	13.467	1.09	19.47	1.41
1.500	0.86	7.500	1.56	13.500	1.10	19.50	1.41
1.533	0.86	7.533	1.56	13.533	6.40	19.53	1.41
1.567	0.86	7.567	1.56	13.567	6.40	19.57	1.41
1.600	0.86	7.600	1.56	13.600	6.40	19.60	1.41
1.633	0.86	7.633	1.56	13.633	6.40	19.63	1.41
1.667	0.86	7.667	1.56	13.667	6.40	19.67	1.41
1.700	0.86	7.700	1.56	13.700	6.40	19.70	1.41
1.733	0.86	7.733	1.56	13.733	6.40	19.73	1.41
1.767	0.86	7.767	1.56	13.767	6.40	19.77	1.41
1.800	0.86	7.800	1.56	13.800	6.40	19.80	1.41
1.833	0.86	7.833	1.56	13.833	6.40	19.83	1.41
1.867	0.86	7.867	1.56	13.867	6.40	19.87	1.41
1.900	0.86	7.900	1.56	13.900	6.40	19.90	1.41
1.933	0.86	7.933	1.56	13.933	6.40	19.93	1.41
1.967	0.86	7.967	1.56	13.967	6.40	19.97	1.41
2.000	0.86	8.000	1.56	14.000	6.39	20.00	1.41
2.033	1.02	8.033	2.11	14.033	2.34	20.03	0.94
2.067	1.02	8.067	2.11	14.067	2.34	20.07	0.94
2.100	1.02	8.100	2.11	14.100	2.34	20.10	0.94
2.133	1.02	8.133	2.11	14.133	2.34	20.13	0.94
2.167	1.02	8.167	2.11	14.167	2.34	20.17	0.94
2.200	1.02	8.200	2.11	14.200	2.34	20.20	0.94
2.233	1.02	8.233	2.11	14.233	2.34	20.23	0.94
2.267	1.02	8.267	2.11	14.267	2.34	20.27	0.94
2.300	1.02	8.300	2.11	14.300	2.34	20.30	0.94
2.333	1.02	8.333	2.11	14.333	2.34	20.33	0.94
2.367	1.02	8.367	2.11	14.367	2.34	20.37	0.94
2.400	1.02	8.400	2.11	14.400	2.34	20.40	0.94
2.433	1.02	8.433	2.11	14.433	2.34	20.43	0.94
2.467	1.02	8.467	2.11	14.467	2.34	20.47	0.94
2.500	1.02	8.500	2.11	14.500	2.34	20.50	0.94
2.533	1.02	8.533	2.11	14.533	2.34	20.53	0.94
2.567	1.02	8.567	2.11	14.567	2.34	20.57	0.94
2.600	1.02	8.600	2.11	14.600	2.34	20.60	0.94
2.633	1.02	8.633	2.11	14.633	2.34	20.63	0.94
2.667	1.02	8.667	2.11	14.667	2.34	20.67	0.94
2.700	1.02	8.700	2.11	14.700	2.34	20.70	0.94
2.733	1.02	8.733	2.11	14.733	2.34	20.73	0.94
2.767	1.02	8.767	2.11	14.767	2.34	20.77	0.94
2.800	1.02	8.800	2.11	14.800	2.34	20.80	0.94
2.833	1.02	8.833	2.11	14.833	2.34	20.83	0.94
2.867	1.02	8.867	2.11	14.867	2.34	20.87	0.94

2.900	1.02	8.900	2.11	14.900	2.34	20.90	0.94
2.933	1.02	8.933	2.11	14.933	2.34	20.93	0.94
2.967	1.02	8.967	2.11	14.967	2.34	20.97	0.94
3.000	1.02	9.000	2.11	15.000	2.34	21.00	0.94
3.033	1.02	9.033	2.50	15.033	2.34	21.03	0.94
3.067	1.02	9.067	2.50	15.067	2.34	21.07	0.94
3.100	1.02	9.100	2.50	15.100	2.34	21.10	0.94
3.133	1.02	9.133	2.50	15.133	2.34	21.13	0.94
3.167	1.02	9.167	2.50	15.167	2.34	21.17	0.94
3.200	1.02	9.200	2.50	15.200	2.34	21.20	0.94
3.233	1.02	9.233	2.50	15.233	2.34	21.23	0.94
3.267	1.02	9.267	2.50	15.267	2.34	21.27	0.94
3.300	1.02	9.300	2.50	15.300	2.34	21.30	0.94
3.333	1.02	9.333	2.50	15.333	2.34	21.33	0.94
3.367	1.02	9.367	2.50	15.367	2.34	21.37	0.94
3.400	1.02	9.400	2.50	15.400	2.34	21.40	0.94
3.433	1.02	9.433	2.50	15.433	2.34	21.43	0.94
3.467	1.02	9.467	2.50	15.467	2.34	21.47	0.94
3.500	1.02	9.500	2.50	15.500	2.34	21.50	0.94
3.533	1.02	9.533	2.81	15.533	2.34	21.53	0.94
3.567	1.02	9.567	2.81	15.567	2.34	21.57	0.94
3.600	1.02	9.600	2.81	15.600	2.34	21.60	0.94
3.633	1.02	9.633	2.81	15.633	2.34	21.63	0.94
3.667	1.02	9.667	2.81	15.667	2.34	21.67	0.94
3.700	1.02	9.700	2.81	15.700	2.34	21.70	0.94
3.733	1.02	9.733	2.81	15.733	2.34	21.73	0.94
3.767	1.02	9.767	2.81	15.767	2.34	21.77	0.94
3.800	1.02	9.800	2.81	15.800	2.34	21.80	0.94
3.833	1.02	9.833	2.81	15.833	2.34	21.83	0.94
3.867	1.02	9.867	2.81	15.867	2.34	21.87	0.94
3.900	1.02	9.900	2.81	15.900	2.34	21.90	0.94
3.933	1.02	9.933	2.81	15.933	2.34	21.93	0.94
3.967	1.02	9.967	2.81	15.967	2.34	21.97	0.94
4.000	1.02	10.000	2.81	16.000	2.34	22.00	0.94
4.033	1.25	10.033	3.59	16.033	1.41	22.03	0.94
4.067	1.25	10.067	3.59	16.067	1.41	22.07	0.94
4.100	1.25	10.100	3.59	16.100	1.41	22.10	0.94
4.133	1.25	10.133	3.59	16.133	1.41	22.13	0.94
4.167	1.25	10.167	3.59	16.167	1.41	22.17	0.94
4.200	1.25	10.200	3.59	16.200	1.41	22.20	0.94
4.233	1.25	10.233	3.59	16.233	1.41	22.23	0.94
4.267	1.25	10.267	3.59	16.267	1.41	22.27	0.94
4.300	1.25	10.300	3.59	16.300	1.41	22.30	0.94
4.333	1.25	10.333	3.59	16.333	1.41	22.33	0.94
4.367	1.25	10.367	3.59	16.367	1.41	22.37	0.94
4.400	1.25	10.400	3.59	16.400	1.41	22.40	0.94
4.433	1.25	10.433	3.59	16.433	1.41	22.43	0.94
4.467	1.25	10.467	3.59	16.467	1.41	22.47	0.94
4.500	1.25	10.500	3.59	16.500	1.41	22.50	0.94
4.533	1.25	10.533	4.84	16.533	1.41	22.53	0.94
4.567	1.25	10.567	4.84	16.567	1.41	22.57	0.94
4.600	1.25	10.600	4.84	16.600	1.41	22.60	0.94
4.633	1.25	10.633	4.84	16.633	1.41	22.63	0.94
4.667	1.25	10.667	4.84	16.667	1.41	22.67	0.94
4.700	1.25	10.700	4.84	16.700	1.41	22.70	0.94
4.733	1.25	10.733	4.84	16.733	1.41	22.73	0.94
4.767	1.25	10.767	4.84	16.767	1.41	22.77	0.94
4.800	1.25	10.800	4.84	16.800	1.41	22.80	0.94
4.833	1.25	10.833	4.84	16.833	1.41	22.83	0.94
4.867	1.25	10.867	4.84	16.867	1.41	22.87	0.94
4.900	1.25	10.900	4.84	16.900	1.41	22.90	0.94

4.933	1.25	10.933	4.84	16.933	1.41	22.93	0.94
4.967	1.25	10.967	4.84	16.967	1.41	22.97	0.94
5.000	1.25	11.000	4.84	17.000	1.41	23.00	0.94
5.033	1.25	11.033	7.50	17.033	1.41	23.03	0.94
5.067	1.25	11.067	7.50	17.067	1.41	23.07	0.94
5.100	1.25	11.100	7.50	17.100	1.41	23.10	0.94
5.133	1.25	11.133	7.50	17.133	1.41	23.13	0.94
5.167	1.25	11.167	7.50	17.167	1.41	23.17	0.94
5.200	1.25	11.200	7.50	17.200	1.41	23.20	0.94
5.233	1.25	11.233	7.50	17.233	1.41	23.23	0.94
5.267	1.25	11.267	7.50	17.267	1.41	23.27	0.94
5.300	1.25	11.300	7.50	17.300	1.41	23.30	0.94
5.333	1.25	11.333	7.50	17.333	1.41	23.33	0.94
5.367	1.25	11.367	7.50	17.367	1.41	23.37	0.94
5.400	1.25	11.400	7.50	17.400	1.41	23.40	0.94
5.433	1.25	11.433	7.50	17.433	1.41	23.43	0.94
5.467	1.25	11.467	7.50	17.467	1.41	23.47	0.94
5.500	1.25	11.500	7.53	17.500	1.41	23.50	0.94
5.533	1.25	11.533	32.49	17.533	1.41	23.53	0.94
5.567	1.25	11.567	32.49	17.567	1.41	23.57	0.94
5.600	1.25	11.600	32.49	17.600	1.41	23.60	0.94
5.633	1.25	11.633	32.49	17.633	1.41	23.63	0.94
5.667	1.25	11.667	32.49	17.667	1.41	23.67	0.94
5.700	1.25	11.700	32.49	17.700	1.41	23.70	0.94
5.733	1.25	11.733	32.49	17.733	1.41	23.73	0.94
5.767	1.25	11.767	59.43	17.767	1.41	23.77	0.94
5.800	1.25	11.800	86.22	17.800	1.41	23.80	0.94
5.833	1.25	11.833	86.22	17.833	1.41	23.83	0.94
5.867	1.25	11.867	86.22	17.867	1.41	23.87	0.94
5.900	1.25	11.900	86.22	17.900	1.41	23.90	0.94
5.933	1.25	11.933	86.22	17.933	1.41	23.93	0.94
5.967	1.25	11.967	86.22	17.967	1.41	23.97	0.94
6.000	1.25	12.000	86.12	18.000	1.41	24.00	0.94

Max.Eff.Inten.(mm/hr)=	86.22	20.29	
over (min)	5.00	8.00	
Storage Coeff. (min)=	3.34 (ii)	7.79 (ii)	
Unit Hyd. Tpeak (min)=	4.00	8.00	
Unit Hyd. peak (cms)=	0.31	0.14	
			TOTALS
PEAK FLOW (cms)=	0.56	0.03	0.585 (iii)
TIME TO PEAK (hrs)=	12.00	12.03	12.00
RUNOFF VOLUME (mm)=	77.13	15.35	63.91
TOTAL RAINFALL (mm)=	78.13	78.13	78.13
RUNOFF COEFFICIENT =	0.99	0.20	0.82

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 48.0 Ia = Dep. 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(3001)|
| IN= 2---> OUT= 1 |
| DT= 2.0 min |

OVERFLOW IS OFF

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.0391	0.0880
0.0028	0.0061	0.0527	0.0958

0.0096	0.0158	0.0660	0.1032
0.0131	0.0255	0.0762	0.1100
0.0157	0.0350	0.0856	0.1159
0.0180	0.0443	0.0932	0.1209
0.0201	0.0535	0.1001	0.1256
0.0219	0.0625	0.1066	0.1304
0.0238	0.0713	0.1155	0.1376
0.0254	0.0798	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (1000)	2.998	0.585	12.00	63.91
OUTFLOW: ID= 1 (3001)	2.998	0.064	12.57	63.72

PEAK FLOW REDUCTION [Qout/Qin](%)= 11.00
TIME SHIFT OF PEAK FLOW (min)= 34.00
MAXIMUM STORAGE USED (ha.m.)= 0.1023

| CALIB |
| STANDHYD (1100)| Area (ha)= 0.09
|ID= 1 DT= 2.0 min | Total Imp(%)= 26.30 Dir. Conn.(%)= 26.30

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.02	0.07
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	25.17	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 2.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.033	0.86	6.033	1.56	12.033	11.25	18.03	1.41
0.067	0.86	6.067	1.56	12.067	11.25	18.07	1.41
0.100	0.86	6.100	1.56	12.100	11.25	18.10	1.41
0.133	0.86	6.133	1.56	12.133	11.25	18.13	1.41
0.167	0.86	6.167	1.56	12.167	11.25	18.17	1.41
0.200	0.86	6.200	1.56	12.200	11.25	18.20	1.41
0.233	0.86	6.233	1.56	12.233	11.25	18.23	1.41
0.267	0.86	6.267	1.56	12.267	11.25	18.27	1.41
0.300	0.86	6.300	1.56	12.300	11.25	18.30	1.41
0.333	0.86	6.333	1.56	12.333	11.25	18.33	1.41
0.367	0.86	6.367	1.56	12.367	11.25	18.37	1.41
0.400	0.86	6.400	1.56	12.400	11.25	18.40	1.41
0.433	0.86	6.433	1.56	12.433	11.25	18.43	1.41
0.467	0.86	6.467	1.56	12.467	11.25	18.47	1.41
0.500	0.86	6.500	1.56	12.500	11.24	18.50	1.41
0.533	0.86	6.533	1.56	12.533	5.78	18.53	1.41
0.567	0.86	6.567	1.56	12.567	5.78	18.57	1.41
0.600	0.86	6.600	1.56	12.600	5.78	18.60	1.41
0.633	0.86	6.633	1.56	12.633	5.78	18.63	1.41
0.667	0.86	6.667	1.56	12.667	5.78	18.67	1.41
0.700	0.86	6.700	1.56	12.700	5.78	18.70	1.41
0.733	0.86	6.733	1.56	12.733	5.78	18.73	1.41
0.767	0.86	6.767	1.56	12.767	5.78	18.77	1.41
0.800	0.86	6.800	1.56	12.800	5.78	18.80	1.41

0.833	0.86	6.833	1.56	12.833	5.78	18.83	1.41
0.867	0.86	6.867	1.56	12.867	5.78	18.87	1.41
0.900	0.86	6.900	1.56	12.900	5.78	18.90	1.41
0.933	0.86	6.933	1.56	12.933	5.78	18.93	1.41
0.967	0.86	6.967	1.56	12.967	5.78	18.97	1.41
1.000	0.86	7.000	1.56	13.000	5.77	19.00	1.41
1.033	0.86	7.033	1.56	13.033	1.09	19.03	1.41
1.067	0.86	7.067	1.56	13.067	1.09	19.07	1.41
1.100	0.86	7.100	1.56	13.100	1.09	19.10	1.41
1.133	0.86	7.133	1.56	13.133	1.09	19.13	1.41
1.167	0.86	7.167	1.56	13.167	1.09	19.17	1.41
1.200	0.86	7.200	1.56	13.200	1.09	19.20	1.41
1.233	0.86	7.233	1.56	13.233	1.09	19.23	1.41
1.267	0.86	7.267	1.56	13.267	1.09	19.27	1.41
1.300	0.86	7.300	1.56	13.300	1.09	19.30	1.41
1.333	0.86	7.333	1.56	13.333	1.09	19.33	1.41
1.367	0.86	7.367	1.56	13.367	1.09	19.37	1.41
1.400	0.86	7.400	1.56	13.400	1.09	19.40	1.41
1.433	0.86	7.433	1.56	13.433	1.09	19.43	1.41
1.467	0.86	7.467	1.56	13.467	1.09	19.47	1.41
1.500	0.86	7.500	1.56	13.500	1.10	19.50	1.41
1.533	0.86	7.533	1.56	13.533	6.40	19.53	1.41
1.567	0.86	7.567	1.56	13.567	6.40	19.57	1.41
1.600	0.86	7.600	1.56	13.600	6.40	19.60	1.41
1.633	0.86	7.633	1.56	13.633	6.40	19.63	1.41
1.667	0.86	7.667	1.56	13.667	6.40	19.67	1.41
1.700	0.86	7.700	1.56	13.700	6.40	19.70	1.41
1.733	0.86	7.733	1.56	13.733	6.40	19.73	1.41
1.767	0.86	7.767	1.56	13.767	6.40	19.77	1.41
1.800	0.86	7.800	1.56	13.800	6.40	19.80	1.41
1.833	0.86	7.833	1.56	13.833	6.40	19.83	1.41
1.867	0.86	7.867	1.56	13.867	6.40	19.87	1.41
1.900	0.86	7.900	1.56	13.900	6.40	19.90	1.41
1.933	0.86	7.933	1.56	13.933	6.40	19.93	1.41
1.967	0.86	7.967	1.56	13.967	6.40	19.97	1.41
2.000	0.86	8.000	1.56	14.000	6.39	20.00	1.41
2.033	1.02	8.033	2.11	14.033	2.34	20.03	0.94
2.067	1.02	8.067	2.11	14.067	2.34	20.07	0.94
2.100	1.02	8.100	2.11	14.100	2.34	20.10	0.94
2.133	1.02	8.133	2.11	14.133	2.34	20.13	0.94
2.167	1.02	8.167	2.11	14.167	2.34	20.17	0.94
2.200	1.02	8.200	2.11	14.200	2.34	20.20	0.94
2.233	1.02	8.233	2.11	14.233	2.34	20.23	0.94
2.267	1.02	8.267	2.11	14.267	2.34	20.27	0.94
2.300	1.02	8.300	2.11	14.300	2.34	20.30	0.94
2.333	1.02	8.333	2.11	14.333	2.34	20.33	0.94
2.367	1.02	8.367	2.11	14.367	2.34	20.37	0.94
2.400	1.02	8.400	2.11	14.400	2.34	20.40	0.94
2.433	1.02	8.433	2.11	14.433	2.34	20.43	0.94
2.467	1.02	8.467	2.11	14.467	2.34	20.47	0.94
2.500	1.02	8.500	2.11	14.500	2.34	20.50	0.94
2.533	1.02	8.533	2.11	14.533	2.34	20.53	0.94
2.567	1.02	8.567	2.11	14.567	2.34	20.57	0.94
2.600	1.02	8.600	2.11	14.600	2.34	20.60	0.94
2.633	1.02	8.633	2.11	14.633	2.34	20.63	0.94
2.667	1.02	8.667	2.11	14.667	2.34	20.67	0.94
2.700	1.02	8.700	2.11	14.700	2.34	20.70	0.94
2.733	1.02	8.733	2.11	14.733	2.34	20.73	0.94
2.767	1.02	8.767	2.11	14.767	2.34	20.77	0.94
2.800	1.02	8.800	2.11	14.800	2.34	20.80	0.94
2.833	1.02	8.833	2.11	14.833	2.34	20.83	0.94

2.867	1.02	8.867	2.11	14.867	2.34	20.87	0.94
2.900	1.02	8.900	2.11	14.900	2.34	20.90	0.94
2.933	1.02	8.933	2.11	14.933	2.34	20.93	0.94
2.967	1.02	8.967	2.11	14.967	2.34	20.97	0.94
3.000	1.02	9.000	2.11	15.000	2.34	21.00	0.94
3.033	1.02	9.033	2.50	15.033	2.34	21.03	0.94
3.067	1.02	9.067	2.50	15.067	2.34	21.07	0.94
3.100	1.02	9.100	2.50	15.100	2.34	21.10	0.94
3.133	1.02	9.133	2.50	15.133	2.34	21.13	0.94
3.167	1.02	9.167	2.50	15.167	2.34	21.17	0.94
3.200	1.02	9.200	2.50	15.200	2.34	21.20	0.94
3.233	1.02	9.233	2.50	15.233	2.34	21.23	0.94
3.267	1.02	9.267	2.50	15.267	2.34	21.27	0.94
3.300	1.02	9.300	2.50	15.300	2.34	21.30	0.94
3.333	1.02	9.333	2.50	15.333	2.34	21.33	0.94
3.367	1.02	9.367	2.50	15.367	2.34	21.37	0.94
3.400	1.02	9.400	2.50	15.400	2.34	21.40	0.94
3.433	1.02	9.433	2.50	15.433	2.34	21.43	0.94
3.467	1.02	9.467	2.50	15.467	2.34	21.47	0.94
3.500	1.02	9.500	2.50	15.500	2.34	21.50	0.94
3.533	1.02	9.533	2.81	15.533	2.34	21.53	0.94
3.567	1.02	9.567	2.81	15.567	2.34	21.57	0.94
3.600	1.02	9.600	2.81	15.600	2.34	21.60	0.94
3.633	1.02	9.633	2.81	15.633	2.34	21.63	0.94
3.667	1.02	9.667	2.81	15.667	2.34	21.67	0.94
3.700	1.02	9.700	2.81	15.700	2.34	21.70	0.94
3.733	1.02	9.733	2.81	15.733	2.34	21.73	0.94
3.767	1.02	9.767	2.81	15.767	2.34	21.77	0.94
3.800	1.02	9.800	2.81	15.800	2.34	21.80	0.94
3.833	1.02	9.833	2.81	15.833	2.34	21.83	0.94
3.867	1.02	9.867	2.81	15.867	2.34	21.87	0.94
3.900	1.02	9.900	2.81	15.900	2.34	21.90	0.94
3.933	1.02	9.933	2.81	15.933	2.34	21.93	0.94
3.967	1.02	9.967	2.81	15.967	2.34	21.97	0.94
4.000	1.02	10.000	2.81	16.000	2.34	22.00	0.94
4.033	1.25	10.033	3.59	16.033	1.41	22.03	0.94
4.067	1.25	10.067	3.59	16.067	1.41	22.07	0.94
4.100	1.25	10.100	3.59	16.100	1.41	22.10	0.94
4.133	1.25	10.133	3.59	16.133	1.41	22.13	0.94
4.167	1.25	10.167	3.59	16.167	1.41	22.17	0.94
4.200	1.25	10.200	3.59	16.200	1.41	22.20	0.94
4.233	1.25	10.233	3.59	16.233	1.41	22.23	0.94
4.267	1.25	10.267	3.59	16.267	1.41	22.27	0.94
4.300	1.25	10.300	3.59	16.300	1.41	22.30	0.94
4.333	1.25	10.333	3.59	16.333	1.41	22.33	0.94
4.367	1.25	10.367	3.59	16.367	1.41	22.37	0.94
4.400	1.25	10.400	3.59	16.400	1.41	22.40	0.94
4.433	1.25	10.433	3.59	16.433	1.41	22.43	0.94
4.467	1.25	10.467	3.59	16.467	1.41	22.47	0.94
4.500	1.25	10.500	3.59	16.500	1.41	22.50	0.94
4.533	1.25	10.533	4.84	16.533	1.41	22.53	0.94
4.567	1.25	10.567	4.84	16.567	1.41	22.57	0.94
4.600	1.25	10.600	4.84	16.600	1.41	22.60	0.94
4.633	1.25	10.633	4.84	16.633	1.41	22.63	0.94
4.667	1.25	10.667	4.84	16.667	1.41	22.67	0.94
4.700	1.25	10.700	4.84	16.700	1.41	22.70	0.94
4.733	1.25	10.733	4.84	16.733	1.41	22.73	0.94
4.767	1.25	10.767	4.84	16.767	1.41	22.77	0.94
4.800	1.25	10.800	4.84	16.800	1.41	22.80	0.94
4.833	1.25	10.833	4.84	16.833	1.41	22.83	0.94
4.867	1.25	10.867	4.84	16.867	1.41	22.87	0.94

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     4.900    1.25 |10.900    4.84 |16.900    1.41 | 22.90    0.94
     4.933    1.25 |10.933    4.84 |16.933    1.41 | 22.93    0.94
     4.967    1.25 |10.967    4.84 |16.967    1.41 | 22.97    0.94
     5.000    1.25 |11.000    4.84 |17.000    1.41 | 23.00    0.94
     5.033    1.25 |11.033    7.50 |17.033    1.41 | 23.03    0.94
     5.067    1.25 |11.067    7.50 |17.067    1.41 | 23.07    0.94
     5.100    1.25 |11.100    7.50 |17.100    1.41 | 23.10    0.94
     5.133    1.25 |11.133    7.50 |17.133    1.41 | 23.13    0.94
     5.167    1.25 |11.167    7.50 |17.167    1.41 | 23.17    0.94
     5.200    1.25 |11.200    7.50 |17.200    1.41 | 23.20    0.94
     5.233    1.25 |11.233    7.50 |17.233    1.41 | 23.23    0.94
     5.267    1.25 |11.267    7.50 |17.267    1.41 | 23.27    0.94
     5.300    1.25 |11.300    7.50 |17.300    1.41 | 23.30    0.94
     5.333    1.25 |11.333    7.50 |17.333    1.41 | 23.33    0.94
     5.367    1.25 |11.367    7.50 |17.367    1.41 | 23.37    0.94
     5.400    1.25 |11.400    7.50 |17.400    1.41 | 23.40    0.94
     5.433    1.25 |11.433    7.50 |17.433    1.41 | 23.43    0.94
     5.467    1.25 |11.467    7.50 |17.467    1.41 | 23.47    0.94
     5.500    1.25 |11.500    7.53 |17.500    1.41 | 23.50    0.94
     5.533    1.25 |11.533   32.49 |17.533    1.41 | 23.53    0.94
     5.567    1.25 |11.567   32.49 |17.567    1.41 | 23.57    0.94
     5.600    1.25 |11.600   32.49 |17.600    1.41 | 23.60    0.94
     5.633    1.25 |11.633   32.49 |17.633    1.41 | 23.63    0.94
     5.667    1.25 |11.667   32.49 |17.667    1.41 | 23.67    0.94
     5.700    1.25 |11.700   32.49 |17.700    1.41 | 23.70    0.94
     5.733    1.25 |11.733   32.49 |17.733    1.41 | 23.73    0.94
     5.767    1.25 |11.767   59.43 |17.767    1.41 | 23.77    0.94
     5.800    1.25 |11.800   86.22 |17.800    1.41 | 23.80    0.94
     5.833    1.25 |11.833   86.22 |17.833    1.41 | 23.83    0.94
     5.867    1.25 |11.867   86.22 |17.867    1.41 | 23.87    0.94
     5.900    1.25 |11.900   86.22 |17.900    1.41 | 23.90    0.94
     5.933    1.25 |11.933   86.22 |17.933    1.41 | 23.93    0.94
     5.967    1.25 |11.967   86.22 |17.967    1.41 | 23.97    0.94
     6.000    1.25 |12.000   86.12 |18.000    1.41 | 24.00    0.94

     Max.Eff.Inten.(mm/hr)=       86.22        19.04
                over (min)         5.00        16.00
     Storage Coeff.  (min)=        1.18 (ii)   14.89 (ii)
     Unit Hyd. Tpeak (min)=        4.00        16.00
     Unit Hyd. peak  (cms)=        0.49         0.07
                                                          *TOTALS*
     PEAK FLOW       (cms)=        0.01         0.00        0.008 (iii)
     TIME TO PEAK    (hrs)=       11.97        12.17        12.00
     RUNOFF VOLUME    (mm)=       77.13        15.35        31.51
     TOTAL RAINFALL   (mm)=       78.13        78.13        78.13
     RUNOFF COEFFICIENT   =        0.99         0.20         0.40

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  48.0    Ia = Dep. 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  (  2002)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
```



```
       ID1= 1 (  1100):     0.09   0.008    12.00    31.51
     + ID2= 2 (  3001):     3.00   0.064    12.57    63.72
       ===================================================
       ID = 3 (  2002):     3.09   0.066    12.53    62.73

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

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2001)
       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 6.2\VO2\voin.dat

  Output  filename:
C:\Users\zhouj\AppData\Local\Civica\VH5\642fa701-08f9-4281-a674-e9ad409f1aac\cacc3e
0f-35da-47d0-a74b-1880169e2b5b\scenar
  Summary filename:
C:\Users\zhouj\AppData\Local\Civica\VH5\642fa701-08f9-4281-a674-e9ad409f1aac\cacc3e
0f-35da-47d0-a74b-1880169e2b5b\scenar


DATE: 09-13-2023                          TIME: 11:19:07

USER:



COMMENTS: ____________________________________________________________


-------------------------------------------------------------------------------
------------------------
  ************************************************
  ** SIMULATION : Run 11                        **
  ************************************************


--------------------
|    READ STORM     |    Filename: C:\Users\zhouj\AppD
|                   |              ata\Local\Temp\
|                   |              8a0057db-68f2-4cf6-9613-b4e66717427d\23d5b20f
| Ptotal= 85.40 mm  |    Comments: 50yr24hrSCS_Midland
--------------------
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
```



```
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                 0.25    0.94 |  6.25    1.71 | 12.25   12.30 | 18.25    1.54
                 0.50    0.94 |  6.50    1.71 | 12.50   12.30 | 18.50    1.54
                 0.75    0.94 |  6.75    1.71 | 12.75    6.32 | 18.75    1.54
                 1.00    0.94 |  7.00    1.71 | 13.00    6.32 | 19.00    1.54
                 1.25    0.94 |  7.25    1.71 | 13.25    1.20 | 19.25    1.54
                 1.50    0.94 |  7.50    1.71 | 13.50    1.20 | 19.50    1.54
                 1.75    0.94 |  7.75    1.71 | 13.75    7.00 | 19.75    1.54
                 2.00    0.94 |  8.00    1.71 | 14.00    7.00 | 20.00    1.54
                 2.25    1.11 |  8.25    2.31 | 14.25    2.56 | 20.25    1.02
                 2.50    1.11 |  8.50    2.31 | 14.50    2.56 | 20.50    1.02
                 2.75    1.11 |  8.75    2.31 | 14.75    2.56 | 20.75    1.02
                 3.00    1.11 |  9.00    2.31 | 15.00    2.56 | 21.00    1.02
                 3.25    1.11 |  9.25    2.73 | 15.25    2.56 | 21.25    1.02
                 3.50    1.11 |  9.50    2.73 | 15.50    2.56 | 21.50    1.02
                 3.75    1.11 |  9.75    3.07 | 15.75    2.56 | 21.75    1.02
                 4.00    1.11 | 10.00    3.07 | 16.00    2.56 | 22.00    1.02
                 4.25    1.37 | 10.25    3.93 | 16.25    1.54 | 22.25    1.02
                 4.50    1.37 | 10.50    3.93 | 16.50    1.54 | 22.50    1.02
                 4.75    1.37 | 10.75    5.29 | 16.75    1.54 | 22.75    1.02
                 5.00    1.37 | 11.00    5.29 | 17.00    1.54 | 23.00    1.02
                 5.25    1.37 | 11.25    8.20 | 17.25    1.54 | 23.25    1.02
                 5.50    1.37 | 11.50    8.20 | 17.50    1.54 | 23.50    1.02
                 5.75    1.37 | 11.75   35.53 | 17.75    1.54 | 23.75    1.02
                 6.00    1.37 | 12.00   94.28 | 18.00    1.54 | 24.00    1.02

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--------------------
| CALIB             |
| STANDHYD (  1000)|   Area    (ha)=   3.00
|ID= 1 DT= 2.0 min |   Total Imp(%)=  78.60   Dir. Conn.(%)=  78.60
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.36         0.64
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     141.37        40.00
     Mannings n          =       0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   2.0 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
                0.033    0.94 | 6.033    1.71 |12.033   12.30 | 18.03    1.54
                0.067    0.94 | 6.067    1.71 |12.067   12.30 | 18.07    1.54
                0.100    0.94 | 6.100    1.71 |12.100   12.30 | 18.10    1.54
                0.133    0.94 | 6.133    1.71 |12.133   12.30 | 18.13    1.54
                0.167    0.94 | 6.167    1.71 |12.167   12.30 | 18.17    1.54
                0.200    0.94 | 6.200    1.71 |12.200   12.30 | 18.20    1.54
                0.233    0.94 | 6.233    1.71 |12.233   12.30 | 18.23    1.54
                0.267    0.94 | 6.267    1.71 |12.267   12.30 | 18.27    1.54
                0.300    0.94 | 6.300    1.71 |12.300   12.30 | 18.30    1.54
                0.333    0.94 | 6.333    1.71 |12.333   12.30 | 18.33    1.54
                0.367    0.94 | 6.367    1.71 |12.367   12.30 | 18.37    1.54
                0.400    0.94 | 6.400    1.71 |12.400   12.30 | 18.40    1.54
                0.433    0.94 | 6.433    1.71 |12.433   12.30 | 18.43    1.54
                0.467    0.94 | 6.467    1.71 |12.467   12.30 | 18.47    1.54
                0.500    0.94 | 6.500    1.71 |12.500   12.29 | 18.50    1.54
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                0.533    0.94 | 6.533    1.71 |12.533    6.32 | 18.53    1.54
                0.567    0.94 | 6.567    1.71 |12.567    6.32 | 18.57    1.54
                0.600    0.94 | 6.600    1.71 |12.600    6.32 | 18.60    1.54
                0.633    0.94 | 6.633    1.71 |12.633    6.32 | 18.63    1.54
                0.667    0.94 | 6.667    1.71 |12.667    6.32 | 18.67    1.54
                0.700    0.94 | 6.700    1.71 |12.700    6.32 | 18.70    1.54
                0.733    0.94 | 6.733    1.71 |12.733    6.32 | 18.73    1.54
                0.767    0.94 | 6.767    1.71 |12.767    6.32 | 18.77    1.54
                0.800    0.94 | 6.800    1.71 |12.800    6.32 | 18.80    1.54
                0.833    0.94 | 6.833    1.71 |12.833    6.32 | 18.83    1.54
                0.867    0.94 | 6.867    1.71 |12.867    6.32 | 18.87    1.54
                0.900    0.94 | 6.900    1.71 |12.900    6.32 | 18.90    1.54
                0.933    0.94 | 6.933    1.71 |12.933    6.32 | 18.93    1.54
                0.967    0.94 | 6.967    1.71 |12.967    6.32 | 18.97    1.54
                1.000    0.94 | 7.000    1.71 |13.000    6.31 | 19.00    1.54
                1.033    0.94 | 7.033    1.71 |13.033    1.20 | 19.03    1.54
                1.067    0.94 | 7.067    1.71 |13.067    1.20 | 19.07    1.54
                1.100    0.94 | 7.100    1.71 |13.100    1.20 | 19.10    1.54
                1.133    0.94 | 7.133    1.71 |13.133    1.20 | 19.13    1.54
                1.167    0.94 | 7.167    1.71 |13.167    1.20 | 19.17    1.54
                1.200    0.94 | 7.200    1.71 |13.200    1.20 | 19.20    1.54
                1.233    0.94 | 7.233    1.71 |13.233    1.20 | 19.23    1.54
                1.267    0.94 | 7.267    1.71 |13.267    1.20 | 19.27    1.54
                1.300    0.94 | 7.300    1.71 |13.300    1.20 | 19.30    1.54
                1.333    0.94 | 7.333    1.71 |13.333    1.20 | 19.33    1.54
                1.367    0.94 | 7.367    1.71 |13.367    1.20 | 19.37    1.54
                1.400    0.94 | 7.400    1.71 |13.400    1.20 | 19.40    1.54
                1.433    0.94 | 7.433    1.71 |13.433    1.20 | 19.43    1.54
                1.467    0.94 | 7.467    1.71 |13.467    1.20 | 19.47    1.54
                1.500    0.94 | 7.500    1.71 |13.500    1.21 | 19.50    1.54
                1.533    0.94 | 7.533    1.71 |13.533    7.00 | 19.53    1.54
                1.567    0.94 | 7.567    1.71 |13.567    7.00 | 19.57    1.54
                1.600    0.94 | 7.600    1.71 |13.600    7.00 | 19.60    1.54
                1.633    0.94 | 7.633    1.71 |13.633    7.00 | 19.63    1.54
                1.667    0.94 | 7.667    1.71 |13.667    7.00 | 19.67    1.54
                1.700    0.94 | 7.700    1.71 |13.700    7.00 | 19.70    1.54
                1.733    0.94 | 7.733    1.71 |13.733    7.00 | 19.73    1.54
                1.767    0.94 | 7.767    1.71 |13.767    7.00 | 19.77    1.54
                1.800    0.94 | 7.800    1.71 |13.800    7.00 | 19.80    1.54
                1.833    0.94 | 7.833    1.71 |13.833    7.00 | 19.83    1.54
                1.867    0.94 | 7.867    1.71 |13.867    7.00 | 19.87    1.54
                1.900    0.94 | 7.900    1.71 |13.900    7.00 | 19.90    1.54
                1.933    0.94 | 7.933    1.71 |13.933    7.00 | 19.93    1.54
                1.967    0.94 | 7.967    1.71 |13.967    7.00 | 19.97    1.54
                2.000    0.94 | 8.000    1.71 |14.000    6.99 | 20.00    1.54
                2.033    1.11 | 8.033    2.31 |14.033    2.56 | 20.03    1.02
                2.067    1.11 | 8.067    2.31 |14.067    2.56 | 20.07    1.02
                2.100    1.11 | 8.100    2.31 |14.100    2.56 | 20.10    1.02
                2.133    1.11 | 8.133    2.31 |14.133    2.56 | 20.13    1.02
                2.167    1.11 | 8.167    2.31 |14.167    2.56 | 20.17    1.02
                2.200    1.11 | 8.200    2.31 |14.200    2.56 | 20.20    1.02
                2.233    1.11 | 8.233    2.31 |14.233    2.56 | 20.23    1.02
                2.267    1.11 | 8.267    2.31 |14.267    2.56 | 20.27    1.02
                2.300    1.11 | 8.300    2.31 |14.300    2.56 | 20.30    1.02
                2.333    1.11 | 8.333    2.31 |14.333    2.56 | 20.33    1.02
                2.367    1.11 | 8.367    2.31 |14.367    2.56 | 20.37    1.02
                2.400    1.11 | 8.400    2.31 |14.400    2.56 | 20.40    1.02
                2.433    1.11 | 8.433    2.31 |14.433    2.56 | 20.43    1.02
                2.467    1.11 | 8.467    2.31 |14.467    2.56 | 20.47    1.02
                2.500    1.11 | 8.500    2.31 |14.500    2.56 | 20.50    1.02
                2.533    1.11 | 8.533    2.31 |14.533    2.56 | 20.53    1.02
```

2.567	1.11	8.567	2.31	14.567	2.56	20.57	1.02
2.600	1.11	8.600	2.31	14.600	2.56	20.60	1.02
2.633	1.11	8.633	2.31	14.633	2.56	20.63	1.02
2.667	1.11	8.667	2.31	14.667	2.56	20.67	1.02
2.700	1.11	8.700	2.31	14.700	2.56	20.70	1.02
2.733	1.11	8.733	2.31	14.733	2.56	20.73	1.02
2.767	1.11	8.767	2.31	14.767	2.56	20.77	1.02
2.800	1.11	8.800	2.31	14.800	2.56	20.80	1.02
2.833	1.11	8.833	2.31	14.833	2.56	20.83	1.02
2.867	1.11	8.867	2.31	14.867	2.56	20.87	1.02
2.900	1.11	8.900	2.31	14.900	2.56	20.90	1.02
2.933	1.11	8.933	2.31	14.933	2.56	20.93	1.02
2.967	1.11	8.967	2.31	14.967	2.56	20.97	1.02
3.000	1.11	9.000	2.31	15.000	2.56	21.00	1.02
3.033	1.11	9.033	2.73	15.033	2.56	21.03	1.02
3.067	1.11	9.067	2.73	15.067	2.56	21.07	1.02
3.100	1.11	9.100	2.73	15.100	2.56	21.10	1.02
3.133	1.11	9.133	2.73	15.133	2.56	21.13	1.02
3.167	1.11	9.167	2.73	15.167	2.56	21.17	1.02
3.200	1.11	9.200	2.73	15.200	2.56	21.20	1.02
3.233	1.11	9.233	2.73	15.233	2.56	21.23	1.02
3.267	1.11	9.267	2.73	15.267	2.56	21.27	1.02
3.300	1.11	9.300	2.73	15.300	2.56	21.30	1.02
3.333	1.11	9.333	2.73	15.333	2.56	21.33	1.02
3.367	1.11	9.367	2.73	15.367	2.56	21.37	1.02
3.400	1.11	9.400	2.73	15.400	2.56	21.40	1.02
3.433	1.11	9.433	2.73	15.433	2.56	21.43	1.02
3.467	1.11	9.467	2.73	15.467	2.56	21.47	1.02
3.500	1.11	9.500	2.73	15.500	2.56	21.50	1.02
3.533	1.11	9.533	3.07	15.533	2.56	21.53	1.02
3.567	1.11	9.567	3.07	15.567	2.56	21.57	1.02
3.600	1.11	9.600	3.07	15.600	2.56	21.60	1.02
3.633	1.11	9.633	3.07	15.633	2.56	21.63	1.02
3.667	1.11	9.667	3.07	15.667	2.56	21.67	1.02
3.700	1.11	9.700	3.07	15.700	2.56	21.70	1.02
3.733	1.11	9.733	3.07	15.733	2.56	21.73	1.02
3.767	1.11	9.767	3.07	15.767	2.56	21.77	1.02
3.800	1.11	9.800	3.07	15.800	2.56	21.80	1.02
3.833	1.11	9.833	3.07	15.833	2.56	21.83	1.02
3.867	1.11	9.867	3.07	15.867	2.56	21.87	1.02
3.900	1.11	9.900	3.07	15.900	2.56	21.90	1.02
3.933	1.11	9.933	3.07	15.933	2.56	21.93	1.02
3.967	1.11	9.967	3.07	15.967	2.56	21.97	1.02
4.000	1.11	10.000	3.07	16.000	2.56	22.00	1.02
4.033	1.37	10.033	3.93	16.033	1.54	22.03	1.02
4.067	1.37	10.067	3.93	16.067	1.54	22.07	1.02
4.100	1.37	10.100	3.93	16.100	1.54	22.10	1.02
4.133	1.37	10.133	3.93	16.133	1.54	22.13	1.02
4.167	1.37	10.167	3.93	16.167	1.54	22.17	1.02
4.200	1.37	10.200	3.93	16.200	1.54	22.20	1.02
4.233	1.37	10.233	3.93	16.233	1.54	22.23	1.02
4.267	1.37	10.267	3.93	16.267	1.54	22.27	1.02
4.300	1.37	10.300	3.93	16.300	1.54	22.30	1.02
4.333	1.37	10.333	3.93	16.333	1.54	22.33	1.02
4.367	1.37	10.367	3.93	16.367	1.54	22.37	1.02
4.400	1.37	10.400	3.93	16.400	1.54	22.40	1.02
4.433	1.37	10.433	3.93	16.433	1.54	22.43	1.02
4.467	1.37	10.467	3.93	16.467	1.54	22.47	1.02
4.500	1.37	10.500	3.93	16.500	1.54	22.50	1.02
4.533	1.37	10.533	5.29	16.533	1.54	22.53	1.02
4.567	1.37	10.567	5.29	16.567	1.54	22.57	1.02

4.600	1.37	10.600	5.29	16.600	1.54	22.60	1.02
4.633	1.37	10.633	5.29	16.633	1.54	22.63	1.02
4.667	1.37	10.667	5.29	16.667	1.54	22.67	1.02
4.700	1.37	10.700	5.29	16.700	1.54	22.70	1.02
4.733	1.37	10.733	5.29	16.733	1.54	22.73	1.02
4.767	1.37	10.767	5.29	16.767	1.54	22.77	1.02
4.800	1.37	10.800	5.29	16.800	1.54	22.80	1.02
4.833	1.37	10.833	5.29	16.833	1.54	22.83	1.02
4.867	1.37	10.867	5.29	16.867	1.54	22.87	1.02
4.900	1.37	10.900	5.29	16.900	1.54	22.90	1.02
4.933	1.37	10.933	5.29	16.933	1.54	22.93	1.02
4.967	1.37	10.967	5.29	16.967	1.54	22.97	1.02
5.000	1.37	11.000	5.29	17.000	1.54	23.00	1.02
5.033	1.37	11.033	8.20	17.033	1.54	23.03	1.02
5.067	1.37	11.067	8.20	17.067	1.54	23.07	1.02
5.100	1.37	11.100	8.20	17.100	1.54	23.10	1.02
5.133	1.37	11.133	8.20	17.133	1.54	23.13	1.02
5.167	1.37	11.167	8.20	17.167	1.54	23.17	1.02
5.200	1.37	11.200	8.20	17.200	1.54	23.20	1.02
5.233	1.37	11.233	8.20	17.233	1.54	23.23	1.02
5.267	1.37	11.267	8.20	17.267	1.54	23.27	1.02
5.300	1.37	11.300	8.20	17.300	1.54	23.30	1.02
5.333	1.37	11.333	8.20	17.333	1.54	23.33	1.02
5.367	1.37	11.367	8.20	17.367	1.54	23.37	1.02
5.400	1.37	11.400	8.20	17.400	1.54	23.40	1.02
5.433	1.37	11.433	8.20	17.433	1.54	23.43	1.02
5.467	1.37	11.467	8.20	17.467	1.54	23.47	1.02
5.500	1.37	11.500	8.23	17.500	1.54	23.50	1.02
5.533	1.37	11.533	35.53	17.533	1.54	23.53	1.02
5.567	1.37	11.567	35.53	17.567	1.54	23.57	1.02
5.600	1.37	11.600	35.53	17.600	1.54	23.60	1.02
5.633	1.37	11.633	35.53	17.633	1.54	23.63	1.02
5.667	1.37	11.667	35.53	17.667	1.54	23.67	1.02
5.700	1.37	11.700	35.53	17.700	1.54	23.70	1.02
5.733	1.37	11.733	35.53	17.733	1.54	23.73	1.02
5.767	1.37	11.767	64.98	17.767	1.54	23.77	1.02
5.800	1.37	11.800	94.28	17.800	1.54	23.80	1.02
5.833	1.37	11.833	94.28	17.833	1.54	23.83	1.02
5.867	1.37	11.867	94.28	17.867	1.54	23.87	1.02
5.900	1.37	11.900	94.28	17.900	1.54	23.90	1.02
5.933	1.37	11.933	94.28	17.933	1.54	23.93	1.02
5.967	1.37	11.967	94.28	17.967	1.54	23.97	1.02
6.000	1.37	12.000	94.17	18.000	1.54	24.00	1.02

Max.Eff.Inten.(mm/hr)=	94.28	24.06	
over (min)	5.00	8.00	
Storage Coeff. (min)=	3.22 (ii)	7.51 (ii)	
Unit Hyd. Tpeak (min)=	4.00	8.00	
Unit Hyd. peak (cms)=	0.32	0.15	
			TOTALS
PEAK FLOW (cms)=	0.61	0.03	0.644 (iii)
TIME TO PEAK (hrs)=	12.00	12.03	12.00
RUNOFF VOLUME (mm)=	84.40	18.18	70.23
TOTAL RAINFALL (mm)=	85.40	85.40	85.40
RUNOFF COEFFICIENT =	0.99	0.21	0.82

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 48.0 Ia = Dep. 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(3001) |
| IN= 2---> OUT= 1 |
| DT= 2.0 min |

OVERFLOW IS OFF

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.0391	0.0880
0.0028	0.0061	0.0527	0.0958
0.0096	0.0158	0.0660	0.1032
0.0131	0.0255	0.0762	0.1100
0.0157	0.0350	0.0856	0.1159
0.0180	0.0443	0.0932	0.1209
0.0201	0.0535	0.1001	0.1256
0.0219	0.0625	0.1066	0.1304
0.0238	0.0713	0.1155	0.1376
0.0254	0.0798	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (1000)	2.998	0.644	12.00	70.23
OUTFLOW: ID= 1 (3001)	2.998	0.077	12.53	70.04

PEAK FLOW REDUCTION [Qout/Qin](%)= 12.02
TIME SHIFT OF PEAK FLOW (min)= 32.00
MAXIMUM STORAGE USED (ha.m.)= 0.1108

| CALIB |
| STANDHYD (1100) |
|ID= 1 DT= 2.0 min |

Area (ha)= 0.09
Total Imp(%)= 26.30 Dir. Conn.(%)= 26.30

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	0.02	0.07
Dep. Storage (mm)=	1.00	5.00
Average Slope (%)=	1.00	2.00
Length (m)=	25.17	40.00
Mannings n =	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 2.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	' TIME ' hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.033	0.94	6.033	1.71	12.033	12.30	18.03	1.54
0.067	0.94	6.067	1.71	12.067	12.30	18.07	1.54
0.100	0.94	6.100	1.71	12.100	12.30	18.10	1.54
0.133	0.94	6.133	1.71	12.133	12.30	18.13	1.54
0.167	0.94	6.167	1.71	12.167	12.30	18.17	1.54
0.200	0.94	6.200	1.71	12.200	12.30	18.20	1.54
0.233	0.94	6.233	1.71	12.233	12.30	18.23	1.54
0.267	0.94	6.267	1.71	12.267	12.30	18.27	1.54
0.300	0.94	6.300	1.71	12.300	12.30	18.30	1.54
0.333	0.94	6.333	1.71	12.333	12.30	18.33	1.54
0.367	0.94	6.367	1.71	12.367	12.30	18.37	1.54
0.400	0.94	6.400	1.71	12.400	12.30	18.40	1.54
0.433	0.94	6.433	1.71	12.433	12.30	18.43	1.54
0.467	0.94	6.467	1.71	12.467	12.30	18.47	1.54

0.500	0.94	6.500	1.71	12.500	12.29	18.50	1.54
0.533	0.94	6.533	1.71	12.533	6.32	18.53	1.54
0.567	0.94	6.567	1.71	12.567	6.32	18.57	1.54
0.600	0.94	6.600	1.71	12.600	6.32	18.60	1.54
0.633	0.94	6.633	1.71	12.633	6.32	18.63	1.54
0.667	0.94	6.667	1.71	12.667	6.32	18.67	1.54
0.700	0.94	6.700	1.71	12.700	6.32	18.70	1.54
0.733	0.94	6.733	1.71	12.733	6.32	18.73	1.54
0.767	0.94	6.767	1.71	12.767	6.32	18.77	1.54
0.800	0.94	6.800	1.71	12.800	6.32	18.80	1.54
0.833	0.94	6.833	1.71	12.833	6.32	18.83	1.54
0.867	0.94	6.867	1.71	12.867	6.32	18.87	1.54
0.900	0.94	6.900	1.71	12.900	6.32	18.90	1.54
0.933	0.94	6.933	1.71	12.933	6.32	18.93	1.54
0.967	0.94	6.967	1.71	12.967	6.32	18.97	1.54
1.000	0.94	7.000	1.71	13.000	6.31	19.00	1.54
1.033	0.94	7.033	1.71	13.033	1.20	19.03	1.54
1.067	0.94	7.067	1.71	13.067	1.20	19.07	1.54
1.100	0.94	7.100	1.71	13.100	1.20	19.10	1.54
1.133	0.94	7.133	1.71	13.133	1.20	19.13	1.54
1.167	0.94	7.167	1.71	13.167	1.20	19.17	1.54
1.200	0.94	7.200	1.71	13.200	1.20	19.20	1.54
1.233	0.94	7.233	1.71	13.233	1.20	19.23	1.54
1.267	0.94	7.267	1.71	13.267	1.20	19.27	1.54
1.300	0.94	7.300	1.71	13.300	1.20	19.30	1.54
1.333	0.94	7.333	1.71	13.333	1.20	19.33	1.54
1.367	0.94	7.367	1.71	13.367	1.20	19.37	1.54
1.400	0.94	7.400	1.71	13.400	1.20	19.40	1.54
1.433	0.94	7.433	1.71	13.433	1.20	19.43	1.54
1.467	0.94	7.467	1.71	13.467	1.20	19.47	1.54
1.500	0.94	7.500	1.71	13.500	1.21	19.50	1.54
1.533	0.94	7.533	1.71	13.533	7.00	19.53	1.54
1.567	0.94	7.567	1.71	13.567	7.00	19.57	1.54
1.600	0.94	7.600	1.71	13.600	7.00	19.60	1.54
1.633	0.94	7.633	1.71	13.633	7.00	19.63	1.54
1.667	0.94	7.667	1.71	13.667	7.00	19.67	1.54
1.700	0.94	7.700	1.71	13.700	7.00	19.70	1.54
1.733	0.94	7.733	1.71	13.733	7.00	19.73	1.54
1.767	0.94	7.767	1.71	13.767	7.00	19.77	1.54
1.800	0.94	7.800	1.71	13.800	7.00	19.80	1.54
1.833	0.94	7.833	1.71	13.833	7.00	19.83	1.54
1.867	0.94	7.867	1.71	13.867	7.00	19.87	1.54
1.900	0.94	7.900	1.71	13.900	7.00	19.90	1.54
1.933	0.94	7.933	1.71	13.933	7.00	19.93	1.54
1.967	0.94	7.967	1.71	13.967	7.00	19.97	1.54
2.000	0.94	8.000	1.71	14.000	6.99	20.00	1.54
2.033	1.11	8.033	2.31	14.033	2.56	20.03	1.02
2.067	1.11	8.067	2.31	14.067	2.56	20.07	1.02
2.100	1.11	8.100	2.31	14.100	2.56	20.10	1.02
2.133	1.11	8.133	2.31	14.133	2.56	20.13	1.02
2.167	1.11	8.167	2.31	14.167	2.56	20.17	1.02
2.200	1.11	8.200	2.31	14.200	2.56	20.20	1.02
2.233	1.11	8.233	2.31	14.233	2.56	20.23	1.02
2.267	1.11	8.267	2.31	14.267	2.56	20.27	1.02
2.300	1.11	8.300	2.31	14.300	2.56	20.30	1.02
2.333	1.11	8.333	2.31	14.333	2.56	20.33	1.02
2.367	1.11	8.367	2.31	14.367	2.56	20.37	1.02
2.400	1.11	8.400	2.31	14.400	2.56	20.40	1.02
2.433	1.11	8.433	2.31	14.433	2.56	20.43	1.02
2.467	1.11	8.467	2.31	14.467	2.56	20.47	1.02
2.500	1.11	8.500	2.31	14.500	2.56	20.50	1.02

2.533	1.11	8.533	2.31	14.533	2.56	20.53	1.02
2.567	1.11	8.567	2.31	14.567	2.56	20.57	1.02
2.600	1.11	8.600	2.31	14.600	2.56	20.60	1.02
2.633	1.11	8.633	2.31	14.633	2.56	20.63	1.02
2.667	1.11	8.667	2.31	14.667	2.56	20.67	1.02
2.700	1.11	8.700	2.31	14.700	2.56	20.70	1.02
2.733	1.11	8.733	2.31	14.733	2.56	20.73	1.02
2.767	1.11	8.767	2.31	14.767	2.56	20.77	1.02
2.800	1.11	8.800	2.31	14.800	2.56	20.80	1.02
2.833	1.11	8.833	2.31	14.833	2.56	20.83	1.02
2.867	1.11	8.867	2.31	14.867	2.56	20.87	1.02
2.900	1.11	8.900	2.31	14.900	2.56	20.90	1.02
2.933	1.11	8.933	2.31	14.933	2.56	20.93	1.02
2.967	1.11	8.967	2.31	14.967	2.56	20.97	1.02
3.000	1.11	9.000	2.31	15.000	2.56	21.00	1.02
3.033	1.11	9.033	2.73	15.033	2.56	21.03	1.02
3.067	1.11	9.067	2.73	15.067	2.56	21.07	1.02
3.100	1.11	9.100	2.73	15.100	2.56	21.10	1.02
3.133	1.11	9.133	2.73	15.133	2.56	21.13	1.02
3.167	1.11	9.167	2.73	15.167	2.56	21.17	1.02
3.200	1.11	9.200	2.73	15.200	2.56	21.20	1.02
3.233	1.11	9.233	2.73	15.233	2.56	21.23	1.02
3.267	1.11	9.267	2.73	15.267	2.56	21.27	1.02
3.300	1.11	9.300	2.73	15.300	2.56	21.30	1.02
3.333	1.11	9.333	2.73	15.333	2.56	21.33	1.02
3.367	1.11	9.367	2.73	15.367	2.56	21.37	1.02
3.400	1.11	9.400	2.73	15.400	2.56	21.40	1.02
3.433	1.11	9.433	2.73	15.433	2.56	21.43	1.02
3.467	1.11	9.467	2.73	15.467	2.56	21.47	1.02
3.500	1.11	9.500	2.73	15.500	2.56	21.50	1.02
3.533	1.11	9.533	3.07	15.533	2.56	21.53	1.02
3.567	1.11	9.567	3.07	15.567	2.56	21.57	1.02
3.600	1.11	9.600	3.07	15.600	2.56	21.60	1.02
3.633	1.11	9.633	3.07	15.633	2.56	21.63	1.02
3.667	1.11	9.667	3.07	15.667	2.56	21.67	1.02
3.700	1.11	9.700	3.07	15.700	2.56	21.70	1.02
3.733	1.11	9.733	3.07	15.733	2.56	21.73	1.02
3.767	1.11	9.767	3.07	15.767	2.56	21.77	1.02
3.800	1.11	9.800	3.07	15.800	2.56	21.80	1.02
3.833	1.11	9.833	3.07	15.833	2.56	21.83	1.02
3.867	1.11	9.867	3.07	15.867	2.56	21.87	1.02
3.900	1.11	9.900	3.07	15.900	2.56	21.90	1.02
3.933	1.11	9.933	3.07	15.933	2.56	21.93	1.02
3.967	1.11	9.967	3.07	15.967	2.56	21.97	1.02
4.000	1.11	10.000	3.07	16.000	2.56	22.00	1.02
4.033	1.37	10.033	3.93	16.033	1.54	22.03	1.02
4.067	1.37	10.067	3.93	16.067	1.54	22.07	1.02
4.100	1.37	10.100	3.93	16.100	1.54	22.10	1.02
4.133	1.37	10.133	3.93	16.133	1.54	22.13	1.02
4.167	1.37	10.167	3.93	16.167	1.54	22.17	1.02
4.200	1.37	10.200	3.93	16.200	1.54	22.20	1.02
4.233	1.37	10.233	3.93	16.233	1.54	22.23	1.02
4.267	1.37	10.267	3.93	16.267	1.54	22.27	1.02
4.300	1.37	10.300	3.93	16.300	1.54	22.30	1.02
4.333	1.37	10.333	3.93	16.333	1.54	22.33	1.02
4.367	1.37	10.367	3.93	16.367	1.54	22.37	1.02
4.400	1.37	10.400	3.93	16.400	1.54	22.40	1.02
4.433	1.37	10.433	3.93	16.433	1.54	22.43	1.02
4.467	1.37	10.467	3.93	16.467	1.54	22.47	1.02
4.500	1.37	10.500	3.93	16.500	1.54	22.50	1.02
4.533	1.37	10.533	5.29	16.533	1.54	22.53	1.02

4.567	1.37	10.567	5.29	16.567	1.54	22.57	1.02
4.600	1.37	10.600	5.29	16.600	1.54	22.60	1.02
4.633	1.37	10.633	5.29	16.633	1.54	22.63	1.02
4.667	1.37	10.667	5.29	16.667	1.54	22.67	1.02
4.700	1.37	10.700	5.29	16.700	1.54	22.70	1.02
4.733	1.37	10.733	5.29	16.733	1.54	22.73	1.02
4.767	1.37	10.767	5.29	16.767	1.54	22.77	1.02
4.800	1.37	10.800	5.29	16.800	1.54	22.80	1.02
4.833	1.37	10.833	5.29	16.833	1.54	22.83	1.02
4.867	1.37	10.867	5.29	16.867	1.54	22.87	1.02
4.900	1.37	10.900	5.29	16.900	1.54	22.90	1.02
4.933	1.37	10.933	5.29	16.933	1.54	22.93	1.02
4.967	1.37	10.967	5.29	16.967	1.54	22.97	1.02
5.000	1.37	11.000	5.29	17.000	1.54	23.00	1.02
5.033	1.37	11.033	8.20	17.033	1.54	23.03	1.02
5.067	1.37	11.067	8.20	17.067	1.54	23.07	1.02
5.100	1.37	11.100	8.20	17.100	1.54	23.10	1.02
5.133	1.37	11.133	8.20	17.133	1.54	23.13	1.02
5.167	1.37	11.167	8.20	17.167	1.54	23.17	1.02
5.200	1.37	11.200	8.20	17.200	1.54	23.20	1.02
5.233	1.37	11.233	8.20	17.233	1.54	23.23	1.02
5.267	1.37	11.267	8.20	17.267	1.54	23.27	1.02
5.300	1.37	11.300	8.20	17.300	1.54	23.30	1.02
5.333	1.37	11.333	8.20	17.333	1.54	23.33	1.02
5.367	1.37	11.367	8.20	17.367	1.54	23.37	1.02
5.400	1.37	11.400	8.20	17.400	1.54	23.40	1.02
5.433	1.37	11.433	8.20	17.433	1.54	23.43	1.02
5.467	1.37	11.467	8.20	17.467	1.54	23.47	1.02
5.500	1.37	11.500	8.23	17.500	1.54	23.50	1.02
5.533	1.37	11.533	35.53	17.533	1.54	23.53	1.02
5.567	1.37	11.567	35.53	17.567	1.54	23.57	1.02
5.600	1.37	11.600	35.53	17.600	1.54	23.60	1.02
5.633	1.37	11.633	35.53	17.633	1.54	23.63	1.02
5.667	1.37	11.667	35.53	17.667	1.54	23.67	1.02
5.700	1.37	11.700	35.53	17.700	1.54	23.70	1.02
5.733	1.37	11.733	35.53	17.733	1.54	23.73	1.02
5.767	1.37	11.767	64.98	17.767	1.54	23.77	1.02
5.800	1.37	11.800	94.28	17.800	1.54	23.80	1.02
5.833	1.37	11.833	94.28	17.833	1.54	23.83	1.02
5.867	1.37	11.867	94.28	17.867	1.54	23.87	1.02
5.900	1.37	11.900	94.28	17.900	1.54	23.90	1.02
5.933	1.37	11.933	94.28	17.933	1.54	23.93	1.02
5.967	1.37	11.967	94.28	17.967	1.54	23.97	1.02
6.000	1.37	12.000	94.17	18.000	1.54	24.00	1.02

```
     Max.Eff.Inten.(mm/hr)=      94.28        22.61
                over (min)        5.00        14.00
     Storage Coeff.  (min)=       1.14 (ii)   13.94 (ii)
     Unit Hyd. Tpeak (min)=       4.00        14.00
     Unit Hyd. peak  (cms)=       0.50         0.08
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.01         0.00         0.009 (iii)
     TIME TO PEAK    (hrs)=      11.97        12.13        12.00
     RUNOFF VOLUME    (mm)=      84.40        18.18        35.51
     TOTAL RAINFALL   (mm)=      85.40        85.40        85.40
     RUNOFF COEFFICIENT   =       0.99         0.21         0.42

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  48.0    Ia = Dep. Storage  (Above)
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      (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  (  2002)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  1100):     0.09   0.009    12.00    35.51
      + ID2= 2 (  3001):     3.00   0.077    12.53    70.04
        ==================================================
          ID = 3 (  2002):     3.09   0.079    12.50    68.98

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

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

       V    V   I    SSSSS  U   U    A    L               (v 6.2.2001)
       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 6.2\VO2\voin.dat

  Output  filename:
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  Summary filename:
C:\Users\zhouj\AppData\Local\Civica\VH5\642fa701-08f9-4281-a674-e9ad409f1aac\51a6bb
b3-569e-4f1f-b6a7-240b35bebf41\scenar


DATE: 09-13-2023                          TIME: 11:19:06

USER:



COMMENTS: ____________________________________________________________
```



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------------------------------------------------------------------------------------
------------------------
  **********************************************
  ** SIMULATION : Run 12                      **
  **********************************************


--------------------
|   READ STORM     |    Filename: C:\Users\zhouj\AppD
|                  |              ata\Local\Temp\
|                  |              8a0057db-68f2-4cf6-9613-b4e66717427d\0711d3e4
| Ptotal= 92.89 mm |    Comments: 100yr24hrSCS_Midland
--------------------
```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	1.02	6.25	1.86	12.25	13.38	18.25	1.67
0.50	1.02	6.50	1.86	12.50	13.38	18.50	1.67
0.75	1.02	6.75	1.86	12.75	6.87	18.75	1.67
1.00	1.02	7.00	1.86	13.00	6.87	19.00	1.67
1.25	1.02	7.25	1.86	13.25	1.30	19.25	1.67
1.50	1.02	7.50	1.86	13.50	1.30	19.50	1.67
1.75	1.02	7.75	1.86	13.75	7.62	19.75	1.67
2.00	1.02	8.00	1.86	14.00	7.62	20.00	1.67
2.25	1.21	8.25	2.51	14.25	2.79	20.25	1.11
2.50	1.21	8.50	2.51	14.50	2.79	20.50	1.11
2.75	1.21	8.75	2.51	14.75	2.79	20.75	1.11
3.00	1.21	9.00	2.51	15.00	2.79	21.00	1.11
3.25	1.21	9.25	2.97	15.25	2.79	21.25	1.11
3.50	1.21	9.50	2.97	15.50	2.79	21.50	1.11
3.75	1.21	9.75	3.34	15.75	2.79	21.75	1.11
4.00	1.21	10.00	3.34	16.00	2.79	22.00	1.11
4.25	1.49	10.25	4.27	16.25	1.67	22.25	1.11
4.50	1.49	10.50	4.27	16.50	1.67	22.50	1.11
4.75	1.49	10.75	5.76	16.75	1.67	22.75	1.11
5.00	1.49	11.00	5.76	17.00	1.67	23.00	1.11
5.25	1.49	11.25	8.92	17.25	1.67	23.25	1.11
5.50	1.49	11.50	8.92	17.50	1.67	23.50	1.11
5.75	1.49	11.75	38.65	17.75	1.67	23.75	1.11
6.00	1.49	12.00	102.56	18.00	1.67	24.00	1.11

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--------------------
| CALIB            |
| STANDHYD (  1000)|   Area    (ha)=   3.00
|ID= 1 DT= 2.0 min |   Total Imp(%)=  78.60   Dir. Conn.(%)=  78.60
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      2.36          0.64
     Dep. Storage     (mm)=      1.00          5.00
     Average Slope     (%)=      1.00          2.00
     Length            (m)=    141.37         40.00
     Mannings n           =     0.013         0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   2.0 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
```

0.033	1.02	6.033	1.86	12.033	13.38	18.03	1.67
0.067	1.02	6.067	1.86	12.067	13.38	18.07	1.67
0.100	1.02	6.100	1.86	12.100	13.38	18.10	1.67
0.133	1.02	6.133	1.86	12.133	13.38	18.13	1.67
0.167	1.02	6.167	1.86	12.167	13.38	18.17	1.67
0.200	1.02	6.200	1.86	12.200	13.38	18.20	1.67
0.233	1.02	6.233	1.86	12.233	13.38	18.23	1.67
0.267	1.02	6.267	1.86	12.267	13.38	18.27	1.67
0.300	1.02	6.300	1.86	12.300	13.38	18.30	1.67
0.333	1.02	6.333	1.86	12.333	13.38	18.33	1.67
0.367	1.02	6.367	1.86	12.367	13.38	18.37	1.67
0.400	1.02	6.400	1.86	12.400	13.38	18.40	1.67
0.433	1.02	6.433	1.86	12.433	13.38	18.43	1.67
0.467	1.02	6.467	1.86	12.467	13.38	18.47	1.67
0.500	1.02	6.500	1.86	12.500	13.37	18.50	1.67
0.533	1.02	6.533	1.86	12.533	6.87	18.53	1.67
0.567	1.02	6.567	1.86	12.567	6.87	18.57	1.67
0.600	1.02	6.600	1.86	12.600	6.87	18.60	1.67
0.633	1.02	6.633	1.86	12.633	6.87	18.63	1.67
0.667	1.02	6.667	1.86	12.667	6.87	18.67	1.67
0.700	1.02	6.700	1.86	12.700	6.87	18.70	1.67
0.733	1.02	6.733	1.86	12.733	6.87	18.73	1.67
0.767	1.02	6.767	1.86	12.767	6.87	18.77	1.67
0.800	1.02	6.800	1.86	12.800	6.87	18.80	1.67
0.833	1.02	6.833	1.86	12.833	6.87	18.83	1.67
0.867	1.02	6.867	1.86	12.867	6.87	18.87	1.67
0.900	1.02	6.900	1.86	12.900	6.87	18.90	1.67
0.933	1.02	6.933	1.86	12.933	6.87	18.93	1.67
0.967	1.02	6.967	1.86	12.967	6.87	18.97	1.67
1.000	1.02	7.000	1.86	13.000	6.86	19.00	1.67
1.033	1.02	7.033	1.86	13.033	1.30	19.03	1.67
1.067	1.02	7.067	1.86	13.067	1.30	19.07	1.67
1.100	1.02	7.100	1.86	13.100	1.30	19.10	1.67
1.133	1.02	7.133	1.86	13.133	1.30	19.13	1.67
1.167	1.02	7.167	1.86	13.167	1.30	19.17	1.67
1.200	1.02	7.200	1.86	13.200	1.30	19.20	1.67
1.233	1.02	7.233	1.86	13.233	1.30	19.23	1.67
1.267	1.02	7.267	1.86	13.267	1.30	19.27	1.67
1.300	1.02	7.300	1.86	13.300	1.30	19.30	1.67
1.333	1.02	7.333	1.86	13.333	1.30	19.33	1.67
1.367	1.02	7.367	1.86	13.367	1.30	19.37	1.67
1.400	1.02	7.400	1.86	13.400	1.30	19.40	1.67
1.433	1.02	7.433	1.86	13.433	1.30	19.43	1.67
1.467	1.02	7.467	1.86	13.467	1.30	19.47	1.67
1.500	1.02	7.500	1.86	13.500	1.31	19.50	1.67
1.533	1.02	7.533	1.86	13.533	7.62	19.53	1.67
1.567	1.02	7.567	1.86	13.567	7.62	19.57	1.67
1.600	1.02	7.600	1.86	13.600	7.62	19.60	1.67
1.633	1.02	7.633	1.86	13.633	7.62	19.63	1.67
1.667	1.02	7.667	1.86	13.667	7.62	19.67	1.67
1.700	1.02	7.700	1.86	13.700	7.62	19.70	1.67
1.733	1.02	7.733	1.86	13.733	7.62	19.73	1.67
1.767	1.02	7.767	1.86	13.767	7.62	19.77	1.67
1.800	1.02	7.800	1.86	13.800	7.62	19.80	1.67
1.833	1.02	7.833	1.86	13.833	7.62	19.83	1.67
1.867	1.02	7.867	1.86	13.867	7.62	19.87	1.67
1.900	1.02	7.900	1.86	13.900	7.62	19.90	1.67
1.933	1.02	7.933	1.86	13.933	7.62	19.93	1.67
1.967	1.02	7.967	1.86	13.967	7.62	19.97	1.67
2.000	1.02	8.000	1.86	14.000	7.61	20.00	1.67
2.033	1.21	8.033	2.51	14.033	2.79	20.03	1.11

2.067	1.21	8.067	2.51	14.067	2.79	20.07	1.11
2.100	1.21	8.100	2.51	14.100	2.79	20.10	1.11
2.133	1.21	8.133	2.51	14.133	2.79	20.13	1.11
2.167	1.21	8.167	2.51	14.167	2.79	20.17	1.11
2.200	1.21	8.200	2.51	14.200	2.79	20.20	1.11
2.233	1.21	8.233	2.51	14.233	2.79	20.23	1.11
2.267	1.21	8.267	2.51	14.267	2.79	20.27	1.11
2.300	1.21	8.300	2.51	14.300	2.79	20.30	1.11
2.333	1.21	8.333	2.51	14.333	2.79	20.33	1.11
2.367	1.21	8.367	2.51	14.367	2.79	20.37	1.11
2.400	1.21	8.400	2.51	14.400	2.79	20.40	1.11
2.433	1.21	8.433	2.51	14.433	2.79	20.43	1.11
2.467	1.21	8.467	2.51	14.467	2.79	20.47	1.11
2.500	1.21	8.500	2.51	14.500	2.79	20.50	1.11
2.533	1.21	8.533	2.51	14.533	2.79	20.53	1.11
2.567	1.21	8.567	2.51	14.567	2.79	20.57	1.11
2.600	1.21	8.600	2.51	14.600	2.79	20.60	1.11
2.633	1.21	8.633	2.51	14.633	2.79	20.63	1.11
2.667	1.21	8.667	2.51	14.667	2.79	20.67	1.11
2.700	1.21	8.700	2.51	14.700	2.79	20.70	1.11
2.733	1.21	8.733	2.51	14.733	2.79	20.73	1.11
2.767	1.21	8.767	2.51	14.767	2.79	20.77	1.11
2.800	1.21	8.800	2.51	14.800	2.79	20.80	1.11
2.833	1.21	8.833	2.51	14.833	2.79	20.83	1.11
2.867	1.21	8.867	2.51	14.867	2.79	20.87	1.11
2.900	1.21	8.900	2.51	14.900	2.79	20.90	1.11
2.933	1.21	8.933	2.51	14.933	2.79	20.93	1.11
2.967	1.21	8.967	2.51	14.967	2.79	20.97	1.11
3.000	1.21	9.000	2.51	15.000	2.79	21.00	1.11
3.033	1.21	9.033	2.97	15.033	2.79	21.03	1.11
3.067	1.21	9.067	2.97	15.067	2.79	21.07	1.11
3.100	1.21	9.100	2.97	15.100	2.79	21.10	1.11
3.133	1.21	9.133	2.97	15.133	2.79	21.13	1.11
3.167	1.21	9.167	2.97	15.167	2.79	21.17	1.11
3.200	1.21	9.200	2.97	15.200	2.79	21.20	1.11
3.233	1.21	9.233	2.97	15.233	2.79	21.23	1.11
3.267	1.21	9.267	2.97	15.267	2.79	21.27	1.11
3.300	1.21	9.300	2.97	15.300	2.79	21.30	1.11
3.333	1.21	9.333	2.97	15.333	2.79	21.33	1.11
3.367	1.21	9.367	2.97	15.367	2.79	21.37	1.11
3.400	1.21	9.400	2.97	15.400	2.79	21.40	1.11
3.433	1.21	9.433	2.97	15.433	2.79	21.43	1.11
3.467	1.21	9.467	2.97	15.467	2.79	21.47	1.11
3.500	1.21	9.500	2.97	15.500	2.79	21.50	1.11
3.533	1.21	9.533	3.34	15.533	2.79	21.53	1.11
3.567	1.21	9.567	3.34	15.567	2.79	21.57	1.11
3.600	1.21	9.600	3.34	15.600	2.79	21.60	1.11
3.633	1.21	9.633	3.34	15.633	2.79	21.63	1.11
3.667	1.21	9.667	3.34	15.667	2.79	21.67	1.11
3.700	1.21	9.700	3.34	15.700	2.79	21.70	1.11
3.733	1.21	9.733	3.34	15.733	2.79	21.73	1.11
3.767	1.21	9.767	3.34	15.767	2.79	21.77	1.11
3.800	1.21	9.800	3.34	15.800	2.79	21.80	1.11
3.833	1.21	9.833	3.34	15.833	2.79	21.83	1.11
3.867	1.21	9.867	3.34	15.867	2.79	21.87	1.11
3.900	1.21	9.900	3.34	15.900	2.79	21.90	1.11
3.933	1.21	9.933	3.34	15.933	2.79	21.93	1.11
3.967	1.21	9.967	3.34	15.967	2.79	21.97	1.11
4.000	1.21	10.000	3.34	16.000	2.79	22.00	1.11
4.033	1.49	10.033	4.27	16.033	1.67	22.03	1.11
4.067	1.49	10.067	4.27	16.067	1.67	22.07	1.11

4.100	1.49	10.100	4.27	16.100	1.67	22.10	1.11
4.133	1.49	10.133	4.27	16.133	1.67	22.13	1.11
4.167	1.49	10.167	4.27	16.167	1.67	22.17	1.11
4.200	1.49	10.200	4.27	16.200	1.67	22.20	1.11
4.233	1.49	10.233	4.27	16.233	1.67	22.23	1.11
4.267	1.49	10.267	4.27	16.267	1.67	22.27	1.11
4.300	1.49	10.300	4.27	16.300	1.67	22.30	1.11
4.333	1.49	10.333	4.27	16.333	1.67	22.33	1.11
4.367	1.49	10.367	4.27	16.367	1.67	22.37	1.11
4.400	1.49	10.400	4.27	16.400	1.67	22.40	1.11
4.433	1.49	10.433	4.27	16.433	1.67	22.43	1.11
4.467	1.49	10.467	4.27	16.467	1.67	22.47	1.11
4.500	1.49	10.500	4.27	16.500	1.67	22.50	1.11
4.533	1.49	10.533	5.76	16.533	1.67	22.53	1.11
4.567	1.49	10.567	5.76	16.567	1.67	22.57	1.11
4.600	1.49	10.600	5.76	16.600	1.67	22.60	1.11
4.633	1.49	10.633	5.76	16.633	1.67	22.63	1.11
4.667	1.49	10.667	5.76	16.667	1.67	22.67	1.11
4.700	1.49	10.700	5.76	16.700	1.67	22.70	1.11
4.733	1.49	10.733	5.76	16.733	1.67	22.73	1.11
4.767	1.49	10.767	5.76	16.767	1.67	22.77	1.11
4.800	1.49	10.800	5.76	16.800	1.67	22.80	1.11
4.833	1.49	10.833	5.76	16.833	1.67	22.83	1.11
4.867	1.49	10.867	5.76	16.867	1.67	22.87	1.11
4.900	1.49	10.900	5.76	16.900	1.67	22.90	1.11
4.933	1.49	10.933	5.76	16.933	1.67	22.93	1.11
4.967	1.49	10.967	5.76	16.967	1.67	22.97	1.11
5.000	1.49	11.000	5.76	17.000	1.67	23.00	1.11
5.033	1.49	11.033	8.92	17.033	1.67	23.03	1.11
5.067	1.49	11.067	8.92	17.067	1.67	23.07	1.11
5.100	1.49	11.100	8.92	17.100	1.67	23.10	1.11
5.133	1.49	11.133	8.92	17.133	1.67	23.13	1.11
5.167	1.49	11.167	8.92	17.167	1.67	23.17	1.11
5.200	1.49	11.200	8.92	17.200	1.67	23.20	1.11
5.233	1.49	11.233	8.92	17.233	1.67	23.23	1.11
5.267	1.49	11.267	8.92	17.267	1.67	23.27	1.11
5.300	1.49	11.300	8.92	17.300	1.67	23.30	1.11
5.333	1.49	11.333	8.92	17.333	1.67	23.33	1.11
5.367	1.49	11.367	8.92	17.367	1.67	23.37	1.11
5.400	1.49	11.400	8.92	17.400	1.67	23.40	1.11
5.433	1.49	11.433	8.92	17.433	1.67	23.43	1.11
5.467	1.49	11.467	8.92	17.467	1.67	23.47	1.11
5.500	1.49	11.500	8.96	17.500	1.67	23.50	1.11
5.533	1.49	11.533	38.65	17.533	1.67	23.53	1.11
5.567	1.49	11.567	38.65	17.567	1.67	23.57	1.11
5.600	1.49	11.600	38.65	17.600	1.67	23.60	1.11
5.633	1.49	11.633	38.65	17.633	1.67	23.63	1.11
5.667	1.49	11.667	38.65	17.667	1.67	23.67	1.11
5.700	1.49	11.700	38.65	17.700	1.67	23.70	1.11
5.733	1.49	11.733	38.65	17.733	1.67	23.73	1.11
5.767	1.49	11.767	70.69	17.767	1.67	23.77	1.11
5.800	1.49	11.800	102.56	17.800	1.67	23.80	1.11
5.833	1.49	11.833	102.56	17.833	1.67	23.83	1.11
5.867	1.49	11.867	102.56	17.867	1.67	23.87	1.11
5.900	1.49	11.900	102.56	17.900	1.67	23.90	1.11
5.933	1.49	11.933	102.56	17.933	1.67	23.93	1.11
5.967	1.49	11.967	102.56	17.967	1.67	23.97	1.11
6.000	1.49	12.000	102.44	18.000	1.67	24.00	1.11

```
Max.Eff.Inten.(mm/hr)=     102.56          28.17
           over (min)        5.00           8.00
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    Storage Coeff.  (min)=       3.11 (ii)    7.27 (ii)
    Unit Hyd. Tpeak (min)=       4.00         8.00
    Unit Hyd. peak  (cms)=       0.33         0.15
                                                         *TOTALS*
    PEAK FLOW       (cms)=       0.67         0.04         0.704 (iii)
    TIME TO PEAK    (hrs)=      12.00        12.03         12.00
    RUNOFF VOLUME    (mm)=      91.88        21.27         76.77
    TOTAL RAINFALL   (mm)=      92.89        92.89         92.89
    RUNOFF COEFFICIENT   =       0.99         0.23          0.83


      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  48.0    Ia = Dep. 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(  3001)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  2.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0391      0.0880
                          0.0028     0.0061   |   0.0527      0.0958
                          0.0096     0.0158   |   0.0660      0.1032
                          0.0131     0.0255   |   0.0762      0.1100
                          0.0157     0.0350   |   0.0856      0.1159
                          0.0180     0.0443   |   0.0932      0.1209
                          0.0201     0.0535   |   0.1001      0.1256
                          0.0219     0.0625   |   0.1066      0.1304
                          0.0238     0.0713   |   0.1155      0.1376
                          0.0254     0.0798   |   0.0000      0.0000

                                AREA      QPEAK      TPEAK        R.V.
                                (ha)      (cms)      (hrs)        (mm)
   INFLOW : ID= 2 (  1000)      2.998      0.704      12.00       76.77
   OUTFLOW: ID= 1 (  3001)      2.998      0.091      12.53       76.59

                PEAK   FLOW   REDUCTION [Qout/Qin](%)= 12.94
                TIME SHIFT OF PEAK FLOW         (min)= 32.00
                MAXIMUM  STORAGE   USED       (ha.m.)=  0.1196

-------------------------------------------------------------------------------
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| CALIB            |
| STANDHYD (  1100)|   Area    (ha)=   0.09
|ID= 1 DT= 2.0 min |   Total Imp(%)=  26.30   Dir. Conn.(%)=  26.30
--------------------
                             IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=       0.02         0.07
    Dep. Storage     (mm)=       1.00         5.00
    Average Slope     (%)=       1.00         2.00
    Length            (m)=      25.17        40.00
    Mannings n          =       0.013        0.250

        NOTE:  RAINFALL WAS TRANSFORMED TO   2.0 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
0.033	1.02	6.033	1.86	12.033	13.38	18.03	1.67
0.067	1.02	6.067	1.86	12.067	13.38	18.07	1.67
0.100	1.02	6.100	1.86	12.100	13.38	18.10	1.67
0.133	1.02	6.133	1.86	12.133	13.38	18.13	1.67
0.167	1.02	6.167	1.86	12.167	13.38	18.17	1.67
0.200	1.02	6.200	1.86	12.200	13.38	18.20	1.67
0.233	1.02	6.233	1.86	12.233	13.38	18.23	1.67
0.267	1.02	6.267	1.86	12.267	13.38	18.27	1.67
0.300	1.02	6.300	1.86	12.300	13.38	18.30	1.67
0.333	1.02	6.333	1.86	12.333	13.38	18.33	1.67
0.367	1.02	6.367	1.86	12.367	13.38	18.37	1.67
0.400	1.02	6.400	1.86	12.400	13.38	18.40	1.67
0.433	1.02	6.433	1.86	12.433	13.38	18.43	1.67
0.467	1.02	6.467	1.86	12.467	13.38	18.47	1.67
0.500	1.02	6.500	1.86	12.500	13.37	18.50	1.67
0.533	1.02	6.533	1.86	12.533	6.87	18.53	1.67
0.567	1.02	6.567	1.86	12.567	6.87	18.57	1.67
0.600	1.02	6.600	1.86	12.600	6.87	18.60	1.67
0.633	1.02	6.633	1.86	12.633	6.87	18.63	1.67
0.667	1.02	6.667	1.86	12.667	6.87	18.67	1.67
0.700	1.02	6.700	1.86	12.700	6.87	18.70	1.67
0.733	1.02	6.733	1.86	12.733	6.87	18.73	1.67
0.767	1.02	6.767	1.86	12.767	6.87	18.77	1.67
0.800	1.02	6.800	1.86	12.800	6.87	18.80	1.67
0.833	1.02	6.833	1.86	12.833	6.87	18.83	1.67
0.867	1.02	6.867	1.86	12.867	6.87	18.87	1.67
0.900	1.02	6.900	1.86	12.900	6.87	18.90	1.67
0.933	1.02	6.933	1.86	12.933	6.87	18.93	1.67
0.967	1.02	6.967	1.86	12.967	6.87	18.97	1.67
1.000	1.02	7.000	1.86	13.000	6.86	19.00	1.67
1.033	1.02	7.033	1.86	13.033	1.30	19.03	1.67
1.067	1.02	7.067	1.86	13.067	1.30	19.07	1.67
1.100	1.02	7.100	1.86	13.100	1.30	19.10	1.67
1.133	1.02	7.133	1.86	13.133	1.30	19.13	1.67
1.167	1.02	7.167	1.86	13.167	1.30	19.17	1.67
1.200	1.02	7.200	1.86	13.200	1.30	19.20	1.67
1.233	1.02	7.233	1.86	13.233	1.30	19.23	1.67
1.267	1.02	7.267	1.86	13.267	1.30	19.27	1.67
1.300	1.02	7.300	1.86	13.300	1.30	19.30	1.67
1.333	1.02	7.333	1.86	13.333	1.30	19.33	1.67
1.367	1.02	7.367	1.86	13.367	1.30	19.37	1.67
1.400	1.02	7.400	1.86	13.400	1.30	19.40	1.67
1.433	1.02	7.433	1.86	13.433	1.30	19.43	1.67
1.467	1.02	7.467	1.86	13.467	1.30	19.47	1.67
1.500	1.02	7.500	1.86	13.500	1.31	19.50	1.67
1.533	1.02	7.533	1.86	13.533	7.62	19.53	1.67
1.567	1.02	7.567	1.86	13.567	7.62	19.57	1.67
1.600	1.02	7.600	1.86	13.600	7.62	19.60	1.67
1.633	1.02	7.633	1.86	13.633	7.62	19.63	1.67
1.667	1.02	7.667	1.86	13.667	7.62	19.67	1.67
1.700	1.02	7.700	1.86	13.700	7.62	19.70	1.67
1.733	1.02	7.733	1.86	13.733	7.62	19.73	1.67
1.767	1.02	7.767	1.86	13.767	7.62	19.77	1.67
1.800	1.02	7.800	1.86	13.800	7.62	19.80	1.67
1.833	1.02	7.833	1.86	13.833	7.62	19.83	1.67
1.867	1.02	7.867	1.86	13.867	7.62	19.87	1.67
1.900	1.02	7.900	1.86	13.900	7.62	19.90	1.67
1.933	1.02	7.933	1.86	13.933	7.62	19.93	1.67
1.967	1.02	7.967	1.86	13.967	7.62	19.97	1.67
2.000	1.02	8.000	1.86	14.000	7.61	20.00	1.67

2.033	1.21	8.033	2.51	14.033	2.79	20.03	1.11
2.067	1.21	8.067	2.51	14.067	2.79	20.07	1.11
2.100	1.21	8.100	2.51	14.100	2.79	20.10	1.11
2.133	1.21	8.133	2.51	14.133	2.79	20.13	1.11
2.167	1.21	8.167	2.51	14.167	2.79	20.17	1.11
2.200	1.21	8.200	2.51	14.200	2.79	20.20	1.11
2.233	1.21	8.233	2.51	14.233	2.79	20.23	1.11
2.267	1.21	8.267	2.51	14.267	2.79	20.27	1.11
2.300	1.21	8.300	2.51	14.300	2.79	20.30	1.11
2.333	1.21	8.333	2.51	14.333	2.79	20.33	1.11
2.367	1.21	8.367	2.51	14.367	2.79	20.37	1.11
2.400	1.21	8.400	2.51	14.400	2.79	20.40	1.11
2.433	1.21	8.433	2.51	14.433	2.79	20.43	1.11
2.467	1.21	8.467	2.51	14.467	2.79	20.47	1.11
2.500	1.21	8.500	2.51	14.500	2.79	20.50	1.11
2.533	1.21	8.533	2.51	14.533	2.79	20.53	1.11
2.567	1.21	8.567	2.51	14.567	2.79	20.57	1.11
2.600	1.21	8.600	2.51	14.600	2.79	20.60	1.11
2.633	1.21	8.633	2.51	14.633	2.79	20.63	1.11
2.667	1.21	8.667	2.51	14.667	2.79	20.67	1.11
2.700	1.21	8.700	2.51	14.700	2.79	20.70	1.11
2.733	1.21	8.733	2.51	14.733	2.79	20.73	1.11
2.767	1.21	8.767	2.51	14.767	2.79	20.77	1.11
2.800	1.21	8.800	2.51	14.800	2.79	20.80	1.11
2.833	1.21	8.833	2.51	14.833	2.79	20.83	1.11
2.867	1.21	8.867	2.51	14.867	2.79	20.87	1.11
2.900	1.21	8.900	2.51	14.900	2.79	20.90	1.11
2.933	1.21	8.933	2.51	14.933	2.79	20.93	1.11
2.967	1.21	8.967	2.51	14.967	2.79	20.97	1.11
3.000	1.21	9.000	2.51	15.000	2.79	21.00	1.11
3.033	1.21	9.033	2.97	15.033	2.79	21.03	1.11
3.067	1.21	9.067	2.97	15.067	2.79	21.07	1.11
3.100	1.21	9.100	2.97	15.100	2.79	21.10	1.11
3.133	1.21	9.133	2.97	15.133	2.79	21.13	1.11
3.167	1.21	9.167	2.97	15.167	2.79	21.17	1.11
3.200	1.21	9.200	2.97	15.200	2.79	21.20	1.11
3.233	1.21	9.233	2.97	15.233	2.79	21.23	1.11
3.267	1.21	9.267	2.97	15.267	2.79	21.27	1.11
3.300	1.21	9.300	2.97	15.300	2.79	21.30	1.11
3.333	1.21	9.333	2.97	15.333	2.79	21.33	1.11
3.367	1.21	9.367	2.97	15.367	2.79	21.37	1.11
3.400	1.21	9.400	2.97	15.400	2.79	21.40	1.11
3.433	1.21	9.433	2.97	15.433	2.79	21.43	1.11
3.467	1.21	9.467	2.97	15.467	2.79	21.47	1.11
3.500	1.21	9.500	2.97	15.500	2.79	21.50	1.11
3.533	1.21	9.533	3.34	15.533	2.79	21.53	1.11
3.567	1.21	9.567	3.34	15.567	2.79	21.57	1.11
3.600	1.21	9.600	3.34	15.600	2.79	21.60	1.11
3.633	1.21	9.633	3.34	15.633	2.79	21.63	1.11
3.667	1.21	9.667	3.34	15.667	2.79	21.67	1.11
3.700	1.21	9.700	3.34	15.700	2.79	21.70	1.11
3.733	1.21	9.733	3.34	15.733	2.79	21.73	1.11
3.767	1.21	9.767	3.34	15.767	2.79	21.77	1.11
3.800	1.21	9.800	3.34	15.800	2.79	21.80	1.11
3.833	1.21	9.833	3.34	15.833	2.79	21.83	1.11
3.867	1.21	9.867	3.34	15.867	2.79	21.87	1.11
3.900	1.21	9.900	3.34	15.900	2.79	21.90	1.11
3.933	1.21	9.933	3.34	15.933	2.79	21.93	1.11
3.967	1.21	9.967	3.34	15.967	2.79	21.97	1.11
4.000	1.21	10.000	3.34	16.000	2.79	22.00	1.11
4.033	1.49	10.033	4.27	16.033	1.67	22.03	1.11

4.067	1.49	10.067	4.27	16.067	1.67	22.07	1.11
4.100	1.49	10.100	4.27	16.100	1.67	22.10	1.11
4.133	1.49	10.133	4.27	16.133	1.67	22.13	1.11
4.167	1.49	10.167	4.27	16.167	1.67	22.17	1.11
4.200	1.49	10.200	4.27	16.200	1.67	22.20	1.11
4.233	1.49	10.233	4.27	16.233	1.67	22.23	1.11
4.267	1.49	10.267	4.27	16.267	1.67	22.27	1.11
4.300	1.49	10.300	4.27	16.300	1.67	22.30	1.11
4.333	1.49	10.333	4.27	16.333	1.67	22.33	1.11
4.367	1.49	10.367	4.27	16.367	1.67	22.37	1.11
4.400	1.49	10.400	4.27	16.400	1.67	22.40	1.11
4.433	1.49	10.433	4.27	16.433	1.67	22.43	1.11
4.467	1.49	10.467	4.27	16.467	1.67	22.47	1.11
4.500	1.49	10.500	4.27	16.500	1.67	22.50	1.11
4.533	1.49	10.533	5.76	16.533	1.67	22.53	1.11
4.567	1.49	10.567	5.76	16.567	1.67	22.57	1.11
4.600	1.49	10.600	5.76	16.600	1.67	22.60	1.11
4.633	1.49	10.633	5.76	16.633	1.67	22.63	1.11
4.667	1.49	10.667	5.76	16.667	1.67	22.67	1.11
4.700	1.49	10.700	5.76	16.700	1.67	22.70	1.11
4.733	1.49	10.733	5.76	16.733	1.67	22.73	1.11
4.767	1.49	10.767	5.76	16.767	1.67	22.77	1.11
4.800	1.49	10.800	5.76	16.800	1.67	22.80	1.11
4.833	1.49	10.833	5.76	16.833	1.67	22.83	1.11
4.867	1.49	10.867	5.76	16.867	1.67	22.87	1.11
4.900	1.49	10.900	5.76	16.900	1.67	22.90	1.11
4.933	1.49	10.933	5.76	16.933	1.67	22.93	1.11
4.967	1.49	10.967	5.76	16.967	1.67	22.97	1.11
5.000	1.49	11.000	5.76	17.000	1.67	23.00	1.11
5.033	1.49	11.033	8.92	17.033	1.67	23.03	1.11
5.067	1.49	11.067	8.92	17.067	1.67	23.07	1.11
5.100	1.49	11.100	8.92	17.100	1.67	23.10	1.11
5.133	1.49	11.133	8.92	17.133	1.67	23.13	1.11
5.167	1.49	11.167	8.92	17.167	1.67	23.17	1.11
5.200	1.49	11.200	8.92	17.200	1.67	23.20	1.11
5.233	1.49	11.233	8.92	17.233	1.67	23.23	1.11
5.267	1.49	11.267	8.92	17.267	1.67	23.27	1.11
5.300	1.49	11.300	8.92	17.300	1.67	23.30	1.11
5.333	1.49	11.333	8.92	17.333	1.67	23.33	1.11
5.367	1.49	11.367	8.92	17.367	1.67	23.37	1.11
5.400	1.49	11.400	8.92	17.400	1.67	23.40	1.11
5.433	1.49	11.433	8.92	17.433	1.67	23.43	1.11
5.467	1.49	11.467	8.92	17.467	1.67	23.47	1.11
5.500	1.49	11.500	8.96	17.500	1.67	23.50	1.11
5.533	1.49	11.533	38.65	17.533	1.67	23.53	1.11
5.567	1.49	11.567	38.65	17.567	1.67	23.57	1.11
5.600	1.49	11.600	38.65	17.600	1.67	23.60	1.11
5.633	1.49	11.633	38.65	17.633	1.67	23.63	1.11
5.667	1.49	11.667	38.65	17.667	1.67	23.67	1.11
5.700	1.49	11.700	38.65	17.700	1.67	23.70	1.11
5.733	1.49	11.733	38.65	17.733	1.67	23.73	1.11
5.767	1.49	11.767	70.69	17.767	1.67	23.77	1.11
5.800	1.49	11.800	102.56	17.800	1.67	23.80	1.11
5.833	1.49	11.833	102.56	17.833	1.67	23.83	1.11
5.867	1.49	11.867	102.56	17.867	1.67	23.87	1.11
5.900	1.49	11.900	102.56	17.900	1.67	23.90	1.11
5.933	1.49	11.933	102.56	17.933	1.67	23.93	1.11
5.967	1.49	11.967	102.56	17.967	1.67	23.97	1.11
6.000	1.49	12.000	102.44	18.000	1.67	24.00	1.11

Max.Eff.Inten.(mm/hr)=   102.56   27.36


```
           over (min)          5.00         14.00
     Storage Coeff.  (min)=      1.11 (ii)   12.96 (ii)
     Unit Hyd. Tpeak (min)=      4.00        14.00
     Unit Hyd. peak  (cms)=      0.50         0.09
                                                         *TOTALS*
     PEAK FLOW       (cms)=      0.01         0.00         0.010 (iii)
     TIME TO PEAK    (hrs)=     11.97        12.13        12.00
     RUNOFF VOLUME    (mm)=     91.89        21.28        39.75
     TOTAL RAINFALL   (mm)=     92.89        92.89        92.89
     RUNOFF COEFFICIENT   =      0.99         0.23         0.43

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  48.0    Ia = Dep. 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  (  2002)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  1100):      0.09   0.010    12.00    39.75
      + ID2= 2 (  3001):      3.00   0.091    12.53    76.59
        ===============================================
        ID = 3 (  2002):      3.09   0.093    12.50    75.46

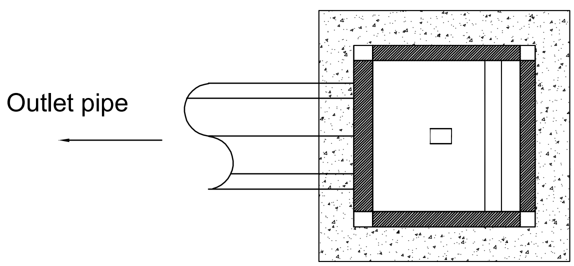
     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
```

APPENDIX

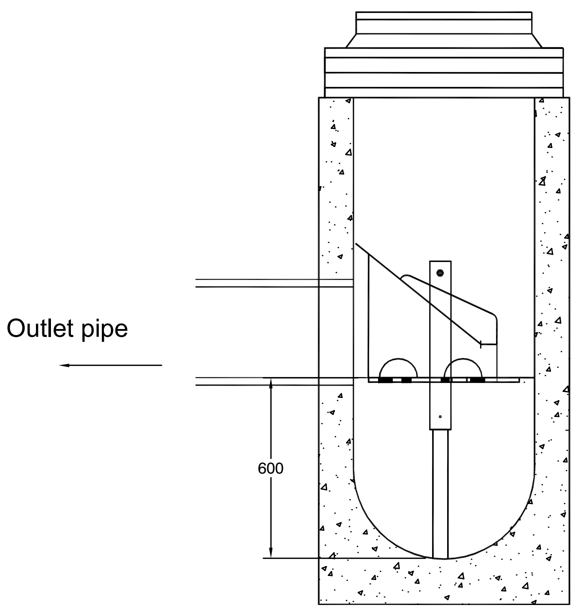
C CB SHIELDS

Notes

1. CB Shield can be installed at any time. In a non frozen condition.
2. The **frame and cover <u>MUST BE</u> well aligned** with the catchbasin for proper installation.
3. The catchbasin sump must be clean before installation
4. The grate should be at the same level as the standing water in the sump.



Top view



Profile view

CB Shield (600mm Sump)

Canadian ETV Verification Report

Performance Testing
of
Catch Basin Shield Technology

<u>FINAL – STRICTLY CONFIDENTIAL</u>

Date: 17 October 2016

Prepared For:
GLOBE Performance Solutions
World Trade Centre
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Vancouver, British Columbia
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Prepared By:
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Toronto and Region Conservation for The Living City

Authentication

Dated: 17 October 2016
Approved by:

Name: Tim Van Seters
Title/Position: Senior Manager
Department: Sustainable Technologies,
Organization: Toronto and Region Conservation Authority

Verification Report Outline for CB Shield Inc.

Catch Basin Shield Technology

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Disclaimer

The Toronto and Region Conservation Authority ("TRCA") including its employees and Directors, (the "Verifier") has participated in the Canadian Environmental Technology Verification (ETV) Program verification of the CB Shield (the "Vendor") Catch Basin Shield Technology.

Any reference to the "Technology" refers to the Vendor's Catch Basin Shield Technology.

The Verifier is in no way affiliated with the Vendor.

The Vendor shall not edit or modify the report in any way or make any attempt to misrepresent data to the benefit of the Vendor. Selectively using sections of the report in order to change or misrepresent its overall meaning is also prohibited.

Claim verification by the Verifier does not represent any guarantee of the performance or safety of the Technology.

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The Vendor is wholly responsible for ensuring that the Technology complies with all applicable legislation, regulations, and other authorities.

Executive Summary

The CB Shield Technology was subjected to verification in accordance with the Canadian ETV Program General Verification Protocol, and taking into account the current draft of the proposed FDIS ISO 14034.

The verification process was mutually agreed upon by GLOBE Performance Solutions, the Verification Body, and Toronto and Region Conservation Authority ("TRCA"), the subcontracted Verification Expert. The purpose of this verification is to provide objective and quality-assured performance data on environmental technologies, so that users, developers, regulators, and consultants can make informed decisions about purchasing and applying these technologies.

This report, prepared by TRCA according to the criteria and guidelines set out in the Canadian ETV Program General Verification Protocol (GVP) of June 2012, is an official audit of the testing report generated through the performance testing of the CB Shield technology. The report is based on the Canadian ETV Program.

In addition, through guidance provided by GPS, the TRCA completed its verification of the CB Shield technology performance taking into account the principles and requirements of FDIS ISO 14034.

Performance testing for this verification took place at Good Harbour Laboratories in Mississauga, Ontario, Canada. Good Harbour Laboratories conducted the testing and followed the test sediment particle size distribution and many of the methods outlined in the *Procedure for Laboratory Testing of Oil-Grit Separators* developed by Toronto and Region Conservation Authority for the Canadian ETV Program.

CB Shield Technology is based on established scientific and technical principles in the field of fluid dynamics, sedimentation/settling, hydrology and sediment transport.

The technology incorporates an insert for catchbasins that aims to deflect and reduce the energy of inflows and thereby increase capture and reduce scour of sediment found in stormwater runoff.

After examination and audit of the test report and based on the test data submitted, the TRCA has concluded that _the CB Shield insert provides an environmental benefit related to capture and scour prevention of suspended sediments in stormwater runoff.

Accordingly, the TRCA recommends that the performance claims be worded as follows:

1. During the sediment capture test, for a catch basin with a false floor set to 50% of the manufacturer's recommended maximum sediment storage depth and a constant influent sediment concentration of 200 mg/L, the catch basin with a CB Shield insert removed 64, 59.9, 52.4, 42.6, 25.2, and 26.7 percent of influent sediment by mass at inflow rates of 0.24, 0.48, 1.20, 2.40, 6.00, and 8.40 L/s, respectively.

2. For a catchbasin filled to three quarters of the manufacturer's recommended maximum sediment storage depth, with the CB Shield™ insert, scouring of test sediment is at most 8% of the control catchbasin during a continuous 30 minute scour test run with 5 minute duration inflows of 1.2, 4.8, 8.4, 12.0, and 15.6 L/s.

1. Introduction

GLOBE Performance Solutions (GPS) which operates the Canadian ETV Program on behalf of Environment Canada has engaged the Toronto and Region Conservation Authority ("TRCA") to verify the performance of CB Shield Technology within the framework of a subcontracted agreement. The CB Shield technology is a technology for capturing sediment from storm water runoff when inserted inside street drains (catchbasins) and retaining sediment by preventing scour and re-suspension.

GLOBE Performance Solutions, in collaboration with the TRCA, has further agreed to prepare a verification report and verification statement that will meet the requirements of the Canadian ETV Program.

This verification report, prepared by the TRCA (the Verifier), in its capacity as a Canadian ETV Program Verification Expert (VE), constitutes a review of the application of the CB Shield technology based on the Canadian ETV Program General Verification Protocol (GVP) and taking into account the principles and requirements of FDIS ISO 14034.

The verification report is a summary record of the audit undertaken by the TRCA to verify the Vendor's technology performance claim.

CB Shield applied for technology verification through GLOBE Performance Solutions. Testing was carried out by the Good Harbour Laboratories in accordance with ISO 17025 requirements. TRCA examined the test report and prepared the verification report.

The CB Shield Technology is based on established scientific and technical principles in the field of _fluid dynamics, sedimentation/settling, hydrology and sediment transport. The technology incorporates an insert for catchbasins that deflects incoming water to the sidewalls dissipating its energy and passing it over a grate where velocity is decreased and residence time is increased allowing sediments to drop out of suspension and be captured. The dissipation of influent water energy also reduces scouring of already captured sediment during subsequent storms.

CB Shield's performance claims as submitted were:

1. For a catch basin containing sediment up to 150mm below the outlet invert, use of a CB Shield™ reduces scour of ETV sediment by a factor of at least 20 for stormwater inflows from 1.2-15.6L/s.
2. In addition use of CB Shield™ increases capture of ETV test sediment in all cases and by at least 370% to 490% respectively for flows of 2.4L/s and 8.4L/s.

Results showed that the initial claim for capture test could not be verified for individual flow rates as independence between samples of different flow rates could not be maintained since the captured sediment was not removed between the tests of different flow rates. A re-test was requested for the capture test. The re-test was done on a catchbasin with CB Shield insert without reference to a control catch basin. Results showed removal efficiencies ranging from 64.0 - 26.7% for inflow rates ranging from 0.24 - 8.40 L/s respectively.

The scour test was evaluated as a continuous test. Comparing the CB Shield to the Control treatment indicated that the CB Shield scoured much less than the control catch basin at 5 minute duration inflow rates of 1.2, 4.8, 8.4, 12.0, and 15.6 L/s.

1.1 Objectives

The objective of this report is to verify the performance claim made by CB Shield for the Catch Basin Shield Technology. This report summarizes the findings of the Canadian ETV Program Verification Expert, the TRCA, based on information and data contained in the Formal Application submitted by CB Shield to GLOBE Performance Solutions.

1.2 Scope

This verification was conducted by the TRCA using the June 2012 Canadian ETV Program General Verification Protocol and the most recent version (June 2015) of the international ETV standard (FDIS ISO 14034).

2. Review of the Application

2.1 Introduction

This section provides a summary of the information provided by the applicant included with the pre-screening application and formal application forms submitted to GLOBE Performance Solutions and reviewed by the TRCA pursuant to the Canadian ETV Program and the new international ETV standard (FDIS ISO 14034).

2.2 Applicant Organization

CB Shield Inc.
233 Cross Avenue, Suite 302
Oakville, ON L6J 2W9

Canada

2.3 Documents Reviewed

The technology and all information provided by the Applicant with the Formal Application, the formal application binder and all subsequent transmittals to the Verification Expert were reviewed. The results of this Application Review are summarized in the Application Review Checklist (Table 1) below.

Table 1: Application Review Checklist – Mandatory Information

Ref.	Criteria		Yes	No	Verifier Comments
1.1	Signed Formal Application.		☑	☐	
1.2	Signed Declaration Regarding Codes & Standards submitted with signed formal application.		☑	☐	
1.3	Technology provides an environmental benefit.		☑	☐	When installed in storm water catch basin, the device reduces souring and re-suspension of retained sediment, thereby reducing discharge of sediment into the environment.
1.4	A copy of "Claim to be Verified" for each performance claim to be verified included with the Formal Application.		☑	☐	"Claim to be Verified" submitted with application.
1.5	Performance Claim composed in a way that satisfies "Criteria for Specifying Claims":		☐	☐	
	1.5.1	Include Technology name (and model number)	☑	☐	CB Shield™
	1.5.2	Include application of the technology	☑	☐	Applied as an insert into catchbasins to improve capture and reduce scour of stormwater runoff sediment.
	1.5.3	Include specific operating conditions during testing	☑	☐	Test sediment: ETV test sediment Capture (Claim 1): Constant influent concentration of 200 mg/L. False floor set to 50% of the manufacturer's recommended maximum sediment storage (300 mm below the outlet invert) Inflow rates of 0.24, 0.48, 1.20, 2.40, 6.00 and 8.40 L/s. Scour (Claim 2): Catchbasin filled to ¾ of the manufacturer's recommended maximum sediment storage depth Claim based on continuous 30 minute test with 5 minute duration inflows of 1.2, 4.8, 8.4, 12.0, and 15.6 L/s.
	1.5.4	Does it meet the minimum requirement for the majority of Canadian Standards / Guidelines?	☑	☐	Signed Declaration Regarding Codes & Standards submitted with signed formal
	1.5.5	Does it specify the performance achievable by the technology?	☑	☐	Capture: Removal efficiencies of 64, 59.9, 52.4, 42.6, 25.2, and 26.7 for inflow rates of 0.24, 0.48, 1.20, 2.40, 6.00, and 8.40 L/s respectively with a constant influent sediment concentration of 200 mg/L. Scour: Scouring is at most 8% of the control catchbasin during a continuous 30 minute scour test run with 5 minute duration inflows of 1.2, 4.8, 8.4, 12.0, and 15.6 L/s.

	1.5.6	Is the performance measurable?	☑	☐	Capture: To measure the capture performance at each flow rate, a modified mass balance calculation is required, which can be done using mass of the sediment added to the sediment feeder, mass of sediment remaining in the feeder, and mass of captured sediment. Scour: To compare scouring potential for the continuous test between the control and CB Shield treatments the total effluent load is calculated for the entire duration of the test based on flow rate, duration, and sediment concentration of individual samples.
1.6	Standard operating practices and a description of operating conditions for each individual performance claim specified.		☑	☐	Tests are done in a lab on a simulated street scape with catchbasins clean of litter/debris. In the field, on average there are 5 catch basins per hectare. Therefore, the results from the maximum flow rate (15.6L/s) during the scour test will be meaningful for runoff flows up to 78 L/s per hectare. The range of flows tested is anticipated to match the range of flows expected at most installations. ETV test sediment: AGSCO 1-1000 micron silica sediment blend. Background samples are taken to account for all sources of sediment input. Capture Test (Claim 1) Background samples taken at least three times per run to account for all sources of sediment input Influent sediment concentration is constant at 200 mg/L (+/- 25mg/L) Tested flows: 0.24, 0.48, 1.2, 2.4, 6, and 8.4 L/s. These flow rates comply with surface loading rates specified in the CETV OGS testing procedures (40, 80, 200, 400, 1000, and 1400 L/min/m^2), based on the effective treatment area (0.36m^2) of the device. The specified loading rate of 600 L/min/m^2 was not tested. Conducted with a false bottom set at 300 mm below the outlet invert. Effluent was not recirculated; single pass through. Sediment injected 16.5 mm away from the inlet Scour Test (Claim 2) Tested flows: 1.2, 4.8, 8.4, 12, and 15.6 L/s. These flow rates comply with surface loading rates specified in the CETV OGS testing procedures (200, 800, 1400, 2000, and 2600 L/min/m^2), based on the effective treatment area (0.36m^2) of the device. Conducted with a false bottom set at 254 mm below the invert and preloaded with sediment up to 152 mm below the outlet invert. Water is filled to the effluent pipe and allowed to settle for 12-24 hours. Initial start time and flow rate transition times shall not exceed 1 minute. Effluent filtered using a 10µm filter before recirculation.

1.7	The proponent has supplied significant references describing or supporting scientific and engineering principles of the technology.	☐	☐	Proponent claimed that scientific principles underlying the CB Shield are based on widely accepted knowledge of fluid dynamics, sedimentation/settling, hydrology and sediment transport. Link to EPA paper was broken.
1.8	Two or more names and contact information of independent experts (with no vested interest in the technology), qualified (backgrounds of experts are needed) to review the scientific and engineering principles on which the technology is based. These experts must be willing to be contacted by the VE.	☑	☐	Greg Williams (Ph.D., P.Eng), Jenn Drake (Ph.D)
1.9	Brief summary of significant human or environmental health and safety issues associated with the technology. (Note: this criterion complements but does not replace the obligation for the applicant to submit a duly signed "Declaration Regarding Codes and Standards")	☑	☐	Brief descriptions given about health and safety issues associated with the working environment during installation, removal, the cleanout of catchbasins (considering they are confined spaces), and sediment disposal. Persons involved with installing, removing, and or maintaining CB Shield inserts need to be trained in accordance with requirements for servicing regular catchbasins.
1.10	Brief summary of training requirements needed for safe, effective operation of technology, and a list of available documents describing these requirements. (Note: this criterion complements but does not replace the obligation for the applicant to submit a duly signed "Declaration Regarding Codes and Standards")	☑	☐	Link to video instructions that guides installation and removal of the CB Shield is provided; a list of general practices is also given.
1.11	Process flow diagram(s), design drawings, photographs, equipment specification sheets (including response parameters and operating conditions), and/or other information identifying the unit processes or specific operating steps in the technology. If feasible, a site visit to inspect the process should be part of the technology assessment.	☑	☐	Photographs of lab setup, flow diagrams of water flow through the simulated streetscape, and links to videos showing test runs and sampling methods were provided.
1.12	Supplemental materials (optional) have been supplied which offer additional insight into the technology application integrity and performance, including one or more of the following:	☐	☑	
	A copy of patent(s) for the technology, patent pending or submitted.	☐	☑	
	User manual(s).	☐	☑	
	Maintenance manuals.	☐	☑	
	Operator manuals.	☐	☑	
	Quality assurance procedures.	☐	☑	
	Sensor/monitor calibration program.	☐	☑	
	Certification for ISO 9001, ISO 14000, or similar.	☐	☑	
	Material Safety Data Sheet (MSDS) information.	☐	☑	
	Workplace Hazardous Materials Information System (WHMIS) information.	☐	☑	
	Health and Safety plan.	☐	☑	
	Emergency response plan.	☐	☑	
	Protective equipment identified.	☐	☑	
	Technical brochures.	☑	☐	Website link provided with technical drawings and information.
1.13	The applicant provided adequate documentation and data. There is sufficient information on the technology and performance claim for the verification. [Note: The Verifier should communicate with the Canadian ETV Program, through GPS, to request copies of the necessary documentation and required data that are available to support the claims.]	☑	☐	Adequate documentation given for reviewing testing protocol. All collected data including laboratory work book were submitted. Methodology for testing was clearly outlined in application. Videos of testing protocol, and installation/removal of CB Shield were also provided.

3. Review of the Technology

3.1 Technology Review Criteria

The results of the Technology Review are summarized in the Technology Review Criteria Checklist (Table 2) below.

Table 2: Technology Review Criteria Checklist

Ref	Criteria	Yes	No	Verifier Comments
2.1	The technology is based on scientific and technical principles. (Note: It will be necessary for the Verifier to read the key articles and citations listed in the Formal Application. It may also be necessary to contact the independent experts listed in the Formal Application to obtain additional information)	☑	☐	The technology is a flow deflection device that dissipates the energy of inflows, preventing scour and increasing capture. The scientific principles underlying the technology are based on well-known areas of fluid dynamics, sedimentation/settling, hydrology and sediment transport.
2.2	The technology is supported by peer review technical literature or references. (Note: Peer review literature and texts must be supplied with the Formal Application as well as relevant regulations and standards that are pertinent to the performance claim)	☐	☐	Currently the link to peer review article is inaccessible.
2.3	The technology is designed, manufactured, and/or operated reliably. (Note: Historical data from the applicant, not conforming to all data criteria, may be useful for the Verifier to review to assess the viability of the technology not for verification, but for insight purposes)	☑	☐	CB Shield is said to be constructed in Canada using quality fiberglass. No details from long term studies to comment on long term reliability.
2.4	The technology is designed to provide an environmental benefit and not create an alternative environmental issue. (e.g., It does not create a more hazardous and/ or unmanaged byproduct and it does not result in the transfer of an environmental problem from one media to another media without appropriate management of the subsequent contaminated media)	☑	☐	The technology provides an environmental benefit of controlling sediment washoff at upstream locations by capturing and retaining sediment from stormwater runoff within the catchbasin. However, long term reliability specifically about the clogging of grate opening by debris which would decrease its hydraulic capacity requires further attention.
2.5	The technology conforms to standards for health and safety of workers and the public. (Note: The vendor must submit a signed "Declaration Regarding Codes & Standards", with the Formal Application. The Verifier should ensure that this signed document is included with the information that is reviewed for the performance claim verification)	☑	☐	Signed Declaration Regarding Codes and Standards was submitted.
Environmental Standards				
2.6	Technology achieves federal, provincial, and/or municipal regulations or guidelines for management of contaminated and/or treated soils, sediments, sludges, or other solid-phase materials.	☑	☐	
2.7	Technology achieves federal, provincial, and/or municipal regulations or guidelines for all (contaminated and or treated) aqueous discharges as determined by the applicant's information.	☑	☐	
2.8	Technology achieves federal, provincial, and/or municipal regulations or guidelines for all (direct or indirect) air emissions. If the environmental technology results in the transfer of contaminants directly or indirectly to the atmosphere, then, where required, all regulations or guidelines (at any level of government) relating to the management of air emissions must be satisfied by the applicant's information.	☑	☐	
Commercial Readiness				
2.9	Technology and all components (apparatus, processes, products) is full-scale, commercially-available, or alternatively see 2.10 or 2.11, and, data supplied to the Verifier is from the use or demonstration of a commercial unit.	☑	☐	Technology and components used for testing are full-scale and commercially available. At the time of this verification, the vendor has the capacity to produce many hundred units per month.

2.10	Technology is a final prototype design prior to manufacture or supply of commercial units, or alternatively see 2.11. (Note: Verification of the performance claim for the technology is valid if based on a prototype unit, if that prototype is the final design and represents a pre- commercial unit. The verification will apply to any subsequent commercial unit that is based on the prototype unit design. The verification will not be valid for any commercial unit that includes any technology design change from the prototype unit used to generate the supporting data for the verification.	☐	☐	NA
2.11	Technology is a pilot scale unit used to provide data which when used with demonstrated scale up factors, proves that the commercial unit satisfies the performance claim.	☐	☐	NA
Operating Conditions				
2.12	All operating conditions affecting technology performance and the performance claim have been identified.	☑	☐	Operating conditions affecting technology performance were identified. Please see Ref. 1.6.
2.13	The relationships among operating conditions and their impacts on technology performance have been identified. (Note: It is the responsibility of the Verifier to understand the relationship between the operating conditions and the performance of the technology, and to ensure that the impacts of the operating conditions and the responses of the technology are compatible)	☑	☐	Background concentration – needs to be < 20 mg/L to allow for accurate assessment of performance in the laboratory Water temperature – needs to be <25 °C; higher water temperatures have reduced viscosity allowing suspended sediments to settle quicker. However, water temperature has a negligible impact on settling velocity. Standardized test sediment - ensures comparability between units and a fair assessment of performance based on range of sediment sizes. Flow rates - lower flow rates should allow higher percentage of capture and retention. False floor (used storage capacity) – higher false floor will lower capture and retention performance as sediment will be held closer to the outlet invert <u>Capture test</u> Influent sediment concentration - held constant at 200 mg/L; studies have shown this to be a reasonable average sediment concentration in stormwater runoff from paved surfaces. Higher or lower influent concentrations may change the removal efficiencies
2.14	Technology designed to respond predictably when operated at normal conditions (i.e. conditions given in 2.12), and/or alternatively see 2.15. (Note: The Verifier must be satisfied that these data do not demonstrate a performance that is different than the performance indicated in the Performance Claim to be validated)	☑	☐	Based on the test results, the technology does respond predictably when operated at normal conditions. The discrepancy with the S5 run result during the control treatment of the scour test showing the second lowest scour rate for the highest flow rate is likely the result of a lack of finer sediments in the sump to scour.
2.15	Effects of variable operating conditions, including start up and shut down, are important to the performance of the technology and have been described completely as a qualifier to the performance claim under assessment.	☑	☐	A range of inflow rates were tested and the samples taken when changing from one flow rate to the next were clearly distinguished.
Throughput Parameters				

2.16	Effects of variable contaminant loading or throughput rate must be assessed and input/output limits established for the technology. Note: If the application of the technology is to a variable waste source or expected (designed) variable operating conditions, then it will be necessary to establish acceptable upper and lower ranges for the operating conditions, applications and/or technology responses. Sufficient, quality data must be supplied to validate the performance of the technology at the upper and lower ranges for the operating conditions, applications and or technology responses detailed in the performance claim.	☑	☐	Scour: The tested flow rates were between 1.2 and 15.6 L/s. The catch basins with and without CB Shield were pre-loaded with test sediment. Influent was clean water. Testing was continuous from one flow rate to the next with 1 minute transition periods. Capture: The tested lower and upper throughput rates are 0.24 and 8.40 L/s. Contaminant loading rates were controlled to have a constant inflow sediment concentration of 200mg/L.
Other Relevant Parameters/Variables/Operating Conditions Note: The Verifier is expected to understand the technology and identify and record all relevant criteria, parameters, variables or operating conditions that potentially can or will affect the performance of the technology under assessment. It is practical to include all of these variables in Table 2 (i.e., from 2.17 to ...).		☑	☐	Parameters mentioned from 2.12 to 2.16 will also affect field performance accordingly (e.g., the false floor represents the accumulated amount of sediment). Additionally, in the field, debris may accumulate and affect performance which was not evaluated in the lab setting but can be evaluated in a field case study.
2.17				
2.18				

4. Review of Test Plan, Test Execution and Data

4.1 Review of Test Plan and Execution of Test Plan

The results of the Test Plan Review are summarized in the Test Plan Design Assessment Criteria Checklist (Table 3) below.

Table 3: Test Plan Design Assessment Criteria Checklist

Ref.	Criteria			Verifier Comments
3.1	Was a statistician, or an expert with specialized capabilities in the design of experiments, consulted prior to the completion of the test program, and if so please provide the contact details	☑	☐	Greg Williams 416-624-2007 gwilliams@goodharbourlabs.com
3.2	Is a statistically testable hypothesis or hypotheses provided? (such that an objective, specific test is possible)	☑	☐	The testable hypothesis is that a catchbasin with the CB Shield insert will retain more sediment in stormwater runoff than a catch basin without the insert. The hypothesis can be tested by a capture and comparative scour test as follows: Capture test: The OGS testing protocol requires the total amount of sediment to be accounted for by means of a modified mass balance. As a result, statistics will not be required since the whole "population" is taken into account instead of taking samples. Scour test: The scour test is a continuous test where samples taken within and between flow rates are not independent of each other. Since the assumption of independence fails, a mix model approach is required to compare the means between the control and CB shield catchbasin and confirm a significance difference. A measure of difference can be calculated between the two treatments by finding the quotient of their total effluent loads.
3.3a-c	Does the performance test generate data suitable for testing the hypothesis being postulated? Namely:	☑	☐	

3.3a	Does the test measure the parameters used in the performance claim hypothesis?	☑	☐	<u>Capture test:</u> Total amount of sediment added into the feeder is measured as well as the total amount captured after each flow rate test. A modified mass balance is undertaken to calculate exactly how much sediment was fed through the feeder as influent into the catchbasin and what percentage was retained for both treatments. <u>Scour test:</u> Performance test measures effluent concentrations of control and CB Shield treatments.
3.3b	Does the performance test control for extraneous variability?	☑	☐	The test was conducted under controlled laboratory conditions, following well defined procedures, thereby limiting extraneous variability. More specifically, influent flow was sampled to account for any background concentrations that would add to the controlled influent sediment feed. Inflow concentration was measured for each flow rate to ensure auger feed rates were synced to influent flow rate to achieve target influent concentrations. When concentrations of samples were analyzed, a blank, 20 mg/L standard, and 100 mg/L standard were also tested to account for instrumental or systematic errors. For sediment re-suspension test, pre-loaded sediment is allowed to settle for 12-24 hours before tests are started. Water temperature were monitored to not exceed 25°C as higher temperature can decrease water viscosity and thereby increase sediment settling velocity.
3.3c	Does the performance test include only those effects attributable to the technology being evaluated?	☑	☐	To ensure effects are attributable to the technology evaluated, the catchbasin with a CB shield insert is evaluated against a catchbasin without the insert (control) as part of the scour test.
3.4	Does the performance test generate data suitable for analysis using the SAWs? (Note: It is preferable that tests are designed with the SAWS in mind before test plans are written)	☐	☑	The mixed model approach required to compare control and CB Shield catchbasin scour test results requires a test outside of recommended SAWs (the R statistical program was used)
3.5	Does the performance test generate data suitable for analysis using other generic experimental designs? (Note: Performance testing and verification studies should be designed with the final data analysis in mind to facilitate interpretation and reduce costs)	☑	☐	<u>Capture</u> and <u>scour</u> tests generally followed the experimental design proposed by the OGS testing protocol which do not require statistical analysis. However, scour test claim compares control and CB Shield catchbasin which requires further analysis (mixed model) to prove significance difference between control and CB Shield catchbasin.
3.6	Are the appropriate parameters, specific to the technology and performance claim, measured? (Note: It is essential that the Verifier and the technology developer ensure that all parameters – e.g. temperature, etc - that could affect the performance evaluation are either restricted to pre-specified operating conditions or are measured)	☑	☐	Water temperature, influent flow rate, background concentration <u>Capture test:</u> Influent concentration, total influent mass, total captured mass <u>Scour test:</u> influent flow rate, preloaded sediment mass, effluent concentration
3.7a-d	Are samples representative of process characteristics at specified locations? Namely:	☑	☐	

3.7a	Are samples collected in a manner representative of typical process characteristics at the sampling locations? (e.g., the samples are collected from the source stream fully mixed, etc.)	☑	☐	Capture test: Sampling done according to OGS test Procedure. Upon completion of test, the remaining water from the catchbasin is decanted over a period of less than 30hrs. The total sediment captured is removed, dried and weighed. Mass of sediment remaining in the feeder is weighed and subtracted from total mass of sediment added at the beginning of the test to establish actual amount fed. Scour test: Effluent grab samples are taken at the catch basin outlet which will reflect effluent concentrations. A minimum of 500 ml samples was taken in 1000 mL jars that were attempted to be held under the whole effluent stream or passed under the stream such that the sample collection would be complete with a single pass.
3.7b	Is data representative of the current technology?	☑	☐	The data reflects the effect of a CB shield inserted into a normal catchbasin without any other alterations to the catchbasin. The inserted CB Shield is the unit that is currently commercially available.
3.7c	Have samples been collected after a sufficient period of time for the process to stabilize?	☑	☐	Samples were collected according to OGS testing procedure, which was developed based on scientific principles to ensure, among other things, sampling is conducted in a representative and replicable manner. Capture test: Sediment is only fed once target flows are reached and stabilized. A maximum of 30hrs is given to decant remaining water after a test run before captured sediment is removed, dried and weighed. Scour: Once sediment is pre-loaded, the device is filled up with water to the invert and allowed to sit for 12-24 hours before starting the tests. Changes in flow rates were done within 60s and an effluent sample was taken at approximately 30s to determine if additional scouring was taking place while flow rates were stabilizing.
3.7d	Have samples been collected over a sufficient period of time to ensure that the samples are representative of process performance?	☑	☐	Capture test: Total captured sediment is collected at the end of each flow run. The test duration for tested flow rates of 0.24, 0.48, 1.20, 2.40, 6.00, and 8.40 L/s are 420, 420, 360, 180, 70, and 50 mins respectively. Scour test: Effluent samples were taken every 1 minute for test durations of 5 minutes for flow rates of 1.2, 4.8, 8.4, 12.0, and 15.6 L/s. Transition samples were taken within 30 seconds of switching to a new flow rate. The system was shut down between flow rates of 8.4 and 12.0 L/s and between 12.0 and 15.6 L/s due to standpipe overflow.

3.8	Are samples representative of operating conditions? (Note: A time lag occurs between establishing steady state conditions and stabilization of the observed process performance. This time lag depends in part on the time scale of the process)	☑	☐	Long term operating conditions need to be evaluated. The effect of debris accumulation in an in situ field setting needs to be considered as affecting the performance. Capture test: Flow rates are monitored and influent sediment is only added once each target flow is stabilized in order to match performance to specific flow rates that cover the expected range of catchbasin inflow. Performance is representative of catchbasin that has used up 50% of the manufacture recommended Maximum Sediment Storage Depth and a constant inflow concentration of 200 mg/L. Because the sediment is collected at the end of each run, it accounts for the performance of the unit during start up and shut down as well. Scour test: Samples are representative for a specific operating condition of having the catch basin ¾ full of sediment. Scouring results are from a continuous test where scouring from a previous flow will affect subsequent scouring rates. After pre-loading the sediment time is given for agitated sediments to settle over a period of 12-24 hours. Flow changes are done within 1 minute and a sample is taken at approximately 30s to capture the scouring potential when altering flow rates.
3.9	Are samples representative of known, measured and appropriate operating conditions? (Note: This includes technologies that operate on short cycles and so have start and stop cycles which affects the operation of the technology. If the operating conditions are not vital but are recommended, then the reviewer must evaluate operating conditions)	☑	☐	The device is a passive device working to deflect and reduce the energy of stormwater inflow, which increases capture and reduces scour. The data were collected under controlled laboratory conditions using a test sediment that includes clay, silt and sand sized particles characteristic of stormwater runoff. The effects of debris on performance were not evaluated.
3.10	Were samples and data prepared or provided by a third party? (Note: In some cases, where the expertise rests with the applicant, an independent unbiased third party should witness and audit the collection of information and data about the technology. The witness auditor must not have any vested interest in the technology.)	☑	☐	Data samples were analyzed and prepared by a third party laboratory (Good Harbour Laboratories). Good Harbour Laboratories 2596 Dunwin Drive, Mississauga ON, L5L 1J5 905 696 7276 goodharbourlabs.com
3.11a-c	Performance Test Design is Acceptable - Namely:	☑	☐	
3.11a	The samples have been collected when the technology was operated under controlled and monitored conditions.	☑	☐	Capture test: flow rate, and influent concentrations were monitored and adjusted as required Scour test: flow rates were monitored and adjusted as required
3.11b	The test plan design should have been established prior to testing to ensure that the data were collected using a systematic and rational approach	☑	☐	Test plan design generally satisfied the OGS testing protocol.

3.11c	The test plan design should have defined the acceptable values or ranges of values for key operating conditions, and the data collection and analysis methodology	☑	☐	Operating conditions: Flows tested (operating conditions) are the expected general range of flows through a catchbasin: capture test (0.24-8.4L/s), scour test: (1.2-15.6 L/s). Water temperature needs to be below 25°C. Unit tested having 50% of its maximum storage capacity filled. Data collection and analysis: follows the OGS testing protocol. However, the scour test is run additionally with a control catch basin for comparison.

4.3 Data Validity Checklist

The results of the Data Validity Review are summarized in the Data Validity Checklist (Table 4) below.

Table 4: Data Validity Checklist

Ref.	Criteria	Yes	No	Verifier Comments
4.1	Were appropriate sample collection methods used (e.g. random, judgmental, systematic etc)? For example: simple grab samples are appropriate if the process characteristics at a sampling location remain constant over time. Composites of aliquots instead may be suitable for flows with fluctuating process characteristics at a sampling location. (Note: Sampling methods appropriate for specific processes may sometimes be described in federal, provincial or local monitoring regulations)	☑	☐	Capture test: The mass of sediments fed into the catchbasin and captured is measured in order to carry out a modified mass balance. Scour test: Multiple effluent grab samples are appropriate to evaluate the effluent concentrations and thereby the scouring potential at each flow rate.
4.2	Were apparatus and/or facilities for the test(s) adequate for generation of relevant data? (i.e. testing was performed at a location and under operating conditions and environmental conditions for which the performance claim has been defined)	☑	☐	Facility/apparatus sufficiently simulated a streetscape with a catchbasin with and without a CB Shield insert. Slurry feeder was calibrated and the auger feed rate was monitored. The facility had the capacity to manage the large amounts of water required for testing.
4.3	Were operating conditions during the test monitored and documented and provided?	☑	☐	Monitored/ documented operating conditions: background concentration, water temperature, PSD of test sediment Capture test: False floor height, flow rates, influent sediment concentration, amount of sediment injected Scour test: False floor height, flow rates, time limits, sampling frequency
4.4	Has the information and/or data on operating conditions and measuring equipment measurements and calibrations been supplied to the Verifier?	☑	☐	Measurements of monitored flow, water temperature and concentrations of sediment added were provided. Calibration of flow meter and PSD of sediment used were also provided.

4.5	Were acceptable protocols used for sample collection, preservation and transport? (Note: Acceptable protocols include those developed by a recognized authority in environmental testing such as a provincial regulatory body, ASTM, USEPA, Standard Methods)	☑	☐	
4.6	Were Quality Assurance/Quality Control (QA/QC) (e.g. use of field blanks, standards, replicates, spikes etc) procedures followed during sample collection? A formal QA/QC program, although highly desirable, is not essential, if it has been demonstrated by the vendor's information that quality assurance has been applied to the data generation and collection.	☑	☐	Replicates were taken and kept for 7 days (refrigerated) for each sample. Blank, 20 mg/L standard, and 100 mg/L standard run during sample analysis.
4.7	Were samples analyzed using approved analytical protocols? (e.g. samples analyzed using a protocol recognized by an authority in environmental testing such as Standard Methods, EPA. ASTM etc. Were the chemical analyses at the site in conformance with the SOPs (Standard Operating Procedures)?	☑	☐	The SSC samples were analyzed by GHL as detailed in ASTM D3977-97 (2013), Standard Test Methods for Determining Sediment Concentration in Water Samples.
4.8	Were samples analysed within recommended analysis times (especially for time sensitive analysis such as bacteria)	☑	☐	Recommended storage time is 7 days but samples were analyzed within 2.
4.9 a-e	Were QA/QC procedures followed during sample analysis? Namely:	☐	☐	
4.9a	Maintaining control charts	☑	☐	QA/QC (e.g., flow rates monitored to not vary more than expected COV (<0.04)
4.9b	Establishing minimum detection limits	☑	☐	MDL is 1.26 mg/L.
4.9c	Establishing recovery values	☐	☑	
4.9d	Determining precision for analytical results	☐	☑	
4.9e	Determining accuracy for analytical results	☐	☑	
4.10 a-c	Was a chain-of-custody (full tracing of the sample from collection to analysis) methodology used for sample handling and analysis - Namely:	☐	☐	
4.10a	Are completed and signed chain-of-custody forms used for each sample submitted from the field to the analytical lab provided for inspection by the Verifier?	☑	☐	Chain of custody provided for ETV test sediment analysis. Sampling and analyzing were done by GHL in their laboratory.
4.10b	Are completed and easily readable field logbooks available for the Verifier to inspect?	☑	☐	Field logbook from GHL was made available to the verifier.
4.10c	Are there other chain-of-custody methodology actions and documentation recorded/available (e.g. sample labels, sample seals, sample submission sheet, sample receipt log and assignment for analysis)?	☑	☐	GHL provided certificate of analysis for effluent concentration of the scour test.
4.11	Experimental Data Set is Acceptable (i.e., the quality of the data submitted is established using the best professional judgment of the Verifier)	☑	☐	The Verifier believes that the experimental data quality set is acceptable as overseen by Good Harbour Laboratories.

4.5 Data Analysis Checklist

The intent of the data analysis checklist is to ensure that the appropriate statistical tools can be used in a rigorous, defensible manner (Environment Canada 2012). The checklist also emphasizes that an initial performance claim may be rewritten and updated to better reflect what the data support, using the expertise of the Verifier and other pertinent resources. In this case, the performance claims were modified and restated by the Verifier. The updated performance claims are presented in the conclusion of this report.

Table 5: Data Analysis Checklist

Ref.	Criteria	Yes	No	Verifier Comments

5.1	Does the analysis test the performance claim being postulated? (Note: When conducting performance evaluations, under the Canadian ETV program, the alternative hypothesis of a "significant difference" without stating the direction of the expected difference will usually be unacceptable)	☑	☐	Capture test: analysis not required since modified mass balance will be done. Scour test: mixed model is used to evaluate whether there is a significant difference in effluent concentrations between CB shield and Control treatments. A confidence interval for the quotient of means between the control and CB Shield treatment will be calculated for comparison. The standard error of the distributions that is required to calculate the confidence intervals is calculated using a bootstrap method in R statistical program. This method is less stringent on the assumption of normality which the data set does not fully satisfy.
5.2	Does the analysis fit into a generic verification study design? For example, many other "generic" designs exist that are not explicitly covered by the Canadian ETV Program (e.g. ANOVA, ANCOVA, regression, etc.) that are potentially useful.	☑	☐	Capture test: Since there are no replications, results of the tests are presented as they are. Scour test: Mixed model analysis is carried to determine if there is a significant difference, a type of comparison of means taking into account non-independence. The quotient between the Control and the CB Shield treatments are used to compare the treatments.
5.2 a-c	Are the assumptions of the analysis met? Namely: (Note: A negative response means the Verifier needs to request further information)	☑	☐	Scour test: assumptions for a linear model include: 1. Linearity –dependent variable is the result of a linear combination of independent variable(s) 2. Absence of collinearity – fixed effects should not be collinear to each other 3. Homoskedasticity – variance of your data should be approximately equal across the range of predicted values 4. Normality or residuals (least important) – residuals of the regression need to be normally distributed 5. Absence of influential data points 6. Independence – most important for a linear model. Samples need to be independent. Since this assumption is not satisfied, a mixed model is used in place of a linear model. The mixed model allows for non-independent samples.
5.2.a	Did the data analyst check the assumptions of the statistical test used?	☑	☐	
5.2.b	Are the tests of assumptions presented?	☑	☐	
5.2.c	Do the tests of the assumptions validate the use of the test and hence the validity of the inferences?	☑	☐	
5.3	Data Analysis is Acceptable The data analysis is acceptable if the statistical test employed tests the hypothesis being postulated by the technology developer, the assumptions of the statistical test is met and the test is performed correctly.	☑	☐	Data analysis is acceptable.

4.7 Data Interpretation Checklist

The intent of the data interpretation checklist is to ensure that the data analyses results are reviewed in a manner that emphasizes the applicability to the specific performance claim and the statistical power of the performance test.

Table 6: Data Interpretation Checklist

Ref	Criteria	Yes	No	Verifier Comments

6.1a	Are the results statistically or operationally significant? Did the performance test result in a statistically significant test of hypothesis?	☑	☐	<u>Capture test:</u> Results are operationally significant. Removal efficiencies ranged from 64 to 26.7% for flow rates of 0.24 – 8.40 L/s. <u>Scour test:</u> results reflect comparison between control and CB Shield for a continuous scour test of different flow rates (0.24-8.4L/s) at 5 minute intervals. Under a mixed model analysis that takes into account non-independence between samples (since it is a continuous test, the previous sample will affect subsequent sample) it was shown that the treatment (control vs. CB Shield) had a significant effect on scouring.
6.1b	To be operationally significant, does the technology meet regulatory guidelines and applicable laws?	☑	☐	Declaration regarding codes & standards have been signed.
6.2	Does the performance test have sufficient power to support the claim being made? Note: For performance test designs where acceptance of the null hypothesis results in a performance claim being met, the statistical power of the test must be determined (Note: A statistical power of at least 0.8 is the target. If the power of the verification experiment is less than this value, the Verifier should contact the Canadian ETV Program to discuss an appropriate course of action)	☑	☐	<u>Capture test:</u> No statistical tests were conducted. Instead, a mass balance approach was used, which is regarded as a direct and robust and scientifically valid means of evaluating capture in stormwater sedimentation devices. <u>Scour test:</u> No suitable method of testing the power of a mixed model statistical test was available. However, the differences between the control catch basin and CB shield catch basin were very significant, and the number of effluent samples collected was suitable for the selected statistical method of evaluation.
6.3	Is the interpretation phrased in a defensible manner? Note: The final performance claim should reflect any changes to the claim made during the course of the analyses, variations or restrictions on operating conditions, etc. that changed the scope of the performance claim. The initial performance claim should be viewed as a tentative claim that is subject to modification as the verification progresses. A thoughtful open-minded verification will in the end, prove to be of greatest benefit to the technology developer.	☑	☐	<u>Both claims were revised</u> <u>Capture test:</u> Results for the capture test cannot undergo a statistical test due to a lack of replicates. However, since the analysis was performed in a control laboratory setting, it is assumed that results would be replicable and therefore interpreted as results for a given set of testing conditions. <u>Scour test:</u> Since the scour test was run as a continuous test, comparison between specific flow rates cannot be made, but rather on the entire series. Using mixed models to account for non-independence between samples, a significant difference was found between the two treatments. The interpretation is specific to testing conditions, but can be generalized to state the CB Shield scours much less than the control catchbasin.
6.4	Data Interpretation is Acceptable The data interpretation is acceptable if the data analyses results are reviewed in a manner that emphasizes the applicability to the specific performance claim and the statistical power of the verification experiment.	☑	☐	In general, the data interpretation is acceptable.

5. Statistical Evaluation of Claims

The statistical evaluation of the claims put forward by the Vendor was carried out using the R statistical software based on some of the principles presented in Statistical Analysis Worksheets (SAWs) provided by GPS (as per Environment Canada 2012). The first claim (capture test) does not require a statistical evaluation since the entire "population" is sampled (total mass of influent and captured sediments are accounted for) and n = 1 for each flow rate. The capture test follows the OGS protocol published by CETV and the analysis of which specifies a modified mass balance approach.

The data set resulting from the scour test does not satisfy the assumption of independence. Therefore, the second claim (scour test) cannot be evaluated statistically using the provided standard SAWs that require normality. A mixed model approach is taken to confirm significant difference between results of control catchbasin and one with a CB Shield. A bootstrap simulation method is used in R to calculate the standard deviation from which confidence intervals for their quotient is derived to make estimates of the minimum performance limit.

5.1 Statistical Evaluation of Claim #1: Capture test

A modified mass balance approach is taken to analyze the treatment performance of capturing suspended sediments at various loading rates. Each flow rate is run only once due to feasibility related to testing duration and cost, but the total influent sediment and total captured sediment is weighed and accounted for. Since there are no repeated tests, statistical analysis is not carried out but rather the results of the modified mass balance is given as is.

5.1.1 Raw Data

The raw data provided by the Vendor is presented in Appendix D of the formal application.

5.1.2 Assessing Normality

This procedure is used to determine if the data variable is normally distributed or log-normally distributed. This is important as the assumption of normality is often invoked in subsequent calculations.

– Not applicable

Assumptions:
- Not applicable

5.1.3 Testing if the Mean is Equal to Specified Value

This test is used to determine at a level of 95% confidence that the mean is not equal to some pre-specified value, μ_o. The value μ_o will often be the performance that a technology is claiming to achieve.
$H_0 : \mu_1 = \mu_o$

– Not applicable

Assumptions:
- Not applicable

Inferences:
No statistical inferences are made. Based on the modified mass balance approach, under specified operating conditions of a false floor set to 50% of the manufacturer's recommended maximum sediment storage depth and a constant influent sediment concentration of 200 mg/L, the catch basin with a CB Shield insert removed 64, 59.9, 52.4, 42.6, 25.2, and 26.7 percent of influent sediment by mass at inflow rates of 0.24, 0.48, 1.20, 2.40, 6.00, and 8.40 L/s, respectively.

Table Z1: Summary of Acceptable Data Sets for Verification

Acceptable Data Set(s) Identification	SAWs Used	Supports Claim (Y/N)
Table 9. Removal efficiency based on mass balance (from Performance testing of the CB Shield for the enhancement of catch basin sediment capture – 24 Aug 2016)	Not applicable	Yes

5.2 Statistical Evaluation of Claim #2: Scour Test

5.2.1 Raw Data

The raw data provided by the Vendor is presented in Appendix D of the formal application.

5.2.2 Mixed model analysis: Testing for significant difference between scour test effluent loads of control and CB Shield treatment using

The scour test is run continuously with test sediment of a specified PSD preloaded and having flow rates altered at 5 minute intervals (1.2, 4.8, 8.4, 12.0, and 15.6 L/s). Effluent loads of the two treatments cannot be compared separately at each flow rate since preceding flow rates affect the amount of sediment left to scour during subsequent flow rates. As a result, for each treatment all collected effluent concentrations are treated as part of a single dataset. However, conventional statistics used for comparison of means analysis (i.e., t-test) requires each sample to be independent of each other, put forth as the assumption of independence. Since data from the scour test fails to meet this assumption, a mixed model approach is taken.

A mix model is a linear model that includes a “mix” of fixed and random effects. Effects that are constant for each sample are fixed effects (i.e., the treatment) while effects that are variable for each sample(run/flow rate) are random effects and in part treated as a random error term. A “full” model is created with all fixed and random effects along with a “null” model that excludes the fixed effect that is in question of having a significant effect. The treatment effect (CB Shield vs. control) will be excluded in the null model. An ANOVA is used to compare the two models which if determined to be significantly different from each other identifies the fixed effect in question (i.e., treatment) to be a significant effect.

Assumptions:

- Linearity: The dependent variable has to be a result of a linear combination of the independent variables. A residual plot can be used as an indicator. Residuals should not exhibit a recognizable pattern (e.g., exhibit an increase or decrease or a curved relationship)

- Homoscedasticity: Variance of the data should be approximately equal across the range of predicted values. Residuals on a residual plot should be approximately equal distance from the Y=0 line.

- Absence of collinearity: Fixed effects should not be collinear (very closely related) to each other so that it would not be difficult to distinguish between their effects.

- Normality of residuals: Linear model are relatively robust against violations of normality assumption so this is the least important assumption to satisfy. Normality of residuals can be checked using a q-q plot.

- Absence of influential data points

5.2.3 Calculating the 95% confidence interval for the effluent load mean quotient of the two treatments

To make a claim on the effluent load performance of the CB Shield relative to the control treatment, the quotient of the mean effluent loads is calculated and expressed as a percentage. The 95% confidence interval of the quotient of means is calculated and the lower limit is used in the claim to reference the minimum performance as required by CETV instead of the mean performance.

A bootstrap simulation method is used in R to calculate the standard deviation of the distribution of effluent loads of the two treatments as an effective means of correcting for non-normal distribution. The calculated standard deviation is used with GraphPad’s web application (http://www.graphpad.com/quickcalcs/errorProp1/) to estimate the 95% confidence intervals of the quotient. The application assumes normal distributions for the datasets, which although not satisfied, the robust bootstrapping method used to calculate the standard deviations is believed to give very good estimates of the minimum performance without introducing complications of transforming and retransforming variables.

Assumptions:

- Data set is normally distributed: although not satisfied, the robust bootstrapping method used to calculate the standard deviations is believed to give good estimates of the calculated minimum performance without introducing abstractions of transforming and retransforming variables.

Inferences:
Based upon the above inferences, it can be concluded that for a catchbasin filled to three quarters of the manufacturer's recommended maximum sediment storage depth, with the CB Shield™ insert, scouring of test sediment is at most 8% of the control catchbasin during a continuous 30 minute scour test run with 5 minute duration inflows of 1.2, 4.8, 8.4, 12.0, and 15.6 L/s.

Table Z2: Summary of Acceptable Data Sets for Verification

Acceptable Data Set(s) Identification	Analysis Used	Supports Claim (Y/N)
Table 2. Scour test results for CB Shield protected and control catch basins (from Environmental Technology Verification (ETV): Supporting documentation for Canadian ETV program formal application – October 2015)	Mixed model regression is used (R statistical package)	Y
Table 2. Scour test results for CB Shield protected and control catch basins (from Environmental Technology Verification (ETV): Supporting documentation for Canadian ETV program formal application – October 2015)	Bootstrap simulation is run in R to find the standard error for the mean percent change (between scour results of the control and CB Shield treatments)	Y

Table 2. Scour test results for CB Shield protected and control catch basins (from Environmental Technology Verification (ETV): Supporting documentation for Canadian ETV program formal application – October 2015)	GraphPad web application is used to calculate 95% confidence interval of the quotient of mean effluent loads of the two treatments.	Y

6. Audit Trail

The items in Table 8 are useful in determining reasons for data discrepancies.

Table 8: Key documents

Raw data sheets and summary data	Yes
Signature pages	Yes
Signed Formal Application	Yes
Declaration Regarding Codes & Standards	Yes
Patent(s)	NA (Patent Pending)
Sample security: e.g. chain of custody sheets for each sample	Chain of custody for sediment, not for effluent sample since collected and analyzed by same lab.
Operation and maintenance manual	Operation and maintenance videos.
Field notebooks	Provided
Certificate of accreditation of laboratories	GHL not accredited but allowed by the verifier since an internal verification documented in the validation report TR-AA20120409-01.

7. Conclusion

CB Shield's technology performance claims have been verified as follows:

1. Capture test:

   During the sediment capture test, for a catch basin with a false floor set to 50% of the manufacturer's recommended maximum sediment storage depth and a constant influent sediment concentration of 200 mg/L, the catch basin with a CB Shield insert removed 64, 59.9, 52.4, 42.6, 25.2, and 26.7 percent of influent sediment by mass at inflow rates of 0.24, 0.48, 1.20, 2.40, 6.00, and 8.40 L/s, respectively.

2. Scour Test:

   For a catchbasin filled to three quarters of the manufacturer's recommended maximum sediment storage depth, with the CB Shield™ insert, scouring of test sediment is lowered by at least 81% compared to a control catchbasin during a continuous 30 minute scour test run with 5 minute duration inflows of 1.2, 4.8, 8.4, 12.0, and 15.6 L/s.

The verified claims concur with the verification report.

8. References

Environment Canada. 2012. Environmental Technology Verification – General Verification Protocol (GVP). Review of Application & Assessment of Technology. [online] http://etvcanada.ca/wp-content/uploads/2013/05/General-Verification-Protocol_Canadian-ETV-Program_June2012-May2013.pdf [accessed June 2016]. Environment Canada, Science and Technology Programs, Science and Technologies Strategies Directorate, Science and Technology Branch, Gatineau, QC.

ISO/FDIS 14034:2015, Environmental management – Environmental technology verification (ETV)

ISO/IEC 17025, General requirements for the competence of testing and calibration laboratories

Appendices

Appendix A. Statistical Analysis

Appendix A contains the detailed worksheets of the statistical analysis undertaken to confirm the CB Shield Technology performance claims.

A.1 Claim 1: Capture Test

No statistical analysis performed. It is not feasible to do repeated tests for the capture test. Instead, a modified mass balance is calculated by weighing the mass of all influent and captured materials to arrive at removal efficiencies.

A.2 Claim 2: Scour Test

A.2.1 Mixed model analysis: Testing for significant difference between scour test effluent loads of control and CB Shield treatment using

A "linear mixed model" approach is taken to compare the effluent loads of the CB Shield and Control treatment.

The scour test is run continuously with test sediment of a specified PSD preloaded and having flow rates altered at 5 minute intervals (1.2, 4.8, 8.4, 12.0, and 15.6 L/s). Effluent loads of the two treatments cannot be compared separately at each flow rate since preceding flow rates affect the amount of sediment left to scour during subsequent flow rates. As a result, for each treatment all collected effluent concentrations are treated as part of a single dataset. However, conventional statics used for comparison of means analysis (i.e., t-test) requires each sample to be independent of each other, put forth as the assumption of independence. Since data from the scour test fails to meet this assumption, a mixed model approach is taken.

A mixed model can represent a "mix" of fixed and random variables. In our study, treatment will be a fixed effect while each run (different flow rate) will be treated as a random effect. More specifically, we account for the interaction of the treatment and run factor as the random effect. The analysis is carried out in "R" statistical software using the "lmer" function of the "lme4" package. To assess if the fixed factor "treatment" (CB Shield, Control) has a significant effect on the model, both a "full" model and a "null" model are created, with and without the fixed effect of "treatment" respectively. An ANOVA is run to compare the "full" and "null" model and a significant difference between the two models indicates that the fixed factor "treatment" is a significant effect. This indicates a significant difference in the responses (effluent loads) of the two treatments.

There are 6 assumptions for linear models:

1. Linearity: The dependent variable has to be a result of a linear combination of the independent variables. A residual plot can be used as an indicator. Residuals should not exhibit a recognizable pattern (e.g., exhibit an increase or decrease or a curved relationship)

2. Homoscedasticity: Variance of the data should be approximately equal across the range of predicted values. Residuals on a residual plot should be approximately equal distance from the Y=0 line.

3. Absence of collinearity: Fixed effects should not be collinear (very closely related) to each other so that it would not be difficult to distinguish between them.

4. Normality of residuals: Linear model are relatively robust against violations of normality assumption so this is the least important assumption to satisfy. Normality of residuals can be check using a q-q plot.

5. Absence of influential data points: Influential data points can change interpretation of results. The "influence" and "dfbetas" function for the "influence.ME" package can be used in R to check for this.

6. Independence: This is the most important assumption for a linear model. If the assumption is not satisfied, and linear "mixed model" is used.

The "full" and "null" models are built using the following codes. Notice that loads is the response variable, treatment is the fixed effect (constant for samples) and the interaction of the treatment and run variables is the random effect (varies for each sample) .

```
Code [
model_full = lmer(loads_g ~ treatment + (treatment|run), data=test.data, REML=FALSE)
model_null = lmer(loads_g ~ (1|run), data=test.data, REML=FALSE)
]
```

<u>Assumptions 1 and 2: Linearity and homoscedasticity</u>
Both assumption 1 and 2 can be checked using a residual plot.

```
Code [
```

plot(fitted(model_full), residuals(model_full))
]

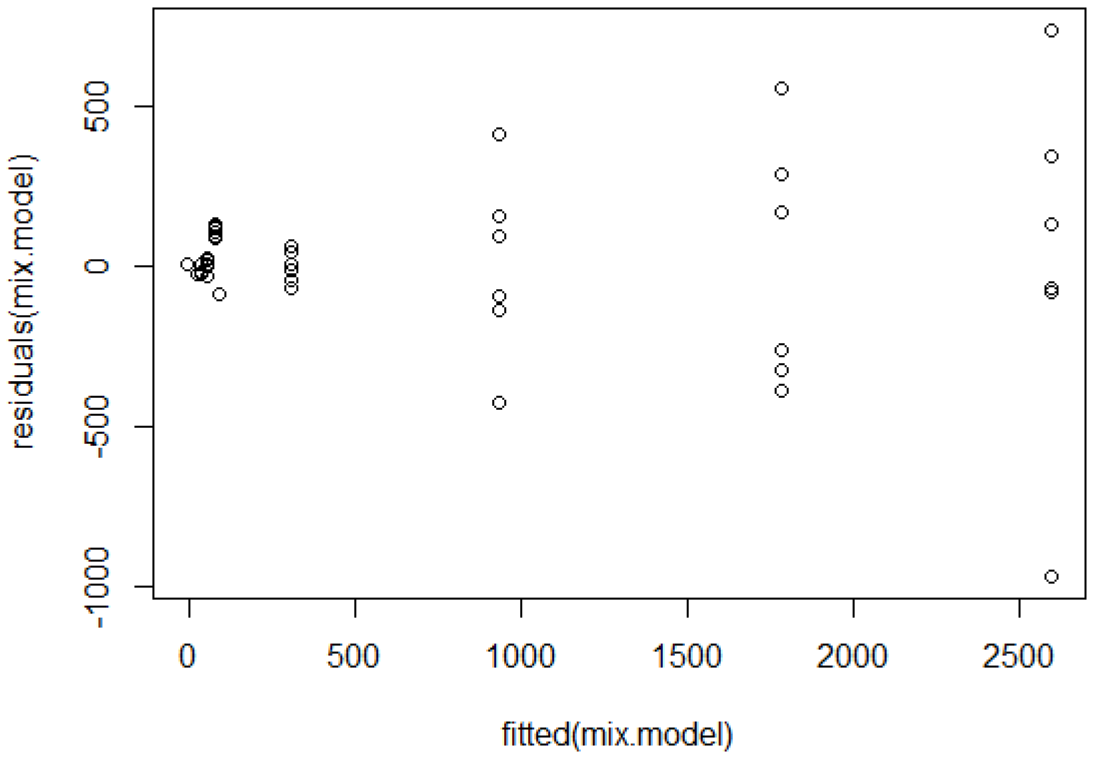

Figure A1. Residual vs. fitted model.

There seems to be a pattern where the residuals of this model are increasingly dispersed. As a result, the response variable (loads) is transformed logarithmically and the assumptions are re-tested.

```
Code [
model_full = lmer(loads_g_log ~ treatment + (treatment|run), data=test.data, REML=FALSE)
model_null = lmer(loads_g_log ~ (1|run), data=test.data, REML=FALSE)

plot(fitted(model_full), residuals(model_full))
]
```

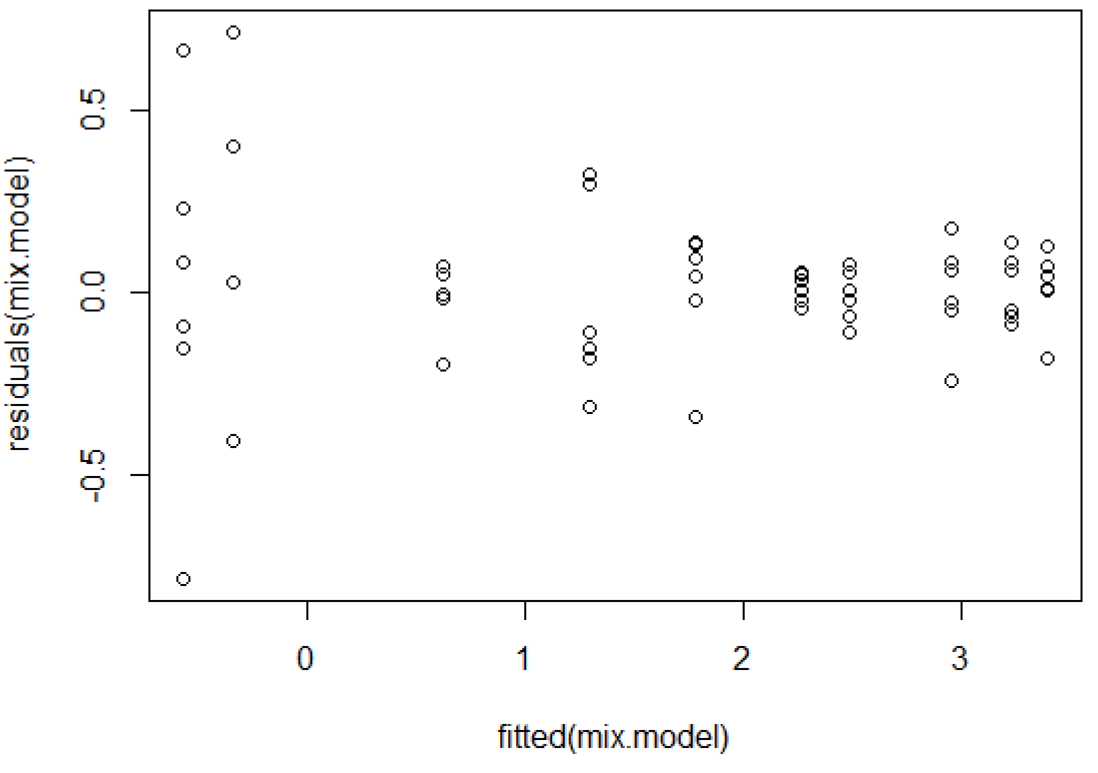

Figure A2. Residual vs. fitted model with log transformed response variable.

This model satisfactorily meets the assumptions 1 and 2. Residuals do not exhibit a clear recognizable pattern and are relatively equidistant from the Y=0 line.

<u>Assumption 3: Absence of collinearity</u>
This assumption is satisfied as the model only identifies one fixed effect with no other closely related variables.

<u>Assumption 4: Normality of residuals</u>

```
Code[
# LOAD LIBRARY
library(fitdistrplus)

# PLOT THE FITTED MODEL AGAINST THE NORMAL DISTRIBUTION
fit.norm <- fitdist(residuals(model_full), "norm")
```

```
plot(fit.norm)
]
```

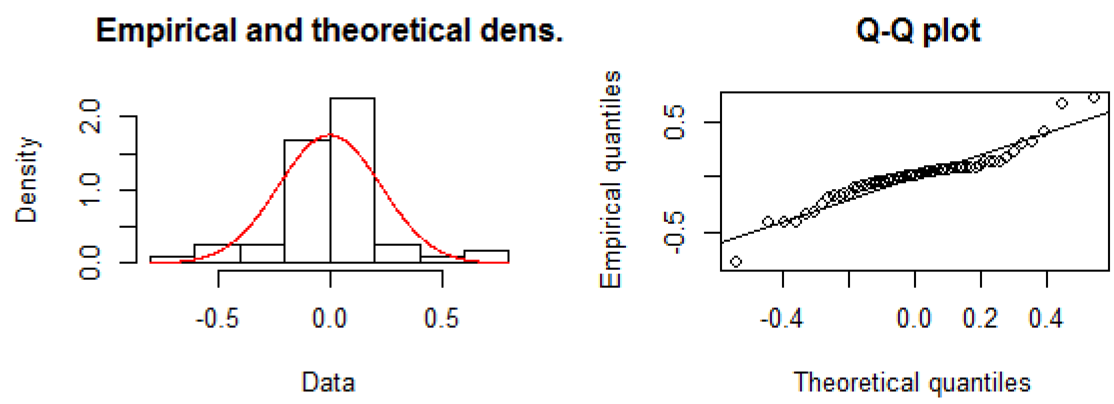

Figure A3. Histogram and Q-Q plot of residuals

Based on figure A3, the model satisfies assumption 4.

<u>Assumption 5: Absence of influential data points</u>

```
Code[
#LOAD LIBRARY
library(influence.ME)

# DFBETA VALUES SHOULD NOT BE MORE THAN 2/sqrt of n;  "n" BEING NUMBER OF VALUES
FOR THE GROUPING FACTOR (THERE ARE 5 RUNS/FLOW RATES)
2/(sqrt(5)) # equals 0.8944272

estex.mix.model <- influence(mix.model, "run")
dfbetas(estex.mix.model, parameter =c(0))
]
```

Table A1. DFBETAS values fixed factor by runs.

Run/flow rates	Intercept	treatmentControl
S1	-0.64651330	-0.02705247
S2	-0.50157391	0.88798512
S3	-0.05102875	0.34856408
S4	0.45949187	-0.29719975
S5	0.81812841	-0.93360428

All DFBETA values are less than 2/sqrt of n (2/(sqrt(5)) = 0.8944272); "n" being number of values for the grouping factor (there are 5 runs/flow rates). Assumption 5 is also satisfied.

<u>ANOVA comparing the full and null model, with and without the fixed factor of treatment respectively</u>

```
Code[
anova(model_full, model_null)
]
```

Table A2. Results for ANOVA comparing the full and null model with and without the fixed factor of treatment, respectively.

Model	Df	AIC	BIC	logLik	Deviance	Chisq	Pr(>Chisq)
Model_null	3	206.187	212.470	-100.094	200.187		
Model_full	6	59.523	72.089	-23.761	47.523	152.66	<2.2e-16

Based on table A2, there is significant difference between the models with and without the fixed factor of treatment. It can be inferred that the treatment has a significant effect, and therefore a significant difference can be claimed between the effluent loads from the CB Shield and Control treatments.

A.2.2 Calculating the 95% confidence interval for the effluent load mean quotient of the two treatments

Table A3. Calculated total/mean loads, bootstrapped standard error, standard deviation, and variance for the scour test results.

	N	Total load (g)	Mean load (g)	Bootstrap standard error[a]	Standard deviation	Variance
CB Shield	30	1564.42	52.11	12.69	69.52	4832.47
Control	30	33957.38	1131.91	176.50	966.75	934597.15

[a]Since datasets are not well suited to satisfy a normal distribution, a bootstrap method was used to calculate standard errors in the R statistical program. The bootstrap method is less stringent on satisfying the normality assumption for calculation of standard errors.

<u>Ratio of mean effluent loads between the control and CB Shield treatments:</u>

Mean of CB Shield/ Mean of Control
= 52.150/1131.910
=0.046
= The mean effluent load of the CB Shield treatment is 5% of the Control treatment.

Confidence Interval:
Using the standard deviation calculated in Table A1, the following GraphPad web application was used to find the confidence interval:
http://www.graphpad.com/quickcalcs/errorProp1/

CI of a sum, difference, quotient or product
Mean of CB Shield **divided by** Mean of Control = 0.046

Table A2. Confidence intervals calculated using bootstrapped standard error at the 90, 95, and 99 percentile (using GraphPad web application)

90% CI:	0.026	to	0.073
95% CI:	**0.023**	**to**	**0.080**
99% CI:	0.016	to	0.096

"These results assume that both variables follow a Gaussian distribution and that the measurements of CB Shield are not paired or matched to measurements of Control. Although the datasets are not entirely normally distributed, the standard error used to calculate the standard deviation was derived using a bootstrap method which is assumed to decrease the stringency on the requirement of normality.

Results computed by the method of EC Fieller, Suppl to J.R.Statist.Soc, 7,1-64 summarized here. "

Based on the calculated confidence interval, the effluent load of the CB Shield during the scour test is at most 8% of that of the Control treatment.

Appendix B. Supplemental Verification Checklist Pursuant to ISO/FDIS 14034:2015

Appendix B provides a supplemental verification checklist pursuant to ISO/FDIS 14034:2015. It may be useful for the verifier to include this completed Appendix in the final Verification Report.

ISO/FDIS 14034:2015 Checklist Principles, procedures and requirements for ETV		
Reference	Requirements (Criteria)	Verifier Comments
1. Applicant Information	1.1 Applicant name(s), address(es) and physical location(s)	Applicant names and addresses provided.
2. Technology Description	2.1 A unique identifier for the technology (e.g., a commercial name, an identification number or applicable version)	The technology is uniquely identified as CB Shield™.
3. Information about the intended application of the technology NOTE: More than one technology purpose, type of material and measurable property can be provided.	3.1 Purpose of the technology	The technology is a flow deflection device that when inserted into catchbasins dissipates the energy of inflows by deflecting flows to the side walls which prevents scour and increases capture of sediments within storm water runoff by increasing its residence time inside the catchbasin.
	3.2 Type of material for which the technology is intended	The technology is intended to catch suspended sediments from stormwater runoff.
	3.3 Measurable property that is affected by the technology and the way in which it is affected	The effluent sediment concentration of stormwater catchbasins is reduced by the technology.
	3.4 Information sufficient to understand the operation and performance of the technology	Applicant has provided sufficient information to understand the operation (i.e., videos and written instructions) and performance of the technology (lab test results).
	3.5 Development status of the	Technology is ready for the market. Production

	technology proposed for verification and its readiness for market (Note: Technology proposed for verification shall be either already available on the market or available at least at a stage where no substantial change affecting its performance will be implemented before market entry)	line is set up to make 100s at a time.
	3.6 Information on relevant alternatives of the technology, including relevant performance and environmental impacts	Current alternatives are in some form of fine mesh either as a guard surrounding the catchbasin inlet or as a pouch directly under the inlet through which all inflow passes through. More similar alternatives to the CB shield include OGS units, but are more expensive to install or retrofit while the CB Shield can be simply inserted into an existing catch basin.
	3.7 Information on significant environmental impacts of the technology proposed for verification and its environmental added value, if applicable.	Yes, the technology will reduce downstream transport of suspended sediment within stormwater runoff received in the catchbasin.
	3.8 Does the technology fulfil the definition of environmental technology?	Definition: "technology that either results in an environmental added value or measures parameters that indicate an environmental impact". The CB Shield inserted into a catchbasin results in an environmental added value of decreased effluent suspended sediment concentration from catchbasins.
4. Operational aspects	4.1 Are the Installation and operating requirements and conditions described?	Yes, installation, operating requirements, and conditions are detailed within the application in addition to links for videos that show installation and lab testing.
	4.2 Are the service and maintenance requirements described?	Yes, service and maintenance would be that required by normal catchbasins in terms of cleanout. The technology is manufactured with strong fiberglass material making it very durable.
	4.3 Is information provided on the expected length of time for which the technology functions under normal operating conditions?	The applicant expects the technology to operate normally given its durability combined with a regular cleanout cycle of less than 2 years; no specific life expectancy is provided.
5. Legal and regulatory context	5.1 Is information provided on the relevant legal requirements and/or standards related to the technology and its use?	Yes.
	5.2 Does the technology adhere to applicable regulatory requirements?	Yes it adheres to requirements for technologies fitted into a catchbasin.
6.Health and Safety	6.1 Are there any applicable health and safety requirements and considerations?	Health and safety requirements follow those set out for cleaning and maintaining regular catchbasins.
7. Performance claim(s) and parameters	7.1 Do the performance claims for the intended application of the technology address the needs of the interested parties?	Yes, the performance claim addresses typical flows that can be expected for a catchbasin and the performance as a result of the CB Shield insert.
	7.2 Is the information on the technology sufficient to review the performance claim(s)?	Yes, the technology is a fairly straight forward flow deflection device and information provided is sufficient to review performance claims.
	7.3 Do the performance claim(s) to be verified include proposed performance parameters and numerical values?	Yes.

	7.4 Are the performance parameters relevant and sufficient for verification of the performance of the environmental technology, and the environmental added value, if applicable?	Yes, the performance parameters indicate the improvement to sediment capture and retention.
	7.5 Can the performance claims be quantitatively verified through testing?	For the claim regarding removal efficiencies determined through the capture test, the results will be simply stated in the form of a claim. For the scour analysis, a significance difference between control and CB shield catchbasin can be verified and the absolute difference stated.
	7.6 Can their numerical values be verified under set operating conditions, using existing verification plans and relevant technical references, including standardized testing methods, preferably based on international standards?	Their numerical values and analysis for the performance claims were attained by 3rd party Good Harbour Laboratory under set operating conditions following for the greater part the OGS testing protocol published by TRCA.
8. Test data	8.1 Are relevant test data and the methods for acquiring these data provided to support the performance claim?	Testing methodology, videos taken during testing, and relevant test data were provided to support the performance claims.
	8.2 Are specifications of the requirements for the test data provided, including quality and quantity and testing conditions?	Specific testing conditions were listed in report regarding flow rates, time for each run, height of the sump (false floor), and amount of sediment added to list a few.
	8.3 Is a description provided of the methods for the assessment of the test data and their quality?	Description of the methods used to assess test data and its quality were provided.
	8.4 Are the data at a quality level generally accepted by the scientific community for the technology and/or the industrial sector concerned?	Yes.
	8.5 Are the data of sufficient quality in terms of reproducibility, repeatability, ranges of confidence, accuracy, and uncertainties?	Yes for the most part. There were a few discrepancies related to the filter of recycled effluent flow not working optimally which increased the background sediment concentration and not having enough sediment left over for scour in the control catchbasin for the final flow rate.
	8.6 Are other relevant technical references included, such as other existing verification plans, applicable legislation, standardized test methods and international standards?	Yes, applicant refrenced OGS testing protocol upon which much of the testing for the CB Shield was based on.
	8.7 Was information provided to explain deviations from the test plan?	Yes deviations from the OGS testing protocol were evident in the testing methodology.
9. Verification	9.1 Were the test data assessed against the performance specified in the verification plan?	Yes.

	9.2 Do the test data confirm the performance of the technology, achieved under the same conditions, constraints and limitations as those specified?	Yes. Few requests made for proof of analysis and for alteration of claim composition were satisfied.
	9.3 Are the performance claims verified as originally stated?	No.
	9.4 If the performance claims are not verified as originally stated, how should they be modified?	Capture test: During the sediment capture test, for a catch basin with a false floor set to 50% of the manufacturer's recommended maximum sediment storage depth and a constant influent sediment concentration of 200 mg/L, the catch basin with a CB Shield insert removed 64, 59.9, 52.4, 42.6, 25.2, and 26.7 percent of influent test sediment by mass at inflow rates of 0.24, 0.48, 1.20, 2.40, 6.00, and 8.40 L/s, respectively. Scour test: For a catchbasin filled to three quarters of the manufacturer's recommended maximum sediment storage depth, with the CB Shield™ insert, scouring of test sediment is at most 8% of the control catchbasin during a continuous 30 minute scour test run with 5 minute duration inflows of 1.2, 4.8, 8.4, 12.0, and 15.6 L/s.

Appendix C. Verification Guidance Pursuant to ISO/FDIS 14034:2015

Appendix C provides guidance on performance testing and verification of technologies pursuant to ISO/FDIS 14034:2015

1. Definition of Roles:

Verifier - Organization that performs environmental technology verification

Test body - Organization that performs testing, test-implementation and reporting on the testing of an environmental technology

Applicant – Organization proposing a technology for which performance will be verified through environmental technology verification

2. Terminology

2.1 Terms related to verification

Verification - Confirmation through the provision of objective evidence

Verification Plan - Detailed planning document for implementation of the environmental technology verification

Verification Report - Document detailing the environmental technology verification and its results

Verification Statement - Document summarizing the results of the environmental technology verification

Test Plan - Detailed planning document specifying the principles, testing methods, conditions and procedures, required to carry out testing and to produce test data

Data Quality - Characteristics of data that relate to their ability to satisfy stated requirements [SOURCE: ISO 14040:2006]

Test Report - Document describing conditions and results of testing

2.2 Terms related to technology

Technology - Application of scientific knowledge, tools, techniques, crafts, or systems in order to solve a problem or achieve an objective, which can result in a product or process

Product - Any goods or service [SOURCE: ISO 14050:2009]

Process - Set of interrelated or interacting activities that transforms inputs into outputs [SOURCE: ISO 14001]

Environmental Technology - Technology that either results in an environmental added value or measures parameters that indicate an environmental impact

Environmental Technology Verification - Verification of the performance of an environmental technology by a verifier

Environmental Impact - Change to the environment, whether adverse or beneficial, wholly or partially resulting from material acquisition, design, production, use, or end-of-use of a technology [SOURCE: adapted from ISO 14001]

Environmental Added Value - More beneficial or less adverse environmental impact of a technology with respect to the relevant alternative

Relevant Alternative - Technology applied currently in similar situation as the environmental technology for which performance will be verified through environmental technology verification

2.3 Terms related to performance

Performance - Measurable result; Performance relates to measurable results supported by numerical quantitative findings. [SOURCE: adapted from ISO 14001]

Performance Claim - Statement of the performance of the environmental technology declared by the applicant

Performance Parameter - Numerical or other measurable factor of the performance of a technology

3. General principles and requirements

3.1 Principles

General - The purpose of environmental technology verification is to provide a credible and impartial account of the performance of environmental technologies. Environmental technology verification is based on a number of principles to ensure that verifications are performed and reported accurately, clearly, unambiguously and objectively.

Factual approach - Verification statements are based on factual and relevant evidence collected through an objective confirmation of the performance of environmental technologies.

Sustainability - Environmental technology verification is a tool in support of sustainability, by providing credible information on the performance of environmental technologies.

Transparency and credibility - Environmental technology verification is based on reliable test results and robust procedures. The process is facilitated such that, to the greatest extent feasible, methods and data are fully disclosed and reports are clear, complete, objective and useful to the interested parties.

Flexibility - Environmental technology verification allows for flexibility in the specification of performance parameters and test methods. This is achieved through dialogue among the applicant, verifier and interested parties to maximize utility of environmental technology verification.

3.2 Requirements

When verifying performance of environmental technologies, the requirements of ISO/FDIS 14034 and the current version of ISO/IEC 17020 Conformity assessment – requirements for the operation of various types of bodies performing inspection - shall be applied and demonstrated.

4. Application review

4.1 Administrative review

Administrative review shall ensure that all information requested for the application has been provided in accordance with the requirements specified.

4.2 Technical review

Technical review shall ensure that:
a) The technology fulfils the definition of environmental technology
b) The performance claim for the intended application of the technology addresses the needs of the interested parties
c) The information on the technology is sufficient to review the performance claim.

4.3 Feedback to Applicant

Any issues related to the acceptance or rejection of the application that may arise from the administrative or the technical review shall be resolved prior to the verification. Acceptance or rejection of the application shall be communicated to the applicant with justification.

5. Pre-verification

5.1 Specification of performance to be verified

Performance to be verified shall be specified in consultation with the applicant prior to the establishment of the verification plan.

Performance parameters shall be specified considering that:
a) They are relevant and sufficient for the verification of the performance of the environmental technology, and the environmental added value, if applicable;
b) They correspond in full to the needs of the interested parties;
c) They can be quantitatively verified through testing;
d) Their numerical values can be verified under set operating conditions, using existing verification plans and relevant technical references, including standardized testing methods, preferably based on international standards.

5.2 Verification plan

The verification plan shall detail the verification procedure specific to the technology and the performance to be verified. The testing conditions specified in the verification plan shall be identical to the operational conditions of the technology defined. The verification plan shall include at a minimum:
a) Identification of the verifier;

b) Identification of the applicant;
c) Unique identification of the verification plan and date of issue;
d) Description of the technology;
e) A list of performance parameters and their assigned numerical values and the description of how they will be verified;
f) Technical and operational details of the planned verification;
g) Specification of the requirements for the test data, including quality and quantity and testing conditions;
h) Description of methods for the assessment of the test data and their quality.

NOTE:
- Requirements on data and data quality should refer to the quality level (e.g. regarding reproducibility, repeatability, ranges of confidence, accuracy, uncertainties,) generally accepted by the scientific community for the technology or (by default) in the industrial sector concerned.
- Other existing verification plans, similar relevant technical references including applicable legislation and standardized test methods, preferably international standards, should be used or referred to wherever available.

6. Verification

The verification of the performance shall be organized as follows: i) acceptance of existing test data; ii) generation of additional test data if needed and iii) confirmation of the performance based on the results of test data assessment.

6.1 Acceptance of existing test data

Test data provided by the applicant which were generated prior to verification may be accepted for the verification if they meet the following requirements:
a) They are relevant for the performance to be verified;
b) They are produced and reported according to the requirements of ISO/IEC 17025;
c) They meet the requirements specified in the verification plan.

If the existing test data do not meet the above requirements then additional test data shall be generated. This shall be communicated to the applicant.

6.2 Generation of additional test data

If any additional test data is required, they shall be produced meeting the requirements specified. This shall be communicated to the applicant.

6.3 Confirmation of performance

Existing test data, that is accepted and additional test data that is generated shall be assessed against the performance specified in the verification plan. The result of the assessment shall be a confirmation of the performance of the technology, achieved under the same conditions, constraints and limitations as those specified for the generation of the test data used for verification.

7. Reporting

7.1 Verification report

A verification report shall be developed. It shall adhere to the verification plan and shall include at a minimum:
a) Identification of the verifier;
b) Identification of the applicant;
c) Unique identification of the report and date of issue;
d) Date of verification;
e) Description of the technology;
f) Test results;
g) Verification results including the verified performance, test conditions, constraints and limitations under which they are met;
h) Description on how the requirements for the verification of the performance and for the test data, as specified in the verification plan, were met, including reporting of any deviations;
i) Signature or other indication of approval by verifier;

If it is necessary to include, information not verified under the environmental technology verification, this shall be clearly stated and explained. The report shall be submitted to the applicant for review and comment. The comments may be incorporated as deemed appropriate.

7.2 Verification statement

A short document summarizing the verification report shall be developed. It shall include at a minimum:

a) Identification of the verifier;
b) Identification of the applicant;
c) Unique identification of the statement and date of issue;
d) A summary description of the technology;
e) A summary description on how the requirements specified in the verification plan were met;
f) Verification results including the verified performance;
g) Description on how the requirements of the verification specified in the verification plan were met including reporting of any deviations
h) A summary of the verification results including the verified performance, test conditions, constraints and limitations under which they are met;
i) A statement that the verification plan has been addressed,
j) Any other information necessary to understand and use the verification statement
k) Signature or other indication of approval by the verifier.

If it is necessary to include, information not verified under the environmental technology verification this shall be clearly stated and explained. The statement shall be submitted to the applicant for review and comment. The comments may be incorporated as deemed appropriate.

8. Post-verification

8.1 Publication

At a minimum, the verification statement should be made available publicly. The publication shall be included in a publicly available directory (e.g. website).

The applicant shall make the statement available to interested parties in full and shall not use parts of the statement for any purpose.

8.2 Validity of the verification report / verification statement

The applicant shall:
a) Ensure that the technology which performance has been verified is conforming to the conditions as per its verification, published verification statement and report, if relevant;
b) Inform the verifier, in writing, of any changes that are made to the technology.

Based on the information provided by the applicant, the verifier shall determine the impact of any changes on the verified performance of the technology to the verification conditions, and therefore the validity of the verification statement and the verification report.

If it is determined that the verification statement and verification report are no longer valid, it shall be communicated to the applicant and made publicly available

8.3 Expiration

An expiration date may be established on the verification statement. After the defined time period, upon demonstration that no changes affecting the verified performance have occurred in the technology, the validity of the verification statement could be extended under the same conditions.

9. References

ISO/IEC 14001, Environmental management systems - Requirements with guidance for use

ISO/IEC 14025, Environmental labels and declarations – Type III environmental declarations – Principles and procedures

ISO/IEC 14040, Environmental management — Life cycle assessment — Principles and framework

ISO/IEC 14050, Environmental management — Vocabulary

ISO/IEC 17020, General criteria for the operation of various types of bodies performing inspection

ISO/IEC 17025, General requirements for the competence of testing and calibration laboratories

ISO Guide 82, Guidelines for addressing sustainability in standards

Appendix D. Raw data

Capture test raw data

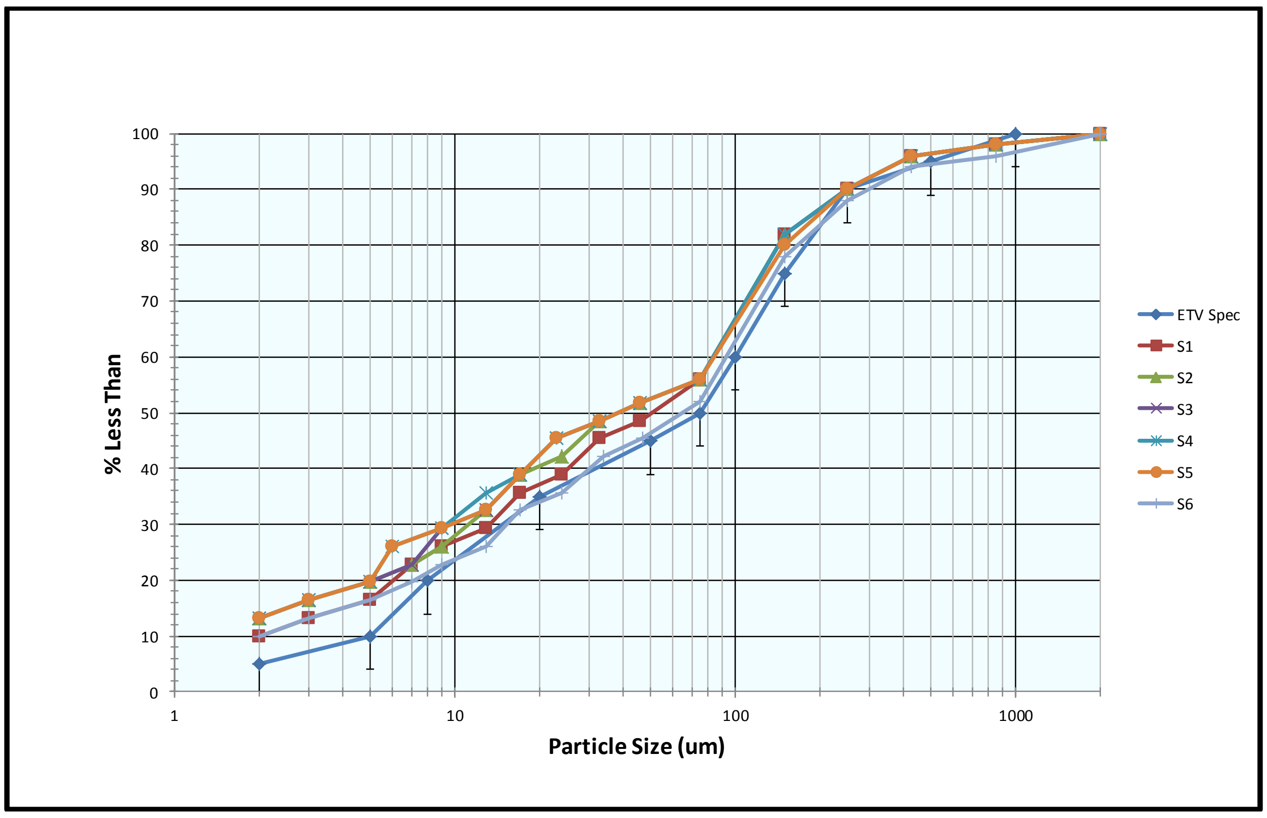

Figure D1. Feed sediment particle size distribution.

Table D1. Removal efficiency based on mass balance.

Run		S1	S2	S3	S4	S5	S6
Target Flow Rate	(L/s)	0.24	0.48	1.2	2.4	6.0	8.4
	(gpm)	3.8	7.7	19.0	38.0	95.1	133
Sediment Mass Added	(kg)	1.217	2.302	5.072	5.150	4.921	4.812
Sediment Captured in Catch Basin	(kg)	0.765	1.368	2.643	2.184	1.238	1.287
Sediment Captured on FCS and Grate	(kg)	0.013	0.010	0.016	0.012	0	0
Total Mass Captured	(kg)	0.778	1.378	2.659	2.196	1.238	1.287
Removal Efficiency	(%)	64.0	59.9	52.4	42.6	25.2	26.7

Scour test raw data

Run Summary for CB Shield – Simulated Streetscape

- Control (No CB Shield Installed)

Run Date: March 6th, 2015

Sediment Pre-load:

- The test sediment was the AGSCO silica sand (1-1000 micron)
- Sediment was pre-loaded on March 5th
- The total sediment load was 53 kg
- Following the preload, the sump was filled with water and allowed to sit overnight

Water Temperature:

Temperature at 1:00 minutes into run: 18.1 °C
Temperature at 7:00 minutes into run: 12.3 °C
Temperature at 13:00 minutes into run: 11.7 °C
Temperature at 52:30 minutes into run: 12.5 °C

Run Data:

Target Flow Rate	Run Time	Flow Rate
1.2 L/S (19 GPM)	0:00	19.3[1]
	0:30	19.7[1]
	1:00	19.8
	1:30	19.9
	2:00	19.9
	2:30	19.9
	3:00	19.9
	3:30	19.9
	4:00	19.8
	4:30	19.9
	5:00	19.9
	5:30	20.0
	6:00	22.3
Average Flow Rate (US GPM):		20.1
4.8 L/S (76 GPM)	6:30	74.2[1]
	7:00	76.3
	7:30	76.3
	8:00	76.3
	8:30	76.2
	9:00	76.2
	9:30	76.2
	10:00	76.0
	10:30	76.2
	11:00	76.1

	11:30	76.0
	12:00	80.7
Average Flow Rate (US GPM):		76.6

[1] Transition flow rate, not included in the average

Target Flow Rate	Run Time	Flow Rate
8.4 L/S (133 GPM)	12:30	134.6[1]
	13:00	132.6
	13:30	132.9
	14:00	132.4
	14:30	132.5
	15:00	132.9
	15:30	132.8
	16:00	132.5
	16:30	132.7
	17:00	132.4
	17:30	132.6
	18:00	132.4
Average Flow Rate (US GPM):		132.6
12.0 L/S [2] (190 GPM)	25:00	185.2[1]
	25:30	188.7
	26:00	189.3
	26:30	189.5
	27:00	191.0
	27:30	191.0
	28:00	190.8
	28:30	190.8
	29:00	190.6
	29:30	191.0
	30:00	190.7
	30:30	191.2
Average Flow Rate (US GPM):		190.4
15.6 L/S [3] (247 GPM)	52:00	245.7[1]
	52:30	249.1
	53:00	248.2
	53:30	248.6
	54:00	248.0
	54:30	247.9
	55:00	247.9
	55:30	247.7
	56:00	248.1
	56:30	247.9
	57:00	247.8
	57:30	247.7
Average Flow Rate (US GPM):		248.1

[1] Transition flow rate, not included in the average

[2] The system was shut down between flow 8.4 L/s and flow 12.0 L/s due to standpipe overflow

[3] The system was shut down between flow 12.0 L/s and flow 15.6 L/s due to standpipe overflow

Effluent Analysis:

Run Time (minutes)	Sample ID	Sample Description	SSC (mg/L)	
			Measured	Corrected[4]
0:00	Background 1-1	Background sample taken at 1.2 L/s	< MDL	-
0:30	Effluent 1-1	1.2 L/s transition sample #1	94.3	94.3
1:00	Effluent 2-1	1st sample taken at 1.2 L/s	129.2	129.2
2:00	Effluent 3-1	2nd sample taken at 1.2 L/s	185.3	185.3
3:00	Effluent 4-1	3rd sample taken at 1.2 L/s	206.0	206.0
4:00	Effluent 5-1	4th sample taken at 1.2 L/s	176.0	176.0
5:00	Effluent 6-1	5th sample taken at 1.2 L/s	523.6	523.6
6:00	Effluent 7-1	6th sample taken at 1.2 L/s	495.7	495.7
7:00	Background 2-1	Background sample taken at 4.8 L/s	< MDL	-
6:30	Effluent 8-1	4.8 L/s transition sample #1	6420	6420
7:00	Effluent 9-1	1st sample taken at 4.8 L/s	7164	7164
8:00	Effluent 10-1	2nd sample taken at 4.8 L/s	8094	8094
9:00	Effluent 11-1	3rd sample taken at 4.8 L/s	6762	6762
10:00	Effluent 12-1	4th sample taken at 4.8 L/s	4842	4842
11:00	Effluent 13-1	5th sample taken at 4.8 L/s	5266	5266
12:00	Effluent 14-1	6th sample taken at 4.8 L/s	4768	4768
13:00	Background 3-1	Background sample taken at 8.4 L/s	1.8	-
12:30	Effluent 15-1	8.4 L/s transition sample #1	6665	6663
13:00	Effluent 16-1	1st sample taken at 8.4 L/s	5431	5429
14:00	Effluent 17-1	2nd sample taken at 8.4 L/s	6649	6648
15:00	Effluent 18-1	3rd sample taken at 8.4 L/s	5027	5025
16:00	Effluent 19-1	4th sample taken at 8.4 L/s	5861	5859
17:00	Effluent 20-1	5th sample taken at 8.4 L/s	5021	5019
18:00	Effluent 21-1	6th sample taken at 8.4 L/s	3251	3249
The system was shut down due to standpipe overflow				
25:30	Background 4-1	Background sample taken at 12.0 L/s	41.2	-
25:00	Effluent 22-1	12.0 L/s transition sample #1	1569	1528
25:30	Effluent 23-1	1st sample taken at 12.0 L/s	1927	1886
26:30	Effluent 24-1	2nd sample taken at 12.0 L/s	1474	1432
27:30	Effluent 25-1	3rd sample taken at 12.0 L/s	1208	1167
28:30	Effluent 26-1	4th sample taken at 12.0 L/s	1550	1508
29:30	Effluent 27-1	5th sample taken at 12.0 L/s	1141	1100
30:30	Effluent 28-1	6th sample taken at 12.0 L/s	749.5	708
The system was shut down due to standpipe overflow				
52:00	Effluent 29-1	15.6 L/s transition sample #1	Not tested	
52:30	Background 5-1	1st Background sample taken at 15.6 L/s	145.6	-
52:30	Effluent 30-1	1st effluent sample taken at 15.6 L/s	532.5	386.9
53:30	Background 6-1	2nd Background sample taken at 15.6 L/s	179.2	-
53:30	Effluent 31-1	2nd effluent sample taken at 15.6 L/s	432.0	252.7
54:30	Background 7-1	3rd Background sample taken at 15.6 L/s	182.4	-
54:30	Effluent 32-1	3rd effluent sample taken at 15.6 L/s	554.9	372.5
55:30	Background 8-1	4th Background sample taken at 15.6 L/s	198.2	-
55:30	Effluent 33-1	4th effluent sample taken at 15.6 L/s	530.6	332.4

56:30	Background 9-1	5th Background sample taken at 15.6 L/s	200.3	-
56:30	Effluent 34-1	5th effluent sample taken at 15.6 L/s	480.1	279.8
57:30	Background 10-1	6th Background sample taken at 15.6 L/s	210.0	-
57:30	Effluent 35-1	6th effluent sample taken at 15.6 L/s	520.2	310.2

MDL – Method detection limit

[4] $SSC_{corrected} = SSC_{measured} - SSC_{background}$

Run Summary for CB Shield Scour Testing

– Simulated Streetscape - With CB Shield Insert

Run Date: March 13th, 2015

Sediment Pre-load:

- The test sediment was the AGSCO silica sand (1-1000 micron)
- Sediment was pre-loaded on March 12th
- The total sediment load was 53 kg
- Following the preload, the sump was filled with water and allowed to sit overnight

Water Temperature:

Temperature at 1:00 minutes into run: 17.1 °C
Temperature at 7:00 minutes into run: 10.6 °C
Temperature at 13:00 minutes into run: 10.0 °C
Temperature at 19:00 minutes into run: 10.4 °C
Temperature at 25:00 minutes into run: 10.7 °C

Run Data:

Target Flow Rate	Run Time	Flow Rate
1.2 L/S (19 GPM)	0:00	17.7[1]
	0:30	18.8[1]
	1:00	18.8
	1:30	18.9
	2:00	18.9
	2:30	19.0
	3:00	18.9
	3:30	19.0
	4:00	18.9
	4:30	18.9
	5:00	18.9
	5:30	18.9
	6:00	18.9
Average Flow Rate (US GPM):		18.9
4.8 L/S (76 GPM)	6:30	50.9[1]
	7:00	76.6
	7:30	76.5
	8:00	76.2
	8:30	76.0
	9:00	75.8
	9:30	76.0
	10:00	76.0
	10:30	75.8

	11:00	75.8
	11:30	76.0
	12:00	75.9
Average Flow Rate (US GPM):		76.1

[1] Transition flow rate, not included in the average

Target Flow Rate	Run Time	Flow Rate
8.4 L/S (133 GPM)	12:30	131.0[1]
	13:00	132.6
	13:30	132.5
	14:00	132.8
	14:30	132.7
	15:00	132.6
	15:30	133.0
	16:00	132.8
	16:30	132.8
	17:00	132.8
	17:30	132.8
	18:00	132.6
Average Flow Rate (US GPM):		132.7
12.0 L/S (190 GPM)	25:00	181.9[1]
	25:30	187.6
	26:00	188.5
	26:30	189.8
	27:00	189.4
	27:30	189.2
	28:00	190.0
	28:30	189.4
	29:00	189.6
	29:30	190.0
	30:00	189.9
	30:30	189.9
Average Flow Rate (US GPM):		189.4
15.6 L/S (247 GPM)	52:00	247.5[1]
	52:30	248.0
	53:00	247.8
	53:30	247.6
	54:00	247.5
	54:30	247.6
	55:00	247.7
	55:30	247.6
	56:00	247.6
	56:30	247.7
	57:00	247.6
	57:30	247.5
Average Flow Rate (US GPM):		247.7

[1] Transition flow rate, not included in the average

Effluent Analysis:

Run Time (minutes)	Sample ID	Sample Description	SSC (mg/L)	
			Measured	Corrected[2]
0:00	Background 1-1	Background sample taken at 1.2 L/s	< MDL	-
0:30	Effluent 1-1	1.2 L/s transition sample #1	31.5	31.5
1:00	Effluent 2-1	1st sample taken at 1.2 L/s	17.7	17.7
2:00	Effluent 3-1	2nd sample taken at 1.2 L/s	6.5	6.5
3:00	Effluent 4-1	3rd sample taken at 1.2 L/s	2.7	2.7
4:00	Effluent 5-1	4th sample taken at 1.2 L/s	3.1	3.1
5:00	Effluent 6-1	5th sample taken at 1.2 L/s	4.6	4.6
6:00	Effluent 7-1	6th sample taken at 1.2 L/s	< MDL	< MDL
7:00	Background 2-1	Background sample taken at 4.8 L/s	< MDL	-
6:30	Effluent 8-1	4.8 L/s transition sample #1	3.0	3.0
7:00	Effluent 9-1	1st sample taken at 4.8 L/s	8.2	8.2
8:00	Effluent 10-1	2nd sample taken at 4.8 L/s	4.0	4.0
9:00	Effluent 11-1	3rd sample taken at 4.8 L/s	< MDL	< MDL
10:00	Effluent 12-1	4th sample taken at 4.8 L/s	< MDL	< MDL
11:00	Effluent 13-1	5th sample taken at 4.8 L/s	1.7	1.7
12:00	Effluent 14-1	6th sample taken at 4.8 L/s	< MDL	< MDL
13:00	Background 3-1	Background sample taken at 8.4 L/s	< MDL	-
12:30	Effluent 15-1	8.4 L/s transition sample #1	2.5	2.5
13:00	Effluent 16-1	1st sample taken at 8.4 L/s	5.4	5.4
14:00	Effluent 17-1	2nd sample taken at 8.4 L/s	10	10
15:00	Effluent 18-1	3rd sample taken at 8.4 L/s	9.5	9.5
16:00	Effluent 19-1	4th sample taken at 8.4 L/s	10	10
17:00	Effluent 20-1	5th sample taken at 8.4 L/s	8.4	8.4
18:00	Effluent 21-1	6th sample taken at 8.4 L/s	8.2	8.2
19:00	Background 4-1	Background sample taken at 12.0 L/s	1.6	-
18:30	Effluent 22-1	12.0 L/s transition sample #1	21.1	19.5
19:00	Effluent 23-1	1st sample taken at 12.0 L/s	40.0	38.4
20:00	Effluent 24-1	2nd sample taken at 12.0 L/s	81.0	79.4
21:00	Effluent 25-1	3rd sample taken at 12.0 L/s	115	113
22:00	Effluent 26-1	4th sample taken at 12.0 L/s	104	103
23:00	Effluent 27-1	5th sample taken at 12.0 L/s	116	114
24:00	Effluent 28-1	6th sample taken at 12.0 L/s	93.9	92.3
25:00	Background 5-1	1st Background sample taken at 15.6 L/s	2.0	-
24:30	Effluent 29-1	15.6 L/s transition sample #1	131.3	128.0
25:00	Effluent 30-1	1st sample taken at 15.6 L/s	180.8	177.4
26:00	Effluent 31-1	2nd sample taken at 15.6 L/s	214.9	211.6
27:00	Effluent 32-1	3rd sample taken at 15.6 L/s	223.7	220.3

28:00	Effluent 33-1	4th sample taken at 15.6 L/s	191.1	187.8
29:00	Effluent 34-1	5th sample taken at 15.6 L/s	227.7	224.4
30:00	Effluent 35-1	6th sample taken at 15.6 L/s	202.5	199.2
30:00	Background 6-1	2nd Background sample taken at 15.6 L/s	4.6	-

MDL – Method detection limit

[2] $SSC_{corrected} = SSC_{measured} - SSC_{background}$

For additional datasets please request for vendor's CETV formal application.

APPENDIX

D OGS UNIT SIZING REPORT

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Detailed Stormceptor Sizing Report – Balm Beach Rd. E and Sundowner Rd.

Project Information & Location			
Project Name	Balm Beach Rd. E and Sundowner Rd.	**Project Number**	-
City	Midland	**State/ Province**	Ontario
Country	Canada	**Date**	10/18/2018
Designer Information		**EOR Information (optional)**	
Name	Brandon O'Leary	**Name**	James Zhou
Company	Forterra	**Company**	WSP Canada Group Ltd.
Phone #	905-630-0359	**Phone #**	
Email	brandon.oleary@forterrabp.com	**Email**	james.zhou@wsp.com

Stormwater Treatment Recommendation

The recommended Stormceptor Model(s) which achieve or exceed the user defined water quality objective for each site within the project are listed in the below Sizing Summary table.

Site Name	Balm Beach Rd. E and Sundowner Rd.
Recommended Stormceptor Model	EFO10
TSS Removal (%) Provided	80
Particle Size Distribution (PSD)	Fine Distribution
Rainfall Station	BARRIE WPCC

The recommended Stormceptor model achieves the water quality objectives based on the selected inputs, historical rainfall records and selected particle size distribution.

EFO Sizing Summary			
EFO Model	**% TSS Removal Provided**	**% Runoff Volume Captured Provided**	**Standard EFO Hydrocarbon Storage Capacity**
EFO4	53	53	265 L (70 gal)
EFO6	67	74	610 L (160 gal)
EFO8	73	85	1070 L (280 gal)
EFO10	80	91	1670 L (440 gal)
EFO12	84	95	2475 L (655 gal)
Parallel Units / MAX	Custom	Custom	Custom

For Stormceptor Specifications and Drawings Please Visit:
http://www.imbriumsystems.com/technical-specifications

OVERVIEW

Stormceptor ® EF is a continuation and evolution of the most globally recognized oil-grit separator (OGS) stormwater treatment technology - **Stormceptor ®.** Also known as a hydrodynamic separator, the enhanced flow Stormceptor EF is a high performing oil-grit separator that effectively removes a wide variety of pollutants from stormwater and snowmelt runoff at higher flow rates as compared to the original Stormceptor. Stormceptor EF captures and retains sediment (TSS), free oils, gross pollutants and other pollutants that attach to particles, such as nutrients and metals. Stormceptor EF's patent-pending treatment and scour prevention technology and internal bypass ensures sediment is retained during all rainfall events.

Design Methodology

Stormceptor is sized using PCSWMM for Stormceptor, a continuous simulation model based on US EPA SWMM. The program calculates hydrology using local historical rainfall data and specified site parameters. With US EPA SWMM's precision, every Stormceptor unit is designed to achieve a defined water quality objective. The TSS removal data presented follows US EPA guidelines to reduce the average annual TSS load. The Stormceptor's unit process for TSS removal is settling. The settling model calculates TSS removal by analyzing:

- Site parameters
- Continuous historical rainfall data, including duration, distribution, peaks & inter-event dry periods
- Particle size distribution, and associated settling velocities (Stokes Law, corrected for drag)
- TSS load
- Detention time of the system

Hydrology Analysis

PCSWMM for Stormceptor calculates annual hydrology with the US EPA SWMM and local continuous historical rainfall data. Performance calculations of Stormceptor are based on the average annual removal of TSS for the selected site parameters. The Stormceptor is engineered to capture sediment particles by treating the required average annual runoff volume, ensuring positive removal efficiency is maintained during each rainfall event, and preventing negative removal efficiency (scour).
Smaller recurring storms account for the majority of rainfall events and average annual runoff volume, as observed in the historical rainfall data analyses presented in this section.

Rainfall Station

State/Province	Ontario	**Total Number of Rainfall Events**	2595
Rainfall Station Name	BARRIE WPCC	**Total Rainfall (mm)**	12897.4
Station ID #	0557	**Average Annual Rainfall (mm)**	358.3
Coordinates	44°23'N, 79°41'W	**Total Evaporation (mm)**	1090.9
Elevation (ft)	725	**Total Infiltration (mm)**	2480.2
Years of Rainfall Data	36	**Total Rainfall that is Runoff (mm)**	9326.3

Notes

- Stormceptor performance estimates are based on simulations using PCSWMM for Stormceptor, which uses the EPA Rainfall and Runoff modules.
- Design estimates listed are only representative of specific project requirements based on total suspended solids (TSS) removal defined by the selected PSD, and based on stable site conditions only, after construction is completed.
- For submerged applications or sites specific to spill control, please contact your local Stormceptor representative for further design assistance.

ONLINE APPLICATION

Stormceptor EF's internal bypass and patent-pending scour prevention technology has demonstrated very effective retention of pollutants in third-party testing and verification following the Canadian ETV's **Procedure for Laboratory Testing of Oil-Grit Separators.** Sediment scour prevention demonstrated an effluent concentration of less than 10 mg/L for sediment particles ranging from 1 to 1,000 microns, even during peak influent flow rates associated with infrequent high intensity storm events. While Stormceptor EF will capture oil, only the Stormceptor EFO configuration has been third-party tested and verified to retain greater than 99% of captured oil. Based on these verified performance attributes, the most efficient and widely accepted application of Stormceptor EF is an online configuration, which allows all upstream conveyance flows to enter and exit the unit. The online application eliminates the need for costly additional bypass structures, piping and installation expense.

FLOW ENTRANCE OPTIONS

Single Inlet Pipe – A common design which includes one inlet pipe and one outlet pipe. A 90-degree (maximum) bend is also accepted with this configuration.

Inlet Grate – Allows surface runoff to enter the unit from grade. The inlet grate option can also be used in conjunction with one inlet pipe or multiple inlet pipes. A removable flow deflector is added in the Stormceptor EF4/EFO4.

Maximum Pipe Diameter		
Model	Inlet (in/mm)	Outlet (in/mm)
EF4 / EFO4	24 / 610	24 / 610
EF6 / EFO6	36 / 915	36 / 915
EF8 / EFO8	48 / 1220	48 / 1220
EF10 / EFO10	72 / 1828	72 / 1828
EF12 / EFO12	72 / 1828	72 / 1828

Multiple Inlet Pipe – Allows for multiple inlet pipes of various diameters to enter the unit.

Maximum Pipe Diameter		
Model	Inlet (in/mm)	Outlet (in/mm)
EF4 / EFO4	18 / 457	24 / 610
EF6 / EFO6	30 / 762	36 / 915
EF8 / EFO8	42 / 1067	48 / 1220
EF10 / EFO10	60 / 1524	72 / 1828
EF12 / EFO12	60 / 1524	72 / 1828

Drainage Area	
Total Area (ha)	2.856
Imperviousness %	80.4

Up Stream Storage	
Storage (ha-m)	Discharge (cms)
0.000	0.000

Up Stream Flow Diversion	
Max. Flow to Stormceptor (cms)	

Design Details	
Stormceptor Inlet Invert Elev (m)	
Stormceptor Outlet Invert Elev (m)	
Stormceptor Rim Elev (m)	
Normal Water Level Elevation (m)	
Pipe Diameter (mm)	
Pipe Material	
Multiple Inlets (Y/N)	No
Grate Inlet (Y/N)	No

Water Quality Objective	
TSS Removal (%)	80.0
Runoff Volume Capture (%)	90.00
Oil Spill Capture Volume (L)	
Peak Conveyed Flow Rate (L/s)	
Water Quality Flow Rate (L/s)	

Particle Size Distribution (PSD)

Removing the smallest fraction of particulates from runoff ensures the majority of pollutants, such as metals, hydrocarbons and nutrients are captured. The table below identifies the Particle Size Distribution (PSD) that was selected to define TSS removal for the Stormceptor design.

Fine Distribution		
Particle Diameter (microns)	Distribution %	Specific Gravity
20.0	20.0	1.30
60.0	20.0	1.80
150.0	20.0	2.20
400.0	20.0	2.65
2000.0	20.0	2.65

Site Name	Balm Beach Rd. E and Sundowner Rd.

Site Details

Drainage Area	
Total Area (ha)	2.856
Imperviousness %	80.4
Oil Spill Capture Volume (L)	

Infiltration Parameters	
Horton's equation is used to estimate infiltration	
Max. Infiltration Rate (mm/hr)	61.98
Min. Infiltration Rate (mm/hr)	10.16
Decay Rate (1/sec)	0.00055
Regeneration Rate (1/sec)	0.01

Surface Characteristics	
Width (m)	338.00
Slope %	2
Impervious Depression Storage (mm)	0.508
Pervious Depression Storage (mm)	5.08
Impervious Manning's n	0.015
Pervious Manning's n	0.25

Evaporation	
Daily Evaporation Rate (mm/day)	2.54

Dry Weather Flow	
Dry Weather Flow (L/s)	0

Maintenance Frequency	
Maintenance Frequency (months) >	12

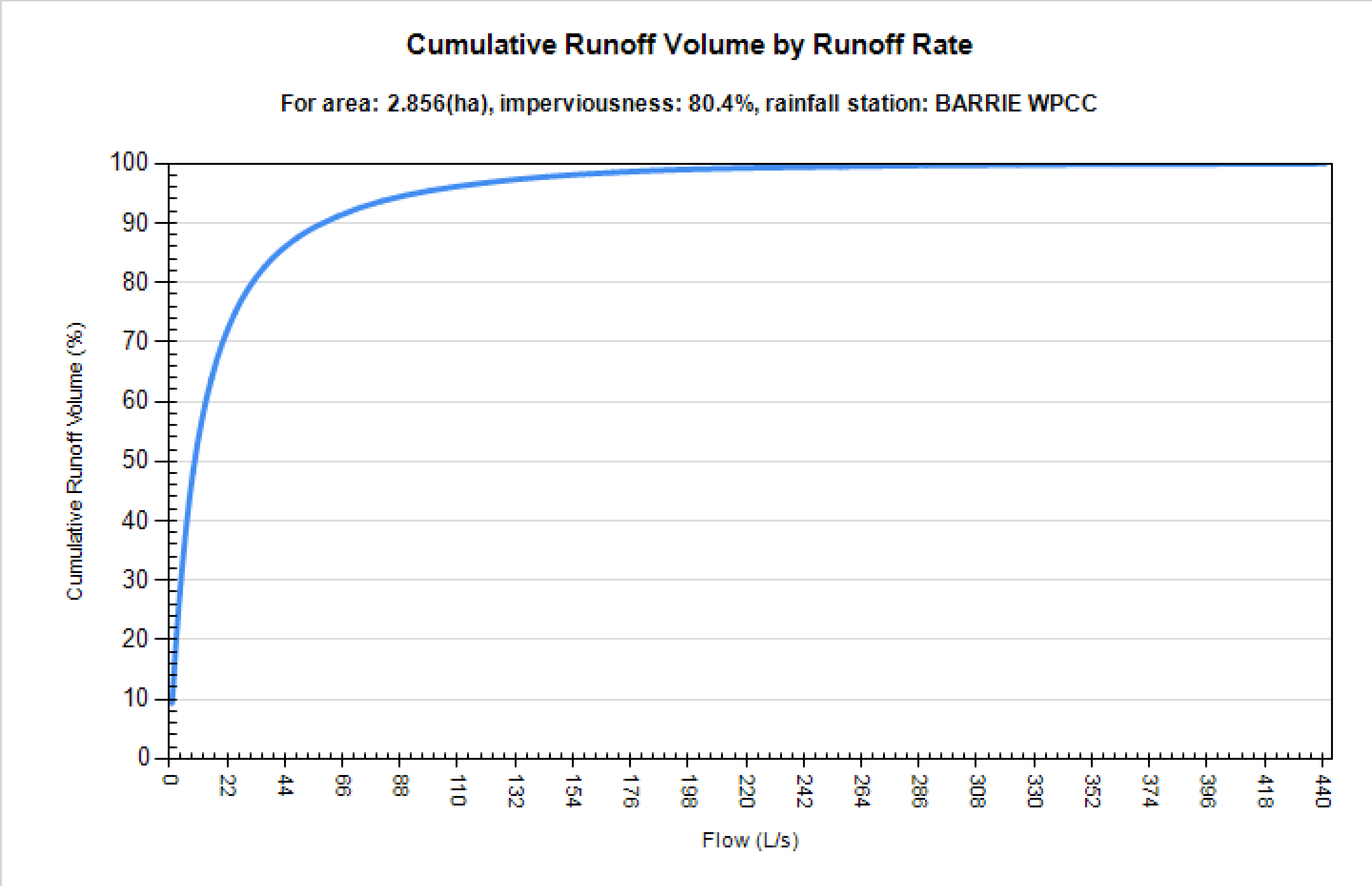
Winter Months	
Winter Infiltration	0

TSS Loading Parameters	
TSS Loading Function	Build Up/ Wash-off

Buildup/Wash-off Parameters	
Target Event Mean Conc. (EMC) mg/L	125
Exponential Buildup Power	0.40
Exponential Washoff Exponent	0.20

TSS Availability Parameters	
Availability Constant A	0.057
Availability Factor B	0.04
Availability Exponent C	1.10
Min. Particle Size Affected by Availability (micron)	400

Cumulative Runoff Volume by Runoff Rate			
Runoff Rate (L/s)	Runoff Volume (m^3)	Volume Over (m^3)	Cumulative Runoff Volume (%)
1	24820	242888	9.3
4	74739	192964	27.9
9	129150	138600	48.2
16	170872	96826	63.8
25	200562	67153	74.9
36	220830	46862	82.5
49	234500	33197	87.6
64	243988	23702	91.1
81	250728	16964	93.7
100	255539	12149	95.5
121	259062	8628	96.8
144	261759	5929	97.8
169	263683	4006	98.5
196	264967	2721	99.0
225	265833	1855	99.3
256	266402	1286	99.5
289	266830	858	99.7
324	267126	562	99.8
361	267330	358	99.9
400	267461	227	99.9
441	267563	125	100.0


Cumulative Runoff Volume by Runoff Rate
For area: 2.856(ha), imperviousness: 80.4%, rainfall station: BARRIE WPCC
Cumulative Runoff Volume (%)
100
90
80
70
60
50
40
30
20
10
0
0
22
44
66
88
110
132
154
176
198
220
242
264
286
308
330
352
374
396
418
440
Flow (L/s)

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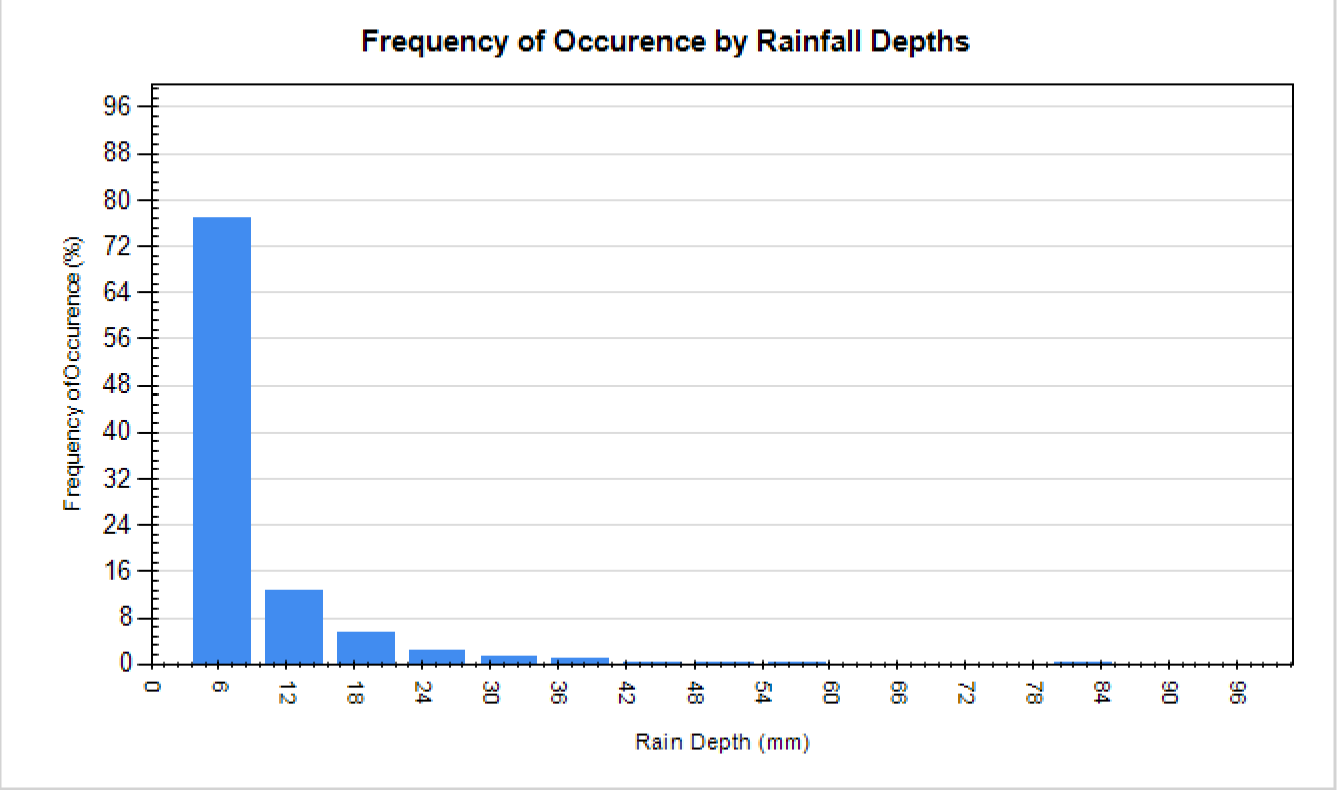
Rainfall Event Analysis				
Rainfall Depth (mm)	No. of Events	Percentage of Total Events (%)	Total Volume (mm)	Percentage of Annual Volume (%)
6.35	1991	76.7	3535	27.4
12.70	325	12.5	2942	22.8
19.05	137	5.3	2129	16.5
25.40	63	2.4	1420	11.0
31.75	36	1.4	1002	7.8
38.10	20	0.8	693	5.4
44.45	10	0.4	406	3.1
50.80	6	0.2	285	2.2
57.15	2	0.1	108	0.8
63.50	1	0.0	58	0.5
69.85	1	0.0	68	0.5
76.20	0	0.0	0	0.0
82.55	2	0.1	156	1.2
88.90	0	0.0	0	0.0
95.25	0	0.0	0	0.0
101.60	1	0.0	96	0.7



APPENDIX

E

ADS STORMTECH MC-4500 CHAMBER SYSTEM

PROJECT INFORMATION	
ENGINEERED PRODUCT MANAGER:	CODY NEATH 519-465-9958 CODY.NEATH@ADSPIPE.COM
ADS SALES REP:	RYAN MARTIN 705-207-3059 RYAN.MARTIN@ADSPIPE.COM
PROJECT NO:	S193606
ONTARIO SITE COORDINATOR:	RYAN RUBENSTEIN 519-710-3687 RYAN.RUBENSTEIN@ADSPIPE.COM

ADS™
Advanced Drainage Systems, Inc.

ADS SiteAssist™
FOR STORMTECH
INSTALLATION INSTRUCTIONS
VISIT OUR WEBSITE

710 BALM BEACH ROAD

MIDLAND, ON.

MC-4500 STORMTECH CHAMBER SPECIFICATIONS

1. CHAMBERS SHALL BE STORMTECH MC-4500.
2. CHAMBERS SHALL BE ARCH-SHAPED AND SHALL BE MANUFACTURED FROM VIRGIN, IMPACT-MODIFIED POLYPROPYLENE COPOLYMERS.
3. CHAMBERS SHALL BE CERTIFIED TO CSA B184, "POLYMERIC SUB-SURFACE STORMWATER MANAGEMENT STRUCTURES", AND MEET THE REQUIREMENTS OF ASTM F2418, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS" CHAMBER CLASSIFICATION 60x101.
4. CHAMBER ROWS SHALL PROVIDE CONTINUOUS, UNOBSTRUCTED INTERNAL SPACE WITH NO INTERNAL SUPPORTS THAT WOULD IMPEDE FLOW OR LIMIT ACCESS FOR INSPECTION.
5. THE STRUCTURAL DESIGN OF THE CHAMBERS, THE STRUCTURAL BACKFILL, AND THE INSTALLATION REQUIREMENTS SHALL ENSURE THAT THE LOAD FACTORS SPECIFIED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, SECTION 12.12, ARE MET FOR: 1) LONG-DURATION DEAD LOADS AND 2) SHORT-DURATION LIVE LOADS, BASED ON THE CSA S6 CL-625 TRUCK AND THE AASHTO DESIGN TRUCK WITH CONSIDERATION FOR IMPACT AND MULTIPLE VEHICLE PRESENCES.
6. CHAMBERS SHALL BE DESIGNED, TESTED AND ALLOWABLE LOAD CONFIGURATIONS DETERMINED IN ACCORDANCE WITH ASTM F2787, "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS". LOAD CONFIGURATIONS SHALL INCLUDE: 1) INSTANTANEOUS (<1 MIN) AASHTO DESIGN TRUCK LIVE LOAD ON MINIMUM COVER 2) MAXIMUM PERMANENT (75-YR) COVER LOAD AND 3) ALLOWABLE COVER WITH PARKED (1-WEEK) AASHTO DESIGN TRUCK.
7. REQUIREMENTS FOR HANDLING AND INSTALLATION:
   - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
   - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 75 mm (3").
   - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT SHALL BE GREATER THAN OR EQUAL TO 450 LBS/FT/%. THE ASC IS DEFINED IN SECTION 6.2.8 OF ASTM F2418. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 23° C / 73° F), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.
8. ONLY CHAMBERS THAT ARE APPROVED BY THE SITE DESIGN ENGINEER WILL BE ALLOWED. UPON REQUEST BY THE SITE DESIGN ENGINEER OR OWNER, THE CHAMBER MANUFACTURER SHALL SUBMIT A STRUCTURAL EVALUATION FOR APPROVAL BEFORE DELIVERING CHAMBERS TO THE PROJECT SITE AS FOLLOWS:
   - THE STRUCTURAL EVALUATION SHALL BE SEALED BY A REGISTERED PROFESSIONAL ENGINEER.
   - THE STRUCTURAL EVALUATION SHALL DEMONSTRATE THAT THE SAFETY FACTORS ARE GREATER THAN OR EQUAL TO 1.95 FOR DEAD LOAD AND 1.75 FOR LIVE LOAD, THE MINIMUM REQUIRED BY ASTM F2787 AND BY SECTIONS 3 AND 12.12 OF THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS FOR THERMOPLASTIC PIPE.
   - THE TEST DERIVED CREEP MODULUS AS SPECIFIED IN ASTM F2418 SHALL BE USED FOR PERMANENT DEAD LOAD DESIGN EXCEPT THAT IT SHALL BE THE 75-YEAR MODULUS USED FOR DESIGN.
9. CHAMBERS AND END CAPS SHALL BE PRODUCED AT AN ISO 9001 CERTIFIED MANUFACTURING FACILITY.

IMPORTANT - NOTES FOR THE BIDDING AND INSTALLATION OF MC-4500 CHAMBER SYSTEM

1. STORMTECH MC-4500 CHAMBERS SHALL NOT BE INSTALLED UNTIL THE MANUFACTURER'S REPRESENTATIVE HAS COMPLETED A PRE-CONSTRUCTION MEETING WITH THE INSTALLERS.
2. STORMTECH MC-4500 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
3. CHAMBERS ARE NOT TO BE BACKFILLED WITH A DOZER OR EXCAVATOR SITUATED OVER THE CHAMBERS. STORMTECH RECOMMENDS 3 BACKFILL METHODS:
   - STONESHOOTER LOCATED OFF THE CHAMBER BED.
   - BACKFILL AS ROWS ARE BUILT USING AN EXCAVATOR ON THE FOUNDATION STONE OR SUBGRADE.
   - BACKFILL FROM OUTSIDE THE EXCAVATION USING A LONG BOOM HOE OR EXCAVATOR.
4. THE FOUNDATION STONE SHALL BE LEVELED AND COMPACTED PRIOR TO PLACING CHAMBERS.
5. JOINTS BETWEEN CHAMBERS SHALL BE PROPERLY SEATED PRIOR TO PLACING STONE.
6. MAINTAIN MINIMUM - 230 mm (9") SPACING BETWEEN THE CHAMBER ROWS.
7. INLET AND OUTLET MANIFOLDS MUST BE INSERTED A MINIMUM OF 300 mm (12") INTO CHAMBER END CAPS.
8. EMBEDMENT STONE SURROUNDING CHAMBERS MUST BE A CLEAN, CRUSHED, ANGULAR STONE WELL GRADED BETWEEN ¾" AND 2" (20-50 mm).
9. STONE SHALL BE BROUGHT UP EVENLY AROUND CHAMBERS SO AS NOT TO DISTORT THE CHAMBER SHAPE. STONE DEPTHS SHOULD NEVER DIFFER BY MORE THAN 300 mm (12") BETWEEN ADJACENT CHAMBER ROWS.
10. STONE MUST BE PLACED ON THE TOP CENTER OF THE CHAMBER TO ANCHOR THE CHAMBERS IN PLACE AND PRESERVE ROW SPACING.
11. THE CONTRACTOR MUST REPORT ANY DISCREPANCIES WITH CHAMBER FOUNDATION MATERIAL BEARING CAPACITIES TO THE SITE DESIGN ENGINEER.
12. ADS RECOMMENDS THE USE OF "FLEXSTORM CATCH IT" INSERTS DURING CONSTRUCTION FOR ALL INLETS TO PROTECT THE SUBSURFACE STORMWATER MANAGEMENT SYSTEM FROM CONSTRUCTION SITE RUNOFF.

NOTES FOR CONSTRUCTION EQUIPMENT

1. STORMTECH MC-4500 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
2. THE USE OF EQUIPMENT OVER MC-4500 CHAMBERS IS LIMITED:
   - NO EQUIPMENT IS ALLOWED ON BARE CHAMBERS.
   - NO RUBBER TIRED LOADER, DUMP TRUCK, OR EXCAVATORS ARE ALLOWED UNTIL PROPER FILL DEPTHS ARE REACHED IN ACCORDANCE WITH THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
   - WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT CAN BE FOUND IN THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
3. FULL 900 mm (36") OF STABILIZED COVER MATERIALS OVER THE CHAMBERS IS REQUIRED FOR DUMP TRUCK TRAVEL OR DUMPING.

USE OF A DOZER TO PUSH EMBEDMENT STONE BETWEEN THE ROWS OF CHAMBERS MAY CAUSE DAMAGE TO CHAMBERS AND IS NOT AN ACCEPTABLE BACKFILL METHOD. ANY CHAMBERS DAMAGED BY USING THE "DUMP AND PUSH" METHOD ARE NOT COVERED UNDER THE STORMTECH STANDARD WARRANTY.

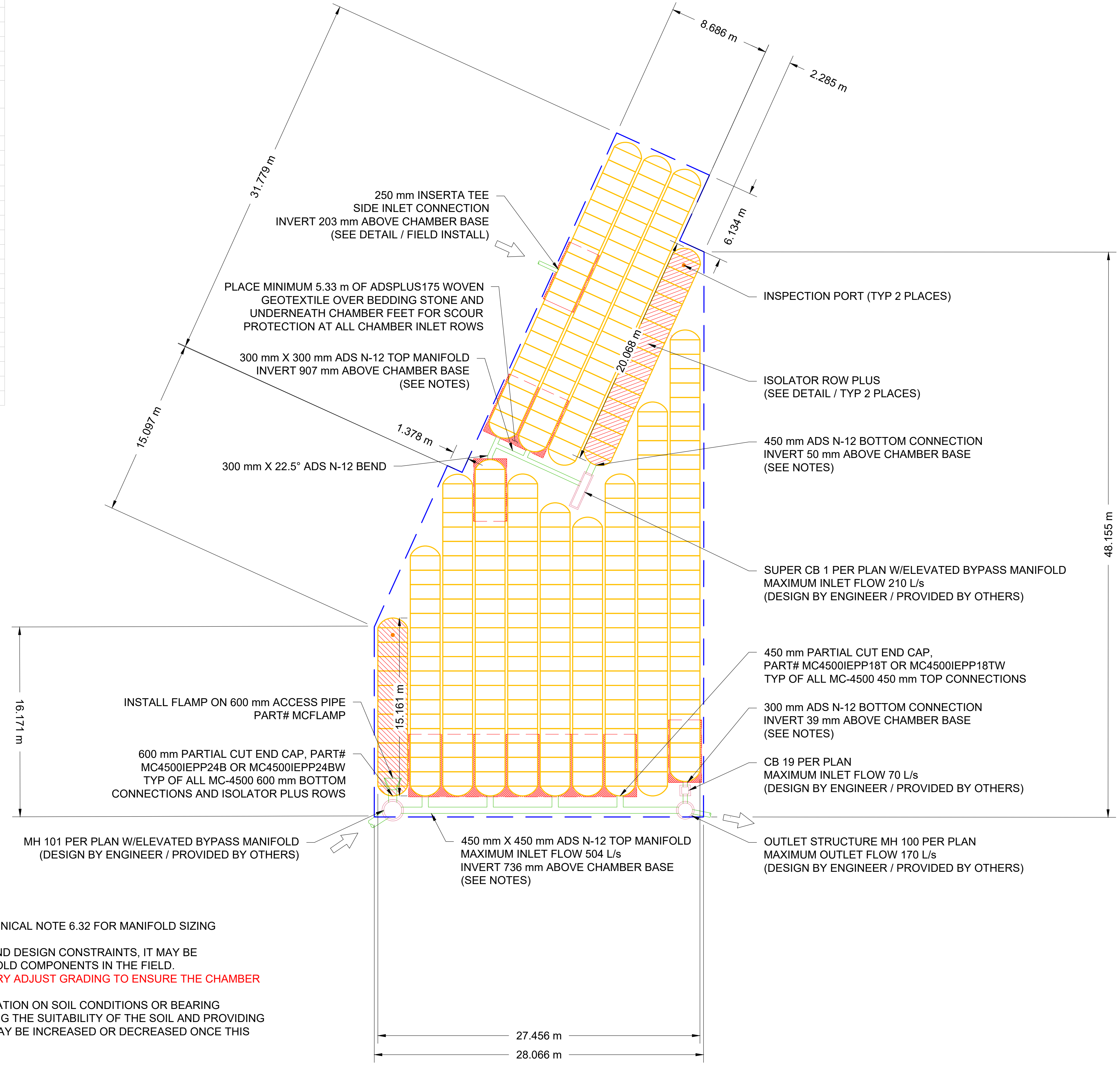
CONTACT STORMTECH AT 1-888-892-2694 WITH ANY QUESTIONS ON INSTALLATION REQUIREMENTS OR WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT.

PROPOSED LAYOUT

283	STORMTECH MC-4500 CHAMBERS
28	STORMTECH MC-4500 END CAPS
350	STONE ABOVE (mm)
229	STONE BELOW (mm)
40	% STONE VOID
1,375.5	**INSTALLED SYSTEM VOLUME (m³) ABOVE ELEVATION 248.500 (PERIMETER STONE INCLUDED)**
144.0	**INSTALLED SYSTEM VOLUME (m³) BELOW ELEVATION 248.500 (PERIMETER STONE INCLUDED)**
1,173.0	SYSTEM AREA (m²)
157.7	SYSTEM PERIMETER (m)

PROPOSED ELEVATIONS

252.119	MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED):
250.747	MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC):
250.595	MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC):
250.595	MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT):
250.595	MINIMUM ALLOWABLE GRADE (TOP OF RIGID PAVEMENT):
250.335	TOP OF STONE:
249.985	TOP OF MC-4500 CHAMBER:
249.366	300 mm TOP CONNECTION INVERT:
249.208	450 mm TOP MANIFOLD INVERT:
248.664	INSERTA TEE SIDE INLET CONNECTION INVERT:
248.518	600 mm ISOLATOR ROW PLUS INVERT:
248.510	450 mm BOTTOM CONNECTION INVERT:
248.500	300 mm BOTTOM CONNECTION INVERT:
248.461	BOTTOM OF MC-4500 CHAMBER:
248.232	BOTTOM OF STONE:



NOTES

- MANIFOLD SIZE TO BE DETERMINED BY SITE DESIGN ENGINEER. SEE TECHNICAL NOTE 6.32 FOR MANIFOLD SIZING GUIDANCE.
- DUE TO THE ADAPTATION OF THIS CHAMBER SYSTEM TO SPECIFIC SITE AND DESIGN CONSTRAINTS, IT MAY BE NECESSARY TO CUT AND COUPLE ADDITIONAL PIPE TO STANDARD MANIFOLD COMPONENTS IN THE FIELD.
- THE SITE DESIGN ENGINEER MUST REVIEW ELEVATIONS AND IF NECESSARY ADJUST GRADING TO ENSURE THE CHAMBER COVER REQUIREMENTS ARE MET.
- THIS CHAMBER SYSTEM WAS DESIGNED WITHOUT SITE-SPECIFIC INFORMATION ON SOIL CONDITIONS OR BEARING CAPACITY. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR DETERMINING THE SUITABILITY OF THE SOIL AND PROVIDING THE BEARING CAPACITY OF THE INSITU SOILS. THE BASE STONE DEPTH MAY BE INCREASED OR DECREASED ONCE THIS INFORMATION IS PROVIDED.\

710 BALM BEACH ROAD

MIDLAND, ON.

DATE:	9/6/23
DRAWN:	RCT
PROJECT #:	S193606
CHECKED:	RCT

DATE	DRWN	CHKD	DESCRIPTION
9/12/23	RCT	RCT	REVISED PER NEW PLAN/COMMENTS
9/8/23	RCT	RCT	REVISED INVERTS PER ENGINEER

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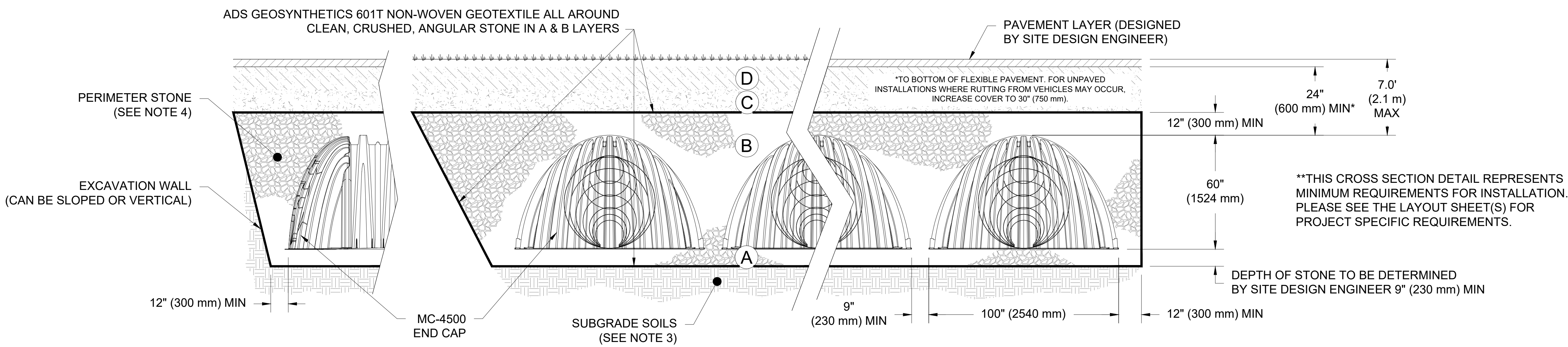
HILLIARD, OH 43026

SCALE = 1 : 350

ACCEPTABLE FILL MATERIALS: STORMTECH MC-4500 CHAMBER SYSTEMS

MATERIAL LOCATION		DESCRIPTION	AASHTO MATERIAL CLASSIFICATIONS	COMPACTION / DENSITY REQUIREMENT
D	**FINAL FILL:** FILL MATERIAL FOR LAYER 'D' STARTS FROM THE TOP OF THE 'C' LAYER TO THE BOTTOM OF FLEXIBLE PAVEMENT OR UNPAVED FINISHED GRADE ABOVE. NOTE THAT PAVEMENT SUBBASE MAY BE PART OF THE 'D' LAYER	ANY SOIL/ROCK MATERIALS, NATIVE SOILS, OR PER ENGINEER'S PLANS. CHECK PLANS FOR PAVEMENT SUBGRADE REQUIREMENTS.	N/A	PREPARE PER SITE DESIGN ENGINEER'S PLANS. PAVED INSTALLATIONS MAY HAVE STRINGENT MATERIAL AND PREPARATION REQUIREMENTS.
C	**INITIAL FILL:** FILL MATERIAL FOR LAYER 'C' STARTS FROM THE TOP OF THE EMBEDMENT STONE ('B' LAYER) TO 24" (600 mm) ABOVE THE TOP OF THE CHAMBER. NOTE THAT PAVEMENT SUBBASE MAY BE A PART OF THE 'C' LAYER.	GRANULAR WELL-GRADED SOIL/AGGREGATE MIXTURES, <35% FINES OR PROCESSED AGGREGATE. MOST PAVEMENT SUBBASE MATERIALS CAN BE USED IN LIEU OF THIS LAYER.	AASHTO M145[1] A-1, A-2-4, A-3 OR AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57, 6, 67, 68, 7, 78, 8, 89, 9, 10	BEGIN COMPACTIONS AFTER 24" (600 mm) OF MATERIAL OVER THE CHAMBERS IS REACHED. COMPACT ADDITIONAL LAYERS IN 12" (300 mm) MAX LIFTS TO A MIN. 95% PROCTOR DENSITY FOR WELL GRADED MATERIAL AND 95% RELATIVE DENSITY FOR PROCESSED AGGREGATE MATERIALS.
B	**EMBEDMENT STONE:** FILL SURROUNDING THE CHAMBERS FROM THE FOUNDATION STONE ('A' LAYER) TO THE 'C' LAYER ABOVE.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43[1] 3, 4	NO COMPACTION REQUIRED.
A	**FOUNDATION STONE:** FILL BELOW CHAMBERS FROM THE SUBGRADE UP TO THE FOOT (BOTTOM) OF THE CHAMBER.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43[1] 3, 4	PLATE COMPACT OR ROLL TO ACHIEVE A FLAT SURFACE.[2,3]

PLEASE NOTE:
1. THE LISTED AASHTO DESIGNATIONS ARE FOR GRADATIONS ONLY. THE STONE MUST ALSO BE CLEAN, CRUSHED, ANGULAR. FOR EXAMPLE, A SPECIFICATION FOR #4 STONE WOULD STATE: "CLEAN, CRUSHED, ANGULAR NO. 4 (AASHTO M43) STONE".
2. STORMTECH COMPACTION REQUIREMENTS ARE MET FOR 'A' LOCATION MATERIALS WHEN PLACED AND COMPACTED IN 9" (230 mm) (MAX) LIFTS USING TWO FULL COVERAGES WITH A VIBRATORY COMPACTOR.
3. WHERE INFILTRATION SURFACES MAY BE COMPROMISED BY COMPACTION, FOR STANDARD DESIGN LOAD CONDITIONS, A FLAT SURFACE MAY BE ACHIEVED BY RAKING OR DRAGGING WITHOUT COMPACTION EQUIPMENT. FOR SPECIAL LOAD DESIGNS, CONTACT STORMTECH FOR COMPACTION REQUIREMENTS.
4. ONCE LAYER 'C' IS PLACED, ANY SOIL/MATERIAL CAN BE PLACED IN LAYER 'D' UP TO THE FINISHED GRADE. MOST PAVEMENT SUBBASE SOILS CAN BE USED TO REPLACE THE MATERIAL REQUIREMENTS OF LAYER 'C' OR 'D' AT THE SITE DESIGN ENGINEER'S DISCRETION.



NOTES:

1. CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2418, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS" CHAMBER CLASSIFICATION 60x101
2. MC-4500 CHAMBERS SHALL BE DESIGNED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
3. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR ASSESSING THE BEARING RESISTANCE (ALLOWABLE BEARING CAPACITY) OF THE SUBGRADE SOILS AND THE DEPTH OF FOUNDATION STONE WITH CONSIDERATION FOR THE RANGE OF EXPECTED SOIL MOISTURE CONDITIONS.
4. PERIMETER STONE MUST BE EXTENDED HORIZONTALLY TO THE EXCAVATION WALL FOR BOTH VERTICAL AND SLOPED EXCAVATION WALLS.
5. REQUIREMENTS FOR HANDLING AND INSTALLATION:
   - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
   - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 3".
   - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT AS DEFINED IN SECTION 6.2.8 OF ASTM F2418 SHALL BE GREATER THAN OR EQUAL TO 500 LBS/FT/%. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 73° F / 23° C), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.

710 BALM BEACH ROAD
MIDLAND, ON.

DATE: 9/6/23 DRAWN: RCT
PROJECT #: S193606 CHECKED: RCT

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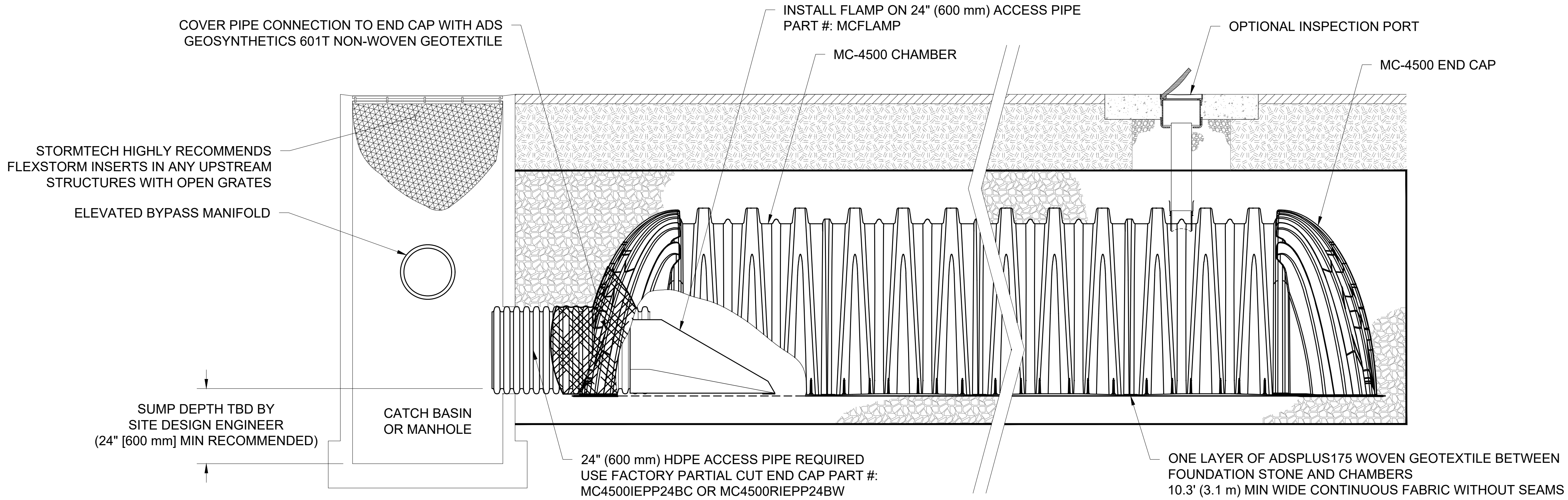


MC-4500 ISOLATOR ROW PLUS DETAIL

NTS

INSPECTION & MAINTENANCE

STEP 1) INSPECT ISOLATOR ROW PLUS FOR SEDIMENT
- A. INSPECTION PORTS (IF PRESENT)
  - A.1. REMOVE/OPEN LID ON NYLOPLAST INLINE DRAIN
  - A.2. REMOVE AND CLEAN FLEXSTORM FILTER IF INSTALLED
  - A.3. USING A FLASHLIGHT AND STADIA ROD, MEASURE DEPTH OF SEDIMENT AND RECORD ON MAINTENANCE LOG
  - A.4. LOWER A CAMERA INTO ISOLATOR ROW PLUS FOR VISUAL INSPECTION OF SEDIMENT LEVELS (OPTIONAL)
  - A.5. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.
- B. ALL ISOLATOR PLUS ROWS
  - B.1. REMOVE COVER FROM STRUCTURE AT UPSTREAM END OF ISOLATOR ROW PLUS
  - B.2. USING A FLASHLIGHT, INSPECT DOWN THE ISOLATOR ROW PLUS THROUGH OUTLET PIPE
    - i) MIRRORS ON POLES OR CAMERAS MAY BE USED TO AVOID A CONFINED SPACE ENTRY
    - ii) FOLLOW OSHA REGULATIONS FOR CONFINED SPACE ENTRY IF ENTERING MANHOLE
  - B.3. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.

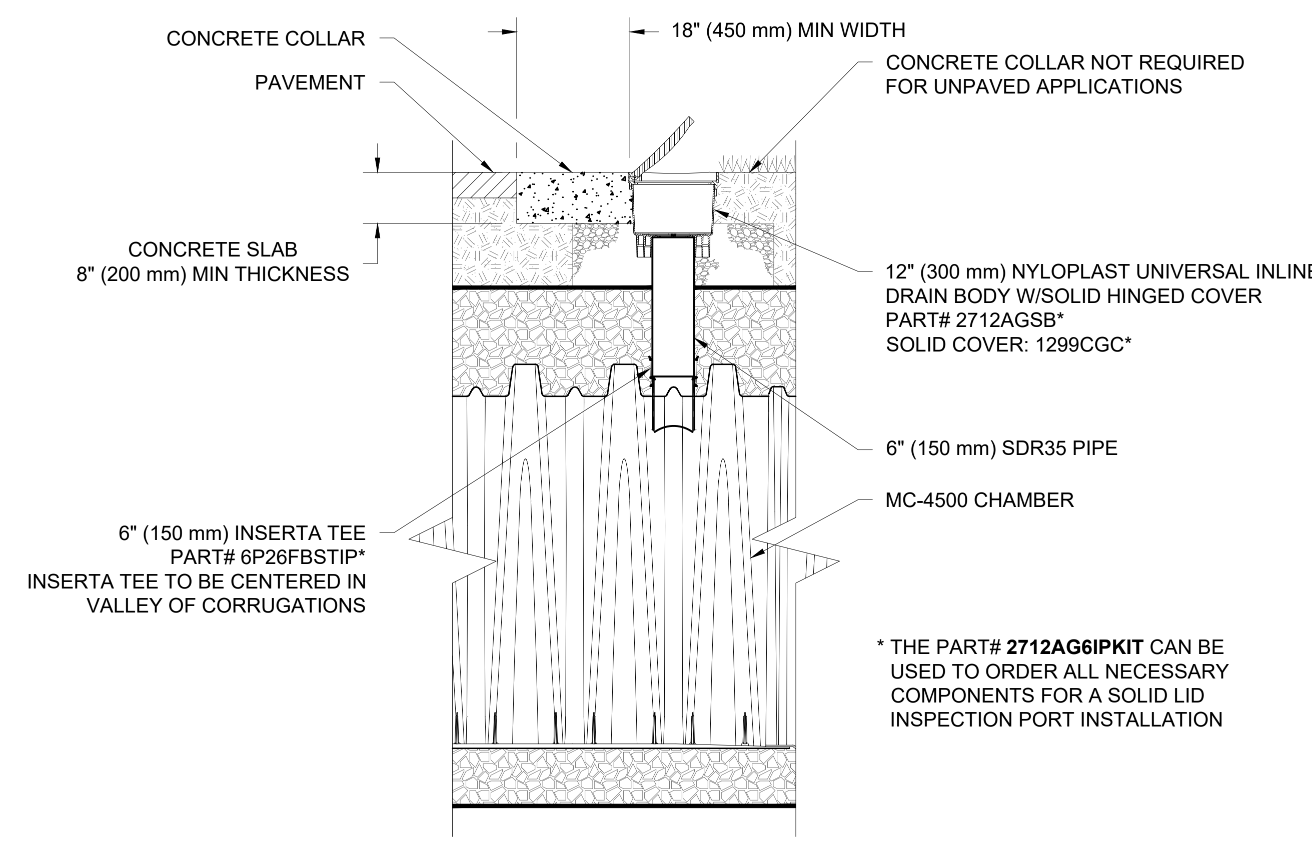
STEP 2) CLEAN OUT ISOLATOR ROW PLUS USING THE JETVAC PROCESS
- A. A FIXED CULVERT CLEANING NOZZLE WITH REAR FACING SPREAD OF 45" (1.1 m) OR MORE IS PREFERRED
- B. APPLY MULTIPLE PASSES OF JETVAC UNTIL BACKFLUSH WATER IS CLEAN
- C. VACUUM STRUCTURE SUMP AS REQUIRED

STEP 3) REPLACE ALL COVERS, GRATES, FILTERS, AND LIDS; RECORD OBSERVATIONS AND ACTIONS.

STEP 4) INSPECT AND CLEAN BASINS AND MANHOLES UPSTREAM OF THE STORMTECH SYSTEM.

NOTES

1. INSPECT EVERY 6 MONTHS DURING THE FIRST YEAR OF OPERATION. ADJUST THE INSPECTION INTERVAL BASED ON PREVIOUS OBSERVATIONS OF SEDIMENT ACCUMULATION AND HIGH WATER ELEVATIONS.
2. CONDUCT JETTING AND VACTORING ANNUALLY OR WHEN INSPECTION SHOWS THAT MAINTENANCE IS NECESSARY.



* THE PART# **2712AG6IPKIT** CAN BE USED TO ORDER ALL NECESSARY COMPONENTS FOR A SOLID LID INSPECTION PORT INSTALLATION

MC-4500 6" (150 mm) INSPECTION PORT DETAIL

NTS

710 BALM BEACH ROAD
MIDLAND, ON.

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PROJECT #: S193606 | CHECKED: RCT

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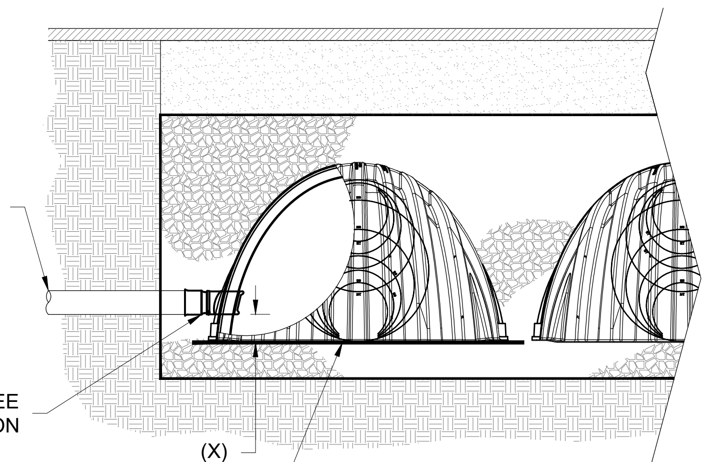
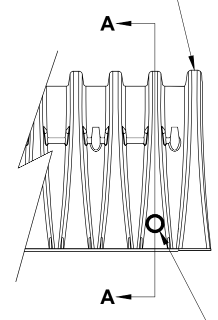
INSERTA TEE DETAIL
NTS

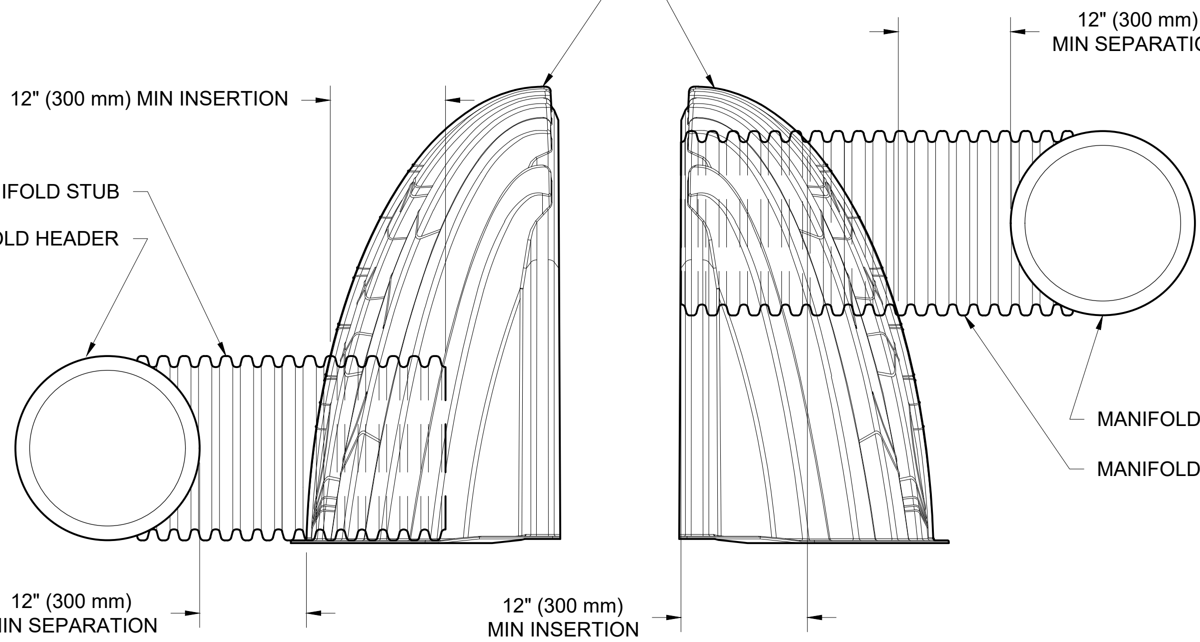




CHAMBER	MAX DIAMETER OF INSERTA TEE	HEIGHT FROM BASE OF CHAMBER (X)
SC-310	6" (150 mm)	4" (100 mm)
SC-740	10" (250 mm)	4" (100 mm)
DC-780	10" (250 mm)	4" (100 mm)
MC-3500	12" (300 mm)	6" (150 mm)
MC-4500	12" (300 mm)	8" (200 mm)
MC-7200	12" (300 mm)	8" (200 mm)
INSERTA TEE FITTINGS AVAILABLE FOR SDR 26, SDR 35, SCH 40 IPS GASKETED & SOLVENT WELD, N-12, HP STORM, C-900 OR DUCTILE IRON		

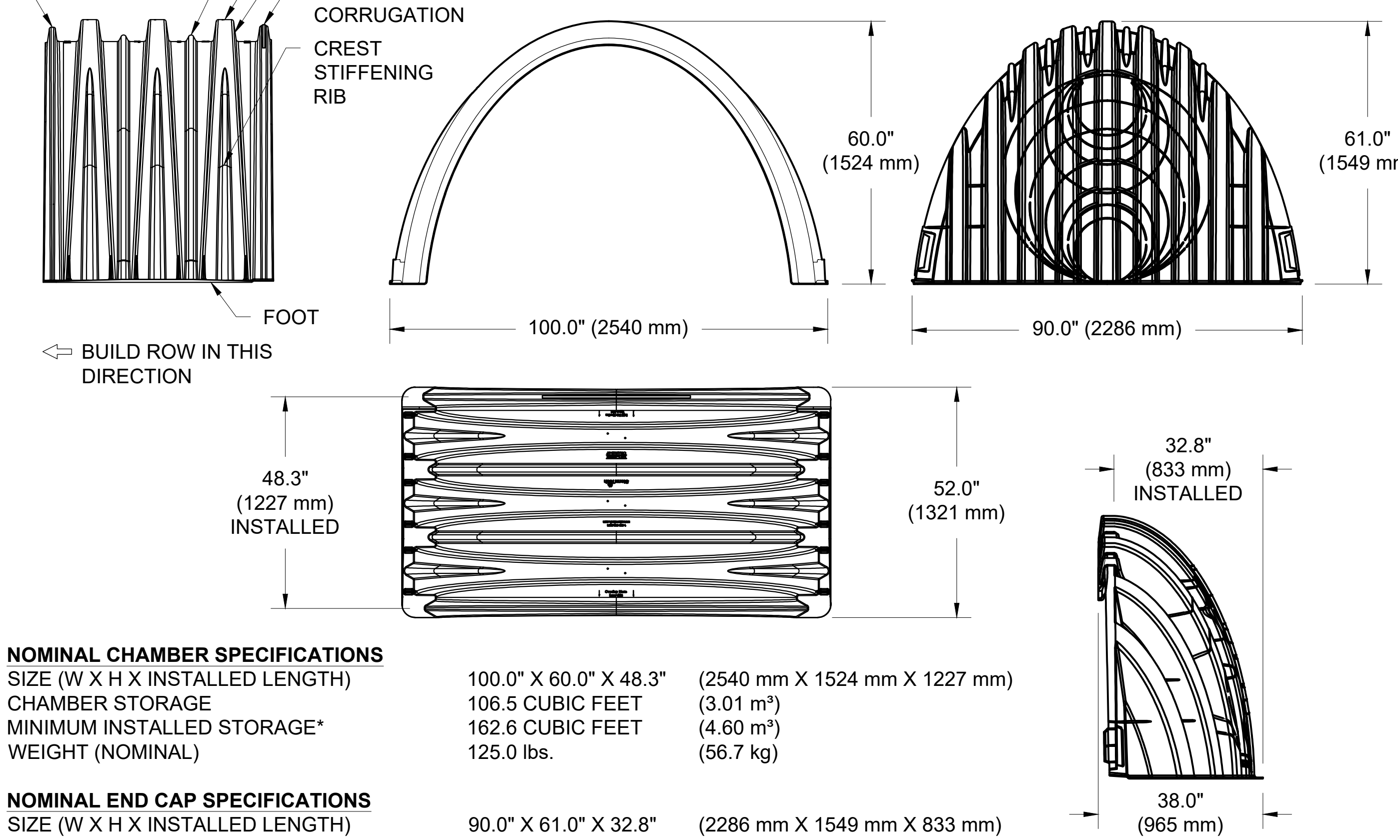
NOTES:
- PART NUMBERS WILL VARY BASED ON INLET PIPE MATERIALS. CONTACT STORMTECH FOR MORE INFORMATION.
- CONTACT ADS ENGINEERING SERVICES IF INSERTA TEE INLET MUST BE RAISED AS NOT ALL INVERTS ARE POSSIBLE.

MC-SERIES END CAP INSERTION DETAIL
NTS



NOTE: MANIFOLD STUB MUST BE LAID HORIZONTAL FOR A PROPER FIT IN END CAP OPENING.

MC-4500 TECHNICAL SPECIFICATION
NTS



NOMINAL CHAMBER SPECIFICATIONS

SIZE (W X H X INSTALLED LENGTH)	100.0" X 60.0" X 48.3"	(2540 mm X 1524 mm X 1227 mm)
CHAMBER STORAGE	106.5 CUBIC FEET	(3.01 m³)
MINIMUM INSTALLED STORAGE*	162.6 CUBIC FEET	(4.60 m³)
WEIGHT (NOMINAL)	125.0 lbs.	(56.7 kg)

NOMINAL END CAP SPECIFICATIONS

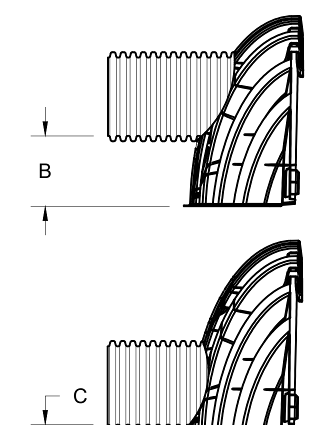
SIZE (W X H X INSTALLED LENGTH)	90.0" X 61.0" X 32.8"	(2286 mm X 1549 mm X 833 mm)
END CAP STORAGE	39.5 CUBIC FEET	(1.12 m³)
MINIMUM INSTALLED STORAGE*	115.3 CUBIC FEET	(3.26 m³)
WEIGHT (NOMINAL)	90 lbs.	(40.8 kg)

*ASSUMES 12" (305 mm) STONE ABOVE, 9" (229 mm) STONE FOUNDATION AND BETWEEN CHAMBERS, 12" (305 mm) STONE PERIMETER IN FRONT OF END CAPS AND 40% STONE POROSITY.

PARTIAL CUT HOLES AT BOTTOM OF END CAP FOR PART NUMBERS ENDING WITH "B"
PARTIAL CUT HOLES AT TOP OF END CAP FOR PART NUMBERS ENDING WITH "T"
END CAPS WITH A PREFABRICATED WELDED STUB END WITH "W"

PART #	STUB	B	C
MC4500IEPP06T	6" (150 mm)	42.54" (1081 mm)	---
MC4500IEPP06B		---	0.86" (22 mm)
MC4500IEPP08T	8" (200 mm)	40.50" (1029 mm)	---
MC4500IEPP08B		---	1.01" (26 mm)
MC4500IEPP10T	10" (250 mm)	38.37" (975 mm)	---
MC4500IEPP10B		---	1.33" (34 mm)
MC4500IEPP12T	12" (300 mm)	35.69" (907 mm)	---
MC4500IEPP12B		---	1.55" (39 mm)
MC4500IEPP15T	15" (375 mm)	32.72" (831 mm)	---
MC4500IEPP15B		---	1.70" (43 mm)
MC4500IEPP18T	18" (450 mm)	29.36" (746 mm)	---
MC4500IEPP18TW			
MC4500IEPP18B		---	1.97" (50 mm)
MC4500IEPP18BW			
MC4500IEPP24T	24" (600 mm)	23.05" (585 mm)	---
MC4500IEPP24TW			
MC4500IEPP24B		---	2.26" (57 mm)
MC4500IEPP24BW			
MC4500IEPP30BW	30" (750 mm)	---	2.95" (75 mm)
MC4500IEPP36BW	36" (900 mm)	---	3.25" (83 mm)
MC4500IEPP42BW	42" (1050 mm)	---	3.55" (90 mm)

NOTE: ALL DIMENSIONS ARE NOMINAL



CUSTOM PREFABRICATED INVERTS ARE AVAILABLE UPON REQUEST. INVENTORIED MANIFOLDS INCLUDE 12-24" (300-600 mm) SIZE ON SIZE AND 15-48" (375-1200 mm) ECCENTRIC MANIFOLDS. CUSTOM INVERT LOCATIONS ON THE MC-4500 END CAP CUT IN THE FIELD ARE NOT RECOMMENDED FOR PIPE SIZES GREATER THAN 10" (250 mm). THE INVERT LOCATION IN COLUMN 'B' ARE THE HIGHEST POSSIBLE FOR THE PIPE SIZE.

710 BEACH ROAD
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THIS DRAWING HAS BEEN PREPARED BASED ON INFORMATION PROVIDED TO ADS UNDER THE DIRECTION OF THE SITE DESIGN ENGINEER OR OTHER PROJECT REPRESENTATIVE. THE SITE DESIGN ENGINEER SHALL REVIEW THIS DRAWING PRIOR TO CONSTRUCTION. IT IS THE ULTIMATE RESPONSIBILITY OF THE SITE DESIGN ENGINEER TO ENSURE THAT THE PRODUCT(S) DEPICTED AND ALL ASSOCIATED DETAILS MEET ALL APPLICABLE LAWS, REGULATIONS, AND PROJECT REQUIREMENTS.

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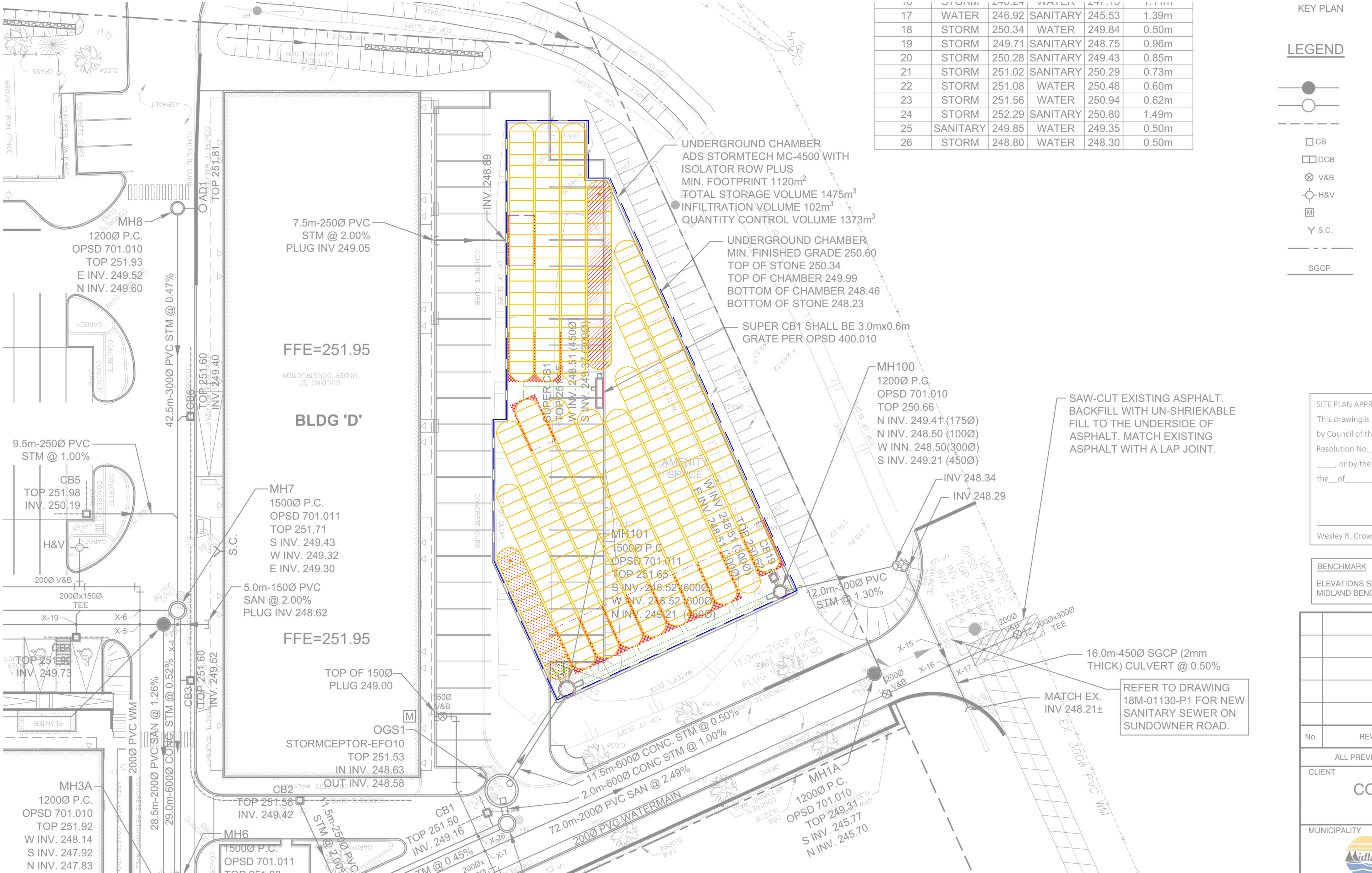
16	STORM	248.24	WATER	247.13	1.11m
17	WATER	246.92	SANITARY	245.53	1.39m
18	STORM	250.34	WATER	249.84	0.50m
19	STORM	249.71	SANITARY	248.75	0.96m
20	STORM	250.28	SANITARY	249.43	0.85m
21	STORM	251.02	SANITARY	250.29	0.73m
22	STORM	251.08	WATER	250.48	0.60m
23	STORM	251.56	WATER	250.94	0.62m
24	STORM	252.29	SANITARY	250.80	1.49m
25	SANITARY	249.85	WATER	249.35	0.50m
26	STORM	248.80	WATER	248.30	0.50m



Project: **710 Balm Beach Rd Rev 1**

☑ Include Perimeter Stone in Calculations

☐ Click for Stage Area Data

☐ Click to Invert Stage Area Data

Click Here for Imperial

Chamber Model -	MC-4500	
Units -	**Metric**	
Number of Chambers -	283	
Number of End Caps -	28	
Voids in the stone (porosity) -	40	%
Base of Stone Elevation -	248.23	m
Amount of Stone Above Chambers -	350	mm
Amount of Stone Below Chambers -	229	mm

1173 sq.meters   Min. Area - 1049.74 sq.meters

StormTech MC-4500 Cumulative Storage Volumes

Height of System *(mm)*	Incremental Single Chamber *(cubic meters)*	Incremental Single End Cap *(cubic meters)*	Incremental Chambers *(cubic meters)*	Incremental End Cap *(cubic meters)*	Incremental Stone *(cubic meters)*	Incremental Ch, EC and Stone *(cubic meters)*	Cumulative System *(cubic meters)*	Elevation *(meters)*
2108	0.00	0.00	0.00	0.00	11.912	11.91	1519.59	250.34
2083	0.00	0.00	0.00	0.00	11.912	11.91	1507.68	250.32
2057	0.00	0.00	0.00	0.00	11.912	11.91	1495.77	250.29
2032	0.00	0.00	0.00	0.00	11.912	11.91	1483.86	250.27
2007	0.00	0.00	0.00	0.00	11.912	11.91	1471.95	250.24
1981	0.00	0.00	0.00	0.00	11.912	11.91	1460.03	250.22
1956	0.00	0.00	0.00	0.00	11.912	11.91	1448.12	250.19
1930	0.00	0.00	0.00	0.00	11.912	11.91	1436.21	250.16
1905	0.00	0.00	0.00	0.00	11.912	11.91	1424.30	250.14
1880	0.00	0.00	0.00	0.00	11.912	11.91	1412.39	250.11
1854	0.00	0.00	0.00	0.00	11.912	11.91	1400.48	250.09
1829	0.00	0.00	0.00	0.00	11.912	11.91	1388.56	250.06
1803	0.00	0.00	0.00	0.00	11.912	11.91	1376.65	250.04
1778	0.00	0.00	0.00	0.00	11.912	11.91	1364.74	250.01
1753	0.00	0.00	0.33	0.01	11.776	12.11	1352.83	249.99
1727	0.00	0.00	0.93	0.03	11.529	12.49	1340.71	249.96
1702	0.00	0.00	1.32	0.04	11.367	12.73	1328.23	249.94
1676	0.01	0.00	1.67	0.05	11.222	12.95	1315.50	249.91
1651	0.01	0.00	2.15	0.07	11.025	13.24	1302.55	249.89
1626	0.01	0.00	3.63	0.08	10.427	14.14	1289.31	249.86
1600	0.02	0.00	5.33	0.10	9.737	15.17	1275.17	249.83
1575	0.02	0.00	6.40	0.13	9.299	15.83	1260.00	249.81
1549	0.03	0.01	7.28	0.15	8.941	16.37	1244.17	249.78
1524	0.03	0.01	8.04	0.17	8.628	16.84	1227.80	249.76
1499	0.03	0.01	8.71	0.20	8.348	17.26	1210.96	249.73
1473	0.03	0.01	9.32	0.22	8.095	17.64	1193.71	249.71
1448	0.03	0.01	9.89	0.24	7.860	17.99	1176.07	249.68
1422	0.04	0.01	10.42	0.26	7.642	18.32	1158.08	249.66
1397	0.04	0.01	10.91	0.28	7.436	18.62	1139.76	249.63
1372	0.04	0.01	11.37	0.30	7.242	18.92	1121.14	249.61
1346	0.04	0.01	11.81	0.32	7.059	19.19	1102.22	249.58
1321	0.04	0.01	12.22	0.35	6.883	19.45	1083.03	249.55
1295	0.04	0.01	12.62	0.37	6.716	19.71	1063.58	249.53
1270	0.05	0.01	12.99	0.39	6.557	19.94	1043.87	249.50
1245	0.05	0.01	13.35	0.41	6.405	20.17	1023.93	249.48
1219	0.05	0.02	13.70	0.43	6.260	20.39	1003.76	249.45
1194	0.05	0.02	14.02	0.45	6.122	20.60	983.37	249.43
1168	0.05	0.02	14.34	0.47	5.989	20.80	962.77	249.40
1143	0.05	0.02	14.64	0.48	5.861	20.99	941.98	249.38
1118	0.05	0.02	14.93	0.50	5.738	21.17	920.99	249.35
1092	0.05	0.02	15.21	0.51	5.623	21.35	899.82	249.33
1067	0.05	0.02	15.48	0.54	5.504	21.52	878.47	249.30
1041	0.06	0.02	15.74	0.55	5.394	21.69	856.95	249.28
1016	0.06	0.02	15.99	0.57	5.287	21.85	835.26	249.25
991	0.06	0.02	16.23	0.59	5.185	22.00	813.41	249.22
965	0.06	0.02	16.46	0.61	5.086	22.15	791.41	249.20
940	0.06	0.02	16.68	0.62	4.990	22.29	769.26	249.17
914	0.06	0.02	16.89	0.64	4.900	22.43	746.97	249.15
889	0.06	0.02	17.10	0.65	4.812	22.56	724.54	249.12
864	0.06	0.02	17.30	0.66	4.726	22.69	701.98	249.10
838	0.06	0.02	17.49	0.67	4.646	22.81	679.29	249.07
813	0.06	0.02	17.67	0.68	4.569	22.93	656.48	249.05
787	0.06	0.03	17.85	0.71	4.489	23.05	633.55	249.02
762	0.06	0.03	18.02	0.72	4.416	23.15	610.50	249.00
737	0.06	0.03	18.19	0.73	4.346	23.26	587.35	248.97
711	0.06	0.03	18.34	0.73	4.283	23.36	564.09	248.95
686	0.07	0.03	18.49	0.75	4.215	23.46	540.73	248.92
660	0.07	0.03	18.64	0.76	4.153	23.55	517.28	248.89
635	0.07	0.03	18.78	0.77	4.093	23.64	493.73	248.87
610	0.07	0.03	18.91	0.78	4.036	23.73	470.09	248.84
584	0.07	0.03	19.04	0.77	3.988	23.80	446.36	248.82
559	0.07	0.03	19.16	0.80	3.929	23.89	422.56	248.79
533	0.07	0.03	19.28	0.80	3.880	23.96	398.68	248.77
508	0.07	0.03	19.39	0.81	3.833	24.03	374.72	248.74
483	0.07	0.03	19.49	0.82	3.788	24.10	350.69	248.72
457	0.07	0.03	19.59	0.82	3.745	24.16	326.59	248.69
432	0.07	0.03	19.69	0.83	3.705	24.22	302.43	248.67
406	0.07	0.03	19.78	0.84	3.667	24.28	278.21	248.64
381	0.07	0.03	19.86	0.83	3.634	24.33	253.93	248.62
356	0.07	0.03	19.94	0.84	3.600	24.38	229.60	248.59
330	0.07	0.03	20.02	0.85	3.564	24.43	205.23	248.56
305	0.07	0.03	20.09	0.86	3.534	24.48	180.79	248.54
279	0.07	0.03	20.15	0.86	3.506	24.52	156.31	248.51
254	0.07	0.03	20.25	0.88	3.461	24.59	131.79	248.49
229	0.00	0.00	0.00	0.00	11.912	11.91	107.21	248.46
203	0.00	0.00	0.00	0.00	11.912	11.91	95.29	248.44
178	0.00	0.00	0.00	0.00	11.912	11.91	83.38	248.41
152	0.00	0.00	0.00	0.00	11.912	11.91	71.47	248.39
127	0.00	0.00	0.00	0.00	11.912	11.91	59.56	248.36
102	0.00	0.00	0.00	0.00	11.912	11.91	47.65	248.34
76	0.00	0.00	0.00	0.00	11.912	11.91	35.74	248.31
51	0.00	0.00	0.00	0.00	11.912	11.91	23.82	248.28
25	0.00	0.00	0.00	0.00	11.912	11.91	11.91	248.26

1375.54m^3 above elevation 248.5

144.05m^3 below elevation 248.5

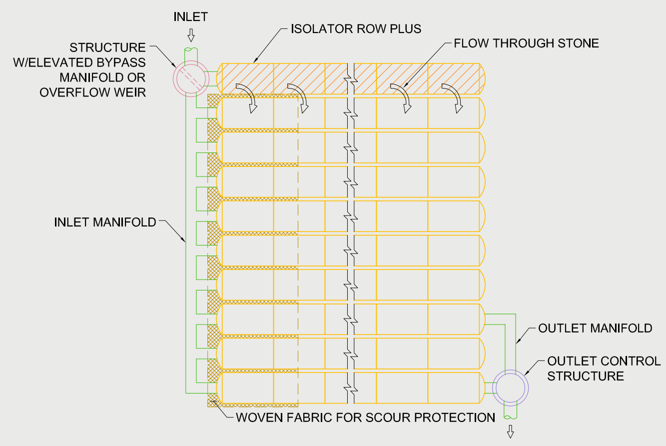
Isolator® Row Plus

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

Features

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

Schematic of the StormTech Isolator Row Plus System



Technology Descriptions

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

Summary of Verified Claims[1]

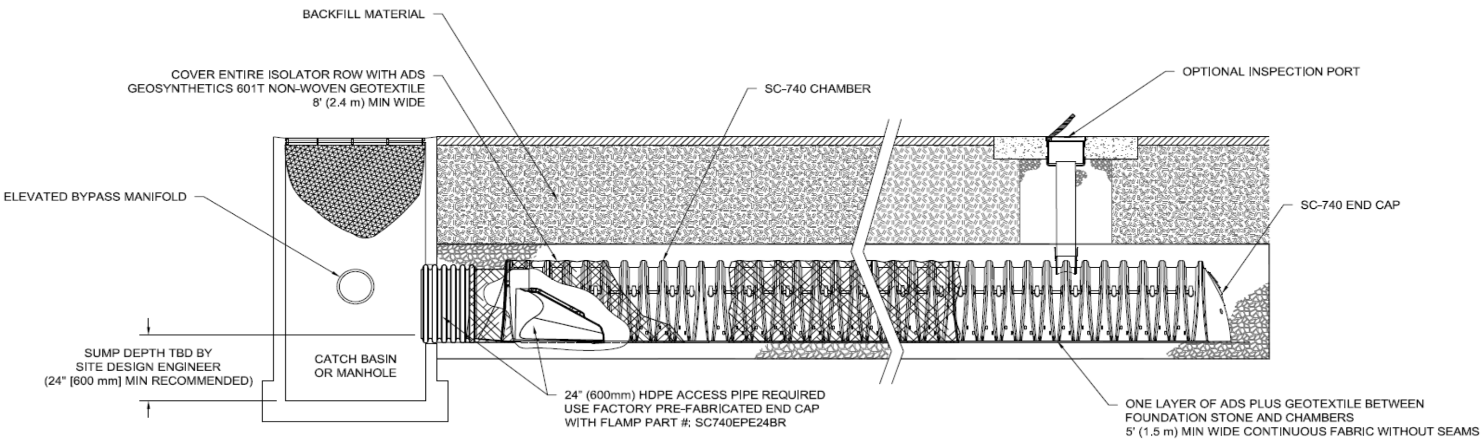
Treatment Rate (gpm/ft²)	4.1
Underlying Geotextile Layers	1
NJDEP Test Sediment	1-1000µ
Mean Particle Concentration (mg/L)	200
TSS Removal Efficiency	81%

[1] Verification testing of the StormTech SC-740 Isolator Row PLUS in accordance with NJDEP Laboratory protocol to access total suspended solids removal by filtration manufactured treatment device, 2013

ADS StormTech™

StormTech Isolator Row Plus (not to scale)

Note: Non-woven fabric is only required over the chambers for the SC-310 and SC-740 chamber models.



Maintenance

The Isolator Row Plus was designed to reduce the cost of periodic maintenance. By "isolating" sediment to just one row of the StormTech system, costs are dramatically reduced by eliminating the need to clean out each row of the entire storage bed. If inspection indicates the potential need for maintenance, access is provided via a manhole(s) located on the end(s) of the row for cleanout.

Maintenance is accomplished with the JetVac® process. The JetVac process utilizes a high-pressure water nozzle to propel itself down the Isolator Row Plus while scouring and suspending sediment. As the nozzle is retrieved, the captured pollutants are flushed back into the manhole for vacuuming. Most sewer and pipe maintenance companies have vacuum/JetVac combination vehicles. Selection of an appropriate JetVac nozzle will improve maintenance efficiency.

StormTech Isolator Row Plus

Chamber Model	Chamber Storage	Chamber Footprint	Treatment Rate
SC-160LP	15.0 cf (0.42 m^3)	11.45 sf (1.06 m^2)	0.11 cfs (3.11 L/s)
SC-310	31.0 cf (0.88 m^3)	17.7 sf (1.64 m^2)	0.16 cfs (4.53 L/s)
SC-740	74.9 cf (2.12 m^3)	27.8 sf (2.58 m^2)	0.26 cfs (7.36 L/s)
DC-780	78.4 cf (2.22 m^3)	27.8 sf (2.58 m^2)	0.26 cfs (7.36 L/s)
MC-3500	175.0 cf (4.96 m^3)	42.9 sf (3.99 m^2)	0.40 cfs (11.32 L/s)
MC-4500	162.6 cf (4.60 m^3)	30.1 sf (2.80 m^2)	0.28 cfs (7.93 L/s)
MC-7200	267.3 cf (7.57 m^3)	50.0 sf (4.65 m^2)	0.45 cfs (12.74 L/s)

Installation

Installation of the stormwater treatment unit(s) shall be preformed per manufacture's installation instructions. Such instructions can be obtained by calling Advanced Drainage Systems Inc. at (800) 821-6710 or by logging on to www.ads-pipe.com or www.stormtech.com

Verification Statement

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

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

Verified Performance Claims

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

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

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

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

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

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

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

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

Technology Application

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

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

Technology Description

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

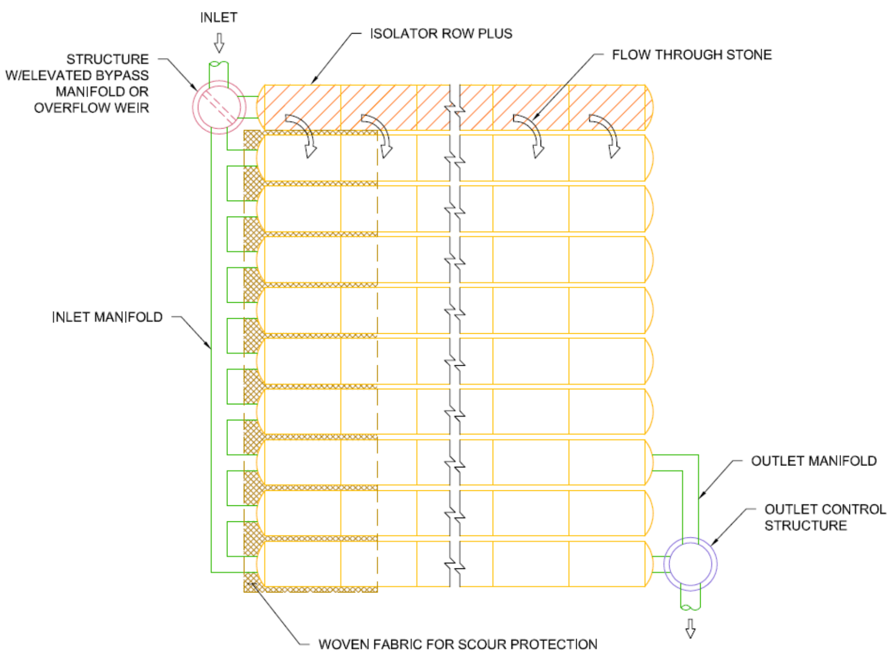


Figure 1: Schematic of the StormTech Isolator® Row PLUS System

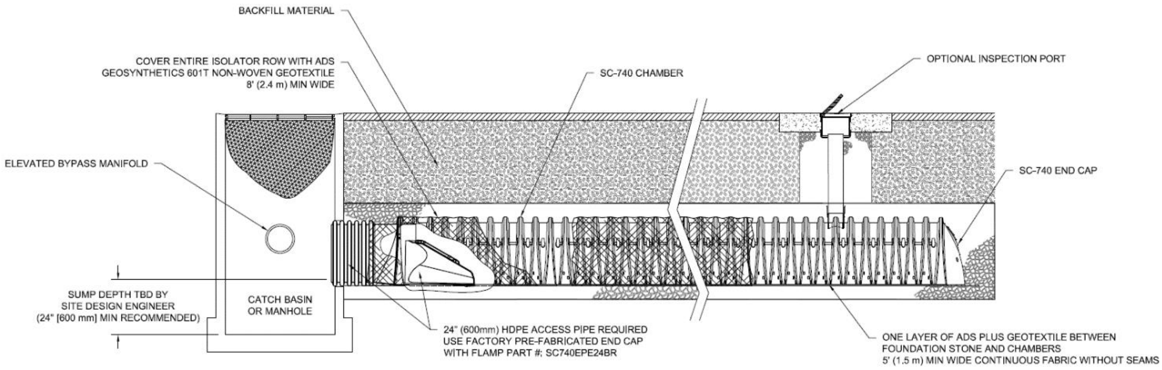


Figure 2: Isolator® Row PLUS Detail

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

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

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

Description of Test Procedure for the StormTech Isolator® Row PLUS

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

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

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

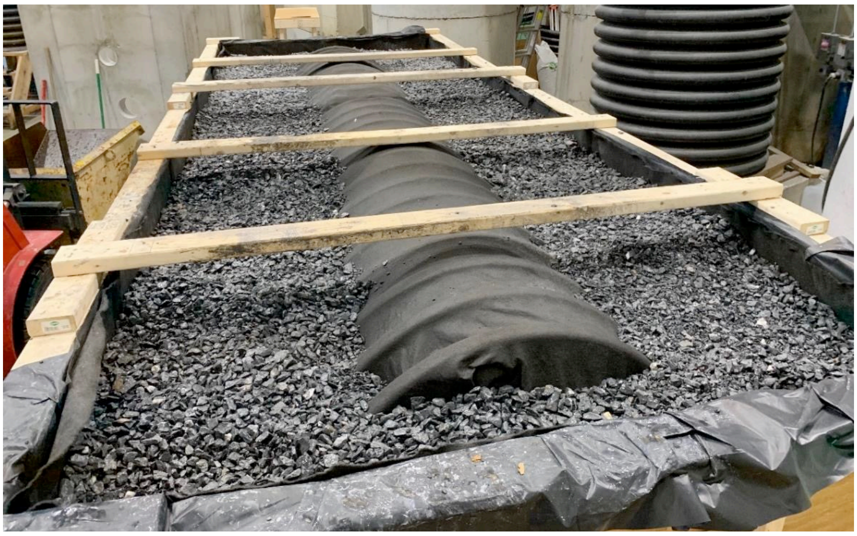


Figure 3: StormTech "Isolator® Row PLUS" Test Set-up at MASWRC

Verification Results

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

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

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

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

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

Table 1: NJDEP PSD Specification

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

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

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

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

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

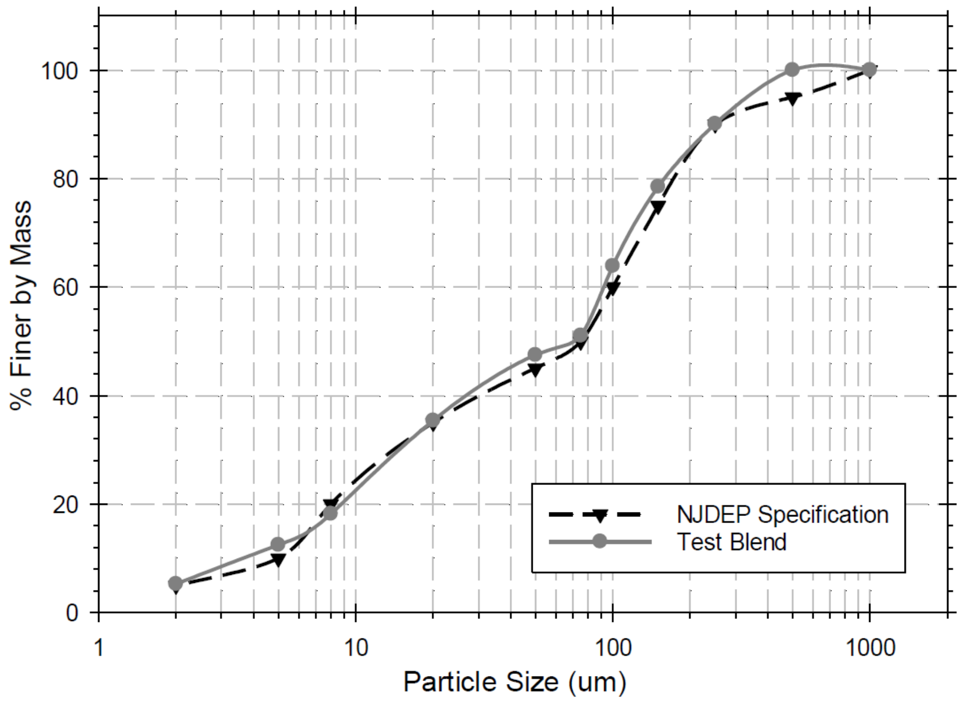


Figure 4– Particle Size Distribution (PSD)

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

Table 3: Flow Rate and Temperature Summary

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

Table 4: Removal Efficiency Results

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

Quality Assurance

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

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

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

Table 5. Validation of QA/QC Procedures

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

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

Variance

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

Verification Summary

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

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

Table 6 - Summary of Verification Results Against Performance Parameters

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

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

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

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

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

What is ISO 14034?

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

Benefits of ETV

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

For more information on the StormTech "Isolator® Row PLUS" technology, contact:	For more information on VerifiGlobal, contact:
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Signed for StormTech: *Original signed by:* *Greg Spires* Greg Spires, P.E. General Manager	Signed for VerifiGlobal: *Original signed by:* *Thomas Bruun* Thomas Bruun, Managing Director *Original signed by:* *John Neate* John Neate, Managing Director

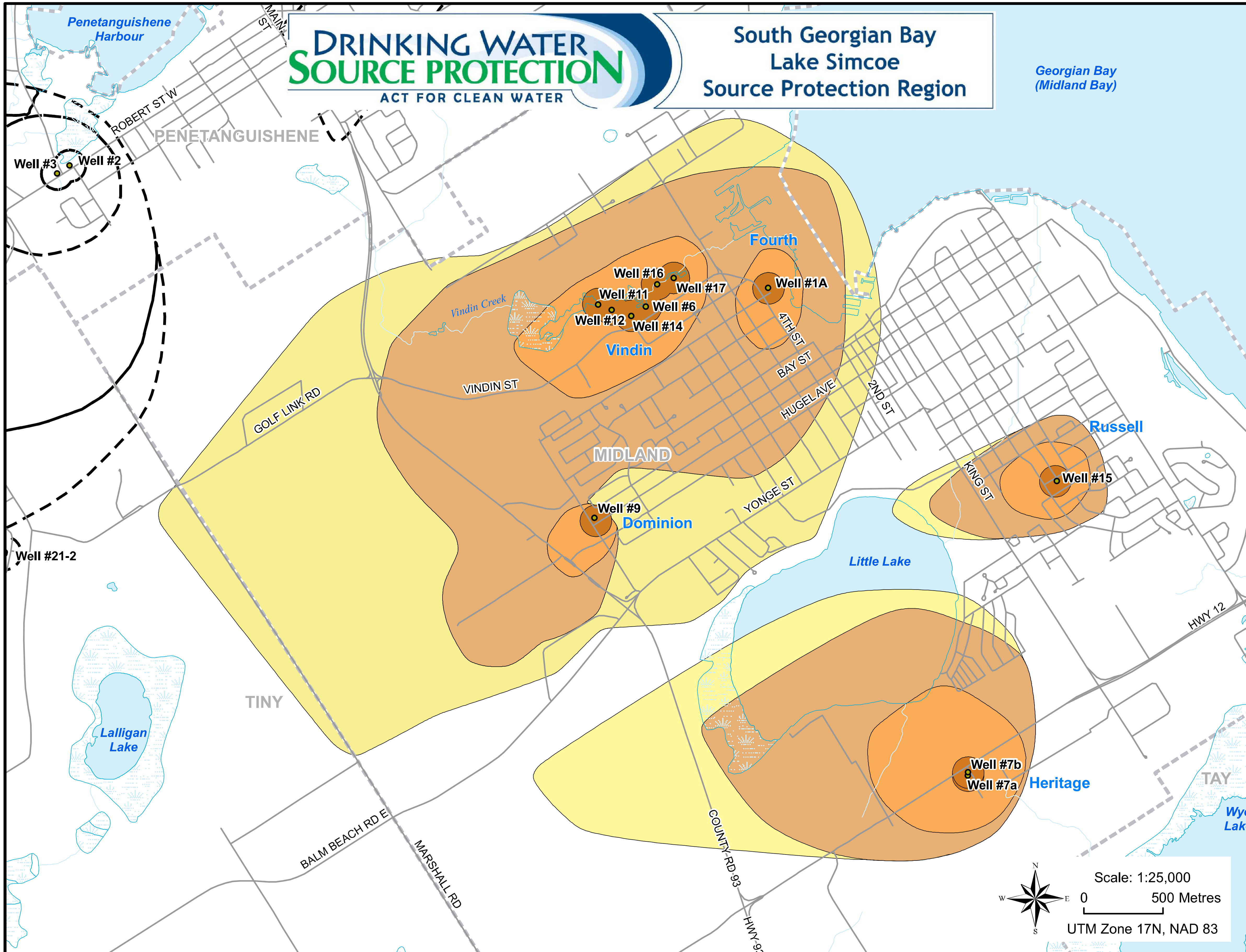
APPENDIX

F

EXCERPT FROM BACKGROUND DOCUMENTS

APPENDIX

F-1 *EXCERT FROM SEVERN SOUND SOURCE PROTECTION AREA APPROVED ASSESSMENT REPORT*



Town of Midland
Wellhead Protection Areas

LEGEND

- Municipal Wells
- Road
- Watercourse
- Water Area, Permanent
- Wetland, Permanent
- Municipal Boundary

WHPA TOT

- WHPA-A (100 m radius)
- WHPA-B (2 yr TOT)
- WHPA-C1 (10 yr TOT)
- WHPA-D (25 yr TOT)
- Adjacent Well Field WHPA

Golder Associates
Barrie, Ontario

Created by: Golder Associates Ltd.
Amendments by: Severn Sound Environmental Association
Original Project #:07-14170-0014
Supplement Project #: 13-1152-0336
Supplement File #: 1311520336AACAPT
Date: 2014-01-22

Ontario

7a-1

This map was produced for the Town of Midland for the purpose of updating the South Georgian Bay Lake Simcoe Assessment Report Supplement. Base data have been compiled from various sharing agreements. While every effort has been made to accurately depict the base data, errors may exist.

APPENDIX

F-2 *GEOTECHNICAL INVESTIGATION REPORT*

Peto MacCallum Ltd.
CONSULTING ENGINEERS

GEOTECHNICAL INVESTIGATION
PROPOSED COMMERCIAL SITE
710 BALM BEACH ROAD EAST AND
1277 & 1337 SUNDOWNER ROAD
MIDLAND, ONTARIO

for

COLAND DEVELOPMENTS CORPORATION

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1 cc: PML Barrie

PML Ref.: 18BF056
Report: 1
November 2018

Peto MacCallum Ltd.
CONSULTING ENGINEERS

November 20, 2018

PML Ref.: 18BF056
Report: 1

Mr. David Colagiacomo
Coland Development Corporation
5875 Highway 7, Unit 3
Woodbridge, Ontario
L4L 1T9

Dear Mr. Colagiacomo

Geotechnical Investigation
Proposed Commercial Site
710 Balm Beach Road East and
1277 & 1337 Sundowner Road
Midland, Ontario

Peto MacCallum Ltd. (PML) is pleased to present the results of the geotechnical investigation recently completed at the above noted project site. Authorization for the work described in this report was provided by Mr. D. Colagiacomo in the signed Engineering Services Agreement dated September 25, 2018 and the signed Engineering Services Agreement Change Order No. 1, dated October 10, 2018.

A commercial development with five one to two storey buildings, between 460 and 1470 m^2 in plan, is proposed for the 3.1 ha parcel of land comprising 710 Balm Beach Road East and 1277 and 1337 Sundowner Road in Midland. All buildings will be slab-on-grade. Site servicing, paved parking and access are planned. A Storm Water Management (SWM) Pond will be constructed at the north end of the site. Infiltration facilities are also proposed throughout the site. The proposed site configuration is shown on Drawing 1-1, appended.

The purpose of this investigation was to assess the subsurface conditions at the site, and based on this information, provide comments and geotechnical engineering recommendations for building foundations, site servicing, infiltration parameters, SWM Pond construction and pavement design.

Geoenvironmental services (observations, recording, testing or assessment of the environmental conditions of the soil and ground water) were not within the terms of reference for this assignment, and no work has been carried out in this regard. If excess soils requiring transportation off-site are generated, a program of soil sampling and chemical testing will be needed to determine the chemical properties of the soil to evaluate appropriate Receiving Site options, in accordance with the MOECC document; Management of Excess Soil – A Guide for Best Management Practices, January, 2014.

The comments and recommendations provided in this report are based on the site conditions at the time of the investigation, and are applicable only to the proposed works as addressed in the report. Any changes in the proposed plans will require review by PML to assess the validity of the report, and may require modified recommendations, additional investigation and/or analysis.

INVESTIGATION PROCEDURES

The field work for this investigation was conducted on October 16 and 17, 2018, and consisted of Boreholes 1 to 13 advanced to 4.7 to 5.0 m depth across the site at the locations shown on Drawing 1-1, appended.

The boreholes were advanced for the site features as summarized in the below table:

SITE FEATURES	ASSOCIATED BOREHOLES
Storm Water Management Pond	1
Building D – Retail	2 to 4
Building E – Daycare	5 and 6
Building C – Retail	7 to 9
Building B – Office / Medical	9 and 10
Building A - Office	11 to 13

Test Pits 1 to 6 were excavated to 2.4 to 2.6 m depth below existing grade on October 16, 2018 across the site, for the purpose of conducting in-situ Guelph Permeameter (GP) tests.

The borehole locations were established in the field by a subcontracted surveying company based on a drawing provided by the Client. The test pit locations were determined in the field by PML. Co-ordination of clearances of underground utilities was provided by PML with the aid of a sub-contracting private utility locating company. Boreholes were drilled and test pits were excavated, cognizant of utility locates. Tree clearing, as required, was provided for the boreholes by PML with the excavator utilized for the test pits.

The boreholes and test pts were conducted during the same time. The boreholes were advanced using continuous flight solid stem augers, powered by a rubber tire mounted CME-75 drill rig, equipped with an automatic hammer, supplied and operated by a specialist drilling contractor. The test pits were excavated using a large track mounted excavator supplied by an excavating contractor. Boreholes and test pits were advanced under the full-time supervision of a member of PML's engineering staff.

At the surface of the boreholes and test pits, the topsoil thicknesses encountered were measured.

Representative samples of the overburden in the boreholes were recovered at frequent depth intervals for identification purposes using a conventional split spoon sampler. Standard penetration tests were carried out simultaneously with the sampling operations to assess the strength characteristics of the substrata. The ground water conditions in the boreholes were assessed during drilling by visual examination of the soil samples, the sampler, and drill rods as the samples were retrieved, and measurement of water in the open boreholes upon completion, if any.

In the test pits, the exposed soils were tested and documented along with ground water observations.

Monitoring wells comprised of 50 mm diameter PVC pipe (bottom 1.5 m screened), filter sand, bentonite seal and above grade protective casing were installed in four boreholes to permit monitoring of the ground water table. Boreholes without wells were backfilled in accordance with O.Reg. 903. As per O.Reg. 903, wells become the property of the Owner and will have to be decommissioned when no longer required. PML would be pleased to assist in this regard.

Ground surface elevations of the boreholes were established in the field by Better Measures Inc. PML interpolated the surface elevations of the test pits utilizing a survey plan provided by the Client.

All recovered samples were returned to our laboratory for moisture content determination and detailed examination to confirm field classification. Grain size analyses were carried out on four samples of the major soil types. The results are presented in Figures 1-1 to 1-4, attached.

SITE DESCRIPTION AND SUMMARIZED SUBSURFACE CONDITIONS

The majority of the site is currently forested (undeveloped). A single residence occupies the southwestern portion of the site (1337 Sundowner Road). The site relief drops roughly 6 m from the south to the north.

Reference is made to the appended Log of Borehole sheets for details of the subsurface conditions, including soil classifications, inferred stratigraphy, Standard Penetration Test N Values (N Values, blows per 300 mm penetration of the split spoon sampler), ground water observations and the results of laboratory moisture content determinations.

Due to the soil sampling procedures and the limited size of samples, the depth/elevation demarcations on the borehole logs must be viewed as “transitional” zones, and cannot be construed as exact geologic boundaries between layers. PML should be retained to assist in defining the geological boundaries in the field during construction, if required.

The Log of Test Pit Sheets provide details of the soil stratigraphy, assessment of density and ground water observations.

In general, the boreholes and test pits showed topsoil was encountered over fill and native granular soils. A description of the distribution of the subsurface conditions encountered is provided below.

Topsoil

Topsoil was present at the surface of Boreholes 1 to 10 and 13 and Test Pits 1 to 5. The topsoil was 50 to 500 mm thick.

Fill

Below the topsoil in Borehole 13, and at the surface of Boreholes 11 and 12, a local fill layer was present that was associated with the existing residence and tree clearing. The fill comprised silty sand with trace gravel, and trace organics were noted. The fill carried to 1.4 to 2.5 m depth (elevation 253.6 to 254.4). The material had N Values of 3 to 19 indicating variable compactive effort when placed. The layer was moist with water contents of 2 to 13%.

Silt and Sand/Sandy Silt

Underlying the topsoil in Boreholes 1, 2, 4, 5 and 7 and Test Pit 1, all at the north end of the site, a native silt and sand/sandy silt deposit with trace gravel and clay was encountered. Cobbles and boulders were noted in the open test pit. The layer extended to the 2.6 m depth of Test Pit 1 and to the 5.0 m depth of drilling in Boreholes 1, 2, 4 and 7, being penetrated at 1.4 m depth (elevation 251.9) in Borehole 5. A sample of the material from Test Pit 1 was submitted for grain size analysis and the results are presented on Figure 1-1, appended. The layer was very loose to compact (N Values 2 to 27) in the upper 1.4 to 4.0 m (elevation 246.1 to 251.9), and was compact to very dense below 4.0 m depth (N Values of 20 to greater than 50). Moisture contents were measured at about 3 to 23%, being typically moist to very moist, with local wet seams in Boreholes 2 and 3.

Silt

Underlying the topsoil in Borehole 3 and Test Pit 2, a silt layer with some sand and trace gravel and clay was observed to the 5.0 and 2.5 m depth of investigation, respectively. Cobbles and boulders were observed in the open test pit. A sample of the material was submitted for gradation and the results are appended in Figure 1-2. The layer was loose to compact (N Values of 5 to 11) in the upper 4.0 m (elevation 246.4) of Borehole 3, becoming dense below 4.0 m depth (N Value of 33). The silt was moist, becoming wet with depth, and water contents were 10 to 25%.

Silty Sand

A major silty sand to sand deposit was encountered below the topsoil or fill in Boreholes 6, 8, 10 and 13 and Test Pits 3 and 5. The layer contained trace clay and gravel, and cobbles and boulders were noted in the open test pits. A sample of the material was submitted for gradation and the results are presented on Figure 1-3, appended. The material was penetrated at 4.0 m depth (elevation 250.7) in Borehole 6 and continued to the 2.5 to 4.9 m depth of exploration in all remaining test pits/boreholes. The layer was very loose to compact in the upper 2 to 3 m of the layer (N Values of 3 to 22) becoming dense to very dense (N Values of 36 to greater than 50) in the lower portion of the unit. The layer was moist with water contents 10% or less.

Sandy Silt Till

Beneath the sandy silt/silty sand in Boreholes 5 and 6 in the western portion of the site, a sandy silt till deposit was uncovered. The deposit contained trace gravel and clay, and cobbles and boulders were noted. The unit was penetrated at 4.0 m depth (elevation 249.3) in Borehole 5 and continued to the 4.9 m depth of exploration in Borehole 6. The unit was compact to very dense (N Values of 12 to greater than 50) and was very moist to moist with depth (water contents of 4 to 15%).

Sand

Typically within the southern half of the site, below the topsoil, fill or till in Boreholes 5, 9, 11 and 12, and Test Pit 4, a basal sand deposit was encountered to the 2.4 to 5.0 m depth of exploration. The layer contained trace to some silt, trace gravel, and cobbles and boulders were noted in the open test pit. A sample of the material was submitted for gradation and the results are appended in Figure 1-4. The material was loose to compact in the upper portion of Borehole 9 (N Values of 4 to 21) and was compact to dense below this and within the other boreholes (N Values of 19 to greater than 50). The layer was very moist to moist. Moisture contents typically 6% or less.

Ground Water

Ground water was first encountered only in seams and only within Boreholes 2 and 3 at 3.0 and 4.6 m depth, respectively. The surrounding soils were found to be relatively moist to very moist. No water was observed upon completion of drilling in any of the boreholes.

Water levels in the monitoring wells installed in Boreholes 1, 6, 9 and 13 were measured on November 1, 2018, about two weeks after installation. All four monitoring wells were dry.

No seepage or ground water was noted in any of the test pits.

It is noted that local perched water should be anticipated.

Ground water levels will fluctuate seasonally, and in response to variations in precipitation.

GEOTECHNCIAL ENGINEERING CONSIDERATIONS

General

A commercial development with five one to two storey buildings, between 460 and 1470 m^2 in plan, is proposed for the 3.1 ha parcel of land comprising 710 Balm Beach Road East and 1277 and 1337 Sundowner Road in Midland. All buildings will be slab-on-grade. Site servicing, paved parking and access are planned. A Storm Water Management (SWM) Pond will be constructed at the north end of the site. Infiltration facilities are also proposed throughout the site. The proposed site configuration is shown on Drawing 1-1, appended.

The site is characterized by topsoil, locally overlying fill, overlying granular soil deposits. The granular soil was typically very loose to compact in the upper portions of the boreholes, becoming dense or very dense at depth. Based on the stabilized water level observations in the wells the regional ground water table is believed to be below the depth of exploration for this assignment, with only local perched water anticipated.

Based on the subsurface conditions revealed in the boreholes and test pits, slab-on-grade construction for buildings should be straightforward with lower bearing capacity in the upper 2 to 3 m and greater bearing capacity at depth. Engineered fill will be required in some areas. Excavation for structures, SWM pond, infiltration parameters and site servicing should only encounter local ground water seepage.

Site Grading and Engineered Fill

The site grading has not been determined and as such building slab or founding elevations have also not been set. For purposes of this report the floor slabs are generally assumed to be slightly above the existing site grade (as much as 0.5 m above existing grade) with exterior footings at 1.5 m below the slab level and interior footings founded at about 0.6 m below the floor slab. Based on this, buildings would be founded in the upper 1.0 to 1.5 m of existing grade where the boreholes encountered local fill or typically very loose to loose soil.

As such, it is recommended that existing fill and the upper 1.0 m of typically very loose to loose soils be removed and grades be raised with engineered fill to the required elevation. Both footings and floor slabs could then be supported on engineered fill, locally footings would be supported on native soils.

In the area of the existing house, the in-situ fill and foundations will have to be removed, such that the extent of the excavation extends to compact native soil in all directions. It is noted that fill may be deeper around the existing house then indicated on the borehole logs.

Reference is made to Appendix A for guidelines for engineered fill construction. The following general highlights are provided:

- Strip existing topsoil, fill, very loose native soils and other deleterious materials down to about 1.0 m depth. The excavated soil should be segregated and stockpiled for reuse or disposal;
- Proofroll exposed subgrade using a heavy vibrating roller to targeted 100% Standard Proctor maximum dry density, under geotechnical review;

- Following geotechnical review and approval of the subgrade, spread approved material in maximum 200 mm thick lifts and uniformly compacted to 100% Standard Proctor maximum dry density in building areas and 95% Standard Proctor maximum dry density in pavement areas;

- Subject to geotechnical review during construction, the excavated fill and very loose/loose native soils are generally suitable for reuse as engineered fill, subject to remove of organics, topsoil, oversized (over 150 mm) or otherwise deleterious material and moisture content. If imported fill is required, it should comprise OPSS Granular B or OPSS Select Subgrade Material (SSM). Other sources of imported material should be reviewed by our office to ensure suitability;

- The engineered fill pad must extend at least 1 m beyond the structure to be supported, then outwards and downwards at no steeper than 45° to the horizontal to meet the underlying approved native subgrade. In this regard, strict survey control and detailed documentation of the lateral and vertical extent of the engineered fill limits should be carried out to ensure that the engineered fill pad fully incorporates the structure to be supported;

- Engineered fill construction must be carried out under full time field review by PML, to approve sub-excavation and subgrade preparation, backfill materials, placement and compaction procedures, and to verify that the specified compaction standards are achieved throughout.

Foundations

Based on the above discussion, in general footings will typically be supported on engineered fill locally on underlying native soils. Footings supported on engineered fill or locally native soils in upper 1.0 to 1.5 m can be designed for a geotechnical bearing resistance at Serviceability Limit State (SLS) of 100 kPa, and a factored bearing resistance at Ultimate Limit State (ULS) of 150 kPa. Locally the bearing resistance is only 50 kPa at SLS and 75 kPa at ULS. The founding elevation and bearing resistance values will have to be reviewed when site grades have been determined.

Alternatively, the footings can be stepped down to dense/very dense soils anticipated at depths of 1.5 to 4.0 m where a geotechnical bearing resistances at SLS of 300 kPa and corresponding factored bearing resistance at ULS of 450 kPa can be utilized for footing design. The depths/elevations and soil type are also summarized below:

BOREHOLES	DEPTH/ELEVATION (m)	SUBGRADE
Building A – Two Storey Office Building		
BH 11	3.0 / 253.1	Sand
BH 12	3.0 / 253.5	Sand
BH 13	1.4 / 254.4	Silty Sand
Building B – Two Storey Office/Medical Building		
BH 9	2.1 / 252.1	Sand
BH 10	2.1 252.7	Silty Sand
Building C – Single Storey Retail Building		
BH 7	3.0 / 247.1	Sandy Silt
BH 8	2.9 / 249.1	Silty Sand
BH 9	2.1 / 252.1	Sand
Building D – Single Storey Retail Building		
BH 2	4.0 / 246.7	Sandy Silt
BH 3	4.0 / 246.4	Silt
BH 4	3.0 / 246.4	Sandy Silt
Building E – Single Storey Daycare Building		
BH 5	2.5 / 250.8	Till
BH 6	3.0 / 251.7	Silty Sand

It is noted that in the area of the existing house, fill soil will likely be present below the depths noted on the borehole logs. As such, as discussed above, existing fill and foundations once fully removed will have to be replaced with engineered fill.

The geotechnical bearing resistance at SLS is based on 25 mm or settlement in the bearing stratum with differential settlement not exceeding 75% of the value.

Footings subject to frost action should be provided with a minimum 1.2 m of earth cover or equivalent.

Prior to placement of structural concrete, all founding surfaces should be reviewed by PML to verify the design bearing capacity is available, or to reassess the design parameters based on the actual conditions revealed in the excavation.

Seismic Design

Based on the soil profile revealed in the boreholes, Site Classification D is applicable for Seismic Site Response as set out in Table 4.1.8.4.A of the Ontario Building Code (2012). Based on the type and relative density of the soil cover at the site there is a low potential for liquefaction of soils to occur.

Floor Slab-on-Grade

Floor slab-on-grade construction is feasible on engineered fill, constructed as discussed earlier, or locally native soil.

A minimum 200 mm thick base layer of crushed stone (nominal 20 mm size) is recommended directly beneath the floor slab. Where a vapour sensitive floor finish is to be used then the use of polyethylene sheeting or similar means should be incorporation as a vapour barrier.

Exterior grades should be established to promote surface drainage away from the building.

Site Servicing

Design details were not finalized at the time of this report. For purposes of this report, inverts are assumed to be as much as 3.0 m below existing grade.

Trench Excavation and Ground Water Control

Trench excavation and ground water control are described later in the report under Excavation and Ground Water Control.

Pipe Bedding

Native granular soils are generally expected at invert levels which is considered satisfactory for pipe support.

Where existing fill or other deleterious material is encountered at the design invert level (possibly adjacent to the existing house), such material should be sub-excavated and replaced with an increased thickness of bedding material, subject to geotechnical field review and approval.

Standard Granular A bedding, in accordance with OPSS, compacted to 95% Standard Proctor maximum dry density should be satisfactory. For flexible pipes, bedding and cover material should comprise OPSS Granular A. For rigid pipes, the bedding material should comprise OPSS Granular A and cover material may comprise select native soil free of oversized material.

Trench Backfill

Backfill in trenches should comprise select inorganics soil and be placed in maximum 200 mm thick loose lifts compacted to at least 95% Standard Proctor maximum dry density to minimize post construction settlement in the backfill. Topsoil, organic, excessively wet, frozen oversized (greater than 200 mm), or otherwise deleterious material should not be incorporated as trench backfill. The moisture content of the trench backfill should be within 2% of the optimum moisture content in order to achieve the specified compaction and be close to optimum moisture content in the upper 1 m to prevent subgrade instability issues. Ideally the backfill should comprise excavated site soil, in order to minimize differential frost heave.

The excavated soil will comprise fill and native granular soils (silt and sand/sandy silt, silt, silty sand, till and sand). Soil should generally be acceptable for reuse subject to moisture content control and removal of organics and geotechnical review during construction.

Earthworks operations should be inspected by PML to verify subgrade preparation, backfill materials, placement and compaction efforts and ensure the specified degree of compaction is achieved throughout.

Excavation and Ground Water Control

It is anticipated that excavation for the engineered fill/buildings will extend as much as 4.0 m below existing grades. Excavation may extend deeper in the area of the existing house to remove existing fill and foundations. Excavation for site servicing is anticipated to 3.0 m below existing grade. Excavation will encounter fill and native granular soils. Harder digging below about 3.0 m depth and the presence of cobbles and boulders should be expected throughout the site as revealed in the test pits.

The soils encountered at the site should be considered as Type 3 soil requiring excavation sidewalls to be constructed at no steeper than one horizontal to one vertical (1H:1V) from the base of the excavation in accordance with the Occupational Health and Safety Act.

The ground water table was generally not encountered during the assignment. Accordingly, it is expected that nuisance ground water seepage should be managed using conventional sump pumping techniques.

Water taking in Ontario is governed by the Ontario Water Resources Act (OWRA) and the Water Takings and Transfer Regulation O. Reg. 387/04. Section 34 of the OWRA requires anyone taking more than 50,000 L/d to notify the Ministry of the Environment, Conservation and Parks (MECP). This requirement applies to all withdrawals, whether for consumption, temporary construction dewatering, or permanent drainage improvements. Where it is assessed than more than 50,000 L/d but less than 400,000 L/d of ground water taking is required, the Owner can register online via the Environmental Activity and Sector Registry (EASR) system. Where it is assessed that more than 400,000 L/d of ground water taking is required then a Category 3 Permit-To-Take-Water (PTTW) is required.

Based on the conditions revealed in the boreholes and test pits, and anticipated excavation depths noted above, a PTTW or registry on the EASR is not anticipated as the excavation will be above the ground water table.

Storm Water Management Pond

A SWM pond is proposed at the north end of the site. The site grading and pond levels are currently unknown.

Borehole 1 and Test Pit 1 were conducted in the SWM Pond area. Beneath 120 mm of topsoil, very loose to compact silt and sand was encountered to the 2.6 m depth of the test pit and 2.9 m depth (elevation 246.7) in Borehole 1, over compact to dense sandy silt to 5.0 m (elevation 244.6). The monitoring well in Borehole 1 was measured on November 1, 2018 about two weeks after installation and was found to be dry. The test pit was also dry. The following general geotechnical input is provided below:

- Berms, if required, should be constructed as engineered fill, using select material, compacted to 95% Standard Proctor maximum dry density. Berm material requirements (permeability) should be assessed when pond details are finalized;
- Interior side slopes should be no steeper than 5H:1V, and protected from erosion by provision of vegetation cover, granular blanket, rip rap or the like. Exterior slopes should be constructed at no steeper than 3H:1V;
- The silt and sand and sandy silt are semi-permeable to permeable;
- If the pond is to be a wet pond with a permanent pool elevation an impermeable liner will be required.

It is recommended that when the grading and design details of the proposed pond are determined, the drawings should be submitted for review by PML to more fully assess the geotechnical parameters, which may necessitate additional investigations.

Pavement Design and Construction

The grading has not been determined and it is anticipated that the pavement subgrade will comprise near surface soils which are typically moderately to highly frost susceptible. Based on this, the following pavement structure thicknesses are recommended:

	LIGHT DUTY (CAR PARKING)	HEAVY DUTY (FIRE ROUTE)
Asphalt (mm)	80	110
Granular A Base Course (mm)	150	150
Granular B Subbase Course (mm)	400	550
Total Thickness (mm)	630	810

Following rough grading to the subgrade level, subgrade preparation should include proofrolling and compacting the exposed subgrade with a heavy vibratory compactor to 95% Standard Proctor maximum dry density under geotechnical review. It is not intended to remove all of the existing fill from under the pavement. Any unstable zones identified during this process should be sub-excavated and replace with compacted select site material, subject to geotechnical field review.

Imported material for the granular base and subbase should conform to OPSS gradation specifications for Granular A and Granular B, and should be compacted to 100% Standard Proctor maximum dry density. Asphalt should be compacted in accordance with OPSS 310.

For the pavement to function properly, it is essential that provisions be made for water to drain out of and not collect in the base material. The incorporation of subdrains is recommended in conjunction with crowning of the final subgrade to promote drainage towards the pavement edge. Subdrains should be installed at least 300 mm below the subgrade level. Refer to OPSD 216 Series for details regarding pipe, filter fabric or filter sock, bedding and cover material. Maintenance hole/catchbasins should be backfilled with free draining material with frost tapers and stub drains extending out from structures. The above measures will help drain the pavement structure as well as alleviate the problems of differential frost movement between the catchbasins and pavement.

Infiltration Parameters

Guelph Permeameter Testing

Guelph Permeameter (GP) tests were completed in Test Pits 1 to 5 at the locations shown on Drawing 1-1, appended. Tests were completed at depths of about 1.0 m and 2.5 m in each test pit to determine the field saturated hydraulic conductivity. For each GP test, the water level drop in the GP chamber was visually monitored and recorded until a steady infiltration rate was reached.

The field saturated hydraulic conductivity, K_{fs}, was determined utilizing the Zhang et al. (1998) Single Head Method:

$$K_{fs} = \frac{C_1 x Q_1}{2\pi {H_1}^2 + \pi a^2 C_1 + 2\pi \left(\frac{H_1}{a^*}\right)}$$

Where:

C = shape factor
Q = the steady-state rate of fall of water in reservoir (cm/s)
H = hydraulic head (cm)
α = borehole radius (cm)

Utilizing the method in the Toronto Region Conservation Authority (TRCA) LID Storm Water Management Planning and Design Guide, the K_{fs} value was utilized to established/determine infiltration rates based on the following equation. Factored infiltration rates were also determined.

$$Infiltrate\,Rate = \sqrt[3.7363]{\frac{K_{fs}}{6\,x\,10^{-11}}}$$

The results of the GP testing are summarized below:

TEST PIT	TEST DEPTH (m)	MATERIAL TYPE	K_{fs} (cm/sec)	INFILTRATION RATE (mm/hr)	FACTORED INFILTRATION RATE (mm/hr)
1	GP Test 1 - 0.9 GP Test 2 - 2.4	Silt and Sand Silt and Sand	8.1×10^{-4} 1.3×10^{-3}	81 96	27
2	GP Test 1 - 0.8 GP Test 2 - 2.3	Silt Silt	7.9×10^{-4} 6.9×10^{-4}	81 78	31
3	GP Test 1 - 0.9 GP Test 2 - 2.4	Silty Sand Silty Sand	1.1×10^{-3} 7.9×10^{-4}	86 81	32
4	GP Test 1 - 0.9 GP Test 2 - 2.2	Sand Sand	6.0×10^{-4} 6.0×10^{-4}	75 75	30
5	GP Test 1 - 1.0 GP Test 2 - 2.3	Silty Sand Silty Sand	6.9×10^{-4} 4.3×10^{-4}	78 69	28

Particle Size Distribution

Four soil samples from the test pits were submitted for grain size analysis and Hydraulic Conductivity (K) was estimated based on the particle size distribution. The results of the laboratory testing are included in Figures 1-1 to 1-4 and an estimation of Hydraulic Conductivity is summarized in the table below.

SAMPLE	DEPTH (m)	SOIL TYPE	ESTIMATED K (cm/sec)
TP1 GP Test 1	0.9	Silt and Sand, Trace Gravel, Trace Clay	10^{-4}
TP2 GP Test 2	2.3	Silt, Some Sand, Trace Clay, Trace Gravel	10^{-4}
TP4 GP Test 2	2.2	Sand, Some Silt, Trace Gravel	10^{-3} to 10^{-4}
TP5 GP Test 1	2.3	Silty Sand, Trace Clay, Trace Gravel	10^{-3} to 10^{-4}

The Vukovic & Soro method was used to assess K.

The K value derived from the particle size distribution curve does not take into consideration site specific details such as compaction, soil structure, organic content and/or the degree of saturation.

Geotechnical Review and Construction Inspection and Testing

It is recommended that the final design drawings be submitted to PML for geotechnical review for compatibility with site conditions and recommendations of this report.

Earthworks operations should be carried out under the supervision of PML to approve subgrade preparation, backfill materials, placement and compaction procedures and check the specified degree of compaction is achieved throughout.

Prior to placement of structural concrete, all founding surfaces must be inspected by PML to verify the design bearing capacity is available, or to reassess the design parameters based on the actual conditions.

The comments and recommendations provided in the report are based on information revealed in the boreholes and test pits. Conditions away from and between boreholes/test pits may vary, particularly where foundation and/or service trenches exist. Geotechnical review during construction should be ongoing to confirm the subsurface conditions are substantially similar to those encountered in the boreholes/test pits, which may otherwise require modification to the original recommendations.

CLOSURE

We trust this report is complete within our terms of reference, and the information presented is sufficient for your present purposes. If you have any questions, or when we may be of further assistance, please do not hesitate to call our office.

Sincerely

Peto MacCallum Ltd.

LICENSED PROFESSIONAL ENGINEER
R. R. BLAIR
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2018-11-20
PROVINCE OF ONTARIO

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Nov. 20/2018
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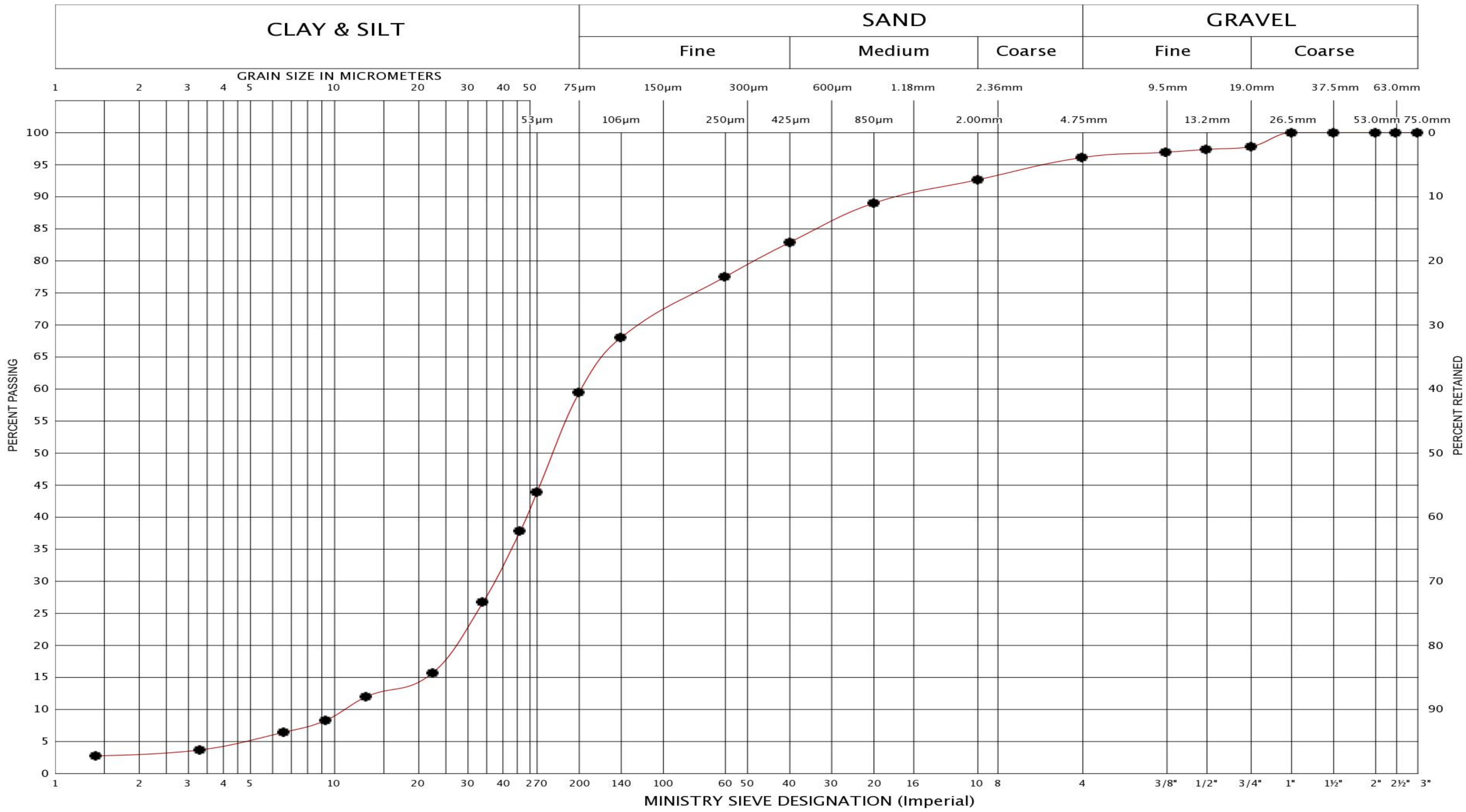
Associate
Manager, Geotechnical and Geoenvironmental Services

RB/GRW:jlb

Enclosures:
Figures 1-1 to 1-4 – Grain Size Distribution
List of Abbreviations
Log of Borehole Nos. 1 to 13
Log of Test Pits Nos. 1 to 5
Drawing 1-1 - Borehole and Test Pit Location Plan
Appendix A – Engineered Fill

UNIFIED SOIL CLASSIFICATION SYSTEM



LEGEND	BH	
	SAMPLE	TP1 GS1
	SYMBOL	⬢

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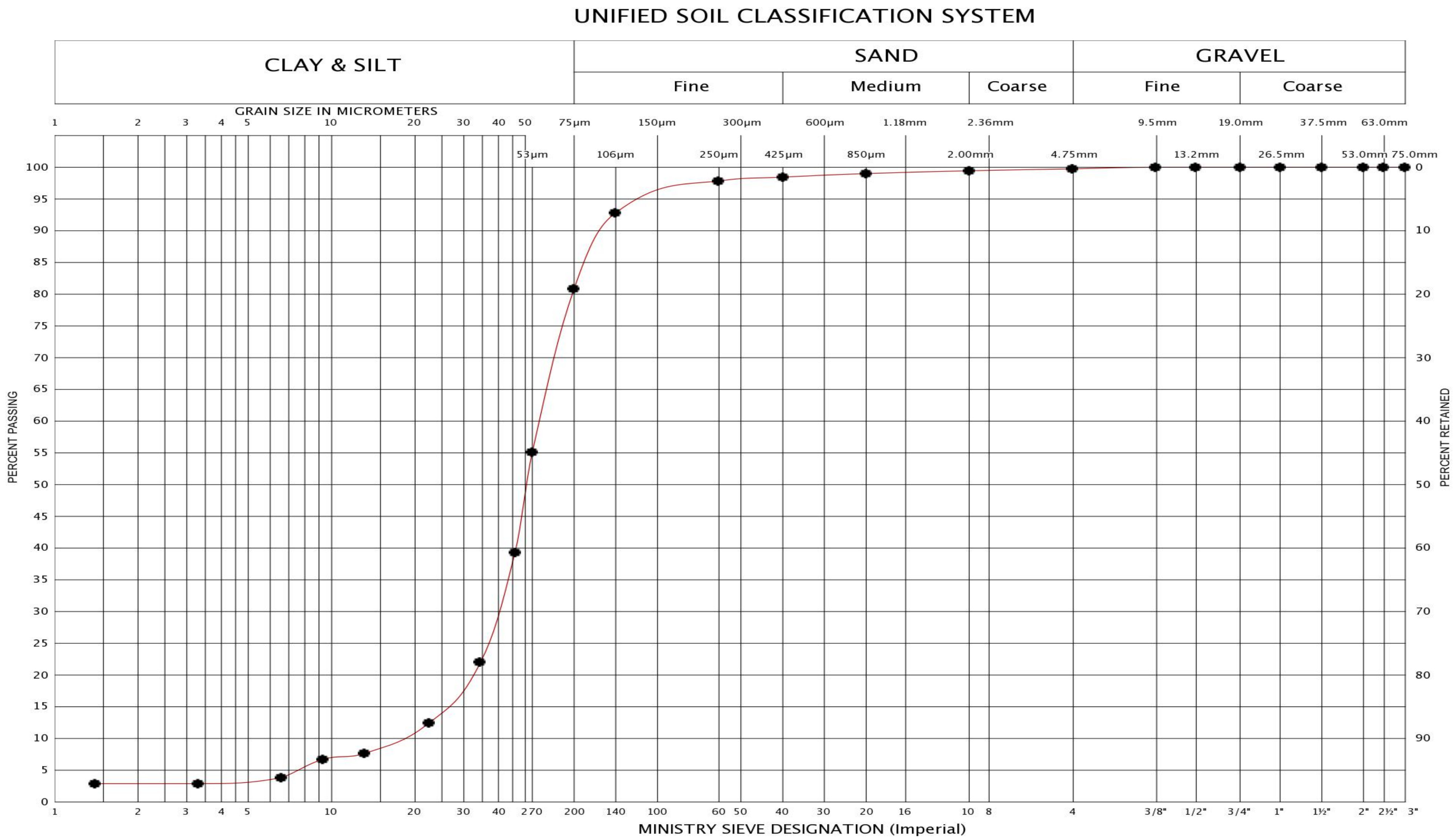
GRAIN SIZE DISTRIBUTION

Silt and Sand, Trace Gravel, Trace Clay

FIG No.: 1-1

Project No.: 18BF056



LEGEND	BH	
	SAMPLE	TP2 GS2
	SYMBOL	●

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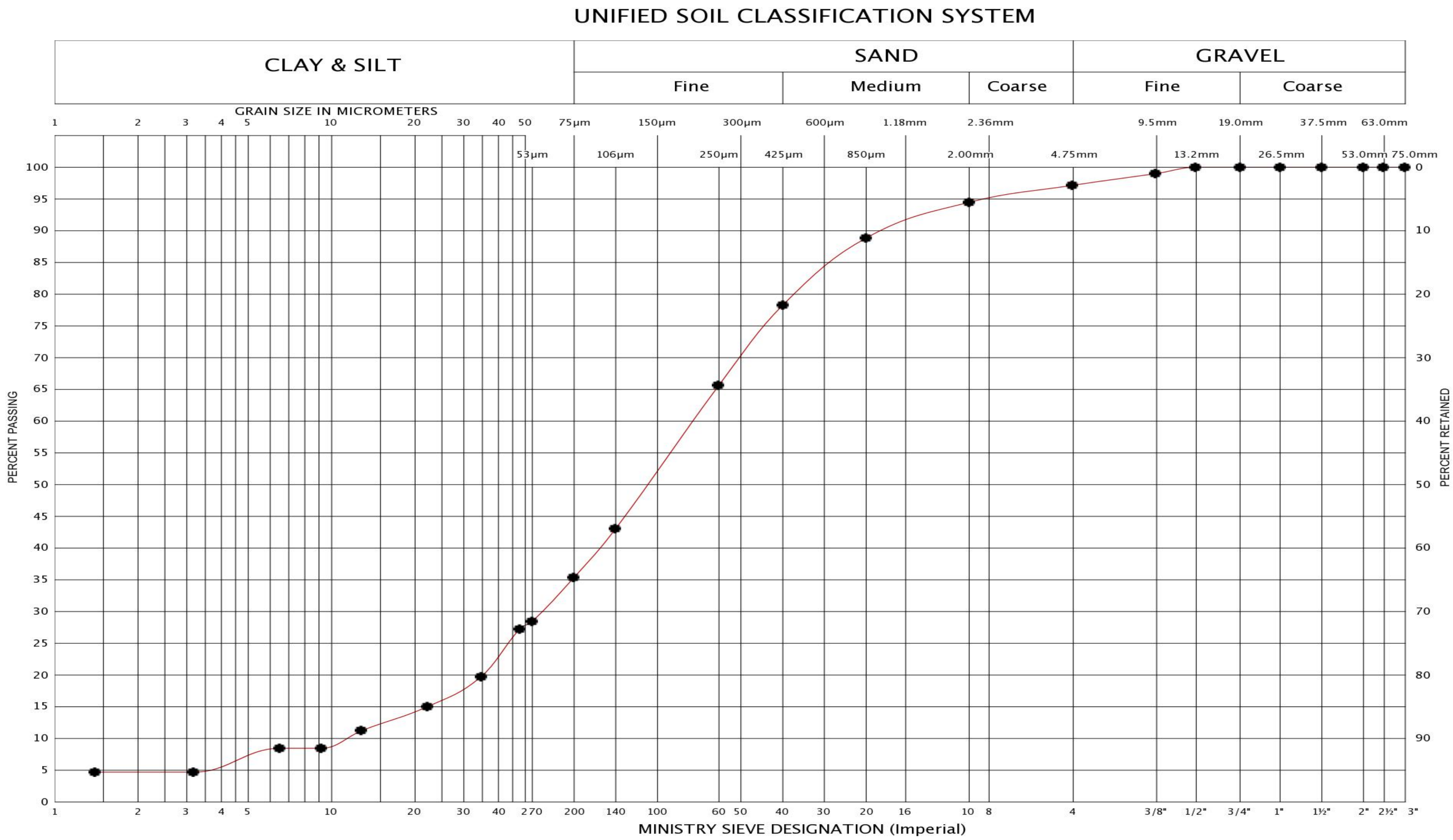
GRAIN SIZE DISTRIBUTION

Silt, Some Sand, Trace Clay, Trace Gravel

FIG No.: 1-2

Project No.: 18BF056



LEGEND	BH	
	SAMPLE	TP5 GS2
	SYMBOL	⬣

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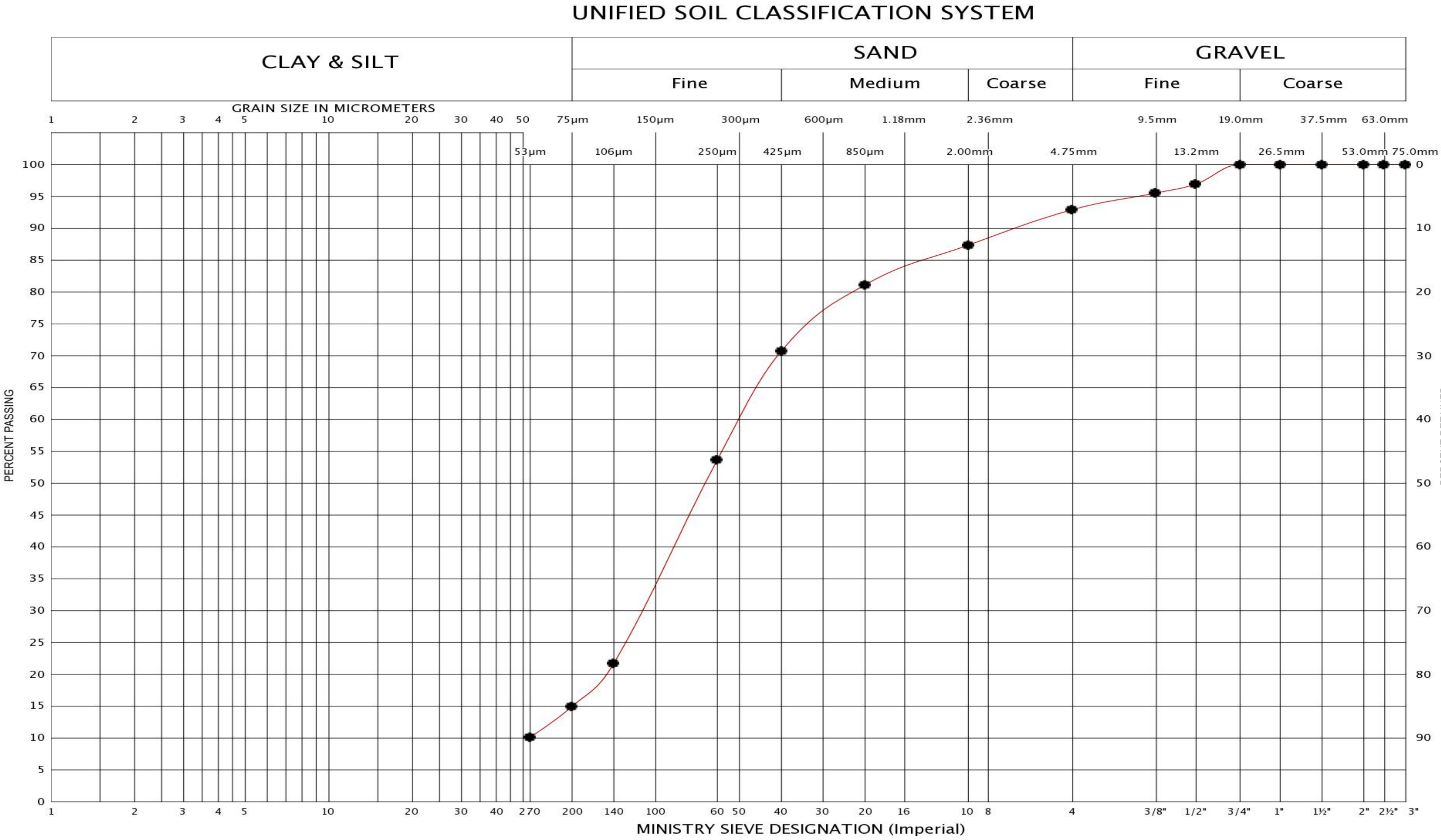
GRAIN SIZE DISTRIBUTION

Silty Sand, Trace Clay, Trace Gravel

FIG No.: 1-3

Project No.: 18BF056



LEGEND	BH	
	SAMPLE	TP4 GS2
	SYMBOL	●

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GRAIN SIZE DISTRIBUTION

Sand, Some Silt, Trace Gravel

FIG No.: 1-4

Project No.: 18BF056

LIST OF ABBREVIATIONS

PENETRATION RESISTANCE

Standard Penetration Resistance N: - The number of blows required to advance a standard split spoon sampler 0.3 m into the subsoil. Driven by means of a 63.5 kg hammer falling freely a distance of 0.76 m.

Dynamic Penetration Resistance: - The number of blows required to advance a 51 mm, 60 degree cone, fitted to the end of drill rods, 0.3 m into the subsoil. The driving energy being 475 J per blow.

DESCRIPTION OF SOIL

The consistency of cohesive soils and the relative density or denseness of cohesionless soils are described in the following terms:

CONSISTENCY	N (blows/0.3 m)	c (kPa)	DENSENESS	N (blows/0.3 m)
Very Soft	0 - 2	0 - 12	Very Loose	0 - 4
Soft	2 - 4	12 - 25	Loose	4 - 10
Firm	4 - 8	25 - 50	Compact	10 - 30
Stiff	8 - 15	50 - 100	Dense	30 - 50
Very Stiff	15 - 30	100 - 200	Very Dense	> 50
Hard	> 30	> 200		

WTLL	Wetter Than Liquid Limit
WTPL	Wetter Than Plastic Limit
APL	About Plastic Limit
DTPL	Drier Than Plastic Limit

TYPE OF SAMPLE

SS	Split Spoon	ST	Slotted Tube Sample
WS	Washed Sample	TW	Thinwall Open
SB	Scraper Bucket Sample	TP	Thinwall Piston
AS	Auger Sample	OS	Oesterberg Sample
CS	Chunk Sample	FS	Foil Sample
GS	Grab Sample	RC	Rock Core

PH	Sample Advanced Hydraulically
PM	Sample Advanced Manually

SOIL TESTS

Qu	Unconfined Compression	LV	Laboratory Vane
Q	Undrained Triaxial	FV	Field Vane
Qcu	Consolidated Undrained Triaxial	C	Consolidation
Qd	Drained Triaxial		

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LOG OF BOREHOLE/MONITORING WELL NO. 1

17T 586074E 4953934N

PROJECT Proposed Commercial Site - Sundowner Road
PML REF. 18BF056
LOCATION 710 Balm Beach Road East, Midland, Ontario
BORING DATE October 17, 2018
ENGINEER GW
BORING METHOD Continuous Flight Solid Stem Augers
TECHNICIAN AT

DEPTH / ELEV (metres)	DESCRIPTION (SOIL PROFILE)	SAMPLE NUMBER	TYPE	"N" VALUES	GROUND WATER OBSERVATIONS AND REMARKS
	SURFACE ELEVATION 249.55				
0.12 / 249.43	TOPSOIL: Brown, sand, trace silt, trace gravel, moist	1	SS	3	Stick-up casing
	SILT AND SAND: Very loose to compact, brown, silt and sand, trace gravel, trace clay, very moist to moist	2	SS	11	
		3	SS	10	Bentonite seal
		4	SS	5	
2.9 / 246.7	SANDY SILT: Compact to dense, brown, sandy silt, very moist to moist	5	SS	20	50 mm slotted pipe; Filter sand
		6	SS	39	
5.0 / 244.6	BOREHOLE TERMINATED AT 5.0 m				Upon completion of augering; No water; No cave

Water Level Readings:

Date	Depth	Elev.
2018-01-11	Dry	

SHEAR STRENGTH (kPa): + FIELD VANE, △ TORVANE, ○ Qu, ▲ POCKET PENETROMETER, ○ Q (50, 100, 150, 200)
DYNAMIC CONE PENETRATION ×; STANDARD PENETRATION TEST ● (20, 40, 60, 80)
PLASTIC LIMIT w_P, NATURAL MOISTURE CONTENT w, LIQUID LIMIT w_L; WATER CONTENT (%) (10, 20, 30, 40)
UNIT WEIGHT kN/m³
GRAIN SIZE DISTRIBUTION (%) GR SA SI&CL

NOTES

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LOG OF BOREHOLE NO. 2

17T 586045E 4953899N

PROJECT Proposed Commercial Site - Sundowner Road
LOCATION 710 Balm Beach Road East, Midland, Ontario
BORING METHOD Continuous Flight Solid Stem Augers
BORING DATE October 17, 2018
PML REF. 18BF056
ENGINEER GW
TECHNICIAN AT

SURFACE ELEVATION 250.65

DEPTH / ELEV (metres)	DESCRIPTION	SAMPLE NUMBER	TYPE	"N" VALUES	GROUND WATER OBSERVATIONS AND REMARKS
0.11 / 250.54	TOPSOIL: Brown, silty sand, trace gravel, moist	1	SS	3	
	SANDY SILT: Very loose to compact. brown, sandy silt, trace gravel, moist	2	SS	14	
		3	SS	8	
		4	SS	6	
	Wet seam	5	SS	20	First water strike at 3.0 m
4.0 / 246.7	Becoming dense, grey	6	SS	49	
5.0 / 245.7	BOREHOLE TERMINATED AT 5.0 m				Upon completion of augering: No water No cave

SHEAR STRENGTH (kPa): + FIELD VANE △ TORVANE ○ Qu ▲ POCKET PENETROMETER ○ Q (50, 100, 150, 200)
DYNAMIC CONE PENETRATION × STANDARD PENETRATION TEST ● (20, 40, 60, 80)
PLASTIC LIMIT W_P — NATURAL MOISTURE CONTENT W — LIQUID LIMIT W_L; WATER CONTENT (%) (10, 20, 30, 40)
UNIT WEIGHT kN/m³
GRAIN SIZE DISTRIBUTION (%) GR SA SI&CL

NOTES

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LOG OF BOREHOLE NO. 3

17T 586083E 4953883N

PROJECT Proposed Commercial Site - Sundowner Road
PML REF. 18BF056
LOCATION 710 Balm Beach Road East, Midland, Ontario
BORING DATE October 17, 2018
ENGINEER GW
BORING METHOD Continuous Flight Solid Stem Augers
TECHNICIAN AT

DEPTH / ELEV (metres)	SOIL PROFILE DESCRIPTION	SAMPLE NUMBER	TYPE	"N" VALUES	ELEVATION SCALE	WATER CONTENT (%)	GROUND WATER OBSERVATIONS AND REMARKS
	SURFACE ELEVATION 250.35						
0.11 / 250.24	TOPSOIL: Black, silty sand, trace gravel, moist	1	SS	5	250		
	SILT: Loose to compact, brown, silt, some sand, trace clay, trace gravel, moist to very moist	2	SS	10	249		
		3	SS	9	248		
		4	SS	6	247		
		5	SS	11			
4.0 / 246.4	Becoming dense, grey, wet	6	SS	33	246		First water strike at 4.6 m
5.0 / 245.4	BOREHOLE TERMINATED AT 5.0 m						Upon completion of augering: No water No cave

Column headings: SHEAR STRENGTH (kPa) — + FIELD VANE, △ TORVANE, ○ Qu, ▲ POCKET PENETROMETER, O Q (50, 100, 150, 200); DYNAMIC CONE PENETRATION ×; STANDARD PENETRATION TEST ● (20, 40, 60, 80); PLASTIC LIMIT W_P, NATURAL MOISTURE CONTENT W, LIQUID LIMIT W_L; WATER CONTENT (%) (10, 20, 30, 40); UNIT WEIGHT kN/m³; STRAT PLOT; GRAIN SIZE DISTRIBUTION (%) GR SA SI&CL

Depth scale (m): 0.0, 1.0, 2.0, 3.0, 4.0, 5.0, 6.0, 7.0, 8.0, 9.0, 10.0, 11.0, 12.0, 13.0, 14.0, 15.0

NOTES

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LOG OF BOREHOLE NO. 4

17T 586114E 4953909N

PROJECT Proposed Commercial Site - Sundowner Road
LOCATION 710 Balm Beach Road East, Midland, Ontario
BORING METHOD Continuous Flight Solid Stem Augers
BORING DATE October 17, 2018
PML REF. 18BF056
ENGINEER GW
TECHNICIAN AT

DEPTH / ELEV (metres)	DESCRIPTION	SAMPLE NUMBER	TYPE	"N" VALUES	ELEVATION SCALE	NATURAL MOISTURE CONTENT	UNIT WEIGHT kN/m³	GROUND WATER OBSERVATIONS AND REMARKS
	SURFACE ELEVATION 249.35							
0.11 / 249.24	TOPSOIL: Black, silty sand, trace gravel, moist	1	SS	2	249	~22%		
	SANDY SILT: Very loose, brown, silty sand, trace gravel, very moist to moist	2	SS	3	248	~19%		
		3	SS	4		~14%		
2.1 / 247.3	Becoming compact to dense, grey	4	SS	28	247	~8%		
		5	SS	32	246	~9%		
4.0 / 245.4	Becoming very moist	6	SS	29	245	~22%		
5.0 / 244.4	BOREHOLE TERMINATED AT 5.0 m							Upon completion of augering: No water No cave

Legend: SHEAR STRENGTH (kPa): + FIELD VANE, △ TORVANE, ○ Qu, ▲ POCKET PENETROMETER, ○ Q (50, 100, 150, 200); DYNAMIC CONE PENETRATION ×, STANDARD PENETRATION TEST ● (20, 40, 60, 80); PLASTIC LIMIT W_P, NATURAL MOISTURE CONTENT W, LIQUID LIMIT W_L; WATER CONTENT (%) (10, 20, 30, 40); GRAIN SIZE DISTRIBUTION (%) GR SA SI&CL

Depth scale: 0.0 – 15.0 m

NOTES

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CONSULTING ENGINEERS

LOG OF BOREHOLE NO. 5

17T 586048E 4953825N

PROJECT Proposed Commercial Site - Sundowner Road
LOCATION 710 Balm Beach Road East, Midland, Ontario
BORING METHOD Continuous Flight Solid Stem Augers
BORING DATE October 17, 2018
PML REF. 18BF056
ENGINEER GW
TECHNICIAN AT

SURFACE ELEVATION 253.30

DEPTH / ELEV (metres)	DESCRIPTION	SAMPLE NUMBER	TYPE	"N" VALUES	ELEVATION SCALE	GROUND WATER OBSERVATIONS AND REMARKS
0.14 / 253.16	TOPSOIL: Black, sandy silt, trace gravel, moist					
	SANDY SILT: Loose, brown, sandy silt, trace gravel, trace organics, moist	1	SS	5	253	
		2	SS	6		
1.4 / 251.9	SANDY SILT TILL: Compact to very dense, brown, sandy silt, trace gravel, trace clay, cobbles and boulders, very moist to moist	3	SS	12	252	
		4	SS	34	251	
		5	SS	65	250	
4.0 / 249.3	SAND: Very dense, brown, sand, some silt, trace gravel, moist				249	
		6	SS	78		
5.0 / 248.3	BOREHOLE TERMINATED AT 5.0 m					Upon completion of augering: No water No cave

Chart columns: SHEAR STRENGTH (kPa) — + FIELD VANE △ TORVANE ○ Qu ▲ POCKET PENETROMETER ○ Q (50, 100, 150, 200); DYNAMIC CONE PENETRATION × STANDARD PENETRATION TEST ● (20, 40, 60, 80); PLASTIC LIMIT W_P, NATURAL MOISTURE CONTENT W, LIQUID LIMIT W_L; WATER CONTENT (%) (10, 20, 30, 40); UNIT WEIGHT kN/m³; GRAIN SIZE DISTRIBUTION (%) GR SA SI&CL

NOTES

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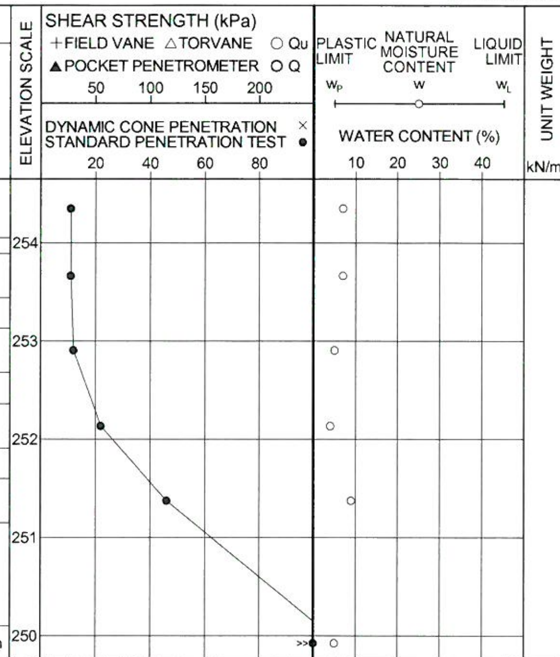
CONSULTING ENGINEERS

LOG OF BOREHOLE/MONITORING WELL NO. 6

17T 586069E 4953803N

PROJECT Proposed Commercial Site - Sundowner Road
LOCATION 710 Balm Beach Road East, Midland, Ontario
BORING METHOD Continuous Flight Solid Stem Augers
BORING DATE October 17, 2018
PML REF. 18BF056
ENGINEER GW
TECHNICIAN AT

DEPTH / ELEV (metres)	DESCRIPTION	SAMPLE NUMBER	TYPE	"N" VALUES	GROUND WATER OBSERVATIONS AND REMARKS
	SURFACE ELEVATION 254.65				
0.05 / 254.60	TOPSOIL: Black, silty sand, trace gravel, moist	1	SS	11	Stick-up casing
	SILTY SAND: Compact to dense, brown, silty sand, trace gravel, moist	2	SS	11	Bentonite seal
		3	SS	12	
		4	SS	22	
		5	SS	46	50 mm slotted pipe Filter sand
4.0 / 250.7	SANDY SILT TILL: Very dense, brown, sandy silt, trace gravel, trace clay, cobbles and boulders, moist	6	SS	82/270 mm	
4.9 / 249.8	BOREHOLE TERMINATED AT 4.9 m				Upon completion of augering No water No cave Water Level Readings: Date / Depth / Elev. 2018-01-11 / Dry



Depth scale (m): 0.0 – 15.0

NOTES

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CONSULTING ENGINEERS

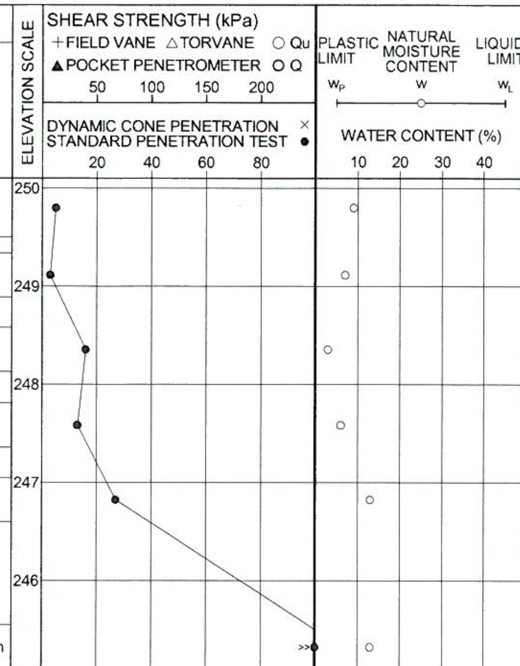
LOG OF BOREHOLE NO. 7

17T 589138E 4953879N

PROJECT Proposed Commercial Site - Sundowner Road
PML REF. 18BF056
LOCATION 710 Balm Beach Road East, Midland, Ontario
BORING DATE October 16, 2018
ENGINEER GW
BORING METHOD Continuous Flight Solid Stem Augers
TECHNICIAN AT

SURFACE ELEVATION 250.10

DEPTH / ELEV (metres)	DESCRIPTION	SAMPLE NUMBER	TYPE	"N" VALUES	WATER CONTENT (%)	GROUND WATER OBSERVATIONS AND REMARKS
0.18 / 249.92	TOPSOIL: Black to brown, sandy silt, trace gravel, moist					
	SANDY SILT: Very loose to compact, brown, sandy silt, trace gravel, moist to very moist	1	SS	5		
		2	SS	3		
		3	SS	16		
		4	SS	13		
		5	SS	27		
4.0 / 246.1	Becoming very dense					
		6	SS	90/290 mm		
5.0 / 245.1	BOREHOLE TERMINATED AT 5.0 m					Upon completion of augering: No water No cave



Depth scale: 0.0 – 15.0 m

UNIT WEIGHT kN/m³

GRAIN SIZE DISTRIBUTION (%) GR SA SI&CL

NOTES

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CONSULTING ENGINEERS

LOG OF BOREHOLE NO. 8

17T 586121E 4953842N

PROJECT Proposed Commercial Site - Sundowner Road
LOCATION 710 Balm Beach Road East, Midland, Ontario
BORING METHOD Continuous Flight Solid Stem Augers
BORING DATE October 16, 2018
PML REF. 18BF056
ENGINEER GW
TECHNICIAN AT

DEPTH / ELEV (metres)	DESCRIPTION	SAMPLE NUMBER	TYPE	"N" VALUES	ELEVATION SCALE	NATURAL MOISTURE CONTENT (approx. %)	GROUND WATER OBSERVATIONS AND REMARKS
0.0 / 252.00	SURFACE ELEVATION 252.00						
0.12 / 251.88	TOPSOIL: Black, sandy silt, trace gravel, moist	1	SS	3		○	
	SILTY SAND: Very loose to compact, brown, silty sand, trace to some gravel, moist	2	SS	14	251	○	
		3	SS	3	250	○	
		4	SS	8		○	
2.9 / 249.1	Becoming very dense	5	SS	82/295 mm	249	○	
					248		
4.7 / 247.3		6	SS	50/140 mm		○	
	BOREHOLE TERMINATED AT 4.7 m						Upon completion of augering: No water No cave

Legend: SHEAR STRENGTH (kPa): + FIELD VANE, △ TORVANE, ○ Qu, ▲ POCKET PENETROMETER, ○ Q (scale 50, 100, 150, 200); DYNAMIC CONE PENETRATION ×; STANDARD PENETRATION TEST ● (scale 20, 40, 60, 80); PLASTIC LIMIT W_P, NATURAL MOISTURE CONTENT W, LIQUID LIMIT W_L; WATER CONTENT (%) (scale 10, 20, 30, 40); UNIT WEIGHT kN/m³; GRAIN SIZE DISTRIBUTION (%) GR SA SI&CL

Depth scale (m): 0.0, 1.0, 2.0, 3.0, 4.0, 5.0, 6.0, 7.0, 8.0, 9.0, 10.0, 11.0, 12.0, 13.0, 14.0, 15.0

NOTES

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE/MONITORING WELL NO. 9

17T 586149E 4953804N

PROJECT Proposed Commercial Site - Sundowner Road
PML REF. 18BF056
LOCATION 710 Balm Beach Road East, Midland, Ontario
BORING DATE October 16, 2018
ENGINEER GW
BORING METHOD Continuous Flight Solid Stem Augers
TECHNICIAN AT

SURFACE ELEVATION 254.15

DEPTH / ELEV (metres)	DESCRIPTION	SAMPLE NUMBER	TYPE	"N" VALUES	WATER CONTENT	GROUND WATER OBSERVATIONS AND REMARKS
0.11 / 254.04	TOPSOIL: Brown to black, sandy silt, trace gravel, moist	1	SS	4	○	Stick-up casing
	SAND: Loose to compact, brown, sand, some silt, trace gravel, moist	2	SS	8	○	
		3	SS	21	○	Bentonite seal
2.1 / 252.1	Becoming dense to very dense	4	SS	35	○	
		5	SS	77	○	
						50 mm slotted pipe Filter sand
		6	SS	92	○	
5.0 / 249.2	BOREHOLE TERMINATED AT 5.0 m					Upon completion of augering No water No cave Water Level Readings: Date / Depth / Elev. 2018-01-11 / Dry

Column headings: SOIL PROFILE; STRAT PLOT; SAMPLES; ELEVATION SCALE; SHEAR STRENGTH (kPa) — +FIELD VANE △TORVANE ○ Qu ▲POCKET PENETROMETER ○ Q (50, 100, 150, 200); DYNAMIC CONE PENETRATION ×, STANDARD PENETRATION TEST ● (20, 40, 60, 80); PLASTIC LIMIT W_P, NATURAL MOISTURE CONTENT W, LIQUID LIMIT W_L; WATER CONTENT (%) (10, 20, 30, 40); UNIT WEIGHT kN/m³; GRAIN SIZE DISTRIBUTION (%) GR SA SI&CL

NOTES

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CONSULTING ENGINEERS

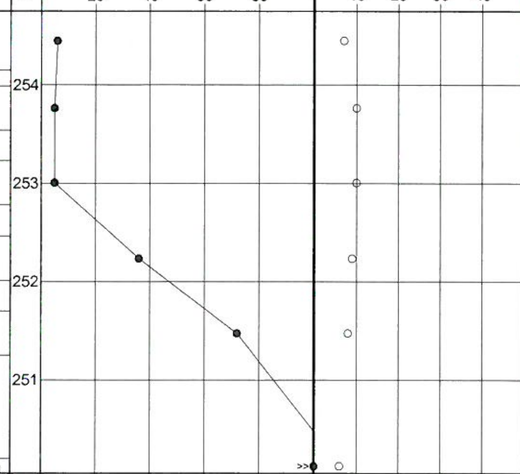
LOG OF BOREHOLE NO. 10

17T 586137E 4953752N

PROJECT Proposed Commercial Site - Sundowner Road
LOCATION 710 Balm Beach Road East, Midland, Ontario
BORING METHOD Continuous Flight Solid Stem Augers
BORING DATE October 16, 2018
PML REF. 18BF056
ENGINEER GW
TECHNICIAN AT

DEPTH / ELEV (metres)	SOIL PROFILE – DESCRIPTION	STRAT PLOT	SAMPLE NUMBER	TYPE	"N" VALUES	GROUND WATER OBSERVATIONS AND REMARKS
	SURFACE ELEVATION 254.75					
0.14 / 254.61	TOPSOIL: Black, sandy silt, trace gravel, moist		1	SS	6	
	SILTY SAND: Loose, brown, silty sand, trace gravel, moist		2	SS	5	
			3	SS	5	
2.1 / 252.7	Becoming dense to very dense		4	SS	36	
			5	SS	72	
			6	SS	50/100mm	
4.7 / 250.1	BOREHOLE TERMINATED AT 4.7 m					Upon completion of augering: No water No cave

SHEAR STRENGTH (kPa): + FIELD VANE △ TORVANE ○ Qu ▲ POCKET PENETROMETER ○ Q (50, 100, 150, 200)
DYNAMIC CONE PENETRATION × STANDARD PENETRATION TEST ● (20, 40, 60, 80)
PLASTIC LIMIT W_P — NATURAL MOISTURE CONTENT W — LIQUID LIMIT W_L
WATER CONTENT (%) (10, 20, 30, 40)
UNIT WEIGHT kN/m³
GRAIN SIZE DISTRIBUTION (%) GR SA SI&CL



Depth scale: 0.0 – 15.0 m

NOTES

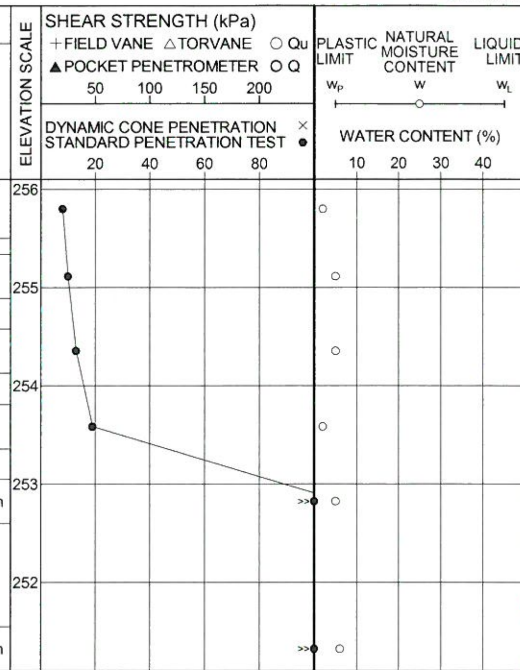
LOG OF BOREHOLE NO. 11

17T 586058E 4953732N

PROJECT Proposed Commercial Site - Sundowner Road
PML REF. 18BF056
LOCATION 710 Balm Beach Road East, Midland, Ontario
BORING DATE October 16, 2018
ENGINEER GW
BORING METHOD Continuous Flight Solid Stem Augers
TECHNICIAN AT

SURFACE ELEVATION 256.10

DEPTH / ELEV (metres)	DESCRIPTION	SAMPLE NUMBER	TYPE	"N" VALUES	GROUND WATER OBSERVATIONS AND REMARKS
0.0	FILL: Black to brown, silty sand, trace gravel, trace organics, moist	1	SS	8	
		2	SS	10	
		3	SS	13	
2.5 / 253.6	SAND: Compact to very dense, brown, sand, some silt, trace gravel, moist	4	SS	19	
		5	SS	68/270 mm	
		6	SS	50/290 mm	
5.0 / 251.1	BOREHOLE TERMINATED AT 5.0 m				Upon completion of augering: No water No cave



NOTES

Peto MacCallum Ltd.
CONSULTING ENGINEERS

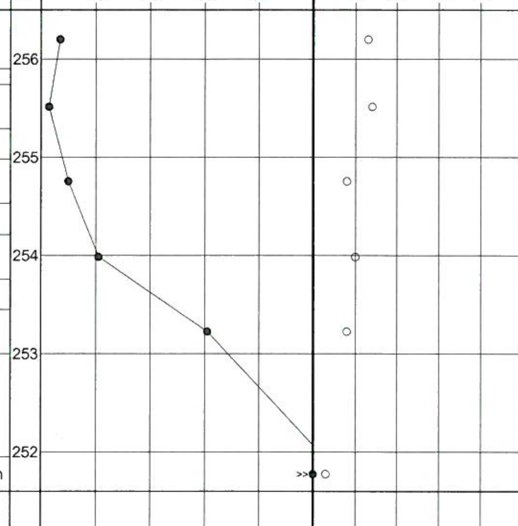
LOG OF BOREHOLE NO. 12

17T 586072E 4953701N

PROJECT Proposed Commercial Site - Sundowner Road
LOCATION 710 Balm Beach Road East, Midland, Ontario
BORING METHOD Continuous Flight Solid Stem Augers
BORING DATE October 16, 2018
PML REF. 18BF056
ENGINEER GW
TECHNICIAN AT

DEPTH / ELEV (metres)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES	GROUND WATER OBSERVATIONS AND REMARKS
	SURFACE ELEVATION 256.50					
	FILL: Brown to dark brown, silty sand, trace gravel, moist		1	SS	7	
			2	SS	3	
			3	SS	10	
2.1 / 254.4	SAND: Compact to very dense, brown, sand, some silt, trace gravel, moist		4	SS	21	
			5	SS	61	
			6	SS	70/290 mm	
4.9 / 251.6	BOREHOLE TERMINATED AT 4.9 m					Upon completion of augering: No water No cave

SHEAR STRENGTH (kPa): + FIELD VANE △ TORVANE ○ Qu ▲ POCKET PENETROMETER ○ Q (50, 100, 150, 200)
DYNAMIC CONE PENETRATION × ; STANDARD PENETRATION TEST ● (20, 40, 60, 80)
PLASTIC LIMIT w_P, NATURAL MOISTURE CONTENT w, LIQUID LIMIT w_L; WATER CONTENT (%) (10, 20, 30, 40)
UNIT WEIGHT kN/m³
GRAIN SIZE DISTRIBUTION (%) GR SA SI&CL



NOTES

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE/MONITORING WELL NO. 13

17T 586087E 4953671N

PROJECT Proposed Commercial Site - Sundowner Road
LOCATION 710 Balm Beach Road East, Midland, Ontario
BORING METHOD Continuous Flight Solid Stem Augers
BORING DATE October 16, 2018
PML REF. 18BF056
ENGINEER GW
TECHNICIAN AT

SURFACE ELEVATION 255.80

DEPTH / ELEV (metres)	DESCRIPTION	SAMPLE NUMBER	TYPE	"N" VALUES	WATER CONTENT (%)	GROUND WATER OBSERVATIONS AND REMARKS
0.12 / 255.68	TOPSOIL: Black, sandy silt, trace gravel, moist	1	SS	3		Stick-up casing
	FILL: Brown, silty sand, trace gravel, moist	2	SS	4		Bentonite seal
1.4 / 254.4	SILTY SAND: Dense to very dense, brown, silty sand, trace clay, trace gravel, moist	3	SS	44		
		4	SS	85/295 mm		
		5	SS	85		50 mm slotted pipe Filter sand
		6	SS	73/290 mm		
4.9 / 250.9	BOREHOLE TERMINATED AT 4.9 m					Upon completion of augering No water Cave at 4.3 m Water Level Readings: Date / Depth / Elev. 2018-01-11 / Dry

Depth scale (m): 0.0 – 15.0. Elevation scale: 255, 254, 253, 252, 251.

Column headings: SOIL PROFILE; STRAT PLOT; SAMPLES; ELEVATION SCALE; SHEAR STRENGTH (kPa) — + FIELD VANE △ TORVANE ○ Qu ▲ POCKET PENETROMETER ○ Q — 50 100 150 200; DYNAMIC CONE PENETRATION × STANDARD PENETRATION TEST ● — 20 40 60 80; PLASTIC LIMIT W_P, NATURAL MOISTURE CONTENT W, LIQUID LIMIT W_L; WATER CONTENT (%) 10 20 30 40; UNIT WEIGHT kN/m³; GRAIN SIZE DISTRIBUTION (%) GR SA SI&CL

NOTES

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF TEST PIT NO. 1

17T 586100E 4953949N

PROJECT Proposed Commercial Site - Sundowner Road
LOCATION 710 Balm Beach Road East, Midland, Ontario
EXCAVATION METHOD Excavator
BORING DATE October 16, 2018
PML REF. 18BF056
ENGINEER GW
TECHNICIAN AK/RB

SURFACE ELEVATION 248.95

DEPTH / ELEV (metres)	DESCRIPTION	SAMPLE NUMBER	TYPE	"N" VALUES	ELEVATION SCALE	GROUND WATER OBSERVATIONS AND REMARKS
0.12 / 248.83	TOPSOIL: Brown, sand, trace silt, trace gravel, moist					
	SILT AND SAND: Loose to compact, brown, silt and sand, trace gravel, trace clay, cobbles and boulders, moist	1	GS	-	248	GP1 Test One
					247	
2.6		2	GS	-		GP1 Test Two
246.4	TEST PIT TERMINATED AT 2.6 m					Upon completion of excavating No water No cave

Depth scale (m): 0.0, 1.0, 2.0, 3.0, 4.0, 5.0, 6.0, 7.0, 8.0, 9.0, 10.0

SHEAR STRENGTH (kPa): + FIELD VANE △ TORVANE ○ Qu ▲ POCKET PENETROMETER ○ Q — 50, 100, 150, 200
DYNAMIC CONE PENETRATION × STANDARD PENETRATION TEST ● — 20, 40, 60, 80
PLASTIC LIMIT W_P — NATURAL MOISTURE CONTENT W — LIQUID LIMIT W_L
WATER CONTENT (%) — 10, 20, 30, 40
UNIT WEIGHT kN/m^3
GRAIN SIZE DISTRIBUTION (%) GR SA SI&CL

NOTES

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF TEST PIT NO. 2

17T 586078E 4953869N

PROJECT Proposed Commercial Site - Sundowner Road
LOCATION 710 Balm Beach Road East, Midland, Ontario
EXCAVATION METHOD Excavator
BORING DATE October 16, 2018
PML REF. 18BF056
ENGINEER GW
TECHNICIAN AK/RB

DEPTH / ELEV (metres)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES	ELEVATION SCALE	SHEAR STRENGTH (kPa) / DYNAMIC CONE PENETRATION / STANDARD PENETRATION TEST	PLASTIC LIMIT / NATURAL MOISTURE CONTENT / LIQUID LIMIT / WATER CONTENT (%)	UNIT WEIGHT kN/m³	GROUND WATER OBSERVATIONS AND REMARKS / GRAIN SIZE DISTRIBUTION (%) GR SA SI&CL
	SURFACE ELEVATION 251.25									
0.0	TOPSOIL: Black, sandy silt, trace gravel, moist					251				
0.35 / 250.90	SILT: Loose to compact, brown, silt, some sand, trace clay, trace gravel, cobbles and boulders, moist		1	GS	-	250				GP2 Test One
			2	GS	-	249				GP2 Test Two
2.5 / 248.8	TEST PIT TERMINATED AT 2.5 m									Upon completion of excavating No water No cave

Shear strength legend: + FIELD VANE △ TORVANE ○ Qu ▲ POCKET PENETROMETER ○ Q; scale 50 100 150 200. Dynamic cone penetration ×, standard penetration test ●; scale 20 40 60 80. Water content scale 10 20 30 40 (w_P, w, w_L).

Depth scale: 0.0, 1.0, 2.0, 3.0, 4.0, 5.0, 6.0, 7.0, 8.0, 9.0, 10.0

NOTES

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF TEST PIT NO. 3

17T 586099E 4953763N

PROJECT Proposed Commercial Site - Sundowner Road
PML REF. 18BF056
LOCATION 710 Balm Beach Road East, Midland, Ontario
BORING DATE October 16, 2018
ENGINEER GW
EXCAVATION METHOD Excavator
TECHNICIAN AK/RB

DEPTH / ELEV (metres)	SOIL PROFILE – DESCRIPTION	STRAT PLOT	SAMPLES – NUMBER	SAMPLES – TYPE	"N" VALUES	ELEVATION SCALE	SHEAR STRENGTH (kPa) / DYNAMIC CONE PENETRATION / STANDARD PENETRATION TEST	PLASTIC LIMIT / NATURAL MOISTURE CONTENT / LIQUID LIMIT – WATER CONTENT (%)	UNIT WEIGHT kN/m³	GROUND WATER OBSERVATIONS AND REMARKS / GRAIN SIZE DISTRIBUTION (%) GR SA SI&CL
	SURFACE ELEVATION 255.00									
0.0	TOPSOIL: Black, sandy silt, trace gravel, moist									
0.30 / 254.70	SILTY SAND: Loose to compact, brown, silty sand, trace gravel, cobbles and boulders, moist									
1.0			1	GS	-	254				GP3 Test One
2.0						253				
			2	GS	-					GP3 Test Two
2.6 / 252.4	TEST PIT TERMINATED AT 2.6 m									Upon completion of excavating No water No cave

Shear strength legend: + FIELD VANE, △ TORVANE, ○ Qu, ▲ POCKET PENETROMETER, ○ Q (scale 50, 100, 150, 200). Dynamic cone penetration ×, Standard penetration test ● (scale 20, 40, 60, 80). Water content scale: 10, 20, 30, 40 (W_P, W, W_L).

Depth scale: 0.0 – 10.0 m

NOTES

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF TEST PIT NO. 4

17T 586154E 4953811N

PROJECT Proposed Commercial Site - Sundowner Road
LOCATION 710 Balm Beach Road East, Midland, Ontario
EXCAVATION METHOD Excavator
BORING DATE October 16, 2018
PML REF. 18BF056
ENGINEER GW
TECHNICIAN AK/RB

SURFACE ELEVATION 254.25

DEPTH / ELEV (metres)	DESCRIPTION	SAMPLE NUMBER	TYPE	"N" VALUES	GROUND WATER OBSERVATIONS AND REMARKS
0.30 / 253.95	TOPSOIL: Brown to black, sandy silt, trace gravel, moist				
	SAND: Loose to compact, brown, sand, some silt, trace gravel, cobbles and boulders, moist	1	GS	-	GP4 Test One
2.4 / 251.9		2	GS	-	GP4 Test Two
	TEST PIT TERMINATED AT 2.4 m				Upon completion of excavating No water No cave

Column headings: SOIL PROFILE; STRAT PLOT; SAMPLES; ELEVATION SCALE (254, 253, 252); SHEAR STRENGTH (kPa) +FIELD VANE △TORVANE ○ Qu ▲POCKET PENETROMETER ○ Q 50 100 150 200; DYNAMIC CONE PENETRATION × STANDARD PENETRATION TEST ● 20 40 60 80; PLASTIC LIMIT w_P, NATURAL MOISTURE CONTENT w, LIQUID LIMIT w_L; WATER CONTENT (%) 10 20 30 40; UNIT WEIGHT kN/m³; GRAIN SIZE DISTRIBUTION (%) GR SA SI&CL

Depth scale: 0.0, 1.0, 2.0, 3.0, 4.0, 5.0, 6.0, 7.0, 8.0, 9.0, 10.0

NOTES

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF TEST PIT NO. 5

17T 586097E 4953679N

PROJECT Proposed Commercial Site - Sundowner Road
PML REF. 18BF056
LOCATION 710 Balm Beach Road East, Midland, Ontario
BORING DATE October 16, 2018
ENGINEER GW
EXCAVATION METHOD Excavator
TECHNICIAN AK/RB

DEPTH / ELEV (metres)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES	ELEVATION SCALE	SHEAR STRENGTH (kPa) / DYNAMIC CONE PENETRATION / STANDARD PENETRATION TEST	WATER CONTENT (%)	UNIT WEIGHT kN/m³	GROUND WATER OBSERVATIONS AND REMARKS / GRAIN SIZE DISTRIBUTION (%) GR SA SI&CL
	SURFACE ELEVATION 255.55									
0.0	TOPSOIL: Black, sandy silt, trace gravel, moist									
0.50 / 255.05	SILTY SAND: Loose to dense, brown, silty sand, trace gravel, trace clay, cobbles and boulders, moist					255				
1.0			1	GS	-					GP5 Test One
						254				
2.5			2	GS	-					GP5 Test Two
253.1	TEST PIT TERMINATED AT 2.5 m									Upon completion of excavating No water No cave

Shear strength legend: + FIELD VANE △ TORVANE ○ Qu ▲ POCKET PENETROMETER ○ Q; scale 50, 100, 150, 200. Dynamic cone penetration ×, Standard penetration test ●; scale 20, 40, 60, 80. Plastic limit W_P, Natural moisture content W, Liquid limit W_L; water content scale 10, 20, 30, 40.

Depth scale: 0.0, 1.0, 2.0, 3.0, 4.0, 5.0, 6.0, 7.0, 8.0, 9.0, 10.0

NOTES

SITE AREA	31132.48 m2 or 7.69 acres
BUILDING G.F.A.	8013.35 m2
SITE COVERAGE	18.28%
LANDSCAPED AREA	11148.35 m2 or 35.81%
PAVED AREA	14293.53 m2 or 45.91%
TOTAL PARKING PROVIDED	385 spaces
BARRIER FREE SPACES PROVIDED	10 spaces
PARKING REQUIRED	
BLDG 'A' – OFFICE (1space/30m2)	93 spaces
BLDG 'B' – OFFICE (1space/30m2)	31 spaces
MEDICAL (1space/practioner)	50 spaces
BLDG 'C' – RETAIL (5spaces/90m2)	78 spaces
BLDG 'D' – RETAIL (5spaces/90m2)	82 spaces
BLDG 'E' – RETAIL (5spaces/90m2)	26 spaces
TOTAL PARKING REQUIRED	360 spaces
BARRIER FREE SPACES REQUIRED	5 spaces

KEY PLAN
MIDLAND, ONTARIO

LEGEND:

BH 1 EL. 249.55 — BOREHOLE 1 (WITH MONITORING WELL) SURFACE ELEVATION

BH 2 EL. 250.65 — BOREHOLE 2 SURFACE ELEVATION

TP 1 EL. 248.95 — TEST PIT 1 SURFACE ELEVATION

REFERENCE:
BASE PLAN PROVIDED BY CLIENT.

0m 10 20 30 40 50 75
SCALE

BOREHOLE AND TEST PIT LOCATION PLAN

PROPOSED COMMERCIAL SITE
710 BALM BEACH ROAD, 1277 & 1337 SUNDOWNER ROAD
MIDLAND, ONTARIO

PML Peto MacCallum Ltd.
CONSULTING ENGINEERS

DRAWN	JR	DATE	SCALE	PML REF.	DRAWING NO.
CHECKED	RB	NOV. 2018	AS SHOWN	18BF056	1–1
APPROVED	GW				

APPENDIX A

Engineered Fill

ENGINEERED FILL

The information presented in this appendix is intended for general guidance only. Site specific conditions and prevailing weather may require modification of compaction standards, backfill type or procedures. Each site must be discussed, and procedures agreed with Peto MacCallum Ltd. prior to the start of the earthworks and must be subject to ongoing review during construction. This appendix is not intended to apply to embankments. Steeply sloping ravine residential lots require special consideration.

For fill to be classified as engineered fill suitable for supporting structural loads, a number of conditions must be satisfied, including but not necessarily limited to the following:

1. Purpose

The site specific purpose of the engineered fill must be recognized. In advance of construction, all parties should discuss the project and its requirements and agree on an appropriate set of standards and procedures.

2. Minimum Extent

The engineered fill envelope must extend beyond the footprint of the structure to be supported. The minimum extent of the envelope should be defined from a geotechnical perspective by:

- at founding level, extend a minimum 1.0 m beyond the outer edge of the foundations, greater if adequate layout has not yet been completed as noted below; and

- extend downward and outward at a slope no greater than 45° to meet the subgrade

All fill within the envelope established above must meet the requirements of engineered fill in order to support the structure safely. Other considerations such as survey control, or construction methods may require an envelope that is larger, as noted in the following sections.

Once the minimum envelope has been established, structures must not be moved or extended without consultation with Peto MacCallum Ltd. Similarly, Peto MacCallum Ltd. should be consulted prior to any excavation within the minimum envelope.

3. Survey Control

Accurate survey control is essential to the success of an engineered fill project. The boundaries of the engineered fill must be laid out by a surveyor in consultation with engineering staff from Peto MacCallum Ltd. Careful consideration of the maximum building envelope is required.

During construction it is necessary to have a qualified surveyor provide total station control on the three dimensional extent of filling.

4. Subsurface Preparation

Prior to placement of fill, the subgrade must be prepared to the satisfaction of Peto MacCallum Ltd. All deleterious material must be removed and in some cases, excavation of native mineral soils may be required.

Particular attention must be paid to wet subgrades and possible additional measures required to achieve sufficient compaction. Where fill is placed against a slope, benching may be necessary and natural drainage paths must not be blocked.

5. Suitable Fill Materials

All material to be used as fill must be approved by Peto MacCallum Ltd. Such approval will be influenced by many factors and must be site and project specific. External fill sources must be sampled, tested and approved prior to material being hauled to site.

6. Test Section

In advance of the start of construction of the engineered fill pad, the Contractor should conduct a test section. The compaction criterion will be assessed in consultation with Peto MacCallum Ltd. for the various fill material types using different lift thicknesses and number of passes for the compaction equipment proposed by the Contractor.

Additional test sections may be required throughout the course of the project to reflect changes in fill sources, natural moisture content of the material and weather conditions.

The Contractor should be particularly aware of changes in the moisture content of fill material. Site review by Peto MacCallum Ltd. is required to ensure the desired lift thickness is maintained and that each lift is systematically compacted, tested and approved before a subsequent lift is commenced.

7. Inspection and Testing

Uniform, thorough compaction is crucial to the performance of the engineered fill and the supported structure. Hence, all subgrade preparation, filling and compacting must be carried out under the full time inspection by Peto MacCallum Ltd.

All founding surfaces for all buildings and residential dwellings or any part thereof (including but not limited to footings and floor slabs) on structural fill or native soils must be inspected and approved by PML engineering personnel prior to placement of the base/subbase granular material and/or concrete. The purpose of the inspection is to ensure the subgrade soils are capable of supporting the building/house foundation and floor slab loads and to confirm the building/house envelope does not extend beyond the limits of any structural fill pads.

8. Protection of Fill

Fill is generally more susceptible to the effects of weather than natural soil. Fill placed and approved to the level at which structural support is required must be protected from excessive wetting, drying, erosion or freezing. Where adequate protection has not been provided, it may be necessary to provide deeper footings or to strip and recompact some of the fill.

9. Construction Delay Time Considerations

The integrity of the fill pad can deteriorate due to the harsh effects of our Canadian weather. Hence, particular care must be taken if the fill pad is constructed over a long time period.

It is necessary therefore, that all fill sources are tested to ensure the material compactability prior to the soil arriving at site. When there has been a lengthy delay between construction periods of the fill pad, it is necessary to conduct subgrade proof rolling, test pits or boreholes to verify the adequacy of the exposed subgrade to accept new fill material.

When the fill pad will be constructed over a lengthy period of time, a field survey should be completed at the end of each construction season to verify the areal extent and the level at which the compacted fill has been brought up to, tested and approved.

In the following spring, subexcavation may be necessary if the fill pad has been softened attributable to ponded surface water or freeze/thaw cycles.

A new survey is required at the beginning of the next construction season to verify that random dumping and/or spreading of fill has not been carried out at the site.

10. Approved Fill Pad Surveillance

It should be appreciated that once the fill pad has been brought to final grade and documented by field survey, there must be ongoing surveillance to ensure that the integrity of the fill pad is not threatened.

Grading operations adjacent to fill pads can often take place several months or years after completion of the fill pad.

It is imperative that all site management and supervision staff, the staff of Contractors and earthwork operators be fully aware of the boundaries of all approved engineered fill pads.

Excavation into an approved engineered fill pad should never be contemplated without the full knowledge, approval and documentation by the geotechnical consultant.

If the fill pad is knowingly built several years in advance of ultimate construction, the areal limits of the fill pad should be substantially overbuilt laterally to allow for changes in possible structure location and elevation and other earthwork operations and competing interests on the site. The overbuilt distance required is project and/or site specified.

Iron bars should be placed at the corner/intermediate points of the fill pad as a permanent record of the approved limits of the work for record keeping purposes.

11. Unusual Working Conditions

Construction of fill pads may at times take place at night and/or during periods of freezing weather conditions because of the requirements of the project schedule. It should be appreciated therefore, that both situations present more difficult working conditions. The Owner, Contractor, Design Consultant and Geotechnical Engineer must be willing to work together to revise site construction procedures, enhance field testing and surveillance, and incorporate design modifications as necessary to suit site conditions.

When working at night there must be sufficient artificial light to properly illuminate the fill pad and borrow areas.

Placement of material to form an engineered fill pad during winter and freezing temperatures has its own special conditions that must be addressed. It is imperative that each day prior to placement of new fill, the exposed subgrade must be inspected and any overnight snow or frozen material removed. Particular attention should be given to the borrow source inspection to ensure only nonfrozen fill is brought to the site.

The Contractor must continually assess the work program and have the necessary spreading and compacting equipment to ensure that densification of the fill material takes place in a minimum amount of time. Changes may be required to the spreading methods, lift thickness, and compaction techniques to ensure the desired compaction is achieved uniformly throughout each fill lift.

The Contractor should adequately protect the subgrade at the end of each shift to minimize frost penetration overnight. Since water cannot be added to the fill material to facilitate compaction, it is imperative that densification of the fill be achieved by additional compaction effort and an appropriate reduced lift thickness. Once the fill pad has been completed, it must be properly protected from freezing temperatures and ponding of water during the spring thaw period.

If the pad is unusually thick or if the fill thickness varies dramatically across the width or length of the fill pad, Peto MacCallum Ltd. should be consulted for additional recommendations. In this case, alternative special provisions may be recommended, such as providing a surcharge preload for a limited time or increase the degree of compaction of the fill.