TATHAM ENGINEERING

Enhancing our communities

Cumac Subdivision – Phase II

PRELIMINARY STORMWATER MANAGEMENT REPORT

Township of Adjala-Tosorontio

File 116238 | November 4, 2019

Document Control

File:	Prepared by:	Prepared for:
116238	**Tatham Engineering Limited** 115 Sandford Fleming Drive, Suite 200 Collingwood, Ontario L9Y 5A6 **T** 705-444-2565 **tathameng.com**	**Alvin Young** Winzen Construction Limited 30 Algie Avenue Etobicoke, ON M8Z 5J8
Date: **November 4, 2019**		

Authored by:	Reviewed by:
	
Andrew Schoof, B.A.Sc., M.A.Sc. Intern Engineer	Randy Simpson, B.A.Sc., P.Eng. Director, Group Leader

Disclaimer	Copyright
The information contained in this document is solely for the use of the Client identified on the cover sheet for the purpose for which it has been prepared and Tatham Engineering Limited undertakes no duty to or accepts any responsibility to any third party who may rely upon this document.	This document may not be used for any purpose other than that provided in the contract between the Owner/Client and the Engineer nor may any section or element of this document be removed, reproduced, electronically stored or transmitted in any form without the express written consent of Tatham Engineering Limited.

Issue	Date	Description
1	November 4, 2019	First Submission

Document Contents

Tables

Figures

Appendices

List of Drawings

1 Introduction

Tatham Engineering Limited (Tatham) has been retained by Mr. Alvin Young to prepare a Stormwater Management Report in support of the proposed Cumac Phase II Residential Development within the Township of Adjala-Tosorontio. This report has been prepared to address the Stormwater Management Criteria requirements for the proposed development.

The primary objective of this report is to demonstrate that the proposed development will conform to the SWM criteria established in the MECP Stormwater Management Planning and Design Manual (March, 2003), the Everett Secondary Plan Master Servicing Plan report (January 2013) and The NVCA Development Review Guidelines (December 2013).

1.1 SITE DESCRIPTION

The 4.33 Ha development site is located within the Town of Everett and is bounded by Pine Park Boulevard to the Northwest, Burbank Circle to the South and Concession 6 to the east. We have enclosed Figure 1.0 - Site Location Plan in overleaf for reference. The legal description of the property is Part Lot 11 of Concession 5 in the Township of Adjala-Tosorontio; being Part 1 of Plan 51R-18023.

The site is well vegetated forestlands with mature trees and underbrush. The land consists of rolling terrain and low-lying marsh areas with a drainage course traversing the landscape.

1.2 EXISTING NATURAL HAZARDS

A Natural Hazard Study has previously been submitted to the Nottawasaga Valley Conservation Authority (NVCA) which has established the flood and erosion hazard limits associated with the channel across the site. As per Provincial Policy Statement 3.1, development is restricted to areas outside the natural hazards. As such, development of the subject property is restricted to the area outside the flood and erosion hazard limits. The NVCA has acknowledged and approved the hazard limits as defined in the assessment in a letter dated March 6, 2017. We have enclosed a copy of the letter in Appendix A and approved Natural Hazard Mapping Plan (FM-1) at the rear of the report. To adequately address the natural hazards moving forward, the hazard assessment concludes that the proposed channel cleanout/improvements be applied prior to construction to reinstate the channel to original grade.

1.3 GEOTECHNICAL REPORT

A preliminary Geotechnical investigation of the site has been completed by GeoPro Consulting Ltd. in support of the development. The geotechnical recommendations will be considered during final design. Below is a summary of the findings contained in the geotechnical report.

GeoPro completed 4 boreholes at various locations throughout the development site. Each borehole identified the soil stratification as follows:

- topsoil occurred from 0 – 0.3 m in depth;
- fill material (silty sand and sand) occurred in borehole 1 to a depth of 1.40 m below existing ground surface;
- reworked fill material (silty sand) occurred in borehole 3 to a depth of 0.80 m below existing ground surface;
- sand to fine sand deposits were encountered in all boreholes and extended to depths ranging from 4.60 m to 8.10 m below the existing ground surface;
- ground water during drilling was encountered in borehole 2 and borehole 3; and
- monitoring wells were installed in each borehole and were monitored on March 7, 2017; groundwater was encountered between 0.80 m to 2.74 m below ground surface in all boreholes.

For the purpose of our preliminary calculations we reviewed the Simcoe County Soils Map and Report No. 29 for information relating to the typical soil classifications in the area. The map indicates that the soil on site is classified as Tioga Sand Loam – Bondhead Loam. This formation is found throughout South Simcoe County primarily in the Adjala & Tecumseth Townships. This classification is categorized as having a Hydrological Soil Group A-AB; having generally good

drainage and is stone-free to moderately stony which is consistent with the findings of the preliminary geotechnical report.

The stormwater management design should utilize low impact development (LID) and infiltration techniques where possible and will be analysed in conjunction with the geotechnical recommendations during final design.

1.4 PROPOSED LAND USE

Under the 2017 development concept prepared by Jones Consulting, 45 residential lots will be developed utilizing 4.33 Ha. We have enclosed a copy of the current plan provided.

1.5 EXISTING SERVICES

Development on this site has been expected and planned for years. Currently, Phase I of the Cumac Subdivision is serviced with private septic systems, rural road ditches and Municipal water servicing.

2 Post-Development Stormwater Management Plan

2.1 STORMWATER MANAGEMENT OBJECTIVES AND BACKGROUND

The primary objective of this report is to demonstrate that the proposed development will conform to the SWM criteria established in the MECP Stormwater Management Planning and Design Manual (March, 2003), the Everett Secondary Plan Master Servicing Plan report (January 2013) and The NVCA Development Review Guidelines (December 2013).

This will be accomplished by evaluating the effect of expansion on the local drainage conditions, review of recommendations set-forth in the Master Servicing Study report for stormwater quality and quantity control measures, and providing solutions to mitigate siltation and erosion during and after construction.

The stormwater management strategy for the proposed development site has been prepared recognizing the pertinent Conservation Authority, Municipal and Provincial guidelines on water resources including the following:

- Nottawasaga Valley Conservation Authority Technical Guidelines, Nottawasaga Valley Conservation Authority (December 2013);
- Design Criteria for the Township of Adjala-Tosorontio, Township of Adjala-Tosorontio (January 2006);
- Stormwater Management Planning and Design Manual, Ministry of the Environment, Conservation and Parks, (March 2003); and
- Everett Secondary Master Servicing Plan, Class Environmental Assessment Study Report; Greenland Consulting Engineers, (January 2013).

2.2 STORMWATER MANAGEMENT CRITERIA

Several environmental factors and site conditions govern the design of the stormwater management plan for the residential development. The SWM criteria to be adhered to during detailed design are as follows:

- SWM plan must attenuate post development peak flow rates off-site to existing levels for the 2 year through 100 year design storms;
- Achieve Level 1 ‘Enhanced’ stormwater runoff treatment including 80% removal of Total Suspended Solids (TSS);

- No development is permitted within the Natural Hazard setback limit of the on-site drainage course buffer zone in accordance with Provincial Policy Statement 3.1;
- Roadside ditches to be designed to convey the 100-year runoff flow rate from the upstream catchments;
- Safe conveyance of the Regional design storm through the site; and
- Promote groundwater recharge and infiltration where possible.

3 Post-Development Water Quality Control

3.1 EVERETT SECONDARY PLAN MASTER SERVICING PLAN BACKGROUND SUMMARY

This report will focus on the viability of the conclusions and recommendations set-forth in the Everett Secondary Plan Master Servicing Plan Class Environmental Assessment Study report (MSP) and Master Drainage report (MDP) prepared by Greenland Consulting Engineers.

The MDP report recommends a Regional approach for stormwater quantity control. This approach will allow for the post-development stormwater directed to the Pine River to be controlled to pre-development levels at key nodes in the river system, without controlling site specific runoff from each development within the Secondary Plan Area.

The Cumac Phase II development is located within Catchment 7 (56.32 Ha) of the Pine River Tributary Node 100 as demonstrated in the recommended MDP Option 3. Based on the MDP Study report the total catchment area draining to Node 100 under existing conditions is 584.24 Ha. Under post-development conditions, the total catchment area increases by 31.76 Ha to 616.00 Ha. A copy of the MDP Option 3 drainage catchment area plan prepared by Greenland Consulting Engineers is enclosed in Appendix B.

A Visual OTTHYMO model was developed for the MDP report to analyze the ultimate buildout of the Everett Secondary Plan Area on a regional scale. This model utilized the MOE Owen Sound Intensity-Duration-Frequency (IDF) rainfall data for the period from 1965 to 2003.

The model utilizes eight (8) stormwater management facilities (SWMF) in key developments within the Secondary Plan Area to control the pre-to-post peak runoff flow rate matching in a regional scale. Three (3) of the SWMF are existing while five (5) are proposed to be constructed as development of the Secondary Plan Area occurs. For preliminary pond sizing please refer to Volume 3 of the MDP report. The pre-to-post peak runoff flow rate outflow at each node is summarized in Table 1 below.

Table 1: Pre-to-Post Development Peak Runoff Flow Rate m³/s (MDP Option 3)

	PINE RIVER TRIBUTARY (100)		PINE RIVER MAIN BRANCH (200)		BOYNE RIVER TRIBUTARY (300)	
Design Criteria	CHI	SCS	CHI	SCS	CHI	SCS
25mm	2.84 (2.81)	-	0.48 (0.51)	-	0.64 (0.64)	-
2-Year	4.52 (4.47)	3.79 (3.71)	1.12 (1.17)	1.73 (1.83)	1.40 (1.43)	2.07 (2.24)
5-Year	7.00 (6.92)	5.43 (5.40)	2.34 (2.45)	3.02 (3.20)	2.81 (2.88)	3.50 (3.81)
25-Year	11.96 (12.31)	8.26 (8.35)	4.97 (5.19)	5.45 (5.76)	5.63 (5.88)	6.04 (6.69)
100-Year	14.96 (14.93)	11.17 (11.38)	7.18 (7.50)	8.02 (8.49)	8.13 (8.39)	8.92 (9.66)
Regional (Timmins)	17.28 (18.36)	-	15.47 (16.45)	-	16.07(18.47)	-

*Based on Everett Secondary Plan Master Drainage Plan report (November 2012); (0.64) Pre-development Peak Runoff Flow Rate (m³/s)

As noted in the MDP Study report, the post-development peak runoff flow rate analysis in MDP Option 3 closely mimics the pre-development runoff flow rates. MDP Option 3 over-controls the post-development flow rates draining into Node 100. We have enclosed the Visual OTTHYMO output from the Greenland model in Appendix B.

3.2 CUMAC PHASE II STORMWATER MANAGEMENT

To further demonstrate the pre-to-post development peak runoff flow rate matching, we have prorated the runoff flow rate from Catchment 7 as noted in the MDP Option 3 based on the Cumac Phase II development area of 4.33 Ha. Table 2 below summarizes the allowable post-development peak runoff flow for the development site.

Table 2: Allowable Post-Development Peak Runoff Flow Rate (MDP Option 3)

DESIGN CRITERIA	MDP CATCHMENT 7*		CUMAC PHASE II	
	CHI	SCS	CHI	SCS
25mm	2.18	-	0.168	-
2-Year	3.03	1.08	0.233	0.083
5-Year	4.66	1.42	0.358	0.109
25-Year	6.62	1.92	0.509	0.148
100-Year	8.29	2.37	0.637	0.182
Regional (Timmins)	2.51	-	0.193	-

*Based on Everett Secondary Plan Master Drainage Plan report (November 2012); (0.64) Pre-development Peak Runoff Flow Rate (m^3/s)

Detailed allowable post-development peak runoff flow rate calculations are enclosed in Appendix A.

3.3 POST-DEVELOPMENT VISUAL OTTHYMO ANALYSIS

A post-development Visual OTTHYMO model has been developed to quantify the post-development peak runoff flow rates from the site. The model has been developed utilizing the rainfall data consistent with the MDP Option 3 and prepared by Greenland. The rainfall data is derived from the Intensity-Duration-Frequency Curves (IDF Curve) from the Owen Sound MOE Rain Gauge for the period from 1965 to 2003.

The site is divided into separate catchment areas identified on the Post-Development Drainage Plan (DP-2) enclosed. The catchments were developed based on the preliminary site grading and a rural road cross-section.

Catchment 200 consists of the combined roof-top areas of each house. The runoff for Catchment 200 will be stored and infiltrated by individual soakaway pits on each lot. The MECP Stormwater Management Planning and Design Manual (March, 2003) was used to develop a combined rating curve for the soakaway pits in order to model them in Visual OTTHYMO. The soakaway pit design calculations have been enclosed in Appendix A.

Catchment 201 is comprised of the combined lawn areas and driveways which will be constructed of permeable pavers to increase infiltration.

Catchment 202 consists of the development's right-of-way (R.O.W) area, including the asphalt, gravel shoulders and roadside bioswales complete with underground storage chambers. A typical 20-metre rural R.O.W has been assumed for the purposes of quantifying the post-development peak runoff flow rate from Catchment 202.

The remaining catchments consist of the flood hazard area associated with the channel that runs through the property (Catchment 203), and two small catchments along the northeast corner of the property which will be directed off the property as uncontrolled sheet flow (Catchments 204 & 205).

Detailed impervious calculations for each catchment are enclosed in Appendix A. Table 3 below summarizes the post-development catchment parameters.

Table 3: Post-Development Catchment Parameters

CATCHMENT ID	CATCHMENT AREA (HA)	SCS CURVE NUMBER (CN)	% IMPERVIOUS	% IMPERVIOUS DIRECTLY CONNECT
Catchment 200	1.01	-	95.0 %	95.0%
Catchment 201	1.54	76.8	-	-
Catchment 202	0.67	-	45.2 %	45.2 %
Catchment 203	0.62	57.4	-	-
Catchment 204	0.02	49.0	-	-
Catchment 205	0.47	49.5	-	-
Catchment 200	1.01	-	95.0 %	95.0%

Table 4 below summarizes the post-development total peak runoff flow rates from the development site. We have enclosed the Post-Development Drainage Plan (DP-2) for reference.

Table 4: Post-Development Peak Runoff Flow Rate

DESIGN CRITERIA	CUMAC PHASE II	
	CHI	SCS
25mm	0.015 (0.168)	-
2-Year	0.027 (0.233)	0.033 (0.083)
5-Year	0.039 (0.358)	0.046 (0.109)
25-Year	0.060 (0.509)	0.070 (0.148)
100-Year	0.080 (0.637)	0.094 (0.182)
Regional (Timmins)	0.154 (0.193)	-

(0.168) Allowable Pre-development Peak Runoff Flow Rate (m^3/s) per MDP Option 3

3.4 ROADSIDE DITCH AND BIO-SWALE FUNCTION

The Visual OTTHYMO hydrologic model has also been used to evaluate the function of the storage within the proposed roadside ditches and bio-swales. A summary of the storage volumes and water levels are provided in Table 5 below.

Table 5: Post-Development Peak Runoff Flow Rate

DESIGN STORM	STORAGE VOLUME USED (m^3)	STORAGE DEPTH (m)
25 mm	96	0.10
2 Year	241	0.20
5 Year	392	0.27
25 Year	646	0.38
100 Year	874	0.54
Regional (Timmins)	1813	1.22

The 25 mm to 100-year design storm runoff volume will be contained in the underground storage chambers, while the Regional runoff volume will pond behind the permanent rock check dams to a depth of 0.30 m and will dissipate by infiltration over time. Detailed calculations are enclosed in Appendix A.

3.5 FLOOD HAZARD ASSESSMENT – CULVERT DESIGN

Tatham was retained in 2016 to prepare a Natural Hazard Study to establish the flood and erosion hazard limits associated with the channel that flows from west to east across the subject property. A flood hazard assessment was completed in accordance with Section 3.1 of the Provincial Policy Statement and specifically the Ontario Ministry of Natural Resources (MNR) Technical Guide for River & Stream Systems: Flood Hazard Limit. The assessment is enclosed in Appendix D.

As part of the Natural Hazard Study, a Visual OTTHYMO hydrologic model of the channel's contributing drainage area was created. The catchment area draining to the channel was determined to be 27.3 ha. The hydrologic model for the 100-year 24-hour SCS type II design storm generated the greatest peak flow rate of 3.67 m^3/s. The peak flow rate was used to develop a HEC-RAS hydraulic model to establish the proposed flood hazard limit.

The HEC-RAS model has been revised to illustrate the conveyance of flow under the proposed roadway. The model used the peak flow rate of 3.67 m^3/s. It was determined that a single 3.0 m by 1.2 m box culvert is required for the upstream and downstream crossings, to ensure the post-development flood hazard limit matches the pre-development limit. Detailed hydraulic design calculations are enclosed in Appendix A.

4 Water Quality Control

Water quality control for the site will be maintained by roadside ditches designed as bio-swales, permanent rock check dams, individual soakaway pits, permeable pavers, property line swales and lot level controls. Preliminary water quality calculations have been developed based on the MOECC guidelines for the overall post-development.

4.1 LOW IMPACT DEVELOPMENT TECHNIQUES

Low Impact Development (LID) techniques are utilised in planning and engineering design to promote stormwater filtration, infiltration, water conservation and protect water quality. LID techniques allow planning and engineering design to implement hydrological controls while providing pre-to-post peak runoff flow rate matching in part with end of pipe stormwater quantity and quality control as part of the overall treatment train.

The implementation of LID techniques has been analyzed and will include:

- individual soak-away pits on each lot;
- permeable pavers utilized for driveways;
- enhanced roadside ditches and bio-swales; and
- property line swales and lot level controls.

4.2 WATER QUALITY STORAGE VOLUME

Water quality storage volumes have been calculated based on the MOECC guidelines for the overall post-development. The post-development site area is 4.33 Ha with an overall average impervious area of 39.2 %. Based on Table 3.2 of the guidelines, the water quality storage volume required to achieve Level 1 'Enhanced' treatment is 111.97 m^3, while the proposed underground storage chambers can provide approximately 935 m^3 of storage. Detailed calculations are enclosed in Appendix A.

4.3 PHOSPHORUS REDUCTION

Phosphorous loading reduction methods were explored in conformance with the TRCA Low Impact Development Stormwater Management Planning and Design Guide (2010). Through the use of individual soakaway pits designed to collect and infiltrate 20 mm of rooftop runoff and roadside ditches designed as a grassed swale / underground storage system, the post-development phosphorous load was reduced from 2.49 kg/year with no controls, to 0.78 kg/year. Detailed calculations are enclosed in Appendix A.

5 Inspection and Maintenance

There are several components of the stormwater management system that require routine inspections and periodic maintenance. A Stormwater Management Maintenance Manual will be prepared upon the completion of final design that outlines an inspection and maintenance plan for the development.

6 Siltation and Erosion Control

Siltation and erosion controls will be implemented for all construction activities, including topsoil stripping, material stockpiling, road construction activities and grading operations. The detailed erosion and sediment control measures proposed will be implemented during and after construction and will be provided during final design and may include the following:

- heavy duty silt fence will be erected around the perimeter of the site before any grading operations commence to control sediment movement;
- a construction vehicle entrance will be constructed and maintained consisting of a stone mud mat to reduce off-site tracking of material; and
- rock check flow dams and straw bale check flow dams will be installed prior to construction and will be maintained and inspected throughout the course of construction as required to prevent the transportation of sediment and deleterious materials offsite.

7 Conclusions and Recommendations

The conclusions and recommendations contained herein are based on the preferred recommended options analyzed by Greenland Consulting Engineers contained in the Everett Secondary Plan Master Servicing Plan study reports Volume 1 through Volume 3 which has been accepted by the Township of Adjala-Tosorontio.

The proposed Stormwater Management Plan demonstrates that the development will meet the established criteria with respect to stormwater management set forth in governing documents and can proceed without negatively impacting the local drainage systems and the Pine River.

Water quantity control in the form of post to pre-development peak flow matching will be provided through the roadside ditches and infiltration chambers in the bio-swales as well as LID measures including individual soakaway pits and permeable paver driveways. Sediment and erosion control measures will be implemented during and after construction to prevent the transport of deleterious materials downstream.

Water Quality for the site will be in accordance with MOECC Guidelines. Level 1 'Enhanced' water quality control in the form of 80% TSS removal will be satisfied utilizing the roadside ditch's design as bioswales in accordance with the MOECC Guidelines. Bioswales will be incorporated into the design upstream of the existing drainage course to reduce the pollutant transport and sediment downstream.

In conclusion, the proposed Stormwater Management Plan supports the concept of an environmentally sustainable development and will mitigate anticipated stormwater impacts associated with the construction of the proposed development.

TATHAM ENGINEERING

CUMAC SUBDIVISION
SITE LOCATION PLAN

DWG. No.
FIG. 1

SCALE: N.T.S.	DATE: MAR/17	JOB NO. 116238

Drawing Name: 116238–FIG01.dwg, Plotted: Nov 05, 2019

Appendix A:
Supporting Calculations

TATHAM ENGINEERING	Project: Cumac Subdivision Phase II	Date: January 2017
	File No.: 116238	Designed: DDH
	Subject: Allowable Flow Calculations	Checked: AS

Allowable Peak Runoff Flow Rate Calculations

Total Catchment Area (Node 100) = 616.00 Ha
Catchment Area (CA7) = 56.32 Ha
Site Area = 4.33 Ha

Post Development Peak Runoff Flow Rates Pine River Tributary (Catchment 7)		
Design Storm	**4-Hr Chicago**	**SCS 24-Hr**
25 mm	2.18	-
2-Year	3.03	1.080
5-Year	4.66	1.420
25-Year	6.62	1.920
100-Year	8.29	2.370
Regional (Timmins)	2.51	-

* Option 3 OTTHYMO Model - Everett Secondary Plan MDR

Post Development Peak Runoff Flow Rates Allowable Peak Runoff Flow Rate (Cumac II)		
Design Storm	**4-Hr Chicago**	**SCS 24-Hr**
25 mm	0.168	-
2-Year	0.233	0.083
5-Year	0.358	0.109
25-Year	0.509	0.148
100-Year	0.637	0.182
Regional (Timmins)	0.193	-

TATHAM ENGINEERING

Project:	Cumac Subdivision Phase II
File No.:	116238-2
Date:	April 2008
Designed By:	AS
Checked By:	
Subject:	CN Calculator

CURVE NUMBER, INITIAL ABSTRACTION & TIME TO PEAK CALCULATIONS

CONDITIONS

Catchment 203 **Area** 0.62 ha

WEIGHTED CN VALUE																									
Soil Series	Soil Series	Hydrologic Soil Group	Soil Texture	Runoff Coefficient	Catchment Soil Characteristics		Forest/Woodland			Pasture/Lawns			Meadows			Cultivated			Impervious			Wetland/Lakes/SWMF			Average CN for Soil Type
				Type	Area	Percent	Area	Percent	CN	Area	Percent	CN	Area	Percent	CN	Area	Percent	CN	Area	Percent	CN	Area	Percent	CN	
Tis	TIOGA	A	Sand Loam	1	0.62	1	0		32	0.0763	0.123	49	0		38	0		62	0.093	0.15	100	0.4507	0.727	50	57.377
	#N/A	#N/A	#N/A	#N/A	0		0		#N/A	0		#N/A	0		#N/A	0		#N/A	0		#N/A	0		#N/A	0
	#N/A	#N/A	#N/A	#N/A	0		0		#N/A	0		#N/A	0		#N/A	0		#N/A	0		#N/A	0		#N/A	0
	#N/A	#N/A	#N/A	#N/A	0		0		#N/A	0		#N/A	0		#N/A	0		#N/A	0		#N/A	0		#N/A	0
	#N/A	#N/A	#N/A	#N/A	0		0		#N/A	0		#N/A	0		#N/A	0		#N/A	0		#N/A	0		#N/A	0
				Totals	**0.62**	**1**	**0**	**0**		**0.07626**	**0.123**		**0**	**0**		**0**	**0**		**0.093**	**0.15**		**0.45074**	**0.727**		**57.4**

Time of Concentration Calculations

Initial Abstraction	**9.639 mm**

Wetlands	12
Woods	10
Meadows	8
Cultivated	7
Lawns	5
Impervious	2

For Runoff Coefficients greater than 0.4

Bransby-Williams Formula

Maximum Catchment Elevation	239	m
Minimum Catchment Elevation	237	m
Catchment length	240	m
Catchment Slope	1%	
Catchment Area	0.62	ha
Time of Concentration (Minutes)	**14.88**	
Time of Concentration (Hours)	**0.25**	
Time to Peak (2/3 x Time of Concentration)	**0.17**	

Time to Peak	**0.54 hrs**

For Runoff Coefficients less than 0.4

Airport Method

Maximum Catchment Elevation	239	m
Minimum Catchment Elevation	237	m
Catchment length	240	m
Catchment Slope	1%	
Catchment Area	0.62	ha
Time of Concentration (Minutes)	**48.75**	
Time of Concentration (Hours)	**0.81**	
Time to Peak (2/3 x Time of Concentration)	**0.54**	

Runoff Coefficient	**0.19**

Landuse Type	Soil Series				
	Tis	0	0	0	0
	1	#N/A	#N/A	#N/A	#N/A
Forest/Woodland	0.08	#N/A	#N/A	#N/A	#N/A
Cultivated	0.22	#N/A	#N/A	#N/A	#N/A
Pasture/Lawn	0.1	#N/A	#N/A	#N/A	#N/A
Impervious	0.95	#N/A	#N/A	#N/A	#N/A
Wetland/Lake/SWMF	0.05	#N/A	#N/A	#N/A	#N/A
Meadows	0.09	#N/A	#N/A	#N/A	#N/A
Soil Series Total	0.1912	#N/A	#N/A	#N/A	#N/A

TATHAM ENGINEERING

Project:	Cumac Subdivision Phase II
File No.:	116238-2
Date:	April 2008
Designed By:	AS
Checked By:	
Subject:	CN Calculator

CURVE NUMBER, INITIAL ABSTRACTION & TIME TO PEAK CALCULATIONS

CONDITIONS

Catchment 204 **Area** 0.02 ha

WEIGHTED CN VALUE

Soil Series	Soil Series	Hydrologic Soil Group	Soil Texture	Runoff Coefficient Type	Catchment Soil Characteristics		Forest/Woodland			Pasture/Lawns			Meadows			Cultivated			Impervious			Wetland/Lakes/SWMF			Average CN for Soil Type
					Area	Percent	Area	Percent	CN	Area	Percent	CN	Area	Percent	CN	Area	Percent	CN	Area	Percent	CN	Area	Percent	CN	
Tis	TIOGA	A	Sand Loam	1	0.02	1	0		32	0.02	1	49	0		38	0		62	0		100	0	0	50	49
	#N/A	#N/A	#N/A	#N/A	0		0		#N/A	0		#N/A	0		#N/A	0		#N/A	0		#N/A	0		#N/A	0
	#N/A	#N/A	#N/A	#N/A	0		0		#N/A	0		#N/A	0		#N/A	0		#N/A	0		#N/A	0		#N/A	0
	#N/A	#N/A	#N/A	#N/A	0		0		#N/A	0		#N/A	0		#N/A	0		#N/A	0		#N/A	0		#N/A	0
	#N/A	#N/A	#N/A	#N/A	0		0		#N/A	0		#N/A	0		#N/A	0		#N/A	0		#N/A	0		#N/A	0
				Totals	**0.02**	**1**	**0**	**0**		**0.02**	**1**		**0**	**0**		**0**	**0**		**0**	**0**		**0**	**0**		**49.0**

Time of Concentration Calculations

For Runoff Coefficients greater than 0.4

Bransby-Williams Formula

Maximum Catchment Elevation	239	m
Minimum Catchment Elevation	238.2	m
Catchment length	14	m
Catchment Slope	6%	
Catchment Area	0.02	ha
Time of Concentration (Minutes)	**0.83**	
Time of Concentration (Hours)	**0.01**	
Time to Peak (2/3 x Time of Concentration)	**0.01**	

Time to Peak	**0.07 hrs**

For Runoff Coefficients less than 0.4

Airport Method

Maximum Catchment Elevation	239	m
Minimum Catchment Elevation	238.2	m
Catchment length	14	m
Catchment Slope	6%	
Catchment Area	0.02	ha
Time of Concentration (Minutes)	**6.52**	
Time of Concentration (Hours)	**0.11**	
Time to Peak (2/3 x Time of Concentration)	**0.07**	

Initial Abstraction	**5 mm**

Wetlands	12
Woods	10
Meadows	8
Cultivated	7
Lawns	5
Impervious	2

Runoff Coefficient	**0.15**

Landuse Type	Soil Series				
	Tis	0	0	0	0
	1	#N/A	#N/A	#N/A	#N/A
Forest/Woodland	0.12	#N/A	#N/A	#N/A	#N/A
Cultivated	0.3	#N/A	#N/A	#N/A	#N/A
Pasture/Lawn	0.15	#N/A	#N/A	#N/A	#N/A
Impervious	0.95	#N/A	#N/A	#N/A	#N/A
Wetland/Lake/SWMF	0.05	#N/A	#N/A	#N/A	#N/A
Meadows	0.14	#N/A	#N/A	#N/A	#N/A
Soil Series Total	0.15	#N/A	#N/A	#N/A	#N/A

TATHAM ENGINEERING

Project:	Cumac Subdivision Phase II
File No.:	116238-2
Date:	April 2008
Designed By:	AS
Checked By:	
Subject:	CN Calculator

CURVE NUMBER, INITIAL ABSTRACTION & TIME TO PEAK CALCULATIONS

CONDITIONS

Catchment 205 **Area** 0.47 ha

WEIGHTED CN VALUE

Soil Series	Soil Series	Hydrologic Soil Group	Soil Texture	Runoff Coefficient	Catchment Soil Characteristics		Forest/Woodland			Pasture/Lawns			Meadows			Cultivated			Impervious			Wetland/Lakes/SWMF			Average CN for Soil Type
				Type	Area	Percent	Area	Percent	CN	Area	Percent	CN	Area	Percent	CN	Area	Percent	CN	Area	Percent	CN	Area	Percent	CN	
Tis	TIOGA	A	Sand Loam	1	0.47	1	0		32	0.235	0.5	49	0		38	0		62	0		100	0.235	0.5	50	49.5
	#N/A	#N/A	#N/A	#N/A	0		0		#N/A	0		#N/A	0		#N/A	0		#N/A	0		#N/A	0		#N/A	0
	#N/A	#N/A	#N/A	#N/A	0		0		#N/A	0		#N/A	0		#N/A	0		#N/A	0		#N/A	0		#N/A	0
	#N/A	#N/A	#N/A	#N/A	0		0		#N/A	0		#N/A	0		#N/A	0		#N/A	0		#N/A	0		#N/A	0
	#N/A	#N/A	#N/A	#N/A	0		0		#N/A	0		#N/A	0		#N/A	0		#N/A	0		#N/A	0		#N/A	0
				Totals	**0.47**	**1**	**0**	**0**		**0.235**	**0.5**		**0**	**0**		**0**	**0**		**0**	**0**		**0.235**	**0.5**		**49.5**

Time of Concentration Calculations

For Runoff Coefficients greater than 0.4			**For Runoff Coefficients less than 0.4**		
Bransby-Williams Formula			**Airport Method**		
Maximum Catchment Elevation	240.5	m	Maximum Catchment Elevation	240.5	m
Minimum Catchment Elevation	238.3	m	Minimum Catchment Elevation	238.3	m
Catchment length	450	m	Catchment length	450	m
Catchment Slope	0.5%		Catchment Slope	0%	
Catchment Area	0.47	ha	Catchment Area	0.47	ha
Time of Concentration (Minutes)	**31.92**		**Time of Concentration (Minutes)**	**89.77**	
Time of Concentration (Hours)	**0.53**		**Time of Concentration (Hours)**	**1.50**	
Time to Peak (2/3 x Time of Concentration)	**0.35**		**Time to Peak (2/3 x Time of Concentration)**	**1.00**	

Time to Peak	**1.00 hrs**

Initial Abstraction	**8.5 mm**

Wetlands	12
Woods	10
Meadows	8
Cultivated	7
Lawns	5
Impervious	2

Runoff Coefficient	**0.08**

Landuse Type	Soil Series				
	Tis	0	0	0	0
	1	#N/A	#N/A	#N/A	#N/A
Forest/Woodland	0.08	#N/A	#N/A	#N/A	#N/A
Cultivated	0.22	#N/A	#N/A	#N/A	#N/A
Pasture/Lawn	0.1	#N/A	#N/A	#N/A	#N/A
Impervious	0.95	#N/A	#N/A	#N/A	#N/A
Wetland/Lake/SWMF	0.05	#N/A	#N/A	#N/A	#N/A
Meadows	0.09	#N/A	#N/A	#N/A	#N/A
Soil Series Total	0.075	#N/A	#N/A	#N/A	#N/A

Project:	Cumac Subdivision Phase II
File No.:	116238-2
Date:	April 2008
Designed By:	AS
Checked By:	
Subject:	CN Calculator

CURVE NUMBER, INITIAL ABSTRACTION & TIME TO PEAK CALCULATIONS

CONDITIONS

Catchment 201 **Area** 1.54 ha

WEIGHTED CN VALUE																									
Soil Series	Soil Series	Hydrologic Soil Group	Soil Texture	Runoff Coefficient	Catchment Soil Characteristics		Forest/Woodland			Pasture/Lawns			Meadows			Cultivated			Permeable Pavers			Wetland/Lakes/SWMF			Average CN for Soil Type
				Type	Area	Percent	Area	Percent	CN	Area	Percent	CN	Area	Percent	CN	Area	Percent	CN	Area	Percent	CN	Area	Percent	CN	
Tis	TIOGA	A	Sand Loam	1	1.54	1	0		32	1.4445	0.938	49	0		38	0		62	0.0955	0.062	94	0.77	0.5	50	76.79
	#N/A	#N/A	#N/A	#N/A	0		0		#N/A	0		#N/A	0		#N/A	0		#N/A	0		#N/A	0		#N/A	0
	#N/A	#N/A	#N/A	#N/A	0		0		#N/A	0		#N/A	0		#N/A	0		#N/A	0		#N/A	0		#N/A	0
	#N/A	#N/A	#N/A	#N/A	0		0		#N/A	0		#N/A	0		#N/A	0		#N/A	0		#N/A	0		#N/A	0
	#N/A	#N/A	#N/A	#N/A	0		0		#N/A	0		#N/A	0		#N/A	0		#N/A	0		#N/A	0		#N/A	0
				Totals	**1.54**	**1**	**0**	**0**		**1.44452**	**0.938**		**0**	**0**		**0**	**0**		**0.09548**	**0.062**		**0.77**	**0.5**		**76.8**

Time of Concentration Calculations

For Runoff Coefficients greater than 0.4

Bransby-Williams Formula

Maximum Catchment Elevation	240.5	m
Minimum Catchment Elevation	238.3	m
Catchment length	450	m
Catchment Slope	0.5%	
Catchment Area	1.54	ha
Time of Concentration (Minutes)	**28.35**	
Time of Concentration (Hours)	**0.47**	
Time to Peak (2/3 x Time of Concentration)	**0.31**	

Time to Peak	**0.90 hrs**

For Runoff Coefficients less than 0.4

Airport Method

Maximum Catchment Elevation	240.5	m
Minimum Catchment Elevation	238.3	m
Catchment length	450	m
Catchment Slope	0%	
Catchment Area	1.54	ha
Time of Concentration (Minutes)	**80.77**	
Time of Concentration (Hours)	**1.35**	
Time to Peak (2/3 x Time of Concentration)	**0.90**	

Initial Abstraction	**10.814 mm**

Wetlands	12
Woods	10
Meadows	8
Cultivated	7
Lawns	5
Impervious	2

Runoff Coefficient	**0.18**

Landuse Type	Soil Series				
	Tis	0	0	0	0
	1	#N/A	#N/A	#N/A	#N/A
Forest/Woodland	0.08	#N/A	#N/A	#N/A	#N/A
Cultivated	0.22	#N/A	#N/A	#N/A	#N/A
Pasture/Lawn	0.1	#N/A	#N/A	#N/A	#N/A
Impervious	0.95	#N/A	#N/A	#N/A	#N/A
Wetland/Lake/SWMF	0.05	#N/A	#N/A	#N/A	#N/A
Meadows	0.09	#N/A	#N/A	#N/A	#N/A
Soil Series Total	0.1777	#N/A	#N/A	#N/A	#N/A

TATHAM ENGINEERING	Project: Cumac Subdivision - Phase II	Date: March 2018
	File No.: 116238-2	Designed: AS
	Subject: Impervious Area Calculations	Checked: RS

Site Area (Catchment 202)	=	6,713.0	sq.m
Road Area	=	2,030.0	sq.m
Gravel Surface	=	1,002.0	sq.m
Ditch Area	=	3,681.0	sq.m
Directly Connected Area	=	3,032.0	sq.m
% Impervious	=	45.2%	
% Directly Connected	=	45.2%	

CUMAC
SWM Storage Volume Table

Storage Capacity and Material Quantity Calculator

STORMTANK® Module

SWM Discharge T

Date: **2017/06/26**

Inputs:

Metric Units

StormTank® System Dimensions:	Desired Size	Actual Size	System Configuration:	
Length (1.5 ft [0.457 m] increments):	**570.00**	570.13	Liner:	**Lined**
Width (3 ft [0.914 m] increments):	**3.00**	3.66	Liner Loc:	**Excavation**
	Footprint:	2,085.30	**Single_m**	Stacked
			Height:	**0.3048** m

Stone Storage Incl.: **Yes**

Leveling Bed Depth:	**0.15**	m	*(Minimum 0.5 feet [0.1524 m] & Maximum 1.0 foot [0.3048 m])*
Side Backfill Width:	**0.30**	m	*(Minimum 1.0 foot [0.3048 m])*
Top Backfill Depth:	**0.30**	m	*(Minimum 1.0 foot [0.3048 m] & Maximum 2.0 feet [0.6096 m])*
Stone Void Space:	**40%**		*(Industry Standard is 40%)*
System Invert Elevation:	**100.00**	m	*(Measured at Leveling Bed)*
System Top Cover:	**0.15**	m	*(Measured from Top Backfill to Grade)*

Outputs:

Stone Storage Volume:	488.09	cu.m.
Module Storage Volume:	595.49	cu.m.
Total Storage Volume:	1,083.57	cu.m.

Component Quantities:

	Bottom Layer	Top Layer	Total
Height	12	0	12
# of Modules	4,988	0	4,988
# of Platens	9,976	0	9,976
# of Side Panels	2,510	0	2,510
# of Columns	39,904	0	39,904
# of Stacking Pins	0	N/A	0

Associated Material Quantities:

Required Excavation: 2,221.13 cu.m.
Required Stone Volume: 1,220.22 cu.m.

Estimated Geotextile Required: 2,224.28 sq.m.
(This value is an estimation as roll size, overlaps, waste, etc. may vary)

Estimated Liner Required: 7,184.01 sq.m.
(This value is an estimation, based on liner around the modules, and as roll size, overlaps, waste, etc. may vary)

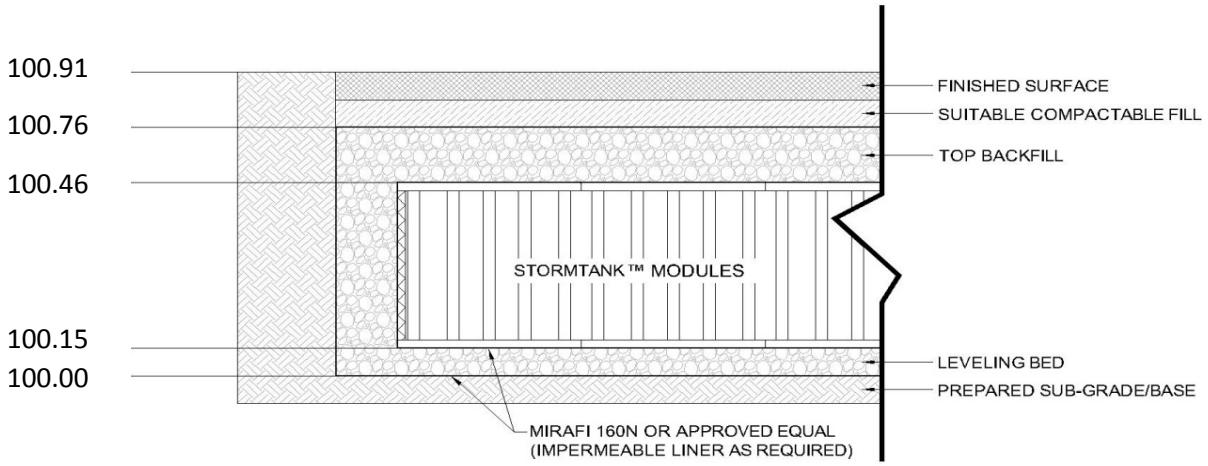
Brentwood Industries, Inc.
610 Morgantown Road, Reading, PA 19611, USA
brentwoodindustries.com
Phone: 610.236.1100
Fax: 610.376.6022

STORMTANK® Module

Stage Storage Tables

SWM Discharge T0

Date: 2017/06/26



STAGE ELEV. (m.)	SITE ELEV. (m.)	STAGE VOLUME (cu. m.)	TOTAL VOLUME (cu. m.)
0.00	0.00	0.00	0.00
0.05	100.05	49.49	49.49
0.10	100.10	49.49	98.98
0.15	100.15	49.49	148.47
0.20	100.20	95.82	244.28
0.25	100.25	111.64	355.92
0.30	100.30	111.64	467.55
0.36	100.36	111.64	579.19
0.41	100.41	111.64	690.83
0.46	100.46	95.82	786.64
0.51	100.51	49.49	836.13
0.56	100.56	49.49	885.62
0.61	100.61	49.49	935.11
0.66	100.66	49.49	984.60
0.71	100.71	49.49	1034.08
0.76	100.76	49.49	1083.57
0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00

STAGE ELEV. (m.)	SITE ELEV. (m.)	STAGE VOLUME (cu. m.)	TOTAL VOLUME (cu. m.)
0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00

Note: Stage elevation 0.00 is the invert of the leveling bed.

Brenwood Industries, Inc.
610 Morgantown Road, Reading, PA 19611, USA
www. brentwoodindustries.com
Phone: 610.236.1100
Fax: 610.376.6022

CUMAC

StormTank Storage Discharge Table

Designed: AS
Checked:
Date: March 2018

SWM Discharge Table:

Orifice #1:		**Orifice #2:**			Overflow Weir:		
Diameter:	225	Diameter:	0	mm	Bottom Length:	0	m
Area:	0.0398	Area:	0.0000	m^2	Sill Elevation:	0	m
C:	0.63	C:	0.63		D/S Weir Length:	0	m
Invert:	100.00	Invert:	0	m	Side Slopes (H:V)	0	:1

	Orifice #1		Orifice #2		Overflow Weir			
Elevation (m)	Head (m)	Discharge (m)	Head (m)	Discharge (m)	Head (m)	Discharge (m)	Hydraulic Control	Discharge (m^3/s)
100.00	0.000	0.000	100.00	0.000	100.00	0	Orifice	0.000
100.05	0.000	0.000	100.05	0.000	100.05	0	Orifice	0.000
100.10	0.000	0.000	100.10	0.000	100.10	0	Orifice	0.000
100.15	0.037	0.021	100.15	0.000	100.15	0	Orifice	0.021
100.20	0.087	0.033	100.20	0.000	100.20	0	Orifice	0.033
100.25	0.137	0.041	100.25	0.000	100.25	0	Orifice	0.041
100.30	0.187	0.048	100.30	0.000	100.30	0	Orifice	0.048
100.35	0.237	0.054	100.35	0.000	100.35	0	Orifice	0.054
100.40	0.287	0.059	100.40	0.000	100.40	0	Orifice	0.059
100.45	0.337	0.064	100.45	0.000	100.45	0	Orifice	0.064
100.50	0.387	0.069	100.50	0.000	100.50	0	Orifice	0.069
100.55	0.437	0.073	100.55	0.000	100.55	0	Orifice	0.073
100.60	0.487	0.077	100.60	0.000	100.60	0	Orifice	0.077
100.65	0.537	0.081	100.65	0.000	100.65	0	Orifice	0.081
100.70	0.587	0.085	100.70	0.000	100.70	0	Orifice	0.085
100.75	0.637	0.089	100.75	0.000	100.75	0	Orifice	0.089

Comments:

1 0.15 - Calculation based on prefered weir flow spreadsheet

2 N/A - Not Applicable

3 Orifice Equation is: $Q = C \times A \times (2gH)^{0.5}$

Where:
Q = flow rate (cms)
C = constant
A = area of opening(sq. m)
H = net head on the orifice
g = Acceleration due to gravity

CUMAC PHASE II
BIO-SWALE VOLUME

Side Slope	3.00	H:1 V	Void Ratio	
Bottom Length	600.00	m	Gravel	0.4
			Engineering soil	0.25
Bottom Width	3.50	m		
Bottom Elev.	100.00	m		
Stage	0.1	m		

Elev. (m)	Depth (m)	Area (m^2)	Volume (m^3)	Accum. Total (m^3)	Accum. Total (ha-m)
100.00	0.00		0.00	0.00	0.0000
100.05	0.05		49.49	49.49	0.0049
100.10	0.10		49.49	98.98	0.0099
100.15	0.15		49.49	148.47	0.0148
100.20	0.20		95.82	244.28	0.0244
100.25	0.25		111.64	355.92	0.0356
100.30	0.30		111.64	467.55	0.0468
100.35	0.35		111.64	579.19	0.0579
100.40	0.40		111.64	690.83	0.0691
100.45	0.45		95.82	786.64	0.0787
100.50	0.50		49.49	836.13	0.0836
100.55	0.55		49.49	885.62	0.0886
100.60	0.60		49.49	935.11	0.0935
100.65	0.65		49.49	984.60	0.0985
100.70	0.70		49.49	1034.08	0.1034
100.75	0.75		49.49	1083.57	0.1084
100.80	0.80	2100	26.25	1109.82	0.1110
100.85	0.85	2100	26.25	1136.07	0.1136
100.90	0.90	2100	26.25	1162.32	0.1162
100.95	0.95	0	0.00	1162.32	0.1162
101.00	1.00	180	109.50	1271.82	0.1272
101.05	1.05	360	114.00	1385.82	0.1386
101.10	1.10	540	118.50	1504.32	0.1504
101.15	1.15	720	123.00	1627.32	0.1627
101.20	1.20	900	127.50	1754.82	0.1755
101.25	1.25	1080	132.00	1886.82	0.1887

CUMAC PHASE II

BIO-SWALE DISCHARGE

Designed: AS
Checked:
Date: March 2018

Bio-swale Discharge Table:

Orifice #1:		**Orifice #2:**			Overflow Weir:		
Diameter:	225	Diameter:	0	mm	Bottom Length:	6.5	m
Area:	0.0398	Area:	0.0000	m^2	Sill Elevation:	101.9	m
C:	0.63	C:	0.63		D/S Weir Length:	10	m
Invert:	100.0	Invert:	100	m	Side Slopes (H:V)	3	:1

	Orifice #1		Orifice #2		Overflow Weir			
Elevation (m)	Head (m)	Discharge (m)	Head (m)	Discharge (m)	Head (m)	Discharge (m)	Hydraulic Control	Discharge (m^3/s)
100.00	0.000	0.000	0.000	0.000	0	0	Orifice	0.000
100.05	0.000	0.000	0.050	0.000	0	0	Orifice	0.000
100.10	0.000	0.000	0.100	0.000	0	0	Orifice	0.000
100.15	0.037	0.021	0.150	0.000	0	0	Orifice	0.021
100.20	0.087	0.033	0.200	0.000	0	0	Orifice	0.033
100.25	0.137	0.041	0.250	0.000	0	0	Orifice	0.041
100.30	0.187	0.048	0.300	0.000	0	0	Orifice	0.048
100.35	0.237	0.054	0.350	0.000	0	0	Orifice	0.054
100.40	0.287	0.059	0.400	0.000	0	0	Orifice	0.059
100.45	0.337	0.064	0.450	0.000	0	0	Orifice	0.064
100.50	0.387	0.069	0.500	0.000	0	0	Orifice	0.069
100.55	0.437	0.073	0.550	0.000	0	0	Orifice	0.073
100.60	0.487	0.077	0.600	0.000	0	0	Orifice	0.077
100.65	0.537	0.081	0.650	0.000	0	0	Orifice	0.081
100.70	0.587	0.085	0.700	0.000	0	0	Orifice	0.085
100.75	0.637	0.089	0.750	0.000	0	0	Orifice	0.089
100.80	0.687	0.092	0.800	0.000	0	0	Orifice	0.092
100.85	0.737	0.095	0.850	0.000	0	0	Orifice	0.095
100.90	0.787	0.098	0.900	0.000	0	0	Orifice	0.098
100.95	0.837	0.102	0.950	0.000	0	0	Orifice	0.102
101.00	0.887	0.105	1.000	0.000	0	0	Orifice	0.105
101.05	0.937	0.107	1.050	0.000	0	0	Orifice	0.107
101.10	0.987	0.110	1.100	0.000	0	0	Orifice	0.110
101.15	1.037	0.113	1.150	0.000	0	0	Orifice	0.113
101.20	1.087	0.116	1.200	0.000	0	0	Orifice	0.116
101.25	1.137	0.118	1.250	0.000	0	0	Orifice	0.118

CUMAC PHASE II
BIO-SWALE STAGE-STORAGE-DISCHARGE TABLE

Designed: AS
Checked:
Date: March 2018

Stormwater Management Bio-swale							
Bio-swale Geometry				Bio-swale Volume (m^3)			Discharge (m^3/s)
Elevation (m)	Depth (m)	Area (m^2)	Avg. Area (m)	Dead	Live	Acc. Total	
100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000
100.05	0.05	0.00	0.00	0.00	49.49	49.49	0.000
100.10	0.10	0.00	0.00	1.00	49.49	98.98	0.000
100.15	0.15	0.00	0.00	2.00	49.49	148.47	0.021
100.20	0.20	0.00	0.00	3.00	95.82	244.28	0.033
100.25	0.25	0.00	0.00	4.00	111.64	355.92	0.041
100.30	0.30	0.00	0.00	5.00	111.64	467.55	0.048
100.35	0.35	0.00	0.00	6.00	111.64	579.19	0.054
100.40	0.40	0.00	0.00	7.00	111.64	690.83	0.059
100.45	0.45	0.00	0.00	8.00	95.82	786.64	0.064
100.50	0.50	0.00	0.00	9.00	49.49	836.13	0.069
100.55	0.55	0.00	0.00	10.00	49.49	885.62	0.073
100.60	0.60	0.00	0.00	11.00	49.49	935.11	0.077
100.65	0.65	0.00	0.00	12.00	49.49	984.60	0.081
100.70	0.70	0.00	0.00	13.00	49.49	1034.08	0.085
100.75	0.75	0.00	0.00	14.00	49.49	1083.57	0.089
100.80	0.80	2100.00	2100.00	15.00	26.25	1109.82	0.092
100.85	0.85	2100.00	2100.00	16.00	26.25	1136.07	0.095
100.90	0.90	2100.00	2100.00	17.00	26.25	1162.32	0.098
100.95	0.95	0.00	0.00	18.00	0.00	1162.32	0.102
101.00	1.00	180.00	180.00	19.00	109.50	1271.82	0.105
101.05	1.05	360.00	360.00	20.00	114.00	1385.82	0.107
101.10	1.10	540.00	540.00	21.00	118.50	1504.32	0.110
101.15	1.15	720.00	720.00	22.00	123.00	1627.32	0.113
101.20	1.20	900.00	900.00	23.00	127.50	1754.82	0.116
101.25	1.25	1080.00	1080.00	24.00	132.00	1886.82	0.118

CUMAC PHASE II
Soakaway Pit Rating Curve Calculations

Designed: AS
Checked:
Date: March 2018

MOE Stormwater Management Planning and Design Manual - March 2003
Roof Leader Discharge to Soakaway Pits

V = Rainfall * Area

Rainfall = 20 mm (Rainfall depth - min. 5 mm - max. 20 mm)
Area = 204 m^2 (Assumed rooftop area)

V = 4.08 m^3

A = 1,000 V / P n t *Equation 4.3 - Infiltration Trench Bottom Area*

P = 50 mm/hr (assumed percolation rate)
n = 0.4 (porosity of clear stone)
t = 24 hr (retention time)

A = 8.5 m^2
L = 2.92 m
W = 2.92 m

Depth (D) = V / A
D = 1.2 m

$D_{max} = P * T$ *Equation 4.2 - Maximum Pit Depth*

T = 24 hr (drawdown time)
D_{max} = 1.2 m

D 0.48 m

D < D_{max}, therefore soakaway pit depth within allowable range

$Q = f * (P / 3{,}600{,}000) * (2 * L_{total} * D + 2 * W * D + L_{total} * W) * n$ *Equation 4.17 - Soakaway Pit Rating Curve*

f = 0.75 (longevity factor)
L_{total} = 131.196 m (total length of 45 soakaway pits)
W = 2.92 m (width of each pit)

Q = 0.0029 m^3/s

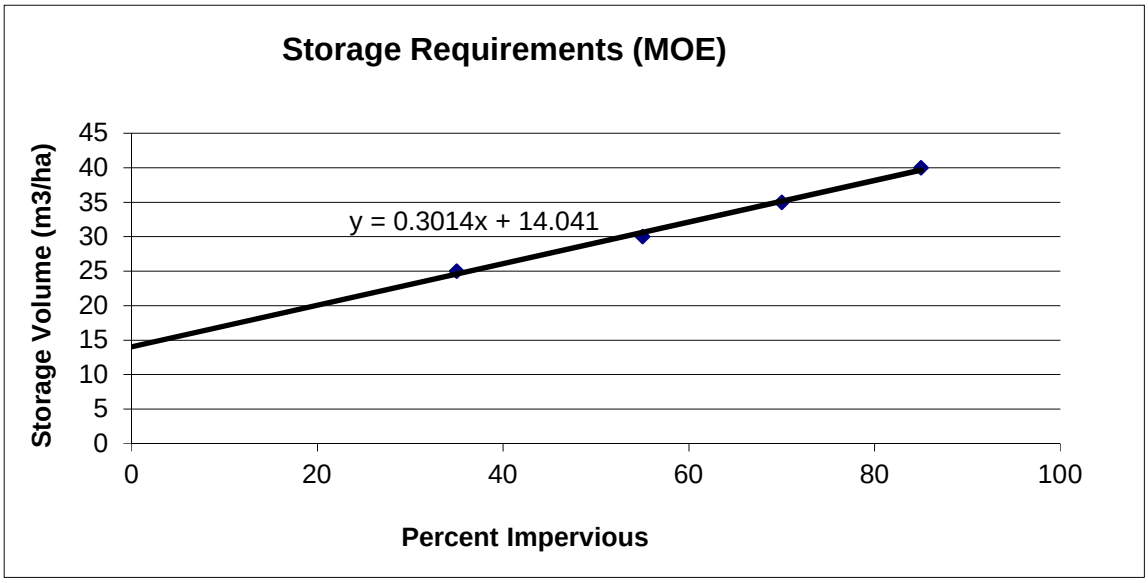
$V = L_{total} * W * D * n * f$

V = 137.7 m^3 = 0.01377 ha.m

Cumac Subdivision - Phase 2
MOE Water Quality Storage Volumes
Combined Bio-swale (Entire Development)

Table 3.2 Values (MOE Drainage Manual)

% imp	storage (m^3/ha)
35	25
55	30
70	35
85	40



Contributing Areas

Catchment	200	Area	1.01	ha	%Impervious	95
Catchment	201	Area	1.54	ha	%Impervious	18
Catchment	202	Area	0.67	ha	%Impervious	45.2
Catchment	203	Area	0.62	ha	%Impervious	19
Catchment	204	Area	0.02	ha	%Impervious	15
Catchment	205	Area	0.47	ha	%Impervious	8
Catchment		Area		ha	%Impervious	
Catchment		Area		ha	%Impervious	
TOTAL AREA			**4.33**	**ha**	**%Impervious**	**39.2**

% Impervious	39.2
Storage Volume (m^3/ha)	25.9
Drainage Area (ha)	4.33
Storage Volume (m^3)	**111.97**

TATHAM ENGINEERING	Project: Cumac Subdivision - Phase II	Date: March 2017
	File No.: 116238-2	Designed: AS
	Subject: Rock Check Dam Spacing	Checked:

Maximum Post-Development Rock Check Dam Spacing

Ditch Slope (m/m)	=	0.005
Depth of Ponding (m)	=	0.3
Rock Check Dam Spacing (m)	=	60

$$L = \frac{\Delta y}{Slope}$$

TATHAM ENGINEERING	Project:	Cumac Subdivision - Phase II	Date:	March 2018
	File No.:	116238-2	Designed:	AS
	Subject:	Phosphorous Budget Assessment	Checked:	

			Existing		Proposed	
LAND USE CATEGORY	Existing Phosphorous Loading Rate (kg/ha/year)	Future Phosphorous Loading Rate (kg/ha/year)	Existing Area (ha)	Existing Phosphorous Loading (kg/year)	Area (ha)	Phosphorous Load (kg/year)
Hay - Pasture	0.07	0.07	0.00	0.00	0.00	0.00
Cropland	0.19	0.19	0.00	0.00	0.00	0.000
Turf -Sod	0.12	0.12	0.00	0.00	2.03	0.24
Quarry	0.08	0.08	0.00	0.00	0.00	0.00
Low Intensity Development	0.13	0.13	0.00	0.00	0.00	0.00
Unpaved Road	0.83	0.83	0.00	0.00	0.00	0.00
High Intensity Development - C/I	1.82	1.82	0.00	0.00	0.00	0.00
High Intensity Development - R	1.32	1.32	0.00	0.00	1.68	2.22
Transition	0.06	0.06	0.00	0.00	0.00	0.00
Polder	0.00	0.00	0.00	0.00	0.00	0.00
Forest	0.05	0.05	4.33	0.22	0.62	0.03
Wetland	0.05	0.05	0.00	0.00	0.00	0.00
Total			4.33	0.22	4.33	2.49

Notes: 1) Phosphorus Loading Rates determined from MOE's Phosphorus Budget Tool in Support of Sustainable Development for the Lake Simcoe Watershed (2012)

Controls

	Removal Efficiency (%)	Proposed	
Area contributing to Infiltration control	Soakaway Pits	Area (ha)	Phosphorous Load (kg/year)
High Intensity Development - R	60%	1.01	0.533
Area contributing to Infiltration control	Grass swale / perforated pipe system	Area (ha)	Phosphorous Load (kg/year)
Turf - Sod	85%	1.54	0.028
High Intensity Development - R		0.67	0.133
Remaining Areas			
Forest		0.62	0.031
Turf - Sod		0.49	0.059
Total Phosphorous pre - infiltration			2.49
Total Phosphorous post - infiltration			0.78

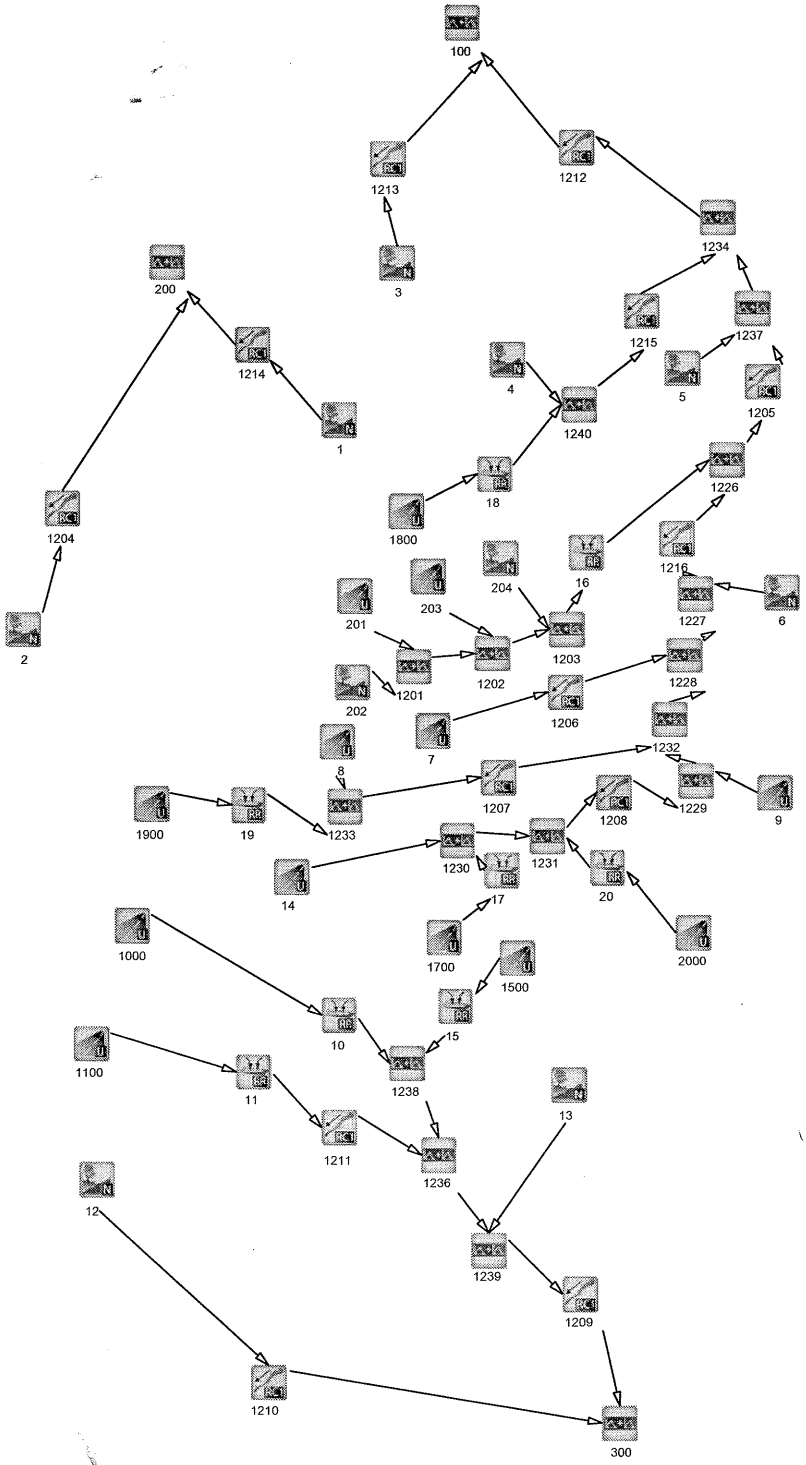
Summary		
Existing Phosphorous Load	0.22	kg/year
Post Development Phosphorous Load (no controls)	2.49	kg/year
Increase	2.28	kg/year
Post Development Phosphorous Load (with controls)	0.78	kg/year

Appendix B:
Master Drainage Plan Option 3
Visual Otthymo Output

MDP OPTION 3

(POST - DEVELOPMENT)

MDP OPTION 3 VO2 MODEL SCHEMATIC



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

 OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM, Version 2.1
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
```


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

Input filename: C:\Program Files\Visual OTTHYMO 2.3.1\voin.dat
Output filename: T:\2804_Everett MSP\SWM Assessment\Everett_VO2_Model_WithChecks\Option 3 Full Development with Local and Regional SWMFs.
Summary filename: T:\2804_Everett MSP\SWM Assessment\Everett_VO2_Model_WithChecks\Option 3 Full Development with Local and Regional SWMFs.

DATE: 27/11/2012 TIME: 3:27:29 PM

USER:

COMMENTS: _____

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

W/E	COMMAND	HYD	ID	DT min	AREA ha	Qpeak cms	Tpeak hrs	R.V. mm	R.C.	Qbase cms
	START @ .00 hrs									
	READ STORM			60.0						
	[Ptot=193.00 mm]									
	fname : T:\2804_Everett MSP\SWM Assessment\Everett_VO2_Model\Storms\Timmins Storm.stm									
	remark: Timmins Storm									
*										
**	CALIB NASHYD	0204	1	8.0	10.89	.49	7.47	84.40	.44	.000
	[CN=54.3]									
	[N = 3.0:Tp .73]									
*										
**	CALIB STANDHYD	0203	1	5.0	14.52	1.07	7.00	114.72	.59	.000
	[I%=25.0:S%= 2.00]									
*										
**	CALIB STANDHYD	0201	1	5.0	47.41	3.78	7.00	126.68	.66	.000
	[I%=35.0:S%= 2.00]									
*										
**	CALIB NASHYD	0202	1	5.0	1.87	.09	7.17	78.13	.40	.000
	[CN=49.0]									
	[N = 3.0:Tp .48]									
*										
*	CALIB STANDHYD	0009	1	5.0	76.82	2.41	7.00	50.42	.26	.000
	[I%=26.4:S%= 1.34]									
*										
*	CALIB STANDHYD	0014	1	5.0	21.40	1.03	7.00	84.27	.44	.000
	[I%=40.1:S%= 1.16]									
*										
*	CALIB STANDHYD	1700	1	5.0	18.84	.78	7.00	76.01	.39	.000
	[I%=33.5:S%= 2.02]									
*										
*	CALIB STANDHYD	2000	1	5.0	44.27	1.29	7.00	63.73	.33	.000
	[I%=23.1:S%= 5.00]									
*										
*	CALIB STANDHYD	1900	1	5.0	64.29	2.00	7.00	56.39	.29	.000
	[I%=26.0:S%= 2.02]									
*										
*	CALIB STANDHYD	0008	1	5.0	33.64	1.66	7.00	83.46	.43	.000
	[I%=41.3:S%= 1.34]									
*										
*	CALIB STANDHYD	0007	1	5.0	56.32	2.51	7.00	71.24	.37	.000
	[I%=37.3:S%= 1.34]									
*										
*	CALIB NASHYD	0006	1	10.0	13.24	.78	7.00	79.87	.41	.000
	[CN=51.9]									
	[N = 3.0:Tp .20]									

TIMMINS REGIONAL.

```
*
  *   CALIB NASHYD       0005  1 10.0   76.24    3.78  7.17  80.50  .42    .000
      [CN=51.4         ]
      [ N = 3.0:Tp  .49]
*
  *   CALIB STANDHYD     1800  1  5.0   40.65    2.06  7.00  81.17  .42    .000
      [I%=42.5:S%= 2.02]
*
  *   CALIB NASHYD       0004  1 10.0   40.29    1.78  7.33  77.98  .40    .000
      [CN=50.1         ]
      [ N = 3.0:Tp  .61]
*
  *   CALIB NASHYD       0003  1 10.0   55.30    3.12  7.17  90.95  .47    .000
      [CN=57.0         ]
      [ N = 3.0:Tp  .50]
*
  *   CALIB NASHYD       0001  1 10.0   48.14    2.87  7.17 101.95  .53    .000
      [CN=62.5         ]
      [ N = 3.0:Tp  .60]
*
  *   CALIB NASHYD       0002  1 10.0  295.09   12.70  7.50  82.04  .43    .000
      [CN=52.4         ]
      [ N = 3.0:Tp  .76]
*
  *   CALIB NASHYD       0012  1 10.0   56.77    3.22  7.17  91.85  .48    .000
      [CN=57.2         ]
      [ N = 3.0:Tp  .50]
*
  *   CALIB NASHYD       0013  1 10.0  193.01   10.66  7.50 105.34  .55    .000
      [CN=64.2         ]
      [ N = 3.0:Tp  .80]
*
  *   CALIB STANDHYD     1000  1  5.0   69.17    2.19  7.00  56.59  .29    .000
      [I%=26.6:S%= 2.02]
*
  *   CALIB STANDHYD     1500  1  5.0   13.50    1.01  7.00 114.62  .59    .000
      [I%=40.0:S%= 2.02]
*
  *   CALIB STANDHYD     1100  1  5.0   76.47    1.54  7.00  32.47  .17    .000
      [I%=17.0:S%= 2.02]
*
      ADD [0201 + 0202]  1201  3  5.0   49.28    3.87  7.00 124.83  n/a    .000
*
      RESRVR [ 2 : 1700] 0017  1  5.0   18.84     .53  7.17  75.98  n/a    .000
      {ST=   .37 ha.m }
*
      RESRVR [ 2 : 2000] 0020  1  5.0   44.27     .19 12.42  45.69  n/a    .000
      {ST=  2.49 ha.m }
*
      RESRVR [ 2 : 1900] 0019  1  5.0   64.29     .26 12.33  56.38  n/a    .000
      {ST=  2.83 ha.m }
*
      ADD [0019 + 0008]  1233  3  5.0   97.93    1.81  7.00  65.68  n/a    .000
*
      CHANNEL[ 2 : 0007] 1206  1  5.0   56.32    2.50  7.00  71.24  n/a    .000
*
      RESRVR [ 2 : 1800] 0018  1  5.0   40.65     .25 12.17  80.46  n/a    .000
      {ST=  2.75 ha.m }
*
      ADD [0018 + 0004]  1240  3  5.0   80.94    1.92  7.33  79.23  n/a    .000
*
      CHANNEL[ 2 : 0003] 1213  1  5.0   55.30    3.07  7.25  90.95  n/a    .000
*
      CHANNEL[ 2 : 0001] 1214  1  5.0   48.14    2.87  7.25 101.95  n/a    .000
*
      CHANNEL[ 2 : 0002] 1204  1  5.0  295.09   12.68  7.50  82.03  n/a    .000
*
      CHANNEL[ 2 : 0012] 1210  1  5.0   56.77    2.94  7.42  91.84  n/a    .000
*
      RESRVR [ 2 : 1000] 0010  1  5.0   69.17    1.42  7.25  56.57  n/a    .000
      {ST=  1.21 ha.m }
*
      RESRVR [ 2 : 1500] 0015  1  5.0   13.50     .59  9.08 114.60  n/a    .000
      {ST=   .56 ha.m }
*
      RESRVR [ 2 : 1100] 0011  1  5.0   76.47     .81  7.58  32.45  n/a    .000
      {ST=   .87 ha.m }
*
      ADD [0203 + 1201]  1202  3  5.0   63.80    4.93  7.00 122.53  n/a    .000
*
      ADD [0014 + 0017]  1230  3  5.0   40.24    1.54  7.00  80.39  n/a    .000
*
      ADD [1230 + 0020]  1231  3  5.0   84.51    1.56  7.00  62.21  n/a    .000
*
      CHANNEL[ 2 : 1233] 1207  1  5.0   97.93    1.80  7.00  65.68  n/a    .000
*
      CHANNEL[ 2 : 1240] 1215  1  5.0   80.94    1.89  7.42  79.22  n/a    .000
*
      ADD [1214 + 1204]  0200  3  5.0  343.23   15.47  7.42  84.83  n/a    .000
```

```
*
      ADD [0010 + 0015]  1238  3  5.0   82.67    1.84  9.00  66.05  n/a    .000
*
      CHANNEL[ 2 : 0011] 1211  1  5.0   76.47     .80  7.83  32.45  n/a    .000
*
      ADD [0204 + 1202]  1203  3  5.0   74.69    5.36  7.00 116.97  n/a    .000
*
      CHANNEL[ 2 : 1231] 1208  1  5.0   84.51    1.52  7.00  62.19  n/a    .000
*
      ADD [1238 + 1211]  1236  3  5.0  159.14    2.64  9.08  49.90  n/a    .000
*
      RESRVR [ 2 : 1203] 0016  1  5.0   74.69    3.37  9.08 116.91  n/a    .000
      {ST=  3.68 ha.m }
*
      ADD [0009 + 1208]  1229  3  5.0  161.33    3.93  7.00  56.59  n/a    .000
*
      ADD [0013 + 1236]  1239  3  5.0  352.15   13.28  7.50  80.29  n/a    .000
*
      ADD [1229 + 1207]  1232  3  5.0  259.26    5.73  7.00  60.02  n/a    .000
*
      CHANNEL[ 2 : 1239] 1209  1  5.0  352.15   13.19  7.58  80.29  n/a    .000
*
      ADD [1232 + 1206]  1228  3  5.0  315.58    8.23  7.00  62.02  n/a    .000
*
      ADD [1210 + 1209]  0300  3  5.0  408.92   16.07  7.58  81.89  n/a    .000
*
      ADD [1228 + 0006]  1227  3  5.0  328.82    9.01  7.00  62.74  n/a    .000
*
      CHANNEL[ 2 : 1227] 1216  1  5.0  328.82    8.97  7.00  62.74  n/a    .000
*
      ADD [0016 + 1216]  1226  3  5.0  403.52    9.83  7.00  72.77  n/a    .000
*
      CHANNEL[ 2 : 1226] 1205  1  5.0  403.52    9.61  7.08  72.75  n/a    .000
*
      ADD [1205 + 0005]  1237  3  5.0  479.76   13.34  7.08  73.98  n/a    .000
*
      ADD [1237 + 1215]  1234  3  5.0  560.70   15.11  7.17  74.74  n/a    .000
*
      CHANNEL[ 2 : 1234] 1212  1  5.0  560.70   14.29  7.33  74.72  n/a    .000
*
      ADD [1212 + 1213]  0100  3  5.0  616.00   17.32  7.33  76.18  n/a    .000
*
  ****************************
  ** SIMULATION NUMBER:   2 **
  ****************************

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

      START @   .00 hrs
      ---------------------
      MASS STORM                   10.0
      [ Ptot=105.16 mm ]
*
  **  CALIB NASHYD       0204  1  8.0   10.89     .25 13.07  29.31  .28    .000
      [CN=54.3        ]
      [ N = 3.0:Tp  .73]
*
  **  CALIB STANDHYD     0203  1  5.0   14.52     .68 12.25  50.22  .48    .000
      [I%=25.0:S%= 2.00]
*
  **  CALIB STANDHYD     0201  1  5.0   47.41    2.55 12.25  58.23  .55    .000
      [I%=35.0:S%= 2.00]
*
  **  CALIB NASHYD       0202  1  5.0    1.87     .05 12.75  27.52  .26    .000
      [CN=49.0        ]
      [ N = 3.0:Tp  .48]
*
  *   CALIB STANDHYD     0009  1  5.0   76.82    2.25 12.08  27.23  .26    .000
      [I%=26.4:S%= 1.34]
*
  *   CALIB STANDHYD     0014  1  5.0   21.40     .99 12.08  41.37  .39    .000
      [I%=40.1:S%= 1.16]
*
  *   CALIB STANDHYD     1700  1  5.0   18.84     .73 12.08  34.56  .33    .000
      [I%=33.5:S%= 2.02]
*
  *   CALIB STANDHYD     2000  1  5.0   44.27    1.20 12.00  23.83  .23    .000
      [I%=23.1:S%= 5.00]
*
  *   CALIB STANDHYD     1900  1  5.0   64.29    1.83 12.08  26.82  .26    .000
      [I%=26.0:S%= 2.02]
*
  *   CALIB STANDHYD     0008  1  5.0   33.64    1.58 12.08  42.60  .41    .000
      [I%=41.3:S%= 1.34]
*
  *   CALIB STANDHYD     0007  1  5.0   56.32    2.37 12.08  38.48  .37    .000
      [I%=37.3:S%= 1.34]
*
```

100 YEAR SCS

```
  *   CALIB NASHYD       0006  1 10.0   13.24     .41 12.33  28.03  .27    .000
      [CN=51.9         ]
      [ N = 3.0:Tp  .20]
*
  *   CALIB NASHYD       0005  1 10.0   76.24    1.95 12.67  28.01  .27    .000
      [CN=51.4         ]
      [ N = 3.0:Tp  .49]
*
  *   CALIB STANDHYD     1800  1  5.0   40.65    1.93 12.08  43.84  .42    .000
      [I%=42.5:S%= 2.02]
*
  *   CALIB NASHYD       0004  1 10.0   40.29     .91 12.83  26.86  .26    .000
      [CN=50.1         ]
      [ N = 3.0:Tp  .61]
*
  *   CALIB NASHYD       0003  1 10.0   55.30    1.67 12.67  32.78  .31    .000
      [CN=57.0         ]
      [ N = 3.0:Tp  .50]
*
  *   CALIB NASHYD       0001  1 10.0   48.14    1.61 12.83  38.25  .36    .000
      [CN=62.5         ]
      [ N = 3.0:Tp  .60]
*
  *   CALIB NASHYD       0002  1 10.0  295.09    6.50 13.00  28.58  .27    .000
      [CN=52.4         ]
      [ N = 3.0:Tp  .76]
*
  *   CALIB NASHYD       0012  1 10.0   56.77    1.74 12.67  33.35  .32    .000
      [CN=57.2         ]
      [ N = 3.0:Tp  .50]
*
  *   CALIB NASHYD       0013  1 10.0  193.01    5.92 13.00  39.98  .38    .000
      [CN=64.2         ]
      [ N = 3.0:Tp  .80]
*
  *   CALIB STANDHYD     1000  1  5.0   69.17    2.01 12.08  27.44  .26    .000
      [I%=26.6:S%= 2.02]
*
  *   CALIB STANDHYD     1500  1  5.0   13.50     .65 12.00  43.58  .41    .000
      [I%=40.0:S%= 2.02]
*
  *   CALIB STANDHYD     1100  1  5.0   76.47    1.41 12.17  17.54  .17    .000
      [I%=17.0:S%= 2.02]
*
      ADD [0201 + 0202]  1201  3  5.0   49.28    2.58 12.25  57.06  n/a    .000
*
      RESRVR [ 2 : 1700] 0017  1  5.0   18.84     .35 12.83  34.53  n/a    .000
      {ST=   .29 ha.m }
*
      RESRVR [ 2 : 2000] 0020  1  5.0   44.27     .01 24.08  11.80  n/a    .000
      {ST=  1.00 ha.m }
*
      RESRVR [ 2 : 1900] 0019  1  5.0   64.29     .13 16.50  26.80  n/a    .000
      {ST=  1.21 ha.m }
*
      ADD [0019 + 0008]  1233  3  5.0   97.93    1.67 12.08  32.23  n/a    .000
*
      CHANNEL[ 2 : 0007] 1206  1  5.0   56.32    2.31 12.17  38.48  n/a    .000
*
      RESRVR [ 2 : 1800] 0018  1  5.0   40.65     .09 17.25  43.30  n/a    .000
      {ST=  1.35 ha.m }
*
      ADD [0018 + 0004]  1240  3  5.0   80.94    1.00 12.83  35.12  n/a    .000
*
      CHANNEL[ 2 : 0003] 1213  1  5.0   55.30    1.64 12.83  32.77  n/a    .000
*
      CHANNEL[ 2 : 0001] 1214  1  5.0   48.14    1.60 12.92  38.25  n/a    .000
*
      CHANNEL[ 2 : 0002] 1204  1  5.0  295.09    6.47 13.08  28.58  n/a    .000
*
      CHANNEL[ 2 : 0012] 1210  1  5.0   56.77    1.53 13.00  33.34  n/a    .000
*
      RESRVR [ 2 : 1000] 0010  1  5.0   69.17     .89 13.00  27.42  n/a    .000
      {ST=   .98 ha.m }
*
      RESRVR [ 2 : 1500] 0015  1  5.0   13.50     .18 13.17  43.55  n/a    .000
      {ST=   .27 ha.m }
*
      RESRVR [ 2 : 1100] 0011  1  5.0   76.47     .54 13.17  17.52  n/a    .000
      {ST=   .68 ha.m }
*
      ADD [0203 + 1201]  1202  3  5.0   63.80    3.26 12.25  55.50  n/a    .000
*
      ADD [0014 + 0017]  1230  3  5.0   40.24    1.17 12.17  38.17  n/a    .000
*
      ADD [1230 + 0020]  1231  3  5.0   84.51    1.18 12.17  24.35  n/a    .000
*
      CHANNEL[ 2 : 1233] 1207  1  5.0   97.93    1.60 12.25  32.23  n/a    .000
*
```

```
      CHANNEL[ 2 : 1240] 1215  1  5.0   80.94     .98 13.00  35.11  n/a    .000
*
      ADD [1214 + 1204]  0200  3  5.0  343.23    8.02 13.08  29.94  n/a    .000
*
      ADD [0010 + 0015]  1238  3  5.0   82.67    1.06 13.00  30.06  n/a    .000
*
      CHANNEL[ 2 : 0011] 1211  1  5.0   76.47     .53 13.33  17.52  n/a    .000
*
      ADD [0204 + 1202]  1203  3  5.0   74.69    3.41 12.33  51.69  n/a    .000
*
      CHANNEL[ 2 : 1231] 1208  1  5.0   84.51    1.14 12.33  24.34  n/a    .000
*
      ADD [1238 + 1211]  1236  3  5.0  159.14    1.57 13.08  24.03  n/a    .000
*
      RESRVR [ 2 : 1203] 0016  1  5.0   74.69     .70 14.58  51.62  n/a    .000
      {ST=  2.28 ha.m }
*
      ADD [0009 + 1208]  1229  3  5.0  161.33    3.33 12.17  25.72  n/a    .000
*
      ADD [0013 + 1236]  1239  3  5.0  352.15    7.49 13.00  32.77  n/a    .000
*
      ADD [1229 + 1207]  1232  3  5.0  259.26    4.92 12.17  28.18  n/a    .000
*
      CHANNEL[ 2 : 1239] 1209  1  5.0  352.15    7.41 13.17  32.77  n/a    .000
*
      ADD [1232 + 1206]  1228  3  5.0  315.58    7.23 12.17  30.02  n/a    .000
*
      ADD [1210 + 1209]  0300  3  5.0  408.92    8.92 13.17  32.85  n/a    .000
*
      ADD [1228 + 0006]  1227  3  5.0  328.82    7.63 12.17  29.94  n/a    .000
*
      CHANNEL[ 2 : 1227] 1216  1  5.0  328.82    7.61 12.25  29.93  n/a    .000
*
      ADD [0016 + 1216]  1226  3  5.0  403.52    7.83 12.25  33.95  n/a    .000
*
      CHANNEL[ 2 : 1226] 1205  1  5.0  403.52    7.41 12.42  33.94  n/a    .000
*
      ADD [1205 + 0005]  1237  3  5.0  479.76    9.23 12.50  33.00  n/a    .000
*
      ADD [1237 + 1215]  1234  3  5.0  560.70    9.99 12.50  33.30  n/a    .000
*
      CHANNEL[ 2 : 1234] 1212  1  5.0  560.70    9.55 12.75  33.29  n/a    .000
*
      ADD [1212 + 1213]  0100  3  5.0  616.00   11.18 12.75  33.24  n/a    .000
*
  ****************************
  ** SIMULATION NUMBER:   3 **
  ****************************

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

      START @   .00 hrs
      ---------------------
      MASS STORM                   10.0
      [ Ptot= 86.04 mm ]
*
  **  CALIB NASHYD       0204  1  8.0   10.89     .17 13.07  19.95  .23    .000
      [CN=54.3          ]
      [ N = 3.0:Tp  .73]
*
  **  CALIB STANDHYD     0203  1  5.0   14.52     .49 12.25  38.06  .44    .000
      [I%=25.0:S%= 2.00]
*
  **  CALIB STANDHYD     0201  1  5.0   47.41    1.95 12.25  44.94  .52    .000
      [I%=35.0:S%= 2.00]
*
  **  CALIB NASHYD       0202  1  5.0    1.87     .03 12.75  19.01  .22    .000
      [CN=49.0          ]
      [ N = 3.0:Tp  .48]
*
  *   CALIB STANDHYD     0009  1  5.0   76.82    1.82 12.08  22.19  .26    .000
      [I%=26.4:S%= 1.34]
*
  *   CALIB STANDHYD     0014  1  5.0   21.40     .80 12.08  33.70  .39    .000
      [I%=40.1:S%= 1.16]
*
  *   CALIB STANDHYD     1700  1  5.0   18.84     .59 12.08  28.15  .33    .000
      [I%=33.5:S%= 2.02]
*
  *   CALIB STANDHYD     2000  1  5.0   44.27     .96 12.08  19.41  .23    .000
      [I%=23.1:S%= 5.00]
*
  *   CALIB STANDHYD     1900  1  5.0   64.29    1.48 12.17  21.85  .25    .000
      [I%=26.0:S%= 2.02]
*
  *   CALIB STANDHYD     0008  1  5.0   33.64    1.28 12.08  34.71  .40    .000
      [I%=41.3:S%= 1.34]
*
```

25-YEAR SCS

```
*   CALIB STANDHYD     0007  1  5.0   56.32    1.92 12.08  31.35  .36    .000
    [I%=37.3:S%= 1.34]
*
*   CALIB NASHYD       0006  1 10.0   13.24     .28 12.33  19.25  .22    .000
    [CN=51.9         ]
    [ N = 3.0:Tp  .20]
*
*   CALIB NASHYD       0005  1 10.0   76.24    1.32 12.67  19.17  .22    .000
    [CN=51.4         ]
    [ N = 3.0:Tp  .49]
*
*   CALIB STANDHYD     1800  1  5.0   40.65    1.56 12.08  35.72  .42    .000
    [I%=42.5:S%= 2.02]
*
*   CALIB NASHYD       0004  1 10.0   40.29     .61 12.83  18.31  .21    .000
    [CN=50.1         ]
    [ N = 3.0:Tp  .61]
*
*   CALIB NASHYD       0003  1 10.0   55.30    1.14 12.67  22.67  .26    .000
    [CN=57.0         ]
    [ N = 3.0:Tp  .50]
*
*   CALIB NASHYD       0001  1 10.0   48.14    1.12 12.83  26.81  .31    .000
    [CN=62.5         ]
    [ N = 3.0:Tp  .60]
*
*   CALIB NASHYD       0002  1 10.0  295.09    4.39 13.00  19.54  .23    .000
    [CN=52.4         ]
    [ N = 3.0:Tp  .76]
*
*   CALIB NASHYD       0012  1 10.0   56.77    1.19 12.67  23.15  .27    .000
    [CN=57.2         ]
    [ N = 3.0:Tp  .50]
*
*   CALIB NASHYD       0013  1 10.0  193.01    4.11 13.00  28.13  .33    .000
    [CN=64.2         ]
    [ N = 3.0:Tp  .80]
*
*   CALIB STANDHYD     1000  1  5.0   69.17    1.62 12.17  22.35  .26    .000
    [I%=26.6:S%= 2.02]
*
*   CALIB STANDHYD     1500  1  5.0   13.50     .53 12.00  33.62  .39    .000
    [I%=40.0:S%= 2.02]
*
*   CALIB STANDHYD     1100  1  5.0   76.47    1.14 12.17  14.29  .17    .000
    [I%=17.0:S%= 2.02]
*
    ADD [0201 + 0202]  1201  3  5.0   49.28    1.98 12.25  43.96  n/a    .000
*
    RESRVR [ 2 : 1700] 0017  1  5.0   18.84     .26 12.92  28.12  n/a    .000
    {ST=   .25 ha.m }
*
    RESRVR [ 2 : 2000] 0020  1  5.0   44.27     .01 24.17   9.23  n/a    .000
    {ST=   .82 ha.m }
*
    RESRVR [ 2 : 1900] 0019  1  5.0   64.29     .11 16.33  21.83  n/a    .000
    {ST=   .97 ha.m }
*
    ADD [0019 + 0008]  1233  3  5.0   97.93    1.37 12.08  26.26  n/a    .000
*
    CHANNEL[ 2 : 0007] 1206  1  5.0   56.32    1.87 12.17  31.34  n/a    .000
*
    RESRVR [ 2 : 1800] 0018  1  5.0   40.65     .09 17.08  35.25  n/a    .000
    {ST=  1.08 ha.m }
*
    ADD [0018 + 0004]  1240  3  5.0   80.94     .69 12.83  26.82  n/a    .000
*
    CHANNEL[ 2 : 0003] 1213  1  5.0   55.30    1.12 12.83  22.66  n/a    .000
*
    CHANNEL[ 2 : 0001] 1214  1  5.0   48.14    1.11 12.92  26.81  n/a    .000
*
    CHANNEL[ 2 : 0002] 1204  1  5.0  295.09    4.37 13.17  19.54  n/a    .000
*
    CHANNEL[ 2 : 0012] 1210  1  5.0   56.77    1.03 13.08  23.14  n/a    .000
*
    RESRVR [ 2 : 1000] 0010  1  5.0   69.17     .46 13.42  22.34  n/a    .000
    {ST=   .86 ha.m }
*
    RESRVR [ 2 : 1500] 0015  1  5.0   13.50     .14 13.08  33.59  n/a    .000
    {ST=   .22 ha.m }
*
    RESRVR [ 2 : 1100] 0011  1  5.0   76.47     .41 13.25  14.27  n/a    .000
    {ST=   .57 ha.m }
*
    ADD [0203 + 1201]  1202  3  5.0   63.80    2.47 12.25  42.61  n/a    .000
*
    ADD [0014 + 0017]  1230  3  5.0   40.24     .90 12.25  31.09  n/a    .000
*
    ADD [1230 + 0020]  1231  3  5.0   84.51     .90 12.25  19.64  n/a    .000
```

```
*
      CHANNEL[ 2 : 1233] 1207  1  5.0   97.93    1.30 12.25  26.26  n/a    .000
*
      CHANNEL[ 2 : 1240] 1215  1  5.0   80.94     .68 13.00  26.82  n/a    .000
*
      ADD [1214 + 1204]  0200  3  5.0  343.23    5.45 13.08  20.56  n/a    .000
*
      ADD [0010 + 0015]  1238  3  5.0   82.67     .61 13.42  24.18  n/a    .000
*
      CHANNEL[ 2 : 0011] 1211  1  5.0   76.47     .40 13.50  14.27  n/a    .000
*
      ADD [0204 + 1202]  1203  3  5.0   74.69    2.56 12.33  39.33  n/a    .000
*
      CHANNEL[ 2 : 1231] 1208  1  5.0   84.51     .88 12.33  19.62  n/a    .000
*
      ADD [1238 + 1211]  1236  3  5.0  159.14    1.01 13.42  19.42  n/a    .000
*
      RESRVR [ 2 : 1203] 0016  1  5.0   74.69     .53 14.67  39.26  n/a    .000
      {ST=  1.77 ha.m }
*
      ADD [0009 + 1208]  1229  3  5.0  161.33    2.65 12.17  20.84  n/a    .000
*
      ADD [0013 + 1236]  1239  3  5.0  352.15    5.10 13.17  24.19  n/a    .000
*
      ADD [1229 + 1207]  1232  3  5.0  259.26    3.94 12.17  22.89  n/a    .000
*
      CHANNEL[ 2 : 1239] 1209  1  5.0  352.15    5.04 13.25  24.19  n/a    .000
*
      ADD [1232 + 1206]  1228  3  5.0  315.58    5.81 12.17  24.40  n/a    .000
*
      ADD [1210 + 1209]  0300  3  5.0  408.92    6.04 13.25  24.04  n/a    .000
*
      ADD [1228 + 0006]  1227  3  5.0  328.82    6.08 12.17  24.19  n/a    .000
*
      CHANNEL[ 2 : 1227] 1216  1  5.0  328.82    6.08 12.25  24.19  n/a    .000
*
      ADD [0016 + 1216]  1226  3  5.0  403.52    6.20 12.25  26.98  n/a    .000
*
      CHANNEL[ 2 : 1226] 1205  1  5.0  403.52    5.84 12.42  26.97  n/a    .000
*
      ADD [1205 + 0005]  1237  3  5.0  479.76    7.08 12.50  25.75  n/a    .000
*
      ADD [1237 + 1215]  1234  3  5.0  560.70    7.60 12.50  25.90  n/a    .000
*
      CHANNEL[ 2 : 1234] 1212  1  5.0  560.70    7.16 12.75  25.89  n/a    .000
*
      ADD [1212 + 1213]  0100  3  5.0  616.00    8.27 12.75  25.60  n/a    .000
*
  ****************************
  ** SIMULATION NUMBER:   4 **
  ****************************

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

      START @   .00 hrs
      --------------------
      MASS STORM                   10.0
      [ Ptot= 64.53 mm ]
*
  **  CALIB NASHYD       0204  1  8.0   10.89     .09 13.07  11.08  .17    .000
      [CN=54.3         ]
      [ N = 3.0:Tp  .73]
*
  **  CALIB STANDHYD     0203  1  5.0   14.52     .32 12.25  25.57  .40    .000
      [I%=25.0:S%= 2.00]
*
  **  CALIB STANDHYD     0201  1  5.0   47.41    1.33 12.33  31.02  .48    .000
      [I%=35.0:S%= 2.00]
*
  **  CALIB NASHYD       0202  1  5.0    1.87     .02 12.75  10.94  .17    .000
      [CN=49.0         ]
      [ N = 3.0:Tp  .48]
*
   *  CALIB STANDHYD     0009  1  5.0   76.82    1.34 12.17  16.51  .26    .000
      [I%=26.4:S%= 1.34]
*
   *  CALIB STANDHYD     0014  1  5.0   21.40     .60 12.08  25.07  .39    .000
      [I%=40.1:S%= 1.16]
*
   *  CALIB STANDHYD     1700  1  5.0   18.84     .44 12.08  20.95  .32    .000
      [I%=33.5:S%= 2.02]
*
   *  CALIB STANDHYD     2000  1  5.0   44.27     .72 12.08  14.44  .22    .000
      [I%=23.1:S%= 5.00]
*
   *  CALIB STANDHYD     1900  1  5.0   64.29    1.09 12.17  16.26  .25    .000
      [I%=26.0:S%= 2.02]
*
```

```
   *    CALIB STANDHYD      0008  1  5.0    33.64     .95 12.08  25.82  .40    .000
        [I%=41.3:S%= 1.34]
   *
   *    CALIB STANDHYD      0007  1  5.0    56.32    1.42 12.08  23.32  .36    .000
        [I%=37.3:S%= 1.34]
   *
   *    CALIB NASHYD        0006  1 10.0    13.24     .15 12.33  10.92  .17    .000
        [CN=51.9          ]
        [ N = 3.0:Tp  .20]
   *
   *    CALIB NASHYD        0005  1 10.0    76.24     .73 12.83  10.80  .17    .000
        [CN=51.4          ]
        [ N = 3.0:Tp  .49]
   *
   *    CALIB STANDHYD      1800  1  5.0    40.65    1.15 12.17  26.58  .41    .000
        [I%=42.5:S%= 2.02]
   *
   *    CALIB NASHYD        0004  1 10.0    40.29     .34 12.83  10.25  .16    .000
        [CN=50.1          ]
        [ N = 3.0:Tp  .61]
   *
   *    CALIB NASHYD        0003  1 10.0    55.30     .64 12.83  12.95  .20    .000
        [CN=57.0          ]
        [ N = 3.0:Tp  .50]
   *
   *    CALIB NASHYD        0001  1 10.0    48.14     .64 12.83  15.62  .24    .000
        [CN=62.5          ]
        [ N = 3.0:Tp  .60]
   *
   *    CALIB NASHYD        0002  1 10.0   295.09    2.41 13.17  10.98  .17    .000
        [CN=52.4          ]
        [ N = 3.0:Tp  .76]
   *
   *    CALIB NASHYD        0012  1 10.0    56.77     .68 12.83  13.32  .21    .000
        [CN=57.2          ]
        [ N = 3.0:Tp  .50]
   *
   *    CALIB NASHYD        0013  1 10.0   193.01    2.37 13.17  16.47  .26    .000
        [CN=64.2          ]
        [ N = 3.0:Tp  .80]
   *
   *    CALIB STANDHYD      1000  1  5.0    69.17    1.19 12.17  16.63  .26    .000
        [I%=26.6:S%= 2.02]
   *
   *    CALIB STANDHYD      1500  1  5.0    13.50     .39 12.00  25.01  .39    .000
        [I%=40.0:S%= 2.02]
   *
   *    CALIB STANDHYD      1100  1  5.0    76.47     .84 12.17  10.63  .16    .000
        [I%=17.0:S%= 2.02]
   *
        ADD [0201 + 0202]   1201  3  5.0    49.28    1.35 12.33  30.26  n/a    .000
   *
        RESRVR [ 2 : 1700] 0017  1  5.0    18.84     .15 13.08  20.92  n/a    .000
        {ST=   .20 ha.m }
   *
        RESRVR [ 2 : 2000] 0020  1  5.0    44.27     .01 24.17   6.77  n/a    .000
        {ST=   .61 ha.m }
   *
        RESRVR [ 2 : 1900] 0019  1  5.0    64.29     .10 15.17  16.24  n/a    .000
        {ST=   .71 ha.m }
   *
        ADD [0019 + 0008]   1233  3  5.0    97.93    1.02 12.08  19.53  n/a    .000
   *
        CHANNEL[ 2 : 0007] 1206  1  5.0    56.32    1.38 12.25  23.32  n/a    .000
   *
        RESRVR [ 2 : 1800] 0018  1  5.0    40.65     .08 16.75  26.19  n/a    .000
        {ST=   .79 ha.m }
   *
        ADD [0018 + 0004]   1240  3  5.0    80.94     .41 13.00  18.26  n/a    .000
   *
        CHANNEL[ 2 : 0003] 1213  1  5.0    55.30     .63 12.92  12.95  n/a    .000
   *
        CHANNEL[ 2 : 0001] 1214  1  5.0    48.14     .63 12.92  15.62  n/a    .000
   *
        CHANNEL[ 2 : 0002] 1204  1  5.0   295.09    2.41 13.17  10.98  n/a    .000
   *
        CHANNEL[ 2 : 0012] 1210  1  5.0    56.77     .56 13.17  13.31  n/a    .000
   *
        RESRVR [ 2 : 1000] 0010  1  5.0    69.17     .30 13.67  16.62  n/a    .000
        {ST=   .67 ha.m }
   *
        RESRVR [ 2 : 1500] 0015  1  5.0    13.50     .11 13.08  24.98  n/a    .000
        {ST=   .16 ha.m }
   *
        RESRVR [ 2 : 1100] 0011  1  5.0    76.47     .27 13.42  10.61  n/a    .000
        {ST=   .45 ha.m }
   *
        ADD [0203 + 1201]   1202  3  5.0    63.80    1.67 12.33  29.19  n/a    .000
   *
```

5-YEAR SCS

	ADD [0014 + 0017]	1230	3	5.0	40.24	.65	12.08	23.13	n/a	.000
*											
	ADD [1230 + 0020]	1231	3	5.0	84.51	.65	12.08	14.56	n/a	.000
*											
	CHANNEL[2 : 1233]	1207	1	5.0	97.93	.97	12.25	19.53	n/a	.000
*											
	CHANNEL[2 : 1240]	1215	1	5.0	80.94	.40	13.08	18.26	n/a	.000
*											
	ADD [1214 + 1204]	0200	3	5.0	343.23	3.02	13.08	11.63	n/a	.000
*											
	ADD [0010 + 0015]	1238	3	5.0	82.67	.41	13.58	17.98	n/a	.000
*											
	CHANNEL[2 : 0011]	1211	1	5.0	76.47	.27	13.58	10.61	n/a	.000
*											
	ADD [0204 + 1202]	1203	3	5.0	74.69	1.72	12.33	26.55	n/a	.000
*											
	CHANNEL[2 : 1231]	1208	1	5.0	84.51	.62	12.25	14.55	n/a	.000
*											
	ADD [1238 + 1211]	1236	3	5.0	159.14	.67	13.58	14.44	n/a	.000
*											
	RESRVR [2 : 1203]	0016	1	5.0	74.69	.25	15.33	26.49	n/a	.000
	{ST= 1.28 ha.m }										
*											
	ADD [0009 + 1208]	1229	3	5.0	161.33	1.94	12.17	15.48	n/a	.000
*											
	ADD [0013 + 1236]	1239	3	5.0	352.15	3.02	13.17	15.56	n/a	.000
*											
	ADD [1229 + 1207]	1232	3	5.0	259.26	2.92	12.25	17.01	n/a	.000
*											
	CHANNEL[2 : 1239]	1209	1	5.0	352.15	2.96	13.33	15.56	n/a	.000
*											
	ADD [1232 + 1206]	1228	3	5.0	315.58	4.30	12.25	18.14	n/a	.000
*											
	ADD [1210 + 1209]	0300	3	5.0	408.92	3.50	13.33	15.25	n/a	.000
*											
	ADD [1228 + 0006]	1227	3	5.0	328.82	4.45	12.25	17.85	n/a	.000
*											
	CHANNEL[2 : 1227]	1216	1	5.0	328.82	4.42	12.33	17.85	n/a	.000
*											
	ADD [0016 + 1216]	1226	3	5.0	403.52	4.48	12.33	19.45	n/a	.000
*											
	CHANNEL[2 : 1226]	1205	1	5.0	403.52	4.20	12.50	19.44	n/a	.000
*											
	ADD [1205 + 0005]	1237	3	5.0	479.76	4.88	12.50	18.07	n/a	.000
*											
	ADD [1237 + 1215]	1234	3	5.0	560.70	5.18	12.58	18.09	n/a	.000
*											
	CHANNEL[2 : 1234]	1212	1	5.0	560.70	4.82	12.83	18.09	n/a	.000
*											
	ADD [1212 + 1213]	0100	3	5.0	616.00	5.44	12.83	17.63	n/a	.000
*											

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

W/E	COMMAND	HYD ID	DT min	AREA ha	Qpeak cms	Tpeak hrs	R.V. mm	R.C.	Qbase cms
	START @ .00 hrs								

	MASS STORM		10.0						
	[Ptot= 50.19 mm]								
*									
**	CALIB NASHYD	0204 1	8.0	10.89	.05	13.20	6.36	.13	.000
	[CN=54.3]								
	[N = 3.0:Tp .73]								
*									
**	CALIB STANDHYD	0203 1	5.0	14.52	.23	12.17	18.10	.36	.000
	[I%=25.0:S%= 2.00]								
*									
**	CALIB STANDHYD	0201 1	5.0	47.41	.95	12.33	22.48	.45	.000
	[I%=35.0:S%= 2.00]								
*									
**	CALIB NASHYD	0202 1	5.0	1.87	.01	12.75	6.60	.13	.000
	[CN=49.0]								
	[N = 3.0:Tp .48]								
*									
*	CALIB STANDHYD	0009 1	5.0	76.82	1.02	12.17	12.72	.25	.000
	[I%=26.4:S%= 1.34]								
*									
*	CALIB STANDHYD	0014 1	5.0	21.40	.46	12.08	19.32	.39	.000
	[I%=40.1:S%= 1.16]								
*									
*	CALIB STANDHYD	1700 1	5.0	18.84	.34	12.08	16.14	.32	.000
	[I%=33.5:S%= 2.02]								
*									
*	CALIB STANDHYD	2000 1	5.0	44.27	.55	12.08	11.13	.22	.000
	[I%=23.1:S%= 5.00]								
*									

```
   *   CALIB STANDHYD     1900  1  5.0   64.29     .83 12.25  12.53  .25    .000
       [I%=26.0:S%= 2.02]
   *
   *   CALIB STANDHYD     0008  1  5.0   33.64     .73 12.08  19.90  .40    .000
       [I%=41.3:S%= 1.34]
   *
   *   CALIB STANDHYD     0007  1  5.0   56.32    1.08 12.17  17.97  .36    .000
       [I%=37.3:S%= 1.34]
   *
   *   CALIB NASHYD       0006  1 10.0   13.24     .09 12.33   6.45  .13    .000
       [CN=51.9         ]
       [ N = 3.0:Tp  .20]
   *
   *   CALIB NASHYD       0005  1 10.0   76.24     .42 12.83   6.33  .13    .000
       [CN=51.4         ]
       [ N = 3.0:Tp  .49]
   *
   *   CALIB STANDHYD     1800  1  5.0   40.65     .88 12.17  20.48  .41    .000
       [I%=42.5:S%= 2.02]
   *
   *   CALIB NASHYD       0004  1 10.0   40.29     .19 13.00   5.98  .12    .000
       [CN=50.1         ]
       [ N = 3.0:Tp  .61]
   *
   *   CALIB NASHYD       0003  1 10.0   55.30     .37 12.83   7.67  .15    .000
       [CN=57.0         ]
       [ N = 3.0:Tp  .50]
   *
   *   CALIB NASHYD       0001  1 10.0   48.14     .38 12.83   9.42  .19    .000
       [CN=62.5         ]
       [ N = 3.0:Tp  .60]
   *
   *   CALIB NASHYD       0002  1 10.0  295.09    1.38 13.17   6.41  .13    .000
       [CN=52.4         ]
       [ N = 3.0:Tp  .76]
   *
   *   CALIB NASHYD       0012  1 10.0   56.77     .40 12.83   7.96  .16    .000
       [CN=57.2         ]
       [ N = 3.0:Tp  .50]
   *
   *   CALIB NASHYD       0013  1 10.0  193.01    1.41 13.17   9.97  .20    .000
       [CN=64.2         ]
       [ N = 3.0:Tp  .80]
   *
   *   CALIB STANDHYD     1000  1  5.0   69.17     .91 12.25  12.82  .26    .000
       [I%=26.6:S%= 2.02]
   *
   *   CALIB STANDHYD     1500  1  5.0   13.50     .30 12.00  19.28  .38    .000
       [I%=40.0:S%= 2.02]
   *
   *   CALIB STANDHYD     1100  1  5.0   76.47     .64 12.25   8.19  .16    .000
       [I%=17.0:S%= 2.02]
   *
       ADD [0201 + 0202]  1201  3  5.0   49.28     .96 12.33  21.88  n/a    .000
   *
       RESRVR [ 2 : 1700] 0017  1  5.0   18.84     .07 13.67  16.11  n/a    .000
       {ST=   .17 ha.m }
   *
       RESRVR [ 2 : 2000] 0020  1  5.0   44.27     .01 24.25   5.22  n/a    .000
       {ST=   .47 ha.m }
   *
       RESRVR [ 2 : 1900] 0019  1  5.0   64.29     .09 14.92  12.51  n/a    .000
       {ST=   .54 ha.m }
   *
       ADD [0019 + 0008]  1233  3  5.0   97.93     .79 12.08  15.05  n/a    .000
   *
       CHANNEL[ 2 : 0007] 1206  1  5.0   56.32    1.05 12.33  17.97  n/a    .000
   *
       RESRVR [ 2 : 1800] 0018  1  5.0   40.65     .07 16.25  20.15  n/a    .000
       {ST=   .60 ha.m }
   *
       ADD [0018 + 0004]  1240  3  5.0   80.94     .26 13.00  13.09  n/a    .000
   *
       CHANNEL[ 2 : 0003] 1213  1  5.0   55.30     .36 12.92   7.67  n/a    .000
   *
       CHANNEL[ 2 : 0001] 1214  1  5.0   48.14     .37 13.00   9.41  n/a    .000
   *
       CHANNEL[ 2 : 0002] 1204  1  5.0  295.09    1.37 13.25   6.41  n/a    .000
   *
       CHANNEL[ 2 : 0012] 1210  1  5.0   56.77     .31 13.25   7.95  n/a    .000
   *
       RESRVR [ 2 : 1000] 0010  1  5.0   69.17     .19 13.92  12.80  n/a    .000
       {ST=   .54 ha.m }
   *
       RESRVR [ 2 : 1500] 0015  1  5.0   13.50     .08 13.17  19.25  n/a    .000
       {ST=   .13 ha.m }
   *
       RESRVR [ 2 : 1100] 0011  1  5.0   76.47     .18 13.67   8.18  n/a    .000
       {ST=   .37 ha.m }
```

2-YEAR SCS

```
*
      ADD [0203 + 1201]  1202  3  5.0   63.80    1.18 12.25  21.02  n/a    .000
*
      ADD [0014 + 0017]  1230  3  5.0   40.24     .50 12.08  17.82  n/a    .000
*
      ADD [1230 + 0020]  1231  3  5.0   84.51     .50 12.08  11.22  n/a    .000
*
      CHANNEL[ 2 : 1233] 1207  1  5.0   97.93     .75 12.33  15.05  n/a    .000
*
      CHANNEL[ 2 : 1240] 1215  1  5.0   80.94     .25 13.17  13.09  n/a    .000
*
      ADD [1214 + 1204]  0200  3  5.0  343.23    1.73 13.17   6.83  n/a    .000
*
      ADD [0010 + 0015]  1238  3  5.0   82.67     .27 13.75  13.85  n/a    .000
*
      CHANNEL[ 2 : 0011] 1211  1  5.0   76.47     .17 13.92   8.17  n/a    .000
*
      ADD [0204 + 1202]  1203  3  5.0   74.69    1.20 12.33  18.88  n/a    .000
*
      CHANNEL[ 2 : 1231] 1208  1  5.0   84.51     .48 12.33  11.21  n/a    .000
*
      ADD [1238 + 1211]  1236  3  5.0  159.14     .45 13.83  11.13  n/a    .000
*
      RESRVR [ 2 : 1203] 0016  1  5.0   74.69     .15 16.50  18.83  n/a    .000
      {ST=   .96 ha.m }
*
      ADD [0009 + 1208]  1229  3  5.0  161.33    1.49 12.25  11.93  n/a    .000
*
      ADD [0013 + 1236]  1239  3  5.0  352.15    1.81 13.17  10.49  n/a    .000
*
      ADD [1229 + 1207]  1232  3  5.0  259.26    2.24 12.25  13.11  n/a    .000
*
      CHANNEL[ 2 : 1239] 1209  1  5.0  352.15    1.77 13.42  10.49  n/a    .000
*
      ADD [1232 + 1206]  1228  3  5.0  315.58    3.30 12.25  13.98  n/a    .000
*
      ADD [1210 + 1209]  0300  3  5.0  408.92    2.07 13.42  10.14  n/a    .000
*
      ADD [1228 + 0006]  1227  3  5.0  328.82    3.38 12.25  13.67  n/a    .000
*
      CHANNEL[ 2 : 1227] 1216  1  5.0  328.82    3.37 12.33  13.67  n/a    .000
*
      ADD [0016 + 1216]  1226  3  5.0  403.52    3.42 12.33  14.63  n/a    .000
*
      CHANNEL[ 2 : 1226] 1205  1  5.0  403.52    3.16 12.58  14.62  n/a    .000
*
      ADD [1205 + 0005]  1237  3  5.0  479.76    3.56 12.58  13.30  n/a    .000
*
      ADD [1237 + 1215]  1234  3  5.0  560.70    3.75 12.58  13.27  n/a    .000
*
      CHANNEL[ 2 : 1234] 1212  1  5.0  560.70    3.45 12.83  13.27  n/a    .000
*
      ADD [1212 + 1213]  0100  3  5.0  616.00    3.81 12.83  12.77  n/a    .000
*
  ****************************
  ** SIMULATION NUMBER:   6 **
  ****************************

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

      START @   .00 hrs
      --------------------
      CHIC STORM               10.0
      [ Ptot= 77.31 mm ]
*
  **  CALIB NASHYD       0204  1  8.0   10.89     .22  2.27  16.12  .21    .000
      [CN=54.3         ]
      [ N = 3.0:Tp  .73]
*
  *   CALIB STANDHYD     0203  1  5.0   14.52    1.68  1.33  32.83  .42    .000
      [I%=25.0:S%= 2.00]
*
  *   CALIB STANDHYD     0201  1  5.0   47.41    6.79  1.33  39.15  .51    .000
      [I%=35.0:S%= 2.00]
*
  *   CALIB NASHYD       0202  1  5.0    1.87     .05  1.92  15.53  .20    .000
      [CN=49.0         ]
      [ N = 3.0:Tp  .48]
*
  *   CALIB STANDHYD     0009  1  5.0   76.82    7.68  1.33  19.88  .26    .000
      [I%=26.4:S%= 1.34]
*
  *   CALIB STANDHYD     0014  1  5.0   21.40    3.59  1.33  31.63  .41    .000
      [I%=40.1:S%= 1.16]
*
  *   CALIB STANDHYD     1700  1  5.0   18.84    2.64  1.33  28.09  .36    .000
      [I%=33.5:S%= 2.02]
*
```

```
   *   CALIB STANDHYD     2000  1  5.0   44.27    4.34  1.33  19.96  .26    .000
       [I%=23.1:S%= 5.00]
   *
   *   CALIB STANDHYD     1900  1  5.0   64.29    6.17  1.33  20.96  .27    .000
       [I%=26.0:S%= 2.02]
   *
   *   CALIB STANDHYD     0008  1  5.0   33.64    5.64  1.33  31.52  .41    .000
       [I%=41.3:S%= 1.34]
   *
   *   CALIB STANDHYD     0007  1  5.0   56.32    8.29  1.33  28.09  .36    .000
       [I%=37.3:S%= 1.34]
   *
   *   CALIB NASHYD       0006  1 10.0   13.24     .57  1.50  15.36  .20    .000
       [CN=51.9         ]
       [ N = 3.0:Tp  .20]
   *
   *   CALIB NASHYD       0005  1 10.0   76.24    1.92  1.83  15.26  .20    .000
       [CN=51.4         ]
       [ N = 3.0:Tp  .49]
   *
   *   CALIB STANDHYD     1800  1  5.0   40.65    6.67  1.33  32.01  .41    .000
       [I%=42.5:S%= 2.02]
   *
   *   CALIB NASHYD       0004  1 10.0   40.29     .84  2.00  14.54  .19    .000
       [CN=50.1         ]
       [ N = 3.0:Tp  .61]
   *
   *   CALIB NASHYD       0003  1 10.0   55.30    1.65  1.83  18.15  .24    .000
       [CN=57.0         ]
       [ N = 3.0:Tp  .50]
   *
   *   CALIB NASHYD       0001  1 10.0   48.14    1.56  2.00  21.64  .28    .000
       [CN=62.5         ]
       [ N = 3.0:Tp  .60]
   *
   *   CALIB NASHYD       0002  1 10.0  295.09    5.73  2.33  15.55  .20    .000
       [CN=52.4         ]
       [ N = 3.0:Tp  .76]
   *
   *   CALIB NASHYD       0012  1 10.0   56.77    1.74  1.83  18.58  .24    .000
       [CN=57.2         ]
       [ N = 3.0:Tp  .50]
   *
   *   CALIB NASHYD       0013  1 10.0  193.01    5.41  2.33  22.75  .30    .000
       [CN=64.2         ]
       [ N = 3.0:Tp  .80]
   *
   *   CALIB STANDHYD     1000  1  5.0   69.17    6.73  1.33  21.13  .27    .000
       [I%=26.6:S%= 2.02]
   *
   *   CALIB STANDHYD     1500  1  5.0   13.50    2.39  1.33  37.62  .49    .000
       [I%=40.0:S%= 2.02]
   *
   *   CALIB STANDHYD     1100  1  5.0   76.47    4.71  1.33  12.80  .17    .000
       [I%=17.0:S%= 2.02]
   *
       ADD [0201 + 0202]  1201  3  5.0   49.28    6.80  1.33  38.25  n/a    .000
   *
       RESRVR [ 2 : 1700] 0017  1  5.0   18.84     .38  1.83  28.06  n/a    .000
       {ST=   .30 ha.m }
   *
       RESRVR [ 2 : 2000] 0020  1  5.0   44.27     .01  9.92   9.99  n/a    .000
       {ST=   .84 ha.m }
   *
       RESRVR [ 2 : 1900] 0019  1  5.0   64.29     .13  4.08  20.94  n/a    .000
       {ST=  1.15 ha.m }
   *
       ADD [0019 + 0008]  1233  3  5.0   97.93    5.72  1.33  24.58  n/a    .000
   *
       CHANNEL[ 2 : 0007] 1206  1  5.0   56.32    6.68  1.42  28.09  n/a    .000
   *
       RESRVR [ 2 : 1800] 0018  1  5.0   40.65     .09  4.08  31.65  n/a    .000
       {ST=  1.21 ha.m }
   *
       ADD [0018 + 0004]  1240  3  5.0   80.94     .92  2.00  23.13  n/a    .000
   *
       CHANNEL[ 2 : 0003] 1213  1  5.0   55.30    1.61  2.00  18.15  n/a    .000
   *
       CHANNEL[ 2 : 0001] 1214  1  5.0   48.14    1.55  2.08  21.64  n/a    .000
   *
       CHANNEL{ 2 : 0002] 1204  1  5.0  295.09    5.72  2.33  15.55  n/a    .000
   *
       CHANNEL[ 2 : 0012] 1210  1  5.0   56.77    1.39  2.33  18.57  n/a    .000
   *
       RESRVR [ 2 : 1000] 0010  1  5.0   69.17     .79  2.08  21.11  n/a    .000
       {ST=   .96 ha.m }
   *
       RESRVR [ 2 : 1500] 0015  1  5.0   13.50     .21  2.83  37.59  n/a    .000
       {ST=   .32 ha.m }
```

100-YEAR CH1

```
*
      RESRVR [ 2 : 1100] 0011  1  5.0   76.47     .52  2.08  12.79  n/a    .000
      {ST=   .66 ha.m }
*
      ADD [0203 + 1201]  1202  3  5.0   63.80    8.48  1.33  37.01  n/a    .000
*
      ADD [0014 + 0017]  1230  3  5.0   40.24    3.68  1.33  29.96  n/a    .000
*
      ADD [1230 + 0020]  1231  3  5.0   84.51    3.68  1.33  19.50  n/a    .000
*
      CHANNEL[ 2 : 1233] 1207  1  5.0   97.93    4.22  1.42  24.58  n/a    .000
*
      CHANNEL[ 2 : 1240] 1215  1  5.0   80.94     .89  2.25  23.13  n/a    .000
*
      ADD [1214 + 1204]  0200  3  5.0  343.23    7.18  2.25  16.40  n/a    .000
*
      ADD [0010 + 0015]  1238  3  5.0   82.67     .99  2.08  23.80  n/a    .000
*
      CHANNEL[ 2 : 0011] 1211  1  5.0   76.47     .51  2.33  12.79  n/a    .000
*
      ADD [0204 + 1202]  1203  3  5.0   74.69    8.50  1.33  33.97  n/a    .000
*
      CHANNEL[ 2 : 1231] 1208  1  5.0   84.51    2.71  1.42  19.48  n/a    .000
*
      ADD [1238 + 1211]  1236  3  5.0  159.14    1.49  2.17  18.51  n/a    .000
*
      RESRVR [ 2 : 1203] 0016  1  5.0   74.69     .61  4.00  33.93  n/a    .000
      {ST=  1.99 ha.m }
*
      ADD [0009 + 1208]  1229  3  5.0  161.33   10.04  1.33  19.67  n/a    .000
*
      ADD [0013 + 1236]  1239  3  5.0  352.15    6.87  2.33  20.83  n/a    .000
*
      ADD [1229 + 1207]  1232  3  5.0  259.26   13.76  1.33  21.53  n/a    .000
*
      CHANNEL[ 2 : 1239] 1209  1  5.0  352.15    6.76  2.42  20.83  n/a    .000
*
      ADD [1232 + 1206]  1228  3  5.0  315.58   20.39  1.33  22.70  n/a    .000
*
      ADD [1210 + 1209]  0300  3  5.0  408.92    8.13  2.42  20.52  n/a    .000
*
      ADD [1228 + 0006]  1227  3  5.0  328.82   20.84  1.33  22.40  n/a    .000
*
      CHANNEL[ 2 : 1227] 1216  1  5.0  328.82   19.41  1.50  22.40  n/a    .000
*
      ADD [0016 + 1216]  1226  3  5.0  403.52   19.55  1.50  24.53  n/a    .000
*
      CHANNEL[ 2 : 1226] 1205  1  5.0  403.52   15.19  1.67  24.53  n/a    .000
*
      ADD [1205 + 0005]  1237  3  5.0  479.76   16.90  1.67  23.05  n/a    .000
*
      ADD [1237 + 1215]  1234  3  5.0  560.70   17.36  1.67  23.06  n/a    .000
*
      CHANNEL[ 2 : 1234] 1212  1  5.0  560.70   13.38  2.08  23.06  n/a    .000
*
      ADD [1212 + 1213]  0100  3  5.0  616.00   14.98  2.08  22.62  n/a    .000
*
  ****************************
  ** SIMULATION NUMBER:   7 **
  ****************************

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

      START @   .00 hrs
      ---------------------
      CHIC STORM                  10.0
      [ Ptot= 63.96 mm ]
*
  **  CALIB NASHYD       0204  1  8.0   10.89     .15  2.27  10.87  .17    .000
      [CN=54.3         ]
      [ N = 3.0:Tp  .73]
*
  *   CALIB STANDHYD     0203  1  5.0   14.52    1.31  1.33  25.26  .39    .000
      [I%=25.0:S%= 2.00]
*
  *   CALIB STANDHYD     0201  1  5.0   47.41    5.32  1.33  30.67  .48    .000
      [I%=35.0:S%= 2.00]
*
  *   CALIB NASHYD       0202  1  5.0    1.87     .03  1.92  10.75  .17    .000
      [CN=49.0         ]
      [ N = 3.0:Tp  .48]
*
  *   CALIB STANDHYD     0009  1  5.0   76.82    6.11  1.33  16.36  .26    .000
      [I%=26.4:S%= 1.34]
*
  *   CALIB STANDHYD     0014  1  5.0   21.40    2.88  1.33  24.84  .39    .000
      [I%=40.1:S%= 1.16]
*
```

*	CALIB STANDHYD [I%=33.5:S%= 2.02]	1700	1	5.0	18.84	2.12	1.33	20.76	.32	.000
*	CALIB STANDHYD [I%=23.1:S%= 5.00]	2000	1	5.0	44.27	3.49	1.33	14.31	.22	.000
*	CALIB STANDHYD [I%=26.0:S%= 2.02]	1900	1	5.0	64.29	4.39	1.42	16.11	.25	.000
*	CALIB STANDHYD [I%=41.3:S%= 1.34]	0008	1	5.0	33.64	4.52	1.33	25.59	.40	.000
*	CALIB STANDHYD [I%=37.3:S%= 1.34]	0007	1	5.0	56.32	6.62	1.33	23.11	.36	.000
*	CALIB NASHYD [CN=51.9] [N = 3.0:Tp .20]	0006	1	10.0	13.24	.39	1.50	10.53	.17	.000
*	CALIB NASHYD [CN=51.4] [N = 3.0:Tp .49]	0005	1	10.0	76.24	1.32	2.00	10.41	.16	.000
*	CALIB STANDHYD [I%=42.5:S%= 2.02]	1800	1	5.0	40.65	5.31	1.33	26.33	.41	.000
*	CALIB NASHYD [CN=50.1] [N = 3.0:Tp .61]	0004	1	10.0	40.29	.58	2.17	9.89	.16	.000
*	CALIB NASHYD [CN=57.0] [N = 3.0:Tp .50]	0003	1	10.0	55.30	1.15	2.00	12.50	.20	.000
*	CALIB NASHYD [CN=62.5] [N = 3.0:Tp .60]	0001	1	10.0	48.14	1.10	2.00	15.09	.24	.000
*	CALIB NASHYD [CN=52.4] [N = 3.0:Tp .76]	0002	1	10.0	295.09	3.96	2.33	10.59	.17	.000
*	CALIB NASHYD [CN=57.2] [N = 3.0:Tp .50]	0012	1	10.0	56.77	1.21	2.00	12.86	.20	.000
*	CALIB NASHYD [CN=64.2] [N = 3.0:Tp .80]	0013	1	10.0	193.01	3.82	2.33	15.92	.25	.000
*	CALIB STANDHYD [I%=26.6:S%= 2.02]	1000	1	5.0	69.17	4.80	1.42	16.48	.26	.000
*	CALIB STANDHYD [I%=40.0:S%= 2.02]	1500	1	5.0	13.50	1.92	1.33	28.84	.45	.000
*	CALIB STANDHYD [I%=17.0:S%= 2.02]	1100	1	5.0	76.47	3.36	1.42	10.53	.16	.000
	ADD [0201 + 0202]	1201	3	5.0	49.28	5.33	1.33	29.91	n/a	.000
	RESRVR [2 : 1700] {ST= .26 ha.m }	0017	1	5.0	18.84	.28	1.92	20.73	n/a	.000
	RESRVR [2 : 2000] {ST= .63 ha.m }	0020	1	5.0	44.27	.01	4.17	7.05	n/a	.000
	RESRVR [2 : 1900] {ST= .92 ha.m }	0019	1	5.0	64.29	.11	4.08	16.09	n/a	.000
	ADD [0019 + 0008]	1233	3	5.0	97.93	4.58	1.33	19.35	n/a	.000
	CHANNEL[2 : 0007]	1206	1	5.0	56.32	5.42	1.42	23.11	n/a	.000
	RESRVR [2 : 1800] {ST= .99 ha.m }	0018	1	5.0	40.65	.08	4.08	26.02	n/a	.000
	ADD [0018 + 0004]	1240	3	5.0	80.94	.65	2.17	17.99	n/a	.000
	CHANNEL[2 : 0003]	1213	1	5.0	55.30	1.11	2.08	12.49	n/a	.000
	CHANNEL[2 : 0001]	1214	1	5.0	48.14	1.09	2.08	15.09	n/a	.000
	CHANNEL[2 : 0002]	1204	1	5.0	295.09	3.93	2.33	10.59	n/a	.000
	CHANNEL[2 : 0012]	1210	1	5.0	56.77	.94	2.33	12.85	n/a	.000
	RESRVR [2 : 1000] {ST= .84 ha.m }	0010	1	5.0	69.17	.45	2.42	16.46	n/a	.000

25-YEAR CH1

```
*
      RESRVR [ 2 : 1500] 0015  1  5.0   13.50     .16  2.67  28.81  n/a    .000
      {ST=   .24 ha.m }
*
      RESRVR [ 2 : 1100] 0011  1  5.0   76.47     .40  2.25  10.52  n/a    .000
      {ST=   .56 ha.m }
*
      ADD [0203 + 1201]  1202  3  5.0   63.80    6.64  1.33  28.85  n/a    .000
*
      ADD [0014 + 0017]  1230  3  5.0   40.24    2.95  1.33  22.92  n/a    .000
*
      ADD [1230 + 0020]  1231  3  5.0   84.51    2.95  1.33  14.61  n/a    .000
*
      CHANNEL[ 2 : 1233] 1207  1  5.0   97.93    3.38  1.42  19.35  n/a    .000
*
      CHANNEL[ 2 : 1240] 1215  1  5.0   80.94     .63  2.25  17.98  n/a    .000
*
      ADD [1214 + 1204]  0200  3  5.0  343.23    4.96  2.33  11.22  n/a    .000
*
      ADD [0010 + 0015]  1238  3  5.0   82.67     .61  2.50  18.48  n/a    .000
*
      CHANNEL[ 2 : 0011] 1211  1  5.0   76.47     .39  2.50  10.52  n/a    .000
*
      ADD [0204 + 1202]  1203  3  5.0   74.69    6.65  1.33  26.23  n/a    .000
*
      CHANNEL[ 2 : 1231] 1208  1  5.0   84.51    2.15  1.42  14.60  n/a    .000
*
      ADD [1238 + 1211]  1236  3  5.0  159.14    1.00  2.50  14.65  n/a    .000
*
      RESRVR [ 2 : 1203] 0016  1  5.0   74.69     .43  4.00  26.20  n/a    .000
      {ST=  1.59 ha.m }
*
      ADD [0009 + 1208]  1229  3  5.0  161.33    7.96  1.33  15.43  n/a    .000
*
      ADD [0013 + 1236]  1239  3  5.0  352.15    4.82  2.33  15.35  n/a    .000
*
      ADD [1229 + 1207]  1232  3  5.0  259.26   10.86  1.33  16.91  n/a    .000
*
      CHANNEL[ 2 : 1239] 1209  1  5.0  352.15    4.72  2.50  15.35  n/a    .000
*
      ADD [1232 + 1206]  1228  3  5.0  315.58   16.05  1.33  18.02  n/a    .000
*
      ADD [1210 + 1209]  0300  3  5.0  408.92    5.63  2.50  15.00  n/a    .000
*
      ADD [1228 + 0006]  1227  3  5.0  328.82   16.33  1.33  17.72  n/a    .000
*
      CHANNEL[ 2 : 1227] 1216  1  5.0  328.82   16.17  1.42  17.72  n/a    .000
*
      ADD [0016 + 1216]  1226  3  5.0  403.52   16.23  1.42  19.29  n/a    .000
*
      CHANNEL[ 2 : 1226] 1205  1  5.0  403.52   12.18  1.67  19.28  n/a    .000
*
      ADD [1205 + 0005]  1237  3  5.0  479.76   13.33  1.67  17.87  n/a    .000
*
      ADD [1237 + 1215]  1234  3  5.0  560.70   13.62  1.67  17.89  n/a    .000
*
      CHANNEL[ 2 : 1234] 1212  1  5.0  560.70   10.87  2.00  17.88  n/a    .000
*
      ADD [1212 + 1213]  0100  3  5.0  616.00   11.98  2.00  17.40  n/a    .000
*
  ****************************
  ** SIMULATION NUMBER:   8 **
  ****************************

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

      START @   .00 hrs
      --------------------
      CHIC STORM                   10.0
      [ Ptot= 45.63 mm ]
*
  **  CALIB NASHYD       0204  1  8.0   10.89     .07  2.40   5.09  .11    .000
      [CN=54.3         ]
      [ N = 3.0:Tp  .73]
*
  **  CALIB STANDHYD     0203  1  5.0   14.52     .89  1.33  15.89  .35    .000
      [I%=25.0:S%= 2.00]
*
  **  CALIB STANDHYD     0201  1  5.0   47.41    3.31  1.42  19.92  .44    .000
      [I%=35.0:S%= 2.00]
*
  **  CALIB NASHYD       0202  1  5.0    1.87     .02  1.92   5.41  .12    .000
      [CN=49.0         ]
      [ N = 3.0:Tp  .48]
*
  *   CALIB STANDHYD     0009  1  5.0   76.82    3.84  1.42  11.52  .25    .000
      [I%=26.4:S%= 1.34]
*
```

```
*   CALIB STANDHYD     0014  1  5.0   21.40    2.05  1.33  17.50  .38    .000
    [I%=40.1:S%= 1.16]
*
*   CALIB STANDHYD     1700  1  5.0   18.84    1.51  1.33  14.62  .32    .000
    [I%=33.5:S%= 2.02]
*
*   CALIB STANDHYD     2000  1  5.0   44.27    2.49  1.33  10.08  .22    .000
    [I%=23.1:S%= 5.00]
*
*   CALIB STANDHYD     1900  1  5.0   64.29    3.09  1.42  11.34  .25    .000
    [I%=26.0:S%= 2.02]
*
*   CALIB STANDHYD     0008  1  5.0   33.64    3.20  1.33  18.02  .39    .000
    [I%=41.3:S%= 1.34]
*
*   CALIB STANDHYD     0007  1  5.0   56.32    4.66  1.33  16.28  .36    .000
    [I%=37.3:S%= 1.34]
*
*   CALIB NASHYD       0006  1 10.0   13.24     .18  1.50   5.14  .11    .000
    [CN=51.9         ]
    [ N = 3.0:Tp  .20]
*
*   CALIB NASHYD       0005  1 10.0   76.24     .62  2.00   5.02  .11    .000
    [CN=51.4         ]
    [ N = 3.0:Tp  .49]
*
*   CALIB STANDHYD     1800  1  5.0   40.65    3.32  1.42  18.54  .41    .000
    [I%=42.5:S%= 2.02]
*
*   CALIB NASHYD       0004  1 10.0   40.29     .27  2.17   4.73  .10    .000
    [CN=50.1         ]
    [ N = 3.0:Tp  .61]
*
*   CALIB NASHYD       0003  1 10.0   55.30     .55  2.00   6.12  .14    .000
    [CN=57.0         ]
    [ N = 3.0:Tp  .50]
*
*   CALIB NASHYD       0001  1 10.0   48.14     .53  2.00   7.56  .17    .000
    [CN=62.5         ]
    [ N = 3.0:Tp  .60]
*
*   CALIB NASHYD       0002  1 10.0  295.09    1.86  2.33   5.07  .11    .000
    [CN=52.4         ]
    [ N = 3.0:Tp  .76]
*
*   CALIB NASHYD       0012  1 10.0   56.77     .59  2.00   6.37  .14    .000
    [CN=57.2         ]
    [ N = 3.0:Tp  .50]
*
*   CALIB NASHYD       0013  1 10.0  193.01    1.89  2.33   8.02  .18    .000
    [CN=64.2         ]
    [ N = 3.0:Tp  .80]
*
*   CALIB STANDHYD     1000  1  5.0   69.17    3.38  1.42  11.61  .25    .000
    [I%=26.6:S%= 2.02]
*
*   CALIB STANDHYD     1500  1  5.0   13.50    1.38  1.33  17.45  .38    .000
    [I%=40.0:S%= 2.02]
*
*   CALIB STANDHYD     1100  1  5.0   76.47    2.36  1.42   7.42  .16    .000
    [I%=17.0:S%= 2.02]
*
    ADD [0201 + 0202]  1201  3  5.0   49.28    3.32  1.42  19.37  n/a    .000
*
    RESRVR [ 2 : 1700] 0017  1  5.0   18.84     .13  2.17  14.59  n/a    .000
    {ST=   .20 ha.m }
*
    RESRVR [ 2 : 2000] 0020  1  5.0   44.27     .01  4.25   4.97  n/a    .000
    {ST=   .44 ha.m }
*
    RESRVR [ 2 : 1900] 0019  1  5.0   64.29     .09  4.08  11.33  n/a    .000
    {ST=   .63 ha.m }
*
    ADD [0019 + 0008]  1233  3  5.0   97.93    3.24  1.33  13.63  n/a    .000
*
    CHANNEL[ 2 : 0007] 1206  1  5.0   56.32    3.79  1.42  16.27  n/a    .000
*
    RESRVR [ 2 : 1800] 0018  1  5.0   40.65     .07  4.08  18.28  n/a    .000
    {ST=   .68 ha.m }
*
    ADD [0018 + 0004]  1240  3  5.0   80.94     .34  2.17  11.54  n/a    .000
*
    CHANNEL[ 2 : 0003] 1213  1  5.0   55.30     .52  2.08   6.11  n/a    .000
*
    CHANNEL[ 2 : 0001] 1214  1  5.0   48.14     .53  2.17   7.56  n/a    .000
*
    CHANNEL[ 2 : 0002] 1204  1  5.0  295.09    1.84  2.42   5.07  n/a    .000
*
    CHANNEL[ 2 : 0012] 1210  1  5.0   56.77     .42  2.42   6.36  n/a    .000
```

5-YEAR CHI

```
*
      RESRVR [ 2 : 1000] 0010  1  5.0   69.17     .26  2.67  11.59  n/a    .000
      {ST=   .61 ha.m }
*
      RESRVR [ 2 : 1500] 0015  1  5.0   13.50     .11  2.17  17.43  n/a    .000
      {ST=   .16 ha.m }
*
      RESRVR [ 2 : 1100] 0011  1  5.0   76.47     .23  2.42   7.40  n/a    .000
      {ST=   .42 ha.m }
*
      ADD [0203 + 1201]  1202  3  5.0   63.80    3.98  1.33  18.58  n/a    .000
*
      ADD [0014 + 0017]  1230  3  5.0   40.24    2.10  1.33  16.14  n/a    .000
*
      ADD [1230 + 0020]  1231  3  5.0   84.51    2.10  1.33  10.28  n/a    .000
*
      CHANNEL[ 2 : 1233] 1207  1  5.0   97.93    2.33  1.42  13.63  n/a    .000
*
      CHANNEL[ 2 : 1240] 1215  1  5.0   80.94     .32  2.33  11.54  n/a    .000
*
      ADD [1214 + 1204]  0200  3  5.0  343.23    2.34  2.33   5.42  n/a    .000
*
      ADD [0010 + 0015]  1238  3  5.0   82.67     .36  2.58  12.54  n/a    .000
*
      CHANNEL[ 2 : 0011] 1211  1  5.0   76.47     .23  2.75   7.40  n/a    .000
*
      ADD [0204 + 1202]  1203  3  5.0   74.69    3.98  1.33  16.61  n/a    .000
*
      CHANNEL[ 2 : 1231] 1208  1  5.0   84.51    1.48  1.42  10.28  n/a    .000
*
      ADD [1238 + 1211]  1236  3  5.0  159.14     .59  2.67  10.07  n/a    .000
*
      RESRVR [ 2 : 1203] 0016  1  5.0   74.69     .18  4.17  16.58  n/a    .000
      {ST=  1.08 ha.m }
*
      ADD [0009 + 1208]  1229  3  5.0  161.33    5.31  1.42  10.87  n/a    .000
*
      ADD [0013 + 1236]  1239  3  5.0  352.15    2.46  2.33   8.95  n/a    .000
*
      ADD [1229 + 1207]  1232  3  5.0  259.26    7.64  1.42  11.91  n/a    .000
*
      CHANNEL[ 2 : 1239] 1209  1  5.0  352.15    2.40  2.58   8.95  n/a    .000
*
      ADD [1232 + 1206]  1228  3  5.0  315.58   11.43  1.42  12.69  n/a    .000
*
      ADD [1210 + 1209]  0300  3  5.0  408.92    2.81  2.58   8.59  n/a    .000
*
      ADD [1228 + 0006]  1227  3  5.0  328.82   11.58  1.42  12.38  n/a    .000
*
      CHANNEL[ 2 : 1227] 1216  1  5.0  328.82   10.97  1.42  12.38  n/a    .000
*
      ADD [0016 + 1216]  1226  3  5.0  403.52   11.01  1.42  13.16  n/a    .000
*
      CHANNEL[ 2 : 1226] 1205  1  5.0  403.52    8.22  1.58  13.16  n/a    .000
*
      ADD [1205 + 0005]  1237  3  5.0  479.76    8.66  1.58  11.88  n/a    .000
*
      ADD [1237 + 1215]  1234  3  5.0  560.70    8.73  1.58  11.83  n/a    .000
*
      CHANNEL[ 2 : 1234] 1212  1  5.0  560.70    6.58  1.83  11.83  n/a    .000
*
      ADD [1212 + 1213]  0100  3  5.0  616.00    7.01  1.83  11.31  n/a    .000
*
  ****************************
  ** SIMULATION NUMBER:   9 **
  ****************************

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

      START @   .00 hrs
      ---------------------
      CHIC STORM                  10.0
      [ Ptot= 33.77 mm ]
*
  **  CALIB NASHYD       0204  1  8.0   10.89     .03  2.40   2.38  .07    .000
      [CN=54.3         ]
      [ N = 3.0:Tp  .73]
*
  **  CALIB STANDHYD     0203  1  5.0   14.52     .65  1.33  10.57  .31    .000
      [I%=25.0:S%= 2.00]
*
  **  CALIB STANDHYD     0201  1  5.0   47.41    2.35  1.42  13.61  .40    .000
      [I%=35.0:S%= 2.00]
*
  **  CALIB NASHYD       0202  1  5.0    1.87     .01  1.92   2.82  .08    .000
      [CN=49.0         ]
      [ N = 3.0:Tp  .48]
*
```

```
*   CALIB STANDHYD     0009  1  5.0   76.82    2.81  1.42   8.39  .25    .000
    [I%=26.4:S%= 1.34]
*
*   CALIB STANDHYD     0014  1  5.0   21.40    1.52  1.33  12.74  .38    .000
    [I%=40.1:S%= 1.16]
*
*   CALIB STANDHYD     1700  1  5.0   18.84    1.11  1.33  10.64  .32    .000
    [I%=33.5:S%= 2.02]
*
*   CALIB STANDHYD     2000  1  5.0   44.27    1.84  1.33   7.34  .22    .000
    [I%=23.1:S%= 5.00]
*
*   CALIB STANDHYD     1900  1  5.0   64.29    2.26  1.42   8.26  .24    .000
    [I%=26.0:S%= 2.02]
*
*   CALIB STANDHYD     0008  1  5.0   33.64    2.35  1.33  13.12  .39    .000
    [I%=41.3:S%= 1.34]
*
*   CALIB STANDHYD     0007  1  5.0   56.32    3.03  1.42  11.85  .35    .000
    [I%=37.3:S%= 1.34]
*
*   CALIB NASHYD       0006  1 10.0   13.24     .09  1.50   2.56  .08    .000
    [CN=51.9        ]
    [ N = 3.0:Tp  .20]
*
*   CALIB NASHYD       0005  1 10.0   76.24     .30  2.00   2.46  .07    .000
    [CN=51.4        ]
    [ N = 3.0:Tp  .49]
*
*   CALIB STANDHYD     1800  1  5.0   40.65    2.44  1.42  13.50  .40    .000
    [I%=42.5:S%= 2.02]
*
*   CALIB NASHYD       0004  1 10.0   40.29     .13  2.17   2.30  .07    .000
    [CN=50.1        ]
    [ N = 3.0:Tp  .61]
*
*   CALIB NASHYD       0003  1 10.0   55.30     .26  2.00   3.03  .09    .000
    [CN=57.0        ]
    [ N = 3.0:Tp  .50]
*
*   CALIB NASHYD       0001  1 10.0   48.14     .26  2.17   3.84  .11    .000
    [CN=62.5        ]
    [ N = 3.0:Tp  .60]
*
*   CALIB NASHYD       0002  1 10.0  295.09     .88  2.33   2.46  .07    .000
    [CN=52.4        ]
    [ N = 3.0:Tp  .76]
*
*   CALIB NASHYD       0012  1 10.0   56.77     .29  2.00   3.21  .10    .000
    [CN=57.2        ]
    [ N = 3.0:Tp  .50]
*
*   CALIB NASHYD       0013  1 10.0  193.01     .94  2.33   4.09  .12    .000
    [CN=64.2        ]
    [ N = 3.0:Tp  .80]
*
*   CALIB STANDHYD     1000  1  5.0   69.17    2.46  1.42   8.45  .25    .000
    [I%=26.6:S%= 2.02]
*
*   CALIB STANDHYD     1500  1  5.0   13.50    1.03  1.33  12.71  .38    .000
    [I%=40.0:S%= 2.02]
*
*   CALIB STANDHYD     1100  1  5.0   76.47    1.72  1.42   5.40  .16    .000
    [I%=17.0:S%= 2.02]
*
    ADD [0201 + 0202]  1201  3  5.0   49.28    2.36  1.42  13.20  n/a    .000
*
    RESRVR [ 2 : 1700] 0017  1  5.0   18.84     .06  2.50  10.61  n/a    .000
    {ST=   .15 ha.m }
*
    RESRVR [ 2 : 2000] 0020  1  5.0   44.27     .00  4.25   3.62  n/a    .000
    {ST=   .32 ha.m }
*
    RESRVR [ 2 : 1900] 0019  1  5.0   64.29     .08  4.00   8.24  n/a    .000
    {ST=   .45 ha.m }
*
    ADD [0019 + 0008]  1233  3  5.0   97.93    2.37  1.33   9.92  n/a    .000
*
    CHANNEL[ 2 : 0007] 1206  1  5.0   56.32    2.58  1.50  11.85  n/a    .000
*
    RESRVR [ 2 : 1800] 0018  1  5.0   40.65     .07  4.08  13.28  n/a    .000
    {ST=   .48 ha.m }
*
    ADD [0018 + 0004]  1240  3  5.0   80.94     .19  2.17   7.81  n/a    .000
*
    CHANNEL[ 2 : 0003] 1213  1  5.0   55.30     .24  2.17   3.03  n/a    .000
*
    CHANNEL[ 2 : 0001] 1214  1  5.0   48.14     .26  2.25   3.84  n/a    .000
*
```

2-YEAR CHI

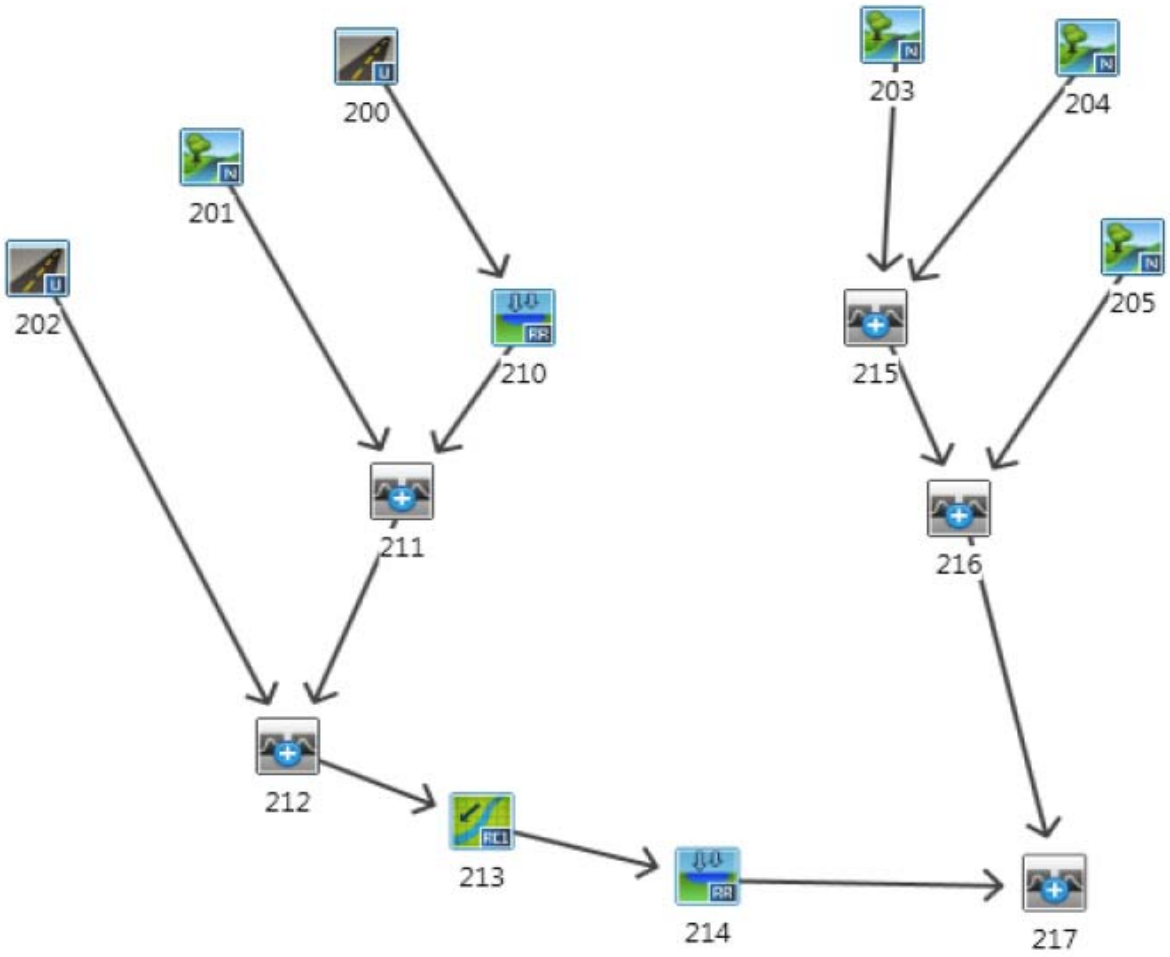
```
      CHANNEL[ 2 : 0002] 1204  1  5.0  295.09     .87  2.50   2.46  n/a    .000
*
      CHANNEL[ 2 : 0012] 1210  1  5.0   56.77     .19  2.58   3.20  n/a    .000
*
      RESRVR [ 2 : 1000] 0010  1  5.0   69.17     .14  3.08   8.44  n/a    .000
      {ST=   .47 ha.m }
*
      RESRVR [ 2 : 1500] 0015  1  5.0   13.50     .03  2.17  12.68  n/a    .000
      {ST=   .12 ha.m }
*
      RESRVR [ 2 : 1100] 0011  1  5.0   76.47     .13  2.75   5.38  n/a    .000
      {ST=   .32 ha.m }
*
      ADD [0203 + 1201]  1202  3  5.0   63.80    2.83  1.33  12.60  n/a    .000
*
      ADD [0014 + 0017]  1230  3  5.0   40.24    1.55  1.33  11.74  n/a    .000
*
      ADD [1230 + 0020]  1231  3  5.0   84.51    1.55  1.33   7.49  n/a    .000
*
      CHANNEL[ 2 : 1233] 1207  1  5.0   97.93    1.65  1.42   9.92  n/a    .000
*
      CHANNEL[ 2 : 1240] 1215  1  5.0   80.94     .18  2.50   7.81  n/a    .000
*
      ADD [1214 + 1204]  0200  3  5.0  343.23    1.12  2.42   2.65  n/a    .000
*
      ADD [0010 + 0015]  1238  3  5.0   82.67     .21  2.83   9.13  n/a    .000
*
      CHANNEL[ 2 : 0011] 1211  1  5.0   76.47     .12  3.00   5.38  n/a    .000
*
      ADD [0204 + 1202]  1203  3  5.0   74.69    2.83  1.33  11.11  n/a    .000
*
      CHANNEL[ 2 : 1231] 1208  1  5.0   84.51    1.05  1.42   7.48  n/a    .000
*
      ADD [1238 + 1211]  1236  3  5.0  159.14     .34  2.92   7.33  n/a    .000
*
      RESRVR [ 2 : 1203] 0016  1  5.0   74.69     .07  4.33  11.08  n/a    .000
      {ST=   .75 ha.m }
*
      ADD [0009 + 1208]  1229  3  5.0  161.33    3.86  1.42   7.91  n/a    .000
*
      ADD [0013 + 1236]  1239  3  5.0  352.15    1.26  2.50   5.55  n/a    .000
*
      ADD [1229 + 1207]  1232  3  5.0  259.26    5.51  1.42   8.67  n/a    .000
*
      CHANNEL[ 2 : 1239] 1209  1  5.0  352.15    1.21  2.75   5.55  n/a    .000
*
      ADD [1232 + 1206]  1228  3  5.0  315.58    8.07  1.42   9.24  n/a    .000
*
      ADD [1210 + 1209]  0300  3  5.0  408.92    1.40  2.75   5.23  n/a    .000
*
      ADD [1228 + 0006]  1227  3  5.0  328.82    8.14  1.42   8.97  n/a    .000
*
      CHANNEL[ 2 : 1227] 1216  1  5.0  328.82    7.83  1.50   8.97  n/a    .000
*
      ADD [0016 + 1216]  1226  3  5.0  403.52    7.87  1.50   9.36  n/a    .000
*
      CHANNEL[ 2 : 1226] 1205  1  5.0  403.52    5.60  1.67   9.36  n/a    .000
*
      ADD [1205 + 0005]  1237  3  5.0  479.76    5.84  1.67   8.26  n/a    .000
*
      ADD [1237 + 1215]  1234  3  5.0  560.70    5.89  1.67   8.20  n/a    .000
*
      CHANNEL[ 2 : 1234] 1212  1  5.0  560.70    4.33  1.92   8.19  n/a    .000
*
      ADD [1212 + 1213]  0100  3  5.0  616.00    4.53  1.92   7.73  n/a    .000
*
  ***************************
  ** SIMULATION NUMBER:  10 **
  ***************************

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

      START @   .00 hrs
      ---------------------
      READ STORM                  10.0
      [ Ptot= 24.99 mm ]
      fname : T:\2804_Everett MSP\SWM Assessment\Everett_VO2_Model\Storms\Owen-4hrC25mm.stm
      remark: 25mm - 4hr CHICAGO STORM - OWEN SOUND RAINFALL
*
  **  CALIB NASHYD       0204  1  8.0   10.89     .01  2.53    .98  .04    .000
      [CN=54.3         ]
      [ N = 3.0:Tp  .73]
*
  **  CALIB STANDHYD     0203  1  5.0   14.52     .46  1.33   7.06  .28    .000
      [I%=25.0:S%= 2.00]
*
  **  CALIB STANDHYD     0201  1  5.0   47.41    1.66  1.42   9.33  .37    .000
      [I%=35.0:S%= 2.00]
```

```
*
  **  CALIB NASHYD       0202  1  5.0    1.87     .00  2.00   1.41  .06    .000
      [CN=49.0         ]
      [ N = 3.0:Tp  .48]
*
   *  CALIB STANDHYD     0009  1  5.0   76.82    2.01  1.42   6.07  .24    .000
      [I%=26.4:S%= 1.34]
*
   *  CALIB STANDHYD     0014  1  5.0   21.40    1.09  1.33   9.22  .37    .000
      [I%=40.1:S%= 1.16]
*
   *  CALIB STANDHYD     1700  1  5.0   18.84     .80  1.33   7.70  .31    .000
      [I%=33.5:S%= 2.02]
*
   *  CALIB STANDHYD     2000  1  5.0   44.27    1.33  1.33   5.31  .21    .000
      [I%=23.1:S%= 5.00]
*
   *  CALIB STANDHYD     1900  1  5.0   64.29    1.61  1.42   5.98  .24    .000
      [I%=26.0:S%= 2.02]
*
   *  CALIB STANDHYD     0008  1  5.0   33.64    1.49  1.42   9.50  .38    .000
      [I%=41.3:S%= 1.34]
*
   *  CALIB STANDHYD     0007  1  5.0   56.32    2.18  1.42   8.58  .34    .000   25 mm
      [I%=37.3:S%= 1.34]
*
   *  CALIB NASHYD       0006  1 10.0   13.24     .04  1.50   1.18  .05    .000
      [CN=51.9         ]
      [ N = 3.0:Tp  .20]
*
   *  CALIB NASHYD       0005  1 10.0   76.24     .13  2.00   1.11  .04    .000
      [CN=51.4         ]
      [ N = 3.0:Tp  .49]
*
   *  CALIB STANDHYD     1800  1  5.0   40.65    1.75  1.42   9.77  .39    .000
      [I%=42.5:S%= 2.02]
*
   *  CALIB NASHYD       0004  1 10.0   40.29     .05  2.17   1.02  .04    .000
      [CN=50.1         ]
      [ N = 3.0:Tp  .61]
*
   *  CALIB NASHYD       0003  1 10.0   55.30     .12  2.00   1.38  .06    .000
      [CN=57.0         ]
      [ N = 3.0:Tp  .50]
*
   *  CALIB NASHYD       0001  1 10.0   48.14     .12  2.17   1.80  .07    .000
      [CN=62.5         ]
      [ N = 3.0:Tp  .60]
*
   *  CALIB NASHYD       0002  1 10.0  295.09     .38  2.50   1.09  .04    .000
      [CN=52.4         ]
      [ N = 3.0:Tp  .76]
*
   *  CALIB NASHYD       0012  1 10.0   56.77     .13  2.00   1.51  .06    .000
      [CN=57.2         ]
      [ N = 3.0:Tp  .50]
*
   *  CALIB NASHYD       0013  1 10.0  193.01     .43  2.50   1.92  .08    .000
      [CN=64.2         ]
      [ N = 3.0:Tp  .80]
*
   *  CALIB STANDHYD     1000  1  5.0   69.17    1.75  1.42   6.12  .24    .000
      [I%=26.6:S%= 2.02]
*
   *  CALIB STANDHYD     1500  1  5.0   13.50     .75  1.33   9.20  .37    .000
      [I%=40.0:S%= 2.02]
*
   *  CALIB STANDHYD     1100  1  5.0   76.47    1.11  1.50   3.91  .16    .000
      [I%=17.0:S%= 2.02]
*
      ADD [0201 + 0202]  1201  3  5.0   49.28    1.66  1.42   9.03  n/a    .000
*
      RESRVR [ 2 : 1700] 0017  1  5.0   18.84     .05  2.50   7.67  n/a    .000
      {ST=   .11 ha.m }
*
      RESRVR [ 2 : 2000] 0020  1  5.0   44.27     .00  4.25   2.62  n/a    .000
      {ST=   .23 ha.m }
*
      RESRVR [ 2 : 1900] 0019  1  5.0   64.29     .07  3.67   5.96  n/a    .000
      {ST=   .32 ha.m }
*
      ADD [0019 + 0008]  1233  3  5.0   97.93    1.52  1.42   7.18  n/a    .000
*
      CHANNEL[ 2 : 0007] 1206  1  5.0   56.32    1.85  1.50   8.57  n/a    .000
*
      RESRVR [ 2 : 1800] 0018  1  5.0   40.65     .06  4.00   9.57  n/a    .000
      {ST=   .34 ha.m }
*
      ADD [0018 + 0004]  1240  3  5.0   80.94     .11  2.33   5.31  n/a    .000
```

```
*
      CHANNEL[ 2 : 0003] 1213  1  5.0   55.30     .10  2.33   1.38  n/a    .000
*
      CHANNEL[ 2 : 0001] 1214  1  5.0   48.14     .12  2.33   1.80  n/a    .000
*
      CHANNEL[ 2 : 0002] 1204  1  5.0  295.09     .37  2.58   1.09  n/a    .000
*
      CHANNEL[ 2 : 0012] 1210  1  5.0   56.77     .06  2.92   1.49  n/a    .000
*
      RESRVR [ 2 : 1000] 0010  1  5.0   69.17     .08  3.50   6.10  n/a    .000
      {ST=   .35 ha.m }
*
      RESRVR [ 2 : 1500] 0015  1  5.0   13.50     .06  2.17   9.17  n/a    .000
      {ST=   .09 ha.m }
*
      RESRVR [ 2 : 1100] 0011  1  5.0   76.47     .05  3.83   3.89  n/a    .000
      {ST=   .25 ha.m }
*
      ADD [0203 + 1201]  1202  3  5.0   63.80    1.99  1.42   8.58  n/a    .000
*
      ADD [0014 + 0017]  1230  3  5.0   40.24    1.11  1.33   8.50  n/a    .000
*
      ADD [1230 + 0020]  1231  3  5.0   84.51    1.11  1.33   5.42  n/a    .000
*
      CHANNEL[ 2 : 1233] 1207  1  5.0   97.93    1.12  1.50   7.17  n/a    .000
*
      CHANNEL[ 2 : 1240] 1215  1  5.0   80.94     .11  2.58   5.31  n/a    .000
*
      ADD [1214 + 1204]  0200  3  5.0  343.23     .48  2.50   1.19  n/a    .000
*
      ADD [0010 + 0015]  1238  3  5.0   82.67     .13  2.67   6.60  n/a    .000
*
      CHANNEL[ 2 : 0011] 1211  1  5.0   76.47     .05  4.17   3.89  n/a    .000
*
      ADD [0204 + 1202]  1203  3  5.0   74.69    1.99  1.42   7.47  n/a    .000
*
      CHANNEL[ 2 : 1231] 1208  1  5.0   84.51     .70  1.42   5.41  n/a    .000
*
      ADD [1238 + 1211]  1236  3  5.0  159.14     .18  3.50   5.30  n/a    .000
*
      RESRVR [ 2 : 1203] 0016  1  5.0   74.69     .05  4.33   7.44  n/a    .000
      {ST=   .50 ha.m }
*
      ADD [0009 + 1208]  1229  3  5.0  161.33    2.71  1.42   5.73  n/a    .000
*
      ADD [0013 + 1236]  1239  3  5.0  352.15     .60  2.50   3.45  n/a    .000
*
      ADD [1229 + 1207]  1232  3  5.0  259.26    3.65  1.42   6.27  n/a    .000
*
      CHANNEL[ 2 : 1239] 1209  1  5.0  352.15     .57  2.83   3.45  n/a    .000
*
      ADD [1232 + 1206]  1228  3  5.0  315.58    5.41  1.42   6.68  n/a    .000
*
      ADD [1210 + 1209]  0300  3  5.0  408.92     .64  2.83   3.18  n/a    .000
*
      ADD [1228 + 0006]  1227  3  5.0  328.82    5.44  1.42   6.46  n/a    .000
*
      CHANNEL[ 2 : 1227] 1216  1  5.0  328.82    5.32  1.50   6.46  n/a    .000
*
      ADD [0016 + 1216]  1226  3  5.0  403.52    5.35  1.50   6.64  n/a    .000
*
      CHANNEL[ 2 : 1226] 1205  1  5.0  403.52    3.73  1.67   6.64  n/a    .000
*
      ADD [1205 + 0005]  1237  3  5.0  479.76    3.82  1.67   5.76  n/a    .000
*
      ADD [1237 + 1215]  1234  3  5.0  560.70    3.85  1.67   5.70  n/a    .000
*
      CHANNEL[ 2 : 1234] 1212  1  5.0  560.70    2.78  2.00   5.69  n/a    .000
*
      ADD [1212 + 1213]  0100  3  5.0  616.00    2.85  2.00   5.31  n/a    .000
*
 FINISH
```

Appendix C: Cumac Phase II Post-Development Visual Otthymo Output

CUMAC SUBDIVISION - PHASE II
PROPOSED CONDITIONS



1	Nashyd	1	Route Pipe	1	Duhyd
1	Standhyd	1	Route Channel	1	Diverthyd
1	Addhyd	1	Route Reservoir		

TATHAM ENGINEERING

Project:	CUMAC SUBDIVISION - PHASE II
File No.:	116238
Subject:	Otthymo Flow Schematic
Date:	Sept 2019 **Figure:** 1

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

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

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


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


  Input   filename: C:\Program Files (x86)\VH Suite 3.0\VO2\voin.dat

  Output  filename:
C:\Users\aschoof\AppData\Local\Temp\0cd4140e-b537-41ad-bf58-1a4fda59fd59\Scenario.ou
t
  Summary filename:
C:\Users\aschoof\AppData\Local\Temp\0cd4140e-b537-41ad-bf58-1a4fda59fd59\Scenario.su
m


DATE: 04/02/2018                          TIME: 06:51:45

USER:


COMMENTS: _____________________________________________________________


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


--------------------
| MASS STORM       |    Filename: C:\Users\aschoof\AppD
|                  |              ata\Local\Temp\
|                  |              0cd4140e-b537-41ad-bf58-1a4fda59fd59\dd4ad48b
| Ptotal= 50.19 mm |    Comments: SCS Type II 24 HR MASS CURVE
--------------------

                     Duration of storm    = 23.75 hrs
                     Mass curve time step = 15.00 min

                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.25    0.60 |  6.25    1.00 | 12.25    7.23 | 18.25    0.80
               0.50    0.40 |  6.50    0.80 | 12.50    3.81 | 18.50    1.00
               0.75    0.60 |  6.75    1.00 | 12.75    3.61 | 18.75    0.80
               1.00    0.60 |  7.00    1.00 | 13.00    2.81 | 19.00    1.00
               1.25    0.60 |  7.25    1.20 | 13.25    2.61 | 19.25    0.80
               1.50    0.40 |  7.50    1.00 | 13.50    2.21 | 19.50    1.00
```



```
               1.75    0.60 |  7.75    1.20 | 13.75    2.01 | 19.75    0.80
               2.00    0.60 |  8.00    1.20 | 14.00    1.61 | 20.00    0.60
               2.25    0.80 |  8.25    1.41 | 14.25    1.41 | 20.25    0.60
               2.50    0.60 |  8.50    1.41 | 14.50    1.61 | 20.50    0.60
               2.75    0.60 |  8.75    1.41 | 14.75    1.41 | 20.75    0.60
               3.00    0.60 |  9.00    1.61 | 15.00    1.61 | 21.00    0.60
               3.25    0.80 |  9.25    1.61 | 15.25    1.41 | 21.25    0.60
               3.50    0.60 |  9.50    1.81 | 15.50    1.61 | 21.50    0.60
               3.75    0.60 |  9.75    1.81 | 15.75    1.41 | 21.75    0.60
               4.00    0.80 | 10.00    2.21 | 16.00    1.00 | 22.00    0.60
               4.25    0.80 | 10.25    2.41 | 16.25    0.80 | 22.25    0.60
               4.50    0.80 | 10.50    3.01 | 16.50    1.00 | 22.50    0.60
               4.75    0.80 | 10.75    3.21 | 16.75    0.80 | 22.75    0.60
               5.00    0.80 | 11.00    4.82 | 17.00    1.00 | 23.00    0.60
               5.25    0.80 | 11.25    4.82 | 17.25    0.80 | 23.25    0.60
               5.50    0.80 | 11.50   14.86 | 17.50    1.00 | 23.50    0.60
               5.75    0.80 | 11.75   61.43 | 17.75    0.80 | 23.75    0.60
               6.00    0.80 | 12.00    7.23 | 18.00    1.00 |

--------------------------------------------------------------------------------
----------------------
| CALIB            |
| NASHYD    (0203) |   Area    (ha)=   0.62   Curve Number   (CN)= 57.4
|ID= 1 DT=10.0 min |   Ia      (mm)=   9.60   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=   0.54

        NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 MIN. TIME STEP.

                          ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.167    0.60 | 6.167    1.00 |12.167    7.23 | 18.17    0.80
               0.333    0.50 | 6.333    0.90 |12.333    5.52 | 18.33    0.90
               0.500    0.40 | 6.500    0.80 |12.500    3.81 | 18.50    1.00
               0.667    0.60 | 6.667    1.00 |12.667    3.61 | 18.67    0.80
               0.833    0.60 | 6.833    1.00 |12.833    3.21 | 18.83    0.90
               1.000    0.60 | 7.000    1.00 |13.000    2.81 | 19.00    1.00
               1.167    0.60 | 7.167    1.20 |13.167    2.61 | 19.17    0.80
               1.333    0.50 | 7.333    1.10 |13.333    2.41 | 19.33    0.90
               1.500    0.40 | 7.500    1.00 |13.500    2.21 | 19.50    1.00
               1.667    0.60 | 7.667    1.20 |13.667    2.01 | 19.67    0.80
               1.833    0.60 | 7.833    1.20 |13.833    1.81 | 19.83    0.70
               2.000    0.60 | 8.000    1.20 |14.000    1.61 | 20.00    0.60
               2.167    0.80 | 8.167    1.41 |14.167    1.41 | 20.17    0.60
               2.333    0.70 | 8.333    1.41 |14.333    1.51 | 20.33    0.60
               2.500    0.60 | 8.500    1.41 |14.500    1.61 | 20.50    0.60
               2.667    0.60 | 8.667    1.41 |14.667    1.41 | 20.67    0.60
               2.833    0.60 | 8.833    1.51 |14.833    1.51 | 20.83    0.60
               3.000    0.60 | 9.000    1.61 |15.000    1.61 | 21.00    0.60
               3.167    0.80 | 9.167    1.61 |15.167    1.41 | 21.17    0.60
               3.333    0.70 | 9.333    1.71 |15.333    1.51 | 21.33    0.60
               3.500    0.60 | 9.500    1.81 |15.500    1.61 | 21.50    0.60
               3.667    0.60 | 9.667    1.81 |15.667    1.41 | 21.67    0.60
               3.833    0.70 | 9.833    2.01 |15.833    1.20 | 21.83    0.60
               4.000    0.80 |10.000    2.21 |16.000    1.00 | 22.00    0.60
               4.167    0.80 |10.167    2.41 |16.167    0.80 | 22.17    0.60
               4.333    0.80 |10.333    2.71 |16.333    0.90 | 22.33    0.60
               4.500    0.80 |10.500    3.01 |16.500    1.00 | 22.50    0.60
               4.667    0.80 |10.667    3.21 |16.667    0.80 | 22.67    0.60
               4.833    0.80 |10.833    4.02 |16.833    0.90 | 22.83    0.60
               5.000    0.80 |11.000    4.82 |17.000    1.00 | 23.00    0.60
               5.167    0.80 |11.167    4.82 |17.167    0.80 | 23.17    0.60
```

5.333	0.80	11.333	9.84	17.333	0.90	23.33	0.60
5.500	0.80	11.500	14.86	17.500	1.00	23.50	0.60
5.667	0.80	11.667	61.43	17.667	0.80	23.67	0.60
5.833	0.80	11.833	34.33	17.833	0.90	23.83	0.30
6.000	0.80	12.000	7.23	18.000	1.00		

Unit Hyd Qpeak (cms)= 0.044

PEAK FLOW (cms)= 0.005 (i)
TIME TO PEAK (hrs)= 12.167
RUNOFF VOLUME (mm)= 7.137
TOTAL RAINFALL (mm)= 50.039
RUNOFF COEFFICIENT = 0.143

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

CALIB					
NASHYD	(0204)	Area (ha)=	0.02	Curve Number (CN)=	49.0
ID= 1 DT=10.0 min		Ia (mm)=	5.00	# of Linear Res.(N)=	3.00
		U.H. Tp(hrs)=	0.07		

Unit Hyd Qpeak (cms)= 0.011

PEAK FLOW (cms)= 0.000 (i)
TIME TO PEAK (hrs)= 11.667
RUNOFF VOLUME (mm)= 2.355
TOTAL RAINFALL (mm)= 50.039
RUNOFF COEFFICIENT = 0.047

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

ADD HYD (0215)					
1 + 2 = 3		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
	ID1= 1 (0203):	0.62	0.005	12.17	7.14
	+ ID2= 2 (0204):	0.02	0.000	11.67	2.36
	ID = 3 (0215):	0.64	0.005	12.17	6.99

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB					
NASHYD	(0205)	Area (ha)=	0.47	Curve Number (CN)=	49.5
ID= 1 DT=10.0 min		Ia (mm)=	8.50	# of Linear Res.(N)=	3.00
		U.H. Tp(hrs)=	1.00		

Unit Hyd Qpeak (cms)= 0.018

PEAK FLOW (cms)= 0.002 (i)
TIME TO PEAK (hrs)= 12.833
RUNOFF VOLUME (mm)= 5.733
TOTAL RAINFALL (mm)= 50.039
RUNOFF COEFFICIENT = 0.115

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

ADD HYD (0216)					
1 + 2 = 3		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
	ID1= 1 (0205):	0.47	0.002	12.83	5.73
	+ ID2= 2 (0215):	0.64	0.005	12.17	6.99
	ID = 3 (0216):	1.11	0.007	12.33	6.46

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB					
NASHYD	(0201)	Area (ha)=	1.54	Curve Number (CN)=	76.8
ID= 1 DT= 5.0 min		Ia (mm)=	10.81	# of Linear Res.(N)=	3.00
		U.H. Tp(hrs)=	0.90		

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.60	6.083	1.00	12.083	7.23	18.08	0.80
0.167	0.60	6.167	1.00	12.167	7.23	18.17	0.80
0.250	0.60	6.250	1.00	12.250	7.23	18.25	0.80
0.333	0.40	6.333	0.80	12.333	3.81	18.33	1.00
0.417	0.40	6.417	0.80	12.417	3.81	18.42	1.00
0.500	0.40	6.500	0.80	12.500	3.81	18.50	1.00
0.583	0.60	6.583	1.00	12.583	3.61	18.58	0.80
0.667	0.60	6.667	1.00	12.667	3.61	18.67	0.80
0.750	0.60	6.750	1.00	12.750	3.61	18.75	0.80
0.833	0.60	6.833	1.00	12.833	2.81	18.83	1.00
0.917	0.60	6.917	1.00	12.917	2.81	18.92	1.00
1.000	0.60	7.000	1.00	13.000	2.81	19.00	1.00
1.083	0.60	7.083	1.20	13.083	2.61	19.08	0.80
1.167	0.60	7.167	1.20	13.167	2.61	19.17	0.80
1.250	0.60	7.250	1.20	13.250	2.61	19.25	0.80
1.333	0.40	7.333	1.00	13.333	2.21	19.33	1.00
1.417	0.40	7.417	1.00	13.417	2.21	19.42	1.00
1.500	0.40	7.500	1.00	13.500	2.21	19.50	1.00
1.583	0.60	7.583	1.20	13.583	2.01	19.58	0.80
1.667	0.60	7.667	1.20	13.667	2.01	19.67	0.80
1.750	0.60	7.750	1.20	13.750	2.01	19.75	0.80
1.833	0.60	7.833	1.20	13.833	1.61	19.83	0.60
1.917	0.60	7.917	1.20	13.917	1.61	19.92	0.60
2.000	0.60	8.000	1.20	14.000	1.61	20.00	0.60
2.083	0.80	8.083	1.41	14.083	1.41	20.08	0.60
2.167	0.80	8.167	1.41	14.167	1.41	20.17	0.60
2.250	0.80	8.250	1.41	14.250	1.41	20.25	0.60
2.333	0.60	8.333	1.41	14.333	1.61	20.33	0.60
2.417	0.60	8.417	1.41	14.417	1.61	20.42	0.60
2.500	0.60	8.500	1.41	14.500	1.61	20.50	0.60
2.583	0.60	8.583	1.41	14.583	1.41	20.58	0.60
2.667	0.60	8.667	1.41	14.667	1.41	20.67	0.60
2.750	0.60	8.750	1.41	14.750	1.41	20.75	0.60
2.833	0.60	8.833	1.61	14.833	1.61	20.83	0.60
2.917	0.60	8.917	1.61	14.917	1.61	20.92	0.60
3.000	0.60	9.000	1.61	15.000	1.61	21.00	0.60
3.083	0.80	9.083	1.61	15.083	1.41	21.08	0.60

3.167	0.80	9.167	1.61	15.167	1.41	21.17	0.60
3.250	0.80	9.250	1.61	15.250	1.41	21.25	0.60
3.333	0.60	9.333	1.81	15.333	1.61	21.33	0.60
3.417	0.60	9.417	1.81	15.417	1.61	21.42	0.60
3.500	0.60	9.500	1.81	15.500	1.61	21.50	0.60
3.583	0.60	9.583	1.81	15.583	1.41	21.58	0.60
3.667	0.60	9.667	1.81	15.667	1.41	21.67	0.60
3.750	0.60	9.750	1.81	15.750	1.41	21.75	0.60
3.833	0.80	9.833	2.21	15.833	1.00	21.83	0.60
3.917	0.80	9.917	2.21	15.917	1.00	21.92	0.60
4.000	0.80	10.000	2.21	16.000	1.00	22.00	0.60
4.083	0.80	10.083	2.41	16.083	0.80	22.08	0.60
4.167	0.80	10.167	2.41	16.167	0.80	22.17	0.60
4.250	0.80	10.250	2.41	16.250	0.80	22.25	0.60
4.333	0.80	10.333	3.01	16.333	1.00	22.33	0.60
4.417	0.80	10.417	3.01	16.417	1.00	22.42	0.60
4.500	0.80	10.500	3.01	16.500	1.00	22.50	0.60
4.583	0.80	10.583	3.21	16.583	0.80	22.58	0.60
4.667	0.80	10.667	3.21	16.667	0.80	22.67	0.60
4.750	0.80	10.750	3.21	16.750	0.80	22.75	0.60
4.833	0.80	10.833	4.82	16.833	1.00	22.83	0.60
4.917	0.80	10.917	4.82	16.917	1.00	22.92	0.60
5.000	0.80	11.000	4.82	17.000	1.00	23.00	0.60
5.083	0.80	11.083	4.82	17.083	0.80	23.08	0.60
5.167	0.80	11.167	4.82	17.167	0.80	23.17	0.60
5.250	0.80	11.250	4.82	17.250	0.80	23.25	0.60
5.333	0.80	11.333	14.86	17.333	1.00	23.33	0.60
5.417	0.80	11.417	14.86	17.417	1.00	23.42	0.60
5.500	0.80	11.500	14.86	17.500	1.00	23.50	0.60
5.583	0.80	11.583	61.43	17.583	0.80	23.58	0.60
5.667	0.80	11.667	61.43	17.667	0.80	23.67	0.60
5.750	0.80	11.750	61.43	17.750	0.80	23.75	0.60
5.833	0.80	11.833	7.23	17.833	1.00		
5.917	0.80	11.917	7.23	17.917	1.00		
6.000	0.80	12.000	7.23	18.000	1.00		

Unit Hyd Qpeak (cms)= 0.065

PEAK FLOW (cms)= 0.016 (i)
TIME TO PEAK (hrs)= 12.667
RUNOFF VOLUME (mm)= 13.270
TOTAL RAINFALL (mm)= 50.040
RUNOFF COEFFICIENT = 0.265

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

CALIB STANDHYD (0200) ID= 1 DT= 5.0 min	Area (ha)= 1.01 Total Imp(%)= 95.00 Dir. Conn.(%)= 95.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.96	0.05
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	82.06	40.00
Mannings n	=	0.013	0.250
Max.Eff.Inten.(mm/hr)=		61.43	43.24
over (min)		5.00	10.00
Storage Coeff. (min)=		2.76 (ii)	5.40 (ii)
Unit Hyd. Tpeak (min)=		5.00	10.00

Unit Hyd. peak (cms)=	0.28	0.16	
			TOTALS
PEAK FLOW (cms)=	0.16	0.00	0.168 (iii)
TIME TO PEAK (hrs)=	11.75	11.75	11.75
RUNOFF VOLUME (mm)=	49.04	9.06	47.04
TOTAL RAINFALL (mm)=	50.04	50.04	50.04
RUNOFF COEFFICIENT =	0.98	0.18	0.94

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

(i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
Fo (mm/hr)= 50.00 K (1/hr)= 2.00
Fc (mm/hr)= 7.50 Cum.Inf. (mm)= 0.00
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

RESERVOIR (0210) IN= 2---> OUT= 1 DT= 5.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.5000	0.0140
	0.0029	0.0138	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0200)	1.010	0.168	11.75	47.04
OUTFLOW: ID= 1 (0210)	1.010	0.200	11.67	45.85

PEAK FLOW REDUCTION [Qout/Qin](%)=119.36
TIME SHIFT OF PEAK FLOW (min)= -5.00
MAXIMUM STORAGE USED (ha.m.)= 0.0144

**** WARNING : HYDROGRAPH PEAK WAS NOT REDUCED.
CHECK OUTFLOW/STORAGE TABLE OR REDUCE DT.

ADD HYD (0211) 1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0201):	1.54	0.016	12.67	13.27
+ ID2= 2 (0210):	1.01	0.200	11.67	45.85
ID = 3 (0211):	2.55	0.202	11.67	26.17

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB STANDHYD (0202) ID= 1 DT= 5.0 min	Area (ha)= 0.67 Total Imp(%)= 45.00 Dir. Conn.(%)= 45.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.30	0.37
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	66.83	400.00
Mannings n	=	0.013	0.250

Max.Eff.Inten.(mm/hr)=	61.43	9.06		
over (min)	5.00	80.00		
Storage Coeff. (min)=	2.44 (ii)	75.85 (ii)		
Unit Hyd. Tpeak (min)=	5.00	80.00		
Unit Hyd. peak (cms)=	0.30	0.01		
			TOTALS	
PEAK FLOW (cms)=	0.05	0.00	0.052 (iii)	
TIME TO PEAK (hrs)=	11.75	12.92	11.75	
RUNOFF VOLUME (mm)=	49.04	9.06	27.05	
TOTAL RAINFALL (mm)=	50.04	50.04	50.04	
RUNOFF COEFFICIENT =	0.98	0.18	0.54	

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

(i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
Fo (mm/hr)= 50.00 K (1/hr)= 2.00
Fc (mm/hr)= 7.50 Cum.Inf. (mm)= 0.00
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0212)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0202):		0.67	0.052	11.75	27.05
+ ID2= 2 (0211):		2.55	0.202	11.67	26.17
ID = 3 (0212):		3.22	0.253	11.67	26.35

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ROUTE CHN (0213)		
IN= 2---> OUT= 1	Routing time step (min)'= 10.00	
<------ DATA FOR SECTION (1.1) ------>		
Distance	Elevation	Manning
0.00	100.00	0.0400 Main Channel
2.50	99.00	0.0400 Main Channel
3.00	99.00	0.0400 Main Channel
5.50	100.00	0.0400 Main Channel

<---------- TRAVEL TIME TABLE ---------->

DEPTH (m)	ELEV (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME (min)
0.05	99.05	.831E+01	0.0	0.22	19.37
0.11	99.11	.201E+02	0.0	0.32	13.22
0.16	99.16	.353E+02	0.1	0.39	10.62
0.21	99.21	.540E+02	0.1	0.46	9.08
0.26	99.26	.762E+02	0.2	0.52	8.03
0.32	99.32	.102E+03	0.2	0.57	7.26
0.37	99.37	.131E+03	0.3	0.63	6.65
0.42	99.42	.163E+03	0.4	0.68	6.17
0.47	99.47	.199E+03	0.6	0.72	5.76
0.53	99.53	.239E+03	0.7	0.77	5.42
0.58	99.58	.282E+03	0.9	0.81	5.13
0.63	99.63	.328E+03	1.1	0.86	4.87
0.68	99.68	.378E+03	1.4	0.90	4.65
0.74	99.74	.431E+03	1.6	0.94	4.44

0.79	99.79	.488E+03	1.9	0.98	4.26
0.84	99.84	.548E+03	2.2	1.02	4.10
0.89	99.89	.612E+03	2.6	1.05	3.95
0.95	99.95	.679E+03	3.0	1.09	3.82
1.00	100.00	.750E+03	3.4	1.13	3.69

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	<-pipe / channel-> MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 2 (0212)	3.22	0.25	11.67	26.35	0.33	0.58
OUTFLOW: ID= 1 (0213)	3.22	0.18	11.75	26.35	0.28	0.54

RESERVOIR (0214)				
IN= 2---> OUT= 1				
DT= 10.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.0920	0.1110
	0.0210	0.0150	0.1180	0.1890
	0.0590	0.0690	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0213)	3.220	0.185	11.75	26.35
OUTFLOW: ID= 1 (0214)	3.220	0.027	13.33	26.29

PEAK FLOW REDUCTION [Qout/Qin](%)= 14.84
TIME SHIFT OF PEAK FLOW (min)= 95.00
MAXIMUM STORAGE USED (ha.m.)= 0.0241

ADD HYD (0217)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0214):		3.22	0.027	13.33	26.29
+ ID2= 2 (0216):		1.11	0.007	12.33	6.46
ID = 3 (0217):		4.33	0.033	12.50	21.21

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

MASS STORM	Filename: C:\Users\aschoof\AppData\Local\Temp\0cd4140e-b537-41ad-bf58-1a4fda59fd59\83c36a9c
Ptotal= 64.53 mm	Comments: SCS Type II 24 HR MASS CURVE

Duration of storm = 23.75 hrs
Mass curve time step = 15.00 min

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	0.77	6.25	1.29	12.25	9.29	18.25	1.03
0.50	0.52	6.50	1.03	12.50	4.90	18.50	1.29

0.75	0.77	6.75	1.29	12.75	4.65	18.75	1.03
1.00	0.77	7.00	1.29	13.00	3.61	19.00	1.29
1.25	0.77	7.25	1.55	13.25	3.36	19.25	1.03
1.50	0.52	7.50	1.29	13.50	2.84	19.50	1.29
1.75	0.77	7.75	1.55	13.75	2.58	19.75	1.03
2.00	0.77	8.00	1.55	14.00	2.06	20.00	0.77
2.25	1.03	8.25	1.81	14.25	1.81	20.25	0.77
2.50	0.77	8.50	1.81	14.50	2.06	20.50	0.77
2.75	0.77	8.75	1.81	14.75	1.81	20.75	0.77
3.00	0.77	9.00	2.06	15.00	2.06	21.00	0.77
3.25	1.03	9.25	2.06	15.25	1.81	21.25	0.77
3.50	0.77	9.50	2.32	15.50	2.06	21.50	0.77
3.75	0.77	9.75	2.32	15.75	1.81	21.75	0.77
4.00	1.03	10.00	2.84	16.00	1.29	22.00	0.77
4.25	1.03	10.25	3.10	16.25	1.03	22.25	0.77
4.50	1.03	10.50	3.87	16.50	1.29	22.50	0.77
4.75	1.03	10.75	4.13	16.75	1.03	22.75	0.77
5.00	1.03	11.00	6.19	17.00	1.29	23.00	0.77
5.25	1.03	11.25	6.19	17.25	1.03	23.25	0.77
5.50	1.03	11.50	19.10	17.50	1.29	23.50	0.77
5.75	1.03	11.75	78.98	17.75	1.03	23.75	0.77
6.00	1.03	12.00	9.29	18.00	1.29		

CALIB					
NASHYD (0203)	Area	(ha)=	0.62	Curve Number (CN)=	57.4
ID= 1 DT=10.0 min	Ia	(mm)=	9.60	# of Linear Res.(N)=	3.00
	U.H. Tp(hrs)=		0.54		

NOTE: RAINFALL WAS TRANSFORMED TO 10.0 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
0.167	0.77	6.167	1.29	12.167	9.29	18.17	1.03
0.333	0.65	6.333	1.16	12.333	7.10	18.33	1.16
0.500	0.52	6.500	1.03	12.500	4.90	18.50	1.29
0.667	0.77	6.667	1.29	12.667	4.65	18.67	1.03
0.833	0.77	6.833	1.29	12.833	4.13	18.83	1.16
1.000	0.77	7.000	1.29	13.000	3.61	19.00	1.29
1.167	0.77	7.167	1.55	13.167	3.36	19.17	1.03
1.333	0.65	7.333	1.42	13.333	3.10	19.33	1.16
1.500	0.52	7.500	1.29	13.500	2.84	19.50	1.29
1.667	0.77	7.667	1.55	13.667	2.58	19.67	1.03
1.833	0.77	7.833	1.55	13.833	2.32	19.83	0.90
2.000	0.77	8.000	1.55	14.000	2.06	20.00	0.77
2.167	1.03	8.167	1.81	14.167	1.81	20.17	0.77
2.333	0.90	8.333	1.81	14.333	1.94	20.33	0.77
2.500	0.77	8.500	1.81	14.500	2.06	20.50	0.77
2.667	0.77	8.667	1.81	14.667	1.81	20.67	0.77
2.833	0.77	8.833	1.94	14.833	1.94	20.83	0.77
3.000	0.77	9.000	2.06	15.000	2.06	21.00	0.77
3.167	1.03	9.167	2.06	15.167	1.81	21.17	0.77
3.333	0.90	9.333	2.19	15.333	1.94	21.33	0.77
3.500	0.77	9.500	2.32	15.500	2.06	21.50	0.77
3.667	0.77	9.667	2.32	15.667	1.81	21.67	0.77
3.833	0.90	9.833	2.58	15.833	1.55	21.83	0.77
4.000	1.03	10.000	2.84	16.000	1.29	22.00	0.77
4.167	1.03	10.167	3.10	16.167	1.03	22.17	0.77
4.333	1.03	10.333	3.48	16.333	1.16	22.33	0.77
4.500	1.03	10.500	3.87	16.500	1.29	22.50	0.77

4.667	1.03	10.667	4.13	16.667	1.03	22.67	0.77
4.833	1.03	10.833	5.16	16.833	1.16	22.83	0.77
5.000	1.03	11.000	6.19	17.000	1.29	23.00	0.77
5.167	1.03	11.167	6.19	17.167	1.03	23.17	0.77
5.333	1.03	11.333	12.65	17.333	1.16	23.33	0.77
5.500	1.03	11.500	19.10	17.500	1.29	23.50	0.77
5.667	1.03	11.667	78.98	17.667	1.03	23.67	0.77
5.833	1.03	11.833	44.14	17.833	1.16	23.83	0.39
6.000	1.03	12.000	9.29	18.000	1.29		

Unit Hyd Qpeak (cms)= 0.044

PEAK FLOW (cms)= 0.009 (i)
TIME TO PEAK (hrs)= 12.167
RUNOFF VOLUME (mm)= 12.308
TOTAL RAINFALL (mm)= 64.336
RUNOFF COEFFICIENT = 0.191

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

CALIB					
NASHYD (0204)	Area	(ha)=	0.02	Curve Number (CN)=	49.0
ID= 1 DT=10.0 min	Ia	(mm)=	5.00	# of Linear Res.(N)=	3.00
	U.H. Tp(hrs)=		0.07		

Unit Hyd Qpeak (cms)= 0.011

PEAK FLOW (cms)= 0.000 (i)
TIME TO PEAK (hrs)= 11.667
RUNOFF VOLUME (mm)= 4.672
TOTAL RAINFALL (mm)= 64.336
RUNOFF COEFFICIENT = 0.073

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

ADD HYD (0215)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0203):	0.62	0.009	12.17	12.31
+ ID2= 2 (0204):	0.02	0.000	11.67	4.67
ID = 3 (0215):	0.64	0.009	12.17	12.07

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB					
NASHYD (0205)	Area	(ha)=	0.47	Curve Number (CN)=	49.5
ID= 1 DT=10.0 min	Ia	(mm)=	8.50	# of Linear Res.(N)=	3.00
	U.H. Tp(hrs)=		1.00		

Unit Hyd Qpeak (cms)= 0.018

PEAK FLOW (cms)= 0.003 (i)
TIME TO PEAK (hrs)= 12.833
RUNOFF VOLUME (mm)= 9.893
TOTAL RAINFALL (mm)= 64.336

RUNOFF COEFFICIENT = 0.154

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

ADD HYD (0216)		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
1 + 2 = 3	ID1= 1 (0205):	0.47	0.003	12.83	9.89
	+ ID2= 2 (0215):	0.64	0.009	12.17	12.07
	ID = 3 (0216):	1.11	0.012	12.33	11.15

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB				
NASHYD (0201)	Area (ha)= 1.54	Curve Number (CN)= 76.8		
ID= 1 DT= 5.0 min	Ia (mm)= 10.81	# of Linear Res.(N)= 3.00		
	U.H. Tp(hrs)= 0.90			

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.77	6.083	1.29	12.083	9.29	18.08	1.03
0.167	0.77	6.167	1.29	12.167	9.29	18.17	1.03
0.250	0.77	6.250	1.29	12.250	9.29	18.25	1.03
0.333	0.52	6.333	1.03	12.333	4.90	18.33	1.29
0.417	0.52	6.417	1.03	12.417	4.90	18.42	1.29
0.500	0.52	6.500	1.03	12.500	4.90	18.50	1.29
0.583	0.77	6.583	1.29	12.583	4.65	18.58	1.03
0.667	0.77	6.667	1.29	12.667	4.65	18.67	1.03
0.750	0.77	6.750	1.29	12.750	4.65	18.75	1.03
0.833	0.77	6.833	1.29	12.833	3.61	18.83	1.29
0.917	0.77	6.917	1.29	12.917	3.61	18.92	1.29
1.000	0.77	7.000	1.29	13.000	3.61	19.00	1.29
1.083	0.77	7.083	1.55	13.083	3.36	19.08	1.03
1.167	0.77	7.167	1.55	13.167	3.36	19.17	1.03
1.250	0.77	7.250	1.55	13.250	3.36	19.25	1.03
1.333	0.52	7.333	1.29	13.333	2.84	19.33	1.29
1.417	0.52	7.417	1.29	13.417	2.84	19.42	1.29
1.500	0.52	7.500	1.29	13.500	2.84	19.50	1.29
1.583	0.77	7.583	1.55	13.583	2.58	19.58	1.03
1.667	0.77	7.667	1.55	13.667	2.58	19.67	1.03
1.750	0.77	7.750	1.55	13.750	2.58	19.75	1.03
1.833	0.77	7.833	1.55	13.833	2.07	19.83	0.77
1.917	0.77	7.917	1.55	13.917	2.06	19.92	0.77
2.000	0.77	8.000	1.55	14.000	2.06	20.00	0.77
2.083	1.03	8.083	1.81	14.083	1.81	20.08	0.77
2.167	1.03	8.167	1.81	14.167	1.81	20.17	0.77
2.250	1.03	8.250	1.81	14.250	1.81	20.25	0.77
2.333	0.77	8.333	1.81	14.333	2.06	20.33	0.77
2.417	0.77	8.417	1.81	14.417	2.06	20.42	0.77
2.500	0.77	8.500	1.81	14.500	2.06	20.50	0.77
2.583	0.77	8.583	1.81	14.583	1.81	20.58	0.77
2.667	0.77	8.667	1.81	14.667	1.81	20.67	0.77
2.750	0.77	8.750	1.81	14.750	1.81	20.75	0.77

2.833	0.77	8.833	2.06	14.833	2.06	20.83	0.77
2.917	0.77	8.917	2.06	14.917	2.06	20.92	0.77
3.000	0.77	9.000	2.06	15.000	2.06	21.00	0.77
3.083	1.03	9.083	2.06	15.083	1.81	21.08	0.77
3.167	1.03	9.167	2.06	15.167	1.81	21.17	0.77
3.250	1.03	9.250	2.06	15.250	1.81	21.25	0.77
3.333	0.77	9.333	2.32	15.333	2.06	21.33	0.77
3.417	0.77	9.417	2.32	15.417	2.06	21.42	0.77
3.500	0.77	9.500	2.32	15.500	2.06	21.50	0.77
3.583	0.77	9.583	2.32	15.583	1.81	21.58	0.77
3.667	0.77	9.667	2.32	15.667	1.81	21.67	0.77
3.750	0.77	9.750	2.32	15.750	1.81	21.75	0.77
3.833	1.03	9.833	2.84	15.833	1.29	21.83	0.77
3.917	1.03	9.917	2.84	15.917	1.29	21.92	0.77
4.000	1.03	10.000	2.84	16.000	1.29	22.00	0.77
4.083	1.03	10.083	3.10	16.083	1.03	22.08	0.77
4.167	1.03	10.167	3.10	16.167	1.03	22.17	0.77
4.250	1.03	10.250	3.10	16.250	1.03	22.25	0.77
4.333	1.03	10.333	3.87	16.333	1.29	22.33	0.77
4.417	1.03	10.417	3.87	16.417	1.29	22.42	0.77
4.500	1.03	10.500	3.87	16.500	1.29	22.50	0.77
4.583	1.03	10.583	4.13	16.583	1.03	22.58	0.77
4.667	1.03	10.667	4.13	16.667	1.03	22.67	0.77
4.750	1.03	10.750	4.13	16.750	1.03	22.75	0.77
4.833	1.03	10.833	6.19	16.833	1.29	22.83	0.77
4.917	1.03	10.917	6.19	16.917	1.29	22.92	0.77
5.000	1.03	11.000	6.19	17.000	1.29	23.00	0.77
5.083	1.03	11.083	6.19	17.083	1.03	23.08	0.77
5.167	1.03	11.167	6.19	17.167	1.03	23.17	0.77
5.250	1.03	11.250	6.19	17.250	1.03	23.25	0.77
5.333	1.03	11.333	19.10	17.333	1.29	23.33	0.77
5.417	1.03	11.417	19.10	17.417	1.29	23.42	0.77
5.500	1.03	11.500	19.10	17.500	1.29	23.50	0.77
5.583	1.03	11.583	78.98	17.583	1.03	23.58	0.77
5.667	1.03	11.667	78.98	17.667	1.03	23.67	0.77
5.750	1.03	11.750	78.98	17.750	1.03	23.75	0.77
5.833	1.03	11.833	9.30	17.833	1.29		
5.917	1.03	11.917	9.29	17.917	1.29		
6.000	1.03	12.000	9.29	18.000	1.29		

Unit Hyd Qpeak (cms)= 0.065

PEAK FLOW (cms)= 0.029 (i)
TIME TO PEAK (hrs)= 12.667
RUNOFF VOLUME (mm)= 21.995
TOTAL RAINFALL (mm)= 64.337
RUNOFF COEFFICIENT = 0.342

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

CALIB		
STANDHYD (0200)	Area (ha)= 1.01	
ID= 1 DT= 5.0 min	Total Imp(%)= 95.00	Dir. Conn.(%)= 95.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.96	0.05
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	82.06	40.00
Mannings n	=	0.013	0.250

Max.Eff.Inten.(mm/hr)=		78.98	65.08	
over (min)		5.00	5.00	
Storage Coeff. (min)=		2.49 (ii)	4.88 (ii)	
Unit Hyd. Tpeak (min)=		5.00	5.00	
Unit Hyd. peak (cms)=		0.29	0.22	
				TOTALS
PEAK FLOW	(cms)=	0.21	0.01	0.219 (iii)
TIME TO PEAK	(hrs)=	11.75	11.75	11.75
RUNOFF VOLUME	(mm)=	63.34	14.80	60.91
TOTAL RAINFALL	(mm)=	64.34	64.34	64.34
RUNOFF COEFFICIENT	=	0.98	0.23	0.95

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

(i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
Fo (mm/hr)= 50.00 K (1/hr)= 2.00
Fc (mm/hr)= 7.50 Cum.Inf. (mm)= 0.00
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

RESERVOIR (0210)
IN= 2---> OUT= 1
DT= 5.0 min

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.5000	0.0140
0.0029	0.0138	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0200)	1.010	0.219	11.75	60.91
OUTFLOW: ID= 1 (0210)	1.010	0.243	11.75	59.72

PEAK FLOW REDUCTION [Qout/Qin](%)=111.19
TIME SHIFT OF PEAK FLOW (min)= 0.00
MAXIMUM STORAGE USED (ha.m.)= 0.0135

**** WARNING : HYDROGRAPH PEAK WAS NOT REDUCED.
CHECK OUTFLOW/STORAGE TABLE OR REDUCE DT.

ADD HYD (0211)
1 + 2 = 3

		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0201):		1.54	0.029	12.67	21.99
+ ID2= 2 (0210):		1.01	0.243	11.75	59.72
ID = 3 (0211):		2.55	0.249	11.75	36.94

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB
STANDHYD (0202)
ID= 1 DT= 5.0 min

Area (ha)= 0.67
Total Imp(%)= 45.00 Dir. Conn.(%)= 45.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.30	0.37
Dep. Storage	(mm)=	1.00	1.50

Average Slope	(%)=	1.00	2.00
Length	(m)=	66.83	400.00
Mannings n	=	0.013	0.250

Max.Eff.Inten.(mm/hr)=		78.98	14.80	
over (min)		5.00	65.00	
Storage Coeff. (min)=		2.20 (ii)	62.55 (ii)	
Unit Hyd. Tpeak (min)=		5.00	65.00	
Unit Hyd. peak (cms)=		0.30	0.02	
				TOTALS
PEAK FLOW	(cms)=	0.07	0.01	0.067 (iii)
TIME TO PEAK	(hrs)=	11.75	12.67	11.75
RUNOFF VOLUME	(mm)=	63.34	14.80	36.64
TOTAL RAINFALL	(mm)=	64.34	64.34	64.34
RUNOFF COEFFICIENT	=	0.98	0.23	0.57

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

(i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
Fo (mm/hr)= 50.00 K (1/hr)= 2.00
Fc (mm/hr)= 7.50 Cum.Inf. (mm)= 0.00
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0212)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0202):	0.67	0.067	11.75	36.64
+ ID2= 2 (0211):	2.55	0.249	11.75	36.94
ID = 3 (0212):	3.22	0.317	11.75	36.87

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ROUTE CHN (0213)
IN= 2---> OUT= 1

Routing time step (min)'= 10.00

<------ DATA FOR SECTION (1.1) ------>

Distance	Elevation	Manning	
0.00	100.00	0.0400	Main Channel
2.50	99.00	0.0400	Main Channel
3.00	99.00	0.0400	Main Channel
5.50	100.00	0.0400	Main Channel

<---------- TRAVEL TIME TABLE ---------->

DEPTH (m)	ELEV (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME (min)
0.05	99.05	.831E+01	0.0	0.22	19.37
0.11	99.11	.201E+02	0.0	0.32	13.22
0.16	99.16	.353E+02	0.1	0.39	10.62
0.21	99.21	.540E+02	0.1	0.46	9.08
0.26	99.26	.762E+02	0.2	0.52	8.03
0.32	99.32	.102E+03	0.2	0.57	7.26
0.37	99.37	.131E+03	0.3	0.63	6.65
0.42	99.42	.163E+03	0.4	0.68	6.17
0.47	99.47	.199E+03	0.6	0.72	5.76
0.53	99.53	.239E+03	0.7	0.77	5.42

0.58	99.58	.282E+03	0.9	0.81	5.13
0.63	99.63	.328E+03	1.1	0.86	4.87
0.68	99.68	.378E+03	1.4	0.90	4.65
0.74	99.74	.431E+03	1.6	0.94	4.44
0.79	99.79	.488E+03	1.9	0.98	4.26
0.84	99.84	.548E+03	2.2	1.02	4.10
0.89	99.89	.612E+03	2.6	1.05	3.95
0.95	99.95	.679E+03	3.0	1.09	3.82
1.00	100.00	.750E+03	3.4	1.13	3.69

	<---- hydrograph ---->			<-pipe / channel->	
	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 2 (0212)	3.22	0.32	11.75	36.87	0.36	0.62
OUTFLOW: ID= 1 (0213)	3.22	0.26	11.75	36.87	0.33	0.59

RESERVOIR (0214)
IN= 2---> OUT= 1
DT= 10.0 min

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.0920	0.1110
0.0210	0.0150	0.1180	0.1890
0.0590	0.0690	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0213)	3.220	0.259	11.75	36.87
OUTFLOW: ID= 1 (0214)	3.220	0.038	13.50	36.81

PEAK FLOW REDUCTION [Qout/Qin](%)= 14.65
TIME SHIFT OF PEAK FLOW (min)=105.00
MAXIMUM STORAGE USED (ha.m.)= 0.0392

ADD HYD (0217)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0214):	3.22	0.038	13.50	36.81
+ ID2= 2 (0216):	1.11	0.012	12.33	11.15
ID = 3 (0217):	4.33	0.046	12.50	30.23

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

MASS STORM
Ptotal= 86.04 mm

Filename: C:\Users\aschoof\AppData\Local\Temp\0cd4140e-b537-41ad-bf58-1a4fda59fd59\b8a868f5
Comments: SCS Type II 24 HR MASS CURVE

Duration of storm = 23.75 hrs
Mass curve time step = 15.00 min

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	1.03	6.25	1.72	12.25	12.39	18.25	1.38
0.50	0.69	6.50	1.38	12.50	6.54	18.50	1.72
0.75	1.03	6.75	1.72	12.75	6.19	18.75	1.38
1.00	1.03	7.00	1.72	13.00	4.82	19.00	1.72
1.25	1.03	7.25	2.06	13.25	4.47	19.25	1.38
1.50	0.69	7.50	1.72	13.50	3.79	19.50	1.72
1.75	1.03	7.75	2.06	13.75	3.44	19.75	1.38
2.00	1.03	8.00	2.06	14.00	2.75	20.00	1.03
2.25	1.38	8.25	2.41	14.25	2.41	20.25	1.03
2.50	1.03	8.50	2.41	14.50	2.75	20.50	1.03
2.75	1.03	8.75	2.41	14.75	2.41	20.75	1.03
3.00	1.03	9.00	2.75	15.00	2.75	21.00	1.03
3.25	1.38	9.25	2.75	15.25	2.41	21.25	1.03
3.50	1.03	9.50	3.10	15.50	2.75	21.50	1.03
3.75	1.03	9.75	3.10	15.75	2.41	21.75	1.03
4.00	1.38	10.00	3.79	16.00	1.72	22.00	1.03
4.25	1.38	10.25	4.13	16.25	1.38	22.25	1.03
4.50	1.38	10.50	5.16	16.50	1.72	22.50	1.03
4.75	1.38	10.75	5.51	16.75	1.38	22.75	1.03
5.00	1.38	11.00	8.26	17.00	1.72	23.00	1.03
5.25	1.38	11.25	8.26	17.25	1.38	23.25	1.03
5.50	1.38	11.50	25.47	17.50	1.72	23.50	1.03
5.75	1.38	11.75	105.31	17.75	1.38	23.75	1.03
6.00	1.38	12.00	12.39	18.00	1.72		

CALIB
NASHYD (0203)
ID= 1 DT=10.0 min

Area (ha)= 0.62 Curve Number (CN)= 57.4
Ia (mm)= 9.60 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.54

NOTE: RAINFALL WAS TRANSFORMED TO 10.0 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
0.167	1.03	6.167	1.72	12.167	12.39	18.17	1.38
0.333	0.86	6.333	1.55	12.333	9.46	18.33	1.55
0.500	0.69	6.500	1.38	12.500	6.54	18.50	1.72
0.667	1.03	6.667	1.72	12.667	6.19	18.67	1.38
0.833	1.03	6.833	1.72	12.833	5.51	18.83	1.55
1.000	1.03	7.000	1.72	13.000	4.82	19.00	1.72
1.167	1.03	7.167	2.06	13.167	4.47	19.17	1.38
1.333	0.86	7.333	1.89	13.333	4.13	19.33	1.55
1.500	0.69	7.500	1.72	13.500	3.79	19.50	1.72
1.667	1.03	7.667	2.06	13.667	3.44	19.67	1.38
1.833	1.03	7.833	2.06	13.833	3.10	19.83	1.20
2.000	1.03	8.000	2.06	14.000	2.75	20.00	1.03
2.167	1.38	8.167	2.41	14.167	2.41	20.17	1.03
2.333	1.20	8.333	2.41	14.333	2.58	20.33	1.03
2.500	1.03	8.500	2.41	14.500	2.75	20.50	1.03
2.667	1.03	8.667	2.41	14.667	2.41	20.67	1.03
2.833	1.03	8.833	2.58	14.833	2.58	20.83	1.03
3.000	1.03	9.000	2.75	15.000	2.75	21.00	1.03
3.167	1.38	9.167	2.75	15.167	2.41	21.17	1.03
3.333	1.20	9.333	2.93	15.333	2.58	21.33	1.03
3.500	1.03	9.500	3.10	15.500	2.75	21.50	1.03
3.667	1.03	9.667	3.10	15.667	2.41	21.67	1.03
3.833	1.20	9.833	3.44	15.833	2.06	21.83	1.03

4.000	1.38	10.000	3.79	16.000	1.72	22.00	1.03
4.167	1.38	10.167	4.13	16.167	1.38	22.17	1.03
4.333	1.38	10.333	4.65	16.333	1.55	22.33	1.03
4.500	1.38	10.500	5.16	16.500	1.72	22.50	1.03
4.667	1.38	10.667	5.51	16.667	1.38	22.67	1.03
4.833	1.38	10.833	6.88	16.833	1.55	22.83	1.03
5.000	1.38	11.000	8.26	17.000	1.72	23.00	1.03
5.167	1.38	11.167	8.26	17.167	1.38	23.17	1.03
5.333	1.38	11.333	16.86	17.333	1.55	23.33	1.03
5.500	1.38	11.500	25.47	17.500	1.72	23.50	1.03
5.667	1.38	11.667	105.31	17.667	1.38	23.67	1.03
5.833	1.38	11.833	58.85	17.833	1.55	23.83	0.52
6.000	1.38	12.000	12.39	18.000	1.72		

Unit Hyd Qpeak (cms)= 0.044

PEAK FLOW (cms)= 0.016 (i)
TIME TO PEAK (hrs)= 12.167
RUNOFF VOLUME (mm)= 21.912
TOTAL RAINFALL (mm)= 85.782
RUNOFF COEFFICIENT = 0.255

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

CALIB					
NASHYD (0204)	Area (ha)=	0.02	Curve Number (CN)=	49.0	
ID= 1 DT=10.0 min	Ia (mm)=	5.00	# of Linear Res.(N)=	3.00	
	U.H. Tp(hrs)=	0.07			

Unit Hyd Qpeak (cms)= 0.011

PEAK FLOW (cms)= 0.001 (i)
TIME TO PEAK (hrs)= 11.667
RUNOFF VOLUME (mm)= 9.013
TOTAL RAINFALL (mm)= 85.782
RUNOFF COEFFICIENT = 0.105

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

ADD HYD (0215)					
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	
ID1= 1 (0203):	0.62	0.016	12.17	21.91	
+ ID2= 2 (0204):	0.02	0.001	11.67	9.01	
ID = 3 (0215):	0.64	0.016	12.17	21.51	

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB					
NASHYD (0205)	Area (ha)=	0.47	Curve Number (CN)=	49.5	
ID= 1 DT=10.0 min	Ia (mm)=	8.50	# of Linear Res.(N)=	3.00	
	U.H. Tp(hrs)=	1.00			

Unit Hyd Qpeak (cms)= 0.018

PEAK FLOW (cms)= 0.006 (i)
TIME TO PEAK (hrs)= 12.667
RUNOFF VOLUME (mm)= 17.747
TOTAL RAINFALL (mm)= 85.782
RUNOFF COEFFICIENT = 0.207

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

ADD HYD (0216)				
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0205):	0.47	0.006	12.67	17.75
+ ID2= 2 (0215):	0.64	0.016	12.17	21.51
ID = 3 (0216):	1.11	0.021	12.33	19.92

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB					
NASHYD (0201)	Area (ha)=	1.54	Curve Number (CN)=	76.8	
ID= 1 DT= 5.0 min	Ia (mm)=	10.81	# of Linear Res.(N)=	3.00	
	U.H. Tp(hrs)=	0.90			

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	1.03	6.083	1.72	12.083	12.39	18.08	1.38
0.167	1.03	6.167	1.72	12.167	12.39	18.17	1.38
0.250	1.03	6.250	1.72	12.250	12.39	18.25	1.38
0.333	0.69	6.333	1.38	12.333	6.54	18.33	1.72
0.417	0.69	6.417	1.38	12.417	6.54	18.42	1.72
0.500	0.69	6.500	1.38	12.500	6.54	18.50	1.72
0.583	1.03	6.583	1.72	12.583	6.19	18.58	1.38
0.667	1.03	6.667	1.72	12.667	6.19	18.67	1.38
0.750	1.03	6.750	1.72	12.750	6.19	18.75	1.38
0.833	1.03	6.833	1.72	12.833	4.82	18.83	1.72
0.917	1.03	6.917	1.72	12.917	4.82	18.92	1.72
1.000	1.03	7.000	1.72	13.000	4.82	19.00	1.72
1.083	1.03	7.083	2.06	13.083	4.47	19.08	1.38
1.167	1.03	7.167	2.06	13.167	4.47	19.17	1.38
1.250	1.03	7.250	2.06	13.250	4.47	19.25	1.38
1.333	0.69	7.333	1.72	13.333	3.79	19.33	1.72
1.417	0.69	7.417	1.72	13.417	3.79	19.42	1.72
1.500	0.69	7.500	1.72	13.500	3.79	19.50	1.72
1.583	1.03	7.583	2.06	13.583	3.44	19.58	1.38
1.667	1.03	7.667	2.06	13.667	3.44	19.67	1.38
1.750	1.03	7.750	2.06	13.750	3.44	19.75	1.38
1.833	1.03	7.833	2.06	13.833	2.75	19.83	1.03
1.917	1.03	7.917	2.06	13.917	2.75	19.92	1.03
2.000	1.03	8.000	2.06	14.000	2.75	20.00	1.03
2.083	1.38	8.083	2.41	14.083	2.41	20.08	1.03
2.167	1.38	8.167	2.41	14.167	2.41	20.17	1.03
2.250	1.38	8.250	2.41	14.250	2.41	20.25	1.03
2.333	1.03	8.333	2.41	14.333	2.75	20.33	1.03
2.417	1.03	8.417	2.41	14.417	2.75	20.42	1.03

2.500	1.03	8.500	2.41	14.500	2.75	20.50	1.03
2.583	1.03	8.583	2.41	14.583	2.41	20.58	1.03
2.667	1.03	8.667	2.41	14.667	2.41	20.67	1.03
2.750	1.03	8.750	2.41	14.750	2.41	20.75	1.03
2.833	1.03	8.833	2.75	14.833	2.75	20.83	1.03
2.917	1.03	8.917	2.75	14.917	2.75	20.92	1.03
3.000	1.03	9.000	2.75	15.000	2.75	21.00	1.03
3.083	1.38	9.083	2.75	15.083	2.41	21.08	1.03
3.167	1.38	9.167	2.75	15.167	2.41	21.17	1.03
3.250	1.38	9.250	2.75	15.250	2.41	21.25	1.03
3.333	1.03	9.333	3.10	15.333	2.75	21.33	1.03
3.417	1.03	9.417	3.10	15.417	2.75	21.42	1.03
3.500	1.03	9.500	3.10	15.500	2.75	21.50	1.03
3.583	1.03	9.583	3.10	15.583	2.41	21.58	1.03
3.667	1.03	9.667	3.10	15.667	2.41	21.67	1.03
3.750	1.03	9.750	3.10	15.750	2.41	21.75	1.03
3.833	1.38	9.833	3.79	15.833	1.72	21.83	1.03
3.917	1.38	9.917	3.79	15.917	1.72	21.92	1.03
4.000	1.38	10.000	3.79	16.000	1.72	22.00	1.03
4.083	1.38	10.083	4.13	16.083	1.38	22.08	1.03
4.167	1.38	10.167	4.13	16.167	1.38	22.17	1.03
4.250	1.38	10.250	4.13	16.250	1.38	22.25	1.03
4.333	1.38	10.333	5.16	16.333	1.72	22.33	1.03
4.417	1.38	10.417	5.16	16.417	1.72	22.42	1.03
4.500	1.38	10.500	5.16	16.500	1.72	22.50	1.03
4.583	1.38	10.583	5.51	16.583	1.38	22.58	1.03
4.667	1.38	10.667	5.51	16.667	1.38	22.67	1.03
4.750	1.38	10.750	5.51	16.750	1.38	22.75	1.03
4.833	1.38	10.833	8.26	16.833	1.72	22.83	1.03
4.917	1.38	10.917	8.26	16.917	1.72	22.92	1.03
5.000	1.38	11.000	8.26	17.000	1.72	23.00	1.03
5.083	1.38	11.083	8.26	17.083	1.38	23.08	1.03
5.167	1.38	11.167	8.26	17.167	1.38	23.17	1.03
5.250	1.38	11.250	8.26	17.250	1.38	23.25	1.03
5.333	1.38	11.333	25.47	17.333	1.72	23.33	1.03
5.417	1.38	11.417	25.47	17.417	1.72	23.42	1.03
5.500	1.38	11.500	25.47	17.500	1.72	23.50	1.03
5.583	1.38	11.583	105.31	17.583	1.38	23.58	1.03
5.667	1.38	11.667	105.31	17.667	1.38	23.67	1.03
5.750	1.38	11.750	105.31	17.750	1.38	23.75	1.03
5.833	1.38	11.833	12.40	17.833	1.72		
5.917	1.38	11.917	12.39	17.917	1.72		
6.000	1.38	12.000	12.39	18.000	1.72		

Unit Hyd Qpeak (cms)= 0.065

PEAK FLOW (cms)= 0.050 (i)
TIME TO PEAK (hrs)= 12.583
RUNOFF VOLUME (mm)= 37.050
TOTAL RAINFALL (mm)= 85.782
RUNOFF COEFFICIENT = 0.432

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

CALIB STANDHYD (0200)	Area (ha)= 1.01
ID= 1 DT= 5.0 min	Total Imp(%)= 95.00 Dir. Conn.(%)= 95.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.96	0.05
Dep. Storage	(mm)=	1.00	1.50

Average Slope	(%)=	1.00	2.00
Length	(m)=	82.06	40.00
Mannings n	=	0.013	0.250
Max.Eff.Inten.(mm/hr)	=	105.31	94.58
over (min)		5.00	5.00
Storage Coeff. (min)	=	2.22 (ii)	4.35 (ii)
Unit Hyd. Tpeak (min)	=	5.00	5.00
Unit Hyd. peak (cms)	=	0.30	0.23

				TOTALS
PEAK FLOW	(cms)=	0.28	0.01	0.293 (iii)
TIME TO PEAK	(hrs)=	11.75	11.75	11.75
RUNOFF VOLUME	(mm)=	84.78	26.68	81.88
TOTAL RAINFALL	(mm)=	85.78	85.78	85.78
RUNOFF COEFFICIENT	=	0.99	0.31	0.95

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

(i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
Fo (mm/hr)= 50.00 K (1/hr)= 2.00
Fc (mm/hr)= 7.50 Cum.Inf. (mm)= 0.00
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

RESERVOIR (0210) IN= 2---> OUT= 1 DT= 5.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.5000	0.0140
	0.0029	0.0138	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0200)	1.010	0.293	11.75	81.88
OUTFLOW: ID= 1 (0210)	1.010	0.292	11.75	80.69

PEAK FLOW REDUCTION [Qout/Qin](%)= 99.70
TIME SHIFT OF PEAK FLOW (min)= 0.00
MAXIMUM STORAGE USED (ha.m.)= 0.0139

ADD HYD (0211) 1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0201):	1.54	0.050	12.58	37.05
+ ID2= 2 (0210):	1.01	0.292	11.75	80.69
ID = 3 (0211):	2.55	0.305	11.75	54.33

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB STANDHYD (0202)	Area (ha)= 0.67
ID= 1 DT= 5.0 min	Total Imp(%)= 45.00 Dir. Conn.(%)= 45.00

IMPERVIOUS PERVIOUS (i)

Surface Area (ha)=	0.30	0.37	
Dep. Storage (mm)=	1.00	1.50	
Average Slope (%)=	1.00	2.00	
Length (m)=	66.83	400.00	
Mannings n =	0.013	0.250	
Max.Eff.Inten.(mm/hr)=	105.31	34.76	
over (min)	5.00	45.00	
Storage Coeff. (min)=	1.96 (ii)	44.84 (ii)	
Unit Hyd. Tpeak (min)=	5.00	45.00	
Unit Hyd. peak (cms)=	0.31	0.03	
			TOTALS
PEAK FLOW (cms)=	0.09	0.02	0.094 (iii)
TIME TO PEAK (hrs)=	11.75	12.33	11.75
RUNOFF VOLUME (mm)=	84.78	26.68	52.83
TOTAL RAINFALL (mm)=	85.78	85.78	85.78
RUNOFF COEFFICIENT =	0.99	0.31	0.62

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

(i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
Fo (mm/hr)= 50.00 K (1/hr)= 2.00
Fc (mm/hr)= 7.50 Cum.Inf. (mm)= 0.00
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0212)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
	ID1= 1 (0202):	0.67	0.094	11.75	52.83
	+ ID2= 2 (0211):	2.55	0.305	11.75	54.33
	ID = 3 (0212):	3.22	0.399	11.75	54.02

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ROUTE CHN (0213)
IN= 2---> OUT= 1	Routing time step (min)'= 10.00

<------ DATA FOR SECTION (1.1) ------>

Distance	Elevation	Manning	
0.00	100.00	0.0400	Main Channel
2.50	99.00	0.0400	Main Channel
3.00	99.00	0.0400	Main Channel
5.50	100.00	0.0400	Main Channel

<---------- TRAVEL TIME TABLE ---------->

DEPTH (m)	ELEV (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME (min)
0.05	99.05	.831E+01	0.0	0.22	19.37
0.11	99.11	.201E+02	0.0	0.32	13.22
0.16	99.16	.353E+02	0.1	0.39	10.62
0.21	99.21	.540E+02	0.1	0.46	9.08
0.26	99.26	.762E+02	0.2	0.52	8.03
0.32	99.32	.102E+03	0.2	0.57	7.26
0.37	99.37	.131E+03	0.3	0.63	6.65
0.42	99.42	.163E+03	0.4	0.68	6.17

0.47	99.47	.199E+03	0.6	0.72	5.76
0.53	99.53	.239E+03	0.7	0.77	5.42
0.58	99.58	.282E+03	0.9	0.81	5.13
0.63	99.63	.328E+03	1.1	0.86	4.87
0.68	99.68	.378E+03	1.4	0.90	4.65
0.74	99.74	.431E+03	1.6	0.94	4.44
0.79	99.79	.488E+03	1.9	0.98	4.26
0.84	99.84	.548E+03	2.2	1.02	4.10
0.89	99.89	.612E+03	2.6	1.05	3.95
0.95	99.95	.679E+03	3.0	1.09	3.82
1.00	100.00	.750E+03	3.4	1.13	3.69

	<---- hydrograph ----> AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	<-pipe / channel-> MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 2 (0212)	3.22	0.40	11.75	54.02	0.40	0.66
OUTFLOW: ID= 1 (0213)	3.22	0.36	11.75	54.01	0.38	0.64

RESERVOIR (0214)		OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
IN= 2---> OUT= 1		0.0000	0.0000	0.0920	0.1110
DT= 10.0 min		0.0210	0.0150	0.1180	0.1890
		0.0590	0.0690	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0213)	3.220	0.363	11.75	54.01
OUTFLOW: ID= 1 (0214)	3.220	0.056	13.58	53.96

PEAK FLOW REDUCTION [Qout/Qin](%)= 15.41
TIME SHIFT OF PEAK FLOW (min)=110.00
MAXIMUM STORAGE USED (ha.m.)= 0.0646

ADD HYD (0217)		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
1 + 2 = 3					
	ID1= 1 (0214):	3.22	0.056	13.58	53.96
	+ ID2= 2 (0216):	1.11	0.021	12.33	19.92
	ID = 3 (0217):	4.33	0.070	12.50	45.23

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

MASS STORM	Filename: C:\Users\aschoof\AppData\Local\Temp\0cd4140e-b537-41ad-bf58-1a4fda59fd59\a2df1772
Ptotal=105.16 mm	Comments: SCS Type II 24 HR MASS CURVE

Duration of storm = 23.75 hrs

Mass curve time step = 15.00 min

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	1.26	6.25	2.10	12.25	15.14	18.25	1.68
0.50	0.84	6.50	1.68	12.50	7.99	18.50	2.10
0.75	1.26	6.75	2.10	12.75	7.57	18.75	1.68
1.00	1.26	7.00	2.10	13.00	5.89	19.00	2.10
1.25	1.26	7.25	2.52	13.25	5.47	19.25	1.68
1.50	0.84	7.50	2.10	13.50	4.63	19.50	2.10
1.75	1.26	7.75	2.52	13.75	4.21	19.75	1.68
2.00	1.26	8.00	2.52	14.00	3.37	20.00	1.26
2.25	1.68	8.25	2.94	14.25	2.94	20.25	1.26
2.50	1.26	8.50	2.94	14.50	3.37	20.50	1.26
2.75	1.26	8.75	2.94	14.75	2.94	20.75	1.26
3.00	1.26	9.00	3.37	15.00	3.37	21.00	1.26
3.25	1.68	9.25	3.37	15.25	2.94	21.25	1.26
3.50	1.26	9.50	3.79	15.50	3.37	21.50	1.26
3.75	1.26	9.75	3.79	15.75	2.94	21.75	1.26
4.00	1.68	10.00	4.63	16.00	2.10	22.00	1.26
4.25	1.68	10.25	5.05	16.25	1.68	22.25	1.26
4.50	1.68	10.50	6.31	16.50	2.10	22.50	1.26
4.75	1.68	10.75	6.73	16.75	1.68	22.75	1.26
5.00	1.68	11.00	10.10	17.00	2.10	23.00	1.26
5.25	1.68	11.25	10.10	17.25	1.68	23.25	1.26
5.50	1.68	11.50	31.13	17.50	2.10	23.50	1.26
5.75	1.68	11.75	128.72	17.75	1.68	23.75	1.26
6.00	1.68	12.00	15.14	18.00	2.10		

CALIB			
NASHYD (0203)	Area (ha)=	0.62	Curve Number (CN)= 57.4
ID= 1 DT=10.0 min	Ia (mm)=	9.60	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)=	0.54	

NOTE: RAINFALL WAS TRANSFORMED TO 10.0 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
0.167	1.26	6.167	2.10	12.167	15.14	18.17	1.68
0.333	1.05	6.333	1.89	12.333	11.57	18.33	1.89
0.500	0.84	6.500	1.68	12.500	7.99	18.50	2.10
0.667	1.26	6.667	2.10	12.667	7.57	18.67	1.68
0.833	1.26	6.833	2.10	12.833	6.73	18.83	1.89
1.000	1.26	7.000	2.10	13.000	5.89	19.00	2.10
1.167	1.26	7.167	2.52	13.167	5.47	19.17	1.68
1.333	1.05	7.333	2.31	13.333	5.05	19.33	1.89
1.500	0.84	7.500	2.10	13.500	4.63	19.50	2.10
1.667	1.26	7.667	2.52	13.667	4.21	19.67	1.68
1.833	1.26	7.833	2.52	13.833	3.79	19.83	1.47
2.000	1.26	8.000	2.52	14.000	3.37	20.00	1.26
2.167	1.68	8.167	2.94	14.167	2.94	20.17	1.26
2.333	1.47	8.333	2.94	14.333	3.15	20.33	1.26
2.500	1.26	8.500	2.94	14.500	3.37	20.50	1.26
2.667	1.26	8.667	2.94	14.667	2.94	20.67	1.26
2.833	1.26	8.833	3.15	14.833	3.15	20.83	1.26
3.000	1.26	9.000	3.37	15.000	3.37	21.00	1.26
3.167	1.68	9.167	3.37	15.167	2.94	21.17	1.26
3.333	1.47	9.333	3.58	15.333	3.15	21.33	1.26
3.500	1.26	9.500	3.79	15.500	3.37	21.50	1.26

3.667	1.26	9.667	3.79	15.667	2.94	21.67	1.26
3.833	1.47	9.833	4.21	15.833	2.52	21.83	1.26
4.000	1.68	10.000	4.63	16.000	2.10	22.00	1.26
4.167	1.68	10.167	5.05	16.167	1.68	22.17	1.26
4.333	1.68	10.333	5.68	16.333	1.89	22.33	1.26
4.500	1.68	10.500	6.31	16.500	2.10	22.50	1.26
4.667	1.68	10.667	6.73	16.667	1.68	22.67	1.26
4.833	1.68	10.833	8.41	16.833	1.89	22.83	1.26
5.000	1.68	11.000	10.10	17.000	2.10	23.00	1.26
5.167	1.68	11.167	10.10	17.167	1.68	23.17	1.26
5.333	1.68	11.333	20.61	17.333	1.89	23.33	1.26
5.500	1.68	11.500	31.13	17.500	2.10	23.50	1.26
5.667	1.68	11.667	128.72	17.667	1.68	23.67	1.26
5.833	1.68	11.833	71.93	17.833	1.89	23.83	0.63
6.000	1.68	12.000	15.14	18.000	2.10		

Unit Hyd Qpeak (cms)= 0.044

PEAK FLOW (cms)= 0.024 (i)
TIME TO PEAK (hrs)= 12.167
RUNOFF VOLUME (mm)= 31.949
TOTAL RAINFALL (mm)= 104.844
RUNOFF COEFFICIENT = 0.305

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

CALIB			
NASHYD (0204)	Area (ha)=	0.02	Curve Number (CN)= 49.0
ID= 1 DT=10.0 min	Ia (mm)=	5.00	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)=	0.07	

Unit Hyd Qpeak (cms)= 0.011

PEAK FLOW (cms)= 0.001 (i)
TIME TO PEAK (hrs)= 11.667
RUNOFF VOLUME (mm)= 13.049
TOTAL RAINFALL (mm)= 104.844
RUNOFF COEFFICIENT = 0.124

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

ADD HYD (0215)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
	ID1= 1 (0203):	0.62	0.024	12.17	31.95
	+ ID2= 2 (0204):	0.02	0.001	11.67	13.05
	ID = 3 (0215):	0.64	0.024	12.17	31.36

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB			
NASHYD (0205)	Area (ha)=	0.47	Curve Number (CN)= 49.5
ID= 1 DT=10.0 min	Ia (mm)=	8.50	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)=	1.00	

Unit Hyd Qpeak (cms)= 0.018

PEAK FLOW (cms)= 0.009 (i)
TIME TO PEAK (hrs)= 12.667
RUNOFF VOLUME (mm)= 26.106
TOTAL RAINFALL (mm)= 104.844
RUNOFF COEFFICIENT = 0.249

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

ADD HYD (0216)		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
1 + 2 = 3	ID1= 1 (0205):	0.47	0.009	12.67	26.11
	+ ID2= 2 (0215):	0.64	0.024	12.17	31.36
	ID = 3 (0216):	1.11	0.032	12.33	29.13

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB NASHYD (0201)	ID= 1 DT= 5.0 min	Area (ha)= 1.54	Ia (mm)= 10.81	U.H. Tp(hrs)= 0.90	Curve Number (CN)= 76.8	# of Linear Res.(N)= 3.00

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	1.26	6.083	2.10	12.083	15.14	18.08	1.68
0.167	1.26	6.167	2.10	12.167	15.14	18.17	1.68
0.250	1.26	6.250	2.10	12.250	15.14	18.25	1.68
0.333	0.84	6.333	1.68	12.333	7.99	18.33	2.10
0.417	0.84	6.417	1.68	12.417	7.99	18.42	2.10
0.500	0.84	6.500	1.68	12.500	7.99	18.50	2.10
0.583	1.26	6.583	2.10	12.583	7.57	18.58	1.68
0.667	1.26	6.667	2.10	12.667	7.57	18.67	1.68
0.750	1.26	6.750	2.10	12.750	7.57	18.75	1.68
0.833	1.26	6.833	2.10	12.833	5.89	18.83	2.10
0.917	1.26	6.917	2.10	12.917	5.89	18.92	2.10
1.000	1.26	7.000	2.10	13.000	5.89	19.00	2.10
1.083	1.26	7.083	2.52	13.083	5.47	19.08	1.68
1.167	1.26	7.167	2.52	13.167	5.47	19.17	1.68
1.250	1.26	7.250	2.52	13.250	5.47	19.25	1.68
1.333	0.84	7.333	2.10	13.333	4.63	19.33	2.10
1.417	0.84	7.417	2.10	13.417	4.63	19.42	2.10
1.500	0.84	7.500	2.10	13.500	4.63	19.50	2.10
1.583	1.26	7.583	2.52	13.583	4.21	19.58	1.68
1.667	1.26	7.667	2.52	13.667	4.21	19.67	1.68
1.750	1.26	7.750	2.52	13.750	4.21	19.75	1.68
1.833	1.26	7.833	2.52	13.833	3.37	19.83	1.26
1.917	1.26	7.917	2.52	13.917	3.37	19.92	1.26
2.000	1.26	8.000	2.52	14.000	3.37	20.00	1.26
2.083	1.68	8.083	2.94	14.083	2.94	20.08	1.26
2.167	1.68	8.167	2.94	14.167	2.94	20.17	1.26
2.250	1.68	8.250	2.94	14.250	2.94	20.25	1.26

2.333	1.26	8.333	2.94	14.333	3.37	20.33	1.26
2.417	1.26	8.417	2.94	14.417	3.37	20.42	1.26
2.500	1.26	8.500	2.94	14.500	3.37	20.50	1.26
2.583	1.26	8.583	2.94	14.583	2.94	20.58	1.26
2.667	1.26	8.667	2.94	14.667	2.94	20.67	1.26
2.750	1.26	8.750	2.94	14.750	2.94	20.75	1.26
2.833	1.26	8.833	3.37	14.833	3.36	20.83	1.26
2.917	1.26	8.917	3.37	14.917	3.37	20.92	1.26
3.000	1.26	9.000	3.37	15.000	3.37	21.00	1.26
3.083	1.68	9.083	3.37	15.083	2.94	21.08	1.26
3.167	1.68	9.167	3.37	15.167	2.94	21.17	1.26
3.250	1.68	9.250	3.37	15.250	2.94	21.25	1.26
3.333	1.26	9.333	3.79	15.333	3.37	21.33	1.26
3.417	1.26	9.417	3.79	15.417	3.37	21.42	1.26
3.500	1.26	9.500	3.79	15.500	3.37	21.50	1.26
3.583	1.26	9.583	3.79	15.583	2.94	21.58	1.26
3.667	1.26	9.667	3.79	15.667	2.94	21.67	1.26
3.750	1.26	9.750	3.79	15.750	2.94	21.75	1.26
3.833	1.68	9.833	4.63	15.833	2.10	21.83	1.26
3.917	1.68	9.917	4.63	15.917	2.10	21.92	1.26
4.000	1.68	10.000	4.63	16.000	2.10	22.00	1.26
4.083	1.68	10.083	5.05	16.083	1.68	22.08	1.26
4.167	1.68	10.167	5.05	16.167	1.68	22.17	1.26
4.250	1.68	10.250	5.05	16.250	1.68	22.25	1.26
4.333	1.68	10.333	6.31	16.333	2.10	22.33	1.26
4.417	1.68	10.417	6.31	16.417	2.10	22.42	1.26
4.500	1.68	10.500	6.31	16.500	2.10	22.50	1.26
4.583	1.68	10.583	6.73	16.583	1.68	22.58	1.26
4.667	1.68	10.667	6.73	16.667	1.68	22.67	1.26
4.750	1.68	10.750	6.73	16.750	1.68	22.75	1.26
4.833	1.68	10.833	10.10	16.833	2.10	22.83	1.26
4.917	1.68	10.917	10.10	16.917	2.10	22.92	1.26
5.000	1.68	11.000	10.10	17.000	2.10	23.00	1.26
5.083	1.68	11.083	10.10	17.083	1.68	23.08	1.26
5.167	1.68	11.167	10.10	17.167	1.68	23.17	1.26
5.250	1.68	11.250	10.10	17.250	1.68	23.25	1.26
5.333	1.68	11.333	31.13	17.333	2.10	23.33	1.26
5.417	1.68	11.417	31.13	17.417	2.10	23.42	1.26
5.500	1.68	11.500	31.13	17.500	2.10	23.50	1.26
5.583	1.68	11.583	128.71	17.583	1.68	23.58	1.26
5.667	1.68	11.667	128.72	17.667	1.68	23.67	1.26
5.750	1.68	11.750	128.72	17.750	1.68	23.75	1.26
5.833	1.68	11.833	15.16	17.833	2.10		
5.917	1.68	11.917	15.14	17.917	2.10		
6.000	1.68	12.000	15.14	18.000	2.10		

Unit Hyd Qpeak (cms)= 0.065

PEAK FLOW (cms)= 0.071 (i)
TIME TO PEAK (hrs)= 12.583
RUNOFF VOLUME (mm)= 51.781
TOTAL RAINFALL (mm)= 104.845
RUNOFF COEFFICIENT = 0.494

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

CALIB STANDHYD (0200)	ID= 1 DT= 5.0 min	Area (ha)= 1.01	Total Imp(%)= 95.00	Dir. Conn.(%)= 95.00

IMPERVIOUS PERVIOUS (i)

Surface Area	(ha)=	0.96	0.05	
Dep. Storage	(mm)=	1.00	1.50	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	82.06	40.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.(mm/hr)=		128.72	119.84	
over (min)		5.00	5.00	
Storage Coeff. (min)=		2.05 (ii)	4.02 (ii)	
Unit Hyd. Tpeak (min)=		5.00	5.00	
Unit Hyd. peak (cms)=		0.31	0.24	
				TOTALS
PEAK FLOW	(cms)=	0.34	0.02	0.359 (iii)
TIME TO PEAK	(hrs)=	11.75	11.75	11.75
RUNOFF VOLUME	(mm)=	103.84	37.21	100.51
TOTAL RAINFALL	(mm)=	104.84	104.84	104.84
RUNOFF COEFFICIENT	=	0.99	0.35	0.96

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

(i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
Fo (mm/hr)= 50.00 K (1/hr)= 2.00
Fc (mm/hr)= 7.50 Cum.Inf. (mm)= 0.00
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

RESERVOIR (0210)
IN= 2---> OUT= 1
DT= 5.0 min

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.5000	0.0140
0.0029	0.0138	0.0000	0.0000

		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0200)		1.010	0.359	11.75	100.51
OUTFLOW: ID= 1 (0210)		1.010	0.362	11.67	99.32

PEAK FLOW REDUCTION [Qout/Qin](%)=100.68
TIME SHIFT OF PEAK FLOW (min)= -5.00
MAXIMUM STORAGE USED (ha.m.)= 0.0140

**** WARNING : HYDROGRAPH PEAK WAS NOT REDUCED.
CHECK OUTFLOW/STORAGE TABLE OR REDUCE DT.

ADD HYD (0211)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0201):	1.54	0.071	12.58	51.78
+ ID2= 2 (0210):	1.01	0.362	11.67	99.32
ID = 3 (0211):	2.55	0.376	11.67	70.61

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB

STANDHYD (0202)	Area (ha)= 0.67
ID= 1 DT= 5.0 min	Total Imp(%)= 45.00 Dir. Conn.(%)= 45.00

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	0.30	0.37	
Dep. Storage	(mm)=	1.00	1.50	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	66.83	400.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.(mm/hr)=		128.72	59.31	
over (min)		5.00	40.00	
Storage Coeff. (min)=		1.81 (ii)	36.44 (ii)	
Unit Hyd. Tpeak (min)=		5.00	40.00	
Unit Hyd. peak (cms)=		0.32	0.03	
				TOTALS
PEAK FLOW	(cms)=	0.11	0.03	0.118 (iii)
TIME TO PEAK	(hrs)=	11.75	12.25	11.75
RUNOFF VOLUME	(mm)=	103.84	37.21	67.19
TOTAL RAINFALL	(mm)=	104.84	104.84	104.84
RUNOFF COEFFICIENT	=	0.99	0.35	0.64

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

(i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
Fo (mm/hr)= 50.00 K (1/hr)= 2.00
Fc (mm/hr)= 7.50 Cum.Inf. (mm)= 0.00
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0212)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0202):	0.67	0.118	11.75	67.19
+ ID2= 2 (0211):	2.55	0.376	11.67	70.61
ID = 3 (0212):	3.22	0.493	11.75	69.90

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ROUTE CHN (0213)
IN= 2---> OUT= 1

Routing time step (min)'= 10.00

<------ DATA FOR SECTION (1.1) ------>

Distance	Elevation	Manning	
0.00	100.00	0.0400	Main Channel
2.50	99.00	0.0400	Main Channel
3.00	99.00	0.0400	Main Channel
5.50	100.00	0.0400	Main Channel

<---------- TRAVEL TIME TABLE ---------->

DEPTH (m)	ELEV (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME (min)
0.05	99.05	.831E+01	0.0	0.22	19.37
0.11	99.11	.201E+02	0.0	0.32	13.22
0.16	99.16	.353E+02	0.1	0.39	10.62
0.21	99.21	.540E+02	0.1	0.46	9.08

0.26	99.26	.762E+02	0.2	0.52	8.03
0.32	99.32	.102E+03	0.2	0.57	7.26
0.37	99.37	.131E+03	0.3	0.63	6.65
0.42	99.42	.163E+03	0.4	0.68	6.17
0.47	99.47	.199E+03	0.6	0.72	5.76
0.53	99.53	.239E+03	0.7	0.77	5.42
0.58	99.58	.282E+03	0.9	0.81	5.13
0.63	99.63	.328E+03	1.1	0.86	4.87
0.68	99.68	.378E+03	1.4	0.90	4.65
0.74	99.74	.431E+03	1.6	0.94	4.44
0.79	99.79	.488E+03	1.9	0.98	4.26
0.84	99.84	.548E+03	2.2	1.02	4.10
0.89	99.89	.612E+03	2.6	1.05	3.95
0.95	99.95	.679E+03	3.0	1.09	3.82
1.00	100.00	.750E+03	3.4	1.13	3.69

	<---- hydrograph ---->				<-pipe / channel->	
	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 2 (0212)	3.22	0.49	11.75	69.90	0.44	0.69
OUTFLOW: ID= 1 (0213)	3.22	0.46	11.75	69.89	0.43	0.68

RESERVOIR (0214)				
IN= 2---> OUT= 1				
DT= 10.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.0920	0.1110
	0.0210	0.0150	0.1180	0.1890
	0.0590	0.0690	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0213)	3.220	0.457	11.75	69.89
OUTFLOW: ID= 1 (0214)	3.220	0.073	13.50	69.84

PEAK FLOW REDUCTION [Qout/Qin](%)= 16.05
TIME SHIFT OF PEAK FLOW (min)=105.00
MAXIMUM STORAGE USED (ha.m.)= 0.0874

ADD HYD (0217)				
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0214):	3.22	0.073	13.50	69.84
+ ID2= 2 (0216):	1.11	0.032	12.33	29.13
ID = 3 (0217):	4.33	0.094	12.58	59.40

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

FINISH

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

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

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


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


  Input   filename: C:\Program Files (x86)\VH Suite 3.0\VO2\voin.dat

  Output  filename:
C:\Users\aschoof\AppData\Local\Temp\0cd4140e-b537-41ad-bf58-1a4fda59fd59\Scenario.ou
t
  Summary filename:
C:\Users\aschoof\AppData\Local\Temp\0cd4140e-b537-41ad-bf58-1a4fda59fd59\Scenario.su
m


DATE: 04/02/2018                          TIME: 06:51:45

USER:


COMMENTS: _____________________________________________________________


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


--------------------
| MASS STORM       |    Filename: C:\Users\aschoof\AppD
|                  |              ata\Local\Temp\
|                  |              0cd4140e-b537-41ad-bf58-1a4fda59fd59\dd4ad48b
| Ptotal= 50.19 mm |    Comments: SCS Type II 24 HR MASS CURVE
--------------------

                     Duration of storm    = 23.75 hrs
                     Mass curve time step = 15.00 min

                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.25    0.60 |  6.25    1.00 | 12.25    7.23 | 18.25    0.80
               0.50    0.40 |  6.50    0.80 | 12.50    3.81 | 18.50    1.00
               0.75    0.60 |  6.75    1.00 | 12.75    3.61 | 18.75    0.80
               1.00    0.60 |  7.00    1.00 | 13.00    2.81 | 19.00    1.00
               1.25    0.60 |  7.25    1.20 | 13.25    2.61 | 19.25    0.80
               1.50    0.40 |  7.50    1.00 | 13.50    2.21 | 19.50    1.00
```



```
               1.75    0.60 |  7.75    1.20 | 13.75    2.01 | 19.75    0.80
               2.00    0.60 |  8.00    1.20 | 14.00    1.61 | 20.00    0.60
               2.25    0.80 |  8.25    1.41 | 14.25    1.41 | 20.25    0.60
               2.50    0.60 |  8.50    1.41 | 14.50    1.61 | 20.50    0.60
               2.75    0.60 |  8.75    1.41 | 14.75    1.41 | 20.75    0.60
               3.00    0.60 |  9.00    1.61 | 15.00    1.61 | 21.00    0.60
               3.25    0.80 |  9.25    1.61 | 15.25    1.41 | 21.25    0.60
               3.50    0.60 |  9.50    1.81 | 15.50    1.61 | 21.50    0.60
               3.75    0.60 |  9.75    1.81 | 15.75    1.41 | 21.75    0.60
               4.00    0.80 | 10.00    2.21 | 16.00    1.00 | 22.00    0.60
               4.25    0.80 | 10.25    2.41 | 16.25    0.80 | 22.25    0.60
               4.50    0.80 | 10.50    3.01 | 16.50    1.00 | 22.50    0.60
               4.75    0.80 | 10.75    3.21 | 16.75    0.80 | 22.75    0.60
               5.00    0.80 | 11.00    4.82 | 17.00    1.00 | 23.00    0.60
               5.25    0.80 | 11.25    4.82 | 17.25    0.80 | 23.25    0.60
               5.50    0.80 | 11.50   14.86 | 17.50    1.00 | 23.50    0.60
               5.75    0.80 | 11.75   61.43 | 17.75    0.80 | 23.75    0.60
               6.00    0.80 | 12.00    7.23 | 18.00    1.00 |

--------------------------------------------------------------------------------
----------------------
| CALIB            |
| NASHYD    (0203) |   Area    (ha)=   0.62   Curve Number   (CN)= 57.4
|ID= 1 DT=10.0 min |   Ia      (mm)=   9.60   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=   0.54

        NOTE:  RAINFALL WAS TRANSFORMED TO  10.0 MIN. TIME STEP.

                          ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.167    0.60 | 6.167    1.00 |12.167    7.23 | 18.17    0.80
               0.333    0.50 | 6.333    0.90 |12.333    5.52 | 18.33    0.90
               0.500    0.40 | 6.500    0.80 |12.500    3.81 | 18.50    1.00
               0.667    0.60 | 6.667    1.00 |12.667    3.61 | 18.67    0.80
               0.833    0.60 | 6.833    1.00 |12.833    3.21 | 18.83    0.90
               1.000    0.60 | 7.000    1.00 |13.000    2.81 | 19.00    1.00
               1.167    0.60 | 7.167    1.20 |13.167    2.61 | 19.17    0.80
               1.333    0.50 | 7.333    1.10 |13.333    2.41 | 19.33    0.90
               1.500    0.40 | 7.500    1.00 |13.500    2.21 | 19.50    1.00
               1.667    0.60 | 7.667    1.20 |13.667    2.01 | 19.67    0.80
               1.833    0.60 | 7.833    1.20 |13.833    1.81 | 19.83    0.70
               2.000    0.60 | 8.000    1.20 |14.000    1.61 | 20.00    0.60
               2.167    0.80 | 8.167    1.41 |14.167    1.41 | 20.17    0.60
               2.333    0.70 | 8.333    1.41 |14.333    1.51 | 20.33    0.60
               2.500    0.60 | 8.500    1.41 |14.500    1.61 | 20.50    0.60
               2.667    0.60 | 8.667    1.41 |14.667    1.41 | 20.67    0.60
               2.833    0.60 | 8.833    1.51 |14.833    1.51 | 20.83    0.60
               3.000    0.60 | 9.000    1.61 |15.000    1.61 | 21.00    0.60
               3.167    0.80 | 9.167    1.61 |15.167    1.41 | 21.17    0.60
               3.333    0.70 | 9.333    1.71 |15.333    1.51 | 21.33    0.60
               3.500    0.60 | 9.500    1.81 |15.500    1.61 | 21.50    0.60
               3.667    0.60 | 9.667    1.81 |15.667    1.41 | 21.67    0.60
               3.833    0.70 | 9.833    2.01 |15.833    1.20 | 21.83    0.60
               4.000    0.80 |10.000    2.21 |16.000    1.00 | 22.00    0.60
               4.167    0.80 |10.167    2.41 |16.167    0.80 | 22.17    0.60
               4.333    0.80 |10.333    2.71 |16.333    0.90 | 22.33    0.60
               4.500    0.80 |10.500    3.01 |16.500    1.00 | 22.50    0.60
               4.667    0.80 |10.667    3.21 |16.667    0.80 | 22.67    0.60
               4.833    0.80 |10.833    4.02 |16.833    0.90 | 22.83    0.60
               5.000    0.80 |11.000    4.82 |17.000    1.00 | 23.00    0.60
               5.167    0.80 |11.167    4.82 |17.167    0.80 | 23.17    0.60
```

5.333	0.80	11.333	9.84	17.333	0.90	23.33	0.60
5.500	0.80	11.500	14.86	17.500	1.00	23.50	0.60
5.667	0.80	11.667	61.43	17.667	0.80	23.67	0.60
5.833	0.80	11.833	34.33	17.833	0.90	23.83	0.30
6.000	0.80	12.000	7.23	18.000	1.00		

Unit Hyd Qpeak (cms)= 0.044

PEAK FLOW (cms)= 0.005 (i)
TIME TO PEAK (hrs)= 12.167
RUNOFF VOLUME (mm)= 7.137
TOTAL RAINFALL (mm)= 50.039
RUNOFF COEFFICIENT = 0.143

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

CALIB					
NASHYD	(0204)	Area (ha)=	0.02	Curve Number (CN)=	49.0
ID= 1 DT=10.0 min		Ia (mm)=	5.00	# of Linear Res.(N)=	3.00
		U.H. Tp(hrs)=	0.07		

Unit Hyd Qpeak (cms)= 0.011

PEAK FLOW (cms)= 0.000 (i)
TIME TO PEAK (hrs)= 11.667
RUNOFF VOLUME (mm)= 2.355
TOTAL RAINFALL (mm)= 50.039
RUNOFF COEFFICIENT = 0.047

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

ADD HYD (0215)					
1 + 2 = 3		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
	ID1= 1 (0203):	0.62	0.005	12.17	7.14
	+ ID2= 2 (0204):	0.02	0.000	11.67	2.36
	ID = 3 (0215):	0.64	0.005	12.17	6.99

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB					
NASHYD	(0205)	Area (ha)=	0.47	Curve Number (CN)=	49.5
ID= 1 DT=10.0 min		Ia (mm)=	8.50	# of Linear Res.(N)=	3.00
		U.H. Tp(hrs)=	1.00		

Unit Hyd Qpeak (cms)= 0.018

PEAK FLOW (cms)= 0.002 (i)
TIME TO PEAK (hrs)= 12.833
RUNOFF VOLUME (mm)= 5.733
TOTAL RAINFALL (mm)= 50.039
RUNOFF COEFFICIENT = 0.115

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

ADD HYD (0216)					
1 + 2 = 3		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
	ID1= 1 (0205):	0.47	0.002	12.83	5.73
	+ ID2= 2 (0215):	0.64	0.005	12.17	6.99
	ID = 3 (0216):	1.11	0.007	12.33	6.46

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB					
NASHYD	(0201)	Area (ha)=	1.54	Curve Number (CN)=	76.8
ID= 1 DT= 5.0 min		Ia (mm)=	10.81	# of Linear Res.(N)=	3.00
		U.H. Tp(hrs)=	0.90		

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.60	6.083	1.00	12.083	7.23	18.08	0.80
0.167	0.60	6.167	1.00	12.167	7.23	18.17	0.80
0.250	0.60	6.250	1.00	12.250	7.23	18.25	0.80
0.333	0.40	6.333	0.80	12.333	3.81	18.33	1.00
0.417	0.40	6.417	0.80	12.417	3.81	18.42	1.00
0.500	0.40	6.500	0.80	12.500	3.81	18.50	1.00
0.583	0.60	6.583	1.00	12.583	3.61	18.58	0.80
0.667	0.60	6.667	1.00	12.667	3.61	18.67	0.80
0.750	0.60	6.750	1.00	12.750	3.61	18.75	0.80
0.833	0.60	6.833	1.00	12.833	2.81	18.83	1.00
0.917	0.60	6.917	1.00	12.917	2.81	18.92	1.00
1.000	0.60	7.000	1.00	13.000	2.81	19.00	1.00
1.083	0.60	7.083	1.20	13.083	2.61	19.08	0.80
1.167	0.60	7.167	1.20	13.167	2.61	19.17	0.80
1.250	0.60	7.250	1.20	13.250	2.61	19.25	0.80
1.333	0.40	7.333	1.00	13.333	2.21	19.33	1.00
1.417	0.40	7.417	1.00	13.417	2.21	19.42	1.00
1.500	0.40	7.500	1.00	13.500	2.21	19.50	1.00
1.583	0.60	7.583	1.20	13.583	2.01	19.58	0.80
1.667	0.60	7.667	1.20	13.667	2.01	19.67	0.80
1.750	0.60	7.750	1.20	13.750	2.01	19.75	0.80
1.833	0.60	7.833	1.20	13.833	1.61	19.83	0.60
1.917	0.60	7.917	1.20	13.917	1.61	19.92	0.60
2.000	0.60	8.000	1.20	14.000	1.61	20.00	0.60
2.083	0.80	8.083	1.41	14.083	1.41	20.08	0.60
2.167	0.80	8.167	1.41	14.167	1.41	20.17	0.60
2.250	0.80	8.250	1.41	14.250	1.41	20.25	0.60
2.333	0.60	8.333	1.41	14.333	1.61	20.33	0.60
2.417	0.60	8.417	1.41	14.417	1.61	20.42	0.60
2.500	0.60	8.500	1.41	14.500	1.61	20.50	0.60
2.583	0.60	8.583	1.41	14.583	1.41	20.58	0.60
2.667	0.60	8.667	1.41	14.667	1.41	20.67	0.60
2.750	0.60	8.750	1.41	14.750	1.41	20.75	0.60
2.833	0.60	8.833	1.61	14.833	1.61	20.83	0.60
2.917	0.60	8.917	1.61	14.917	1.61	20.92	0.60
3.000	0.60	9.000	1.61	15.000	1.61	21.00	0.60
3.083	0.80	9.083	1.61	15.083	1.41	21.08	0.60

3.167	0.80	9.167	1.61	15.167	1.41	21.17	0.60
3.250	0.80	9.250	1.61	15.250	1.41	21.25	0.60
3.333	0.60	9.333	1.81	15.333	1.61	21.33	0.60
3.417	0.60	9.417	1.81	15.417	1.61	21.42	0.60
3.500	0.60	9.500	1.81	15.500	1.61	21.50	0.60
3.583	0.60	9.583	1.81	15.583	1.41	21.58	0.60
3.667	0.60	9.667	1.81	15.667	1.41	21.67	0.60
3.750	0.60	9.750	1.81	15.750	1.41	21.75	0.60
3.833	0.80	9.833	2.21	15.833	1.00	21.83	0.60
3.917	0.80	9.917	2.21	15.917	1.00	21.92	0.60
4.000	0.80	10.000	2.21	16.000	1.00	22.00	0.60
4.083	0.80	10.083	2.41	16.083	0.80	22.08	0.60
4.167	0.80	10.167	2.41	16.167	0.80	22.17	0.60
4.250	0.80	10.250	2.41	16.250	0.80	22.25	0.60
4.333	0.80	10.333	3.01	16.333	1.00	22.33	0.60
4.417	0.80	10.417	3.01	16.417	1.00	22.42	0.60
4.500	0.80	10.500	3.01	16.500	1.00	22.50	0.60
4.583	0.80	10.583	3.21	16.583	0.80	22.58	0.60
4.667	0.80	10.667	3.21	16.667	0.80	22.67	0.60
4.750	0.80	10.750	3.21	16.750	0.80	22.75	0.60
4.833	0.80	10.833	4.82	16.833	1.00	22.83	0.60
4.917	0.80	10.917	4.82	16.917	1.00	22.92	0.60
5.000	0.80	11.000	4.82	17.000	1.00	23.00	0.60
5.083	0.80	11.083	4.82	17.083	0.80	23.08	0.60
5.167	0.80	11.167	4.82	17.167	0.80	23.17	0.60
5.250	0.80	11.250	4.82	17.250	0.80	23.25	0.60
5.333	0.80	11.333	14.86	17.333	1.00	23.33	0.60
5.417	0.80	11.417	14.86	17.417	1.00	23.42	0.60
5.500	0.80	11.500	14.86	17.500	1.00	23.50	0.60
5.583	0.80	11.583	61.43	17.583	0.80	23.58	0.60
5.667	0.80	11.667	61.43	17.667	0.80	23.67	0.60
5.750	0.80	11.750	61.43	17.750	0.80	23.75	0.60
5.833	0.80	11.833	7.23	17.833	1.00		
5.917	0.80	11.917	7.23	17.917	1.00		
6.000	0.80	12.000	7.23	18.000	1.00		

Unit Hyd Qpeak (cms)= 0.065

PEAK FLOW (cms)= 0.016 (i)
TIME TO PEAK (hrs)= 12.667
RUNOFF VOLUME (mm)= 13.270
TOTAL RAINFALL (mm)= 50.040
RUNOFF COEFFICIENT = 0.265

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

CALIB STANDHYD (0200) ID= 1 DT= 5.0 min	Area (ha)= 1.01 Total Imp(%)= 95.00 Dir. Conn.(%)= 95.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.96	0.05
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	82.06	40.00
Mannings n	=	0.013	0.250
Max.Eff.Inten.(mm/hr)=		61.43	43.24
over (min)		5.00	10.00
Storage Coeff. (min)=		2.76 (ii)	5.40 (ii)
Unit Hyd. Tpeak (min)=		5.00	10.00

Unit Hyd. peak (cms)=	0.28	0.16	
			TOTALS
PEAK FLOW (cms)=	0.16	0.00	0.168 (iii)
TIME TO PEAK (hrs)=	11.75	11.75	11.75
RUNOFF VOLUME (mm)=	49.04	9.06	47.04
TOTAL RAINFALL (mm)=	50.04	50.04	50.04
RUNOFF COEFFICIENT =	0.98	0.18	0.94

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

(i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
Fo (mm/hr)= 50.00 K (1/hr)= 2.00
Fc (mm/hr)= 7.50 Cum.Inf. (mm)= 0.00
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

RESERVOIR (0210) IN= 2---> OUT= 1 DT= 5.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.5000	0.0140
	0.0029	0.0138	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0200)	1.010	0.168	11.75	47.04
OUTFLOW: ID= 1 (0210)	1.010	0.200	11.67	45.85

PEAK FLOW REDUCTION [Qout/Qin](%)=119.36
TIME SHIFT OF PEAK FLOW (min)= -5.00
MAXIMUM STORAGE USED (ha.m.)= 0.0144

**** WARNING : HYDROGRAPH PEAK WAS NOT REDUCED.
CHECK OUTFLOW/STORAGE TABLE OR REDUCE DT.

ADD HYD (0211) 1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0201):	1.54	0.016	12.67	13.27
+ ID2= 2 (0210):	1.01	0.200	11.67	45.85
ID = 3 (0211):	2.55	0.202	11.67	26.17

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB STANDHYD (0202) ID= 1 DT= 5.0 min	Area (ha)= 0.67 Total Imp(%)= 45.00 Dir. Conn.(%)= 45.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.30	0.37
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	66.83	400.00
Mannings n	=	0.013	0.250

Max.Eff.Inten.(mm/hr)=	61.43	9.06		
over (min)	5.00	80.00		
Storage Coeff. (min)=	2.44 (ii)	75.85 (ii)		
Unit Hyd. Tpeak (min)=	5.00	80.00		
Unit Hyd. peak (cms)=	0.30	0.01		
			TOTALS	
PEAK FLOW (cms)=	0.05	0.00	0.052 (iii)	
TIME TO PEAK (hrs)=	11.75	12.92	11.75	
RUNOFF VOLUME (mm)=	49.04	9.06	27.05	
TOTAL RAINFALL (mm)=	50.04	50.04	50.04	
RUNOFF COEFFICIENT =	0.98	0.18	0.54	

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

(i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
Fo (mm/hr)= 50.00 K (1/hr)= 2.00
Fc (mm/hr)= 7.50 Cum.Inf. (mm)= 0.00
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0212)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0202):		0.67	0.052	11.75	27.05
+ ID2= 2 (0211):		2.55	0.202	11.67	26.17
ID = 3 (0212):		3.22	0.253	11.67	26.35

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ROUTE CHN (0213)		
IN= 2---> OUT= 1	Routing time step (min)'= 10.00	
<------ DATA FOR SECTION (1.1) ------>		
Distance	Elevation	Manning
0.00	100.00	0.0400 Main Channel
2.50	99.00	0.0400 Main Channel
3.00	99.00	0.0400 Main Channel
5.50	100.00	0.0400 Main Channel

<---------- TRAVEL TIME TABLE ---------->

DEPTH (m)	ELEV (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME (min)
0.05	99.05	.831E+01	0.0	0.22	19.37
0.11	99.11	.201E+02	0.0	0.32	13.22
0.16	99.16	.353E+02	0.1	0.39	10.62
0.21	99.21	.540E+02	0.1	0.46	9.08
0.26	99.26	.762E+02	0.2	0.52	8.03
0.32	99.32	.102E+03	0.2	0.57	7.26
0.37	99.37	.131E+03	0.3	0.63	6.65
0.42	99.42	.163E+03	0.4	0.68	6.17
0.47	99.47	.199E+03	0.6	0.72	5.76
0.53	99.53	.239E+03	0.7	0.77	5.42
0.58	99.58	.282E+03	0.9	0.81	5.13
0.63	99.63	.328E+03	1.1	0.86	4.87
0.68	99.68	.378E+03	1.4	0.90	4.65
0.74	99.74	.431E+03	1.6	0.94	4.44

0.79	99.79	.488E+03	1.9	0.98	4.26
0.84	99.84	.548E+03	2.2	1.02	4.10
0.89	99.89	.612E+03	2.6	1.05	3.95
0.95	99.95	.679E+03	3.0	1.09	3.82
1.00	100.00	.750E+03	3.4	1.13	3.69

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	<-pipe / channel-> MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 2 (0212)	3.22	0.25	11.67	26.35	0.33	0.58
OUTFLOW: ID= 1 (0213)	3.22	0.18	11.75	26.35	0.28	0.54

RESERVOIR (0214)				
IN= 2---> OUT= 1				
DT= 10.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.0920	0.1110
	0.0210	0.0150	0.1180	0.1890
	0.0590	0.0690	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0213)	3.220	0.185	11.75	26.35
OUTFLOW: ID= 1 (0214)	3.220	0.027	13.33	26.29

PEAK FLOW REDUCTION [Qout/Qin](%)= 14.84
TIME SHIFT OF PEAK FLOW (min)= 95.00
MAXIMUM STORAGE USED (ha.m.)= 0.0241

ADD HYD (0217)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0214):		3.22	0.027	13.33	26.29
+ ID2= 2 (0216):		1.11	0.007	12.33	6.46
ID = 3 (0217):		4.33	0.033	12.50	21.21

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

MASS STORM	Filename: C:\Users\aschoof\AppData\Local\Temp\0cd4140e-b537-41ad-bf58-1a4fda59fd59\83c36a9c
Ptotal= 64.53 mm	Comments: SCS Type II 24 HR MASS CURVE

Duration of storm = 23.75 hrs
Mass curve time step = 15.00 min

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	0.77	6.25	1.29	12.25	9.29	18.25	1.03
0.50	0.52	6.50	1.03	12.50	4.90	18.50	1.29

0.75	0.77	6.75	1.29	12.75	4.65	18.75	1.03
1.00	0.77	7.00	1.29	13.00	3.61	19.00	1.29
1.25	0.77	7.25	1.55	13.25	3.36	19.25	1.03
1.50	0.52	7.50	1.29	13.50	2.84	19.50	1.29
1.75	0.77	7.75	1.55	13.75	2.58	19.75	1.03
2.00	0.77	8.00	1.55	14.00	2.06	20.00	0.77
2.25	1.03	8.25	1.81	14.25	1.81	20.25	0.77
2.50	0.77	8.50	1.81	14.50	2.06	20.50	0.77
2.75	0.77	8.75	1.81	14.75	1.81	20.75	0.77
3.00	0.77	9.00	2.06	15.00	2.06	21.00	0.77
3.25	1.03	9.25	2.06	15.25	1.81	21.25	0.77
3.50	0.77	9.50	2.32	15.50	2.06	21.50	0.77
3.75	0.77	9.75	2.32	15.75	1.81	21.75	0.77
4.00	1.03	10.00	2.84	16.00	1.29	22.00	0.77
4.25	1.03	10.25	3.10	16.25	1.03	22.25	0.77
4.50	1.03	10.50	3.87	16.50	1.29	22.50	0.77
4.75	1.03	10.75	4.13	16.75	1.03	22.75	0.77
5.00	1.03	11.00	6.19	17.00	1.29	23.00	0.77
5.25	1.03	11.25	6.19	17.25	1.03	23.25	0.77
5.50	1.03	11.50	19.10	17.50	1.29	23.50	0.77
5.75	1.03	11.75	78.98	17.75	1.03	23.75	0.77
6.00	1.03	12.00	9.29	18.00	1.29		

CALIB					
NASHYD (0203)	Area	(ha)=	0.62	Curve Number (CN)=	57.4
ID= 1 DT=10.0 min	Ia	(mm)=	9.60	# of Linear Res.(N)=	3.00
	U.H. Tp(hrs)=		0.54		

NOTE: RAINFALL WAS TRANSFORMED TO 10.0 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
0.167	0.77	6.167	1.29	12.167	9.29	18.17	1.03
0.333	0.65	6.333	1.16	12.333	7.10	18.33	1.16
0.500	0.52	6.500	1.03	12.500	4.90	18.50	1.29
0.667	0.77	6.667	1.29	12.667	4.65	18.67	1.03
0.833	0.77	6.833	1.29	12.833	4.13	18.83	1.16
1.000	0.77	7.000	1.29	13.000	3.61	19.00	1.29
1.167	0.77	7.167	1.55	13.167	3.36	19.17	1.03
1.333	0.65	7.333	1.42	13.333	3.10	19.33	1.16
1.500	0.52	7.500	1.29	13.500	2.84	19.50	1.29
1.667	0.77	7.667	1.55	13.667	2.58	19.67	1.03
1.833	0.77	7.833	1.55	13.833	2.32	19.83	0.90
2.000	0.77	8.000	1.55	14.000	2.06	20.00	0.77
2.167	1.03	8.167	1.81	14.167	1.81	20.17	0.77
2.333	0.90	8.333	1.81	14.333	1.94	20.33	0.77
2.500	0.77	8.500	1.81	14.500	2.06	20.50	0.77
2.667	0.77	8.667	1.81	14.667	1.81	20.67	0.77
2.833	0.77	8.833	1.94	14.833	1.94	20.83	0.77
3.000	0.77	9.000	2.06	15.000	2.06	21.00	0.77
3.167	1.03	9.167	2.06	15.167	1.81	21.17	0.77
3.333	0.90	9.333	2.19	15.333	1.94	21.33	0.77
3.500	0.77	9.500	2.32	15.500	2.06	21.50	0.77
3.667	0.77	9.667	2.32	15.667	1.81	21.67	0.77
3.833	0.90	9.833	2.58	15.833	1.55	21.83	0.77
4.000	1.03	10.000	2.84	16.000	1.29	22.00	0.77
4.167	1.03	10.167	3.10	16.167	1.03	22.17	0.77
4.333	1.03	10.333	3.48	16.333	1.16	22.33	0.77
4.500	1.03	10.500	3.87	16.500	1.29	22.50	0.77

4.667	1.03	10.667	4.13	16.667	1.03	22.67	0.77
4.833	1.03	10.833	5.16	16.833	1.16	22.83	0.77
5.000	1.03	11.000	6.19	17.000	1.29	23.00	0.77
5.167	1.03	11.167	6.19	17.167	1.03	23.17	0.77
5.333	1.03	11.333	12.65	17.333	1.16	23.33	0.77
5.500	1.03	11.500	19.10	17.500	1.29	23.50	0.77
5.667	1.03	11.667	78.98	17.667	1.03	23.67	0.77
5.833	1.03	11.833	44.14	17.833	1.16	23.83	0.39
6.000	1.03	12.000	9.29	18.000	1.29		

Unit Hyd Qpeak (cms)= 0.044

PEAK FLOW (cms)= 0.009 (i)
TIME TO PEAK (hrs)= 12.167
RUNOFF VOLUME (mm)= 12.308
TOTAL RAINFALL (mm)= 64.336
RUNOFF COEFFICIENT = 0.191

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

CALIB					
NASHYD (0204)	Area	(ha)=	0.02	Curve Number (CN)=	49.0
ID= 1 DT=10.0 min	Ia	(mm)=	5.00	# of Linear Res.(N)=	3.00
	U.H. Tp(hrs)=		0.07		

Unit Hyd Qpeak (cms)= 0.011

PEAK FLOW (cms)= 0.000 (i)
TIME TO PEAK (hrs)= 11.667
RUNOFF VOLUME (mm)= 4.672
TOTAL RAINFALL (mm)= 64.336
RUNOFF COEFFICIENT = 0.073

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

ADD HYD (0215)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0203):	0.62	0.009	12.17	12.31
+ ID2= 2 (0204):	0.02	0.000	11.67	4.67
ID = 3 (0215):	0.64	0.009	12.17	12.07

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB					
NASHYD (0205)	Area	(ha)=	0.47	Curve Number (CN)=	49.5
ID= 1 DT=10.0 min	Ia	(mm)=	8.50	# of Linear Res.(N)=	3.00
	U.H. Tp(hrs)=		1.00		

Unit Hyd Qpeak (cms)= 0.018

PEAK FLOW (cms)= 0.003 (i)
TIME TO PEAK (hrs)= 12.833
RUNOFF VOLUME (mm)= 9.893
TOTAL RAINFALL (mm)= 64.336

RUNOFF COEFFICIENT = 0.154

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

ADD HYD (0216)		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
1 + 2 = 3	ID1= 1 (0205):	0.47	0.003	12.83	9.89
	+ ID2= 2 (0215):	0.64	0.009	12.17	12.07
	ID = 3 (0216):	1.11	0.012	12.33	11.15

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB				
NASHYD (0201)	Area (ha)= 1.54	Curve Number (CN)= 76.8		
ID= 1 DT= 5.0 min	Ia (mm)= 10.81	# of Linear Res.(N)= 3.00		
	U.H. Tp(hrs)= 0.90			

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.77	6.083	1.29	12.083	9.29	18.08	1.03
0.167	0.77	6.167	1.29	12.167	9.29	18.17	1.03
0.250	0.77	6.250	1.29	12.250	9.29	18.25	1.03
0.333	0.52	6.333	1.03	12.333	4.90	18.33	1.29
0.417	0.52	6.417	1.03	12.417	4.90	18.42	1.29
0.500	0.52	6.500	1.03	12.500	4.90	18.50	1.29
0.583	0.77	6.583	1.29	12.583	4.65	18.58	1.03
0.667	0.77	6.667	1.29	12.667	4.65	18.67	1.03
0.750	0.77	6.750	1.29	12.750	4.65	18.75	1.03
0.833	0.77	6.833	1.29	12.833	3.61	18.83	1.29
0.917	0.77	6.917	1.29	12.917	3.61	18.92	1.29
1.000	0.77	7.000	1.29	13.000	3.61	19.00	1.29
1.083	0.77	7.083	1.55	13.083	3.36	19.08	1.03
1.167	0.77	7.167	1.55	13.167	3.36	19.17	1.03
1.250	0.77	7.250	1.55	13.250	3.36	19.25	1.03
1.333	0.52	7.333	1.29	13.333	2.84	19.33	1.29
1.417	0.52	7.417	1.29	13.417	2.84	19.42	1.29
1.500	0.52	7.500	1.29	13.500	2.84	19.50	1.29
1.583	0.77	7.583	1.55	13.583	2.58	19.58	1.03
1.667	0.77	7.667	1.55	13.667	2.58	19.67	1.03
1.750	0.77	7.750	1.55	13.750	2.58	19.75	1.03
1.833	0.77	7.833	1.55	13.833	2.07	19.83	0.77
1.917	0.77	7.917	1.55	13.917	2.06	19.92	0.77
2.000	0.77	8.000	1.55	14.000	2.06	20.00	0.77
2.083	1.03	8.083	1.81	14.083	1.81	20.08	0.77
2.167	1.03	8.167	1.81	14.167	1.81	20.17	0.77
2.250	1.03	8.250	1.81	14.250	1.81	20.25	0.77
2.333	0.77	8.333	1.81	14.333	2.06	20.33	0.77
2.417	0.77	8.417	1.81	14.417	2.06	20.42	0.77
2.500	0.77	8.500	1.81	14.500	2.06	20.50	0.77
2.583	0.77	8.583	1.81	14.583	1.81	20.58	0.77
2.667	0.77	8.667	1.81	14.667	1.81	20.67	0.77
2.750	0.77	8.750	1.81	14.750	1.81	20.75	0.77

2.833	0.77	8.833	2.06	14.833	2.06	20.83	0.77
2.917	0.77	8.917	2.06	14.917	2.06	20.92	0.77
3.000	0.77	9.000	2.06	15.000	2.06	21.00	0.77
3.083	1.03	9.083	2.06	15.083	1.81	21.08	0.77
3.167	1.03	9.167	2.06	15.167	1.81	21.17	0.77
3.250	1.03	9.250	2.06	15.250	1.81	21.25	0.77
3.333	0.77	9.333	2.32	15.333	2.06	21.33	0.77
3.417	0.77	9.417	2.32	15.417	2.06	21.42	0.77
3.500	0.77	9.500	2.32	15.500	2.06	21.50	0.77
3.583	0.77	9.583	2.32	15.583	1.81	21.58	0.77
3.667	0.77	9.667	2.32	15.667	1.81	21.67	0.77
3.750	0.77	9.750	2.32	15.750	1.81	21.75	0.77
3.833	1.03	9.833	2.84	15.833	1.29	21.83	0.77
3.917	1.03	9.917	2.84	15.917	1.29	21.92	0.77
4.000	1.03	10.000	2.84	16.000	1.29	22.00	0.77
4.083	1.03	10.083	3.10	16.083	1.03	22.08	0.77
4.167	1.03	10.167	3.10	16.167	1.03	22.17	0.77
4.250	1.03	10.250	3.10	16.250	1.03	22.25	0.77
4.333	1.03	10.333	3.87	16.333	1.29	22.33	0.77
4.417	1.03	10.417	3.87	16.417	1.29	22.42	0.77
4.500	1.03	10.500	3.87	16.500	1.29	22.50	0.77
4.583	1.03	10.583	4.13	16.583	1.03	22.58	0.77
4.667	1.03	10.667	4.13	16.667	1.03	22.67	0.77
4.750	1.03	10.750	4.13	16.750	1.03	22.75	0.77
4.833	1.03	10.833	6.19	16.833	1.29	22.83	0.77
4.917	1.03	10.917	6.19	16.917	1.29	22.92	0.77
5.000	1.03	11.000	6.19	17.000	1.29	23.00	0.77
5.083	1.03	11.083	6.19	17.083	1.03	23.08	0.77
5.167	1.03	11.167	6.19	17.167	1.03	23.17	0.77
5.250	1.03	11.250	6.19	17.250	1.03	23.25	0.77
5.333	1.03	11.333	19.10	17.333	1.29	23.33	0.77
5.417	1.03	11.417	19.10	17.417	1.29	23.42	0.77
5.500	1.03	11.500	19.10	17.500	1.29	23.50	0.77
5.583	1.03	11.583	78.98	17.583	1.03	23.58	0.77
5.667	1.03	11.667	78.98	17.667	1.03	23.67	0.77
5.750	1.03	11.750	78.98	17.750	1.03	23.75	0.77
5.833	1.03	11.833	9.30	17.833	1.29		
5.917	1.03	11.917	9.29	17.917	1.29		
6.000	1.03	12.000	9.29	18.000	1.29		

Unit Hyd Qpeak (cms)= 0.065

PEAK FLOW (cms)= 0.029 (i)
TIME TO PEAK (hrs)= 12.667
RUNOFF VOLUME (mm)= 21.995
TOTAL RAINFALL (mm)= 64.337
RUNOFF COEFFICIENT = 0.342

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

CALIB		
STANDHYD (0200)	Area (ha)= 1.01	
ID= 1 DT= 5.0 min	Total Imp(%)= 95.00	Dir. Conn.(%)= 95.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.96	0.05
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	82.06	40.00
Mannings n	=	0.013	0.250

Max.Eff.Inten.(mm/hr)=		78.98	65.08	
over (min)		5.00	5.00	
Storage Coeff. (min)=		2.49 (ii)	4.88 (ii)	
Unit Hyd. Tpeak (min)=		5.00	5.00	
Unit Hyd. peak (cms)=		0.29	0.22	
				TOTALS
PEAK FLOW	(cms)=	0.21	0.01	0.219 (iii)
TIME TO PEAK	(hrs)=	11.75	11.75	11.75
RUNOFF VOLUME	(mm)=	63.34	14.80	60.91
TOTAL RAINFALL	(mm)=	64.34	64.34	64.34
RUNOFF COEFFICIENT	=	0.98	0.23	0.95

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

(i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
Fo (mm/hr)= 50.00 K (1/hr)= 2.00
Fc (mm/hr)= 7.50 Cum.Inf. (mm)= 0.00
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

RESERVOIR (0210)
IN= 2---> OUT= 1
DT= 5.0 min

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.5000	0.0140
0.0029	0.0138	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0200)	1.010	0.219	11.75	60.91
OUTFLOW: ID= 1 (0210)	1.010	0.243	11.75	59.72

PEAK FLOW REDUCTION [Qout/Qin](%)=111.19
TIME SHIFT OF PEAK FLOW (min)= 0.00
MAXIMUM STORAGE USED (ha.m.)= 0.0135

**** WARNING : HYDROGRAPH PEAK WAS NOT REDUCED.
CHECK OUTFLOW/STORAGE TABLE OR REDUCE DT.

ADD HYD (0211)
1 + 2 = 3

		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0201):		1.54	0.029	12.67	21.99
+ ID2= 2 (0210):		1.01	0.243	11.75	59.72
ID = 3 (0211):		2.55	0.249	11.75	36.94

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB
STANDHYD (0202)
ID= 1 DT= 5.0 min

Area (ha)= 0.67
Total Imp(%)= 45.00 Dir. Conn.(%)= 45.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.30	0.37
Dep. Storage	(mm)=	1.00	1.50

Average Slope	(%)=	1.00	2.00
Length	(m)=	66.83	400.00
Mannings n	=	0.013	0.250

Max.Eff.Inten.(mm/hr)=		78.98	14.80	
over (min)		5.00	65.00	
Storage Coeff. (min)=		2.20 (ii)	62.55 (ii)	
Unit Hyd. Tpeak (min)=		5.00	65.00	
Unit Hyd. peak (cms)=		0.30	0.02	
				TOTALS
PEAK FLOW	(cms)=	0.07	0.01	0.067 (iii)
TIME TO PEAK	(hrs)=	11.75	12.67	11.75
RUNOFF VOLUME	(mm)=	63.34	14.80	36.64
TOTAL RAINFALL	(mm)=	64.34	64.34	64.34
RUNOFF COEFFICIENT	=	0.98	0.23	0.57

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

(i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
Fo (mm/hr)= 50.00 K (1/hr)= 2.00
Fc (mm/hr)= 7.50 Cum.Inf. (mm)= 0.00
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0212)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0202):	0.67	0.067	11.75	36.64
+ ID2= 2 (0211):	2.55	0.249	11.75	36.94
ID = 3 (0212):	3.22	0.317	11.75	36.87

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ROUTE CHN (0213)
IN= 2---> OUT= 1

Routing time step (min)'= 10.00

<------ DATA FOR SECTION (1.1) ------>

Distance	Elevation	Manning	
0.00	100.00	0.0400	Main Channel
2.50	99.00	0.0400	Main Channel
3.00	99.00	0.0400	Main Channel
5.50	100.00	0.0400	Main Channel

<---------- TRAVEL TIME TABLE ---------->

DEPTH (m)	ELEV (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME (min)
0.05	99.05	.831E+01	0.0	0.22	19.37
0.11	99.11	.201E+02	0.0	0.32	13.22
0.16	99.16	.353E+02	0.1	0.39	10.62
0.21	99.21	.540E+02	0.1	0.46	9.08
0.26	99.26	.762E+02	0.2	0.52	8.03
0.32	99.32	.102E+03	0.2	0.57	7.26
0.37	99.37	.131E+03	0.3	0.63	6.65
0.42	99.42	.163E+03	0.4	0.68	6.17
0.47	99.47	.199E+03	0.6	0.72	5.76
0.53	99.53	.239E+03	0.7	0.77	5.42

0.58	99.58	.282E+03	0.9	0.81	5.13
0.63	99.63	.328E+03	1.1	0.86	4.87
0.68	99.68	.378E+03	1.4	0.90	4.65
0.74	99.74	.431E+03	1.6	0.94	4.44
0.79	99.79	.488E+03	1.9	0.98	4.26
0.84	99.84	.548E+03	2.2	1.02	4.10
0.89	99.89	.612E+03	2.6	1.05	3.95
0.95	99.95	.679E+03	3.0	1.09	3.82
1.00	100.00	.750E+03	3.4	1.13	3.69

	<---- hydrograph ---->			<-pipe / channel->	
	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 2 (0212)	3.22	0.32	11.75	36.87	0.36	0.62
OUTFLOW: ID= 1 (0213)	3.22	0.26	11.75	36.87	0.33	0.59

RESERVOIR (0214)
IN= 2---> OUT= 1
DT= 10.0 min

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.0920	0.1110
0.0210	0.0150	0.1180	0.1890
0.0590	0.0690	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0213)	3.220	0.259	11.75	36.87
OUTFLOW: ID= 1 (0214)	3.220	0.038	13.50	36.81

PEAK FLOW REDUCTION [Qout/Qin](%)= 14.65
TIME SHIFT OF PEAK FLOW (min)=105.00
MAXIMUM STORAGE USED (ha.m.)= 0.0392

ADD HYD (0217)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0214):	3.22	0.038	13.50	36.81
+ ID2= 2 (0216):	1.11	0.012	12.33	11.15
ID = 3 (0217):	4.33	0.046	12.50	30.23

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

MASS STORM
Ptotal= 86.04 mm

Filename: C:\Users\aschoof\AppData\Local\Temp\0cd4140e-b537-41ad-bf58-1a4fda59fd59\b8a868f5
Comments: SCS Type II 24 HR MASS CURVE

Duration of storm = 23.75 hrs
Mass curve time step = 15.00 min

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	1.03	6.25	1.72	12.25	12.39	18.25	1.38
0.50	0.69	6.50	1.38	12.50	6.54	18.50	1.72
0.75	1.03	6.75	1.72	12.75	6.19	18.75	1.38
1.00	1.03	7.00	1.72	13.00	4.82	19.00	1.72
1.25	1.03	7.25	2.06	13.25	4.47	19.25	1.38
1.50	0.69	7.50	1.72	13.50	3.79	19.50	1.72
1.75	1.03	7.75	2.06	13.75	3.44	19.75	1.38
2.00	1.03	8.00	2.06	14.00	2.75	20.00	1.03
2.25	1.38	8.25	2.41	14.25	2.41	20.25	1.03
2.50	1.03	8.50	2.41	14.50	2.75	20.50	1.03
2.75	1.03	8.75	2.41	14.75	2.41	20.75	1.03
3.00	1.03	9.00	2.75	15.00	2.75	21.00	1.03
3.25	1.38	9.25	2.75	15.25	2.41	21.25	1.03
3.50	1.03	9.50	3.10	15.50	2.75	21.50	1.03
3.75	1.03	9.75	3.10	15.75	2.41	21.75	1.03
4.00	1.38	10.00	3.79	16.00	1.72	22.00	1.03
4.25	1.38	10.25	4.13	16.25	1.38	22.25	1.03
4.50	1.38	10.50	5.16	16.50	1.72	22.50	1.03
4.75	1.38	10.75	5.51	16.75	1.38	22.75	1.03
5.00	1.38	11.00	8.26	17.00	1.72	23.00	1.03
5.25	1.38	11.25	8.26	17.25	1.38	23.25	1.03
5.50	1.38	11.50	25.47	17.50	1.72	23.50	1.03
5.75	1.38	11.75	105.31	17.75	1.38	23.75	1.03
6.00	1.38	12.00	12.39	18.00	1.72		

CALIB
NASHYD (0203)
ID= 1 DT=10.0 min

Area (ha)= 0.62 Curve Number (CN)= 57.4
Ia (mm)= 9.60 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.54

NOTE: RAINFALL WAS TRANSFORMED TO 10.0 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
0.167	1.03	6.167	1.72	12.167	12.39	18.17	1.38
0.333	0.86	6.333	1.55	12.333	9.46	18.33	1.55
0.500	0.69	6.500	1.38	12.500	6.54	18.50	1.72
0.667	1.03	6.667	1.72	12.667	6.19	18.67	1.38
0.833	1.03	6.833	1.72	12.833	5.51	18.83	1.55
1.000	1.03	7.000	1.72	13.000	4.82	19.00	1.72
1.167	1.03	7.167	2.06	13.167	4.47	19.17	1.38
1.333	0.86	7.333	1.89	13.333	4.13	19.33	1.55
1.500	0.69	7.500	1.72	13.500	3.79	19.50	1.72
1.667	1.03	7.667	2.06	13.667	3.44	19.67	1.38
1.833	1.03	7.833	2.06	13.833	3.10	19.83	1.20
2.000	1.03	8.000	2.06	14.000	2.75	20.00	1.03
2.167	1.38	8.167	2.41	14.167	2.41	20.17	1.03
2.333	1.20	8.333	2.41	14.333	2.58	20.33	1.03
2.500	1.03	8.500	2.41	14.500	2.75	20.50	1.03
2.667	1.03	8.667	2.41	14.667	2.41	20.67	1.03
2.833	1.03	8.833	2.58	14.833	2.58	20.83	1.03
3.000	1.03	9.000	2.75	15.000	2.75	21.00	1.03
3.167	1.38	9.167	2.75	15.167	2.41	21.17	1.03
3.333	1.20	9.333	2.93	15.333	2.58	21.33	1.03
3.500	1.03	9.500	3.10	15.500	2.75	21.50	1.03
3.667	1.03	9.667	3.10	15.667	2.41	21.67	1.03
3.833	1.20	9.833	3.44	15.833	2.06	21.83	1.03

4.000	1.38	10.000	3.79	16.000	1.72	22.00	1.03
4.167	1.38	10.167	4.13	16.167	1.38	22.17	1.03
4.333	1.38	10.333	4.65	16.333	1.55	22.33	1.03
4.500	1.38	10.500	5.16	16.500	1.72	22.50	1.03
4.667	1.38	10.667	5.51	16.667	1.38	22.67	1.03
4.833	1.38	10.833	6.88	16.833	1.55	22.83	1.03
5.000	1.38	11.000	8.26	17.000	1.72	23.00	1.03
5.167	1.38	11.167	8.26	17.167	1.38	23.17	1.03
5.333	1.38	11.333	16.86	17.333	1.55	23.33	1.03
5.500	1.38	11.500	25.47	17.500	1.72	23.50	1.03
5.667	1.38	11.667	105.31	17.667	1.38	23.67	1.03
5.833	1.38	11.833	58.85	17.833	1.55	23.83	0.52
6.000	1.38	12.000	12.39	18.000	1.72		

Unit Hyd Qpeak (cms)= 0.044

PEAK FLOW (cms)= 0.016 (i)
TIME TO PEAK (hrs)= 12.167
RUNOFF VOLUME (mm)= 21.912
TOTAL RAINFALL (mm)= 85.782
RUNOFF COEFFICIENT = 0.255

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

CALIB					
NASHYD (0204)	Area (ha)=	0.02	Curve Number (CN)=	49.0	
ID= 1 DT=10.0 min	Ia (mm)=	5.00	# of Linear Res.(N)=	3.00	
	U.H. Tp(hrs)=	0.07			

Unit Hyd Qpeak (cms)= 0.011

PEAK FLOW (cms)= 0.001 (i)
TIME TO PEAK (hrs)= 11.667
RUNOFF VOLUME (mm)= 9.013
TOTAL RAINFALL (mm)= 85.782
RUNOFF COEFFICIENT = 0.105

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

ADD HYD (0215)					
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	
ID1= 1 (0203):	0.62	0.016	12.17	21.91	
+ ID2= 2 (0204):	0.02	0.001	11.67	9.01	
ID = 3 (0215):	0.64	0.016	12.17	21.51	

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB					
NASHYD (0205)	Area (ha)=	0.47	Curve Number (CN)=	49.5	
ID= 1 DT=10.0 min	Ia (mm)=	8.50	# of Linear Res.(N)=	3.00	
	U.H. Tp(hrs)=	1.00			

Unit Hyd Qpeak (cms)= 0.018

PEAK FLOW (cms)= 0.006 (i)
TIME TO PEAK (hrs)= 12.667
RUNOFF VOLUME (mm)= 17.747
TOTAL RAINFALL (mm)= 85.782
RUNOFF COEFFICIENT = 0.207

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

ADD HYD (0216)				
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0205):	0.47	0.006	12.67	17.75
+ ID2= 2 (0215):	0.64	0.016	12.17	21.51
ID = 3 (0216):	1.11	0.021	12.33	19.92

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB					
NASHYD (0201)	Area (ha)=	1.54	Curve Number (CN)=	76.8	
ID= 1 DT= 5.0 min	Ia (mm)=	10.81	# of Linear Res.(N)=	3.00	
	U.H. Tp(hrs)=	0.90			

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	1.03	6.083	1.72	12.083	12.39	18.08	1.38
0.167	1.03	6.167	1.72	12.167	12.39	18.17	1.38
0.250	1.03	6.250	1.72	12.250	12.39	18.25	1.38
0.333	0.69	6.333	1.38	12.333	6.54	18.33	1.72
0.417	0.69	6.417	1.38	12.417	6.54	18.42	1.72
0.500	0.69	6.500	1.38	12.500	6.54	18.50	1.72
0.583	1.03	6.583	1.72	12.583	6.19	18.58	1.38
0.667	1.03	6.667	1.72	12.667	6.19	18.67	1.38
0.750	1.03	6.750	1.72	12.750	6.19	18.75	1.38
0.833	1.03	6.833	1.72	12.833	4.82	18.83	1.72
0.917	1.03	6.917	1.72	12.917	4.82	18.92	1.72
1.000	1.03	7.000	1.72	13.000	4.82	19.00	1.72
1.083	1.03	7.083	2.06	13.083	4.47	19.08	1.38
1.167	1.03	7.167	2.06	13.167	4.47	19.17	1.38
1.250	1.03	7.250	2.06	13.250	4.47	19.25	1.38
1.333	0.69	7.333	1.72	13.333	3.79	19.33	1.72
1.417	0.69	7.417	1.72	13.417	3.79	19.42	1.72
1.500	0.69	7.500	1.72	13.500	3.79	19.50	1.72
1.583	1.03	7.583	2.06	13.583	3.44	19.58	1.38
1.667	1.03	7.667	2.06	13.667	3.44	19.67	1.38
1.750	1.03	7.750	2.06	13.750	3.44	19.75	1.38
1.833	1.03	7.833	2.06	13.833	2.75	19.83	1.03
1.917	1.03	7.917	2.06	13.917	2.75	19.92	1.03
2.000	1.03	8.000	2.06	14.000	2.75	20.00	1.03
2.083	1.38	8.083	2.41	14.083	2.41	20.08	1.03
2.167	1.38	8.167	2.41	14.167	2.41	20.17	1.03
2.250	1.38	8.250	2.41	14.250	2.41	20.25	1.03
2.333	1.03	8.333	2.41	14.333	2.75	20.33	1.03
2.417	1.03	8.417	2.41	14.417	2.75	20.42	1.03

2.500	1.03	8.500	2.41	14.500	2.75	20.50	1.03
2.583	1.03	8.583	2.41	14.583	2.41	20.58	1.03
2.667	1.03	8.667	2.41	14.667	2.41	20.67	1.03
2.750	1.03	8.750	2.41	14.750	2.41	20.75	1.03
2.833	1.03	8.833	2.75	14.833	2.75	20.83	1.03
2.917	1.03	8.917	2.75	14.917	2.75	20.92	1.03
3.000	1.03	9.000	2.75	15.000	2.75	21.00	1.03
3.083	1.38	9.083	2.75	15.083	2.41	21.08	1.03
3.167	1.38	9.167	2.75	15.167	2.41	21.17	1.03
3.250	1.38	9.250	2.75	15.250	2.41	21.25	1.03
3.333	1.03	9.333	3.10	15.333	2.75	21.33	1.03
3.417	1.03	9.417	3.10	15.417	2.75	21.42	1.03
3.500	1.03	9.500	3.10	15.500	2.75	21.50	1.03
3.583	1.03	9.583	3.10	15.583	2.41	21.58	1.03
3.667	1.03	9.667	3.10	15.667	2.41	21.67	1.03
3.750	1.03	9.750	3.10	15.750	2.41	21.75	1.03
3.833	1.38	9.833	3.79	15.833	1.72	21.83	1.03
3.917	1.38	9.917	3.79	15.917	1.72	21.92	1.03
4.000	1.38	10.000	3.79	16.000	1.72	22.00	1.03
4.083	1.38	10.083	4.13	16.083	1.38	22.08	1.03
4.167	1.38	10.167	4.13	16.167	1.38	22.17	1.03
4.250	1.38	10.250	4.13	16.250	1.38	22.25	1.03
4.333	1.38	10.333	5.16	16.333	1.72	22.33	1.03
4.417	1.38	10.417	5.16	16.417	1.72	22.42	1.03
4.500	1.38	10.500	5.16	16.500	1.72	22.50	1.03
4.583	1.38	10.583	5.51	16.583	1.38	22.58	1.03
4.667	1.38	10.667	5.51	16.667	1.38	22.67	1.03
4.750	1.38	10.750	5.51	16.750	1.38	22.75	1.03
4.833	1.38	10.833	8.26	16.833	1.72	22.83	1.03
4.917	1.38	10.917	8.26	16.917	1.72	22.92	1.03
5.000	1.38	11.000	8.26	17.000	1.72	23.00	1.03
5.083	1.38	11.083	8.26	17.083	1.38	23.08	1.03
5.167	1.38	11.167	8.26	17.167	1.38	23.17	1.03
5.250	1.38	11.250	8.26	17.250	1.38	23.25	1.03
5.333	1.38	11.333	25.47	17.333	1.72	23.33	1.03
5.417	1.38	11.417	25.47	17.417	1.72	23.42	1.03
5.500	1.38	11.500	25.47	17.500	1.72	23.50	1.03
5.583	1.38	11.583	105.31	17.583	1.38	23.58	1.03
5.667	1.38	11.667	105.31	17.667	1.38	23.67	1.03
5.750	1.38	11.750	105.31	17.750	1.38	23.75	1.03
5.833	1.38	11.833	12.40	17.833	1.72		
5.917	1.38	11.917	12.39	17.917	1.72		
6.000	1.38	12.000	12.39	18.000	1.72		

Unit Hyd Qpeak (cms)= 0.065

PEAK FLOW (cms)= 0.050 (i)
TIME TO PEAK (hrs)= 12.583
RUNOFF VOLUME (mm)= 37.050
TOTAL RAINFALL (mm)= 85.782
RUNOFF COEFFICIENT = 0.432

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

CALIB STANDHYD (0200)	Area (ha)= 1.01
ID= 1 DT= 5.0 min	Total Imp(%)= 95.00 Dir. Conn.(%)= 95.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.96	0.05
Dep. Storage	(mm)=	1.00	1.50

Average Slope	(%)=	1.00	2.00
Length	(m)=	82.06	40.00
Mannings n	=	0.013	0.250
Max.Eff.Inten.(mm/hr)	=	105.31	94.58
over (min)		5.00	5.00
Storage Coeff. (min)	=	2.22 (ii)	4.35 (ii)
Unit Hyd. Tpeak (min)	=	5.00	5.00
Unit Hyd. peak (cms)	=	0.30	0.23

				TOTALS
PEAK FLOW	(cms)=	0.28	0.01	0.293 (iii)
TIME TO PEAK	(hrs)=	11.75	11.75	11.75
RUNOFF VOLUME	(mm)=	84.78	26.68	81.88
TOTAL RAINFALL	(mm)=	85.78	85.78	85.78
RUNOFF COEFFICIENT	=	0.99	0.31	0.95

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

(i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
Fo (mm/hr)= 50.00 K (1/hr)= 2.00
Fc (mm/hr)= 7.50 Cum.Inf. (mm)= 0.00
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

RESERVOIR (0210) IN= 2---> OUT= 1 DT= 5.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.5000	0.0140
	0.0029	0.0138	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0200)	1.010	0.293	11.75	81.88
OUTFLOW: ID= 1 (0210)	1.010	0.292	11.75	80.69

PEAK FLOW REDUCTION [Qout/Qin](%)= 99.70
TIME SHIFT OF PEAK FLOW (min)= 0.00
MAXIMUM STORAGE USED (ha.m.)= 0.0139

ADD HYD (0211) 1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0201):	1.54	0.050	12.58	37.05
+ ID2= 2 (0210):	1.01	0.292	11.75	80.69
ID = 3 (0211):	2.55	0.305	11.75	54.33

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB STANDHYD (0202)	Area (ha)= 0.67
ID= 1 DT= 5.0 min	Total Imp(%)= 45.00 Dir. Conn.(%)= 45.00

IMPERVIOUS PERVIOUS (i)

Surface Area (ha)=	0.30	0.37	
Dep. Storage (mm)=	1.00	1.50	
Average Slope (%)=	1.00	2.00	
Length (m)=	66.83	400.00	
Mannings n =	0.013	0.250	
Max.Eff.Inten.(mm/hr)=	105.31	34.76	
over (min)	5.00	45.00	
Storage Coeff. (min)=	1.96 (ii)	44.84 (ii)	
Unit Hyd. Tpeak (min)=	5.00	45.00	
Unit Hyd. peak (cms)=	0.31	0.03	
			TOTALS
PEAK FLOW (cms)=	0.09	0.02	0.094 (iii)
TIME TO PEAK (hrs)=	11.75	12.33	11.75
RUNOFF VOLUME (mm)=	84.78	26.68	52.83
TOTAL RAINFALL (mm)=	85.78	85.78	85.78
RUNOFF COEFFICIENT =	0.99	0.31	0.62

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

(i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
Fo (mm/hr)= 50.00 K (1/hr)= 2.00
Fc (mm/hr)= 7.50 Cum.Inf. (mm)= 0.00
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0212)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
	ID1= 1 (0202):	0.67	0.094	11.75	52.83
	+ ID2= 2 (0211):	2.55	0.305	11.75	54.33
	ID = 3 (0212):	3.22	0.399	11.75	54.02

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ROUTE CHN (0213)
IN= 2---> OUT= 1	Routing time step (min)'= 10.00

<------ DATA FOR SECTION (1.1) ------>

Distance	Elevation	Manning	
0.00	100.00	0.0400	Main Channel
2.50	99.00	0.0400	Main Channel
3.00	99.00	0.0400	Main Channel
5.50	100.00	0.0400	Main Channel

<---------- TRAVEL TIME TABLE ---------->

DEPTH (m)	ELEV (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME (min)
0.05	99.05	.831E+01	0.0	0.22	19.37
0.11	99.11	.201E+02	0.0	0.32	13.22
0.16	99.16	.353E+02	0.1	0.39	10.62
0.21	99.21	.540E+02	0.1	0.46	9.08
0.26	99.26	.762E+02	0.2	0.52	8.03
0.32	99.32	.102E+03	0.2	0.57	7.26
0.37	99.37	.131E+03	0.3	0.63	6.65
0.42	99.42	.163E+03	0.4	0.68	6.17

0.47	99.47	.199E+03	0.6	0.72	5.76
0.53	99.53	.239E+03	0.7	0.77	5.42
0.58	99.58	.282E+03	0.9	0.81	5.13
0.63	99.63	.328E+03	1.1	0.86	4.87
0.68	99.68	.378E+03	1.4	0.90	4.65
0.74	99.74	.431E+03	1.6	0.94	4.44
0.79	99.79	.488E+03	1.9	0.98	4.26
0.84	99.84	.548E+03	2.2	1.02	4.10
0.89	99.89	.612E+03	2.6	1.05	3.95
0.95	99.95	.679E+03	3.0	1.09	3.82
1.00	100.00	.750E+03	3.4	1.13	3.69

	<---- hydrograph ----> AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	<-pipe / channel-> MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 2 (0212)	3.22	0.40	11.75	54.02	0.40	0.66
OUTFLOW: ID= 1 (0213)	3.22	0.36	11.75	54.01	0.38	0.64

RESERVOIR (0214)		OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
IN= 2---> OUT= 1		0.0000	0.0000	0.0920	0.1110
DT= 10.0 min		0.0210	0.0150	0.1180	0.1890
		0.0590	0.0690	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0213)	3.220	0.363	11.75	54.01
OUTFLOW: ID= 1 (0214)	3.220	0.056	13.58	53.96

PEAK FLOW REDUCTION [Qout/Qin](%)= 15.41
TIME SHIFT OF PEAK FLOW (min)=110.00
MAXIMUM STORAGE USED (ha.m.)= 0.0646

ADD HYD (0217)		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
1 + 2 = 3					
	ID1= 1 (0214):	3.22	0.056	13.58	53.96
	+ ID2= 2 (0216):	1.11	0.021	12.33	19.92
	ID = 3 (0217):	4.33	0.070	12.50	45.23

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

MASS STORM	Filename: C:\Users\aschoof\AppData\Local\Temp\0cd4140e-b537-41ad-bf58-1a4fda59fd59\a2df1772
Ptotal=105.16 mm	Comments: SCS Type II 24 HR MASS CURVE

Duration of storm = 23.75 hrs

Mass curve time step = 15.00 min

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	1.26	6.25	2.10	12.25	15.14	18.25	1.68
0.50	0.84	6.50	1.68	12.50	7.99	18.50	2.10
0.75	1.26	6.75	2.10	12.75	7.57	18.75	1.68
1.00	1.26	7.00	2.10	13.00	5.89	19.00	2.10
1.25	1.26	7.25	2.52	13.25	5.47	19.25	1.68
1.50	0.84	7.50	2.10	13.50	4.63	19.50	2.10
1.75	1.26	7.75	2.52	13.75	4.21	19.75	1.68
2.00	1.26	8.00	2.52	14.00	3.37	20.00	1.26
2.25	1.68	8.25	2.94	14.25	2.94	20.25	1.26
2.50	1.26	8.50	2.94	14.50	3.37	20.50	1.26
2.75	1.26	8.75	2.94	14.75	2.94	20.75	1.26
3.00	1.26	9.00	3.37	15.00	3.37	21.00	1.26
3.25	1.68	9.25	3.37	15.25	2.94	21.25	1.26
3.50	1.26	9.50	3.79	15.50	3.37	21.50	1.26
3.75	1.26	9.75	3.79	15.75	2.94	21.75	1.26
4.00	1.68	10.00	4.63	16.00	2.10	22.00	1.26
4.25	1.68	10.25	5.05	16.25	1.68	22.25	1.26
4.50	1.68	10.50	6.31	16.50	2.10	22.50	1.26
4.75	1.68	10.75	6.73	16.75	1.68	22.75	1.26
5.00	1.68	11.00	10.10	17.00	2.10	23.00	1.26
5.25	1.68	11.25	10.10	17.25	1.68	23.25	1.26
5.50	1.68	11.50	31.13	17.50	2.10	23.50	1.26
5.75	1.68	11.75	128.72	17.75	1.68	23.75	1.26
6.00	1.68	12.00	15.14	18.00	2.10		

CALIB			
NASHYD (0203)	Area (ha)=	0.62	Curve Number (CN)= 57.4
ID= 1 DT=10.0 min	Ia (mm)=	9.60	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)=	0.54	

NOTE: RAINFALL WAS TRANSFORMED TO 10.0 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
0.167	1.26	6.167	2.10	12.167	15.14	18.17	1.68
0.333	1.05	6.333	1.89	12.333	11.57	18.33	1.89
0.500	0.84	6.500	1.68	12.500	7.99	18.50	2.10
0.667	1.26	6.667	2.10	12.667	7.57	18.67	1.68
0.833	1.26	6.833	2.10	12.833	6.73	18.83	1.89
1.000	1.26	7.000	2.10	13.000	5.89	19.00	2.10
1.167	1.26	7.167	2.52	13.167	5.47	19.17	1.68
1.333	1.05	7.333	2.31	13.333	5.05	19.33	1.89
1.500	0.84	7.500	2.10	13.500	4.63	19.50	2.10
1.667	1.26	7.667	2.52	13.667	4.21	19.67	1.68
1.833	1.26	7.833	2.52	13.833	3.79	19.83	1.47
2.000	1.26	8.000	2.52	14.000	3.37	20.00	1.26
2.167	1.68	8.167	2.94	14.167	2.94	20.17	1.26
2.333	1.47	8.333	2.94	14.333	3.15	20.33	1.26
2.500	1.26	8.500	2.94	14.500	3.37	20.50	1.26
2.667	1.26	8.667	2.94	14.667	2.94	20.67	1.26
2.833	1.26	8.833	3.15	14.833	3.15	20.83	1.26
3.000	1.26	9.000	3.37	15.000	3.37	21.00	1.26
3.167	1.68	9.167	3.37	15.167	2.94	21.17	1.26
3.333	1.47	9.333	3.58	15.333	3.15	21.33	1.26
3.500	1.26	9.500	3.79	15.500	3.37	21.50	1.26

3.667	1.26	9.667	3.79	15.667	2.94	21.67	1.26
3.833	1.47	9.833	4.21	15.833	2.52	21.83	1.26
4.000	1.68	10.000	4.63	16.000	2.10	22.00	1.26
4.167	1.68	10.167	5.05	16.167	1.68	22.17	1.26
4.333	1.68	10.333	5.68	16.333	1.89	22.33	1.26
4.500	1.68	10.500	6.31	16.500	2.10	22.50	1.26
4.667	1.68	10.667	6.73	16.667	1.68	22.67	1.26
4.833	1.68	10.833	8.41	16.833	1.89	22.83	1.26
5.000	1.68	11.000	10.10	17.000	2.10	23.00	1.26
5.167	1.68	11.167	10.10	17.167	1.68	23.17	1.26
5.333	1.68	11.333	20.61	17.333	1.89	23.33	1.26
5.500	1.68	11.500	31.13	17.500	2.10	23.50	1.26
5.667	1.68	11.667	128.72	17.667	1.68	23.67	1.26
5.833	1.68	11.833	71.93	17.833	1.89	23.83	0.63
6.000	1.68	12.000	15.14	18.000	2.10		

Unit Hyd Qpeak (cms)= 0.044

PEAK FLOW (cms)= 0.024 (i)
TIME TO PEAK (hrs)= 12.167
RUNOFF VOLUME (mm)= 31.949
TOTAL RAINFALL (mm)= 104.844
RUNOFF COEFFICIENT = 0.305

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

CALIB			
NASHYD (0204)	Area (ha)=	0.02	Curve Number (CN)= 49.0
ID= 1 DT=10.0 min	Ia (mm)=	5.00	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)=	0.07	

Unit Hyd Qpeak (cms)= 0.011

PEAK FLOW (cms)= 0.001 (i)
TIME TO PEAK (hrs)= 11.667
RUNOFF VOLUME (mm)= 13.049
TOTAL RAINFALL (mm)= 104.844
RUNOFF COEFFICIENT = 0.124

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

ADD HYD (0215)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
	ID1= 1 (0203):	0.62	0.024	12.17	31.95
	+ ID2= 2 (0204):	0.02	0.001	11.67	13.05
	ID = 3 (0215):	0.64	0.024	12.17	31.36

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB			
NASHYD (0205)	Area (ha)=	0.47	Curve Number (CN)= 49.5
ID= 1 DT=10.0 min	Ia (mm)=	8.50	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)=	1.00	

Unit Hyd Qpeak (cms)= 0.018

PEAK FLOW (cms)= 0.009 (i)
TIME TO PEAK (hrs)= 12.667
RUNOFF VOLUME (mm)= 26.106
TOTAL RAINFALL (mm)= 104.844
RUNOFF COEFFICIENT = 0.249

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

ADD HYD (0216)		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
1 + 2 = 3	ID1= 1 (0205):	0.47	0.009	12.67	26.11
	+ ID2= 2 (0215):	0.64	0.024	12.17	31.36
	ID = 3 (0216):	1.11	0.032	12.33	29.13

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB NASHYD (0201)	ID= 1 DT= 5.0 min	Area (ha)= 1.54	Ia (mm)= 10.81	U.H. Tp(hrs)= 0.90	Curve Number (CN)= 76.8	# of Linear Res.(N)= 3.00

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	1.26	6.083	2.10	12.083	15.14	18.08	1.68
0.167	1.26	6.167	2.10	12.167	15.14	18.17	1.68
0.250	1.26	6.250	2.10	12.250	15.14	18.25	1.68
0.333	0.84	6.333	1.68	12.333	7.99	18.33	2.10
0.417	0.84	6.417	1.68	12.417	7.99	18.42	2.10
0.500	0.84	6.500	1.68	12.500	7.99	18.50	2.10
0.583	1.26	6.583	2.10	12.583	7.57	18.58	1.68
0.667	1.26	6.667	2.10	12.667	7.57	18.67	1.68
0.750	1.26	6.750	2.10	12.750	7.57	18.75	1.68
0.833	1.26	6.833	2.10	12.833	5.89	18.83	2.10
0.917	1.26	6.917	2.10	12.917	5.89	18.92	2.10
1.000	1.26	7.000	2.10	13.000	5.89	19.00	2.10
1.083	1.26	7.083	2.52	13.083	5.47	19.08	1.68
1.167	1.26	7.167	2.52	13.167	5.47	19.17	1.68
1.250	1.26	7.250	2.52	13.250	5.47	19.25	1.68
1.333	0.84	7.333	2.10	13.333	4.63	19.33	2.10
1.417	0.84	7.417	2.10	13.417	4.63	19.42	2.10
1.500	0.84	7.500	2.10	13.500	4.63	19.50	2.10
1.583	1.26	7.583	2.52	13.583	4.21	19.58	1.68
1.667	1.26	7.667	2.52	13.667	4.21	19.67	1.68
1.750	1.26	7.750	2.52	13.750	4.21	19.75	1.68
1.833	1.26	7.833	2.52	13.833	3.37	19.83	1.26
1.917	1.26	7.917	2.52	13.917	3.37	19.92	1.26
2.000	1.26	8.000	2.52	14.000	3.37	20.00	1.26
2.083	1.68	8.083	2.94	14.083	2.94	20.08	1.26
2.167	1.68	8.167	2.94	14.167	2.94	20.17	1.26
2.250	1.68	8.250	2.94	14.250	2.94	20.25	1.26

2.333	1.26	8.333	2.94	14.333	3.37	20.33	1.26
2.417	1.26	8.417	2.94	14.417	3.37	20.42	1.26
2.500	1.26	8.500	2.94	14.500	3.37	20.50	1.26
2.583	1.26	8.583	2.94	14.583	2.94	20.58	1.26
2.667	1.26	8.667	2.94	14.667	2.94	20.67	1.26
2.750	1.26	8.750	2.94	14.750	2.94	20.75	1.26
2.833	1.26	8.833	3.37	14.833	3.36	20.83	1.26
2.917	1.26	8.917	3.37	14.917	3.37	20.92	1.26
3.000	1.26	9.000	3.37	15.000	3.37	21.00	1.26
3.083	1.68	9.083	3.37	15.083	2.94	21.08	1.26
3.167	1.68	9.167	3.37	15.167	2.94	21.17	1.26
3.250	1.68	9.250	3.37	15.250	2.94	21.25	1.26
3.333	1.26	9.333	3.79	15.333	3.37	21.33	1.26
3.417	1.26	9.417	3.79	15.417	3.37	21.42	1.26
3.500	1.26	9.500	3.79	15.500	3.37	21.50	1.26
3.583	1.26	9.583	3.79	15.583	2.94	21.58	1.26
3.667	1.26	9.667	3.79	15.667	2.94	21.67	1.26
3.750	1.26	9.750	3.79	15.750	2.94	21.75	1.26
3.833	1.68	9.833	4.63	15.833	2.10	21.83	1.26
3.917	1.68	9.917	4.63	15.917	2.10	21.92	1.26
4.000	1.68	10.000	4.63	16.000	2.10	22.00	1.26
4.083	1.68	10.083	5.05	16.083	1.68	22.08	1.26
4.167	1.68	10.167	5.05	16.167	1.68	22.17	1.26
4.250	1.68	10.250	5.05	16.250	1.68	22.25	1.26
4.333	1.68	10.333	6.31	16.333	2.10	22.33	1.26
4.417	1.68	10.417	6.31	16.417	2.10	22.42	1.26
4.500	1.68	10.500	6.31	16.500	2.10	22.50	1.26
4.583	1.68	10.583	6.73	16.583	1.68	22.58	1.26
4.667	1.68	10.667	6.73	16.667	1.68	22.67	1.26
4.750	1.68	10.750	6.73	16.750	1.68	22.75	1.26
4.833	1.68	10.833	10.10	16.833	2.10	22.83	1.26
4.917	1.68	10.917	10.10	16.917	2.10	22.92	1.26
5.000	1.68	11.000	10.10	17.000	2.10	23.00	1.26
5.083	1.68	11.083	10.10	17.083	1.68	23.08	1.26
5.167	1.68	11.167	10.10	17.167	1.68	23.17	1.26
5.250	1.68	11.250	10.10	17.250	1.68	23.25	1.26
5.333	1.68	11.333	31.13	17.333	2.10	23.33	1.26
5.417	1.68	11.417	31.13	17.417	2.10	23.42	1.26
5.500	1.68	11.500	31.13	17.500	2.10	23.50	1.26
5.583	1.68	11.583	128.71	17.583	1.68	23.58	1.26
5.667	1.68	11.667	128.72	17.667	1.68	23.67	1.26
5.750	1.68	11.750	128.72	17.750	1.68	23.75	1.26
5.833	1.68	11.833	15.16	17.833	2.10		
5.917	1.68	11.917	15.14	17.917	2.10		
6.000	1.68	12.000	15.14	18.000	2.10		

Unit Hyd Qpeak (cms)= 0.065

PEAK FLOW (cms)= 0.071 (i)
TIME TO PEAK (hrs)= 12.583
RUNOFF VOLUME (mm)= 51.781
TOTAL RAINFALL (mm)= 104.845
RUNOFF COEFFICIENT = 0.494

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

CALIB STANDHYD (0200)	ID= 1 DT= 5.0 min	Area (ha)= 1.01	Total Imp(%)= 95.00	Dir. Conn.(%)= 95.00

IMPERVIOUS PERVIOUS (i)

Surface Area	(ha)=	0.96	0.05	
Dep. Storage	(mm)=	1.00	1.50	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	82.06	40.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.(mm/hr)=		128.72	119.84	
over (min)		5.00	5.00	
Storage Coeff. (min)=		2.05 (ii)	4.02 (ii)	
Unit Hyd. Tpeak (min)=		5.00	5.00	
Unit Hyd. peak (cms)=		0.31	0.24	
				TOTALS
PEAK FLOW	(cms)=	0.34	0.02	0.359 (iii)
TIME TO PEAK	(hrs)=	11.75	11.75	11.75
RUNOFF VOLUME	(mm)=	103.84	37.21	100.51
TOTAL RAINFALL	(mm)=	104.84	104.84	104.84
RUNOFF COEFFICIENT	=	0.99	0.35	0.96

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

(i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
Fo (mm/hr)= 50.00 K (1/hr)= 2.00
Fc (mm/hr)= 7.50 Cum.Inf. (mm)= 0.00
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

RESERVOIR (0210)
IN= 2---> OUT= 1
DT= 5.0 min

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.5000	0.0140
0.0029	0.0138	0.0000	0.0000

		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0200)		1.010	0.359	11.75	100.51
OUTFLOW: ID= 1 (0210)		1.010	0.362	11.67	99.32

PEAK FLOW REDUCTION [Qout/Qin](%)=100.68
TIME SHIFT OF PEAK FLOW (min)= -5.00
MAXIMUM STORAGE USED (ha.m.)= 0.0140

**** WARNING : HYDROGRAPH PEAK WAS NOT REDUCED.
CHECK OUTFLOW/STORAGE TABLE OR REDUCE DT.

ADD HYD (0211)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0201):	1.54	0.071	12.58	51.78
+ ID2= 2 (0210):	1.01	0.362	11.67	99.32
ID = 3 (0211):	2.55	0.376	11.67	70.61

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB

STANDHYD (0202)	Area (ha)= 0.67
ID= 1 DT= 5.0 min	Total Imp(%)= 45.00 Dir. Conn.(%)= 45.00

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	0.30	0.37	
Dep. Storage	(mm)=	1.00	1.50	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	66.83	400.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.(mm/hr)=		128.72	59.31	
over (min)		5.00	40.00	
Storage Coeff. (min)=		1.81 (ii)	36.44 (ii)	
Unit Hyd. Tpeak (min)=		5.00	40.00	
Unit Hyd. peak (cms)=		0.32	0.03	
				TOTALS
PEAK FLOW	(cms)=	0.11	0.03	0.118 (iii)
TIME TO PEAK	(hrs)=	11.75	12.25	11.75
RUNOFF VOLUME	(mm)=	103.84	37.21	67.19
TOTAL RAINFALL	(mm)=	104.84	104.84	104.84
RUNOFF COEFFICIENT	=	0.99	0.35	0.64

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

(i) HORTONS EQUATION SELECTED FOR PERVIOUS LOSSES:
Fo (mm/hr)= 50.00 K (1/hr)= 2.00
Fc (mm/hr)= 7.50 Cum.Inf. (mm)= 0.00
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0212)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0202):	0.67	0.118	11.75	67.19
+ ID2= 2 (0211):	2.55	0.376	11.67	70.61
ID = 3 (0212):	3.22	0.493	11.75	69.90

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ROUTE CHN (0213)
IN= 2---> OUT= 1

Routing time step (min)'= 10.00

<------ DATA FOR SECTION (1.1) ------>

Distance	Elevation	Manning	
0.00	100.00	0.0400	Main Channel
2.50	99.00	0.0400	Main Channel
3.00	99.00	0.0400	Main Channel
5.50	100.00	0.0400	Main Channel

<---------- TRAVEL TIME TABLE ---------->

DEPTH (m)	ELEV (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME (min)
0.05	99.05	.831E+01	0.0	0.22	19.37
0.11	99.11	.201E+02	0.0	0.32	13.22
0.16	99.16	.353E+02	0.1	0.39	10.62
0.21	99.21	.540E+02	0.1	0.46	9.08

0.26	99.26	.762E+02	0.2	0.52	8.03
0.32	99.32	.102E+03	0.2	0.57	7.26
0.37	99.37	.131E+03	0.3	0.63	6.65
0.42	99.42	.163E+03	0.4	0.68	6.17
0.47	99.47	.199E+03	0.6	0.72	5.76
0.53	99.53	.239E+03	0.7	0.77	5.42
0.58	99.58	.282E+03	0.9	0.81	5.13
0.63	99.63	.328E+03	1.1	0.86	4.87
0.68	99.68	.378E+03	1.4	0.90	4.65
0.74	99.74	.431E+03	1.6	0.94	4.44
0.79	99.79	.488E+03	1.9	0.98	4.26
0.84	99.84	.548E+03	2.2	1.02	4.10
0.89	99.89	.612E+03	2.6	1.05	3.95
0.95	99.95	.679E+03	3.0	1.09	3.82
1.00	100.00	.750E+03	3.4	1.13	3.69

	<---- hydrograph ---->				<-pipe / channel->	
	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 2 (0212)	3.22	0.49	11.75	69.90	0.44	0.69
OUTFLOW: ID= 1 (0213)	3.22	0.46	11.75	69.89	0.43	0.68

RESERVOIR (0214)				
IN= 2---> OUT= 1				
DT= 10.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.0920	0.1110
	0.0210	0.0150	0.1180	0.1890
	0.0590	0.0690	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0213)	3.220	0.457	11.75	69.89
OUTFLOW: ID= 1 (0214)	3.220	0.073	13.50	69.84

PEAK FLOW REDUCTION [Qout/Qin](%)= 16.05
TIME SHIFT OF PEAK FLOW (min)=105.00
MAXIMUM STORAGE USED (ha.m.)= 0.0874

ADD HYD (0217)				
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0214):	3.22	0.073	13.50	69.84
+ ID2= 2 (0216):	1.11	0.032	12.33	29.13
ID = 3 (0217):	4.33	0.094	12.58	59.40

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

FINISH

Appendix D:
Natural Hazard Study

C.C. Tatham & Associates Ltd.
Consulting Engineers

Collingwood Bracebridge Orillia Barrie Ottawa

115 Sandford Fleming Drive, Suite 200
Collingwood, Ontario L9Y 5A6
Tel: (705) 444-2565
Fax: (705) 444-2327
Email: info@cctatham.com
Web: www.cctatham.com

January 17, 2017

via email (alvinyoung88@gmail.com)
CCTA File 116238

Alvin Young
Winzen
30 Algie Avenue
Toronto, ON M8Z 5J8

Re: Natural Hazard Study
Part of Lot 11, Concession 5, Township Adjala - Tosorontio

Dear Mr. Young:

C.C. Tatham & Associates Ltd. (CCTA) was retained to prepare a Natural Hazard Study for the above noted property north of Burbank Circle in the Town of Everett. A channel flows from west to east across the subject property along the south property line. This Natural Hazards Study has been completed to establish the flood and erosion hazard limits associated with the channel, and consequently the allowable development limits, on-site.

A topographic survey of the subject property was provided by Rodney Geyer Ontario Land Surveyors Inc. dated April 21, 2016. A site meeting with the NVCA was attended by CCTA staff on September 27, 2016 to collect background information and confirm channel characteristics. Follow up with the NVCA was completed after the site meeting to confirm that assessing the channel as a confined system was appropriate.

The flood and erosion hazard assessments are described in detail in the following sections.

Flood Hazard Assessment

This flood hazard assessment has been completed in accordance with Section 3.1 of the Provincial Policy Statement and specifically the Ontario Ministry of Natural Resources (MNR) Technical Guide for River & Stream Systems: Flood Hazard Limit. To establish the flood hazard limit, a hydrologic analysis of the channels contributing drainage area was completed along with a hydraulic analysis of the channel through the property. The analysis and the results are discussed in the following sections:

As part of the Natural Hazard Study a Visual OTTHYMO hydrologic model of the channels contributing drainage area was created. The catchment was delineated from the available topographic mapping and was field verified by CCTA staff. The catchment area draining to the channel was determined to be 27.3 ha. A peak flow rate of 3.67 m^3/s was generated for the catchment by the hydrologic model for the 100 year 24 hour SCS type II design storm. The catchment is illustrated on Figure DP-1 enclosed and the detailed model results are attached in Appendix A for reference.

The HEC-RAS hydraulic model was used to establish the existing flood hazard limit across the site. The HEC-RAS hydraulic model of the channel was created using the topographic survey data provided and the peak flows generated from the hydrologic analysis. Channel cross sections were established roughly every 20 m and extend to an elevation that contains the calculated peak flow. The cross sections used in the hydraulic analysis are shown on the Natural Hazards Plan (Drawing FM-1) enclosed along with the flood hazard limit across the subject property. Results from the HEC-RAS hydraulic model are included in Appendix B for reference.

The Manning's roughness coefficients for the channel were selected based on existing conditions witnessed during our field visit. The bottom of the main channel is generally clean with some stones and weeds. However, the banks of the main channel as well as the overbanks are covered in medium to dense brush. A Manning's roughness coefficient of 0.035 has been applied to the bottom of the main channel (toe of slope to toe of slope) consistent with the HEC RAS hydraulic reference manual. Similarly, a Manning's roughness coefficient of 0.07 has been applied to the channel banks and overbanks.

During our field visit it was noted that a section of the channel (cross-section 93.176 to cross-section 0) is deficient and in need of a cleanout/improvement. This was confirmed through a review of the channel profile from the provided topographic survey. As a result, stormwater will backup, overtop the north channel bank and flow northeast overland across the subject property. The channel bank will overtop by approximately 0.06 m during the 100 year storm event and flow leaving the channel will drain overland as sheet flow into the wetland downstream.

During the site meeting, channel improvements and cleanout were discussed. The NVCA noted that improvements/cleanout were appropriate for this channel. As such, we propose to cleanout and improve this section of channel to restore the channel cross-section and grades. The cleanout/improvements involve removal of approximately 0.3 m of material from the channel bottom to restore grades and reinstating the channel banks.

The HEC RAS hydraulic model has been revised to include the proposed cleanout/improvements to establish the proposed flood hazard limit. The results of the revised HEC RAS model demonstrate that the cleanout/improvements will lower flood levels and eliminate the overtopping of the north channel bank. This eliminates the overland sheet flow across the subject property and reduces the extent of the flood hazard limit. It has the added benefit of reducing flood levels along the rear of the existing properties backing onto the channel from Burbank Circle. The proposed flood levels and flood hazard limit are illustrated on the Natural Hazards Plan (Drawing FM-1) enclosed. Results from the proposed HEC-RAS hydraulic model are included in Appendix C for reference.

Erosion Hazard Assessment

The erosion hazard limit established for the site has been defined in accordance with Section 3.1 of the Provincial Policy Statement and specifically the Ontario Ministry of Natural Resources (MNR) Technical Guide for River & Stream Systems: Erosion Hazard Limit. The results of the flood hazard assessment demonstrate that the existing channel generally contains the 100 year storm peak flow. As such, the channel through the subject property is considered a confined system. The assessment of the channel as a confined system was discussed with the NVCA and confirmed appropriate. The erosion hazard limit for a confined

system is defined as the sum of the toe erosion allowance, stable slope allowance and erosion access allowance.

There is no evidence of active erosion along the channel. The Soil Survey Report for Simcoe County describes the soil type for the property as Tioga sandy loam. Given the site soils, a toe erosion allowance of 1.0 m was applied. In the absence of a geotechnical report, the stable slope allowance for this assessment has been defined as a horizontal distance equal to three (3) times the height of slope measured farther landward from the toe erosion allowance. Similarly, a 6 m erosion access allowance has also been applied at the top of slope as per the MNR Technical Guide. The erosion hazard limit is approximately 11 m from the toe of the watercourse bank. The erosion hazard limit is shown on the Natural Hazards Plan (Drawing FM-1) enclosed.

Conclusions

Through this Natural Hazards Assessment, the flood and erosion hazard limits associated with the channel have been established across the site. As per Provincial Policy Statement 3.1, development is restricted to areas outside the natural hazards. As such, development of the subject property is restricted the area outside the flood and erosion hazard limits.

We recommend the proposed channel cleanout/improvements to reinstate the channel to original grade. As such, we recommend the proposed flood hazard limit be applied to this site.

We trust that this study and the enclosed documentation are sufficient for your review and approval. If you have any questions or concerns, please do not hesitate to contact the undersigned.

Yours truly,
C.C. Tatham & Associates Ltd.

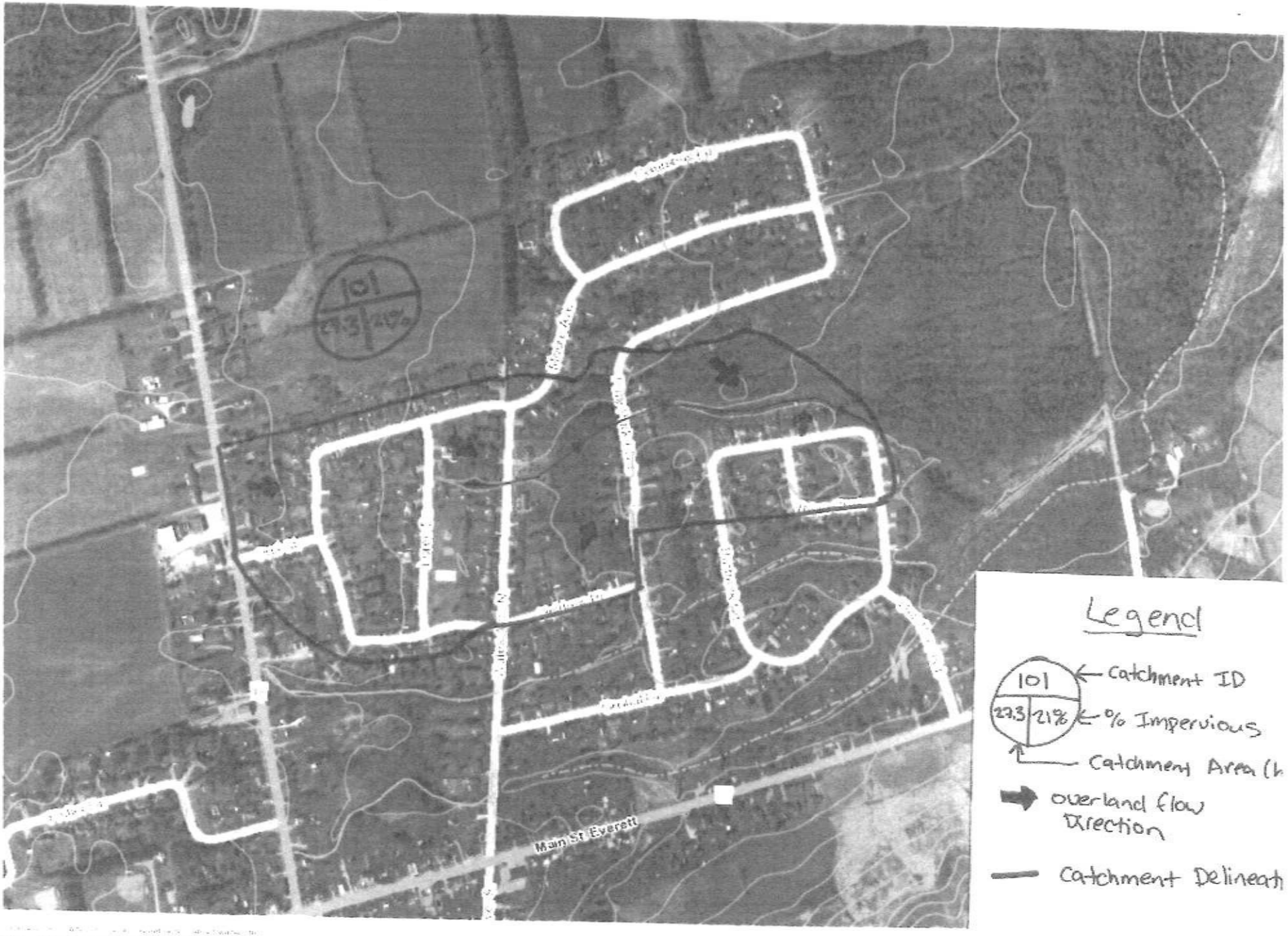
LICENSED PROFESSIONAL ENGINEER
D.R.W. TWIGGER
100147686
JAN. 17, 2017
PROVINCE OF ONTARIO

Amanda West, B.Eng., E.I.T.
Intern Engineer
AW:rlh

Daniel Twigger, B.Sc.Eng., P.Eng.
Senior Engineer, Project Manager

I:\2016 Projects\116238 - Burbank Circle Natural Hazards Study\Documents\Correspondence\L - Alvin Young - Natural Hazard Study.docx

APPENDIX A:
Hydrologic Analysis


101
27.3 | 40%
Main St Everett
Legend
101
Catchment ID
27.3 | 21%
% Impervious
Catchment Area (h
overland flow
Direction
Catchment Delineati
0
0.225
0.45
0.9 km
1:10,000

DP-1

Existing Conditions OTTHYMO Model Schematic

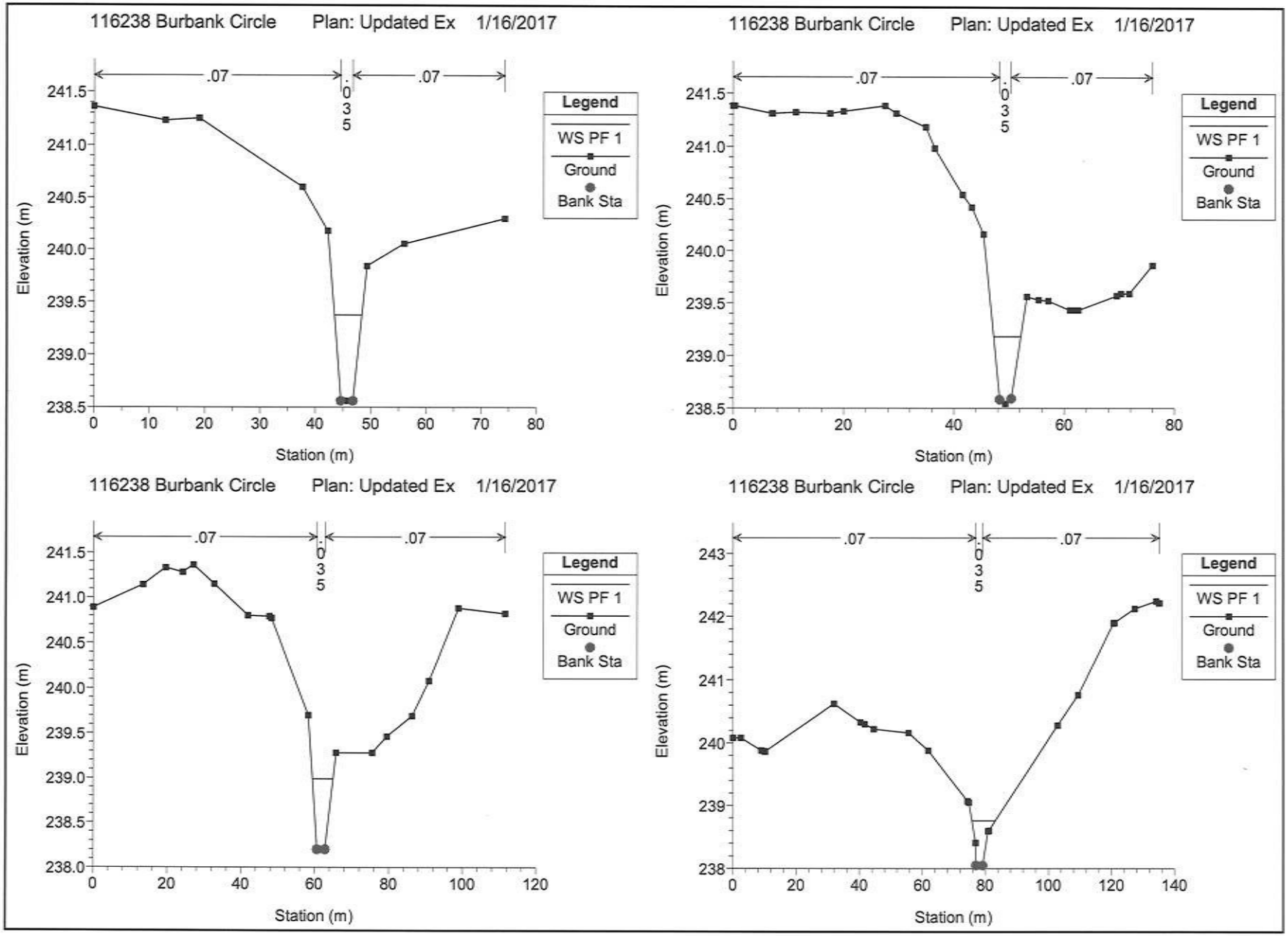
101

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

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

Developed and Distributed by Clarifica Inc.
Copyright 1996, 2007 Clarifica Inc.
All rights reserved.

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

  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 2.3.2\voin.dat
  Output  filename: I:\2016PR-1\116238-1\Design\HYDROL-1\116238-1\Existing Condition.out
  Summary filename: I:\2016PR-1\116238-1\Design\HYDROL-1\116238-1\Existing Condition.sum

DATE: 21/10/2016                          TIME: 11:12:24 AM

USER:

COMMENTS: _____________________________________________

  ****************************
  ** SIMULATION NUMBER:   1 **  100 year SCS Design Storm
  ****************************

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

     START @   .00 hrs
     ---------------------
     MASS STORM                   15.0
     [ Ptot=121.14 mm ]
.
  **  CALIB STANDHYD     0101  1  5.0   27.30    3.67 11.75  53.23  .44    .000
     [Tp=21.0:S=  2.00]
.
  ****************************
  ** SIMULATION NUMBER:   2 **  Timmins Storm Event
  ****************************

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

     START @   .00 hrs
     ---------------------
     READ STORM                   60.0
     [ Ptot=193.00 mm ]
     fname : I:\2016 Projects\116238 - Burbank Circle Natural Hazards Study\Design\Hydrologic Model\Storms
\Timmin
     remark: REGIONAL STORM TIMMINS - 12 hour storm
.
  **  CALIB STANDHYD     0101  1  5.0   27.30    1.75  7.00 102.04  .53    .000
     [Tp=21.0:S=  2.00]
.
  ****************************
  ** SIMULATION NUMBER:   3 **  100 year Chicago Design Storm
  ****************************

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

     START @   .00 hrs
     ---------------------
     CHIC STORM                   15.0
     [ Ptot= 71.02 mm ]
.
  **  CALIB STANDHYD     0101  1  5.0   27.30    2.17  1.25  25.13  .35    .000
     [Tp=21.0:S=  2.00]
.
 FINISH
```

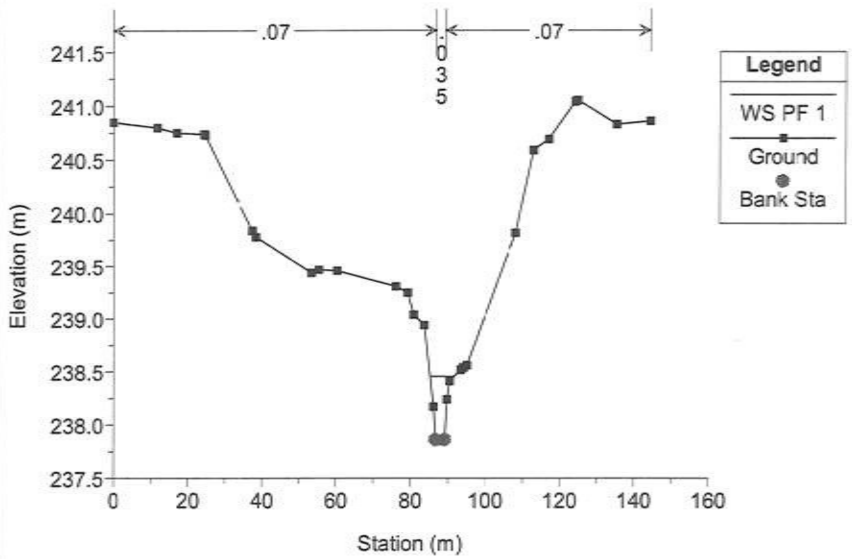
APPENDIX B:
Existing Condition Hydraulic Analysis

HEC-RAS Plan: ex River: Ditch Reach: 1 Profile: PF 1

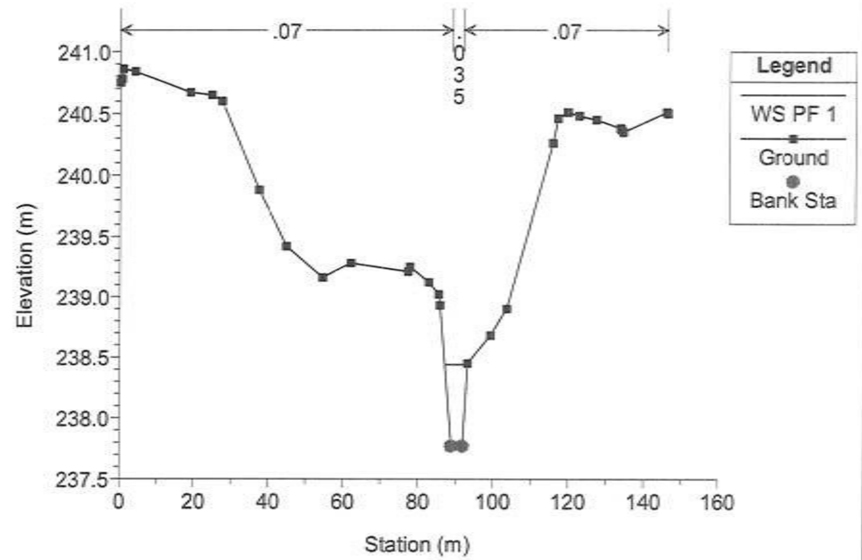
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
1	355.78	PF 1	3.67	238.56	239.37		239.51	0.005295	1.81	2.85	4.91	0.64
1	346.3	PF 1	3.67	238.54	239.18	239.18	239.43	0.013393	2.39	2.13	4.93	0.97
1	327.441	PF 1	3.67	238.20	238.99		239.12	0.005339	1.78	3.02	5.55	0.64
1	301.444	PF 1	3.67	238.05	238.76	238.70	238.94	0.008447	2.08	2.71	7.43	0.79
1	278.365	PF 1	3.67	237.86	238.46	238.46	238.70	0.013065	2.31	2.18	6.47	0.96
1	270.515	PF 1	3.67	237.77	238.44		238.55	0.005328	1.59	3.01	6.02	0.62
1	251.303	PF 1	3.67	237.63	238.39		238.47	0.003166	1.33	4.26	11.86	0.49
1	246.545	PF 1	3.67	237.17	238.42		238.45	0.000540	0.77	8.25	16.69	0.22
1	230.711	PF 1	3.67	237.06	238.43		238.44	0.000318	0.63	15.14	27.41	0.17
1	202.234	PF 1	3.67	237.33	238.37		238.41	0.001643	1.19	7.37	22.87	0.37
1	177.792	PF 1	3.67	237.40	238.15	238.02	238.33	0.007315	2.02	2.90	7.90	0.74
1	154.741	PF 1	3.67	237.16	237.87	237.87	238.11	0.012071	2.50	2.49	6.00	0.95
1	135.994	PF 1	3.67	236.86	237.86	237.52	237.88	0.001165	0.98	10.08	23.72	0.31
1	127.214	PF 1	3.67	236.72	237.87	237.33	237.87	0.000349	0.59	19.58	44.11	0.17
1	115.775	PF 1	3.67	236.69	237.86	237.23	237.87	0.000268	0.52	26.42	76.98	0.15
1	93.176	PF 1	3.67	236.67	237.86	237.22	237.86	0.000057	0.24	46.64	103.32	0.07
1	59.754	PF 1	3.67	236.91	237.86	237.54	237.86	0.000146	0.32	38.67	125.47	0.11
1	39.062	PF 1	3.67	236.89	237.71	237.54	237.84	0.005266	1.73	2.88	5.36	0.63
1	22.92	PF 1	3.67	236.82	237.55	237.47	237.73	0.008226	1.99	2.40	4.89	0.77
1	0	PF 1	3.67	236.55	237.50		237.60	0.003031	1.46	3.44	5.44	0.49
1	-20	PF 1	3.67	236.53	237.38		237.52	0.005149	1.75	2.98	5.53	0.63
1	-40	PF 1	3.67	236.43	237.29	237.10	237.41	0.005004	1.70	2.94	5.51	0.61


116238 Burbank Circle Plan: Updated Ex 1/16/2017
.07
.035
.07
Legend
WS PF 1
Ground
Bank Sta
Elevation (m)
Station (m)
241.5
241.0
240.5
240.0
239.5
239.0
238.5
0
10
20
30
40
50
60
70
80
116238 Burbank Circle Plan: Updated Ex 1/16/2017
.07
.035
.07
Legend
WS PF 1
Ground
Bank Sta
Elevation (m)
Station (m)
241.5
241.0
240.5
240.0
239.5
239.0
238.5
0
20
40
60
80
116238 Burbank Circle Plan: Updated Ex 1/16/2017
.07
.035
.07
Legend
WS PF 1
Ground
Bank Sta
Elevation (m)
Station (m)
241.5
241.0
240.5
240.0
239.5
239.0
238.5
238.0
0
20
40
60
80
100
120
116238 Burbank Circle Plan: Updated Ex 1/16/2017
.07
.035
.07
Legend
WS PF 1
Ground
Bank Sta
Elevation (m)
Station (m)
243
242
241
240
239
238
0
20
40
60
80
100
120
140

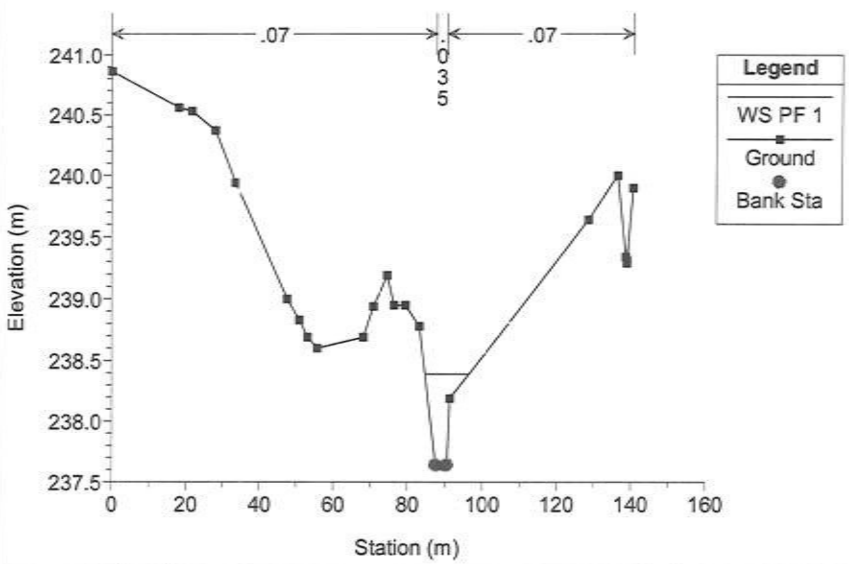
116238 Burbank Circle Plan: Updated Ex 1/16/2017



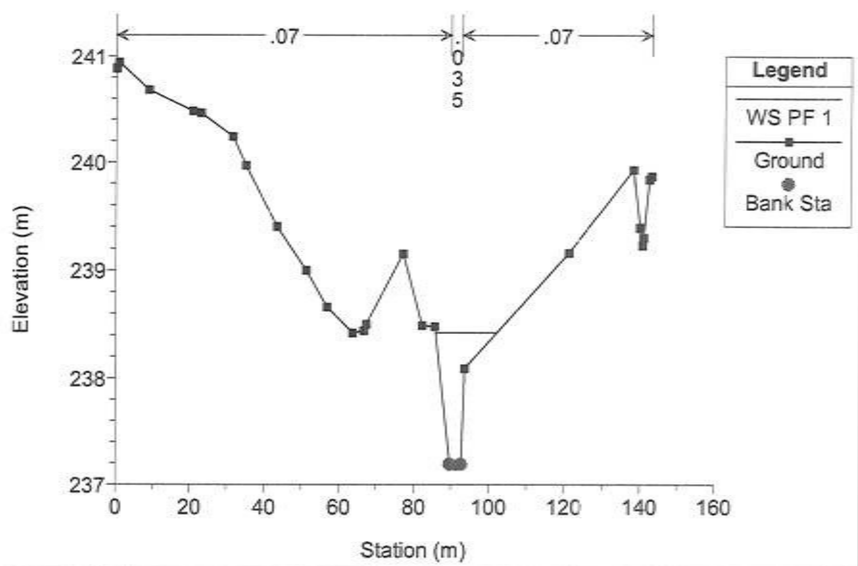
116238 Burbank Circle Plan: Updated Ex 1/16/2017

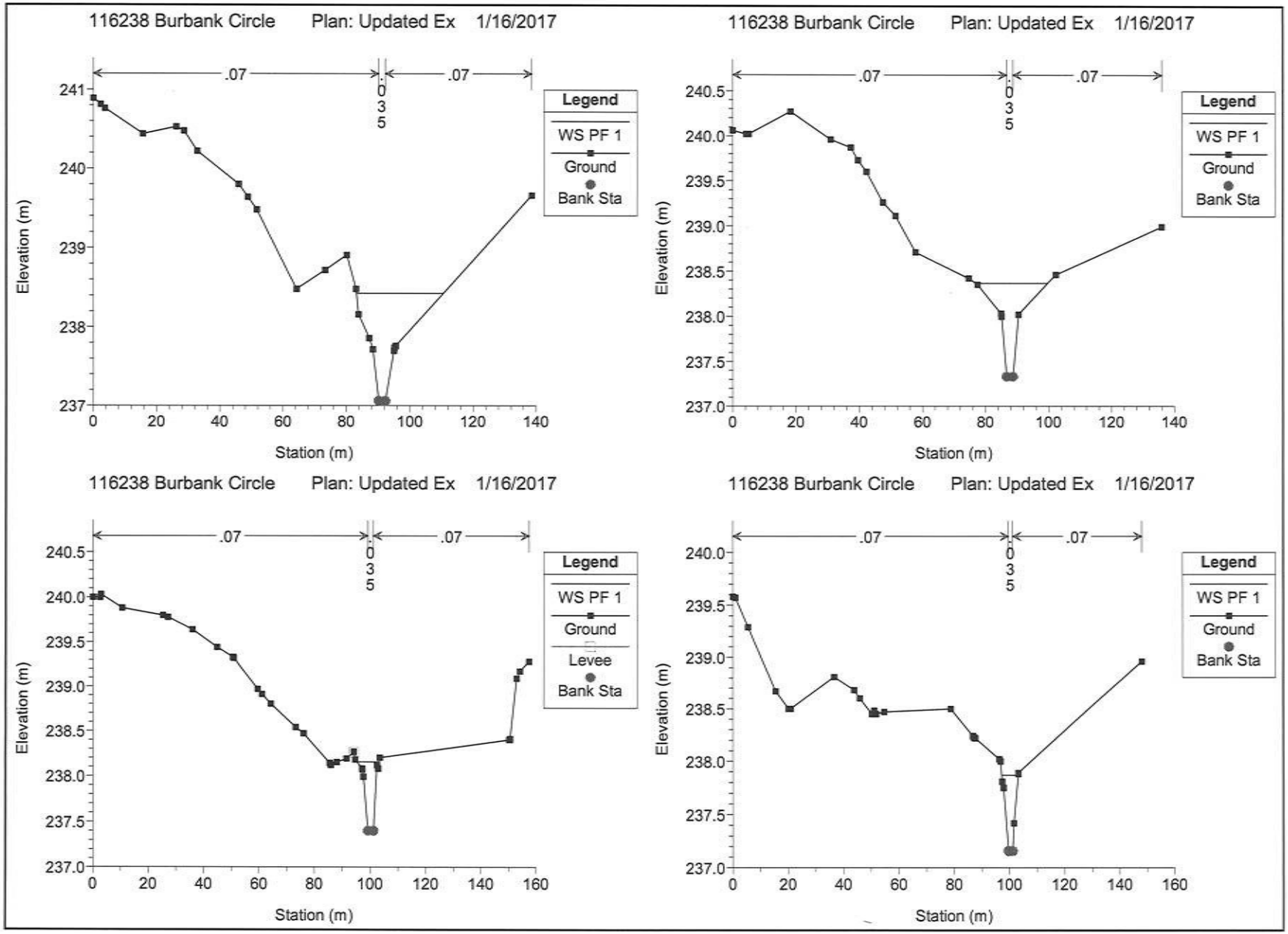


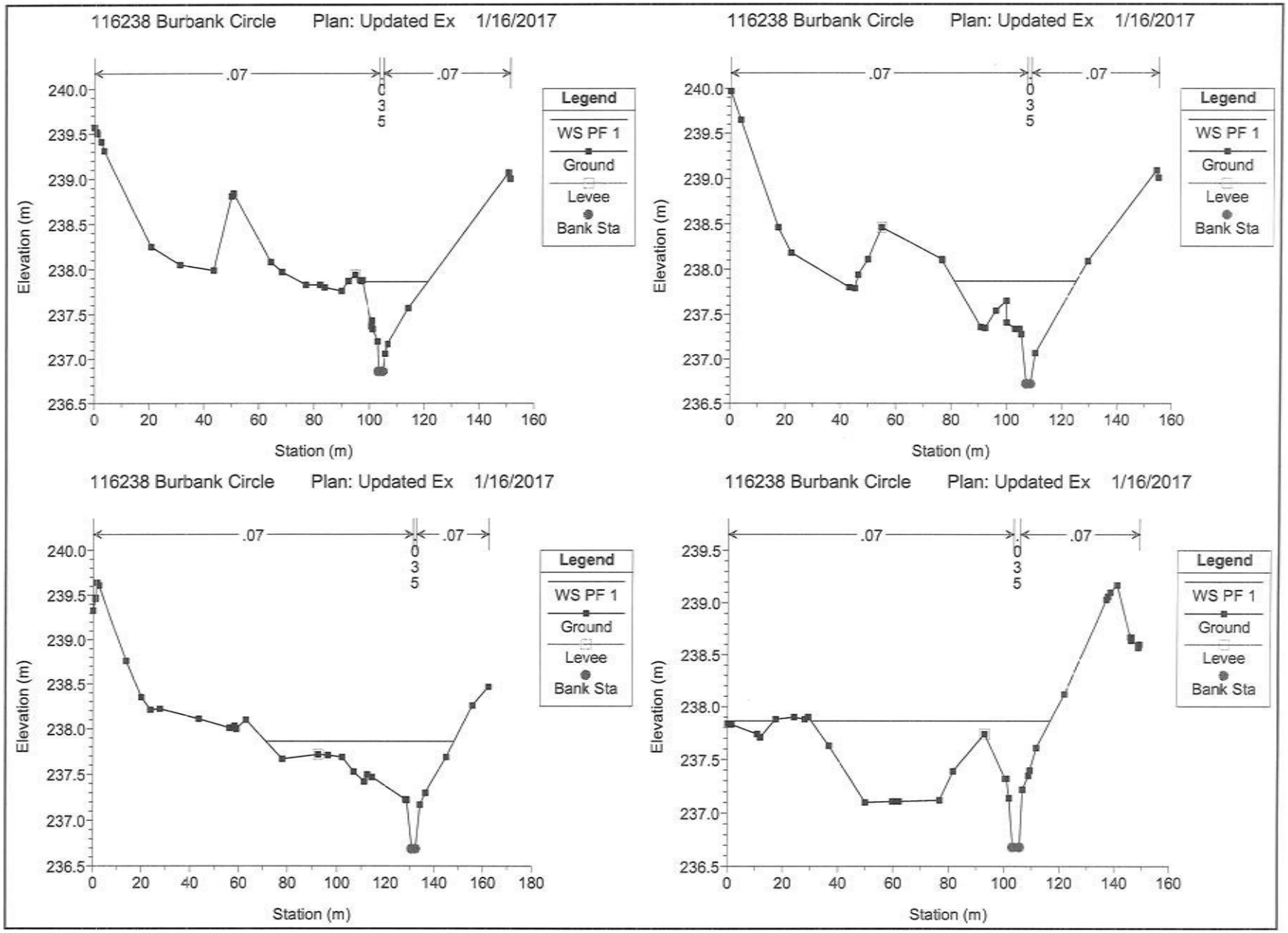
116238 Burbank Circle Plan: Updated Ex 1/16/2017

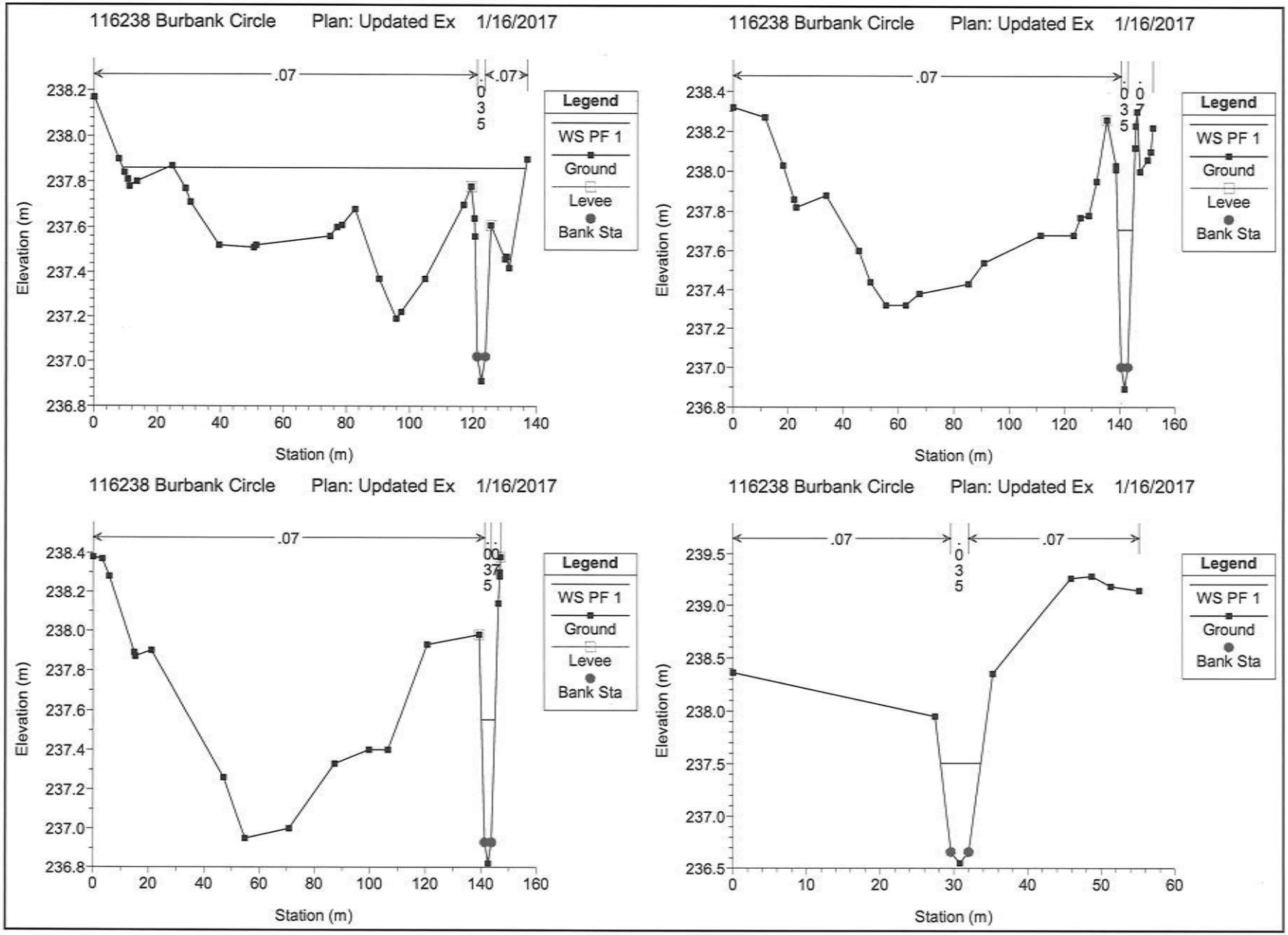


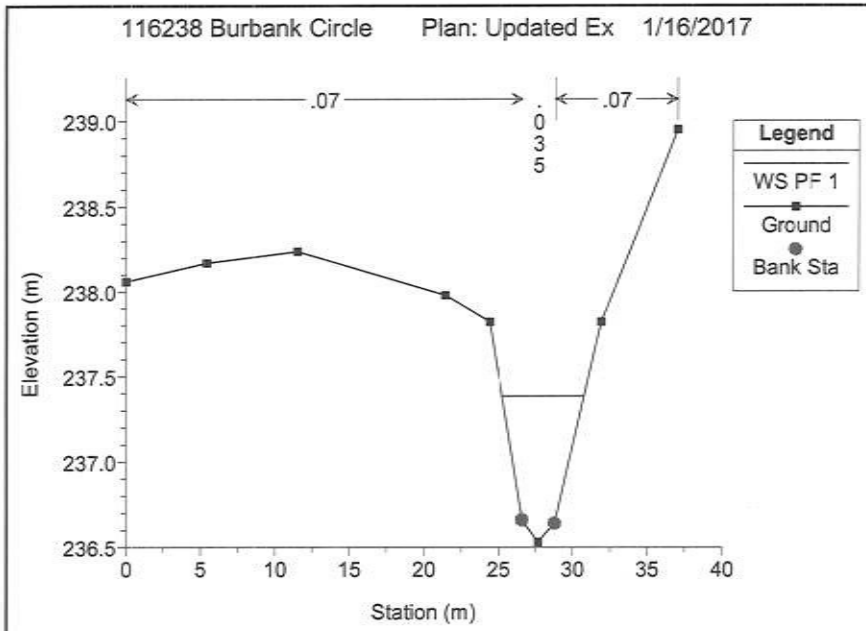
116238 Burbank Circle Plan: Updated Ex 1/16/2017

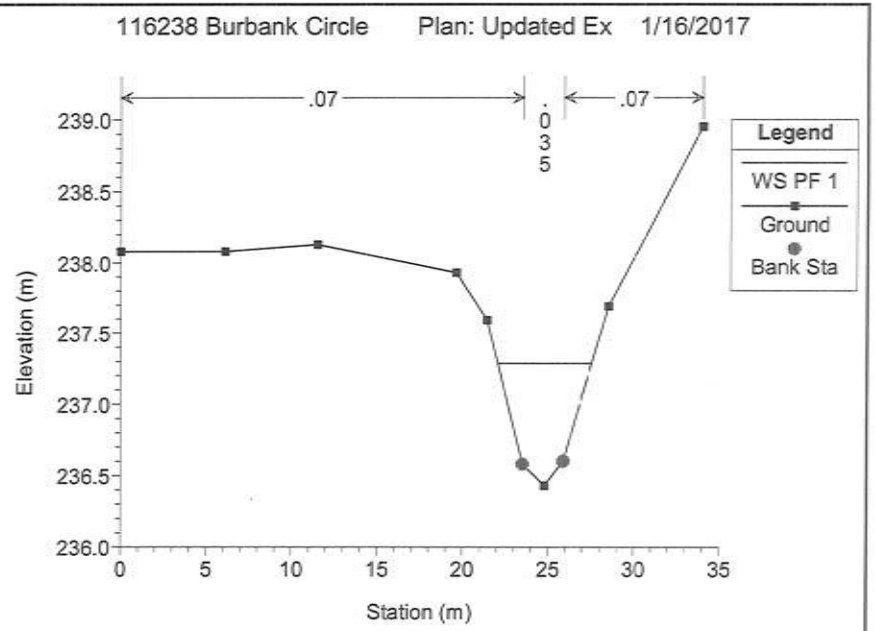



116238 Burbank Circle Plan: Updated Ex 1/16/2017
.07
.07
0
3
5
Legend
WS PF 1
Ground
Bank Sta
Elevation (m)
Station (m)
241
240
239
238
237
0
20
40
60
80
100
120
140
116238 Burbank Circle Plan: Updated Ex 1/16/2017
.07
.07
0
3
5
Legend
WS PF 1
Ground
Bank Sta
Elevation (m)
Station (m)
240.5
240.0
239.5
239.0
238.5
238.0
237.5
237.0
0
20
40
60
80
100
120
140
116238 Burbank Circle Plan: Updated Ex 1/16/2017
.07
.07
0
3
5
Legend
WS PF 1
Ground
Levee
Bank Sta
Elevation (m)
Station (m)
240.5
240.0
239.5
239.0
238.5
238.0
237.5
237.0
0
20
40
60
80
100
120
140
160
116238 Burbank Circle Plan: Updated Ex 1/16/2017
.07
.07
0
3
5
Legend
WS PF 1
Ground
Bank Sta
Elevation (m)
Station (m)
240.0
239.5
239.0
238.5
238.0
237.5
237.0
0
20
40
60
80
100
120
140
160


116238 Burbank Circle Plan: Updated Ex 1/16/2017
.07
.07
0
3
5
Legend
WS PF 1
Ground
Levee
Bank Sta
Elevation (m)
Station (m)
116238 Burbank Circle Plan: Updated Ex 1/16/2017
.07
.07
0
3
5
Legend
WS PF 1
Ground
Levee
Bank Sta
Elevation (m)
Station (m)
116238 Burbank Circle Plan: Updated Ex 1/16/2017
.07
.07
0
3
5
Legend
WS PF 1
Ground
Levee
Bank Sta
Elevation (m)
Station (m)
116238 Burbank Circle Plan: Updated Ex 1/16/2017
.07
.07
0
3
5
Legend
WS PF 1
Ground
Levee
Bank Sta
Elevation (m)
Station (m)


116238 Burbank Circle Plan: Updated Ex 1/16/2017
.07
.07
.0
3
5
Legend
WS PF 1
Ground
Levee
Bank Sta
Elevation (m)
Station (m)
116238 Burbank Circle Plan: Updated Ex 1/16/2017
.07
.0
3
5
.0
7
Legend
WS PF 1
Ground
Levee
Bank Sta
Elevation (m)
Station (m)
116238 Burbank Circle Plan: Updated Ex 1/16/2017
.07
.0
37
5
Legend
WS PF 1
Ground
Levee
Bank Sta
Elevation (m)
Station (m)
116238 Burbank Circle Plan: Updated Ex 1/16/2017
.07
.07
.0
3
5
Legend
WS PF 1
Ground
Bank Sta
Elevation (m)
Station (m)

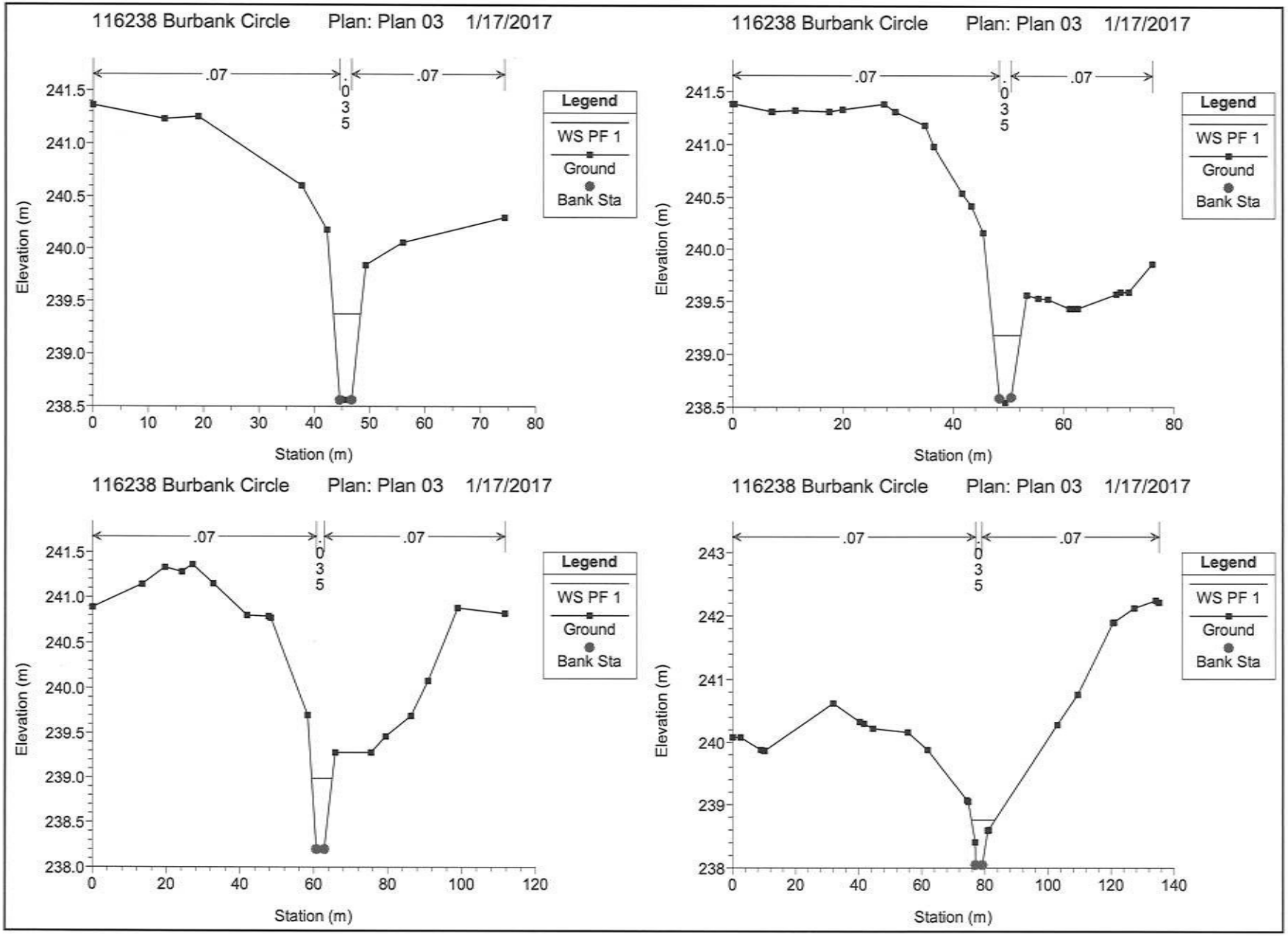

116238 Burbank Circle Plan: Updated Ex 1/16/2017
.07
.035
.07
Legend
WS PF 1
Ground
Bank Sta
Elevation (m)
239.0
238.5
238.0
237.5
237.0
236.5
0
5
10
15
20
25
30
35
40
Station (m)


116238 Burbank Circle Plan: Updated Ex 1/16/2017
.07
.035
.07
Legend
WS PF 1
Ground
Bank Sta
Elevation (m)
239.0
238.5
238.0
237.5
237.0
236.5
236.0
0
5
10
15
20
25
30
35
Station (m)

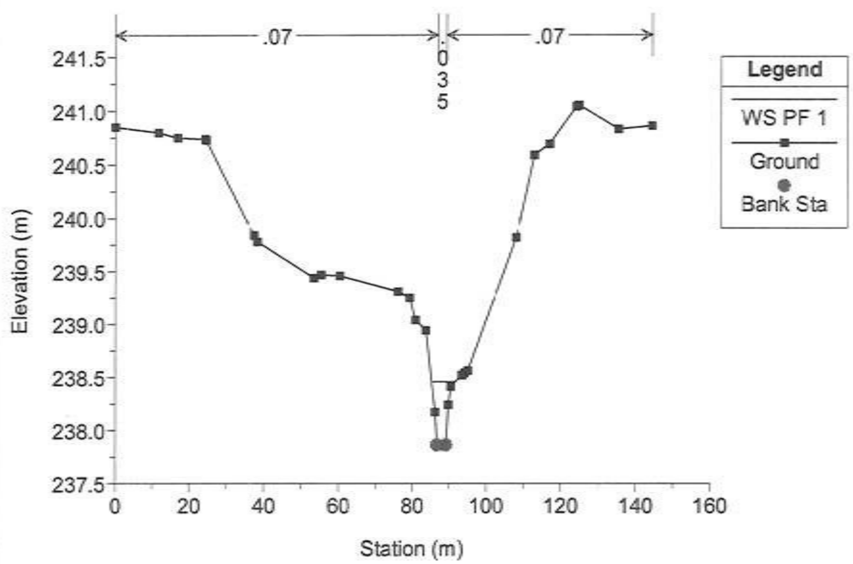
APPENDIX C:
Proposed Condition Hydraulic Analysis

HEC-RAS Plan: ex River: Ditch Reach: 1 Profile: PF 1

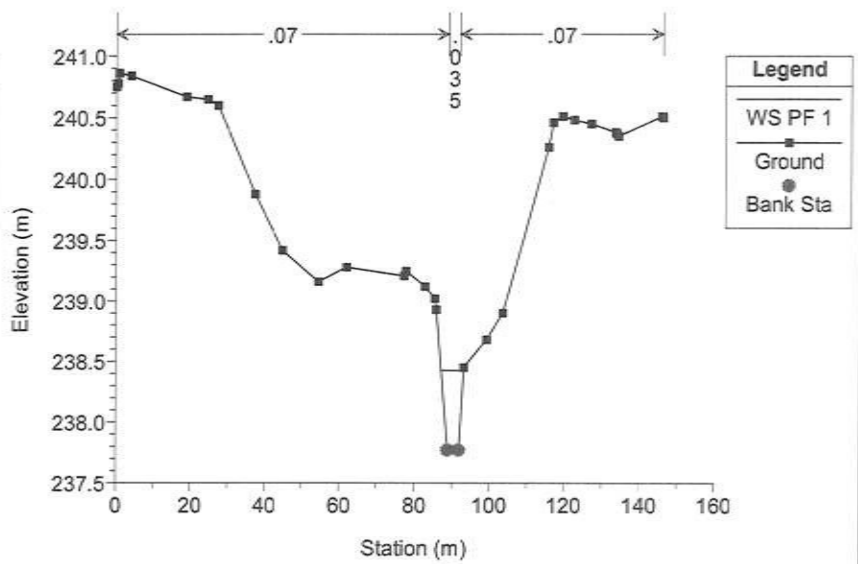
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
1	355.78	PF 1	3.67	238.56	239.37		239.51	0.005295	1.81	2.85	4.91	0.64
1	346.3	PF 1	3.67	238.54	239.18	239.18	239.43	0.013393	2.39	2.13	4.93	0.97
1	327.441	PF 1	3.67	238.20	238.99		239.12	0.005339	1.78	3.02	5.55	0.64
1	301.444	PF 1	3.67	238.05	238.76	238.70	238.94	0.008447	2.08	2.71	7.43	0.79
1	278.365	PF 1	3.67	237.86	238.46	238.46	238.70	0.013065	2.31	2.18	6.47	0.96
1	270.515	PF 1	3.67	237.77	238.43		238.54	0.005711	1.63	2.94	5.96	0.64
1	251.303	PF 1	3.67	237.63	238.37		238.45	0.003561	1.39	4.01	11.23	0.52
1	246.545	PF 1	3.67	237.17	238.40		238.43	0.000576	0.78	7.96	15.87	0.23
1	230.711	PF 1	3.67	237.06	238.41		238.42	0.000342	0.64	14.65	26.95	0.18
1	202.234	PF 1	3.67	237.33	238.34		238.39	0.001887	1.25	6.79	21.30	0.40
1	177.792	PF 1	3.67	237.40	238.04	238.02	238.28	0.012460	2.37	2.21	4.96	0.95
1	154.741	PF 1	3.67	236.97	237.73	237.72	238.00	0.011714	2.57	2.22	4.80	0.94
1	135.994	PF 1	3.67	236.86	237.84	237.52	237.87	0.001295	1.02	9.62	23.12	0.33
1	127.214	PF 1	3.67	236.72	237.84	237.33	237.86	0.000648	0.79	14.00	34.80	0.24
1	115.775	PF 1	3.67	236.69	237.84		237.85	0.000354	0.59	21.80	60.03	0.18
1	93.176	PF 1	3.67	236.67	237.80	237.22	237.83	0.000834	0.89	10.84	47.41	0.27
1	59.754	PF 1	3.67	236.78	237.72	237.35	237.79	0.002017	1.23	5.47	15.17	0.41
1	39.062	PF 1	3.67	236.74	237.65	237.33	237.74	0.002863	1.43	3.55	5.44	0.48
1	22.92	PF 1	3.67	236.71	237.59	237.30	237.69	0.003166	1.48	3.42	5.35	0.50
1	0	PF 1	3.67	236.66	237.51		237.61	0.003568	1.53	3.32	5.45	0.53
1	-20	PF 1	3.67	236.53	237.38		237.52	0.005251	1.77	2.92	5.40	0.63
1	-40	PF 1	3.67	236.43	237.29	237.10	237.41	0.005004	1.70	2.94	5.51	0.61


116238 Burbank Circle Plan: Plan 03 1/17/2017
.07
.035
.07
Legend
WS PF 1
Ground
Bank Sta
Elevation (m)
Station (m)
241.5
241.0
240.5
240.0
239.5
239.0
238.5
0 10 20 30 40 50 60 70 80
116238 Burbank Circle Plan: Plan 03 1/17/2017
.07
.035
.07
Legend
WS PF 1
Ground
Bank Sta
Elevation (m)
Station (m)
241.5
241.0
240.5
240.0
239.5
239.0
238.5
0 20 40 60 80
116238 Burbank Circle Plan: Plan 03 1/17/2017
.07
.035
.07
Legend
WS PF 1
Ground
Bank Sta
Elevation (m)
Station (m)
241.5
241.0
240.5
240.0
239.5
239.0
238.5
238.0
0 20 40 60 80 100 120
116238 Burbank Circle Plan: Plan 03 1/17/2017
.07
.035
.07
Legend
WS PF 1
Ground
Bank Sta
Elevation (m)
Station (m)
243
242
241
240
239
238
0 20 40 60 80 100 120 140

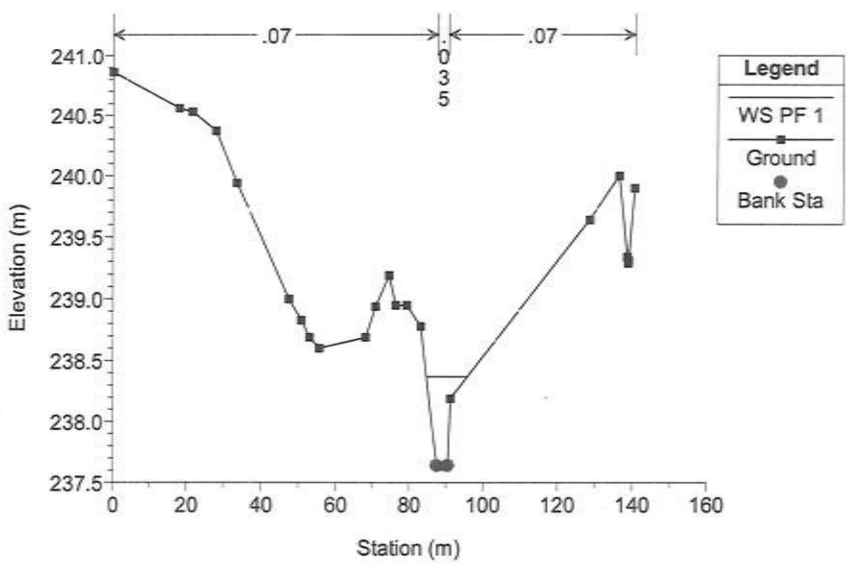
116238 Burbank Circle Plan: Plan 03 1/17/2017



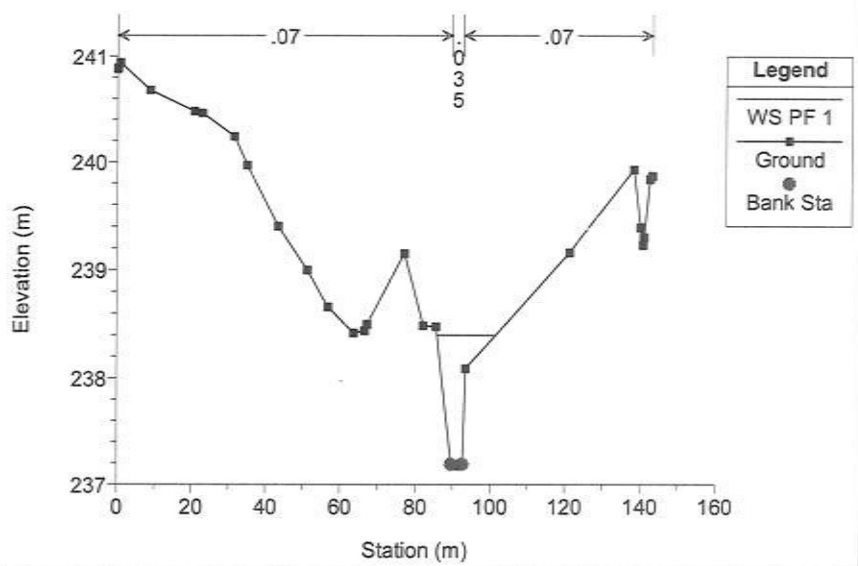
116238 Burbank Circle Plan: Plan 03 1/17/2017

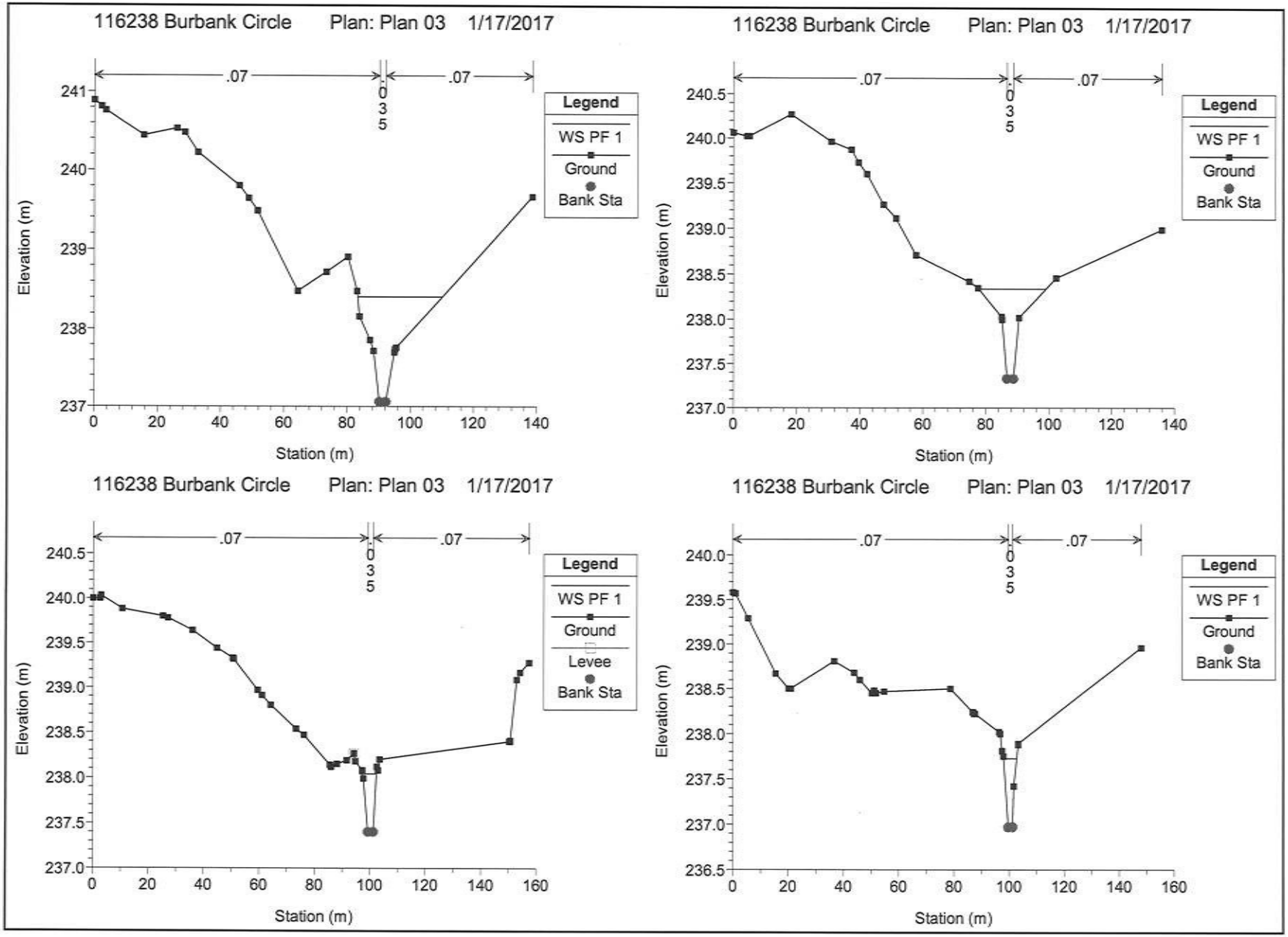


116238 Burbank Circle Plan: Plan 03 1/17/2017

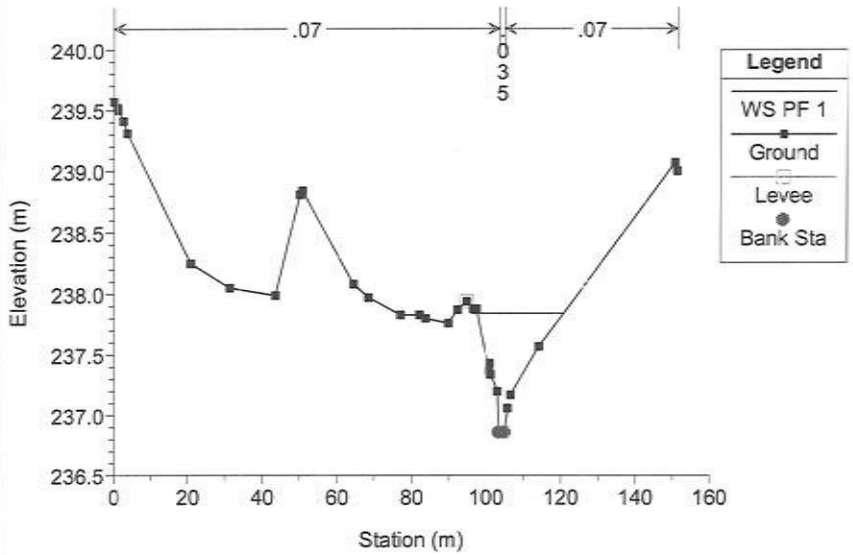


116238 Burbank Circle Plan: Plan 03 1/17/2017

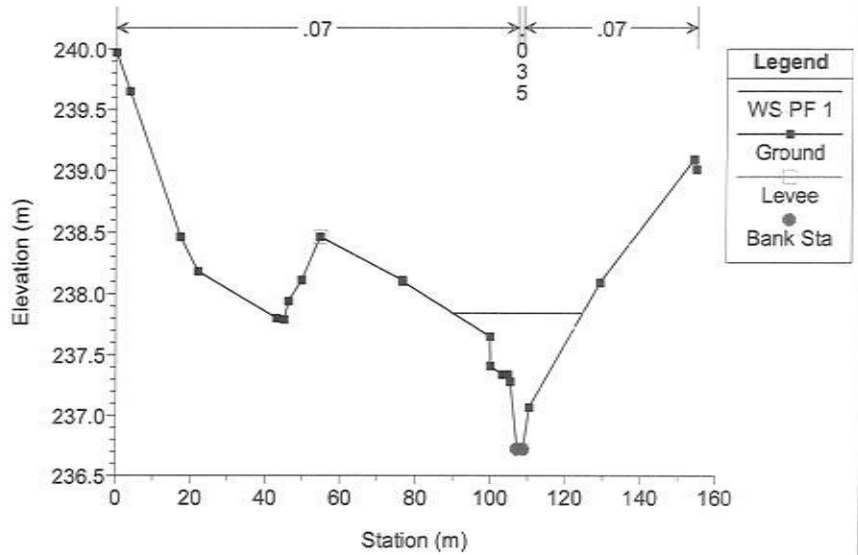



116238 Burbank Circle Plan: Plan 03 1/17/2017
.07
.035
.07
Legend
WS PF 1
Ground
Bank Sta
Elevation (m)
Station (m)
116238 Burbank Circle Plan: Plan 03 1/17/2017
.07
.035
.07
Legend
WS PF 1
Ground
Bank Sta
Elevation (m)
Station (m)
116238 Burbank Circle Plan: Plan 03 1/17/2017
.07
.035
.07
Legend
WS PF 1
Ground
Levee
Bank Sta
Elevation (m)
Station (m)
116238 Burbank Circle Plan: Plan 03 1/17/2017
.07
.035
.07
Legend
WS PF 1
Ground
Bank Sta
Elevation (m)
Station (m)

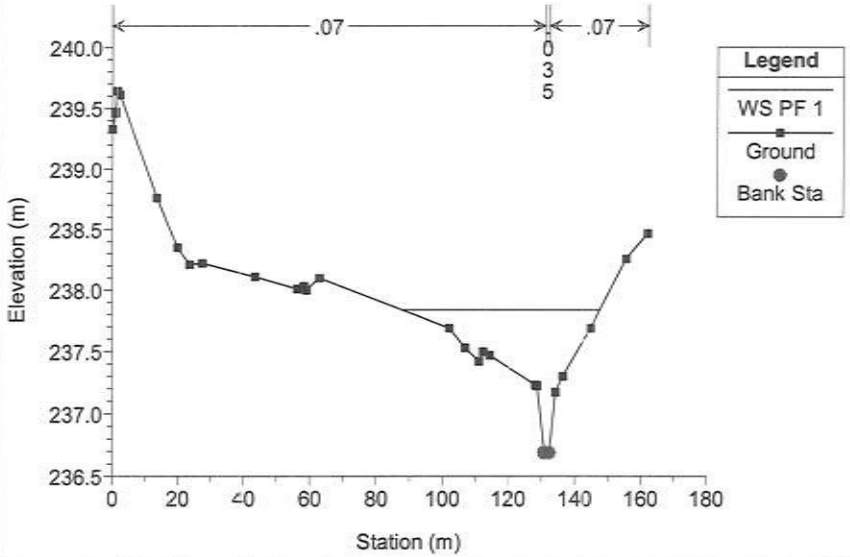
116238 Burbank Circle Plan: Plan 03 1/17/2017



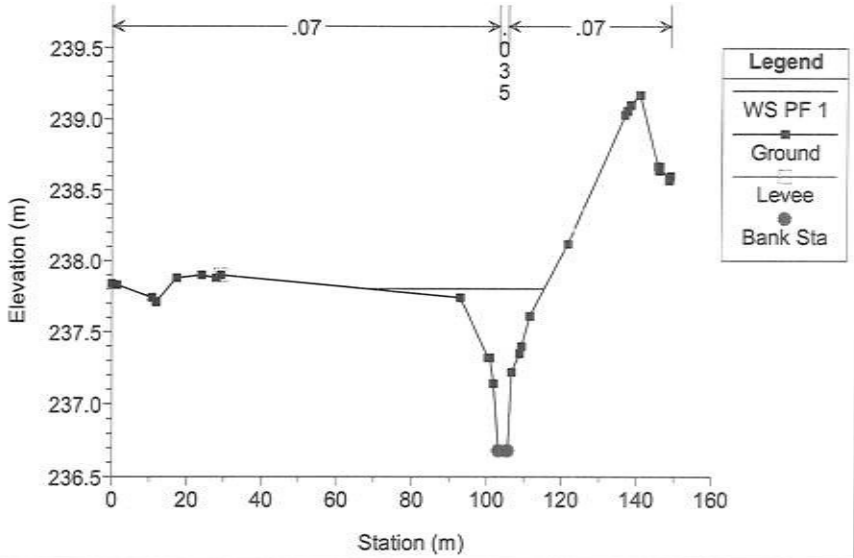
116238 Burbank Circle Plan: Plan 03 1/17/2017

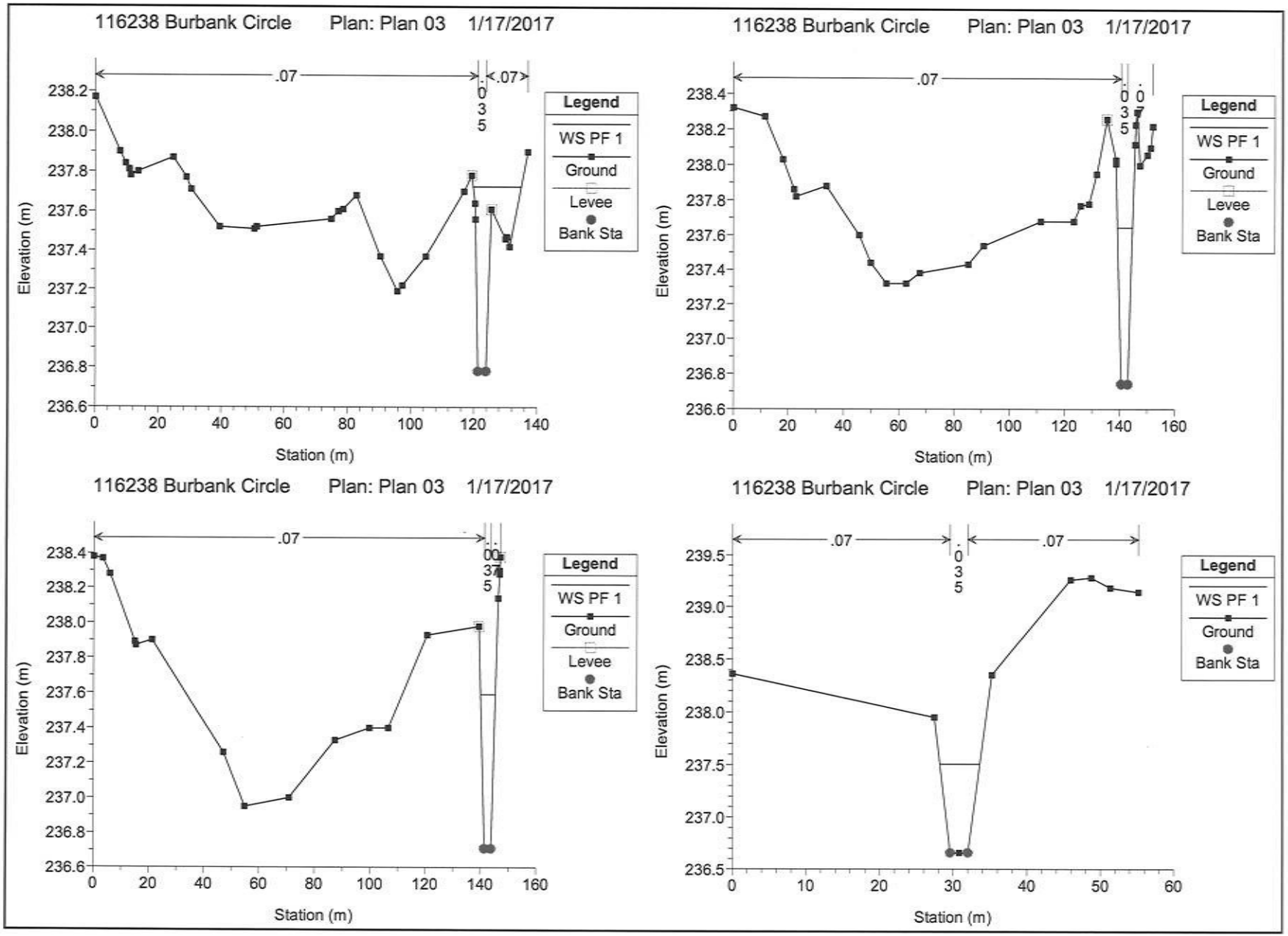


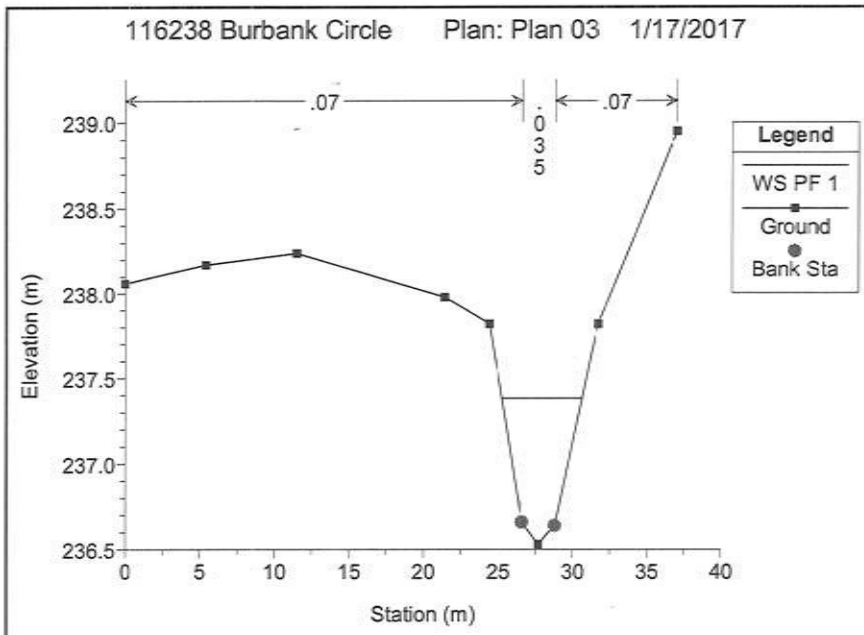
116238 Burbank Circle Plan: Plan 03 1/17/2017

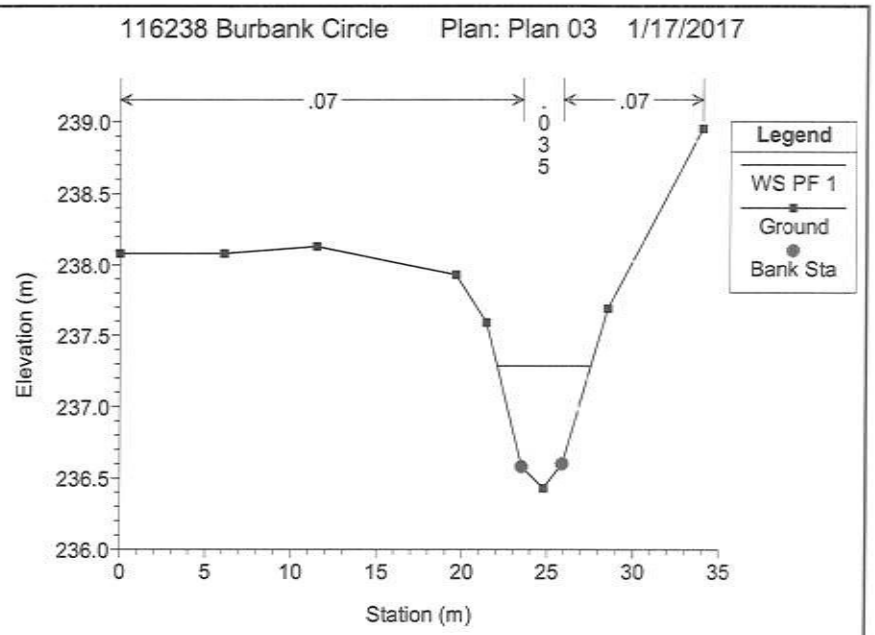


116238 Burbank Circle Plan: Plan 03 1/17/2017




116238 Burbank Circle Plan: Plan 03 1/17/2017
.07
.07
.035
Legend
WS PF 1
Ground
Levee
Bank Sta
Elevation (m)
Station (m)
116238 Burbank Circle Plan: Plan 03 1/17/2017
.07
.035
Legend
WS PF 1
Ground
Levee
Bank Sta
Elevation (m)
Station (m)
116238 Burbank Circle Plan: Plan 03 1/17/2017
.07
.0375
Legend
WS PF 1
Ground
Levee
Bank Sta
Elevation (m)
Station (m)
116238 Burbank Circle Plan: Plan 03 1/17/2017
.07
.035
.07
Legend
WS PF 1
Ground
Bank Sta
Elevation (m)
Station (m)


116238 Burbank Circle Plan: Plan 03 1/17/2017
.07
.035
.07
Legend
WS PF 1
Ground
Bank Sta
Elevation (m)
239.0
238.5
238.0
237.5
237.0
236.5
0
5
10
15
20
25
30
35
40
Station (m)


116238 Burbank Circle Plan: Plan 03 1/17/2017
.07
.035
.07
Legend
WS PF 1
Ground
Bank Sta
Elevation (m)
239.0
238.5
238.0
237.5
237.0
236.5
236.0
0
5
10
15
20
25
30
35
Station (m)

PAR
PLAN 51R
LOT 12, CC

10.0m SERVICING

335.780 239.37 239.30
346.300 239.18 239.16
327.441 238.99 238.81
278.365 238.46 238.36
270.515 238.43 238.42
251.303 238.39 238.41
246.545 238.41 238.41
230.711 238.41 238.41
202.234 238.34 238.34
177.792 238.02 238.03
154.741 237.80 237.76
135.994 237.84 237.79
127.214 237.84 237.80
115.775 237.84 237.79
93.176 237.80 237.76
68.000 237.72 237.72
22.92 237.59 237.45
0 237.51 237.42
-20 237.38 237.26
-40 237.29 237.18

3.67cms

6.0m EROSION ACCESS ALLOWANCE

EROSION HAZARD LIMIT

EROSION ACCESS ALLOWANCE 6.0m

EXISTING FLOOD HAZARD LIMIT

PROPOSED FLOOD HAZARD LIMIT

PROPOSED 50% BLOCKED FLOOD HAZARD LIMIT

STREET "A"

BLOCK 46

BURBANK CIRCLE

LIMIT OF STUDY

LEGEND:

- HEC RAS SECTION ID / EXISTING 100 YEAR FLOOD ELEVATION / PROPOSED 100 YEAR FLOOD ELEVATION — 335.780 / 239.32 / 239.32
- EROSION HAZARD LIMIT
- TOE EROSION/STABLE SLOPE ALLOWANCE
- EXISTING FLOOD HAZARD LIMIT
- PROPOSED FLOOD HAZARD LIMIT
- PEAK FLOW — 3.67cms
- CENTERLINE OF DITCH

DISCLAIMER AND COPYRIGHT

CONTRACTOR MUST VERIFY ALL DIMENSIONS AND BE RESPONSIBLE FOR SAME. ANY DISCREPANCIES MUST BE REPORTED TO THE ENGINEER BEFORE COMMENCING WORK. DRAWINGS ARE NOT TO BE SCALED.

NOTES

TOPOGRAPHIC SURVEY OF THE WATERCOURSE AND FLOODPLAIN AREA PROVIDED BY RODNEY GEYER, OLS, DWG. 16-253571, DATED APRIL 21, 2016.

No.	REVISION DESCRIPTION	DATE
1.	1ST SUBMISSION	NOV 05/19

ENGINEER STAMP

LICENSED PROFESSIONAL ENGINEER — R. S. SIMPSON — PROVINCE OF ONTARIO

CUMAC SUBDIVISION - PH. 2

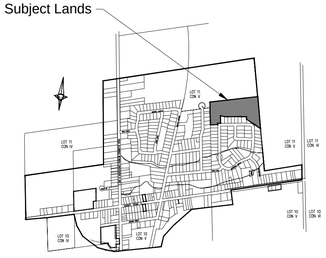
TOWNSHIP OF ADJALA-TOSORONTIO

NATURAL HAZARDS MAPPING PLAN

TATHAM ENGINEERING

DESIGN: AW	FILE: 116238	DWG: FM-1
DRAWN: DEP	DATE: OCT 2016	
CHECK: DRT	SCALE: 1:750	

Drawing Name: 116238-FM-1.dwg, Plotted: Nov 05, 2019



KEY PLAN SCALE 1:20,000

Draft Plan of Subdivision

Part of East Half Lot 11, Concession 5
Geographical Township of Tosorontio,
Now in the
Township of Adjala-Tosorontio
County of Simcoe
2017

OWNER'S CERTIFICATE

I, THE UNDERSIGNED, BEING THE REGISTERED OWNER OF THE SUBJECT LANDS, HEREBY AUTHORIZE THE JONES CONSULTING GROUP LTD., TO PREPARE THIS DRAFT PLAN OF SUBDIVISION AND TO SUBMIT SAME TO THE TOWNSHIP OF ADJALA-TOSORONTIO FOR APPROVAL.

DATE WINZEN DEVELOPMENTS INC.

SURVEYOR'S CERTIFICATE

I CERTIFY THAT THE BOUNDARIES OF THE LANDS TO BE SUBDIVIDED AND THEIR RELATIONSHIP TO ADJACENT LANDS ARE ACCURATELY AND CORRECTLY SHOWN.

DATE RODNEY GEYER, OLS
ONTARIO LAND SURVEYOR

ADDITIONAL INFORMATION REQUIRED UNDER SECTION 51(17) OF THE PLANNING ACT

a) SHOWN ON DRAFT PLAN
b) SHOWN ON DRAFT PLAN
c) SHOWN ON KEY PLAN
d) RESIDENTIAL,
e) SHOWN ON DRAFT PLAN
f) SHOWN ON DRAFT PLAN
g) SHOWN ON DRAFT PLAN
h) MUNICIPAL PIPED WATER TO BE PROVIDED
i) SANDY SILT
j) SHOWN ON DRAFT PLAN
k) ALL MUNICIPAL SERVICES TO BE PROVIDED
l) SHOWN ON DRAFT PLAN

SUBDIVISION STATISTICS	AREA (ha.)	UNITS
SINGLE RESIDENTIAL - 12.2m (LOTS 6-11, 23 & 24, 31 & 32)	0.81 ha.	10 units
SINGLE RESIDENTIAL - 15.2m (LOTS 1-5, 12-22, 25-30, & 33-45)	2.68 ha.	35 units
ROAD (STREET 'A')	0.83 ha.	
TOTAL	4.33 ha.	45 units

20 0 20 40 METRES
SCALE = 1:500 (A1)

WINZEN CUMAC PHASE 2
DRAFT PLAN OF SUBDIVISION

LEGEND:
- EROSION HAZARD LIMIT
- TOE EROSION/STABLE SLOPE ALLOWANCE
- EXISTING FLOOD HAZARD LIMIT
- PROPOSED FLOOD HAZARD LIMIT
- CENTERLINE OF DITCH

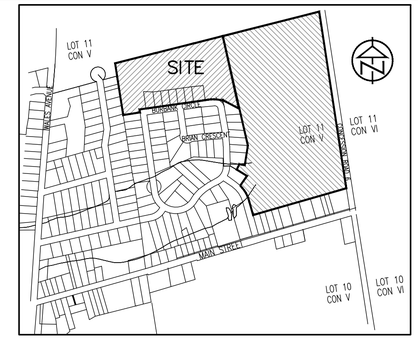
WINZEN CUMAC PHASE 2
TOWNSHIP OF ADJALA-TOSORONTIO

SCHEDULE OF REVISIONS		
DATE	DESCRIPTION	DRAWN

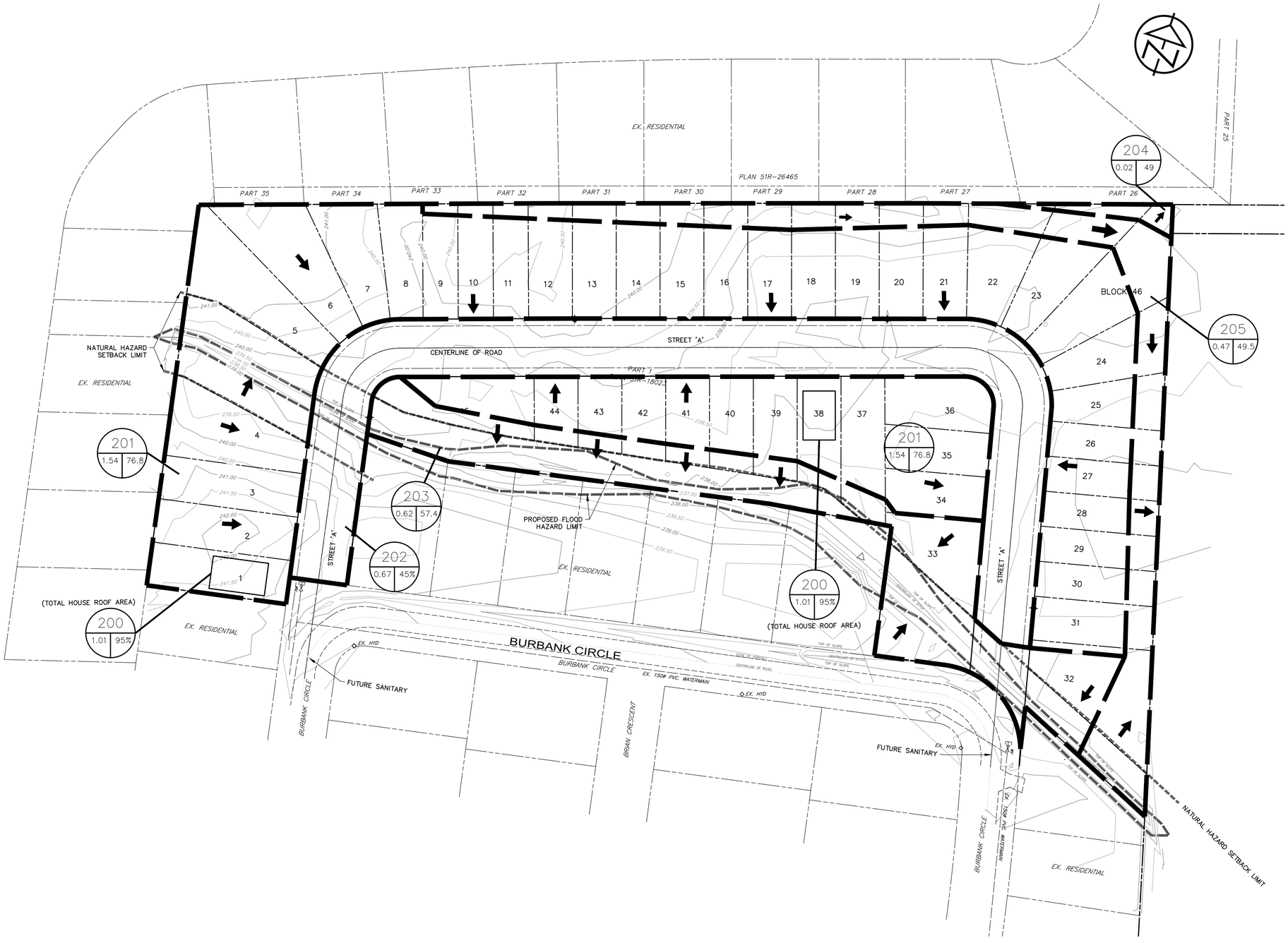
Brandi L. Clemens
REGISTERED PROFESSIONAL PLANNER
R.P.P.

Date Issued:	March 9, 2017
Checked By:	BC
Project No.:	YOU-99107
Drawn By:	m.c.r.
Drawing Name:	YOU-99107-DP-1.dwg

JONES CONSULTING GROUP LTD.
PLANNERS & ENGINEERS
229 Mapleview Drive East, Unit 1, Barrie, Ontario, L4N 0W5
Phone: 705-734-2538 Fax: 705-734-1056
www.jonesconsulting.com



KEY PLAN
SCALE: NTS



LEGEND

- DRAINAGE AREA ID — 100 / 0.42 / 49
- AREA IN HECTARES
- CN VALUE / % IMPERVIOUS
- DRAINAGE AREA BOUNDARY
- PROPOSED FLOW DIRECTION
- PROPOSED OVERLAND FLOW

DISCLAIMER AND COPYRIGHT

CONTRACTOR MUST VERIFY ALL DIMENSIONS AND BE RESPONSIBLE FOR SAME. ANY DISCREPANCIES MUST BE REPORTED TO THE ENGINEER BEFORE COMMENCING WORK. DRAWINGS ARE NOT TO BE SCALED.

NOTES

LEGAL SURVEY INFORMATION AND LOT DIMENSIONS SHOWN ON THIS PLAN ARE TAKEN FROM A SURVEY PLAN PREPARED BY RODNEY GEYER, O.L.S. INC. DATED APRIL 21, 2016 WHICH MAY NOT BE FINAL AND ARE NOT GUARANTEED. THE FINAL REGISTERED PLAN OF SUBDIVISION SHALL BE REFERRED TO FOR CONFIRMATION OF THE DATA.

No.	REVISION DESCRIPTION	DATE
1.	1ST SUBMISSION	NOV 05/19

ENGINEER STAMP

LICENSED PROFESSIONAL ENGINEER — 19114 — R. S. SIMPSON — PROVINCE OF ONTARIO

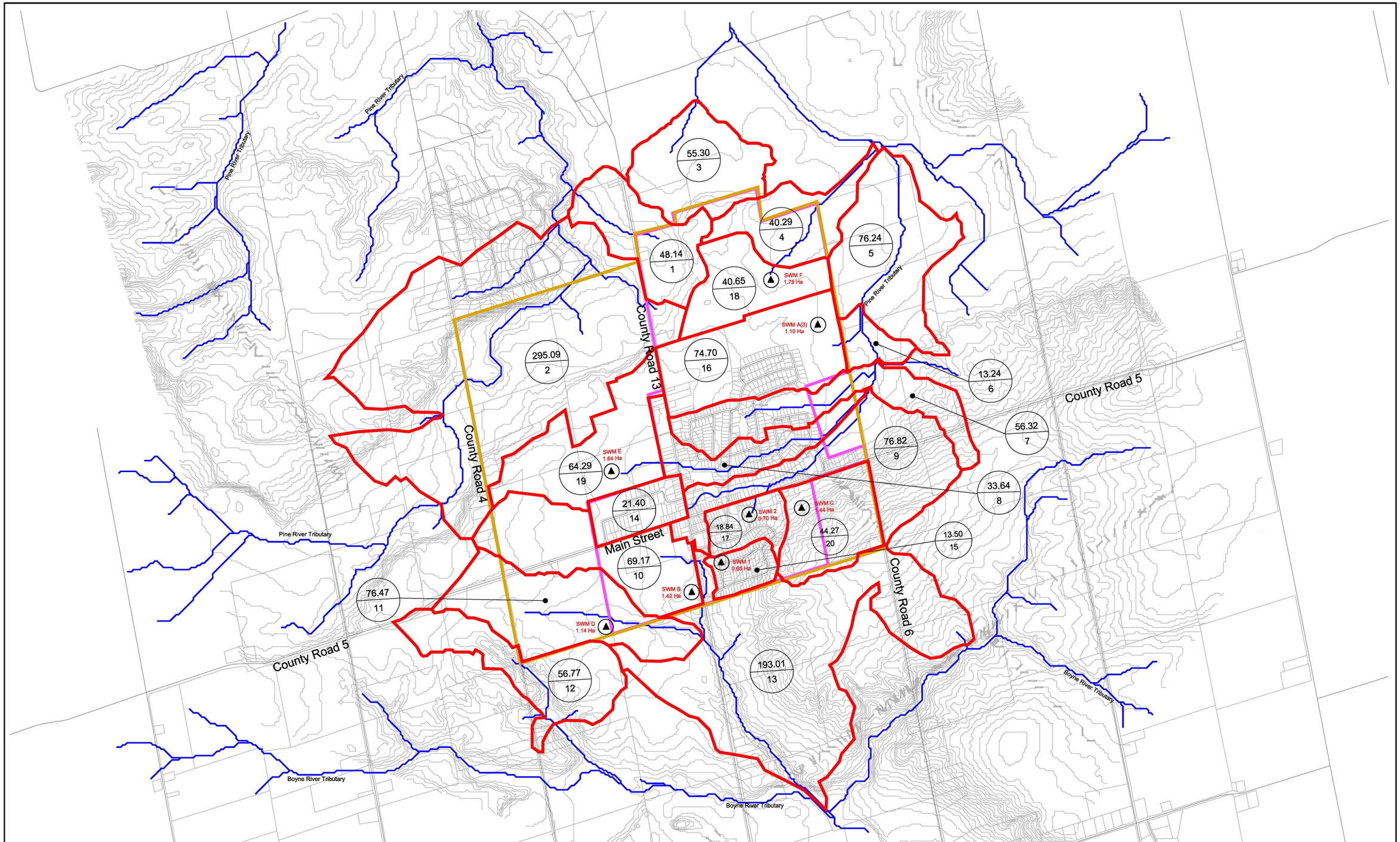
CUMAC SUBDIVISION - PH. 2
TOWNSHIP OF ADJALA-TOSORONTIO

TATHAM ENGINEERING

POST DEVELOPMENT DRAINAGE PLAN

DESIGN: SDH	FILE: 116238	DWG:	DP-2
DRAWN: SDH	DATE: MAR 2017		
CHECK: RS	SCALE: 1:750		

Drawing Name: 116238-DP02.dwg, Plotted: Nov 05, 2019



1. This drawing is the exclusive property of Greenland Consulting Engineers and the reproduction of any part without prior written consent of this office is strictly prohibited.

2. Do not scale the drawings.

NOTES:

LEGEND:

- 244.000 — CONTOURS ELEVATIONS
- WATERCOURSE
- CATCHMENT BOUNDARY
- 55.30 / 3 — AREA (Ha) / CATCHMENT ID
- ROADS
- SECONDARY BOUNDARY
- POND LOCATION

N

No.	REVISION	DATE	INIT.
3.			
2.			
1.			

APPROVED

PROJECT TITLE

EVERETT SECONDARY PLAN
MASTER DRAIN PLAN

DRAWING TITLE

MDP OPTION 3
STORMWATER MANAGEMENT

GREENLAND® Consulting Engineers
120 Hume Street
Collingwood, Ontario, L9Y 1V5
Tel: (705) 444-8805
Fax: (705) 444-5482
E-mail: greenland@grnland.com
Website: www.grnland.com

SCALE: 1:11,250 @ 24x36; 1:25,000 @ 11x17			PROJECT No.: 12-G-2804
DESIGN: J.M.	CHECKED: J. HARTMAN		DWG No. FIGURE A6 -3
DRAWN: K.L.	DATE: OCT. 2012		

T:\2804_Everett MSP\MSP In Progress\Report Figures\Figure Option 1-4&Existing.dwg