MARIANNEVILLE DEVELOPMENTS LTD.

FUNCTIONAL SERVICING REPORT

Estates of Glenway West, Town of Newmarket

L09-301

COLE ENGINEERING GROUP LTD.

HEAD OFFICE
70 Valleywood Drive Markham, ON L3R 4T5
T. 905 940 6161 | 416 987 6161 **F.** 905 940 2064
www.coleengineering.ca

JANUARY 2020

PREPARED BY:

COLE ENGINEERING GROUP LTD.

Berti Andric, P.Eng.
Servicing & Grading

Jessica Lysecki, P.Eng.
Water Resources

Shelley Kuan, P.Eng.
Municipal Water Distribution

CHECKED BY:

COLE ENGINEERING GROUP LTD.

Peter Slama, P.Eng.
Project Manager

AUTHORIZED FOR ISSUE BY:

COLE ENGINEERING GROUP LTD.

Peter Slama, P.Eng.
Project Manager

Issues and Revisions Registry

Identification	Date	Description of issued and/or revision
Functional Servicing Report	April 2018	For Client Submission
Functional Servicing Report	January 2020	For Client Submission

Statement of Conditions

This Report / Study (the "Work") has been prepared at the request of, and for the exclusive use of, the Owner / Client, Town of Newmarket and its affiliates (the "Intended User"). No one other than the Intended User has the right to use and rely on the Work without first obtaining the written authorization of Cole Engineering Group Ltd. and its Owner. Cole Engineering Group Ltd. expressly excludes liability to any party except the Intended User for any use of, and/or reliance upon, the work.

Table of Contents

LIST OF TABLES

LIST OF FIGURES

LIST OF DRAWINGS

APPENDICES

Executive Summary

Cole Engineering Group Ltd. (COLE) was retained by Marianneville Developments Ltd. to undertake a Functional Servicing Report in support of the proposed Estates of Glenway West (the 'development'). This report examines the existing sanitary and storm sewer conveyance network, water distribution network and stormwater management strategy, and recommends a servicing and road grading scheme to accommodate the proposed development requirements in accordance with the Town of Newmarket (the "Town") and Ministry of the Environment and Climate Change (MOECC) standards.

The proposed development is situated within the western half of the existing Glenway Community, south of Davis Drive, generally between Bathurst Street and Eagle Street and consists of low and medium density residential units (total 193 units). The development spans an area of 12.60ha and is situated within the former Glenway Golf and Country Club. The proposed development plan consists of a combination of new residential units fronting private roads within Condo Blocks and new residential units fronting existing municipal roads.

A preliminary road grading design for private streets have been achieved with road gradients conforming to municipal standards and largely maintaining the current stormwater runoff drainage patterns. Major system storm overland flow will be directed along the roads towards the current and re-configured stormwater management ponds located at the east end of Sykes Road (Pond 2) and southwest of the intersection of Alex Doner Drive and the Hydro One corridor (Pond 1).

New private watermains will be required along proposed private roads and shall connect to the existing water distribution network surrounding the site. A new municipal watermain will be extended along Sykes Road to service the private Condo Block adjacent Bathurst Street. The development is situated within the Newmarket West Regional pressure district, and will be served entirely by this district.

Sanitary flow generated from the proposed development will be conveyed via new sewers and connected to the existing surrounding sanitary sewer network at various locations. New sewers will be designed in compliance with current Town standards. The proposed development will generate a total peak sanitary flow rate of 12.99L/s and individual sanitary sewer connections to the existing sewer network for new units fronting municipal streets are feasible.

With respect to downstream sanitary sewer capacity within the existing Western Sub-Trunk and the Newmarket Sewage Pumping Station, the Town's peer review consultant will update their capacity analysis model related to this infrastructure based on the peak sanitary flow rate provided to substantiate adequate capacity.

The stormwater management strategy to accommodate the proposed development involves upgrading existing Stormwater Management Ponds 1 and 2 within the Glenway West Community, in accordance with current stormwater quality and quantity control requirements from the Town, MOECC and the Lake Simcoe Regional Conservation Authority (LSRCA). The existing ponds are in line with the existing storm sewer system for the Glenway Community and currently provide stormwater runoff controls and water quality treatment.

Ponds 1 and 2 will be expanded in area and volume to meet current standards with outlet controls and quality treatment for existing and proposed development within the contributing drainage areas. Quantity control targets are existing pond outflows for the 2-year to 100-year, 24 hour SCS storm by Town standards. The pond bottoms will be deepened and reshaped to provide Enhanced (Level 1) Quality Control as outlined by the MOECC. All components for the re-configured ponds, i.e. side sloping, safety shelf, maintenance access etc. shall be designed in accordance with Town standards. The re-configured pond shall be situated within a Block to be dedicated to the Town for public ownership and maintenance. Access easements through the private Condo Blocks for maintenance of the SWM Ponds shall be provided by the Owner to the Town where required.

1 Introduction

1.1 Scope of Functional Servicing Report

Cole Engineering Group Ltd. (COLE) has been retained by Marianneville Developments Ltd. (the "Owner") to prepare a Functional Servicing Report (FSR) in support of an Official Plan Amendment, Re-Zoning and Draft Plan of Subdivision application for a proposed residential development located within the existing Glenway Estates and Country Club Community in the Town of Newmarket (the "Town"), Regional Municipality of York (the "Region").

This report has been prepared to review the existing sanitary servicing, water distribution network, storm sewer systems and stormwater management (SWM) features and provide recommendations for their potential improvements required to accommodate the proposed development based on the proposed Draft Plan prepared by Zelinka Priamo Limited, revision dated March 2017 . A preliminary road and lot grading design for the proposed development areas covered by the proposed Draft Plan is included.

1.2 Background Review

The following background studies and information were referenced while preparing this Report:

- As Constructed Engineering Servicing Drawings, Glenway Estates & Country Club, prepared by G.M. Sernas and Associates Limited (file #8202), 1989;
- Stormwater Management Study, Glenway Estates & Country Club, prepared by The Lathem Group Inc., dated December 19, 1983;
- Environmental Assessment, Glenway Reservoir Expansion, prepared by GHD, dated July 4, 2011;
- Water and Wastewater Master Plan Report, prepared by WSP and XCG, dated March 2017: and
- Functional Servicing Report, Estates of Glenway Newmarket (East), prepared by Cole Engineering Group Ltd., 2015.

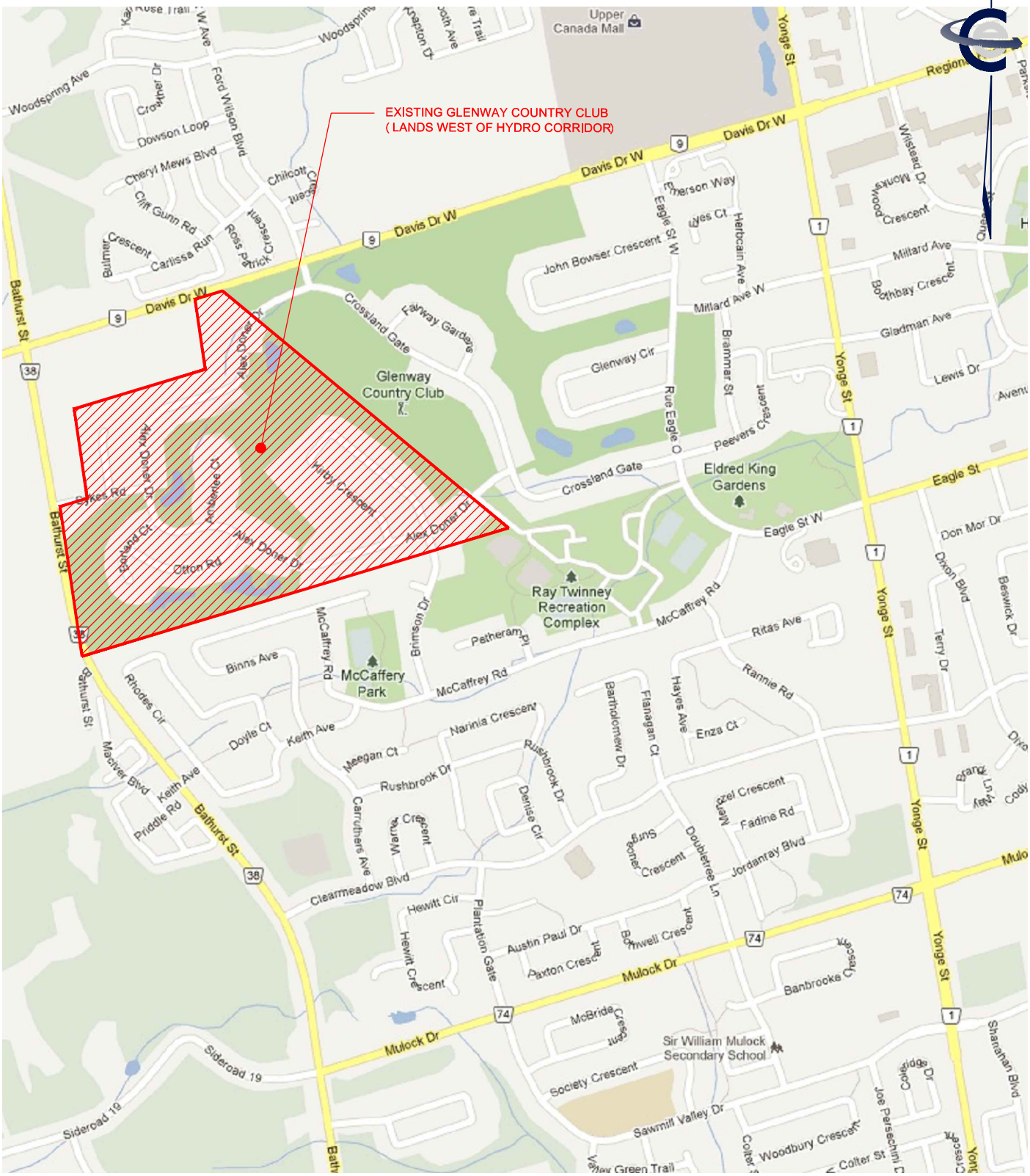
1.3 Site Location

The subject site is located within the western half of the Glenway Community, bordered by Davis Drive to the north, the Hydro One corridor to the east, Bathurst Street to the west and Alex Doner Drive and Borland Court to the south.

Refer to **Figure 1.1** for a depiction of the subject site boundaries.

1.4 Existing Conditions

The western half of the Glenway Community consists primarily of low density residential land uses surrounded by a former golf course. Spread across the Community, the former golf course lands consist of landscaped open space with several stands of trees. A total of four (4) existing stormwater ponds are located within the privately owned Glenway West lands, which services the surrounding residential units and the former golf course. Located at the northwest corner of Kirby Crescent is the Glenway Water Reservoir site, owned and operated by the Region of York. The site has a pump house & chlorination building and an above ground storage reservoir positioned south of the pump house. The Region has completed an Environmental Assessment to locate a second reservoir on the Kirby Crescent site.



COLE ENGINEERING
70 VALLEYWOOD DRIVE, MARKHAM, ON L3R 4T5
T:416.987.6161 / 905.940.6161 F:905.940.2064

LOCATION PLAN

MARIANNEVILLE DEVELOPMENTS LTD.
ESTATES OF GLENWAY NEWMARKET
TOWN OF NEWMARKET

DATE:	JANUARY 2020	PROJECT No.:	L09-301
SCALE:	N.T.S.	FIGURE No.:	1-1

2 Proposed Development

The proposed re-development of the former golf course in the Glenway West Community consists of low and medium density residential land uses. The proposed road network and lot layout is based on the Draft Plan of the Subdivision prepared by Zelinka Priamo Ltd., revision dated March 2017.

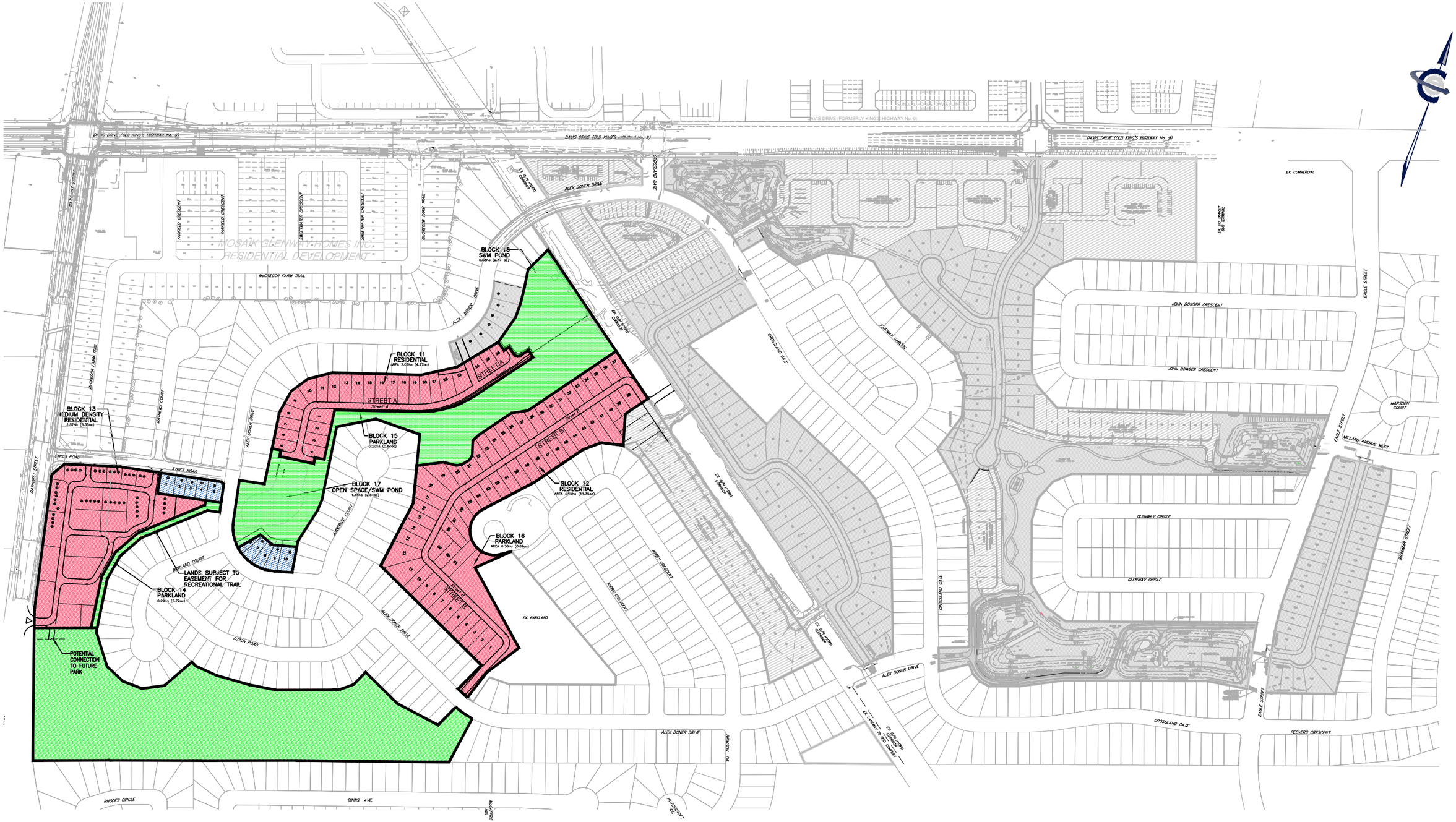
Table 2.1 summarizes the proposed land uses and corresponding development areas.

Table 2.1 Proposed Land Uses and Areas

Land Use	Units	PPU	Population	Areas (hectares)
Private Roads and Residential Condos, Blocks 11 to 12	87	3.38	294	6.48
Medium Density Residential Condos, Block 13	96	2.88	276	2.57
Single Detached Units, Lots 1 to 10	10	3.38	34	0.56
Proposed Parkland, Blocks 14 to 16				0.91
Stormwater Management, Blocks 17, 18				2.02
Total	**193**		**604**	**12.54**

New private roads are proposed for the 183 proposed residential lots within Blocks 11 to 13. Servicing requirements are discussed in the following chapters. Refer to **Figure 2-1** which depicts the proposed re-development areas. A typical cross-section for the private roads in Blocks 11 and 12 has been included as **Figure 2-2**, to demonstrate the layout of the proposed relocation of public infrastructure and proposed private works.

The existing stormwater ponds within the development area to the west of the hydro corridor will continue to service the surrounding lands. Ponds 1 and 2 will be enhanced to suit the requirements of the proposed development. The ponds are currently located within the former golf course property and appropriate Blocks will be created to transfer ownership of the re-configured ponds to the Town.



COLE ENGINEERING
70 VALLEYWOOD DRIVE, MARKHAM, ON L3R 4T5
T:416.987.6161 / 905.940.6161 F:905.940.2064

LEGEND

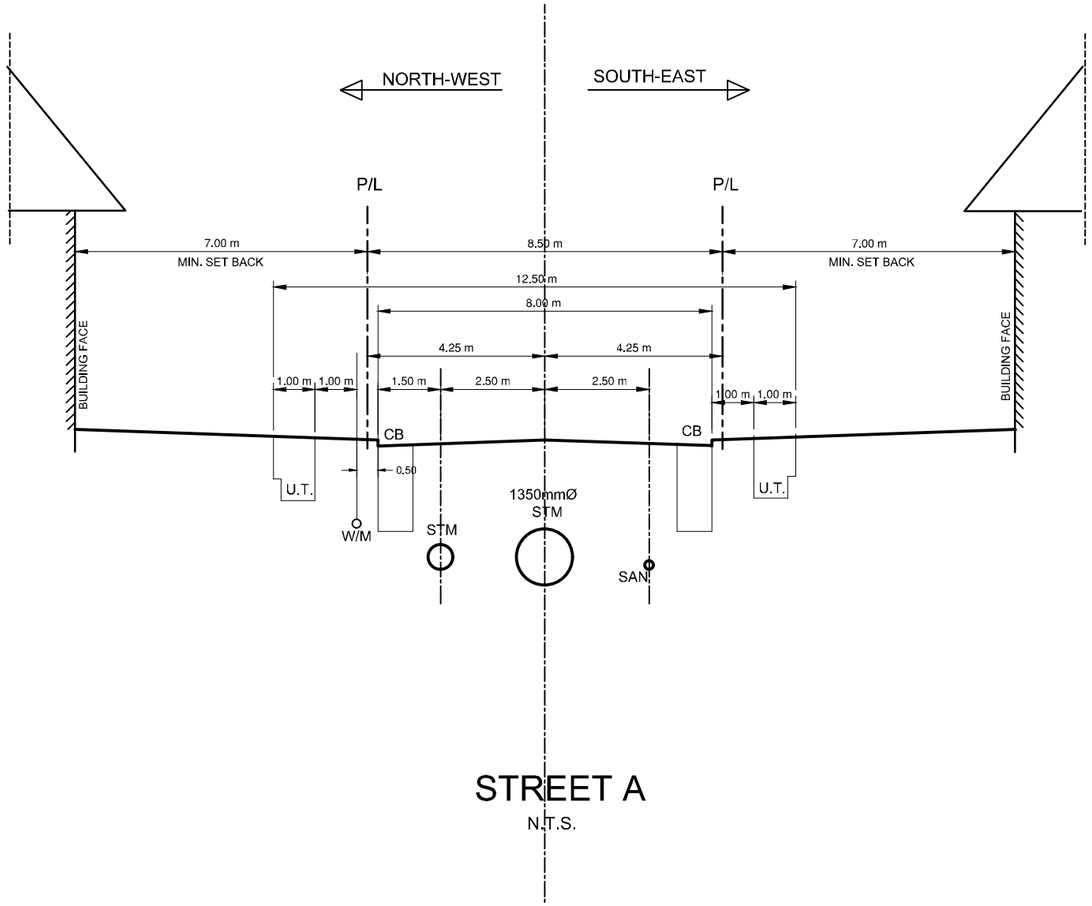
- PROPOSED DEVELOPMENT WITH MUNICIPAL ROAD FRONTAGE
- PROPOSED PRIVATE DEVELOPMENT
- PROPOSED MUNICIPAL OPEN SPACE AREAS
- PHASE 1 DEVELOPMENT WITH MUNICIPAL ROAD FRONTAGE
- PHASE 1 PRIVATE DEVELOPMENT

RE-DEVELOPMENT BOUNDARIES

MARIANNEVILLE DEVELOPMENTS LTD.
ESTATES OF GLENWAY NEWMARKET
TOWN OF NEWMARKET

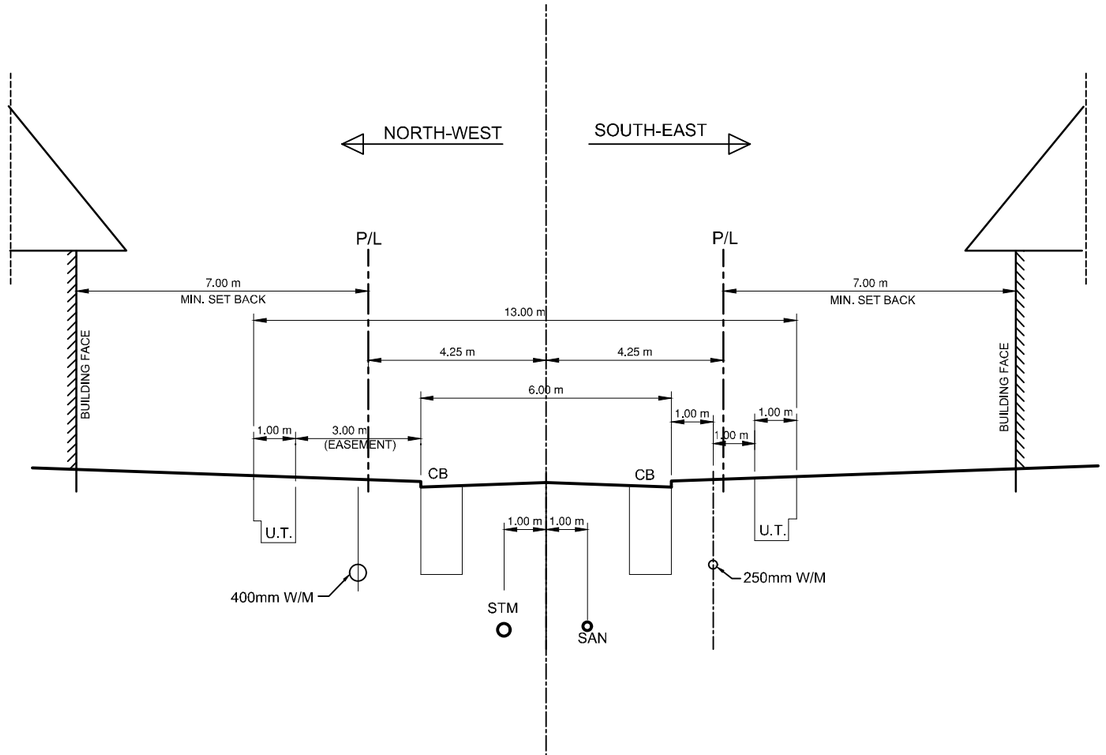
DATE:	JANUARY 2020	PROJECT No.:	L09-301
SCALE:	1:5000	FIGURE No.:	2-1

File : P:\mrk\2009\L09-301 Marianneville Development – Newmarket\WEST\Cad\Sheets\FIG 2-1 – RE-DEV BOUNDARIES.dwg, Date : Jan 23, 2020 – 10:12pm, Edit By : DMa



STREET A

N.T.S.



STREET B

N.T.S.

COLE ENGINEERING
70 VALLEYWOOD DRIVE, MARKHAM, ON L3R 4T5
T:416.987.6161 / 905.940.6161 F:905.940.2064

TYPICAL LANEWAY CROSS-SECTIONS

MARIANNEVILLE DEVELOPMENTS LTD.
ESTATES OF GLENWAY NEWMARKET
TOWN OF NEWMARKET

DATE:	JANUARY 2020	PROJECT No.:	L09-301
SCALE:	N.T.S.	FIGURE No.:	2-2

File : P:\mrk\2009\L09-301 Marianneville Development - Newmarket\WEST\Cad\Sheets\FIG 2-2 - LANEWAY XS.dwg, Date :Jan 24, 2020 - 11:37am, Edit By : mil

3 Area Grading

3.1 Existing Topography

The existing grading and topographic conditions within the Glenway West site are reflective of their former use as a golf course adjacent to an existing residential community.

The majority of existing roads within the residential component of the Community were generally graded with slopes ranging between 0.5 - 2%. A couple of existing roads were constructed with grades ranging from 4% (Alex Doner Drive) to 6% (Kirby Crescent). The existing roads convey major storm drainage towards the existing stormwater ponds located throughout the former golf course lands.

The existing topography between Alex Doner Drive and the western limit of the hydro corridor, which encloses Blocks 11 & 12 and Lots 6 to 10, generally ranges from a high elevation of 300.0m directly north of the existing Glenway reservoir, to a low elevation of 274.0m directly west of the hydro corridor in the northeast corner of Pond 1. The existing topography between Alex Doner Drive and Bathurst Street, which encloses Block 13 and Lots 1 to 5, generally ranges from a high elevation of 287.5m at the southwest corner to a low elevation of 282.5m at the intersection of Sykes Road and Bathurst Street. Within these elevation ranges, the existing local topography exhibits significant grade differentials reflective of the rolling nature of golf courses.

Overland drainage from the Glenway West Community, is currently divided into three (3) separate drainage areas with runoff directed to separate stormwater ponds (Ponds 1, 2 and 3). These stormwater ponds are connected downstream to two (2) stormwater ponds located in the Glenway East Community (Ponds 4a/b and 6), which drain to different watersheds. The first outlet is located at the southeast corner of the overall development at Eagle Street, just north of Crossland Gate, directing flows to Western Creek. The second outlet from the overall development is located at Davis Drive, just east of Crossland Gate and directs flows northerly across Davis Drive towards a constructed channel.

3.2 Proposed Grading

A preliminary grading plan has been prepared for the proposed roads and lots within the subject lands. Perimeter grades along the existing residential lots and along the existing abutting municipal right-of-ways will be maintained. Perimeter grades abutting the Bathurst Street regional right-of-way are proposed to be graded to 0.3m above the existing centreline of Bathurst Street.

The preliminary grading scheme is developed based on the current Town's Engineering Design Standards and Criteria and defines the major system drainage divides to conform to the proposed stormwater management strategy described within **Section 7** of this report.

The proposed private roads are generally graded in the range of 0.5% to 6.0%.

The proposed development will utilize conventional lot drainage patterns such as Front and Split drainage, where possible. In areas where grading is constricted due to significant grade differences with existing perimeter grades, the use of Walk-Out and Walk-Up lot types utilizing 4:1 sloping will be specified, requiring additional attention at the detailed design stage.

As the proposed development can be defined as being of "infill type", the use of rear lot catchbasins will be necessary to contain minor storm runoff within the proposed lots. In areas where significant grade differences occur along the site perimeter, retaining walls may be necessary to be constructed within the proposed development area. Specific retaining wall type and material will be confirmed during the detailed design stage, in consultation with the Town's staff and the project landscape architect.

In accordance with accepted best design practices, including use of slopes (maximum of 3:1), surface or swale gradients ranging from 2% - 5%, and the use of retaining walls will be minimized wherever possible.

The preliminary road and lot grading design is illustrated on **Drawings GR-1 and GR-2** (located in map pocket).

3.3 Erosion and Sediment Control

Prior to any construction within the proposed development, a comprehensive Erosion and Sediment Control Plan acceptable to the Town, LSRCA and the Region will be implemented.

The Erosion and Sediment Control Plan will detail all necessary measures and be designed in accordance with current Town guidelines and the Erosion and Sediment Control Guidelines for Urban Construction. In addition, Town and/or Regional approval will be secured for the location of any required temporary construction entrances.

4 Water Supply and Distribution System

4.1 Existing Water Supply and Distribution Network

4.1.1 Existing Pressure Districts

The subject site covers approximately 12.6ha and is situated adjacent to the existing Glenway Reservoir and Kirby Pumping Station, located at 335 Kirby Crescent, Newmarket. Based on Pressure District mapping prepared by the Region, there are three (3) distinct Pressure Districts within the Town, specifically:

- Newmarket West District (NW);
- Newmarket Central District (NC); and
- Newmarket East District (NE).

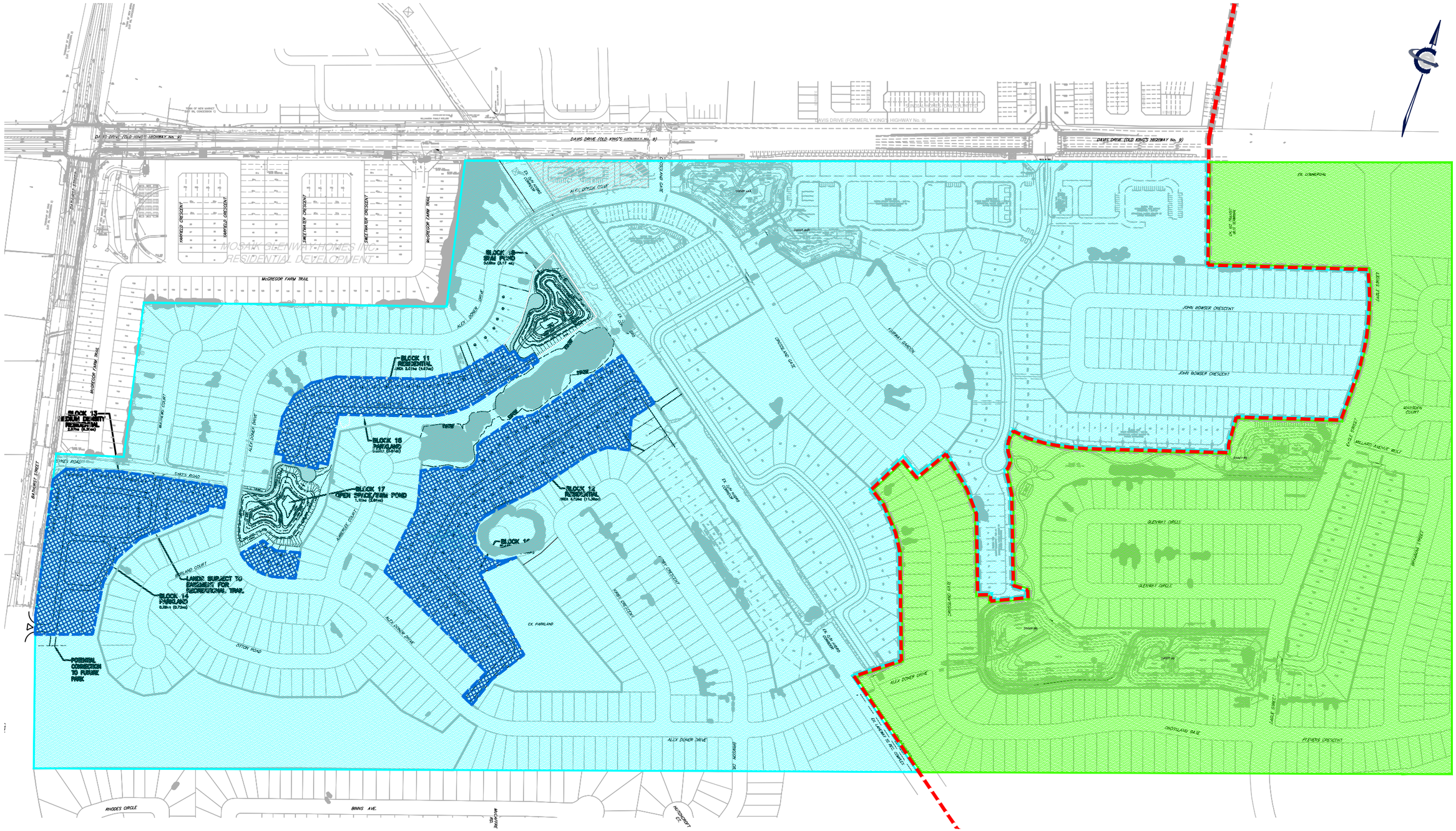
The Region's Pressure District mapping indicates a pressure zone divide aligned through the Glenway Community, specifically the divide between the Newmarket Central (NC) District and Newmarket West (NW) District. The Pressure District boundary between the NC and NW pressure zones generally follows the existing Hydro One corridor for the southern portion of the Glenway East development site, then diverts north-easterly towards Eagle Street, wrapping around the western limit of the existing GO Transit facility.

The subject site (situated west of the existing Hydro One corridor) is located entirely within Region of York's Newmarket West (NW) Pressure District. The NW District is supplied with municipal water from the Newmarket Central District via the existing Kirby Pumping Station and from Aurora via a watermain extended to the Town along Bathurst Street. The existing Newmarket West Reservoir provides water storage and maintains system pressure for the NW water system. The NW Reservoir is located at Bathurst Street between Mulock Drive and St. John's Sideroad.

The existing ground elevation within the Glenway West site ranges from approximately 300m which is directly north of the Glenway Reservoir to 274m in the northern portion of the Glenway West site.

Based on the Region's Pressure District data, the Glenway Reservoir (Newmarket Central) exhibits a low water level of 300.8m and a high water level of 308.4m. Thus, the NC Pressure District can generally service development areas with elevations lower than 273.5m. Development areas with ground elevations higher than 273.5m may be serviced by the NW Pressure District, for which the system pressure is controlled by the NW Reservoir. The water levels in Newmarket West Reservoir range between 327.5m (Low Water Level, LWL) and 340.0m (Top Water Level, TWL) with bottom tank elevation of 321.7m.

Refer to **Figure 4-1** for a depiction of the water pressure district zones and boundary within the Glenway Community.



COLE ENGINEERING
70 VALLEYWOOD DRIVE, MARKHAM, ON L3R 4T5
T:416.987.6161 / 905.940.6161 F:905.940.2064

LEGEND

- EXISTING NEWMARKET WEST PRESSURE DISTRICT
- EXISTING NEWMARKET CENTRAL PRESSURE DISTRICT
- PROPOSED DEVELOPMENT AREAS CONNECTED TO THE NEWMARKET WEST PRESSURE DISTRICT
- APPROXIMATE EXISTING PRESSURE DISTRICT BOUNDARY

WATER PRESSURE DISTRICTS

MARIANNEVILLE DEVELOPMENTS LTD.
ESTATES OF GLENWAY NEWMARKET
TOWN OF NEWMARKET

DATE:	JANUARY 2020	PROJECT No.:	L09-301
SCALE:	1:5000	FIGURE No.:	4-1

File : P:\mrk\2009\L09-301 Marianneville Development - Newmarket\WEST\Cad\Sheets\FIG 4-1 - WATER PRESSURE DISTRICT.dwg, Date : Jan 23, 2020 - 10:13pm, Edit By : DMa

4.1.2 Existing Water Distribution Network

The proposed Glenway West site is surrounded by several existing watermains serving the NW Pressure District. The following lists present the existing watermains in the vicinity of the subject site:

Newmarket West District (discharge pipelines from the Kirby Pumping Station)

- Easement (John Bowser Crescent to Fairway Garden): 300mm dia. watermain;
- Fairway Garden: 300mm dia. watermain;
- Crossland Gate: 200mm dia. watermain from south leg of Fairway Garden to Alex Doner Drive;
- Easements (Kirby Pumping Station northerly to Alex Doner Drive): 200mm dia. and 300mm dia. watermains within separate easements;
- Alex Doner Drive: 200mm dia. watermain from Crossland Gate;
- Kirby Crescent: 150mm dia. – 200mm dia. watermains;
- Amberlee Court: 150mm dia. watermain;
- Easement (Amberlee Court to Alex Doner Drive): 150mm dia. – 400mm dia. watermains;
- Easement (Kirby Pumping Station southerly to Alex Doner Drive): 300mm dia. watermain;
- Easement (Alex Doner Drive to Mathews Court): 150mm dia. watermain; and
- Mathews Court and Sykes Road: 150mm dia. watermain.

Refer to **Drawing WAT-1** provided at the end of the report for the location of the existing watermains.

4.1.3 Existing System Pressure

In order to investigate the capabilities of the existing water distribution system in the vicinity of the proposed development, COLE undertook two (2) separate approaches to analyze the existing water flow and pressure surrounding the site. The first approach was to conduct hydrant flow / pressure tests. One (1) hydrant flow / pressure test at NW Pressure District was performed along the existing watermain in the vicinity of the proposed development. The second approach was to complete a watermain network analysis via a hydraulic model.

4.1.3.1 Hydrant Flow and Pressure Test Approach

NW Pressure District: One (1) hydrant flow / pressure test was conducted along Amberlee Court in the NW Pressure District on October 15, 2009. The static pressures are approximately 450kPa (or 65psi, corresponding to a system head of 336m), which is approximately equal to the 75% full water level (water depth = 14m) at the NW Reservoir level (if there is no significant head loss in the system). The pressure drops 10m (or 15psi, corresponding system head of 326m) when it is flowing at 87L/s. The pressure at this flow test location might have been lower if the system head is 8m lower than 336m during the test day.

Refer to **Appendix A.1-1** for the results of the hydrant flow / pressure tests completed by Applied Fire Technology Inc.

4.1.3.2 Watermain Network Hydraulic Analysis

A skeletal water distribution hydraulic model (using InfoWater) was conducted to confirm the proposed watermain sizes are adequate for the proposed development.

The existing watermains in the vicinity of site are reproduced as per Town's updated Pressure District map. The full build-out condition of the Glenway East re-development was assumed and used in the hydraulic model for analysis.

As suggested by the Town, the water supply boundary conditions coming from the Kirby Pumping Station and a connection from Bathurst Street on Clearmeadow Boulevard were considered for the subject site. The system heads in the model were estimated from the previous fire flow test and the water levels at the NW Reservoir level. The boundary condition for NW system is detailed as follows:

Newmarket West District: Water is supplied to the subject site from the Kirby pumping station, including water from NW Reservoir within the NW district. The NW Reservoir levels range from 327.5m (LWL) to 340.0m (TWL). It was assumed that the tank is near its 25% full level (330.6m) between the TWL and LWL during the high water demand period (e.g. maximum day plus fire and peak hour conditions) and near its top water level (TWL=340m) during the minimum hour demand.

A dummy reservoir with the levels was placed near Bathurst Street and Clearmeadow Boulevard, at the connection from the existing 600mm dia. watermain to the 400mm dia. watermain connected to the local distribution system. Another dummy reservoir was placed near the Kirby pumping station. System head is approximately equal to NW Reservoir near its low water level of 327.5m.

The model results are shown in **Appendix A.1-3** and the results are detailed in the following sections.

4.2 Design Guidelines

For the purposes of this report, the 2008 MOE Guidelines for the Design of Water Distribution Systems and the Town's 2015 design standards for the municipal water distribution system layout were used to estimate the system design pressure and demand requirements for the subject development.

The following design guidelines were used to estimate the water demand for the subject site:

4.2.1 Domestic Water Demand

The average day water demand of 300L/cap/day was adopted from the Town's standards.

4.2.2 Peaking Factor

The peaking factors were taken from the Town's standards. The peaking factors for the Maximum Day and Peak Hour demand scenarios are 2.0 and 3.0, respectively.

The MOE suggested minimum hour peaking factor of 0.40 for a population less than 1000 was adopted and used in the analysis.

4.2.3 Population Density in Residential Development

As per the Town's standards, the following densities were used to determine the expected populations in the residential developments:

- Single Detached Dwellings: 3.38 ppu
- Townhouses: 2.88 ppu

4.2.4 Fire Flow

As per the Town's requirement, the minimum fire flow requirement is as follows:

- Detached and semi-detached dwellings: 7,000 L/min (117 L/s)
- Townhouses: 10,000 L/min (167 L/s)

4.2.5 System Pressure

The Town's standards provide the following system pressure requirements:

- Minimum pressure during peak hourly demand: 350 kPa (50 psi)
- Maximum pressure under any flow scenario: 550 kPa (80 psi)
- Minimum pressure during maximum day + fire flow: 140 kPa (20 psi)

The 2008 MOE Guidelines provide the following system pressure requirements:

- Minimum pressure during peak hourly demand: 275 kPa
- Maximum pressure under any flow scenario: 700 kPa
- Minimum pressure during maximum day + fire flow: 140 kPa

4.2.6 Selection of Watermain Sizes

The suggested Hazen-Williams C factors are to be used to size pipes within the subject site as per the Town's design standards:

- 150 mm: C = 100
- 200 – 250 mm: C = 110
- 300 mm or larger: C = 120

4.3 Proposed Development

Based on the Draft Plan of Subdivision prepared by Zelinka Priamo Ltd., revision dated March 2017, the proposed land uses for the Glenway West re-development area consist of low density and medium density residential parcels. A total of 193 residential units are proposed, generally west of the existing Hydro One corridor.

The proposed residential development consists of both low and medium density / condo type development. For private Blocks, a single water connection will be provided to each separate private condo parcel. The proposed development exhibits ground elevations higher than 273.5m, therefore the proposed watermains shall be connected to existing watermains within the NW Pressure District.

The proposed development road and lot layout configuration introduces several conflicts with existing watermains. In order to construct the proposed residential lots, the following existing watermains will have to be re-routed. In addition, some of the existing re-routed watermains will be upsized to improve system pressures, as shown below:

- 400mm watermain on Lots 38 to 49 within Block 12;
- 200mm watermain on Lots 25 and 49 within Block 12 and upsized to 250mm watermain;
- 200mm watermain near Lot 23 within Block 11; and
- 150mm watermain on Lots 17, and 50 to 56 within Block 12 and upsized to 200mm and 250mm watermain respectively.

New watermain easements will be constructed alongside the proposed lot lines to facilitate a typical building envelope. Refer to **Drawing WAT-1** (located in map pocket) for the proposed watermain re-routing locations.

4.3.1 Estimated Water Demand

Based on the Town's standards for the proposed residential development area and the MOE's guidelines for the proposed area, the estimated water demands for the subject site are summarized within **Table 4.1** below. The domestic water demand for the development requires flows of 0.9L/s, 2.1L/s, 4.2L/s and 6.3L/s for the minimum hour, average day, maximum day and peak hour conditions, respectively. The Town's required fire flows of 117L/s and 167L/s are for the low and medium density residential development, respectively.

Table 4.1 Water Demand Estimation

Land Use	Residential (units)	Pop.	Water Demand (L/s)				
			Min Hr.	Ave Day	Max day	Peak Hour	Fire Flow
Low Density Residential	97	328	0.5	1.1	2.3	3.4	117
Medium Density Residential	96	276	0.4	1.0	1.9	2.9	167
Total	193	604	0.9	2.1	4.2	6.3	---

4.3.2 Newmarket West District Connections

The proposed development areas will be connected to the NW district since the proposed ground elevations in these areas are generally above 273.5m. The proposed development areas within the NW district are divided into three (3) distinct areas (Block 11, Block 12 and Block 13) and their proposed water connections are described as follows:

- **Block 11 – Lots 1-26 (Condo Residential) and Lots 6-10 (Single Family Residential):** This area exhibits a proposed ground elevation range of approximately 277.3m to 285.1m. These condo and single family residential lots can be serviced as follows:
  - Condo Residential: A private NW district watermain will be extended through the private residential development along Street 'A'. The proposed private watermain will connect into

the proposed 200mm dia. municipal watermain located in the easement between Alex Doner Drive and Street 'A'.
- Single Family Residential: Water service connections will be provided from the 200mm dia. watermain along Alex Doner Drive.

- **Block 12 – Lots 1-61 (Condo Residential):** This area exhibits a proposed ground elevation range of approximately 283.8m to 296.1m. To service these lots, a private NW district watermain will be extended through the private residential development along Street 'B'. The proposed private watermain will connect into the 400mm dia. municipal watermain relocated onto Street B, in front of Lot 37.
- **Block 13 – Medium Density Residential and Lots 1-5 (Single Family Residential):** This area exhibits a proposed ground elevation range of approximately 282.5m to 290.0m. These medium density and single family residential lots can be serviced as follows:
  - Medium Density Residential: A 250mm watermain will be proposed along Sykes Road from Alex Doner Drive to Mathews Court to replace the existing 150mm diameter watermain. Private NW district watermains will be extended within the private residential development along private streets, with a connection to the proposed 250mm dia. watermain on Sykes Road at Mathews Court; and
  - Single Family Residential: Water service connections will be provided from the new 250mm dia. watermain to be installed along the south boulevard of Sykes Road.
- The following water connection options were considered. These are:
  - Option A – Servicing to Blocks 11 and 12: A crossing between Block 12's Units 24 and 25 to Block 11's Street A is maintained and utilized, and no connection is made between the 200mm diameter and 400mm diameter watermains located at Alex Doner Drive and the Hydro One Corridor (North). This opinion was proposed in the April 2018 FSR.
  - Option A Alternative: On behalf of the Town of Newmarket, WSP (Dated June 10, 2019) requested that consideration should be given to eliminate the watermain crossing between Block 12's Units 24 and 25 to Block 11's Street A by connecting the existing 200mm diameter watermain with the existing 400mm diameter watermain, located where Alex Doner Drive crosses the Hydro One Corridor (North). This Option A alternative appears feasible, but further modeling analysis will be required to confirm the system pressure during the detailed design stage.
  - Option B – Servicing to Block 13. The original servicing option to Block 13 is through a proposed 250mm watermain along Sykes Road and a section of dead end pipeline occurs within Block 13. In order to further improve the water turnover volume for the dead end pipeline at Block 13, an alternate for servicing Block 13 has been identified. The connection is from the south of Block 13, at the existing 300mm diameter watermain, crossing from Rhodes Circle to Borland Court. This watermain can be tapped to service Block 13. Servicing Block 13 (Option B) has the advantage of not having any dead-end watermains in Block 13. This Option B alternative seems feasible, but further modelling analysis will be provided to confirm the system pressure during the detailed design stage.

Refer to **Drawing WAT-1** (within map pocket at the end of Report) for the proposed watermain connection points and water servicing scheme for the proposed residential development.

4.3.2.1 System Pressure under Normal Operation

The maximum pressure likely occurs at the relatively low ground location (elevation equal = 277m) near Alex Doner Drive and Street 'A' within Block 11 condo residential. The estimated system head is approximately equal to 340m (equal to the high water level at NW Reservoir) and the maximum pressure is approximately equal to 63m (617kPa). The minimum pressure likely occurs at the relatively high ground location (elevation = 296m) near lot 11 (Block 12 condo residential) which is approximately equal to 32m (310kPa) under normal operation when the NW Reservoir is near its low water level.

The estimated minimum and maximum system pressure for the subject area to be connected to the NW district are summarized in **Table 4.3.** Refer to **Appendix A.1-2** for water system schematic and **Appendix A.1-3** for the model outputs. As shown in **Table 4.3**, the system pressure is lower than the Town's preferred operational pressure (350kPa) under the peak hour condition, but exceeds the minimum pressure requirement of 275kPa under normal conditions (as per MOE guidelines).

The system pressures for the subject site within the NW district are higher than the Town's preferred operational pressure (550kPa), but below 700kPa (as per MOE guidelines) under normal condition (e.g. average day). The areas with potential high pressure (higher than 550kPa) are shown in **Appendix A.1-4**.

The system head near Kirby pumping station and the Town's model shall be reviewed to confirm the maximum system head in the vicinity of the subject site and to determine if there is a need for a PRV to be installed on the municipal watermain or at connections to each unit within the potential High Pressure areas as shown in **Appendix A.1-4**.

4.3.2.2 Minimum System Pressure under Fire Flow

The available fire flow was evaluated against the 14m (20 psi) pressure limit at each proposed node within the subject site as shown in **Appendix A.1-3** and the three (3) important locations within the proposed development Blocks are summarized in **Table 4.2**.

Table 4.2 Available Fire Flow

Location	Landuse	Available Fire flow (L/s)	Fire Flow Requirement (L/s)
Block 11 (near lot 7 on Street 'A')	Low density condo residential	119	117
Block 12 (near lot 3 on Street 'B')		131	117
Block 13 (near south end of the block)	Medium density residential	174	167

The modelling results indicate that the available fire flow at each location within the subject site is greater than the required fire flow. The minimum pressure likely occurs at the relatively high ground location, large required fire flow and/or at the dead-end locations.

Based on the fire flow simulation, the estimated minimum system pressure within the subject site is approximately equal to 149kPa (near Lot 7 on Street 'A' within Block 11) for the required fire flow of

117L/s. The hydraulic model outputs for the subject site under the maximum day plus fire flow scenario are shown in **Appendix A.1-3** and summarized in **Table 4.3**.

Table 4.3 Proposed System Pressures for the Subject Area connection to NW

Design Conditions	Maximum *		Minimum**	
	Head (m)	Pressure (m)	Head (m)	Pressure (m)
Minimum Hour	340	63 (617 kPa)	340	44 (434 kPa)
Average Day	340	63 (617 kPa)	340	44 (434 kPa)
Maximum Day	330	53 (524 kPa)	330	35 (340 kPa)
Peak Hour	330	53 (522 kPa)	330	35 (339 kPa)
Maximum Day + Fire Demand***				
Block 11 (Fire flow of 117 L/s near lot 7 on Street 'A')	325	48 (473 kPa)	299	15 (149 kPa)
Block 12 (Fire flow of 117 L/s near lot 3 on Street 'B')	327	50 (493 kPa)	312	18 (175 kPa)
Block 13 (Fire flow of 167 L/s near south end of the block)	326	49 (480 kPa)	305	16 (155 kPa)

*****Maximum pressure likely occurs near the relatively low ground elevation (=277 m) near Alex Doner Drive and Street 'A' and near high system head of 340 m.
**Minimum pressure likely occurs near the relatively high ground elevation (=296 m) near lot 11 (Block 12) when the system is near its low system head of 328 m.
***See Appendix A.1-2 for fire flow locations.

As shown in **Table 4.3,** the system pressure exceeds the minimum pressure requirements of 140kPa for the fire flow condition as per Town's guidelines.

4.4 Water Turnover Rates at Single Feeds

There are a few relatively long dead end watermains within the three (3) private Blocks, west of the existing hydro corridor (see **Appendix A.1-5** for locations). The estimated water turnover rates under an average day water demand condition at these single feeds are shown in **Appendix A.1-6**. The turnover rates for these critical locations are summarized as follows:

Table 4.4 Estimated Water Turnover Rates on Single Feed Watermains

Location	Water Turnover Rate (hour)	Occupancy Rate (%) (to meet Town's typical 24-hour Criteria)
Block 11 – East leg of Street 'A'	6	33
Block 11 – West leg of Street 'A'	9	35
Block 12 – Street 'B'	10	41
Block 13	8	30

As shown in **Table 4.4** and **Appendix A.1-5** and **Appendix A.1-6**, the water turnover rates at these locations range from 6 to 10 hours. The estimated water turnover rates meet the Town's typical requirement of 24 hours under an average day demand condition if approximately 41% of the units are occupied at these Blocks (e.g. at Block 12 – Street 'B'). The detailed turn-over rate will be fine-tuned based on the size and length of looped pipelines near the dead-end during the detailed design stage.

In order to improve the water turnover rates for the single feeds, the looped 50mm pipelines are proposed along the single feeds to the Blocks 11 and 12 Condo Residential development. As shown in **Appendix A.1-6**, no significant system head loss will be generated along the proposed looped pipelines (e.g. maximum head loss of 0.04m with a C-factor of 100, along the looped 80m length, 50mm dia. watermain on the west leg dead-end of Street 'A' and Street 'B').

5 Storm Drainage

5.1 Minor Storm Drainage System

The minor storm drainage system for the overall plan area will be designed in accordance with the Town and MOECC criteria, including the following:

- Storm sewers to be sized to accommodate runoff from a 5-year storm event;
- Minimum flow velocity – 0.8m/s;
- Maximum flow velocity – 4.0m/s;
- Minimum pipe size – 300mm; and
- Minimum pipe depth – 2.7m measured to obvert.

As required by the above standards, the minor storm flows will be captured by the proposed sewers. Quality and quantity control can be provided by the re-configuration of existing SWM Ponds 1 and 2. The proposed sewers will be constructed along the private roads closely following typical road cross-section configurations. The sewers will outlet to the existing SWM Ponds 1 and 2, both located within the Glenway West Community.

A super pipe is proposed to provide quantity control to service a small drainage area at the south entrance to Block 12, which will receive all storm flows up to and including the 100-year storm. The super pipe will have an orifice controlled release into Pond 3.

The proposed configuration of the storm sewer system is shown schematically on **Drawing STM-1** (located in map pocket).

5.1.1 Proposed Storm Sewer Connections

The proposed storm sewer system for the overall development area can be divided into three (3) separate drainage sheds and analyzed independently for proposed connections to existing storm infrastructure, under both the 5-year and 100-year storm conditions. The three (3) drainage sheds are defined as:

- Southwestern Drainage Shed (Tributary to Pond 2);
- Northwestern Drainage Shed (Tributary to Pond 1); and
- Southeastern Drainage Shed (Tributary to Pond 3).

The following sections provide a description of the existing and proposed storm sewer systems. A hydraulic grade line impacts analysis for new storm sewers, due to the proposed maximum water levels within the reconfigured SWM ponds, will be completed at the detailed design stage.

5.1.1.1 Southwestern Drainage Shed (Tributary to Pond 2)

The re-configured SWM Pond 2 will accept storm drainage from the proposed development of Block 13 and Lots 1 to 5. The proposed operating levels for Pond 2 are 280.00m for the Normal Water Level and 281.79m for the 100-year Water Level. The pre-development spillway elevation for Pond 2 is 281.68m towards the proposed Block 11, as per *As Constructed Engineering Servicing Drawings, Glenway Estates & Country Club*, prepared by G.M. Sernas and Associates Limited (file #8202), 1989. With the proposed development of Block 11, Pond 2 is now physically constrained from having an emergency spillway. Therefore, a proposed series of super catch basins and a ditch inlet catch basin will be located within pond 2 and sized to capture the emergency flow and be conveyed through the storm sewer on Street 'A' to Pond 1 as per the pre-development drainage pattern.

New storm sewers will be constructed within the private roads to convey runoff to Pond 2 and will operate independently from existing storm sewers. A new storm sewer will capture all minor drainage from Block 13 and directly outlet to the reconfigured Pond 2. Foundation drains for Lots 1 to 5 fronting Sykes Road will be serviced by sump pumps as the existing storm sewer in the road is not designed to provide foundation drainage.

5.1.1.2 Northwestern Drainage Shed (Tributary to Pond 1)

The re-configured SWM Pond 1 will accept storm drainage from proposed development Block 11 and Block 12, as well as Street 'A' and the northern portion of Street 'B', in addition to existing drainage areas. The proposed operating levels for Pond 1 is 274.00m (Normal Water Level) and 275.48m (100-Year Water Level). An spillway is proposed at an elevation of 275.55m and will outlet into existing Pond 4a located downstream.

New storm sewers will be constructed within the private roads to convey runoff to Pond 1 and will operate largely independently of the existing storm sewers. The proposed connection of the new storm sewer to the existing system will begin at Pond 2, and will be sized to convey the peak emergency flow from the pond. The existing storm sewer infrastructure will be removed and re-routed from between Pond 2 to Pond 1 in order to accommodate construction of the proposed Condo Block 11.

The storm sewer will be re-routed through the private road within the Block 11 development as shown in **Drawing STM-1**. The existing easement from Alex Doner Drive will be re-routed between lots 23/24 to proposed 750mm diameter storm sewer on Street A. Existing 975mm diameter storm will be cut and a new MH60 will be installed. Existing 975 mm diameter pipe between MH60 and Headwall will remain. The existing 300mm diameter pipe from Amberlee Court will be directly diverted to the proposed re-routed storm sewer.

5.1.1.3 Southeastern Drainage Shed (Tributary to Pond 3)

SWM Pond 3 will accept storm drainage from proposed development Units 1 to 10, as well as the southern portions of Street 'B' in addition to existing drainage areas. The proposed operating levels for Pond 3 are 284.45m (Normal Water Level), 285.16m (100-Year Water Level) and 285.30m (Spillway) and will outlet into Ponds 6 and 9. The pre-development spillway elevation for Pond 6 is 267.15m towards Pond 9, as per *Estates of Glenway Newmarket - Stormwater Management*, September 2016, prepared by COLE.

New storm sewers will be constructed along Street 'B' and convey runoff to Pond 3 and will operate independently of existing storm sewers with the exception of the connection to the existing catch basin (CBMH9) entering Pond 3 and does not affect the 5-year conveyance capacity of the existing external storm sewer system. A 70m long, 1800mm diameter superpipe will be constructed at the south end of the development to act as a holding tank for any surplus storm flows that are generated as a result of the development. Outflows from the superpipe will be treated by an oil grit separator prior to being released into the existing storm sewer. As a result, there will be no increase to the existing design flow entering Pond 3 nor a change in water quality and SWM Pond 3 is not proposed to be re-constructed.

Refer to **Drawing STM-1** (within map pocket at the end of Report) for the proposed storm sewers.

5.2 Major Storm Drainage System

Storm drainage flows exceeding the design capacity of the underground sewers, which are sized to convey the minor storm flows, will be directed overland along the road surfaces. The use of inlet control devices (ICD's) placed in catchbasins will be implemented, if necessary, to control the rate of stormwater entering the storm sewers. Specific positions for the ICD's will be established at the detailed design stage. The conveyance capacity of the proposed roads will also be analyzed during final design stage, taking into consideration width of pavement, type of curb and road gradient. Any overland flows directed along the municipal roads will be fully contained within the street right-of-way, while for the private roads the analysis will take into consideration the minimum horizontal and vertical distances to any structure (garage, home).

As described above, all major storm runoff will be directed to the existing SWM Ponds 1, 2 and 3. **Section 7** of this FSR provides functional design details for the improvement of the existing SWM Ponds 1 and 2 to accommodate post-development drainage conditions.

6 Sanitary Sewers

6.1 Existing Conditions

The existing municipal sanitary sewer network servicing the Glenway West Community is composed of local sewers aligned along municipal roads, generally conveying sewage in an easterly direction towards Alex Doner Drive / Crossland Gate, connecting to an existing 450mm dia. sanitary sub-trunk sewer located along Peevers Crescent.

Based on the "As Constructed" Sanitary Sewer Design Sheets for the Glenway Community, prepared by G.M. Sernas & Associates, revision dated January 3, 1995, the theoretical design peak flow rate (including an allowance for infiltration) from the entire Glenway Community is calculated at 177L/s. This theoretical sanitary sewer flow rate was designed between Ex. MH120A to Ex. MH104A / Ex. MH 110A. Refer to **Appendix B.1** for the As Constructed Sanitary Sewer design sheet by G.M. Sernas & Associates. Based on the municipal standards available when the original Glenway subdivision was designed, the following sanitary flow rates were used to develop design peak flows:

- Single Family (15m): 1.3 L/s/ha;
- Single Family (9.75m): 1.6 L/s/ha;
- Commercial / Industrial: 1.7 L/s/ha; and
- School / Multi Family: 2.5 L/s/ha.

Compared to present day municipal standards to calculate sanitary flow generation, the above noted flow rates are conservative and produce higher design flows.

Downstream of Ex. MH 110A and east of Yonge Street, the existing sanitary trunk system is referred to as the *Western Sub-Trunk Sanitary Sewer.* The Western Sub-Trunk Sanitary Sewer conveys flows northeasterly towards the Newmarket Sewage Pumping Station.

6.2 Sanitary Sewer Capacity Analysis

Capacity analysis of downstream sub-trunk sanitary sewers was analyzed and modelled as part of the Water and Wastewater Master Plan Report, prepared on behalf of the Town of Newmarket by WSP and XCG, dated March 2017. New sanitary flows generated by the proposed development within the Glenway West site will be calculated below and used by the Town to undertake an update of the model previously prepared as part of the Master Plan Report to confirm existing capacity within downstream sewers to accommodate the proposed development.

6.3 Proposed Sanitary Sewers

The proposed development will utilize connections to the existing surrounding sanitary sewer network. New sanitary sewers will be constructed along the proposed private roads as required to service all new residential condo lots. All sanitary flows from the proposed development will ultimately outlet to the existing 450mm diameter *Western Sub-Trunk Sanitary Sewer* located at southeast corner of Peevers Crescent.

The additional sanitary sewer flows generated within the proposed development will be distributed to the existing surrounding sewers as follows:

- Area A1.1, Block 12 (Units 1 to 12, 60, 61, and the south leg of Street 'B') will outlet to existing MH242A along the existing 250mm diameter sanitary sewer along Alex Doner Drive;
- Area A1.2, Block 12 (Units 13 to 59, and north leg of Street 'B') will outlet to approved MH18A (from approved Estates of Newmarket (East) development);
- Area A2.1, Block 11 (Units 1 to 26) and Street 'A', will outlet to existing MH210A along the existing 250mm dia. sewer along Alex Doner Drive;
- Area A2.2, Lots 6 to 10, will individually connect to the existing 250mm dia. sewer along Alex Doner Drive;
- Area A3.1, Block 13 will outlet to existing MH218A along the existing 250mm diameter sanitary sewer along Sykes Road; and
- Area A3.2, Lot 1 to 5, will individually connect to the existing 250mm dia. sewer along Sykes Road.

Refer to **Drawing SAN-1** (within map pocket at the end of Report) for a depiction of the proposed sanitary sewer alignments and connection locations to the existing system.

6.4 Proposed Sanitary Flow Analysis

The proposed peak sanitary flow calculations completed for this report are based on a unit flow rate of 360 L/cap/day and the "population per unit" (ppu) counts defined in the current design standards as shown below:

- Single family homes – 3.38 ppu
- Townhomes (and Condo Townhomes) – 2.88 ppu

The total new population from the proposed development calculated based on Town's standards is 604 people with an additional sanitary drainage area of 9.66ha of residential area. Based on these parameters, a total peak sanitary flow rate of 12.99L/s is calculated by considering each proposed development parcel individually for use in designing the proposed local sanitary sewer.

Table 6.1 provides a breakdown of the proposed development unit and area statistics and their corresponding peak sanitary flow generation rates.

Table 6.1 Proposed Sanitary Flow Generation

Sanitary Drainage Area	Units	Area[A] (ha)	PPU	Pop.	Avg. Daily Sanitary Flow[B] (L/s)	Harmon Peaking Factor	Peak San. Flow (L/s)	I & I[C] (L/s)	Total Peak Sanitary Flow (L/s)
A1.1	14	1.30	3.38	47	0.20	4.0	0.80	0.39	1.19
A1.2	47	3.30	3.38	159	0.66	4.0	2.64	0.99	3.63
A2.1	26	2.00	3.38	88	0.37	4.0	1.48	0.60	2.08
A2.2	5	0.25	3.38	17	0.07	4.0	0.28	0.08	0.36
A3.1	96	2.57	2.88	276	1.15	4.0	4.60	0.77	5.37
A3.2	5	0.24	3.38	17	0.07	4.0	0.28	0.08	0.36
Total	**193**	**9.66**		**604**	**2.58**		**10.08**	**2.91**	**12.99**

Notes:
A Area does not include ponds or Parkland
B Based on a residential flow rate of 360 L/cap/day
C Inflow and Infiltration based on a rate of 0.3 L/s/ha

7 Stormwater Management

The proposed Glenway West re-development will consist of single family residential lots as well as townhouse blocks serviced by an internal network of private roads and ultimately by existing SWM ponds. The proposed change in land use will increase the volume and rate of stormwater runoff from the site. Therefore, a SWM plan is required in order to reduce peak runoff rates and provide quality treatment of runoff for the proposed Glenway West re-development.

Existing Pond 3 will remain and will continue to provide quality and quantity control to the surrounding development. Existing Ponds 4 and 6 were enhanced as part of the re-development of the eastern half of the golf course (Estates of Glenway - East), as per the *Estates of Glenway Newmarket - Stormwater Management Report* prepared by COLE (September 2016), and are to contribute to the quantity and quality control of the Glenway West re-development. Existing Ponds 1 and 2 are proposed to be enhanced as part of the Glenway West re-development in order to provide adequate quantity and quality control. The designs of the enhancements to Ponds 1 and 2, as well as the impacts to existing Ponds 3, 4, and 6 are discussed within this report.

7.1 Design Criteria

The proposed development within the Town has been designed in consultation with the drainage and SWM requirements of the Town, the LSRCA and the MOE standards.

The following guidelines were referenced for SWM design criteria:

- MOE – SWM Planning and Design Manual (2003);
- LSRCA – Technical Guidelines for SWM Submissions (2016), (Technical Guidelines); and
- Town of Newmarket – Engineering Design Standards and Criteria (2015).

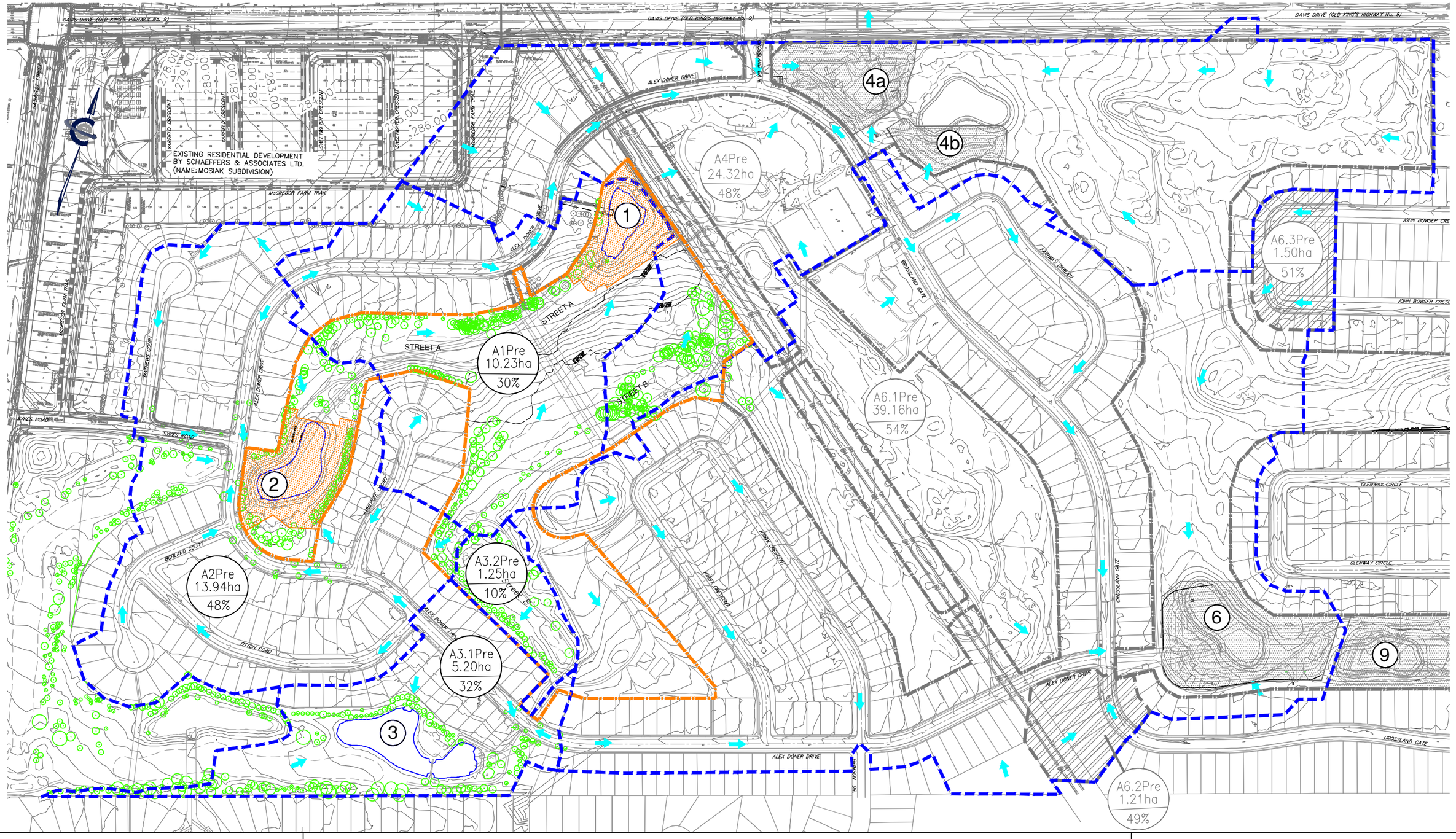
The following criteria were used to size the wet ponds:

- Quality Control – MOE Enhanced (Level 1) Protection;
- Quantity Control – Post-development peak flow control to the existing 2-year to 100-year peak outflows for the 24-hour SCS, 12-hour SCS and four (4)-hour Chicago storm distributions;
- Erosion Control – 24-hour detention of the 25mm, 4-hour Chicago storm; and
- All pond design characteristics to meet Town Criteria.

7.2 Existing Hydrologic Conditions

As part of the existing conditions for the Glenway West development, it is assumed that Estates of Glenway – East, as per the *Estates of Glenway Newmarket - Stormwater Management Report* prepared by COLE, September 2016, is completely developed.

The area proposed for the Glenway West re-development is situated west of the existing Hydro One corridor. Existing drainage areas A1Pre, A2Pre and A4Pre are ultimately discharged to Davis Drive north of the site via the existing Pond 4. Existing drainage areas A3.1Pre, A3.2Pre, A6.1Pre, A6.2Pre and A6.3Pre are ultimately discharged to Eagle Street east of the site via Pond 6. The existing site is currently divided primarily into five (5) separate drainage areas discharging to five (5) existing ponds located within the Glenway West development. Flow from existing Pond 2 discharges into Pond 1 which is conveyed to Pond 4, which ultimately discharges north to Davis Drive. Flow from existing Pond 3 is conveyed to Pond 6, which ultimately discharges south along Eagle Street. The pre-development drainage area plan is illustrated on **Figure 7-1.**



COLE ENGINEERING
70 VALLEYWOOD DR., MARKHAM, ON L3R 4T5
T:416.987.6161 / 905.940.6161 F:905.940.2064

LEGEND

- A2Pre / 14.59ha / 48% — DRAINAGE AREA ID, AREA, % IMPERVIOUS (#%)
- EXISTING POND PERMANENT WATER LEVEL
- DRAINAGE AREA BOUNDARY
- MAJOR/MINOR SPLIT AREA
- (1) POND ID
- DIRECTION OF OVERLAND FLOW
- PHASE 1 POND BLOCK
- PHASE 2 POND BLOCK
- PHASE 1 DEVELOPMENT LIMIT
- PHASE 2 DEVELOPMENT LIMIT

PRE-DEVELOPMENT STORM DRAINAGE AREA PLAN

MARIANNEVILLE DEVELOPMENTS LTD.
ESTATES OF GLENWAY (PHASE 2)
TOWN OF NEWMARKET

DATE:	JANUARY 2020	PROJECT No.:	L09-301
SCALE:	1:4000	FIGURE No.:	7-1

File: S:\2009 Projects\Land Dev Projects (L09)\2009 Subdivision Projects\L09-301 Marianneville Development - Newmarket\WEST\Cad\Sheets\FIG 7-1 - SWM DAP pre-dev.dwg Date: Apr 29, 2018 - 12:41pm Edit By: dma

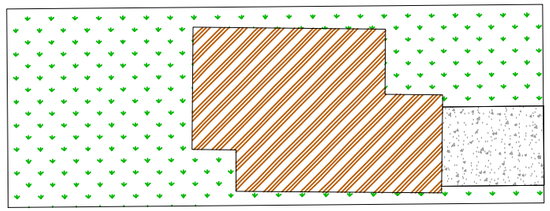
The imperviousness of the existing drainage catchments was determined by calculating the land use composition of each area. The imperviousness of land uses such as residential single-lots and right-of-ways (ROWs), was calculated using example lots and ROW sections from each drainage catchment. The example layouts of the existing lots used to calculate the total imperviousness are shown on **Figure 7-2**. Other land uses, such as golf course, residential apartments, commercial and industrial, were determined using the Town design standards. The excerpt from the Town design standards providing assumed imperviousness values and runoff coefficients for various land uses is provided in **Appendix C.1**. The imperviousness calculations for existing conditions are also provided in **Appendix C.1**.

Visual OTTHYMO (VO) software was used to model pre-development hydrologic conditions in order to determine the pre-development flows from each of the five (5) ponds that will be affected by the proposed development. A combination of NASHYD and STANDHYD commands were used in the VO model to represent the existing conditions. The input parameters for NASHYD commands include a CN* value and a time to peak (Tp). The input parameters for STANDHYD commands include a directly connected impervious value (XIMP), a total impervious value (TIMP) and a CN* value for the Modified SCS Loss Method. The detailed input parameter calculations for the pre-development hydrologic model are provided in **Appendix C.1** and summarized below in **Table 7.1**.

The five (5) existing ponds were modeled in VO as Route Reservoir commands. The rating curve information for Ponds 1, 2 and 3 were initially obtained from Glenway Estates Stormwater Management Study prepared by the Lathem Group Inc. (1983) in which the rating curve information is provided in **Appendix C.1**. To confirm that the information obtained from this report, surveys were performed by COLE in October 2014, December 2014 and March 2015. These rating curves are also provided in **Appendix C.1**. The rating curve information for existing Ponds 4 and 6 was obtained from the Estates of Glenway Newmarket - Stormwater Management Report prepared by COLE (September 2016) for the Glenway East re-development and is also provided in **Appendix C.1**.

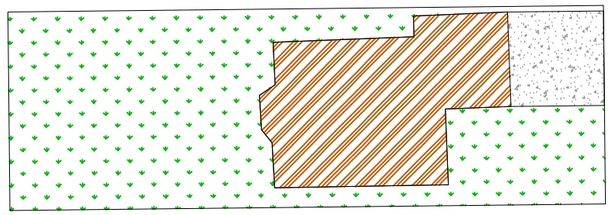
Table 7.1 Pre-development Input Parameters

Receiving Pond	Catchment	Drainage Area (ha)	CN* value	Tp (hr)	XIMP (%)	TIMP (%)
1	A1Pre	10.23	69	-	15.1	30.1
2	A2Pre	13.94	69	-	22.3	47.5
3	A3-1Pre	5.20	69	-	19.4	31.6
	A3-2Pre	1.25	72	0.15	-	-
4	A4Pre	24.32	69	-	29.3	47.5
6	A6-1Pre	39.16	69	-	23.2	54.2
	A6-2Pre (major Only)	1.21	69	-	20.1	49.3
	A6-3Pre (major only)	1.50	69	-	22.0	50.7



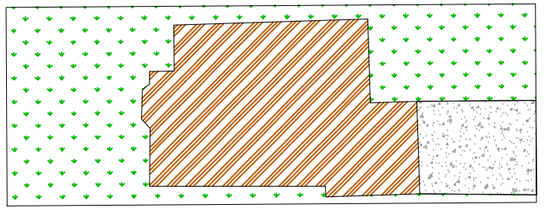
EXISTING LOT 48 (A6.3 PRE)

DRIVEWAY 8% TOTAL LOT AREA
ROOFTOP 33% TOTAL LOT AREA
AMENITY AREA 10% TOTAL LOT AREA
LANDSCAPE 49% TOTAL LOT AREA
TOTAL IMPERVIOUSNESS = 51%
DIRECT IMPERVIOUSNESS = 8%



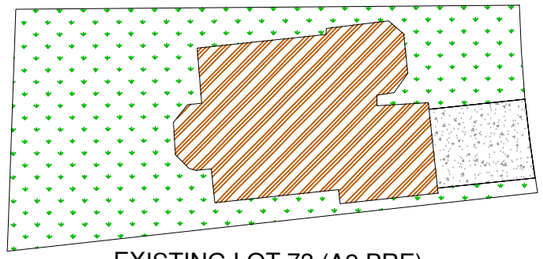
EXISTING LOT 113 (A3 PRE)

DRIVEWAY 8% TOTAL LOT AREA
ROOFTOP 27% TOTAL LOT AREA
AMENITY AREA 10% TOTAL LOT AREA
LANDSCAPE 55% TOTAL LOT AREA
TOTAL IMPERVIOUSNESS = 45%
DIRECT IMPERVIOUSNESS = 8%



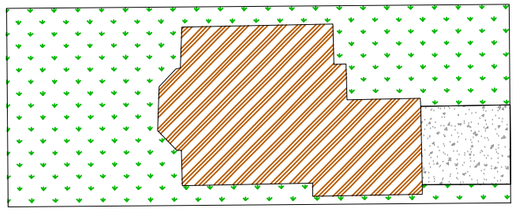
EXISTING LOT 42 (A6.1 & A6.2 PRE)

DRIVEWAY 10% TOTAL LOT AREA
ROOFTOP 39% TOTAL LOT AREA
AMENITY AREA 10% TOTAL LOT AREA
LANDSCAPE 41% TOTAL LOT AREA
TOTAL IMPERVIOUSNESS = 59%
DIRECT IMPERVIOUSNESS = 10%



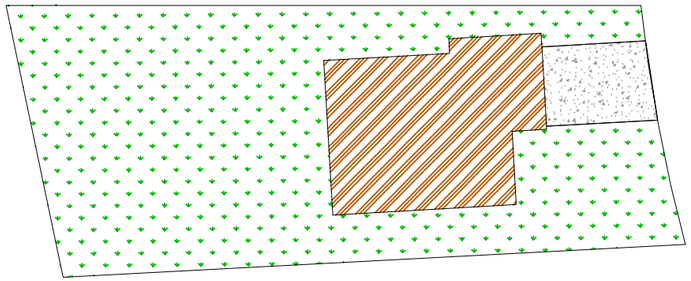
EXISTING LOT 73 (A2 PRE)

DRIVEWAY 7% TOTAL LOT AREA
ROOFTOP 33% TOTAL LOT AREA
AMENITY AREA 10% TOTAL LOT AREA
LANDSCAPE 50% TOTAL LOT AREA
TOTAL IMPERVIOUSNESS = 50%
DIRECT IMPERVIOUSNESS = 7%



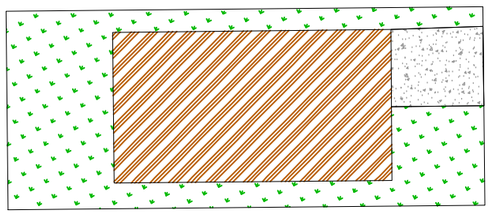
EXISTING LOT 50 (A1 PRE)

DRIVEWAY 7% TOTAL LOT AREA
ROOFTOP 35% TOTAL LOT AREA
AMENITY AREA 10% TOTAL LOT AREA
LANDSCAPE 48% TOTAL LOT AREA
TOTAL IMPERVIOUSNESS = 52%
DIRECT IMPERVIOUSNESS = 7%



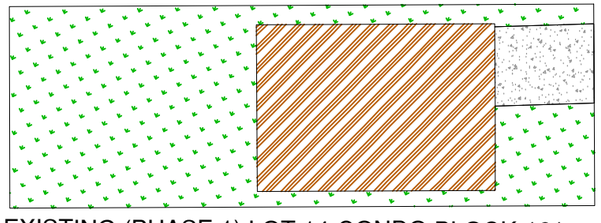
EXISTING LOT 59 (A4 PRE)

DRIVEWAY 5% TOTAL LOT AREA
ROOFTOP 21% TOTAL LOT AREA
AMENITY AREA 10% TOTAL LOT AREA
LANDSCAPE 64% TOTAL LOT AREA
TOTAL IMPERVIOUSNESS = 36%
DIRECT IMPERVIOUSNESS = 5%



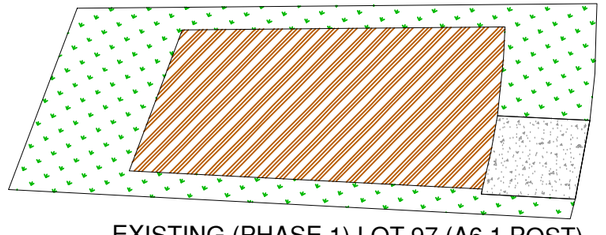
EXISTING (PHASE 1) LOT 12 (A4 POST)

DRIVEWAY 8% TOTAL LOT AREA
ROOFTOP 44% TOTAL LOT AREA
AMENITY AREA 10% TOTAL LOT AREA
LANDSCAPE 38% TOTAL LOT AREA
TOTAL IMPERVIOUSNESS = 62%
DIRECT IMPERVIOUSNESS = 8%



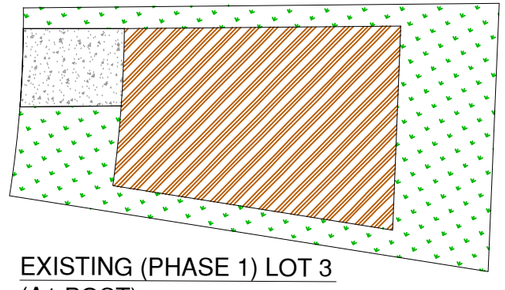
EXISTING (PHASE 1) LOT 14-CONDO BLOCK-161 (A6.1 POST)

DRIVEWAY 7% TOTAL LOT AREA
ROOFTOP 38% TOTAL LOT AREA
AMENITY AREA 10% TOTAL LOT AREA
LANDSCAPE 45% TOTAL LOT AREA
TOTAL IMPERVIOUSNESS = 55%
DIRECT IMPERVIOUSNESS = 7%



EXISTING (PHASE 1) LOT 97 (A6.1 POST)

DRIVEWAY 7% TOTAL LOT AREA
ROOFTOP 48% TOTAL LOT AREA
AMENITY AREA 10% TOTAL LOT AREA
LANDSCAPE 35% TOTAL LOT AREA
TOTAL IMPERVIOUSNESS = 65%
DIRECT IMPERVIOUSNESS = 7%



EXISTING (PHASE 1) LOT 3 (A1 POST)

DRIVEWAY 7% TOTAL LOT AREA
ROOFTOP 46% TOTAL LOT AREA
AMENITY AREA 10% TOTAL LOT AREA
LANDSCAPE 37% TOTAL LOT AREA
TOTAL IMPERVIOUSNESS = 63%
DIRECT IMPERVIOUSNESS = 7%

COLE ENGINEERING
70 VALLEYWOOD DR., MARKHAM, ON L3R 4T5
T:416.987.6161 / 905.940.6161 F:905.940.2064

LEGEND

DRIVEWAY AREA
ROOFTOP AREA
LANDSCAPE AREA

EXAMPLE LOT LAYOUTS - EXISTING

MARIANNEVILLE DEVELOPMENTS LTD.
ESTATES OF GLENWAY NEWMARKET
TOWN OF NEWMARKET

DATE:	JANUARY 2020	PROJECT No.:	L09-301
SCALE:	N.T.S	FIGURE No.:	7-2

The storm distributions used to model pre-development conditions include the 12-hour SCS Type II distribution, as per LSRCA requirements, the 24-hour SCS distribution, as per Town's requirements, and the 4-hour Chicago distribution, as per the Town and LSRCA requirements. The intensity-duration-frequency (IDF) data used for the 4-hour Chicago storm events was taken from the Town's design standards. The 4-hour Chicago IDF curve parameters for all storm events from the 2-year to the 100-year storm are summarized in **Table 7.2**.

Table 7.2 Town of Newmarket IDF Curve Parameters

Storm Event	A	B	C
2-year	648	4	0.784
5-year	930	4	0.798
10-year	1021	3	0.787
25-year	1100	2	0.776
50-year	1488	3	0.803
100-year	1770	4	0.820

The pre-development peak flows for the 12-hour SCS, 24-hour SCS and 4-hour Chicago storm distributions are summarized below in **Table 7.3, Table 7.4** and **Table 7.5**, respectively, for the five (5) ponds impacted by the Glenway West re-development. The detailed pre-development VO model output is provided in **Appendix C.2**.

Table 7.3 Pre- development Peak Flows – 24-hour SCS Type II Distribution

	2 year		5 year		10 year		25 year		50 year		100 year	
Catchments	V (m^3)	Peak Flow (m^3/s)	V (m^3)	Peak Flow (m^3/s)	V (m^3)	Peak Flow (m^3/s)	V (m^3)	Peak Flow (m^3/s)	V (m^3)	Peak Flow (m^3/s)	V (m^3)	Peak Flow (m^3/s)
Pond 1	1718	0.373	2156	0.415	3265	0.524	4071	0.603	4727	0.662	4973	0.679
Pond 2	848	0.360	1119	0.424	1895	0.538	2565	0.621	3069	0.677	3326	0.700
Pond 3	594	0.066	749	0.083	1148	0.130	1420	0.180	1661	0.226	1757	0.245
Pond 4	6715	0.331	7683	0.427	9886	0.643	11,382	0.805	12,801	0.959	13,337	0.983
Pond 6	7985	0.249	8616	0.525	10,897	1.279	12,899	1.655	14,931	1.784	15,869	1.844

Table 7.4 Pre-development Peak Flows – 12-hour SCS Distribution

	2 year		5 year		10 year		25 year		50 year		100 year	
Catchments	V (m^3)	Peak Flow (m^3/s)	V (m^3)	Peak Flow (m^3/s)	V (m^3)	Peak Flow (m^3/s)	V (m^3)	Peak Flow (m^3/s)	V (m^3)	Peak Flow (m^3/s)	V (m^3)	Peak Flow (m^3/s)
Pond 1	1503	0.328	2135	0.414	2639	0.462	3305	0.528	3799	0.576	4323	0.627
Pond 2	685	0.313	1104	0.422	1454	0.474	1923	0.543	2306	0.590	2775	0.647
Pond 3	488	0.054	734	0.082	912	0.101	1146	0.130	1322	0.164	1496	0.196
Pond 4	5975	0.232	7502	0.408	8456	0.502	9680	0.622	10,600	0.720	11,589	0.827
Pond 6	7568	0.107	8406	0.434	9235	0.791	10,527	1.191	11,725	1.449	13,091	1.664

Table 7.5 Pre- development Peak Flows – 4-hour Chicago Distribution

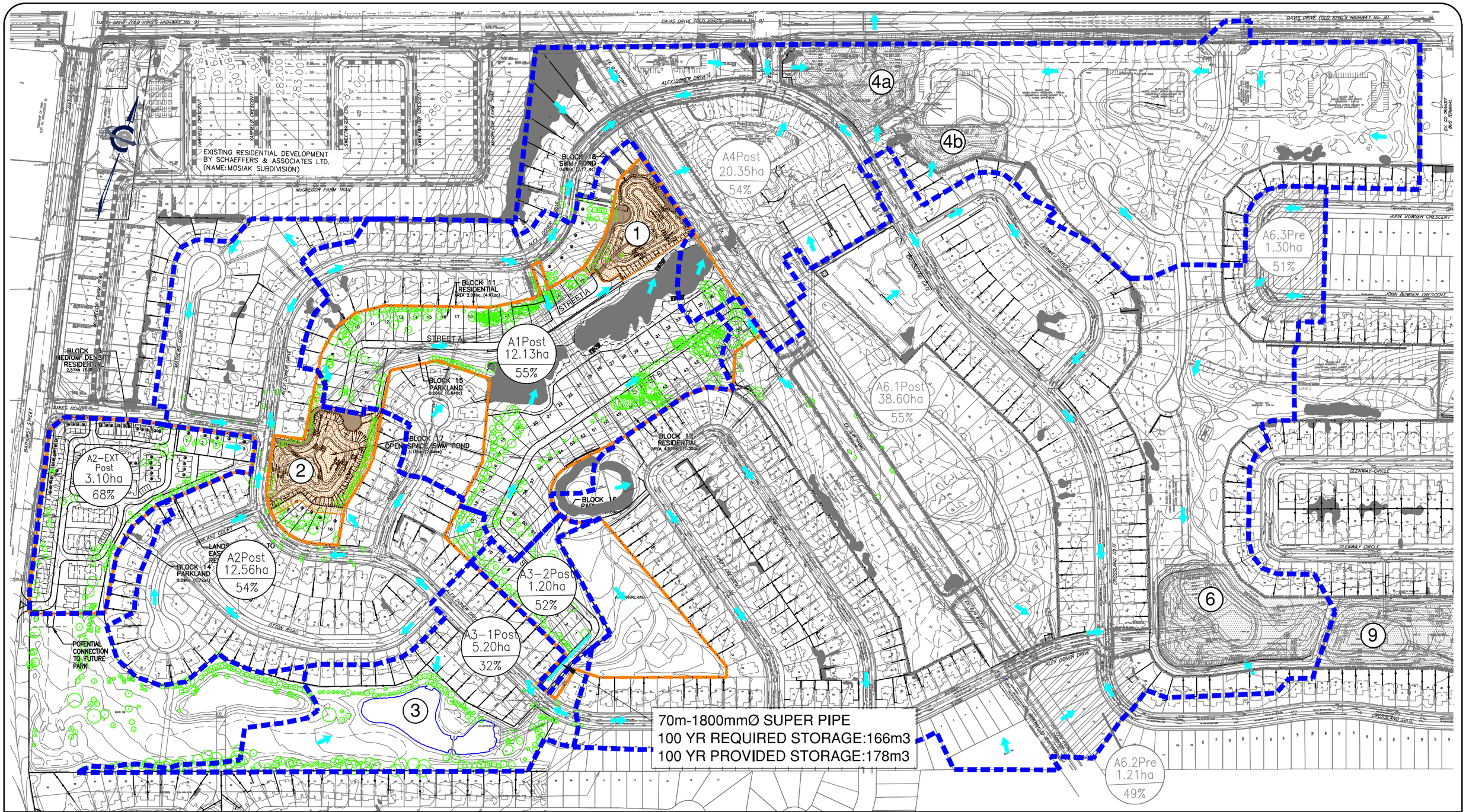
	2 year		5 year		10 year		25 year		50 year		100 year	
Catchments	V (m^3)	Peak Flow (m^3/s)	V (m^3)	Peak Flow (m^3/s)	V (m^3)	Peak Flow (m^3/s)	V (m^3)	Peak Flow (m^3/s)	V (m^3)	Peak Flow (m^3/s)	V (m^3)	Peak Flow (m^3/s)
Pond 1	1396	0.293	2003	0.401	2535	0.453	3109	0.508	3919	0.588	4376	0.633
Pond 2	633	0.296	1099	0.418	1466	0.476	1884	0.540	2680	0.632	3112	0.678
Pond 3	426	0.047	673	0.075	850	0.095	1041	0.116	1326	0.164	1484	0.194
Pond 4	5538	0.173	7149	0.374	8146	0.472	9168	0.572	10,529	0.711	11,206	0.791
Pond 6	6428	0.045	8175	0.334	8841	0.623	9662	0.982	11,356	1.383	12,409	1.601

7.3 Adjacent Development Constraints

The proposed Glenway West re-development is bound by existing residential lots and open space lands to be dedicated to the Town. Development is occurring west of the existing hydro corridor within the former Glenway Country Club golf course lands. There are five (5) existing ponds that accept drainage from land that will be affected by the proposed Glenway West re-development as shown on **Figure 7-3** and described in **Section 7.2** of this report.

The design standards for SWM ponds have changed since the existing ponds were designed and constructed. The original design was based on a 1-hour AES design storm. A combination of the current Town and LSRCA criteria require post to pre-development peak flow control and pond design for the greater of the 4-hour Chicago, 12-hour SCS and 24-hour SCS storm distributions.

In order to mitigate impacts to the existing storm infrastructure resulting from the proposed re-development, the peak discharge rate from Pond 1 under proposed conditions will be controlled to match the peak discharge rate from existing Pond 1 under pre-development conditions using the original Pond 1 design for storage and discharge, as per the *Glenway Estates Stormwater Management Study* prepared by the Lathem Group Inc. (1983). This assumes that the existing storm infrastructure is adequate to accommodate the existing development conditions. The target flows for Pond 1 are summarized in **Table 7.3** through **Table 7.5** above. Target flows for Pond 2 are set as the pre-development peak flows as outlined in **Table 7.3** through **Table 7.5** above. However, peak discharge rates from Pond 2 under post-development conditions will be over controlled to alleviate capacity constraints within downstream Pond 1. As the flows from Ponds 1 and 2 are ultimately conveyed to Pond 4, the hydrologic impacts to Pond 4 were also assessed as part of this SWM analysis to ensure that the target flows and storage capacity for Pond 4, as per the *Estates of Glenway Newmarket - Stormwater Management Report* prepared by COLE (September 2016), are not exceeded. The target flows for Pond 4 are summarized in **Table 7.6**.



COLE ENGINEERING
70 VALLEYWOOD DR., MARKHAM, ON L3R 4T5
T:416.987.6161 / 905.940.6161 F:905.940.2064

LEGEND

- A2Post 14.59ha 48% — DRAINAGE AREA ID, AREA, % IMPERVIOUS (#%)
- EXISTING POND PERMANENT WATER LEVEL
- DRAINAGE AREA BOUNDARY
- MAJOR/MINOR SPLIT AREA
- (1) POND ID
- DIRECTION OF OVERLAND FLOW
- PHASE 1 POND BLOCK
- PHASE 2 POND BLOCK
- PHASE 1 DEVELOPMENT LIMIT
- PHASE 2 DEVELOPMENT LIMIT

POST-DEVELOPMENT STORM DRAINAGE AREA PLAN

MARIANNEVILLE DEVELOPMENTS LTD.
ESTATES OF GLENWAY (PHASE 2)
TOWN OF NEWMARKET

DATE:	JANUARY 2020	PROJECT No.:	L09-301
SCALE:	1:4000	FIGURE No.:	7-3

File: P:\mrk\2009\L09-301 Marianneville Development - Newmarket\WEST\Cad\Sheets\Fig 7-3 SWM DAP post-dev.dwg Date: Jan 24, 2020 - 10:17am Edit By: jkwoki

Table 7.6 Target Flows: Pond 4

Storm Event	Peak Flows: 24-hour SCS Pond 4 (m^3/s)	Peak Flows: 12-hour SCS Pond 4 (m^3/s)	Peak Flows: 4-hour Chicago Pond 4 (m^3/s)
2-year	0.470	0.403	0.368
5-year	0.575	0.571	0.542
10-year	0.831	0.686	0.663
25-year	1.011	0.837	0.789
50-year	1.140	0.956	0.982
100-year	1.182	1.065	1.069

A portion of the Glenway West re-development area is conveyed through existing Pond 3, and ultimately to existing Pond 6. As per the *Estates of Glenway Newmarket - Stormwater Management Report* (September 2016) for the Glenway East re-development, the existing storm infrastructure to which existing Pond 3 outlets was designed assuming a peak discharge of 240L/s from Pond 3. Therefore, under post-development conditions the 100-year flow for the 4-hour Chicago distribution from Pond 3 is not to exceed this target discharge rate. The impacts to the storage capacity of existing Pond 3, as per the survey completed for the *Estates of Glenway Newmarket - Stormwater Management Report* (September 2016), resulting from the Glenway West re-development were also evaluated. As the flows from Pond 3 are ultimately conveyed to Pond 6, the hydrologic impacts to Pond 6 were assessed to ensure that the target flows and storage capacity for Pond 6, as per the *Estates of Glenway Newmarket - Stormwater Management Report* (September 2016) are not exceeded. The target flows for Pond 6 are summarized in **Table 7.7**.

Table 7.7 Target Flows: Pond 6

Storm Event	Peak Flows: 24-hour SCS Pond 6 (m^3/s)	Peak Flows: 12-hour SCS Pond 6 (m^3/s)	Peak Flows: 4-hour Chicago Pond 6 (m^3/s)
2-year	0.724	0.607	0.533
5-year	0.907	0.896	0.843
10-year	1.521	1.115	1.065
25-year	2.213	1.545	1.356
50-year	2.709	1.985	2.129
100-year	2.954	2.417	2.487

7.4 Proposed Conditions

Under post-development conditions, it is expected that changes to site drainage patterns and land cover will affect the hydrologic behaviour of the Glenway West site. The post-development drainage conditions are shown in **Figure 7-3**. In order to mitigate these hydrologic changes, it is proposed to direct storm drainage from the development to the proposed retrofitted Ponds 1 and 2, as shown on **Figure 7-3**. The proposed development involves converting existing golf course land within drainage catchments A1Post, A2Post, A3-1Post and A3-2Post into single detached residential units, as well as converting catchment A2Post External into townhouse units. The proposed development will increase the total impervious cover of the site to approximately 53% from the existing imperviousness of 47%.

The imperviousness of the proposed drainage catchments was determined by calculating the land use composition of each area. Similar to existing conditions, the imperviousness of land uses such as residential single-lots, and ROWs, were calculated using example lots and ROW sections from each proposed drainage catchment. The example layouts of the proposed lots used to calculate the total imperviousness are shown on **Figure 7-4**, and are based on the minimum setback requirements for the proposed land use from the Town design standards. Other land uses, such as open space and townhouse, were determined using the Town design standards. The excerpt from the Town design standards providing assumed imperviousness values and runoff coefficients for various land uses is provided in **Appendix C.1**. The imperviousness calculations for the proposed conditions are also provided in **Appendix C.3**.

VO was also used to model post-development hydrologic conditions in order to determine the required retrofitted pond sizes required to match pre-development peak flows from Ponds 1 as well as 2, and to evaluate the hydrologic impacts to existing Ponds 3, 4 and 6 which are to remain unchanged. Similar to the existing conditions model, STANDHYD commands were used in the VO model to represent the proposed conditions. The detailed input parameter calculations for the post-development hydrologic model are provided in **Appendix C.3** and summarized below in **Table 7.8**.

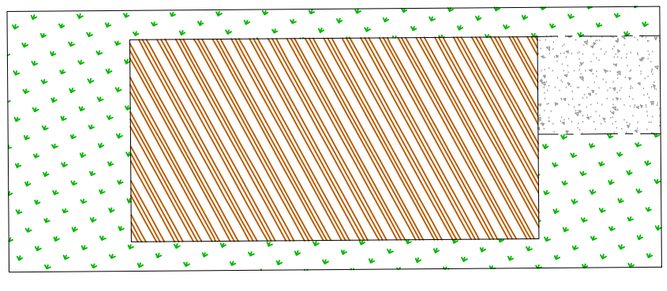
Table 7.8 Post-development Input Parameters

Receiving Pond	Catchment	Drainage Area (ha)	CN value	XIMP (%)	TIMP (%)
1	A1Post	12.13	69	19.7	54.5
2	A2Post	12.56	69	25	54.1
	A2Post External	3.1	69	42.9	67.9
3	A3-1Post	5.20	69	19.4	31.6
	A3-2Post	1.20	69	20.1	52.4
4	A4Post	20.35	69	32.4	53.7
6	A6-1Post	38.60	69	23.2	54.7
	A6-2Post (major only)	1.21	69	20.1	49.3
	A6-3Post (major only)	1.30	69	22.0	50.7

The proposed SWM plan, which includes two (2) retrofitted SWM pond facilities, will satisfy water quality and quantity control requirements. The proposed and existing ponds are to provide adequate quality, quantity and erosion control, as discussed in **Sections 7.5** and **7.6**.

7.5 Stormwater Quantity Control

A hydrologic VO model was prepared to simulate the hydrologic conditions of the site under post-development conditions. The VO model was used to determine the required storage for the proposed retrofitted Ponds, 1 and 2, to control peak flows to target flow rates. The VO model was also used to determine the hydrologic impacts to existing Ponds 3, 4 and 6 resulting from the proposed development. The 24-hour SCS, 12-hour SCS and 4-hour Chicago storm distributions were also used for the post-development hydrologic analysis.



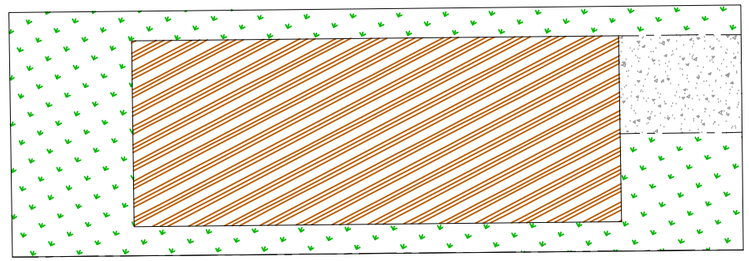
PROPOSED LOT 6 (A1 POST)

DRIVEWAY 7% TOTAL LOT AREA

ROOFTOP 48% TOTAL LOT AREA
AMENITY AREA 10% TOTAL LOT AREA

LANDSCAPE 35% TOTAL LOT AREA

TOTAL IMPERVIOUSNESS = 65%
DIRECT IMPERVIOUSNESS = 7%



PROPOSED LOT 49 (A3-2 POST)

DRIVEWAY 7% TOTAL LOT AREA

ROOFTOP 50% TOTAL LOT AREA
AMENITY AREA 10% TOTAL LOT AREA

LANDSCAPE 33% TOTAL LOT AREA

TOTAL IMPERVIOUSNESS = 67%
DIRECT IMPERVIOUSNESS = 7%

NOTE: ROOFTOP AREAS BASED ON MINIMUM BUILDING SETBACKS AS PER TOWN OF NEWMARKET STANDARDS.

COLE ENGINEERING
70 VALLEYWOOD DR., MARKHAM, ON L3R 4T5
T:416.987.6161 / 905.940.6161 F:905.940.2064

LEGEND

DRIVEWAY AREA

ROOFTOP AREA

LANDSCAPE AREA

EXAMPLE LOT LAYOUTS - PROPOSED

MARIANNEVILLE DEVELOPMENTS LTD.
ESTATES OF GLENWAY NEWMARKET
TOWN OF NEWMARKET

DATE:	APRIL 2018	PROJECT No.:	L09-301
SCALE:	N.T.S	FIGURE No.:	7-4

7.5.1 Pond 1

As discussed in **Section 7.4**, the post-development flows discharging from Pond 1 are to be controlled to pre-development flow rates. The discharge from the Glenway West re-development that drains to Pond 1 is proposed to be controlled by retrofitting the existing pond in order to accommodate the additional runoff and meet current Town's standards, LSRCA criteria and MOECC SWM guidelines. Existing Pond 1 currently provides some attenuation, but was not designed to meet a specific level of protection. The proposed Pond 1 retrofit is designed to provide adequate quantity control and storage volume in order to control the post-development peak flows to pre-development flow rates from Pond 1. The outlet location for the retrofitted Pond 1 is proposed to remain the same as the existing pond, however, the outlet controls will require improvements. The Pond 1 outlet controls will be revised to include a bottom draw pipe to a 120mm diameter orifice plate followed by an additional circular orifice with a diameter of 400mm, and a rectangular orifice with a height of 800mm and a width of 300mm. The Pond 1 stage-storage-discharge design sheets are included in **Appendix C.3.**

The post-development quantity control analysis of Pond 1 for the 24-hour storm distribution is summarized in **Table 7.9**, for which the detailed hydrologic model output is provided in **Appendix C.4**. The Pond 1 hydrologic model output for the 12-hour SCS and 4-hour Chicago storm distributions are also provided in **Appendix C.4**.

Table 7.9 Quantity Control Analysis (24-hour SCS): Pond 1

Storm Event	Target Flow at Pond Outlet (m3/s)	Inflow To Pond (m3/s)	Pond Active Storage (m3)	Outflow From Pond (m3/s)
2-year	0.373	0.736	2,393	0.135
5-year	0.415	0.911	2,788	0.185
10-year	0.524	1.824	3,770	0.349
25-year	0.603	2.291	4,488	0.477
50-year	0.662	2.602	5,146	0.598
100-year	0.679	2.906	5,397	0.645
Provided Active Storage (1.55 m)	--	--	5,741	0.712

As shown in **Table 7.9**, the maximum required active pond storage to control the post-development peak flows to pre-development conditions is 5,397m^3. The proposed retrofitted SWM Pond 1 provides 5,741m^3 of active storage at an elevation of 275.55m, and therefore meets the quantity control requirements for MOE and the Town. The conceptual retrofitted Pond 1 layout is shown in **Figure 7-5**. The overflow spillway location is near the existing hydro corridor east of the pond block, consisting of a proposed spillway weir sized to pass the uncontrolled 100-year flow of 2.906m^3/s. The emergency spillway will have a 30m wide bottom width and a height of 0.25m. The emergency spillway is discussed further in **Section 7.6**.

7.5.2 Pond 2

In **Section 7.4** is was discussed that the post-development flows that will be discharged from Pond 2 are to remain controlled as per pre-development flows. In order to achieve this, it is proposed that Pond 2 is retrofitted so that with the addition of increased runoff, the pond will still meet current Town's standards, LSRCA criteria, and MOE SWM guidelines. However, the retrofit proposed for Pond 2 will incorporate control structures that will over control the discharge to lower values than the pre-development target flows. This is to relieve pressure off of downstream Pond 1, allowing the retrofit for Pond 1 to match pre-development target flows. The outlet controls consist of a bottom draw pipe that connects to a 125mm diameter orifice plate. This will be followed by an additional circular orifice with a diameter of 250mm, and a rectangular orifice with a height and width of 750mm and 100mm respectively. Three (3) super catch basins and one (1) ditch inlet catch-basin (DICB) are proposed to convey the unattenuated 100 year flow. An emergency spillway is not feasible for this pond since it is physically constrained by development surrounding the pond. This will be discussed further in **Section 7.6**. The Pond 2 stage-storage-discharge design sheets are included in **Appendix C.3**.

The post-development quantity control analysis of Pond 2 for the 24-hour storm distribution is summarized in **Table 7.10** below. The detailed hydrologic model output is provided in **Appendix C.4**. The Pond 2 hydrologic model outputs for the 12-hour SCS and 4-hour Chicago storm distributions are also provided in **Appendix C.4**.

Table 7.10 Quantity Control Analysis (24-hour SCS): Pond 2

Storm Event	Target Flow at Pond Outlet (m3/s)	Inflow To Pond (m3/s)	Pond Active Storage (m3)	Outflow From Pond (m3/s)
2-year	0.360	1.086	2,956	0.084
5-year	0.424	1.380	3,555	0.106
10-year	0.538	2.023	5,073	0.177
25-year	0.621	3.004	6,089	0.234
50-year	0.677	3.350	7,048	0.291
100-year	0.700	3.744	7,390	0.309
Provided Active Storage (1.80 m)	--	--	7,439	0.311

Outlined in **Table 7.10**, the required active storage needed for Pond 2 is 7,390m^3 in order to control the post-development peak flows to pre-development peak flows. The proposed pond will have a maximum storage of 7,439m^3 at an elevation of 281.80m. Therefore, the proposed pond will meet the quantity control requirements for MOE and the Town. The conceptual retrofitted Pond 2 layout is shown in **Figure 7-6**.

7.5.3 Pond 4

As Ponds 1 and 2 ultimately discharge to existing Pond 4, the hydrologic impacts to Pond 4 resulting from the Glenway West re-development were also assessed. The post-development quantity control analysis of Pond 4 for the 24-hour storm distribution is summarized in **Table 7.11**, for which the detailed hydrologic model output is provided in **Appendix C.4**. The Pond 4 hydrologic model output for the 12-hour SCS and 4-hour Chicago storm distributions are also provided in **Appendix C.4**.

EXISTING HEADWALL TO BE REMOVED AND REPLACED WITH NEW OUTLET CONTROL STRUCTURE AS SHOWN

CONNECT EX. 600mmØ STORM TO PROPOSED OUTLET MANHOLE

PROPOSED INLET HEADWALL

EXISTING INLET HEADWALL TO BE MAINTAINED

EXISTING PIPE TO BE REMOVED UP TO PROPOSED MANHOLE

BOTTOM DRAW OUTLET PIPE

ALEX DONER DRIVE

MH 205A

MH 210A

EX. 63.0m–600mmØ STM @ 3.20%

9.2m–1650mmØ CONC. STM @ 0.25%

EX. 28.0m–975mmØ CONC STM @ 0.22%

53m PVC SAN–250Ø @ 0.55%

21.4m–750mmØ CONC. STM @ 1.00%

61.3m–750mmØ CONC. STM @ 1.00%

61.3m–1650mmØ CONC. STM @ 0.25%

35.0m–1650mmØ CONC. STM @ 0.25%

19.4m–900mmØ CONC. STM @ 0.50%

51.7m–900mmØ CONC. STM @ 0.50%

31.8m–825mmØ CONC. STM @ 1.50%

10% FOREBAY ACCESS RAMP

FOREBAY BOT = 272.50

WET CELL BOT = 272.00

BERM = 273.70

NWL = 274.00

MWL = 275.48

TOP = 275.80

EMERGENCY SPILLWAY = 275.50

276.00

275.95

276.40

277.20

273.50

273.70

274.30

274.50

272.50

273.50

3:1 MAX.

4:1 MAX.

7:1 MAX.

10:1 MAX.

EXISTING HYDRO CORRIDOR

400Ø PVC WATERMAIN

PART PLAN 65R-11423

PART PLAN 65R-22514

STREET A

APPROVED

NOTES:

PERMANENT POOL DEPTH = 2.00m
ACTIVE STORAGE DEPTH = 1.45m

OUTLET CONTROLS
BOTTOM DRAW PIPE WITH 125mmØ CIRCULAR ORIFICE PLATE INV. 274.00m
400mmØ CIRCULAR ORIFICE INV. 274.45m
RECTANGULAR ORIFICE WITH HEIGHT AND WIDTH OF 800mm BY 350mm
INV. 274.80m

LEGEND

- POND BLOCK BOUNDARY
- POND WATER LEVEL
- PROPOSED STORM PIPE
- EXISTING STORM PIPE

COLE ENGINEERING
70 VALLEYWOOD DR., MARKHAM, ON L3R 4T5
T:416.987.6161 / 905.940.6161 F:905.940.2064

STORMWATER MANAGEMENT POND 1

MARIANNEVILLE DEVELOPMENTS LTD.
ESTATES OF GLENWAY (PHASE 2)
TOWN OF NEWMARKET

DATE:	JANUARY 2020	PROJECT No.:	L09-301
SCALE:	1:600	FIGURE No.:	7-5

EXISTING INLET HEADWALL
TO BE MAINTAINED

87.9m–825mmø
CONC STM @ 0.50%

37.3m–825mmø CONC STM @ 0.50%

PROPOSED INLET HEADWALL

15.7m–825mmø
CONC. STM @ 0.50%

EX. 42.0m–825mmø
CONC STM @ 0.47%

51.7m–450mmø
PVC STM @ 1.00%

92.1m–1350mmø CONC. STM @ 0.80%

EMERGENCY OVERFLOW CAPTURE
3x SUPER CBs (0.9m x 1.8m)
1x DICB

OUTLET CONTROL STRUCTURE

BOTTOM DRAW OUTLET PIPE

EX. 41.8m–825mmø
CONC. STM @ 0.50%

EXISTING HEADWALL
TO BE RELOCATED

ALEX DONER DRIVE

1.5m CONC. SIDEWALK

56.5m PVC SAN–250ø @ 0.44%

200ø PVC WATERMAIN

41.0m CONC STM–825ø @ 0.47%

10% FOREBAY ACCESS RAMP

FOREBAY BOT = 278.50

BERM = 279.70

WET CELL = 278.00

279.50

NWL = 280.00

280.50

MWL = 281.79

TOP = 282.20

100-YEAR WL = 281.68

34.4m PVC SAN–250ø @ 1.16%

30.6m CONC STM–525ø @ 1.14%

39.1m CONC STM–450ø @ 1.36%

40.4m PVC SAN–250ø @ 1.21%

3:1 MAX.
4:1 MAX.
7:1 MAX.

MH 223
MH 223A
MH 224
MH 224A
MH 225
MH 226
MH 227
MH 228
MH 229
MH 230
MH 231
MH 232
MH 233
MH 233A

CB
CBMH
DCB
HYD

NOTES:

PERMANENT POOL DEPTH = 2.00m
ACTIVE STORAGE DEPTH = 1.75m

OUTLET CONTROLS
BOTTOM DRAW PIPE WITH 125mmØ CIRCULAR ORIFICE PLATE INV. 280.00m
250mmØ CIRCULAR ORIFICE INV. 280.55m
RECTANGULAR ORIFICE WITH HEIGHT AND WIDTH OF 750mm BY 100mm
INV. 281.00m

COLE ENGINEERING
70 VALLEYWOOD DR., MARKHAM, ON L3R 4T5
T:416.987.6161 / 905.940.6161 F:905.940.2064

LEGEND

- POND BLOCK BOUNDARY
- POND WATER LEVEL
- PROPOSED STORM PIPE
- EXISTING STORM PIPE

STORMWATER MANAGEMENT POND 2

MARIANNEVILLE DEVELOPMENTS LTD.
ESTATES OF GLENWAY (PHASE 2)
TOWN OF NEWMARKET

DATE:	JANUARY 2020	PROJECT No.:	L09-301
SCALE:	1:600	FIGURE No.:	7-6

Table 7.11 Quantity Control Analysis (24-hour SCS): Pond 4

Storm Event	Target Flow at Pond Outlet (m^3/s)	Inflow To Pond (m^3/s)	Pond Active Storage (m^3)	Outflow From Pond (m^3/s)
2-year	0.470	1.419	5,452	0.162
5-year	0.575	1.725	6,021	0.239
10-year	0.831	2.626	7,968	0.454
25-year	1.011	3.258	9,526	0.607
50-year	1.140	3.725	10,985	0.761
100-year	1.182	5.003	11,405	0.807
Provided Active Storage (2.0 m)	--	--	17,480	1.104

As shown in **Table 7.11**, the maximum required active storage in Pond 4 to control the post-development peak flows to pre-development conditions is 11,405m^3. As existing SWM Pond 4 provides 17,480m^3 of active storage at an elevation of 271.70m, the existing pond capacity is not exceeded and pre-development target flows, as per the *Glenway Newmarket - Stormwater Management Report* (September 2016), are still maintained.

7.5.4 Pond 3

Drainage area A3-2 Post is to be developed as part of the proposed Glenway West site and is to be conveyed to existing Pond 3 and ultimately to existing Pond 6. Although existing Pond 3 is proposed to remain unmodified, the hydrologic impacts to this pond were evaluated using the post-development conditions VO model in order to demonstrate that the existing storage capacity and target flows are not exceeded. As per the stage-storage-discharge information and storm sewer design sheet provided in the **Appendix C.1,** the storage capacity of Pond 3 is 5,200m^3. In order to ensure that the new development will not increase the discharge leaving Pond 3, an 1800mm diameter super pipe with a length of 70m will be installed upstream of the pond. This pipe will act as a storage component, with orifice control at the downstream end of the pipe so that flow entering the pond will meet the existing flow. The target flows leaving the super pipe, as well as the required design parameters are summarized in **Table 7.12**.

Table 7.12 Quantity Control Analysis (24-hour SCS): Super Pipe

Storm Event	Target Flow Rates	Model Flow Rates	Required Storage Based on Model Flow Rates	Required Length of Super Pipe to Achieve Required Storage
(year)	(m^3/s)	(m^3/s)	(m^3)	(m)
2	0.0528	0.0524	50	19.65
5	0.0701	0.0678	76	29.87
10	0.1149	0.1115	113	44.41
25	0.1471	0.1443	137	53.84
50	0.1730	0.1676	155	60.91
100	0.1900	0.1876	166	65.23
Max Storage for Proposed Length	--	--	178	70

The post-development quantity control analysis of Pond 3 for the 24-hour SCS storm distribution under post-development conditions is summarized in **Table 7.13**, for which the detailed hydrologic model output is provided in **Appendix C.4**. The Pond 3 model output for the 12-hour SCS and 4-hour Chicago storm distributions are also provided in **Appendix C.4**.

Table 7.13 Quantity Control Analysis (24-hour SCS): Pond 3

Storm Event	Pre-Development Flow at Pond Outlet (m^3/s)	Inflow To Pond (m^3/s)	Pond Active Storage (m^3)	Outflow From Pond (m^3/s)
2-year	0.066	0.308	659	0.074
5-year	0.083	0.393	824	0.092
10-year	0.130	0.589	1232	0.147
25-year	0.180	0.939	1493	0.196
50-year	0.226	1.073	1738	0.242
100-year	0.245	1.198	1834	0.261
Provided Active Storage (2.0 m)	--	--	5200	0.362

As shown in **Table 7.13**, the maximum required active storage in Pond 3 for the 100-year storm event is 1,995m^3. As existing SWM Pond 3 provides 5,200m^3 of active storage at an elevation of 285.27m, the existing pond capacity is not exceeded. As per **Table 7.13**, it is noted that the post-development flows from Pond 3 exceed pre-development flows slightly. However, the downstream pipe of Pond 3 is a 450mm diameter pipe at a slope of 1.15% which has a flow capacity of 0.3m^3/s. As the 100 year discharge rate is 0.261m^3/s, the storm system will be able to convey the 100 year flow. Furthermore, as discussed in **Section 7.5.5** below, the outflow from Pond 6 is below the target flows.

7.5.5 Pond 6

Existing Pond 6 was reconstructed as part of the Glenway East re-development and no further modifications are proposed to support the Glenway West re-development. The hydrologic impacts to this pond were evaluated using the post-development conditions VO model to demonstrate that the existing storage capacity and target flows for Pond 6, as per the *Glenway Newmarket - Stormwater Management Report* (September 2016), are not exceeded.

The post-development quantity control analysis of Pond 6 under post-development conditions is summarized for the 24-hour SCS storm distribution in **Table 7.14**, for which the detailed hydrologic model output is provided in **Appendix C.4**. The Pond 6 model output for the 12-hour SCS and 4-hour Chicago storm distributions are also provided in **Appendix C.4**.

Table 7.14 Quantity Control Analysis (24-hour SCS): Pond 6

Storm Event	Target Flow at Pond Outlet (m^3/s)	Inflow To Pond (m^3/s)	Pond Active Storage (m^3)	Outflow From Pond (m^3/s)
2-year	0.724	2.290	7,987	0.249
5-year	0.907	2.835	8,618	0.525
10-year	1.521	4.382	10,900	1.280
25-year	2.213	5.491	12,903	1.656
50-year	2.709	6.309	14,937	1.784
100-year	2.954	6.920	15,876	1.844
Provided Active Storage (2.0 m)	--	--	20,578	2.100

As shown in **Table 7.14**, the maximum required active storage in Pond 6 to control the post-development peak flows to pre-development conditions is 15,876m^3. As existing SWM Pond 6 provides 20,578m^3 of active storage at an elevation of 267.10m, the existing pond capacity is not exceeded and pre-development target flows, as per the *Glenway Newmarket - Stormwater Management Report* (September 2016), are still maintained.

7.6 Pond Physical Design Characteristics

The proposed SWM ponds have been designed to satisfy the Town's design standards where possible as well as the MOE SWMPD Guidelines and LSRCA design criteria. The preliminary design layout of the proposed Pond 1 retrofit is shown on **Figure 7-5** and the layout for Pond 2 retrofit is shown on **Figure 7-6.**

7.6.1 Design Criteria

The Town's engineering design criteria have been met for all ponds where constraints did not interfere with the layout of pond. The Town's design criteria are listed in **Table 7.15** and each pond is listed with how it was designed. It is observed in **Table 7.15** that the design features of Pond 1 meets or exceeds the Town's minimum standard.

Table 7.15 Town of Newmarket SWM Pond Design Characteristics

Design Characteristic	Town Minimum Standard	Provided for Pond 1	Provided for Pond 2
Side slopes	4:1	4:1	4:1
Safety Shelf	7:1 for 3.5 m either side of NWL	7:1 for 3.5 m either side of NWL	7:1 for 3.5 m either side of NWL
Permanent Pool Depth	2.5 m	2.0 m	2.0 m
Active Storage Maximum Depth	2.0 m	1.55 m	1.80 m
Min. Freeboard	0.25 m (20% of Active Storage Depth)	0.25 m	0.40 m*
Emergency Overflow	0.1 $m^3/s/ha$	2.91 m^3/s**	3.74 m^3/s**
Maintenance Access	3.0 m wide and 10% max grade	4.0 m wide @ 10%	4.0 m wide @ 10%

*Pond 2 does not have an emergency spillway, 0.4m of freeboard is being provided to the top of the pond with the Super CBs and DICB acting as the emergency flow relief at elevation 281.80m.
**100 year uncontrolled flow was higher than the town standards emergency unit flow rate.

In addition to the above, Town of Newmarket criteria requires that a bypass sewer be provided between the inlet and outlet of SWM ponds to facilitate maintenance. Bypass sewers will be incorporated into the design of the SWM ponds at the detailed design stage.

7.6.2 Grading

As described above, the grading of the proposed Pond 1 and 2 were designed to incorporate the Town's minimum standard side slopes of 4:1 and the 7:1 safety shelf. Pond 1 and 2 have been designed to meet all of the Town's standard grading requirements. The preliminary grading of the proposed Pond 1 and 2 retrofits are shown on **Figure 7-5** and **Figure 7-6**.

7.6.3 Emergency Overflow Spillways

An emergency spillway is designed in the event that the outlet structure of a pond becomes clogged. As per Town design standards, pond emergency spillways are to convey a minimum of 0.1 $m^3/s/ha$. However, as the 100-year unattenuated discharges were higher, those values were used as the flow capacity when designing the spillways. **Table 7.16** summarizes the required emergency spillway capacity for Ponds 1 and 2.

Table 7.16 Required Emergency Spillway Capacity

SWM Pond	Drainage Area (ha)	Flow Capacity (m^3/s)
Pond 1	27.79	2.91
Pond 2	15.66	3.74

As stated above in **Section 7.5**, it is not feasible for Pond 2 to convey the unattenuated 100 year storm through an emergency spillway do to the physical grading constraints of the surrounding development. As such, it is proposed that three (3) Super CBs and one (1) DICB be used in place of the emergency spillway at an elevation of 281.80m. This combination of Super CBs and DICB has been sized to convey the unattenuated 100-year flow out of Pond 2 with a blockage factor of 50%. Currently Pond 2 drains into Pond 1 through a 675mm pipe at 1.69% slope. This pipe allows for a maximum flow of 1.095m^3/s however, this flow is smaller than the required flow capacity of 3.74m^3/s. Therefore, it is proposed that the existing pipe be replaced with a 1350mm pipe at 0.8% slope which provides a conveyance capacity of 4.77m^3/s.

Pond 1 currently spills into the existing hydro corridor located east of the pond block, and ultimately to Pond 4 via Crossland Gate. Under proposed conditions, the emergency spillway will continue discharging to the existing hydro corridor. A 30m wide emergency spillway is proposed as part of the Pond 1 retrofit at a spill elevation of 275.55, for which the depth provided by the weir is 0.25m between 275.55 and 275.80. The spillway was sized using an excel spreadsheet calculation which can be found in **Appendix C.5.** The capacity of the proposed weir was confirmed by modelling in CulvertMaster, in which the output is provided in **Appendix C.5**. As indicated in the CulvertMaster model, the resulting depth of flow at the required discharge is 0.15m, which is within the total provided spillway depth of 0.25m. Therefore, the proposed emergency spillway weir at Pond 1 provides adequate capacity to convey the required flow of 2.91m^3/s.

7.7 Water Quality

Stormwater treatment must meet the Town's criteria of Enhanced (Level 1) Protection quality treatment as defined by the MOE SWMPD Manual (2003). Pond 1 is proposed to provide adequate permanent pool storage to meet Enhanced (Level 1) Protection for the Glenway West re-development within catchment A1 Post and Pond 2 is proposed to provide adequate permanent pool storage for catchments A2 Post and A2- Ext Post. It was also confirmed as part of the SWM analysis for the Glenway West re-development that the proposed development within catchment A3-2 Post will be adequately accommodated in existing Pond 6.

7.7.1 Permanent Pool

Quality control for the Glenway West re-development is required to meet the MOE Enhanced (Level 1) Protection where 80% of total suspended solids (TSS) is to be removed. It has been assumed that quality control is being provided only for the areas draining directly into each pond. Ponds 1 and 2 have been retrofitted in order to provide permanent pool storage in addition to active storage. The permanent pools of Pond 1 and Pond 2 have been designed to MOE standards and each includes a berm separating the forebay from the rest of the permanent pool. Detailed permanent pool calculations are provided in **Appendix C.6**, which are summarized in **Table 7.18**. As indicated in **Table 7.17**, both proposed pond retrofits provide sufficient permanent pool volume to achieve Enhanced (Level 1) Protection.

Table 7.17 Water Quality Requirements: SWM Ponds 1 & 2

SWM Pond	Catchment	Total Drainage Area to SWM Pond (ha)	% Impervious	Permanent Pool Volume (m^3)		Extended Detention Volume (m^3)	
				Required	Provided	Required	Provided
Pond 1	A1 Post	12.13	54.5	1,804	1,805	485	1,286
Pond 2	A2 Post	12.56	54.1	2,419	2,432	626	1,768
	A2 Post External	3.10	67.9				
	Total	15.66	56.8				

Existing Pond 6 is to provide Enhanced (Level 1) Protection quality control for drainage catchments A3-1 Post, A3-2 Post, A6-1 Post, A6-2 Post and A6-3 Post. Detailed permanent pool calculations are provided in **Appendix C.6**, which are summarized in **Table 7.18**. As indicated in **Table 7.18**, existing Pond 6 provides sufficient permanent pool volume to achieve Enhanced (Level 1) Protection.

Table 7.18 Water Quality Requirements: SWM Pond 6

SWM Pond	Catchment	Total Drainage Area to SWM Pond (ha)	% Impervious	Permanent Pool Volume (m^3)		Extended Detention Volume (m^3)	
				Required	Provided	Required	Provided
Pond 6	A3-1 Post	5.20	31.6	6,750	10,334	1,900	4,583
	A3-2 Post	1.20	52.4				
	A6-1 Post	38.60	54.7				
	A6-2 Post	1.21	49.3				
	A6-3 Post	1.30	50.7				
	Total	47.51	51.9				

7.7.2 Forebay Sizing

Forebay sizing calculations were undertaken to confirm the forebay dimensions required to conform to the quality control criteria. A minimum required length to width ratio of 2:1 was applied in order to comply with MOE and Town's design criteria. The forebay sizing requirements for SWM Ponds 1 and 2 are summarized in **Table 7.19**, for which the detailed sizing calculations are provided in **Appendix C.6**.

Table 7.19 Forebay Sizing Requirements

SWM Pond	Minimum Forebay Length for Settling - V_S = 0.0003 m/s (m)		Minimum Dispersion Length (m)		Minimum Bottom Width (m)	
	Required	Provided	Required	Provided	Required	Provided
Pond 1	10.9	46.8	9.7	24.3	1.2	9.1
Pond 2	11.8	44.4	14.7	44.4	1.8	7.8

7.7.3 Phosphorus Loading

The proposed development will change the runoff characteristics of the site and will result in an increase in phosphorus loading to the watershed. The west portion of the Glenway West re-development area (catchments A1 Post, A2 Post and A2Ext Post) is situated in the West Holland subwatershed and the east portion of the re-development area (catchment A3-2 Post) is in the East Holland subwatershed. The results for the phosphorus loading and removal calculations for the proposed re-development within both the East Holland and West Holland subwatersheds are as summarized in **Table 7.20** to **Table 7.24**.

Table 7.20 Phosphorus Loading Overview

Subwatershed	Pre-Development Area	Pre-Development Phosphorus Load	Post-Development Area	Post-Development Phosphorus Load without Treatment	Post-Development Phosphorus Load with Treatment
	(ha)	(kg/yr)	(ha)	(kg/yr)	(kg/yr)
West	27.27	5.35	27.78	6.87	2.54
East	1.20*	0.29	1.20	0.20	0.07

*A3-2 Pre was modelled using an area of 1.20ha as opposed to the actual 1.25ha due to constraints within the MOE Lake Simcoe Phosphorus Loading Tool

Table 7.21 Phosphorus Loading: West Holland (Pre-Development)

Land Use	Pre-Development Area (ha)	Pre-Development Phosphorus Loading (kg/year)	Pre-Development SWM Reduction (%)	Total Pre-Development Phosphorus Load (kg/year)
Low Density Residential	10.84	1.41	0	1.41
Golf Course	16.43	3.94	0	3.94
TOTAL	27.27	5.35	0	5.35

Table 7.22 Phosphorus Loading: West Holland (Post-Development)

Land Use	Post-Development Area (ha)	Post-Development Phosphorus Loading (kg/year)	Post-Development SWM Reduction (%)	Total Post-Development Phosphorus Load (kg/year)
Low Density Residential	23.33	3.03	63	1.25
High Density Residential (Townhouses)	2.56	3.38	63	1.12
Golf Course	1.89	0.45	63	0.17
TOTAL	27.78	6.87	63	2.54

Table 7.23 Phosphorus Loading: East Holland (Pre-Development)

Land Use	Pre-Development Area (ha)	Pre-Development Phosphorus Loading (kg/year)	Pre-Development SWM Reduction (%)	Total Pre-Development Phosphorus Load (kg/year)
Low Density Residential	0	0	0	0
Golf Course	1.20	0.29	0	0.29
TOTAL	1.20	0.29	0	0.29

Table 7.24 Phosphorus Loading: East Holland (Post-Development)

Land Use	Post-Development Area (ha)	Post-Development Phosphorus Loading (kg/year)	Post-Development SWM Reduction (%)	Total Post-Development Phosphorus Load (kg/year)
Low Density Residential	0.83	0.11	63	0.04
Golf Course	0.37	0.09	63	0.03
TOTAL	1.20	0.20	63	0.07

The wet ponds will be accounted to remove 63% of phosphorus on the site. Previously, wet ponds could be assumed to remove 80% phosphorus (LSRCA SWM Technical Guidelines, 2010), however this has been changed since the Lake Simcoe Protection Plan (October, 2011) has been introduced. New guidelines have been set for phosphorus removal targets, removal efficiencies and loading rates. A phosphorus loading and removal tool has been developed by the LSRCA and MOE and was used for the purposes of this development. The phosphorus removal calculations are provided in **Appendix C.6**. As seen in **Table 7.20** to **Table 7.24**, the post-development phosphorus loading is lower than the pre-development loading rates as a result of the mitigation provided by the proposed SWM pond retrofits.

7.8 Extended Detention

For outlet erosion control, the 24 hour detention of the 25mm four (4) hour Chicago Storm is targeted for additional quality control measure as required by MOE SWMPD Guidelines. A bottom draw orifice plate system is proposed to control the extended detention portion of the active storage in both Ponds 1 and 2.

The existing ponds do not account for any 24 hour detention storage as a quality control feature. The 25mm Chicago Storm rainfall event is used to determine the runoff volumes required for detention storage, which dictates the height of the water above the orifice. The 25mm VO output can be found in **Appendix C.7**. To confirm that the extended detention would occur for a minimum of 24 hours, *equation 4.11* of the MOE SWMPD Manual (2003) shown below, was used.

$$t = \frac{0.66C_2h^{1.5} + 2C_3h^{0.5}}{2.75A_O}$$

Where:

A_o = Cross-sectional area of orifice
C_2 = Slope co-efficient from the area-depth linear regression
C_3 = Intercept from the area-depth linear regression
h = Maximum water elevation above center-line of orifice
t = *Extended detention time*

Water stored in the extended detention portion of Pond 1 is to be controlled by a 120mm diameter orifice plate at an invert elevation of 274.00m. Water in Pond 2 will be controlled by a 125mm diameter orifice plate at an invert elevation of 280.00m. The values used in the above equation for each pond are summarized in **Table 7.25**. It was found that Pond 1 had an extended detention time of 25.7 hours and Pond 2 had a time of 30.7 hours, thus both the proposed orifice plates meet the 24 hour minimum detention time requirements. Detailed calculations can be found in **Appendix C.7**.

Table 7.25 Extended Detention Calculation Values

SWM Pond	A_o (m^2)	C_2	C_3	h (m)	t (hr)
Pond 1	π x (0.125/2)^2	2766.3	2295.9	0.390	25.7
Pond 2	π x (0.125/2)^2	1997.6	2660.0	0.488	30.7

7.9 Water Balance Mitigation

A water budget was completed in order to compare the long-term impacts to the local groundwater conditions as a result of the proposed development. The results of this water balance analysis indicate that the annual infiltration is decreased by 5,229 m^3/year (40%), due to the increase in impervious area from 47% to 53%. The decrease in infiltration will require mitigation measures in order to reduce the impact to the existing groundwater conditions.

As per the *Glenway Newmarket - Stormwater Management Report* (September 2016), the application of typical infiltration measures (i.e. infiltration trenches) is not feasible for this site due to the existing soil conditions and high groundwater levels. As per requirements provided in the *Stormwater Management Planning and Design Manual* prepared by the Ministry of the Environment (MOE), the groundwater table must be a minimum of 1m from the bottom of any infiltration facility. Infiltration facilities also typically require frost cover (minimum of 1.2m) if the facility involves any exfiltration pipes. In lieu of proposing typical infiltration measures below ground, it is proposed that the depth of topsoil be increased where possible within parks, boulevards and lots, depending on the existing soil conditions.

The water budget was completed in order to demonstrate the impacts on runoff and infiltration during post-development conditions, including the proposed mitigation measures of increased topsoil depth and disconnected rooftops. **Table 7.26** below summarizes the results of the annual water balance analysis. The detailed water balance calculations are provided in **Appendix C.8.**

Table 7.26 Table Water Balance Analysis Results

Condition	Evapotranspiration (m^3/year)	Infiltration (m3/year)	Runoff (m3/year)
Pre-development	125,155	13,218	101,483
Post-development w/o mitigation	104,383	7,989	136,204
Post-development w/ mitigation	104,383	19,493	124,700

As shown in **Table 7.26**, infiltration across the site will increase from 13,218m^3/year during pre-development conditions to 19,493m^3/year during post-development conditions with the above mentioned mitigation measures.

7.10 Low Impact Development

As discussed in **Section 7.9** above, typical infiltration-based LIDs are not feasible due to the high groundwater conditions and low permeability soils on site. As such it is proposed to increase the topsoil depth on site in order to decrease stormwater runoff and increase infiltration on site. Additionally, reduced lot grading and disconnection of roof downspouts is proposed wherever possible in order to increase the opportunity for infiltration on site.

8 Conclusions and Recommendations

Based on our review and analysis, we conclude the Glenway West development is readily serviceable and provide the following summary and recommendations:

Grading

The proposed road and lot grading scheme follows Town's Engineering Design Standards and respects the perimeter grades of the surrounding properties. The use of retaining walls within proposed lots will be minimized, however final heights and alignment will be determined at the detail design stage. Due to the significant grade differences across certain portions of the proposed development area, the use of Walk-

Out and Front Walk-Up lot grading types are proposed. The final grading design will seek to preserve existing perimeter trees where feasible.

The proposed grading respects the existing and proposed drainage patterns as defined in the SWM section of this report. Conceptual grading designs have been presented for the proposed development.

Water Supply

New watermains shall be constructed along all proposed private roads. One (1) water supply connection shall be permitted from the municipal watermain to each private low / medium density or Condo Blocks.

A water system hydraulic analysis was completed to demonstrate adequate flow and pressure within the existing water distribution network to service the proposed development and determine preliminary watermain sizes for new mains. The proposed system pressures within the subject site are between 339kPa and 617kPa under normal operation which are within the system operational pressures as suggested by MOE 2008.

The minimum pressure is slightly lower than the Town's preferred operational pressure (350kPa) and exceeds the Town's preferred pressure of 550kPa but are below 700kPa of MOE's maximum pressure requirement. Sufficient system pressure (higher than 140kPa) can be maintained within the proposed development under the fire condition.

The estimated water turnover rates under an average day water demand condition at these single feeds (with looped 50mm pipelines after the hydrants at Streets A and B) range from 6 to 10 hours. The estimated water turnover rates meet the Town's typical requirement of 24 hours if approximately 41% of the units are occupied at these Blocks (e.g. at Block 12 – Street 'B) and sufficient system pressures can be provided to these areas under the peak flow conditions.

Periodic watermain flushing shall be performed to ensure that adequate water turnover be maintained, especially under the initial build-outs condition at these single feed watermains, e.g. Block 12, by the Town and/or Owner.

The Town may use the information presented in this water servicing analysis to prepare a detailed hydraulic analysis or assessment of the Town's water supply system. The Town's water analysis will investigate the system demand, system storage and operational ranges of the pump capacity required to include the subject site as part of the system. Subject to the results of the Town's detailed hydraulic analysis, the water analysis for the subject development may need to be updated during detailed design.

Storm Drainage

Storm water conveyance will be accomplished by constructing new sewers through areas of proposed development with sewers designed to capture and convey the 5-year storm runoff. Storm sewers shall be oversized to accommodate the capture and conveyance of major system storm flows in the Northwestern and Southeastern drainage sheds. The Southwestern drainage area will direct storm runoff via a new sewer network directly to Pond 2.

Where proposed development conflicts with existing storm sewers, the existing sewers will be re-aligned and/or increased in size to convey the required flow.

Sanitary Sewers

New sewers will be required to service the proposed development areas and shall be designed in compliance with current Town standards. The proposed development will generate a total peak sanitary flow rate of 12.99L/s and individual sanitary sewer connections to the existing sewer network are feasible at various locations.

With respect to downstream sanitary sewer capacity within the Western Sub-Trunk, the analysis for this infrastructure will be completed by the Town's consulting engineer through an update of the previously completed capacity model prepared as part of municipal master planning and reporting.

Stormwater Management

A SWM plan is proposed to reduce the increase in runoff volumes and peak flows as a result of change in land use for the proposed Glenway West re-development. In order to meet the design criteria set forth by the Town, LSRCA and the MOE, quantity and quality control measures are proposed. The retrofitted SWM Ponds 1 and 2 have also been redesigned to the Town of Newmarket standards for grading, storage depth and volume requirements.

The proposed retrofitted of Ponds 1 and 2 is designed to meet quantity control requirements for the Glenway West re-development within catchments A1 Post, A2 Post, and A2-Ext Post. Existing Pond 6 is to remain in order to meet quantity control requirements for the Glenway West re-development within catchment A3-2 Post. Proposed SWM Pond 1 was designed such that pre-development target flow rates from the existing pond are maintained under post-development conditions for the 24-hour SCS, 12-hour SCS and 4-hour Chicago storm distributions. SWM Pond 2 was designed to over control the outflow in order to help alleviate downstream Pond 1's capacity constraints. Discharge rates from existing Ponds 4 and 6 were evaluated for the three (3) storm distributions to ensure that the existing outflows from these ponds, as per *Glenway Newmarket - Stormwater Management Report* (September 2016), are maintained.

It was confirmed as part of the Glenway West SWM analysis that the 4-hour Chicago 100-year discharge rate from existing Pond 3 did not exceed the pipe capacity target, as per *Glenway Newmarket - Stormwater Management Report* (September 2016), under post-development conditions. It was also confirmed that the storage capacities of proposed Pond 1 and 2 as well as existing Ponds 3, 4 and 6 meet the quantity control requirements for the proposed Glenway West re-development.

Quality control targets were based on MOE Level 1 protection and assumed the existing ponds had no quality treatment as part of the original design. The proposed retrofit of Pond 1 and Pond 2 has been designed to provide adequate storage to allow for the required protection level to be met with respect to area A1 Post for Pond 1 and areas A2-Ext Post and A2 Post for Pond 2. Existing Pond 6 can meet quality control requirements for the Glenway West re-development within catchment A3-2 Post. As part of LSRCA requirements and the Lake Simcoe Protection Plan, measures have been taken to reduce the phosphorus loading from the new development through the use of wet SWM ponds, which provide 63% removal efficiency. The phosphorus loading rates are decreased under post-development conditions below pre-development phosphorus loading rates.

Water balance can be achieved with the use of increased topsoil depth across the site, with roof downspouts disconnected and directed to at grade pervious surfaces.

BLOCK 13
MEDIUM DENSITY
RESIDENTIAL
2.57ha (6.35ac)

BLOCK 15
PARKLAND
0.26ha (0.64ac)

BLOCK 17
OPEN SPACE/SWM POND
1.15ha (2.84ac)

BLOCK 12
RESIDENTIAL
AREA 4.59ha (11.35ac)

BLOCK 16
PARKLAND
AREA 0.36ha (0.89ac)

BLOCK 14
PARKLAND
0.29ha (0.72ac)

LANDS SUBJECT TO
EASEMENT FOR
RECREATIONAL TRAIL

POTENTIAL
CONNECTION
TO FUTURE
PARK

ADDITIONAL LANDS OWNED BY APPLICANT

STREET A

STREET B

STYLES ROAD

BORLAND COURT

AMBERLEE COURT

OTTON ROAD

ALEX DONER DRIVE

MATHEWS COURT

KIRBY CRESCENT

EX. PARKLAND

BATHURST STREET

RHODES CIRCLE

BINNS AVE.

GRADING PLAN

MARIANNEVILLE DEVELOPMENT LTD.
ESTATES OF GLENWAY NEWMARKET
TOWN OF NEWMARKET

DATE:	JANUARY 2020	PROJECT No.:	L09-301
SCALE:	1:1000	FIGURE No.:	GR-1

COLE ENGINEERING
70 VALLEYWOOD DR., MARKHAM, ON L3R 4T5
T:416.987.6161 / 905.940.6161 F:905.940.2064

LEGEND

×271.56	EX. GRADE
×272.00	PROPOSED GRADE
2.0%	PROPOSED SLOPE
F	FRONT DRAINAGE TYPE LOT
S	SPLIT DRAINAGE TYPE LOT
D	DECK/BACKSPLIT TYPE LOT
WO	WALKOUT TYPE LOT
FW	FRONT WALKUP TYPE LOT

EX. DIRECTION OF MAJOR DRAINAGE FLOWS

POST DEV. DIRECTION OF MAJOR DRAINAGE FLOWS

EXISTING TREE

MOSAIK GLENWAY HOMES INC.
RESIDENTIAL DEVELOPMENT

BLOCK 18
SWM POND
0.88ha (2.17 ac)

BLOCK 168
RESIDENTIAL
EXISTING

BLOCK 11
RESIDENTIAL
AREA 2.01ha (4.97ac)

BLOCK 15
PARKLAND
0.26ha (0.64ac)

BLOCK 17
OPEN SPACE/SWM POND
1.15ha (2.84ac)

BLOCK 12
RESIDENTIAL
AREA 4.59ha (11.35ac)

BLOCK 16
PARKLAND
AREA 0.36ha (0.89ac)

LANDS SUBJECT TO
EASEMENT FOR
RECREATIONAL TRAIL

BLOCK 14
PARKLAND
0.29ha (0.72ac)

ADDITIONAL LANDS OWNED BY APPLICANT

ALEX DONER DRIVE
MATHEWS COURT
STATS ROAD
BORLAND COURT
AMBERLEE COURT
OTTON ROAD
STREET A
STREET B
EX. O/H HYDRO CORRIDOR
EX. PARKLAND
KIRBY CRESCENT
BROSSLAND
REG HARRISON TRAIL

GRADING PLAN

MARIANNEVILLE DEVELOPMENT LTD.
ESTATES OF GLENWAY NEWMARKET
TOWN OF NEWMARKET

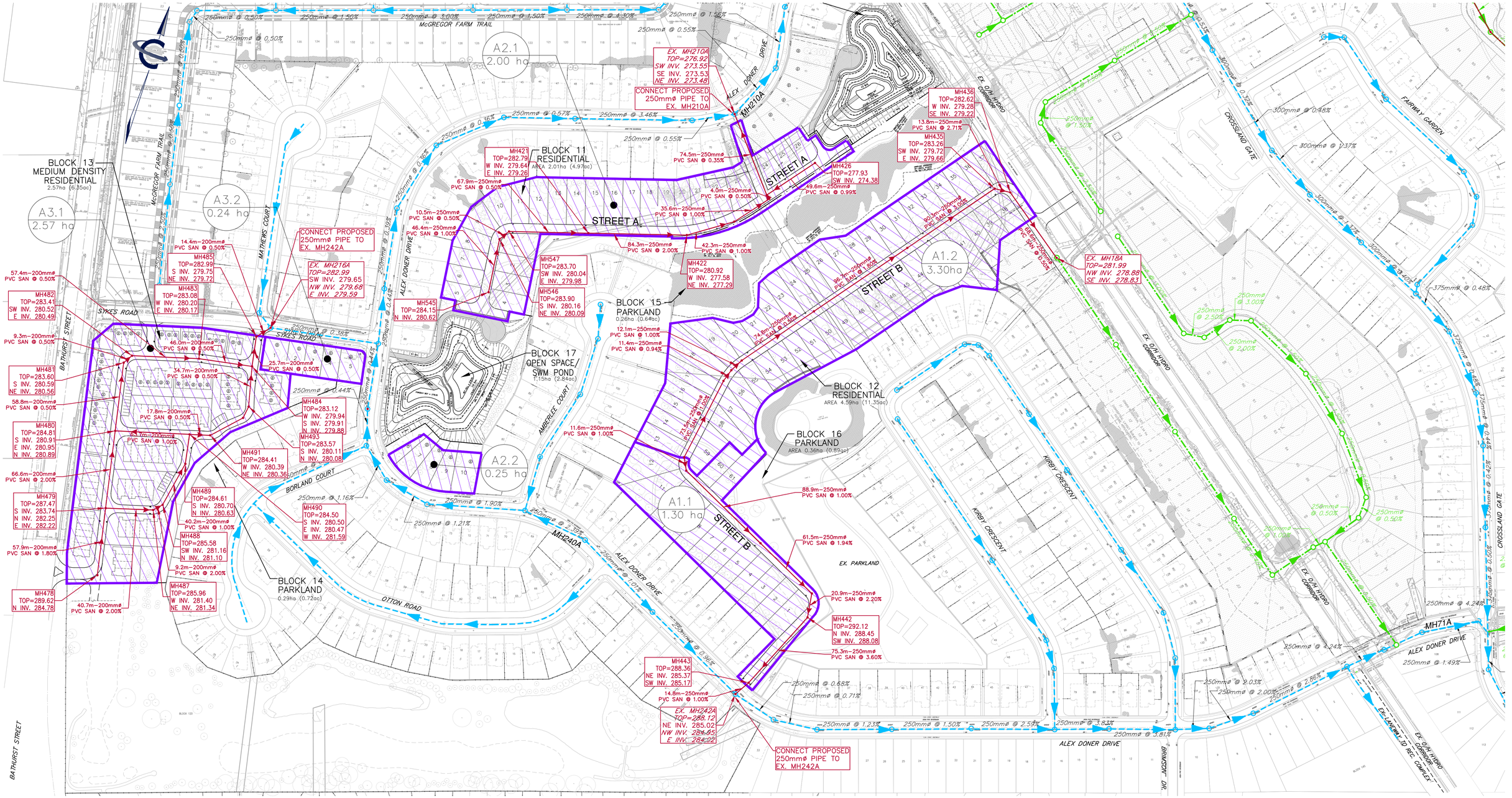
DATE:	JANUARY 2020	PROJECT No.:	L09-301
SCALE:	1:1000	FIGURE No.:	GR-2

COLE ENGINEERING
70 VALLEYWOOD DR., MARKHAM, ON L3R 4T5
T:416.987.6161 / 905.940.6161 F:905.940.2064

LEGEND

×271.56	EX. GRADE
×272.00	PROPOSED GRADE
2.0%	PROPOSED SLOPE
F	FRONT DRAINAGE TYPE LOT
S	SPLIT DRAINAGE TYPE LOT
D	DECK/BACKSPLIT TYPE LOT
WO	WALKOUT TYPE LOT
FW	FRONT WALKUP TYPE LOT

EX. DIRECTION OF MAJOR DRAINAGE FLOWS
POST DEV. DIRECTION OF MAJOR DRAINAGE FLOWS
EXISTING TREE



NOTE:
ALL PROPOSED SANITARY SEWERS ARE 250mmØ

LEGEND

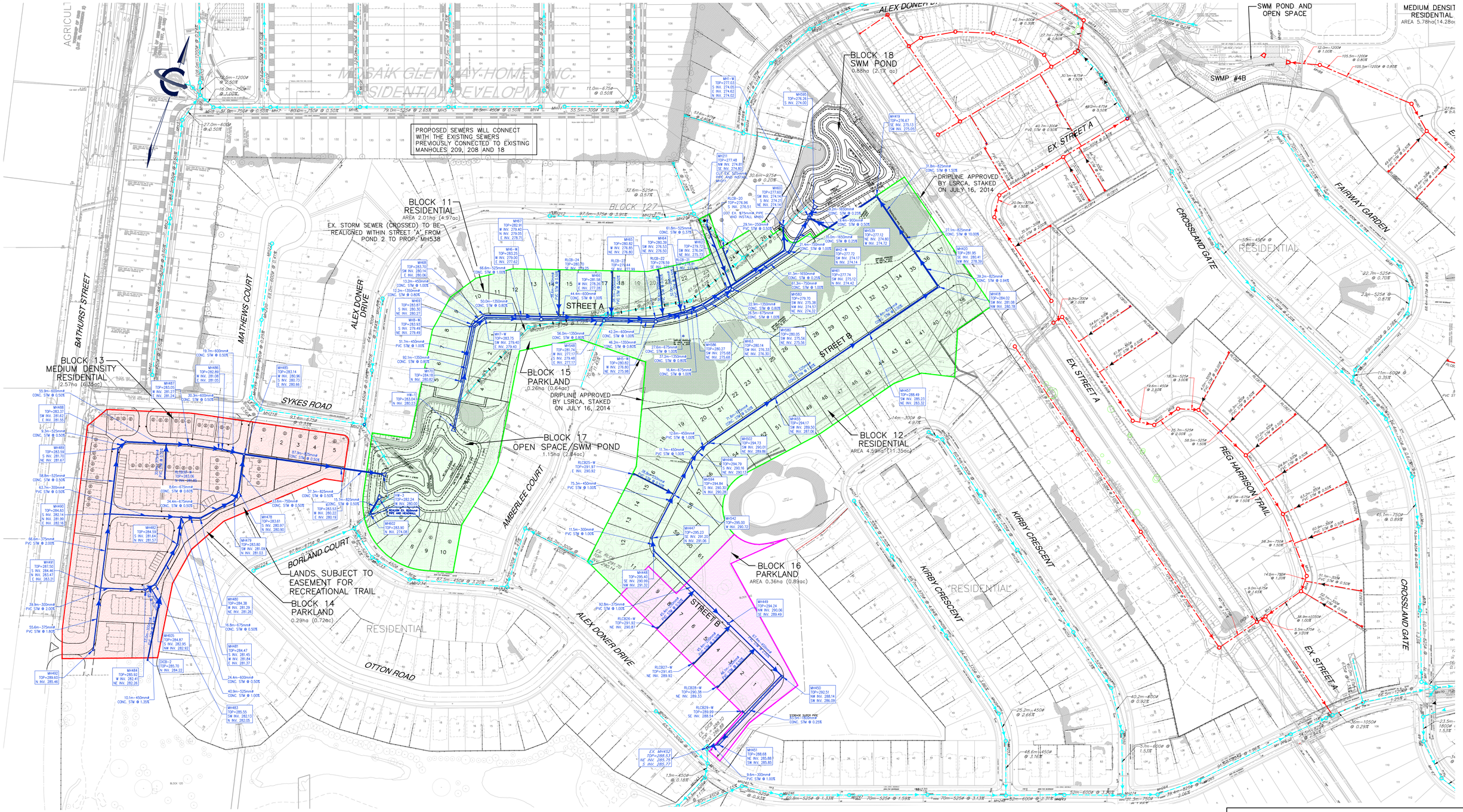
- EXISTING SANITARY SEWER
- PHASE 1 – APPROVED BY TOWN
- PROPOSED SANITARY SEWER
- PROPOSED DRAINAGE AREA
- PHASE 1– APPROVED BY TOWN DRAINAGE AREA – SINGLE FAMILY LOTS, TOWNHOUSES & MEDIUM DENSITY RESIDENTIAL

SANITARY DRAINAGE PLAN

MARIANNEVILLE DEVELOPMENTS LTD.
ESTATES OF GLENWAY NEWMARKET
TOWN OF NEWMARKET

DATE:	JANUARY 2020	PROJECT No.:	L09-301
SCALE:	1:1500	DRAWING No.:	SAN-1

COLE ENGINEERING
70 VALLEYWOOD DR., MARKHAM, ON L3R 4T5
T:416.987.6161 / 905.940.6161 F:905.940.2064



LEGEND

- EX. STORM SEWER
- PHASE 1 - APPROVED BY TOWN
- PROPOSED STORM SEWER
- NORTHWESTERN DRAINAGE SHED (AREA ENCLOSED)
- SOUTHEASTERN DRAINAGE SHED (AREA ENCLOSED)
- SOUTHWESTERN DRAINAGE SHED (AREA ENCLOSED)

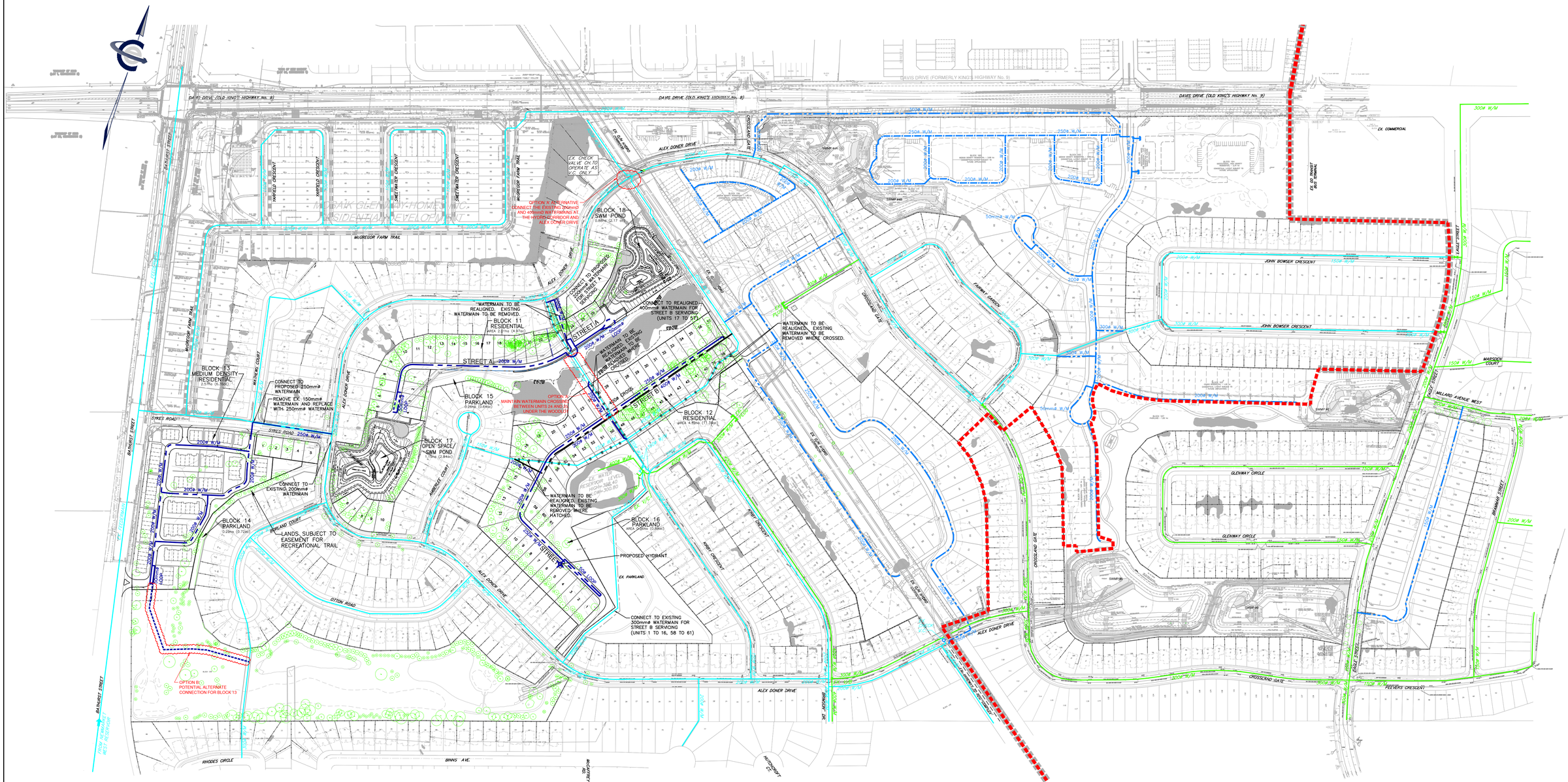
MH7—W
TOP 283.94
E 279.38
SW 279.38
— PIPE INVERT ELEVATION

STORM SEWER SYSTEM PLAN

MARIANNEVILLE DEVELOPMENTS LTD.
ESTATES OF GLENWAY NEWMARKET
TOWN OF NEWMARKET

DATE:	JANUARY 2020	PROJECT No.:	L09-301
SCALE:	1:1500	FIGURE No.:	STM-1

COLE ENGINEERING
70 VALLEYWOOD DR., MARKHAM, ON L3R 4T5
T:416.987.6161 / 905.940.6161 F:905.940.2064



LEGEND

- PROP. WATERMAIN IN PRIVATE LANDS IN NEWMARKET WEST P.D.
- EX. WATERMAIN IN NEWMARKET WEST P.D.
- GLENWAY EAST MUNICIPAL WATERMAIN IN NEWMARKET WEST P.D.
- GLENWAY EAST WATERMAIN IN PRIVATE LAND IN NEWMARKET WEST P.D.
- EX. WATERMAIN IN NEWMARKET CENTRAL P.D.
- EXISTING EASEMENT
- EXISTING PRESSURE DISTRICT BOUNDARY

WATERMAIN NETWORK LAYOUT

MARIANNEVILLE DEVELOPMENTS LTD.
ESTATES OF GLENWAY NEWMARKET
TOWN OF NEWMARKET

DATE:	JANUARY 2020	PROJECT No.:	L09-301
SCALE:	1:2500	DRAWING No.:	WAT-1

COLE ENGINEERING
70 VALLEYWOOD DR., MARKHAM, ON L3R 4T5
T:416.987.6161 / 905.940.6161 F:905.940.2064

File : P:\mrk\2009\L09-301 Mariannevile Development - Newmarket\WEST\Cad\Sheets\WAT 1 - WATERMAIN.dwg, Date :Jan 27, 2020 - 6:04pm, Edit By : DMa

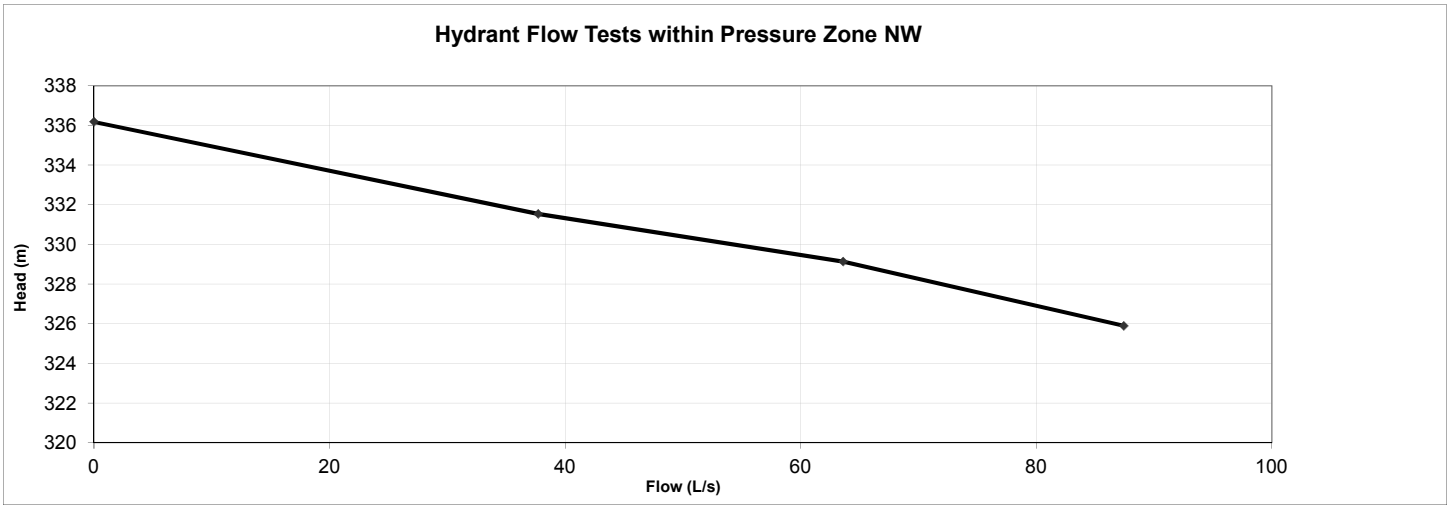
APPENDIX A
Water Distribution System Analysis

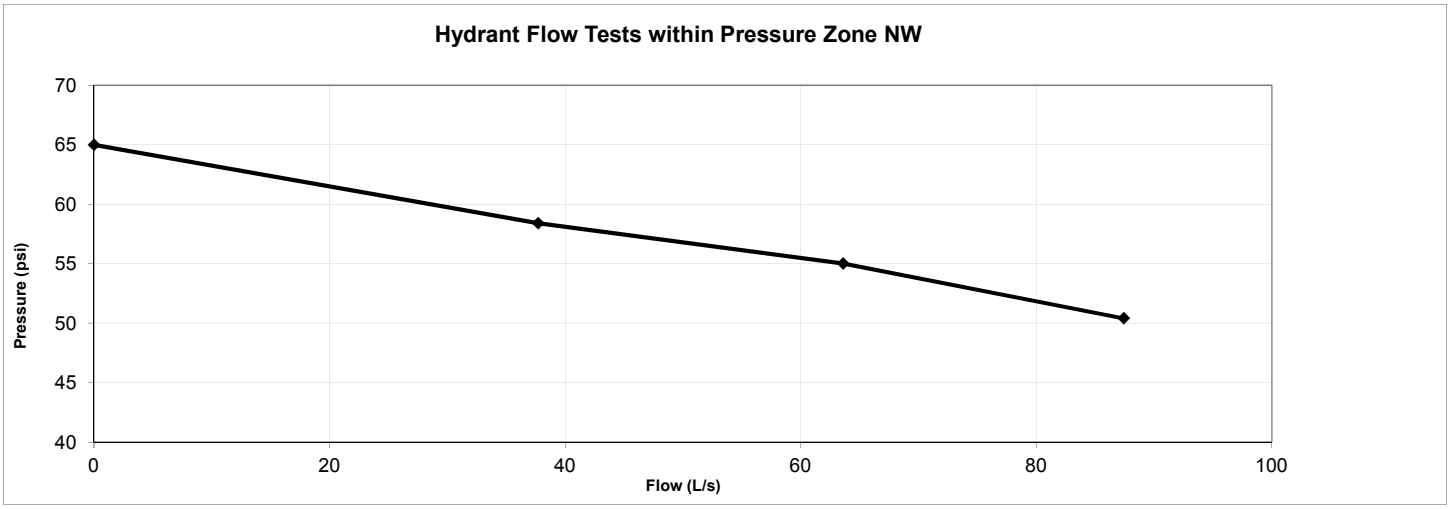
APPENDIX A.1-1
Fire Flow Test Analysis

Fire Flow Test Analysis

Project: L09-301
Date: Feb 30 2012
File:L09-301 fire flow estimation.xls

Test No.	Location for Pressure Measurement	Location for Flow	Date/Time	Elevation (m)	Flow		Pressure		Head
					UPGPM	L/s	(psi)	(m)	(m)
Newmarket West Pressure District	371 Amberlee Ct.	381 Amberlee Ct.	Oct 15 2009 9:00 am	290	0	0	65	46	336
					597	38	58	41	332
					1007	64	55	39	329
					1384	87	50	35	326





Applied
Fire Technology Inc.
Since 1987 — Design • Consulting • Testing • Inspection

WATER SUPPLY TEST

Name of risk: ..... File No.: .....

Address: 371 AMBERLEE CT. Test by: AFT

Municipality: NEW MARKET, ONT Date: OCT. 15 2009

SYSTEM DATA:

Size of Main: 6" Dead End: ..... Two Ways: ✓ Loop: .....

Source Reliable: YES If not explain: .....

Comments: .....

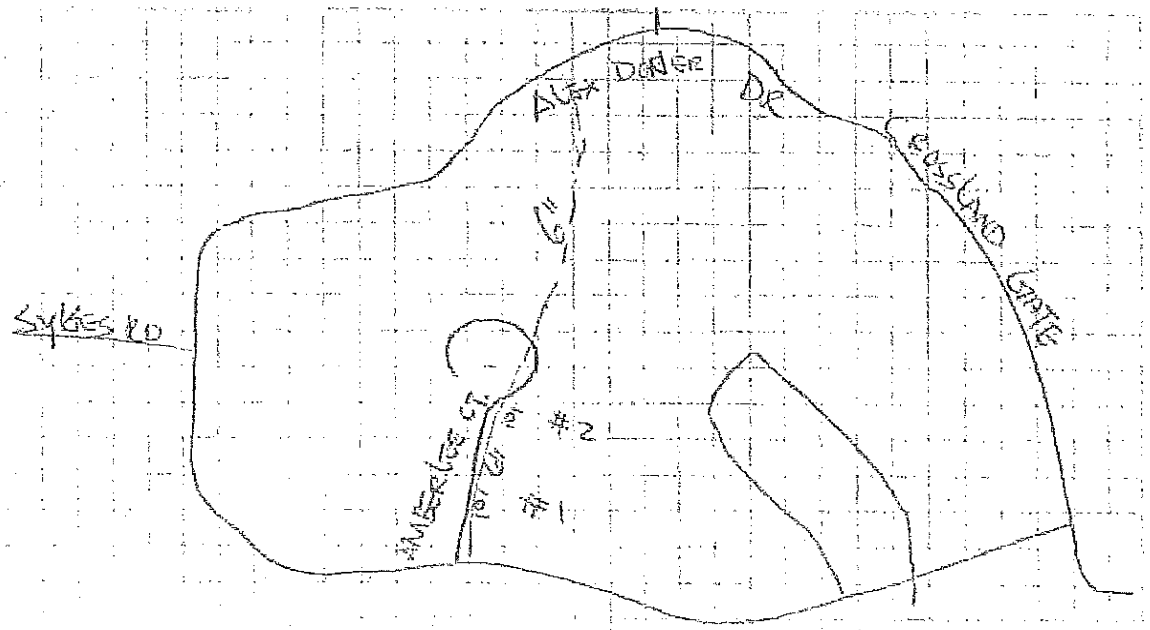
TEST DATA:

Location of test fire hydrants; Residual: #1 371 AMBERLEE CT

Flow: #2 381 AMBERLEE CT

Static pressure 65 psi Time: 900 A.M. — P.M.

Test No.	No. of Outlets	Orifice Size (in.)	Pitot Reading (psi)	Equivalent Flow gpm (U.S.)	Total Flow gpm (U.S.)	Residual Pressure (psi)	Comments
1	1	1¾	43	599	597	68	0.997
2	1	2½	36	1119	1007	55	0.9
3	2	2½	17, 17	769, 769	1384	50	0.9
4							



Sketch by: RW.

Scale: NTS

Name and address of municipal authority who should receive a copy.

PUC

STATIC: 65 PSI

(1) 597 USGPM@ 58 PSI

(2) 1007 USGPM@ 55 PSI

(3) 1384 USGPM@ 50 PSI

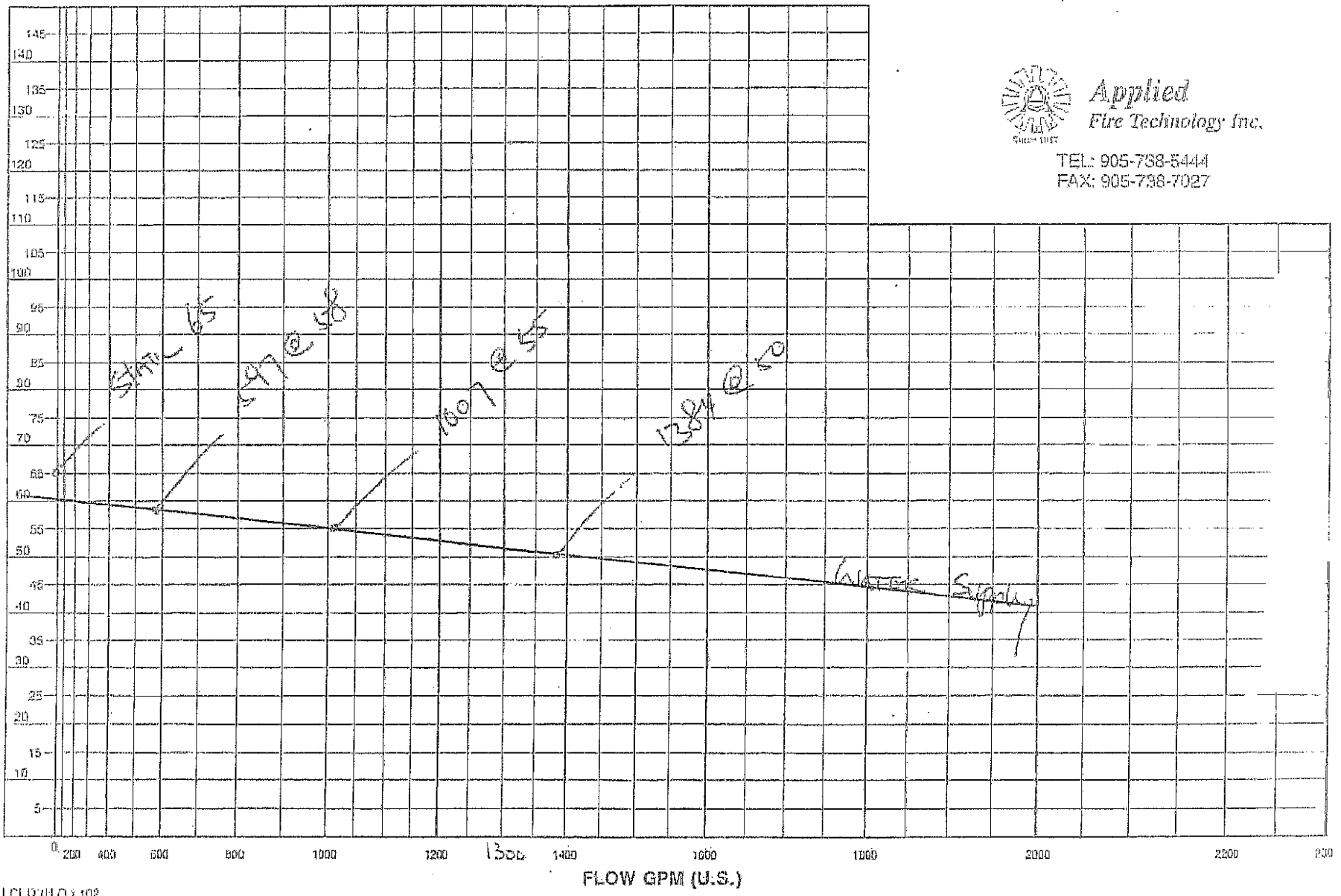
NAME OF RISK: _____ FILE NO.: _____

STREET: 381 AMBERLEE CT

CITY: NEWMARKET, ON.

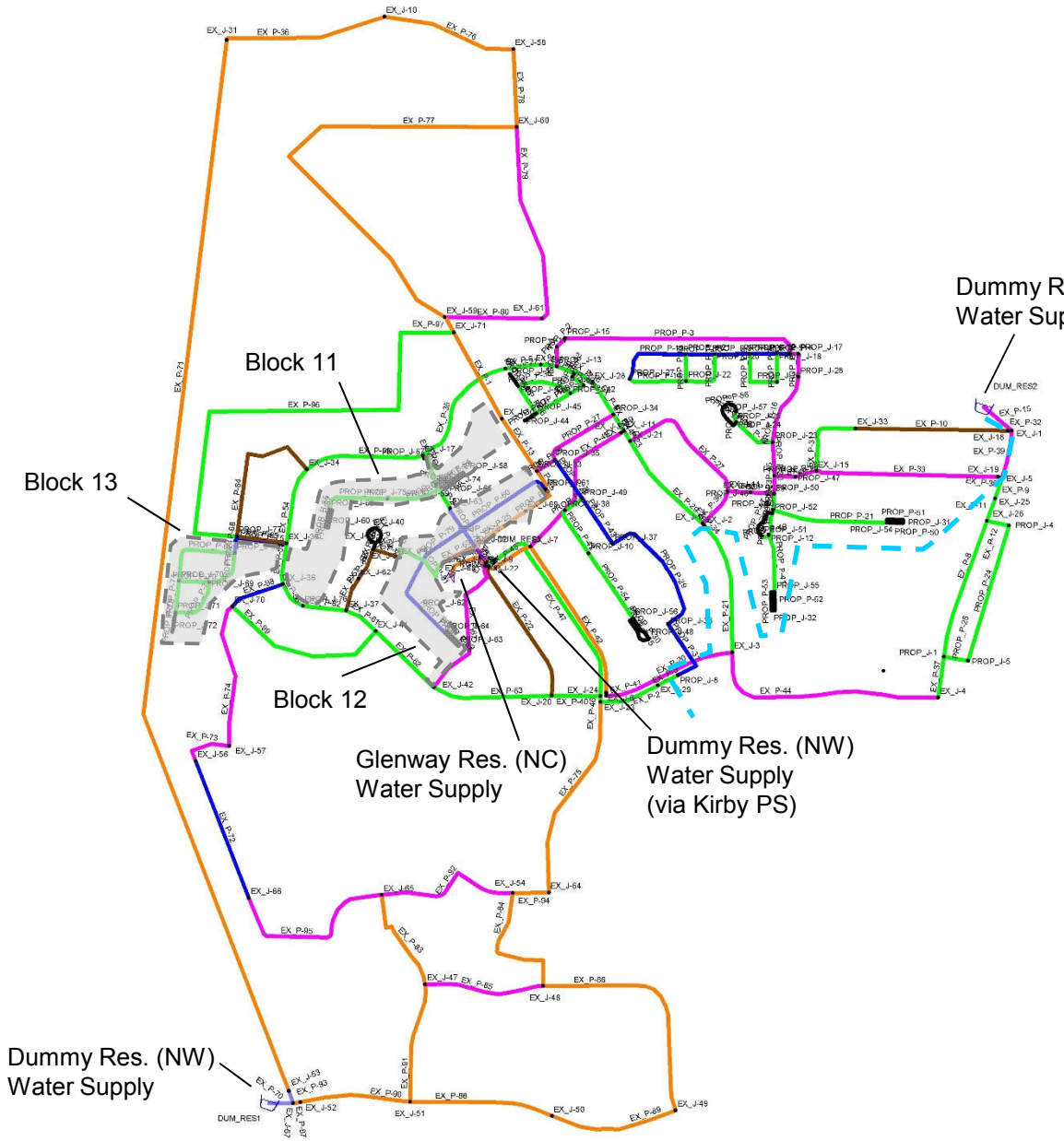
DATE: OCT 15 2009 BY: AFT

Applied Fire Technology Inc.
TEL: 905-738-5444
FAX: 905-738-7027



LCD 07(H.O.) 102

APPENDIX A.1-2
Schematic Model Layout



Legend

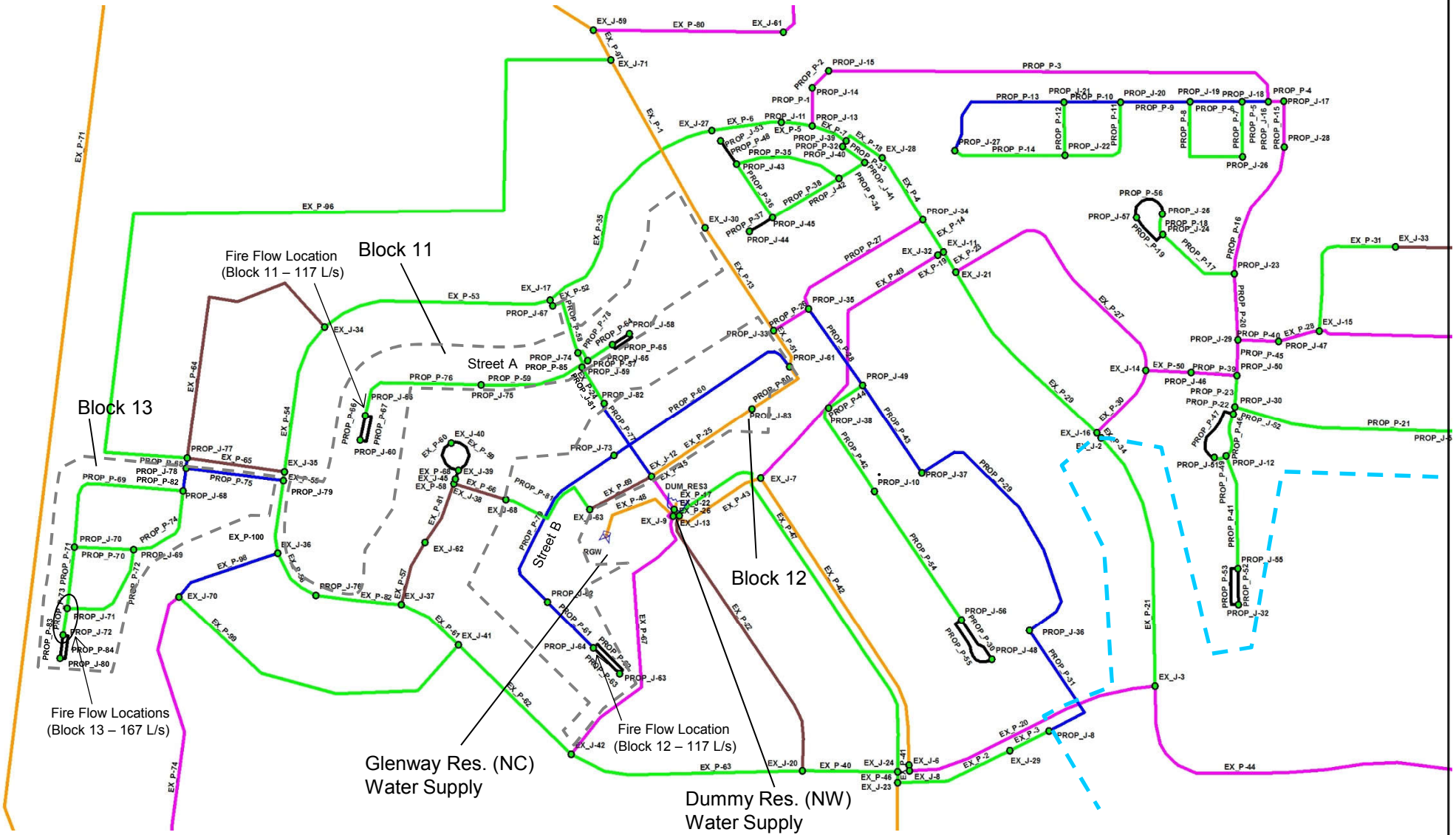
- 50 mm Watermain
- 150 mm Watermain
- 200 mm Watermain
- 250 mm Watermain
- 300 mm Watermain
- 400 mm Watermain
- 600 mm Watermain
- NW/NC District Boundary
- Subject Site

COLE ENGINEERING

Estates of Glenway West
Water Servicing Analysis

Water Schematic Layout

DATE:	PROJ. No.:	FIGURE No:
January 2018	L09-301	Appendix A.1-2.1



Legend

- 50 mm Watermain
- 150 mm Watermain
- 200 mm Watermain
- 250 mm Watermain
- 300 mm Watermain
- 400 mm Watermain
- 600 mm Watermain
- NW/NC District Boundary
- Subject Site

COLE ENGINEERING

Estates of Glenway West
Water Servicing Analysis

Water Schematic Layout

DATE:	PROJ. No.:	FIGURE No:
January 2018	L09-301	Appendix A.1-2.2

APPENDIX A.1-3
Water Model Outputs

Junction output under Minimum Hour Condition

ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (m)	Pressure (kPa)	Remark
Junction Nodes within Subject Site (Glenway West site)						
PROP_J-62	0.0	295.7	340.0	44.3	434	
PROP_J-73	0.0	294.5	340.0	45.5	446	
PROP_J-64	0.3	294.1	340.0	45.9	450	
PROP_J-63	0.0	292.9	340.0	47.1	461	
PROP_J-82	0.0	291.0	340.0	49.0	480	
PROP_J-80	0.0	289.5	340.0	50.5	495	
PROP_J-72	0.0	289.0	340.0	51.0	500	
PROP_J-83	0.0	289.0	340.0	51.0	500	
PROP_J-71	0.4	287.5	340.0	52.5	514	
PROP_J-76	0.0	285.1	340.0	54.9	538	
PROP_J-70	0.0	284.9	340.0	55.1	540	
PROP_J-69	0.0	284.5	340.0	55.5	544	
PROP_J-60	0.0	284.2	340.0	55.8	547	
PROP_J-66	0.1	284.1	340.0	55.9	548	
PROP_J-79	0.0	283.4	340.0	56.6	554	
PROP_J-77	0.0	283.0	340.0	57.0	558	
PROP_J-78	0.0	282.9	340.0	57.1	559	
PROP_J-68	0.0	282.9	340.0	57.1	559	
PROP_J-61	0.0	282.5	340.0	57.5	563	
PROP_J-75	0.0	282.0	340.0	58.0	568	
PROP_J-59	0.0	280.4	340.0	59.6	584	
PROP_J-74	0.0	280.4	340.0	59.6	584	
PROP_J-81	0.0	280.4	340.0	59.6	584	
PROP_J-65	0.0	279.3	340.0	60.7	595	
PROP_J-58	0.0	278.0	340.0	62.0	607	
PROP_J-67	0.0	277.0	340.0	63.0	617	
Junction Nodes within Glenway East site						
PROP_J-38	0.0	281.9	340.0	58.1	570	
PROP_J-17	0.8	281.7	340.0	58.3	571	
PROP_J-16	0.0	281.7	340.0	58.3	571	
PROP_J-33	0.0	281.3	340.0	58.7	575	
PROP_J-28	0.0	281.1	340.0	58.9	577	
PROP_J-47	0.0	281.0	340.0	59.0	578	
PROP_J-18	0.0	280.2	340.0	59.8	586	
PROP_J-49	0.0	280.0	340.0	60.0	588	
PROP_J-10	0.0	280.0	340.0	60.0	588	
PROP_J-35	0.0	279.1	340.0	60.9	596	
PROP_J-19	0.0	278.9	340.0	61.1	599	
PROP_J-26	0.0	278.8	340.0	61.2	600	
PROP_J-37	0.3	278.3	340.0	61.7	605	
PROP_J-23	0.0	277.6	340.0	62.4	612	
PROP_J-20	0.0	277.3	340.0	62.7	614	
PROP_J-29	0.0	276.8	340.0	63.2	619	
PROP_J-24	0.0	276.6	340.0	63.4	621	
PROP_J-50	0.0	276.5	340.0	63.5	622	
PROP_J-57	0.0	276.3	340.0	63.7	624	
PROP_J-25	0.0	276.3	340.0	63.7	624	
PROP_J-54	0.1	276.0	340.0	64.0	627	
PROP_J-56	0.1	276.0	340.0	64.0	627	
PROP_J-21	0.0	275.8	340.0	64.2	629	
PROP_J-52	0.0	275.5	340.0	64.5	632	
PROP_J-30	0.2	275.5	340.0	64.5	632	
PROP_J-34	0.0	275.2	340.0	64.8	635	
PROP_J-48	0.0	274.9	340.0	65.1	638	
PROP_J-12	0.0	274.7	340.0	65.3	640	
PROP_J-51	0.0	274.7	340.0	65.3	640	
PROP_J-41	0.0	274.6	340.0	65.4	641	
PROP_J-22	0.0	274.4	340.0	65.6	642	
PROP_J-42	0.0	274.2	340.0	65.8	645	
PROP_J-36	0.0	274.1	340.0	65.9	646	
PROP_J-44	0.0	274.1	340.0	65.9	646	
PROP_J-45	0.5	274.1	340.0	65.9	646	
PROP_J-8	0.0	273.9	340.0	66.1	647	
PROP_J-43	0.0	273.6	340.0	66.4	651	
PROP_J-39	0.0	273.5	340.0	66.5	652	
PROP_J-40	0.0	273.5	340.0	66.5	652	
PROP_J-53	0.0	273.4	340.0	66.6	652	
PROP_J-31	0.0	273.0	340.0	67.0	656	
PROP_J-11	0.2	272.6	340.0	67.4	661	
PROP_J-46	0.0	272.5	340.0	67.5	661	
PROP_J-13	0.0	272.4	340.0	67.6	662	
PROP_J-27	0.5	272.4	340.0	67.6	662	
PROP_J-55	0.0	272.0	340.0	68.0	666	
PROP_J-14	0.0	271.9	340.0	68.1	667	
PROP_J-15	0.0	271.3	340.0	68.7	673	
PROP_J-32	0.0	270.7	340.0	69.3	679	

Junction output under Minimum Hour Condition

ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (m)	Pressure (kPa)	Remark
Existing Junction Nodes (NW)						
EX_J-63	0.0	299.0	340.0	41.0	402	
EX_J-13	0.0	296.7	340.0	43.3	424	
EX_J-66	0.6	296.0	340.0	44.0	431	
EX_J-57	2.0	294.0	340.0	46.0	451	
EX_J-56	0.0	293.0	340.0	47.0	460	
EX_J-53	0.0	292.3	340.0	47.7	468	
EX_J-68	0.0	292.0	340.0	48.0	470	
EX_J-52	0.0	291.6	340.0	48.4	474	
EX_J-12	0.0	291.0	340.0	49.0	480	
EX_J-22	0.9	291.0	340.0	49.0	480	
EX_J-41	0.0	290.6	340.0	49.4	484	
EX_J-62	0.0	290.0	340.0	50.0	490	
EX_J-67	0.8	290.0	340.0	50.0	490	
EX_J-38	0.0	289.3	340.0	50.7	497	
EX_J-39	0.0	289.0	340.0	51.0	500	
EX_J-45	0.0	289.0	340.0	51.0	500	
EX_J-37	0.0	288.5	340.0	51.5	505	
EX_J-42	3.0	288.4	340.0	51.6	506	
EX_J-40	0.0	288.0	340.0	52.0	509	
EX_J-51	0.0	287.4	340.0	52.6	516	
EX_J-34	0.0	287.0	340.0	53.0	519	
EX_J-47	2.0	286.6	340.0	53.4	523	
EX_J-65	0.6	286.5	340.0	53.5	524	
EX_J-70	0.0	285.0	340.0	55.0	539	
EX_J-20	0.0	284.0	340.0	56.0	549	
EX_J-36	0.6	283.5	340.0	56.5	554	
EX_J-35	0.0	283.0	340.0	57.0	558	
EX_J-10	0.0	282.3	340.0	57.7	565	
EX_J-15	0.0	281.0	340.0	59.0	578	
EX_J-23	0.9	281.0	340.0	59.0	578	
EX_J-50	2.0	280.4	340.0	59.6	584	
EX_J-64	0.8	280.0	340.0	60.0	588	
EX_J-33	0.0	279.5	340.0	60.5	593	
EX_J-24	0.0	279.5	340.0	60.5	593	
EX_J-48	0.0	278.2	340.0	61.8	605	
EX_J-59	0.0	278.0	340.0	62.0	607	
EX_J-71	0.0	278.0	340.0	62.0	607	
EX_J-54	0.0	277.7	340.0	62.3	610	
EX_J-17	0.0	277.0	340.0	63.0	617	
EX_J-29	0.0	276.3	340.0	63.7	624	
EX_J-49	1.6	276.1	340.0	63.9	626	
EX_J-58	4.0	276.0	340.0	64.0	627	
EX_J-30	0.0	276.0	340.0	64.0	627	
EX_J-18	0.0	275.0	340.0	65.0	637	
EX_J-28	0.0	274.5	340.0	65.5	642	
EX_J-21	0.0	274.1	340.0	65.9	646	
EX_J-11	0.0	274.1	340.0	65.9	646	
EX_J-32	0.0	274.1	340.0	65.9	646	
EX_J-60	2.0	274.0	340.0	66.0	647	
EX_J-19	0.0	274.0	340.0	66.0	647	
EX_J-27	0.0	273.3	340.0	66.7	653	
EX_J-61	3.0	273.0	340.0	67.0	656	
EX_J-14	0.0	272.5	340.0	67.5	661	
EX_J-16	0.0	272.0	340.0	68.0	666	
EX_J-31	1.9	268.0	340.0	72.0	705	

Reservoir			
ID	Flow (L/s)	Head (m)	Remark
DUM_RES1	-13.9	340.0	
DUM_RES3	-16.1	340.0	

Junction output under Average Day Condition

ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (m)	Pressure (kPa)	Remark
Junction Nodes within Subject Site (Glenway West site)						
PROP_J-62	0.0	295.7	340.0	44.3	434	
PROP_J-73	0.0	294.5	340.0	45.5	445	
PROP_J-64	0.7	294.1	340.0	45.9	449	
PROP_J-63	0.0	292.9	340.0	47.1	461	
PROP_J-82	0.0	291.0	340.0	49.0	480	
PROP_J-80	0.0	289.5	339.9	50.4	494	
PROP_J-72	0.0	289.0	339.9	50.9	499	
PROP_J-83	0.0	289.0	340.0	51.0	499	
PROP_J-71	1.0	287.5	339.9	52.4	514	
PROP_J-76	0.1	285.1	340.0	54.9	537	
PROP_J-70	0.0	284.9	339.9	55.0	539	
PROP_J-69	0.0	284.5	339.9	55.4	543	
PROP_J-60	0.0	284.2	340.0	55.8	546	
PROP_J-66	0.3	284.1	340.0	55.9	547	
PROP_J-79	0.0	283.4	339.9	56.5	554	
PROP_J-77	0.1	283.0	339.9	56.9	558	
PROP_J-78	0.0	282.9	339.9	57.0	559	
PROP_J-68	0.0	282.9	339.9	57.0	559	
PROP_J-61	0.0	282.5	340.0	57.5	563	
PROP_J-75	0.0	282.0	340.0	58.0	568	
PROP_J-59	0.0	280.4	340.0	59.6	584	
PROP_J-74	0.0	280.4	340.0	59.6	584	
PROP_J-81	0.0	280.4	340.0	59.6	584	
PROP_J-65	0.0	279.3	340.0	60.7	594	
PROP_J-58	0.0	278.0	340.0	62.0	607	
PROP_J-67	0.0	277.0	340.0	63.0	617	
Junction Nodes within Glenway East site						
PROP_J-38	0.0	281.9	340.0	58.1	569	
PROP_J-17	2.0	281.7	339.9	58.2	571	
PROP_J-16	0.0	281.7	339.9	58.2	571	
PROP_J-33	0.0	281.3	340.0	58.7	575	
PROP_J-28	0.0	281.1	339.9	58.9	577	
PROP_J-47	0.0	281.0	339.9	58.9	578	
PROP_J-18	0.0	280.2	339.9	59.7	585	
PROP_J-49	0.0	280.0	340.0	59.9	587	
PROP_J-10	0.0	280.0	340.0	60.0	587	
PROP_J-35	0.0	279.1	340.0	60.8	596	
PROP_J-19	0.0	278.9	339.9	61.1	599	
PROP_J-26	0.0	278.8	339.9	61.2	600	
PROP_J-37	0.7	278.3	340.0	61.7	604	
PROP_J-23	0.0	277.6	339.9	62.4	611	
PROP_J-20	0.0	277.3	339.9	62.6	613	
PROP_J-29	0.0	276.8	339.9	63.1	618	
PROP_J-24	0.0	276.6	339.9	63.3	620	
PROP_J-50	0.0	276.5	339.9	63.4	622	
PROP_J-57	0.1	276.3	339.9	63.6	623	
PROP_J-25	0.1	276.3	339.9	63.6	623	
PROP_J-54	0.2	276.0	339.9	63.9	627	
PROP_J-56	0.2	276.0	340.0	64.0	627	
PROP_J-21	0.0	275.8	339.9	64.1	628	
PROP_J-52	0.0	275.5	339.9	64.4	631	
PROP_J-30	0.5	275.5	339.9	64.4	631	
PROP_J-34	0.0	275.2	340.0	64.8	635	
PROP_J-48	0.1	274.9	340.0	65.0	637	
PROP_J-12	0.0	274.7	339.9	65.3	640	
PROP_J-51	0.0	274.7	339.9	65.3	640	
PROP_J-41	0.0	274.6	339.9	65.3	640	
PROP_J-22	0.0	274.4	339.9	65.5	642	
PROP_J-42	0.0	274.2	339.9	65.8	645	
PROP_J-36	0.0	274.1	340.0	65.8	645	
PROP_J-44	0.0	274.1	339.9	65.9	645	
PROP_J-45	1.3	274.1	339.9	65.9	645	
PROP_J-8	0.0	273.9	340.0	66.0	647	
PROP_J-43	0.0	273.6	339.9	66.3	650	
PROP_J-40	0.0	273.5	339.9	66.5	651	
PROP_J-39	0.0	273.5	339.9	66.5	651	
PROP_J-53	0.0	273.4	339.9	66.5	652	
PROP_J-31	0.0	273.0	339.9	66.9	656	
PROP_J-11	0.5	272.6	339.9	67.4	660	
PROP_J-46	0.0	272.5	339.9	67.4	661	
PROP_J-13	0.0	272.4	339.9	67.5	661	
PROP_J-27	1.3	272.4	339.9	67.5	662	
PROP_J-55	0.1	272.0	339.9	67.9	666	
PROP_J-14	0.0	271.9	339.9	68.0	667	
PROP_J-15	0.0	271.3	339.9	68.6	672	
PROP_J-32	0.0	270.7	339.9	69.2	679	

Junction output under Average Day Condition

ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (m)	Pressure (kPa)	Remark
Existing Junction Nodes (NW)						
EX_J-63	0.0	299.0	340.0	41.0	401	
EX_J-13	0.0	296.7	340.0	43.3	424	
EX_J-66	1.4	296.0	340.0	44.0	431	
EX_J-57	5.0	294.0	339.9	45.9	450	
EX_J-56	0.0	293.0	339.9	46.9	460	
EX_J-53	0.0	292.3	340.0	47.7	468	
EX_J-68	0.0	292.0	340.0	48.0	470	
EX_J-52	0.0	291.6	340.0	48.4	474	
EX_J-12	0.0	291.0	340.0	49.0	480	
EX_J-22	2.3	291.0	340.0	49.0	480	
EX_J-41	0.0	290.6	340.0	49.4	484	
EX_J-62	0.0	290.0	340.0	50.0	490	
EX_J-67	1.9	290.0	340.0	50.0	490	
EX_J-38	0.0	289.3	340.0	50.7	496	
EX_J-39	0.0	289.0	340.0	51.0	499	
EX_J-45	0.0	289.0	340.0	51.0	499	
EX_J-37	0.0	288.5	340.0	51.5	504	
EX_J-42	7.5	288.4	340.0	51.6	505	
EX_J-40	0.0	288.0	340.0	52.0	509	
EX_J-51	0.0	287.4	340.0	52.6	515	
EX_J-34	0.0	287.0	340.0	53.0	519	
EX_J-47	5.0	286.6	340.0	53.3	523	
EX_J-65	1.4	286.5	340.0	53.5	524	
EX_J-70	0.0	285.0	339.9	54.9	538	
EX_J-20	0.0	284.0	340.0	56.0	548	
EX_J-36	1.5	283.5	339.9	56.4	553	
EX_J-35	0.0	283.0	339.9	56.9	558	
EX_J-10	0.0	282.3	339.9	57.6	565	
EX_J-15	0.0	281.0	339.9	58.9	578	
EX_J-23	2.1	281.0	340.0	59.0	578	
EX_J-50	5.0	280.4	340.0	59.5	583	
EX_J-64	1.9	280.0	340.0	60.0	588	
EX_J-33	0.0	279.5	339.9	60.4	592	
EX_J-24	0.0	279.5	340.0	60.5	592	
EX_J-48	0.0	278.2	340.0	61.7	605	
EX_J-59	0.0	278.0	339.9	61.9	607	
EX_J-71	0.0	278.0	339.9	61.9	607	
EX_J-54	0.0	277.7	340.0	62.2	610	
EX_J-17	0.0	277.0	340.0	63.0	617	
EX_J-29	0.0	276.3	340.0	63.7	624	
EX_J-49	3.9	276.1	340.0	63.9	626	
EX_J-58	10.0	276.0	339.9	63.9	626	
EX_J-30	0.0	276.0	339.9	63.9	627	
EX_J-18	0.0	275.0	339.9	64.9	636	
EX_J-28	0.0	274.5	339.9	65.4	641	
EX_J-21	0.0	274.1	339.9	65.9	646	
EX_J-11	0.0	274.1	339.9	65.9	646	
EX_J-32	0.0	274.1	339.9	65.9	646	
EX_J-60	5.0	274.0	339.9	65.9	646	
EX_J-19	0.0	274.0	339.9	65.9	646	
EX_J-27	0.0	273.3	339.9	66.6	653	
EX_J-61	7.5	273.0	339.9	66.9	656	
EX_J-14	0.0	272.5	339.9	67.4	661	
EX_J-16	0.0	272.0	339.9	67.9	666	
EX_J-31	4.7	268.0	339.9	71.9	705	

Reservoir			
ID	Flow (L/s)	Head (m)	Remark
DUM_RES1	-34.9	340.0	
DUM_RES3	-40.4	340.0	

Junction output under Maximum Day Condition

ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (m)	Pressure (kPa)	Remark
Junction Nodes within Subject Site (Glenway West site)						
PROP_J-62	0.0	295.7	330.4	34.7	340	
PROP_J-73	0.0	294.5	330.4	35.9	352	
PROP_J-64	1.4	294.1	330.4	36.3	356	
PROP_J-63	0.1	292.9	330.4	37.5	368	
PROP_J-82	0.0	291.0	330.5	39.5	387	
PROP_J-80	0.0	289.5	330.4	40.9	401	
PROP_J-72	0.0	289.0	330.4	41.4	406	
PROP_J-83	0.0	289.0	330.5	41.5	406	
PROP_J-71	1.9	287.5	330.4	42.9	420	
PROP_J-76	0.1	285.1	330.4	45.3	444	
PROP_J-70	0.0	284.9	330.4	45.5	446	
PROP_J-69	0.0	284.5	330.4	45.9	450	
PROP_J-60	0.1	284.2	330.5	46.3	453	
PROP_J-66	0.5	284.1	330.5	46.4	454	
PROP_J-79	0.0	283.4	330.4	47.0	460	
PROP_J-77	0.1	283.0	330.4	47.4	464	
PROP_J-78	0.0	282.9	330.4	47.5	465	
PROP_J-68	0.0	282.9	330.4	47.5	465	
PROP_J-61	0.0	282.5	330.4	47.9	470	
PROP_J-75	0.0	282.0	330.5	48.5	475	
PROP_J-59	0.0	280.4	330.5	50.1	491	
PROP_J-74	0.0	280.4	330.5	50.1	491	
PROP_J-81	0.0	280.4	330.5	50.1	491	
PROP_J-65	0.0	279.3	330.5	51.2	501	
PROP_J-58	0.1	278.0	330.5	52.5	514	
PROP_J-67	0.0	277.0	330.4	53.4	524	
Junction Nodes within Glenway East site						
PROP_J-38	0.0	281.9	330.4	48.6	476	
PROP_J-17	4.0	281.7	330.4	48.7	477	
PROP_J-16	0.0	281.7	330.4	48.7	477	
PROP_J-33	0.0	281.3	330.4	49.2	482	
PROP_J-28	0.0	281.1	330.4	49.3	483	
PROP_J-47	0.0	281.0	330.4	49.4	484	
PROP_J-18	0.0	280.2	330.4	50.2	492	
PROP_J-49	0.0	280.0	330.4	50.4	494	
PROP_J-10	0.0	280.0	330.4	50.4	494	
PROP_J-35	0.0	279.1	330.4	51.3	503	
PROP_J-19	0.0	278.9	330.4	51.5	505	
PROP_J-26	0.0	278.8	330.4	51.6	506	
PROP_J-37	1.4	278.3	330.4	52.1	511	
PROP_J-23	0.0	277.6	330.4	52.8	518	
PROP_J-20	0.0	277.3	330.4	53.0	520	
PROP_J-29	0.0	276.8	330.4	53.6	525	
PROP_J-24	0.0	276.6	330.4	53.8	527	
PROP_J-50	0.0	276.5	330.4	53.9	528	
PROP_J-57	0.2	276.3	330.4	54.0	530	
PROP_J-25	0.1	276.3	330.4	54.1	530	
PROP_J-54	0.3	276.0	330.4	54.4	533	
PROP_J-56	0.5	276.0	330.4	54.4	533	
PROP_J-21	0.0	275.8	330.4	54.6	535	
PROP_J-52	0.0	275.5	330.4	54.9	538	
PROP_J-30	1.0	275.5	330.4	54.9	538	
PROP_J-34	0.0	275.2	330.4	55.2	541	
PROP_J-48	0.1	274.9	330.4	55.5	544	
PROP_J-12	0.0	274.7	330.4	55.7	546	
PROP_J-51	0.0	274.7	330.4	55.7	546	
PROP_J-41	0.0	274.6	330.4	55.8	546	
PROP_J-22	0.0	274.4	330.4	56.0	548	
PROP_J-42	0.0	274.2	330.4	56.2	551	
PROP_J-44	0.0	274.1	330.4	56.3	552	
PROP_J-45	2.5	274.1	330.4	56.3	552	
PROP_J-36	0.0	274.1	330.4	56.3	552	
PROP_J-8	0.0	273.9	330.4	56.5	554	
PROP_J-43	0.0	273.6	330.4	56.8	556	
PROP_J-40	0.0	273.5	330.4	56.9	558	
PROP_J-39	0.0	273.5	330.4	56.9	558	
PROP_J-53	0.0	273.4	330.4	56.9	558	
PROP_J-31	0.1	273.0	330.4	57.4	562	
PROP_J-11	1.0	272.6	330.4	57.8	567	
PROP_J-46	0.0	272.5	330.4	57.9	567	
PROP_J-27	2.5	272.4	330.4	58.0	568	
PROP_J-13	0.0	272.4	330.4	58.0	568	
PROP_J-55	0.2	272.0	330.4	58.4	572	
PROP_J-14	0.0	271.9	330.4	58.5	573	
PROP_J-15	0.0	271.3	330.4	59.1	579	
PROP_J-32	0.1	270.7	330.4	59.7	585	

Junction output under Maximum Day Condition

ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (m)	Pressure (kPa)	Remark
Existing Junction Nodes (NW)						
EX_J-63	0.0	299.0	330.5	31.5	309	
EX_J-13	0.0	296.7	330.6	33.9	332	
EX_J-66	2.8	296.0	330.4	34.4	337	
EX_J-57	10.0	294.0	330.4	36.4	357	
EX_J-56	0.0	293.0	330.4	37.4	366	
EX_J-53	0.0	292.3	330.6	38.3	375	
EX_J-68	0.0	292.0	330.5	38.5	377	
EX_J-52	0.0	291.6	330.6	39.0	382	
EX_J-12	0.0	291.0	330.5	39.5	387	
EX_J-22	4.6	291.0	330.6	39.6	388	
EX_J-41	0.0	290.6	330.4	39.8	390	
EX_J-62	0.0	290.0	330.4	40.4	396	
EX_J-67	3.9	290.0	330.6	40.6	398	
EX_J-38	0.0	289.3	330.5	41.2	403	
EX_J-39	0.0	289.0	330.5	41.5	406	
EX_J-45	0.0	289.0	330.5	41.5	406	
EX_J-37	0.0	288.5	330.4	41.9	411	
EX_J-42	15.0	288.4	330.5	42.1	412	
EX_J-40	0.0	288.0	330.5	42.5	416	
EX_J-51	0.0	287.4	330.5	43.1	423	
EX_J-34	0.0	287.0	330.4	43.4	425	
EX_J-47	10.0	286.6	330.5	43.8	430	
EX_J-65	2.9	286.5	330.5	44.0	431	
EX_J-70	0.0	285.0	330.4	45.4	445	
EX_J-20	0.0	284.0	330.5	46.5	455	
EX_J-36	3.0	283.5	330.4	46.9	460	
EX_J-35	0.0	283.0	330.4	47.4	464	
EX_J-10	0.0	282.3	330.3	48.0	471	
EX_J-15	0.0	281.0	330.4	49.4	484	
EX_J-23	4.3	281.0	330.5	49.5	485	
EX_J-50	10.0	280.4	330.5	50.0	490	
EX_J-64	3.8	280.0	330.5	50.5	494	
EX_J-33	0.0	279.5	330.4	50.9	499	
EX_J-24	0.0	279.5	330.5	51.0	499	
EX_J-48	0.0	278.2	330.5	52.2	512	
EX_J-59	0.0	278.0	330.4	52.4	513	
EX_J-71	0.0	278.0	330.4	52.4	513	
EX_J-54	0.0	277.7	330.5	52.7	517	
EX_J-17	0.0	277.0	330.4	53.4	524	
EX_J-29	0.0	276.3	330.5	54.2	531	
EX_J-58	20.0	276.0	330.3	54.3	532	
EX_J-49	7.8	276.1	330.5	54.4	533	
EX_J-30	0.0	276.0	330.4	54.4	533	
EX_J-18	0.0	275.0	330.4	55.4	543	
EX_J-28	0.0	274.5	330.4	55.9	548	
EX_J-60	10.0	274.0	330.3	56.3	552	
EX_J-21	0.0	274.1	330.4	56.3	552	
EX_J-11	0.0	274.1	330.4	56.4	552	
EX_J-32	0.0	274.1	330.4	56.4	552	
EX_J-19	0.0	274.0	330.4	56.4	553	
EX_J-27	0.0	273.3	330.4	57.1	559	
EX_J-61	15.0	273.0	330.3	57.3	561	
EX_J-14	0.0	272.5	330.4	57.9	567	
EX_J-16	0.0	272.0	330.4	58.4	572	
EX_J-31	9.3	268.0	330.3	62.3	611	

Reservoir			
ID	Flow (L/s)	Head (m)	Remark
DUM_RES1	-69.7	330.6	
DUM_RES3	-80.7	330.6	

Junction output under Peak Hour Condition

ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (m)	Pressure (kPa)	Remark
Junction Nodes within Subject Site (Glenway West site)						
PROP_J-62	0.0	295.7	330.3	34.6	339	
PROP_J-73	0.0	294.5	330.3	35.8	350	
PROP_J-64	2.0	294.1	330.3	36.2	354	
PROP_J-63	0.1	292.9	330.3	37.4	366	
PROP_J-82	0.0	291.0	330.4	39.4	386	
PROP_J-80	0.0	289.5	330.2	40.7	398	
PROP_J-72	0.0	289.0	330.2	41.2	403	
PROP_J-83	0.0	289.0	330.3	41.3	405	
PROP_J-71	2.9	287.5	330.2	42.7	418	
PROP_J-76	0.2	285.1	330.2	45.1	442	
PROP_J-70	0.0	284.9	330.2	45.3	443	
PROP_J-69	0.0	284.5	330.2	45.7	447	
PROP_J-60	0.1	284.2	330.3	46.1	452	
PROP_J-66	0.8	284.1	330.3	46.2	453	
PROP_J-79	0.0	283.4	330.2	46.7	458	
PROP_J-77	0.2	283.0	330.2	47.2	462	
PROP_J-78	0.0	282.9	330.2	47.2	463	
PROP_J-68	0.0	282.9	330.2	47.3	463	
PROP_J-61	0.0	282.5	330.3	47.8	468	
PROP_J-75	0.0	282.0	330.3	48.3	473	
PROP_J-59	0.0	280.4	330.3	49.9	489	
PROP_J-74	0.0	280.4	330.3	49.9	489	
PROP_J-81	0.0	280.4	330.3	49.9	489	
PROP_J-65	0.0	279.3	330.3	51.0	500	
PROP_J-58	0.1	278.0	330.3	52.3	513	
PROP_J-67	0.0	277.0	330.3	53.3	522	
Junction Nodes within Glenway East site						
PROP_J-38	0.0	281.9	330.2	48.4	474	
PROP_J-17	6.0	281.7	330.1	48.4	474	
PROP_J-16	0.0	281.7	330.1	48.4	474	
PROP_J-33	0.0	281.3	330.2	49.0	480	
PROP_J-28	0.0	281.1	330.1	49.1	481	
PROP_J-47	0.0	281.0	330.1	49.1	482	
PROP_J-18	0.0	280.2	330.1	49.9	489	
PROP_J-49	0.0	280.0	330.2	50.2	492	
PROP_J-10	0.0	280.0	330.2	50.2	492	
PROP_J-35	0.0	279.1	330.2	51.1	501	
PROP_J-19	0.0	278.9	330.1	51.3	503	
PROP_J-26	0.0	278.8	330.1	51.4	504	
PROP_J-37	2.1	278.3	330.2	51.9	509	
PROP_J-23	0.0	277.6	330.1	52.6	515	
PROP_J-20	0.0	277.3	330.1	52.8	517	
PROP_J-29	0.0	276.8	330.1	53.3	522	
PROP_J-24	0.0	276.6	330.1	53.5	524	
PROP_J-50	0.0	276.5	330.2	53.7	526	
PROP_J-57	0.3	276.3	330.1	53.8	527	
PROP_J-25	0.2	276.3	330.1	53.8	527	
PROP_J-54	0.5	276.0	330.1	54.1	531	
PROP_J-56	0.7	276.0	330.2	54.2	531	
PROP_J-21	0.0	275.8	330.1	54.3	532	
PROP_J-52	0.0	275.5	330.1	54.6	535	
PROP_J-30	1.5	275.5	330.1	54.6	535	
PROP_J-34	0.0	275.2	330.2	55.0	539	
PROP_J-48	0.2	274.9	330.2	55.3	542	
PROP_J-12	0.0	274.7	330.1	55.5	544	
PROP_J-51	0.0	274.7	330.1	55.5	544	
PROP_J-41	0.0	274.6	330.2	55.5	544	
PROP_J-22	0.0	274.4	330.1	55.7	546	
PROP_J-42	0.0	274.2	330.2	56.0	549	
PROP_J-44	0.0	274.1	330.1	56.1	549	
PROP_J-45	3.8	274.1	330.1	56.1	549	
PROP_J-36	0.0	274.1	330.3	56.1	550	
PROP_J-8	0.0	273.9	330.3	56.3	552	
PROP_J-43	0.0	273.6	330.1	56.5	554	
PROP_J-40	0.0	273.5	330.2	56.7	555	
PROP_J-39	0.0	273.5	330.2	56.7	555	
PROP_J-53	0.0	273.4	330.1	56.7	556	
PROP_J-31	0.1	273.0	330.1	57.1	560	
PROP_J-11	1.5	272.6	330.2	57.6	564	
PROP_J-46	0.0	272.5	330.2	57.7	565	
PROP_J-27	3.8	272.4	330.1	57.7	565	
PROP_J-13	0.0	272.4	330.2	57.7	566	
PROP_J-55	0.2	272.0	330.1	58.1	570	
PROP_J-14	0.0	271.9	330.2	58.2	571	
PROP_J-15	0.0	271.3	330.2	58.8	577	
PROP_J-32	0.1	270.7	330.1	59.4	582	

Junction output under Peak Hour Condition

ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (m)	Pressure (kPa)	Remark
Existing Junction Nodes (NW)						
EX_J-63	0.0	299.0	330.4	31.4	307	
EX_J-13	0.0	296.7	330.6	33.9	332	
EX_J-66	4.2	296.0	330.2	34.2	335	
EX_J-57	15.0	294.0	330.1	36.1	354	
EX_J-56	0.0	293.0	330.2	37.2	364	
EX_J-53	0.0	292.3	330.6	38.3	375	
EX_J-68	0.0	292.0	330.3	38.3	376	
EX_J-52	0.0	291.6	330.6	38.9	382	
EX_J-12	0.0	291.0	330.4	39.4	386	
EX_J-22	6.9	291.0	330.6	39.6	388	
EX_J-41	0.0	290.6	330.2	39.6	388	
EX_J-62	0.0	290.0	330.3	40.3	395	
EX_J-67	5.8	290.0	330.6	40.6	398	
EX_J-38	0.0	289.3	330.3	41.0	402	
EX_J-39	0.0	289.0	330.3	41.3	405	
EX_J-45	0.0	289.0	330.3	41.3	405	
EX_J-37	0.0	288.5	330.2	41.7	409	
EX_J-42	22.5	288.4	330.3	41.9	411	
EX_J-40	0.0	288.0	330.3	42.3	415	
EX_J-51	0.0	287.4	330.4	43.0	421	
EX_J-34	0.0	287.0	330.2	43.2	423	
EX_J-47	15.0	286.6	330.3	43.7	428	
EX_J-65	4.3	286.5	330.3	43.8	429	
EX_J-70	0.0	285.0	330.2	45.2	443	
EX_J-20	0.0	284.0	330.3	46.3	454	
EX_J-36	4.5	283.5	330.2	46.7	457	
EX_J-35	0.0	283.0	330.2	47.2	462	
EX_J-10	0.0	282.3	330.0	47.7	467	
EX_J-15	0.0	281.0	330.1	49.1	482	
EX_J-23	6.4	281.0	330.3	49.3	483	
EX_J-50	15.0	280.4	330.3	49.9	489	
EX_J-64	5.7	280.0	330.3	50.3	493	
EX_J-33	0.0	279.5	330.1	50.6	496	
EX_J-24	0.0	279.5	330.3	50.8	498	
EX_J-59	0.0	278.0	330.1	52.1	510	
EX_J-48	0.0	278.2	330.3	52.1	510	
EX_J-71	0.0	278.0	330.1	52.1	510	
EX_J-54	0.0	277.7	330.3	52.6	515	
EX_J-17	0.0	277.0	330.2	53.2	522	
EX_J-58	30.0	276.0	330.0	54.0	529	
EX_J-29	0.0	276.3	330.3	54.0	529	
EX_J-30	0.0	276.0	330.2	54.2	531	
EX_J-49	11.6	276.1	330.3	54.2	531	
EX_J-18	0.0	275.0	330.1	55.1	540	
EX_J-28	0.0	274.5	330.2	55.7	545	
EX_J-60	15.0	274.0	330.0	56.0	548	
EX_J-21	0.0	274.1	330.2	56.1	550	
EX_J-11	0.0	274.1	330.2	56.1	550	
EX_J-32	0.0	274.1	330.2	56.1	550	
EX_J-19	0.0	274.0	330.1	56.1	550	
EX_J-27	0.0	273.3	330.2	56.8	557	
EX_J-61	22.5	273.0	330.0	57.0	558	
EX_J-14	0.0	272.5	330.2	57.7	565	
EX_J-16	0.0	272.0	330.2	58.2	570	
EX_J-31	14.0	268.0	330.0	62.0	608	

Reservoir			
ID	Flow (L/s)	Head (m)	Remark
DUM_RES1	-104.6	330.6	
DUM_RES3	-121.1	330.6	

Pipeline output under Peak Hour Condition

ID	From Node	To Node	Length (m)	Diameter (mm)	Roughness	Flow (L/s)	Velocity (m/s)	Headloss (m)	Remark
Pipelines within Subject Site (Glenway West site)									
PROP_P-80	PROP_J-83	PROP_J-61	76	400	120	58.6	0.5	0.1	
PROP_P-85	PROP_J-81	PROP_J-74	17	200	110	10.7	0.3	0.0	
PROP_P-58	PROP_J-67	PROP_J-74	69	200	110	-9.8	0.3	0.1	
PROP_P-77	EX_J-12	PROP_J-82	96	250	110	10.7	0.2	0.0	
PROP_P-81	EX_J-63	EX_J-68	126	200	110	3.4	0.1	0.0	
PROP_P-75	PROP_J-79	PROP_J-78	107	250	110	3.3	0.1	0.0	
PROP_P-82	PROP_J-78	PROP_J-68	25	250	110	2.9	0.1	0.0	
PROP_P-74	PROP_J-68	PROP_J-69	98	200	110	1.6	0.1	0.0	
PROP_P-71	PROP_J-70	PROP_J-71	67	200	110	1.6	0.1	0.0	
PROP_P-79	PROP_J-73	PROP_J-62	215	250	110	2.1	0.0	0.0	
PROP_P-60	PROP_J-61	PROP_J-73	233	250	110	2.1	0.0	0.0	
PROP_P-61	PROP_J-62	PROP_J-64	71	250	110	2.1	0.0	0.0	
PROP_P-72	PROP_J-69	PROP_J-71	115	200	110	1.2	0.0	0.0	
PROP_P-69	PROP_J-68	PROP_J-70	178	200	110	1.2	0.0	0.0	
PROP_P-78	PROP_J-59	PROP_J-74	17	200	110	-1.0	0.0	0.0	
PROP_P-66	PROP_J-66	PROP_J-60	28	50	100	0.1	0.0	0.0	
PROP_P-64	PROP_J-65	PROP_J-58	22	50	100	0.1	0.0	0.0	
PROP_P-63	PROP_J-64	PROP_J-63	40	50	100	0.1	0.0	0.0	
PROP_P-59	PROP_J-59	PROP_J-75	122	200	110	0.9	0.0	0.0	
PROP_P-76	PROP_J-75	PROP_J-66	151	200	110	0.9	0.0	0.0	
PROP_P-62	PROP_J-64	PROP_J-63	50	50	100	0.1	0.0	0.0	
PROP_P-65	PROP_J-58	PROP_J-65	32	50	100	-0.1	0.0	0.0	
PROP_P-67	PROP_J-60	PROP_J-66	41	50	100	-0.1	0.0	0.0	
PROP_P-70	PROP_J-70	PROP_J-69	64	200	110	-0.4	0.0	0.0	
PROP_P-68	PROP_J-77	PROP_J-78	12	250	110	-0.5	0.0	0.0	
PROP_P-57	PROP_J-59	PROP_J-65	32	200	110	0.1	0.0	0.0	
PROP_P-83	PROP_J-72	PROP_J-80	25	50	100	0.0	0.0	0.0	
PROP_P-73	PROP_J-71	PROP_J-72	30	200	110	0.0	0.0	0.0	
PROP_P-84	PROP_J-72	PROP_J-80	36	50	100	0.0	0.0	0.0	
Pipelines within Glenway East site									
PROP_P-27	PROP_J-35	PROP_J-34	169	300	120	13.1	0.2	0.0	
PROP_P-26	PROP_J-33	PROP_J-35	45	300	120	11.5	0.2	0.0	
PROP_P-34	PROP_J-41	PROP_J-42	33	200	110	3.8	0.1	0.0	
PROP_P-33	PROP_J-40	PROP_J-41	30	200	110	3.8	0.1	0.0	
PROP_P-32	PROP_J-39	PROP_J-40	7	200	110	3.8	0.1	0.0	
PROP_P-39	PROP_J-46	PROP_J-50	50	300	120	7.5	0.1	0.0	
PROP_P-31	PROP_J-36	PROP_J-8	151	250	110	-4.6	0.1	0.0	
PROP_P-29	PROP_J-37	PROP_J-36	298	250	110	-4.6	0.1	0.0	
PROP_P-19	PROP_J-24	PROP_J-57	43	50	100	0.2	0.1	0.0	
PROP_P-56	PROP_J-57	PROP_J-25	55	50	100	-0.2	0.1	0.0	
PROP_P-23	PROP_J-30	PROP_J-50	35	200	110	-2.5	0.1	0.0	
PROP_P-9	PROP_J-19	PROP_J-20	76	250	110	3.8	0.1	0.0	
PROP_P-5	PROP_J-18	PROP_J-16	29	250	110	-3.8	0.1	0.0	
PROP_P-3	PROP_J-15	PROP_J-16	502	300	120	5.3	0.1	0.0	
PROP_P-1	PROP_J-13	PROP_J-14	42	300	120	5.3	0.1	0.0	
PROP_P-2	PROP_J-14	PROP_J-15	26	300	120	5.3	0.1	0.0	
PROP_P-38	PROP_J-45	PROP_J-42	84	200	110	-2.3	0.1	0.0	
PROP_P-45	PROP_J-50	PROP_J-29	39	300	120	5.0	0.1	0.0	
PROP_P-20	PROP_J-23	PROP_J-29	72	300	120	-5.0	0.1	0.0	
PROP_P-16	PROP_J-28	PROP_J-23	153	300	120	-4.5	0.1	0.0	
PROP_P-15	PROP_J-17	PROP_J-28	49	300	120	-4.5	0.1	0.0	
PROP_P-6	PROP_J-18	PROP_J-19	57	250	110	2.9	0.1	0.0	
PROP_P-10	PROP_J-20	PROP_J-21	61	250	110	2.7	0.1	0.0	
PROP_P-43	PROP_J-49	PROP_J-37	116	250	110	-2.5	0.1	0.0	
PROP_P-30	PROP_J-48	PROP_J-56	55	50	100	-0.1	0.1	0.0	
PROP_P-35	PROP_J-42	PROP_J-43	118	200	110	1.5	0.1	0.0	
PROP_P-36	PROP_J-43	PROP_J-45	70	200	110	1.5	0.1	0.0	
PROP_P-13	PROP_J-21	PROP_J-27	159	250	110	2.3	0.1	0.0	
PROP_P-14	PROP_J-27	PROP_J-22	122	200	110	-1.5	0.1	0.0	
PROP_P-55	PROP_J-56	PROP_J-48	73	50	100	0.1	0.0	0.0	
PROP_P-11	PROP_J-20	PROP_J-22	115	200	110	1.1	0.0	0.0	
PROP_P-50	PROP_J-54	PROP_J-31	35	50	100	0.1	0.0	0.0	
PROP_P-52	PROP_J-55	PROP_J-32	40	50	100	0.1	0.0	0.0	
PROP_P-28	PROP_J-35	PROP_J-49	102	250	110	-1.6	0.0	0.0	
PROP_P-53	PROP_J-55	PROP_J-32	55	50	100	0.1	0.0	0.0	
PROP_P-51	PROP_J-54	PROP_J-31	48	50	100	0.1	0.0	0.0	
PROP_P-54	PROP_J-56	PROP_J-10	169	200	110	-0.9	0.0	0.0	
PROP_P-42	PROP_J-10	PROP_J-38	110	200	110	-0.9	0.0	0.0	
PROP_P-44	PROP_J-38	PROP_J-49	44	200	110	-0.9	0.0	0.0	
PROP_P-8	PROP_J-26	PROP_J-19	118	200	110	0.9	0.0	0.0	
PROP_P-7	PROP_J-18	PROP_J-26	60	200	110	0.9	0.0	0.0	
PROP_P-4	PROP_J-16	PROP_J-17	17	300	120	1.5	0.0	0.0	
PROP_P-21	PROP_J-30	PROP_J-54	245	200	110	0.6	0.0	0.0	
PROP_P-17	PROP_J-23	PROP_J-24	95	200	110	0.5	0.0	0.0	
PROP_P-18	PROP_J-24	PROP_J-25	25	200	110	0.4	0.0	0.0	
PROP_P-22	PROP_J-30	PROP_J-52	8	200	110	0.4	0.0	0.0	
PROP_P-41	PROP_J-12	PROP_J-55	125	200	110	0.4	0.0	0.0	
PROP_P-12	PROP_J-22	PROP_J-21	58	200	110	-0.4	0.0	0.0	
PROP_P-46	PROP_J-52	PROP_J-12	49	200	110	0.4	0.0	0.0	
PROP_P-47	PROP_J-52	PROP_J-51	72	50	100	0.0	0.0	0.0	
PROP_P-49	PROP_J-51	PROP_J-12	15	200	110	0.0	0.0	0.0	
PROP_P-40	PROP_J-29	PROP_J-47	44	300	120	0.0	0.0	0.0	
PROP_P-37	PROP_J-44	PROP_J-45	30	50	100	0.0	0.0	0.0	
PROP_P-48	PROP_J-43	PROP_J-53	31	50	100	0.0	0.0	0.0	

Pipeline output under Peak Hour Condition

ID	From Node	To Node	Length (m)	Diameter (mm)	Roughness	Flow (L/s)	Velocity (m/s)	Headloss (m)	Remark
Existing Pipelines (NW)									
EX_P-45	EX_J-22	EX_J-12	43	300	120	72.8	1.0	0.2	
EX_P-17	DUM_RES3	EX_J-22	6	400	120	121.1	1.0	0.0	
EX_P-90	EX_J-52	EX_J-51	236	400	120	64.7	0.5	0.2	
EX_P-87	EX_J-67	EX_J-52	15	400	120	64.7	0.5	0.0	
EX_P-25	EX_J-12	PROP_J-83	132	400	120	58.6	0.5	0.1	
EX_P-51	PROP_J-61	PROP_J-33	45	400	120	56.5	0.5	0.0	
EX_P-67	EX_J-22	EX_J-42	330	300	120	29.7	0.4	0.3	
EX_P-97	EX_J-71	EX_J-59	38	400	120	47.4	0.4	0.0	
EX_P-26	EX_J-13	EX_J-22	9	200	110	-11.7	0.4	0.0	
EX_P-70	DUM_RES1	EX_J-67	52	600	120	104.6	0.4	0.0	
EX_P-1	EX_J-30	EX_J-71	210	400	120	45.0	0.4	0.1	
EX_P-13	PROP_J-33	EX_J-30	134	400	120	45.0	0.4	0.1	
EX_P-46	EX_J-23	EX_J-24	12	200	110	-11.2	0.4	0.0	
EX_P-80	EX_J-61	EX_J-59	207	300	120	-24.6	0.4	0.1	
EX_P-24	PROP_J-82	PROP_J-81	46	200	110	10.7	0.3	0.1	
EX_P-52	PROP_J-67	EX_J-17	7	200	110	9.8	0.3	0.0	
EX_P-91	EX_J-47	EX_J-51	255	400	120	-35.2	0.3	0.1	
EX_P-71	EX_J-53	EX_J-31	2309	400	120	34.1	0.3	0.6	
EX_P-47	EX_J-24	EX_J-13	468	200	110	-7.8	0.3	0.3	
EX_P-62	EX_J-41	EX_J-42	171	200	110	-7.7	0.3	0.1	
EX_P-14	PROP_J-34	EX_J-11	42	200	110	7.5	0.2	0.0	
EX_P-23	EX_J-21	EX_J-11	26	200	110	-7.5	0.2	0.0	
EX_P-88	EX_J-51	EX_J-50	307	400	120	29.5	0.2	0.1	
EX_P-22	EX_J-20	EX_J-13	320	150	100	-4.0	0.2	0.3	
EX_P-82	PROP_J-76	EX_J-37	93	200	110	-6.6	0.2	0.0	
EX_P-56	EX_J-36	PROP_J-76	64	200	110	-6.5	0.2	0.0	
EX_P-69	EX_J-12	EX_J-63	76	150	100	3.4	0.2	0.1	
EX_P-66	EX_J-38	EX_J-68	60	150	100	-3.4	0.2	0.0	
EX_P-81	EX_J-62	EX_J-38	72	150	100	-3.4	0.2	0.0	
EX_P-57	EX_J-37	EX_J-62	73	150	100	-3.4	0.2	0.0	
EX_P-95	EX_J-66	EX_J-65	387	300	120	-13.2	0.2	0.1	
EX_P-72	EX_J-66	EX_J-56	313	250	110	9.0	0.2	0.1	
EX_P-77	EX_J-60	EX_J-59	992	400	120	-22.8	0.2	0.1	
EX_P-4	EX_J-28	PROP_J-34	81	200	110	-5.6	0.2	0.0	
EX_P-18	PROP_J-39	EX_J-28	50	200	110	-5.6	0.2	0.0	
EX_P-76	EX_J-10	EX_J-58	288	400	120	20.1	0.2	0.0	
EX_P-36	EX_J-31	EX_J-10	346	400	120	20.1	0.2	0.0	
EX_P-53	EX_J-17	EX_J-34	254	200	110	4.9	0.2	0.1	
EX_P-6	EX_J-27	PROP_J-11	76	200	110	4.9	0.2	0.0	
EX_P-35	EX_J-17	EX_J-27	274	200	110	4.9	0.2	0.1	
EX_P-2	EX_J-29	EX_J-23	130	200	110	-4.6	0.2	0.0	
EX_P-3	EX_J-29	PROP_J-8	48	200	110	4.6	0.2	0.0	
EX_P-99	EX_J-70	EX_J-41	363	200	110	-4.5	0.1	0.1	
EX_P-73	EX_J-56	EX_J-57	106	300	120	9.0	0.1	0.0	
EX_P-83	EX_J-65	EX_J-47	226	400	120	-15.5	0.1	0.0	
EX_P-93	EX_J-53	EX_J-67	28	600	120	-34.1	0.1	0.0	
EX_P-54	EX_J-34	EX_J-35	167	200	110	3.7	0.1	0.0	
EX_P-89	EX_J-50	EX_J-49	274	400	120	14.5	0.1	0.0	
EX_P-40	EX_J-24	EX_J-20	104	200	110	-3.4	0.1	0.0	
EX_P-5	PROP_J-11	PROP_J-13	34	200	110	3.4	0.1	0.0	
EX_P-50	PROP_J-46	EX_J-14	49	300	120	-7.5	0.1	0.0	
EX_P-61	EX_J-37	EX_J-41	77	200	110	-3.2	0.1	0.0	
EX_P-55	EX_J-35	PROP_J-79	10	200	110	2.8	0.1	0.0	
EX_P-74	EX_J-57	EX_J-70	309	300	120	-6.0	0.1	0.0	
EX_P-78	EX_J-58	EX_J-60	166	400	120	-9.9	0.1	0.0	
EX_P-27	EX_J-14	EX_J-21	298	300	120	-5.6	0.1	0.0	
EX_P-96	PROP_J-77	EX_J-71	1034	200	110	2.4	0.1	0.1	
EX_P-64	EX_J-34	PROP_J-77	328	150	100	1.2	0.1	0.0	
EX_P-85	EX_J-47	EX_J-48	255	300	120	4.7	0.1	0.0	
EX_P-29	EX_J-16	EX_J-21	235	200	110	-1.9	0.1	0.0	
EX_P-84	EX_J-54	EX_J-48	288	400	120	-7.7	0.1	0.0	
EX_P-7	PROP_J-13	PROP_J-39	41	200	110	-1.9	0.1	0.0	
EX_P-65	PROP_J-77	EX_J-35	107	150	100	-0.9	0.1	0.0	
EX_P-94	EX_J-64	EX_J-54	76	400	120	-5.6	0.0	0.0	
EX_P-98	EX_J-70	EX_J-36	121	250	110	-1.5	0.0	0.0	
EX_P-79	EX_J-60	EX_J-61	424	300	120	-2.1	0.0	0.0	
EX_P-92	EX_J-54	EX_J-65	316	300	120	2.1	0.0	0.0	
EX_P-30	EX_J-16	EX_J-14	90	300	120	1.9	0.0	0.0	
EX_P-86	EX_J-48	EX_J-49	505	400	120	-2.9	0.0	0.0	
EX_P-63	EX_J-42	EX_J-20	257	200	110	-0.6	0.0	0.0	
EX_P-100	PROP_J-79	EX_J-36	80	200	110	-0.5	0.0	0.0	
EX_P-75	EX_J-23	EX_J-64	438	400	120	0.1	0.0	0.0	
EX_P-68	EX_J-45	EX_J-39	10	50	100	0.0	0.0	0.0	
EX_P-28	EX_J-15	PROP_J-47	46	300	120	0.0	0.0	0.0	
EX_P-19	EX_J-11	EX_J-32	7	300	120	0.0	0.0	0.0	
EX_P-31	EX_J-15	EX_J-33	166	200	110	0.0	0.0	0.0	
EX_P-33	EX_J-19	EX_J-15	388	300	120	0.0	0.0	0.0	
EX_P-60	EX_J-40	EX_J-39	44	50	100	0.0	0.0	0.0	
EX_P-10	EX_J-33	EX_J-18	325	150	100	0.0	0.0	0.0	
EX_P-59	EX_J-39	EX_J-40	49	50	100	0.0	0.0	0.0	
EX_P-58	EX_J-38	EX_J-45	5	150	100	0.0	0.0	0.0	

Junction output under Maximum Day plus Fire Condition

ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (m)	Pressure (kPa)	Remark
Junction Nodes within Subject Site (Glenway West site)						
PROP_J-60	0.1	284.2	299.4	15.2	149	
PROP_J-66	117.5	284.1	299.4	15.3	150	Block 11 (Fire flow of 117 L/s near lot 7 on Street 'A')
PROP_J-75	0.0	282.0	312.3	30.3	297	
PROP_J-62	0.0	295.7	327.3	31.6	310	
PROP_J-73	0.0	294.5	327.3	32.8	322	
PROP_J-64	1.4	294.1	327.3	33.2	326	
PROP_J-63	0.1	292.9	327.3	34.4	337	
PROP_J-82	0.0	291.0	326.3	35.3	345	
PROP_J-80	0.0	289.5	327.1	37.6	368	
PROP_J-72	0.0	289.0	327.1	38.1	373	
PROP_J-83	0.0	289.0	327.3	38.3	376	
PROP_J-71	1.9	287.5	327.1	39.6	388	
PROP_J-70	0.0	284.9	327.1	42.2	413	
PROP_J-59	0.0	280.4	322.7	42.3	415	
PROP_J-76	0.1	285.1	327.4	42.3	415	
PROP_J-69	0.0	284.5	327.1	42.6	417	
PROP_J-65	0.0	279.3	322.7	43.4	425	
PROP_J-79	0.0	283.4	327.1	43.7	428	
PROP_J-74	0.0	280.4	324.2	43.8	429	
PROP_J-77	0.1	283.0	327.1	44.1	432	
PROP_J-78	0.0	282.9	327.1	44.2	433	
PROP_J-68	0.0	282.9	327.1	44.2	433	
PROP_J-81	0.0	280.4	324.7	44.3	434	
PROP_J-58	0.1	278.0	322.7	44.7	438	
PROP_J-61	0.0	282.5	327.3	44.8	439	
PROP_J-67	0.0	277.0	325.2	48.2	473	
Junction Nodes within Glenway East site						
PROP_J-16	0.0	281.7	326.8	45.1	442	
PROP_J-17	4.0	281.7	326.8	45.1	442	
PROP_J-38	0.0	281.9	327.4	45.6	447	
PROP_J-28	0.0	281.1	326.9	45.8	449	
PROP_J-47	0.0	281.0	326.9	45.9	450	
PROP_J-33	0.0	281.3	327.3	46.1	451	
PROP_J-18	0.0	280.2	326.8	46.6	457	
PROP_J-49	0.0	280.0	327.4	47.4	464	
PROP_J-10	0.0	280.0	327.4	47.4	465	
PROP_J-19	0.0	278.9	326.8	48.0	470	
PROP_J-26	0.0	278.8	326.8	48.1	471	
PROP_J-35	0.0	279.1	327.3	48.2	472	
PROP_J-37	1.4	278.3	327.6	49.3	483	
PROP_J-23	0.0	277.6	326.9	49.3	483	
PROP_J-20	0.0	277.3	326.8	49.5	485	
PROP_J-29	0.0	276.8	326.9	50.1	491	
PROP_J-24	0.0	276.6	326.9	50.3	492	
PROP_J-50	0.0	276.5	326.9	50.4	494	
PROP_J-57	0.2	276.3	326.9	50.6	495	
PROP_J-25	0.1	276.3	326.9	50.6	495	
PROP_J-54	0.3	276.0	326.9	50.9	499	
PROP_J-21	0.0	275.8	326.8	51.0	500	
PROP_J-52	0.0	275.5	326.9	51.4	504	
PROP_J-30	1.0	275.5	326.9	51.4	504	
PROP_J-56	0.5	276.0	327.4	51.4	504	
PROP_J-34	0.0	275.2	327.2	52.0	509	
PROP_J-41	0.0	274.6	326.9	52.2	512	
PROP_J-12	0.0	274.7	326.9	52.3	512	
PROP_J-51	0.0	274.7	326.9	52.3	512	
PROP_J-22	0.0	274.4	326.8	52.4	514	
PROP_J-48	0.1	274.9	327.4	52.5	514	
PROP_J-42	0.0	274.2	326.9	52.7	516	
PROP_J-44	0.0	274.1	326.9	52.8	517	
PROP_J-45	2.5	274.1	326.9	52.8	517	
PROP_J-43	0.0	273.6	326.9	53.3	522	
PROP_J-40	0.0	273.5	326.9	53.4	523	
PROP_J-39	0.0	273.5	326.9	53.4	523	
PROP_J-53	0.0	273.4	326.9	53.4	523	
PROP_J-36	0.0	274.1	327.9	53.8	527	
PROP_J-31	0.1	273.0	326.9	53.9	528	
PROP_J-11	1.0	272.6	326.7	54.1	530	
PROP_J-8	0.0	273.9	328.1	54.2	531	
PROP_J-13	0.0	272.4	326.8	54.4	533	
PROP_J-27	2.5	272.4	326.8	54.4	533	
PROP_J-46	0.0	272.5	326.9	54.4	533	
PROP_J-14	0.0	271.9	326.8	54.9	538	
PROP_J-55	0.2	272.0	326.9	54.9	538	
PROP_J-15	0.0	271.3	326.8	55.5	544	
PROP_J-32	0.1	270.7	326.9	56.2	551	

Junction output under Maximum Day plus Fire Condition

ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (m)	Pressure (kPa)	Remark
Existing Junction Nodes (NW)						
EX_J-63	0.0	299.0	327.4	28.4	278	
EX_J-13	0.0	296.7	327.5	30.8	302	
EX_J-66	2.8	296.0	328.8	32.8	321	
EX_J-57	10.0	294.0	327.7	33.7	330	
EX_J-56	0.0	293.0	327.8	34.8	341	
EX_J-68	0.0	292.0	327.4	35.4	347	
EX_J-12	0.0	291.0	327.3	36.3	356	
EX_J-22	4.6	291.0	327.5	36.5	358	
EX_J-41	0.0	290.6	327.5	36.9	361	
EX_J-62	0.0	290.0	327.4	37.4	367	
EX_J-38	0.0	289.3	327.4	38.1	373	
EX_J-53	0.0	292.3	330.5	38.3	375	
EX_J-45	0.0	289.0	327.4	38.4	376	
EX_J-39	0.0	289.0	327.4	38.4	376	
EX_J-52	0.0	291.6	330.5	38.9	381	
EX_J-37	0.0	288.5	327.4	38.9	382	
EX_J-42	15.0	288.4	327.5	39.1	383	
EX_J-40	0.0	288.0	327.4	39.4	386	
EX_J-34	0.0	287.0	326.6	39.6	388	
EX_J-67	3.9	290.0	330.5	40.5	397	
EX_J-51	0.0	287.4	329.7	42.3	415	
EX_J-70	0.0	285.0	327.5	42.5	417	
EX_J-65	2.9	286.5	329.2	42.7	419	
EX_J-47	10.0	286.6	329.4	42.8	419	
EX_J-36	3.0	283.5	327.4	43.9	430	
EX_J-35	0.0	283.0	327.1	44.1	432	
EX_J-20	0.0	284.0	328.1	44.1	432	
EX_J-10	0.0	282.3	327.8	45.5	446	
EX_J-15	0.0	281.0	326.9	45.9	450	
EX_J-33	0.0	279.5	326.9	47.4	465	
EX_J-23	4.3	281.0	328.7	47.7	468	
EX_J-17	0.0	277.0	325.3	48.3	474	
EX_J-24	0.0	279.5	328.6	49.1	481	
EX_J-64	3.8	280.0	329.1	49.1	481	
EX_J-50	10.0	280.4	329.5	49.1	481	
EX_J-71	0.0	278.0	327.4	49.4	484	
EX_J-59	0.0	278.0	327.4	49.4	484	
EX_J-48	0.0	278.2	329.3	51.1	500	
EX_J-30	0.0	276.0	327.3	51.3	503	
EX_J-54	0.0	277.7	329.1	51.4	504	
EX_J-58	20.0	276.0	327.5	51.5	505	
EX_J-18	0.0	275.0	326.9	51.9	509	
EX_J-29	0.0	276.3	328.3	52.0	509	
EX_J-28	0.0	274.5	327.0	52.5	514	
EX_J-19	0.0	274.0	326.9	52.9	518	
EX_J-21	0.0	274.1	327.0	52.9	519	
EX_J-32	0.0	274.1	327.1	53.0	519	
EX_J-11	0.0	274.1	327.1	53.0	519	
EX_J-27	0.0	273.3	326.4	53.0	520	
EX_J-49	7.8	276.1	329.4	53.4	523	
EX_J-60	10.0	274.0	327.5	53.5	524	
EX_J-61	15.0	273.0	327.4	54.4	533	
EX_J-14	0.0	272.5	326.9	54.4	533	
EX_J-16	0.0	272.0	326.9	54.9	538	
EX_J-31	9.3	268.0	328.1	60.1	589	

Reservoir			
ID	Flow (L/s)	Head (m)	Remark
DUM_RES1	-215.9	330.6	
DUM_RES3	-51.5	327.5	

Pipeline output under Maximum Day plus Fire Condition

ID	From Node	To Node	Length (m)	Diameter (mm)	Roughness	Flow (L/s)	Velocity (m/s)	Headloss (m)	Remark
Pipelines within Subject Site (Glenway West site)									
PROP_P-78	PROP_J-59	PROP_J-74	17	200	110	-117.6	3.7	1.4	
PROP_P-59	PROP_J-59	PROP_J-75	122	200	110	117.6	3.7	10.4	
PROP_P-76	PROP_J-75	PROP_J-66	151	200	110	117.6	3.7	12.9	
PROP_P-85	PROP_J-81	PROP_J-74	17	200	110	70.7	2.3	0.6	
PROP_P-58	PROP_J-67	PROP_J-74	69	200	110	47.0	1.5	1.1	
PROP_P-77	EX_J-12	PROP_J-82	96	250	110	70.7	1.4	1.1	
PROP_P-75	PROP_J-79	PROP_J-78	107	250	110	4.5	0.1	0.0	
PROP_P-81	EX_J-63	EX_J-68	126	200	110	-2.6	0.1	0.0	
PROP_P-68	PROP_J-77	PROP_J-78	12	250	110	-2.6	0.1	0.0	
PROP_P-82	PROP_J-78	PROP_J-68	25	250	110	1.9	0.0	0.0	
PROP_P-74	PROP_J-68	PROP_J-69	98	200	110	1.1	0.0	0.0	
PROP_P-71	PROP_J-70	PROP_J-71	67	200	110	1.1	0.0	0.0	
PROP_P-79	PROP_J-73	PROP_J-62	215	250	110	1.4	0.0	0.0	
PROP_P-60	PROP_J-61	PROP_J-73	233	250	110	1.4	0.0	0.0	
PROP_P-61	PROP_J-62	PROP_J-64	71	250	110	1.4	0.0	0.0	
PROP_P-72	PROP_J-69	PROP_J-71	115	200	110	0.8	0.0	0.0	
PROP_P-69	PROP_J-68	PROP_J-70	178	200	110	0.8	0.0	0.0	
PROP_P-66	PROP_J-66	PROP_J-60	28	50	100	0.0	0.0	0.0	
PROP_P-64	PROP_J-65	PROP_J-58	22	50	100	0.0	0.0	0.0	
PROP_P-63	PROP_J-64	PROP_J-63	40	50	100	0.0	0.0	0.0	
PROP_P-62	PROP_J-64	PROP_J-63	50	50	100	0.0	0.0	0.0	
PROP_P-65	PROP_J-58	PROP_J-65	32	50	100	0.0	0.0	0.0	
PROP_P-67	PROP_J-60	PROP_J-66	41	50	100	0.0	0.0	0.0	
PROP_P-70	PROP_J-70	PROP_J-69	64	200	110	-0.3	0.0	0.0	
PROP_P-80	PROP_J-83	PROP_J-61	76	400	120	0.7	0.0	0.0	
PROP_P-57	PROP_J-59	PROP_J-65	32	200	110	0.1	0.0	0.0	
PROP_P-83	PROP_J-72	PROP_J-80	25	50	100	0.0	0.0	0.0	
PROP_P-73	PROP_J-71	PROP_J-72	30	200	110	0.0	0.0	0.0	
PROP_P-84	PROP_J-72	PROP_J-80	36	50	100	0.0	0.0	0.0	
Pipelines within Glenway East site									
PROP_P-27	PROP_J-35	PROP_J-34	169	300	120	33.8	0.5	0.2	
PROP_P-29	PROP_J-37	PROP_J-36	298	250	110	-21.1	0.4	0.4	
PROP_P-31	PROP_J-36	PROP_J-8	151	250	110	-21.1	0.4	0.2	
PROP_P-43	PROP_J-49	PROP_J-37	116	250	110	-19.7	0.4	0.1	
PROP_P-28	PROP_J-35	PROP_J-49	102	250	110	-19.1	0.4	0.1	
PROP_P-39	PROP_J-46	PROP_J-50	50	300	120	17.3	0.2	0.0	
PROP_P-45	PROP_J-50	PROP_J-29	39	300	120	15.6	0.2	0.0	
PROP_P-20	PROP_J-23	PROP_J-29	72	300	120	-15.6	0.2	0.0	
PROP_P-16	PROP_J-28	PROP_J-23	153	300	120	-15.3	0.2	0.0	
PROP_P-15	PROP_J-17	PROP_J-28	49	300	120	-15.3	0.2	0.0	
PROP_P-26	PROP_J-33	PROP_J-35	45	300	120	14.8	0.2	0.0	
PROP_P-4	PROP_J-16	PROP_J-17	17	300	120	-11.3	0.2	0.0	
PROP_P-1	PROP_J-13	PROP_J-14	42	300	120	-8.8	0.1	0.0	
PROP_P-3	PROP_J-15	PROP_J-16	502	300	120	-8.8	0.1	0.0	
PROP_P-2	PROP_J-14	PROP_J-15	26	300	120	-8.8	0.1	0.0	
PROP_P-33	PROP_J-40	PROP_J-41	30	200	110	2.5	0.1	0.0	
PROP_P-34	PROP_J-41	PROP_J-42	33	200	110	2.5	0.1	0.0	
PROP_P-32	PROP_J-39	PROP_J-40	7	200	110	2.5	0.1	0.0	
PROP_P-19	PROP_J-24	PROP_J-57	43	50	100	0.1	0.1	0.0	
PROP_P-56	PROP_J-57	PROP_J-25	55	50	100	-0.1	0.1	0.0	
PROP_P-23	PROP_J-30	PROP_J-50	35	200	110	-1.6	0.1	0.0	
PROP_P-9	PROP_J-19	PROP_J-20	76	250	110	2.5	0.1	0.0	
PROP_P-5	PROP_J-18	PROP_J-16	29	250	110	-2.5	0.1	0.0	
PROP_P-38	PROP_J-45	PROP_J-42	84	200	110	-1.5	0.1	0.0	
PROP_P-6	PROP_J-18	PROP_J-19	57	250	110	1.9	0.0	0.0	
PROP_P-10	PROP_J-20	PROP_J-21	61	250	110	1.8	0.0	0.0	
PROP_P-30	PROP_J-48	PROP_J-56	55	50	100	-0.1	0.0	0.0	
PROP_P-35	PROP_J-42	PROP_J-43	118	200	110	1.0	0.0	0.0	
PROP_P-36	PROP_J-43	PROP_J-45	70	200	110	1.0	0.0	0.0	
PROP_P-13	PROP_J-21	PROP_J-27	159	250	110	1.5	0.0	0.0	
PROP_P-14	PROP_J-27	PROP_J-22	122	200	110	-1.0	0.0	0.0	
PROP_P-55	PROP_J-56	PROP_J-48	73	50	100	0.1	0.0	0.0	
PROP_P-11	PROP_J-20	PROP_J-22	115	200	110	0.7	0.0	0.0	
PROP_P-50	PROP_J-54	PROP_J-31	35	50	100	0.0	0.0	0.0	
PROP_P-52	PROP_J-55	PROP_J-32	40	50	100	0.0	0.0	0.0	
PROP_P-53	PROP_J-55	PROP_J-32	55	50	100	0.0	0.0	0.0	
PROP_P-51	PROP_J-54	PROP_J-31	48	50	100	0.0	0.0	0.0	
PROP_P-44	PROP_J-38	PROP_J-49	44	200	110	-0.6	0.0	0.0	
PROP_P-54	PROP_J-56	PROP_J-10	169	200	110	-0.6	0.0	0.0	
PROP_P-42	PROP_J-10	PROP_J-38	110	200	110	-0.6	0.0	0.0	
PROP_P-8	PROP_J-26	PROP_J-19	118	200	110	0.6	0.0	0.0	
PROP_P-7	PROP_J-18	PROP_J-26	60	200	110	0.6	0.0	0.0	
PROP_P-21	PROP_J-30	PROP_J-54	245	200	110	0.4	0.0	0.0	
PROP_P-17	PROP_J-23	PROP_J-24	95	200	110	0.4	0.0	0.0	
PROP_P-18	PROP_J-24	PROP_J-25	25	200	110	0.2	0.0	0.0	
PROP_P-41	PROP_J-12	PROP_J-55	125	200	110	0.2	0.0	0.0	
PROP_P-22	PROP_J-30	PROP_J-52	8	200	110	0.2	0.0	0.0	
PROP_P-12	PROP_J-22	PROP_J-21	58	200	110	-0.2	0.0	0.0	
PROP_P-46	PROP_J-52	PROP_J-12	49	200	110	0.2	0.0	0.0	
PROP_P-47	PROP_J-52	PROP_J-51	72	50	100	0.0	0.0	0.0	
PROP_P-49	PROP_J-51	PROP_J-12	15	200	110	0.0	0.0	0.0	
PROP_P-48	PROP_J-43	PROP_J-53	31	50	100	0.0	0.0	0.0	
PROP_P-37	PROP_J-44	PROP_J-45	30	50	100	0.0	0.0	0.0	
PROP_P-40	PROP_J-29	PROP_J-47	44	300	120	0.0	0.0	0.0	

Pipeline output under Maximum Day plus Fire Condition

ID	From Node	To Node	Length (m)	Diameter (mm)	Roughness	Flow (L/s)	Velocity (m/s)	Headloss (m)	Remark
Existing Pipelines (NW)									
EX_P-24	PROP_J-82	PROP_J-81	46	200	110	70.7	2.3	1.5	
EX_P-52	PROP_J-67	EX_J-17	7	200	110	-47.0	1.5	0.1	
EX_P-46	EX_J-23	EX_J-24	12	200	110	39.9	1.3	0.1	
EX_P-87	EX_J-67	EX_J-52	15	400	120	137.2	1.1	0.1	
EX_P-90	EX_J-52	EX_J-51	236	400	120	137.2	1.1	0.8	
EX_P-45	EX_J-22	EX_J-12	43	300	120	68.8	1.0	0.2	
EX_P-53	EX_J-17	EX_J-34	254	200	110	-25.1	0.8	1.2	
EX_P-70	DUM_RES1	EX_J-67	52	600	120	215.9	0.8	0.1	
EX_P-40	EX_J-24	EX_J-20	104	200	110	23.6	0.8	0.5	
EX_P-5	PROP_J-11	PROP_J-13	34	200	110	-22.8	0.7	0.1	
EX_P-26	EX_J-13	EX_J-22	9	200	110	22.7	0.7	0.0	
EX_P-72	EX_J-66	EX_J-56	313	250	110	34.6	0.7	0.9	
EX_P-100	PROP_J-79	EX_J-36	80	200	110	-22.1	0.7	0.3	
EX_P-35	EX_J-17	EX_J-27	274	200	110	-21.8	0.7	1.0	
EX_P-6	EX_J-27	PROP_J-11	76	200	110	-21.8	0.7	0.3	
EX_P-2	EX_J-29	EX_J-23	130	200	110	-21.1	0.7	0.5	
EX_P-3	EX_J-29	PROP_J-8	48	200	110	21.1	0.7	0.2	
EX_P-91	EX_J-47	EX_J-51	255	400	120	-84.2	0.7	0.3	
EX_P-54	EX_J-34	EX_J-35	167	200	110	-19.3	0.6	0.5	
EX_P-71	EX_J-53	EX_J-31	2309	400	120	74.9	0.6	2.5	
EX_P-55	EX_J-35	PROP_J-79	10	200	110	-17.6	0.6	0.0	
EX_P-94	EX_J-64	EX_J-54	76	400	120	-69.1	0.6	0.1	
EX_P-14	PROP_J-34	EX_J-11	42	200	110	17.3	0.6	0.1	
EX_P-23	EX_J-21	EX_J-11	26	200	110	-17.3	0.6	0.1	
EX_P-63	EX_J-42	EX_J-20	257	200	110	-17.2	0.6	0.6	
EX_P-95	EX_J-66	EX_J-65	387	300	120	-37.5	0.5	0.5	
EX_P-18	PROP_J-39	EX_J-28	50	200	110	-16.6	0.5	0.1	
EX_P-4	EX_J-28	PROP_J-34	81	200	110	-16.6	0.5	0.2	
EX_P-76	EX_J-10	EX_J-58	288	400	120	65.6	0.5	0.2	
EX_P-36	EX_J-31	EX_J-10	346	400	120	65.6	0.5	0.3	
EX_P-47	EX_J-24	EX_J-13	468	200	110	16.4	0.5	1.0	
EX_P-75	EX_J-23	EX_J-64	438	400	120	-65.3	0.5	0.4	
EX_P-73	EX_J-56	EX_J-57	106	300	120	34.6	0.5	0.1	
EX_P-83	EX_J-65	EX_J-47	226	400	120	-57.0	0.5	0.2	
EX_P-7	PROP_J-13	PROP_J-39	41	200	110	-14.1	0.5	0.1	
EX_P-88	EX_J-51	EX_J-50	307	400	120	53.0	0.4	0.2	
EX_P-98	EX_J-70	EX_J-36	121	250	110	20.5	0.4	0.1	
EX_P-84	EX_J-54	EX_J-48	288	400	120	-52.4	0.4	0.2	
EX_P-17	DUM_RES3	EX_J-22	6	400	120	51.5	0.4	0.0	
EX_P-78	EX_J-58	EX_J-60	166	400	120	45.6	0.4	0.1	
EX_P-22	EX_J-20	EX_J-13	320	150	100	6.3	0.4	0.6	
EX_P-74	EX_J-57	EX_J-70	309	300	120	24.6	0.4	0.2	
EX_P-89	EX_J-50	EX_J-49	274	400	120	43.0	0.3	0.1	
EX_P-64	EX_J-34	PROP_J-77	328	150	100	-5.8	0.3	0.5	
EX_P-86	EX_J-48	EX_J-49	505	400	120	-35.2	0.3	0.1	
EX_P-93	EX_J-53	EX_J-67	28	600	120	-74.9	0.3	0.0	
EX_P-50	PROP_J-46	EX_J-14	49	300	120	-17.3	0.2	0.0	
EX_P-85	EX_J-47	EX_J-48	255	300	120	17.2	0.2	0.1	
EX_P-92	EX_J-54	EX_J-65	316	300	120	-16.7	0.2	0.1	
EX_P-61	EX_J-37	EX_J-41	77	200	110	-7.3	0.2	0.0	
EX_P-79	EX_J-60	EX_J-61	424	300	120	15.2	0.2	0.1	
EX_P-27	EX_J-14	EX_J-21	298	300	120	-12.8	0.2	0.1	
EX_P-97	EX_J-71	EX_J-59	38	400	120	-20.6	0.2	0.0	
EX_P-77	EX_J-60	EX_J-59	992	400	120	20.4	0.2	0.1	
EX_P-96	PROP_J-77	EX_J-71	1034	200	110	-5.1	0.2	0.3	
EX_P-82	PROP_J-76	EX_J-37	93	200	110	-4.7	0.2	0.0	
EX_P-56	EX_J-36	PROP_J-76	64	200	110	-4.6	0.2	0.0	
EX_P-81	EX_J-62	EX_J-38	72	150	100	2.6	0.2	0.0	
EX_P-57	EX_J-37	EX_J-62	73	150	100	2.6	0.2	0.0	
EX_P-66	EX_J-38	EX_J-68	60	150	100	2.6	0.2	0.0	
EX_P-69	EX_J-12	EX_J-63	76	150	100	-2.6	0.2	0.0	
EX_P-29	EX_J-16	EX_J-21	235	200	110	-4.5	0.1	0.1	
EX_P-99	EX_J-70	EX_J-41	363	200	110	4.2	0.1	0.1	
EX_P-13	PROP_J-33	EX_J-30	134	400	120	-15.5	0.1	0.0	
EX_P-1	EX_J-30	EX_J-71	210	400	120	-15.5	0.1	0.0	
EX_P-65	PROP_J-77	EX_J-35	107	150	100	1.7	0.1	0.0	
EX_P-62	EX_J-41	EX_J-42	171	200	110	-3.1	0.1	0.0	
EX_P-30	EX_J-16	EX_J-14	90	300	120	4.5	0.1	0.0	
EX_P-67	EX_J-22	EX_J-42	330	300	120	0.9	0.0	0.0	
EX_P-51	PROP_J-61	PROP_J-33	45	400	120	-0.8	0.0	0.0	
EX_P-25	EX_J-12	PROP_J-83	132	400	120	0.7	0.0	0.0	
EX_P-80	EX_J-61	EX_J-59	207	300	120	0.2	0.0	0.0	
EX_P-19	EX_J-11	EX_J-32	7	300	120	0.0	0.0	0.0	
EX_P-60	EX_J-40	EX_J-39	44	50	100	0.0	0.0	0.0	
EX_P-31	EX_J-15	EX_J-33	166	200	110	0.0	0.0	0.0	
EX_P-28	EX_J-15	PROP_J-47	46	300	120	0.0	0.0	0.0	
EX_P-59	EX_J-39	EX_J-40	49	50	100	0.0	0.0	0.0	
EX_P-58	EX_J-38	EX_J-45	5	150	100	0.0	0.0	0.0	
EX_P-10	EX_J-33	EX_J-18	325	150	100	0.0	0.0	0.0	
EX_P-68	EX_J-45	EX_J-39	10	50	100	0.0	0.0	0.0	
EX_P-33	EX_J-19	EX_J-15	388	300	120	0.0	0.0	0.0	

Junction output under Maximum Day plus Fire Condition

ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (m)	Pressure (kPa)	Remark
Junction Nodes within Subject Site (Glenway West site)						
PROP_J-64	118.4	294.1	312.0	17.9	175	Block 12 (Fire flow of 117 L/s near lot 3 on Street 'B')
PROP_J-62	0.0	295.7	314.1	18.4	180	
PROP_J-63	0.1	292.9	312.0	19.1	187	
PROP_J-73	0.0	294.5	320.3	25.8	253	
PROP_J-82	0.0	291.0	327.3	36.3	356	
PROP_J-80	0.0	289.5	327.4	37.9	372	
PROP_J-83	0.0	289.0	327.2	38.2	374	
PROP_J-72	0.0	289.0	327.4	38.4	376	
PROP_J-71	1.9	287.5	327.4	39.9	391	
PROP_J-76	0.1	285.1	327.5	42.4	416	
PROP_J-70	0.0	284.9	327.4	42.5	417	
PROP_J-69	0.0	284.5	327.4	42.9	421	
PROP_J-60	0.1	284.2	327.3	43.1	422	
PROP_J-66	0.5	284.1	327.3	43.2	423	
PROP_J-79	0.0	283.4	327.4	44.0	431	
PROP_J-77	0.1	283.0	327.4	44.4	435	
PROP_J-78	0.0	282.9	327.4	44.5	436	
PROP_J-68	0.0	282.9	327.4	44.5	436	
PROP_J-61	0.0	282.5	327.1	44.6	437	
PROP_J-75	0.0	282.0	327.3	45.3	444	
PROP_J-59	0.0	280.4	327.3	46.9	460	
PROP_J-74	0.0	280.4	327.3	46.9	460	
PROP_J-81	0.0	280.4	327.3	46.9	460	
PROP_J-65	0.0	279.3	327.3	48.0	470	
PROP_J-58	0.1	278.0	327.3	49.3	483	
PROP_J-67	0.0	277.0	327.3	50.3	493	
Junction Nodes within Glenway East site						
PROP_J-17	4.0	281.7	327.1	45.4	445	
PROP_J-16	0.0	281.7	327.1	45.4	445	
PROP_J-38	0.0	281.9	327.2	45.4	445	
PROP_J-33	0.0	281.3	327.1	45.8	449	
PROP_J-28	0.0	281.1	327.1	46.0	451	
PROP_J-47	0.0	281.0	327.1	46.1	452	
PROP_J-18	0.0	280.2	327.1	46.9	460	
PROP_J-49	0.0	280.0	327.2	47.2	463	
PROP_J-10	0.0	280.0	327.2	47.2	463	
PROP_J-35	0.0	279.1	327.1	48.0	470	
PROP_J-19	0.0	278.9	327.1	48.3	473	
PROP_J-26	0.0	278.8	327.1	48.4	474	
PROP_J-37	1.4	278.3	327.4	49.1	481	
PROP_J-23	0.0	277.6	327.1	49.5	485	
PROP_J-20	0.0	277.3	327.1	49.8	488	
PROP_J-29	0.0	276.8	327.1	50.3	493	
PROP_J-24	0.0	276.6	327.1	50.5	495	
PROP_J-50	0.0	276.5	327.1	50.6	496	
PROP_J-57	0.2	276.3	327.1	50.8	497	
PROP_J-25	0.1	276.3	327.1	50.8	498	
PROP_J-54	0.3	276.0	327.1	51.1	501	
PROP_J-56	0.5	276.0	327.2	51.2	502	
PROP_J-21	0.0	275.8	327.1	51.3	502	
PROP_J-52	0.0	275.5	327.1	51.6	505	
PROP_J-30	1.0	275.5	327.1	51.6	505	
PROP_J-34	0.0	275.2	327.1	51.9	509	
PROP_J-48	0.1	274.9	327.2	52.3	513	
PROP_J-12	0.0	274.7	327.1	52.5	514	
PROP_J-51	0.0	274.7	327.1	52.5	514	
PROP_J-41	0.0	274.6	327.1	52.5	514	
PROP_J-22	0.0	274.4	327.1	52.7	516	
PROP_J-42	0.0	274.2	327.1	53.0	519	
PROP_J-44	0.0	274.1	327.1	53.0	520	
PROP_J-45	2.5	274.1	327.1	53.0	520	
PROP_J-43	0.0	273.6	327.1	53.5	524	
PROP_J-40	0.0	273.5	327.1	53.6	526	
PROP_J-39	0.0	273.5	327.1	53.6	526	
PROP_J-36	0.0	274.1	327.8	53.7	526	
PROP_J-53	0.0	273.4	327.1	53.7	526	
PROP_J-8	0.0	273.9	328.0	54.1	530	
PROP_J-31	0.1	273.0	327.1	54.1	530	
PROP_J-11	1.0	272.6	327.1	54.6	535	
PROP_J-46	0.0	272.5	327.1	54.6	535	
PROP_J-27	2.5	272.4	327.1	54.7	536	
PROP_J-13	0.0	272.4	327.1	54.7	536	
PROP_J-55	0.2	272.0	327.1	55.1	540	
PROP_J-14	0.0	271.9	327.1	55.2	541	
PROP_J-15	0.0	271.3	327.1	55.8	547	
PROP_J-32	0.1	270.7	327.1	56.4	553	

Junction output under Maximum Day plus Fire Condition

ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (m)	Pressure (kPa)	Remark
Existing Junction Nodes (NW)						
EX_J-63	0.0	299.0	327.4	28.4	278	
EX_J-13	0.0	296.7	327.5	30.8	302	
EX_J-66	2.8	296.0	328.8	32.8	321	
EX_J-57	10.0	294.0	327.8	33.8	331	
EX_J-56	0.0	293.0	327.9	34.9	342	
EX_J-68	0.0	292.0	327.4	35.4	347	
EX_J-12	0.0	291.0	327.3	36.3	356	
EX_J-22	4.6	291.0	327.5	36.5	358	
EX_J-41	0.0	290.6	327.5	36.9	362	
EX_J-62	0.0	290.0	327.5	37.5	367	
EX_J-38	0.0	289.3	327.4	38.1	374	
EX_J-53	0.0	292.3	330.5	38.3	375	
EX_J-45	0.0	289.0	327.4	38.4	377	
EX_J-39	0.0	289.0	327.4	38.4	377	
EX_J-52	0.0	291.6	330.5	38.9	381	
EX_J-37	0.0	288.5	327.5	39.0	383	
EX_J-42	15.0	288.4	327.5	39.1	383	
EX_J-40	0.0	288.0	327.4	39.4	386	
EX_J-34	0.0	287.0	327.4	40.4	396	
EX_J-67	3.9	290.0	330.5	40.5	397	
EX_J-51	0.0	287.4	329.7	42.3	415	
EX_J-70	0.0	285.0	327.7	42.7	418	
EX_J-65	2.9	286.5	329.2	42.7	419	
EX_J-47	10.0	286.6	329.4	42.8	419	
EX_J-36	3.0	283.5	327.5	44.0	432	
EX_J-20	0.0	284.0	328.1	44.1	432	
EX_J-35	0.0	283.0	327.4	44.4	435	
EX_J-10	0.0	282.3	327.6	45.3	444	
EX_J-15	0.0	281.0	327.1	46.1	452	
EX_J-33	0.0	279.5	327.1	47.6	466	
EX_J-23	4.3	281.0	328.7	47.7	467	
EX_J-24	0.0	279.5	328.6	49.1	481	
EX_J-64	3.8	280.0	329.1	49.1	481	
EX_J-50	10.0	280.4	329.5	49.1	481	
EX_J-71	0.0	278.0	327.2	49.2	482	
EX_J-59	0.0	278.0	327.2	49.2	482	
EX_J-17	0.0	277.0	327.3	50.3	493	
EX_J-48	0.0	278.2	329.3	51.1	500	
EX_J-30	0.0	276.0	327.1	51.1	501	
EX_J-58	20.0	276.0	327.4	51.4	503	
EX_J-54	0.0	277.7	329.1	51.4	504	
EX_J-29	0.0	276.3	328.2	51.9	509	
EX_J-18	0.0	275.0	327.1	52.1	511	
EX_J-28	0.0	274.5	327.1	52.6	515	
EX_J-21	0.0	274.1	327.1	53.1	520	
EX_J-32	0.0	274.1	327.1	53.1	520	
EX_J-11	0.0	274.1	327.1	53.1	520	
EX_J-19	0.0	274.0	327.1	53.1	520	
EX_J-60	10.0	274.0	327.3	53.3	522	
EX_J-49	7.8	276.1	329.4	53.4	523	
EX_J-27	0.0	273.3	327.2	53.8	527	
EX_J-61	15.0	273.0	327.2	54.2	531	
EX_J-14	0.0	272.5	327.1	54.6	535	
EX_J-16	0.0	272.0	327.1	55.1	540	
EX_J-31	9.3	268.0	327.9	59.9	587	

Reservoir			
ID	Flow (L/s)	Head (m)	Remark
DUM_RES1	-218.0	330.6	
DUM_RES3	-49.4	327.5	

Pipeline output under Maximum Day plus Fire Condition

ID	From Node	To Node	Length (m)	Diameter (mm)	Roughness	Flow (L/s)	Velocity (m/s)	Headloss (m)	Remark
Pipelines within Subject Site (Glenway West site)									
PROP_P-60	PROP_J-61	PROP_J-73	233	250	110	118.4	2.4	6.8	
PROP_P-79	PROP_J-73	PROP_J-62	215	250	110	118.4	2.4	6.3	
PROP_P-61	PROP_J-62	PROP_J-64	71	250	110	118.4	2.4	2.1	
PROP_P-80	PROP_J-83	PROP_J-61	76	400	120	74.8	0.6	0.1	
PROP_P-75	PROP_J-79	PROP_J-78	107	250	110	6.6	0.1	0.0	
PROP_P-81	EX_J-63	EX_J-68	126	200	110	-3.8	0.1	0.0	
PROP_P-68	PROP_J-77	PROP_J-78	12	250	110	-4.7	0.1	0.0	
PROP_P-85	PROP_J-81	PROP_J-74	17	200	110	2.2	0.1	0.0	
PROP_P-58	PROP_J-67	PROP_J-74	69	200	110	-1.6	0.1	0.0	
PROP_P-77	EX_J-12	PROP_J-82	96	250	110	2.2	0.1	0.0	
PROP_P-82	PROP_J-78	PROP_J-68	25	250	110	1.9	0.0	0.0	
PROP_P-74	PROP_J-68	PROP_J-69	98	200	110	1.1	0.0	0.0	
PROP_P-71	PROP_J-70	PROP_J-71	67	200	110	1.1	0.0	0.0	
PROP_P-72	PROP_J-69	PROP_J-71	115	200	110	0.8	0.0	0.0	
PROP_P-69	PROP_J-68	PROP_J-70	178	200	110	0.8	0.0	0.0	
PROP_P-78	PROP_J-59	PROP_J-74	17	200	110	-0.6	0.0	0.0	
PROP_P-66	PROP_J-66	PROP_J-60	28	50	100	0.0	0.0	0.0	
PROP_P-64	PROP_J-65	PROP_J-58	22	50	100	0.0	0.0	0.0	
PROP_P-63	PROP_J-64	PROP_J-63	40	50	100	0.0	0.0	0.0	
PROP_P-59	PROP_J-59	PROP_J-75	122	200	110	0.6	0.0	0.0	
PROP_P-76	PROP_J-75	PROP_J-66	151	200	110	0.6	0.0	0.0	
PROP_P-62	PROP_J-64	PROP_J-63	50	50	100	0.0	0.0	0.0	
PROP_P-65	PROP_J-58	PROP_J-65	32	50	100	0.0	0.0	0.0	
PROP_P-67	PROP_J-60	PROP_J-66	41	50	100	0.0	0.0	0.0	
PROP_P-70	PROP_J-70	PROP_J-69	64	200	110	-0.3	0.0	0.0	
PROP_P-57	PROP_J-59	PROP_J-65	32	200	110	0.1	0.0	0.0	
PROP_P-83	PROP_J-72	PROP_J-80	25	50	100	0.0	0.0	0.0	
PROP_P-73	PROP_J-71	PROP_J-72	30	200	110	0.0	0.0	0.0	
PROP_P-84	PROP_J-72	PROP_J-80	36	50	100	0.0	0.0	0.0	
Pipelines within Glenway East site									
PROP_P-31	PROP_J-36	PROP_J-8	151	250	110	-22.5	0.5	0.2	
PROP_P-29	PROP_J-37	PROP_J-36	298	250	110	-22.5	0.5	0.4	
PROP_P-43	PROP_J-49	PROP_J-37	116	250	110	-21.1	0.4	0.1	
PROP_P-28	PROP_J-35	PROP_J-49	102	250	110	-20.5	0.4	0.1	
PROP_P-26	PROP_J-33	PROP_J-35	45	300	120	-15.9	0.2	0.0	
PROP_P-32	PROP_J-39	PROP_J-40	7	200	110	2.5	0.1	0.0	
PROP_P-33	PROP_J-40	PROP_J-41	30	200	110	2.5	0.1	0.0	
PROP_P-34	PROP_J-41	PROP_J-42	33	200	110	2.5	0.1	0.0	
PROP_P-3	PROP_J-15	PROP_J-16	502	300	120	4.8	0.1	0.0	
PROP_P-2	PROP_J-14	PROP_J-15	26	300	120	4.8	0.1	0.0	
PROP_P-1	PROP_J-13	PROP_J-14	42	300	120	4.8	0.1	0.0	
PROP_P-27	PROP_J-35	PROP_J-34	169	300	120	4.6	0.1	0.0	
PROP_P-19	PROP_J-24	PROP_J-57	43	50	100	0.1	0.1	0.0	
PROP_P-39	PROP_J-46	PROP_J-50	50	300	120	3.7	0.1	0.0	
PROP_P-56	PROP_J-57	PROP_J-25	55	50	100	-0.1	0.1	0.0	
PROP_P-23	PROP_J-30	PROP_J-50	35	200	110	-1.6	0.1	0.0	
PROP_P-9	PROP_J-19	PROP_J-20	76	250	110	2.5	0.1	0.0	
PROP_P-5	PROP_J-18	PROP_J-16	29	250	110	-2.5	0.1	0.0	
PROP_P-38	PROP_J-45	PROP_J-42	84	200	110	-1.5	0.1	0.0	
PROP_P-6	PROP_J-18	PROP_J-19	57	250	110	1.9	0.0	0.0	
PROP_P-10	PROP_J-20	PROP_J-21	61	250	110	1.8	0.0	0.0	
PROP_P-30	PROP_J-48	PROP_J-56	55	50	100	-0.1	0.0	0.0	
PROP_P-4	PROP_J-16	PROP_J-17	17	300	120	2.3	0.0	0.0	
PROP_P-35	PROP_J-42	PROP_J-43	118	200	110	1.0	0.0	0.0	
PROP_P-36	PROP_J-43	PROP_J-45	70	200	110	1.0	0.0	0.0	
PROP_P-13	PROP_J-21	PROP_J-27	159	250	110	1.5	0.0	0.0	
PROP_P-14	PROP_J-27	PROP_J-22	122	200	110	-1.0	0.0	0.0	
PROP_P-45	PROP_J-50	PROP_J-29	39	300	120	2.1	0.0	0.0	
PROP_P-20	PROP_J-23	PROP_J-29	72	300	120	-2.1	0.0	0.0	
PROP_P-55	PROP_J-56	PROP_J-48	73	50	100	0.1	0.0	0.0	
PROP_P-15	PROP_J-17	PROP_J-28	49	300	120	-1.7	0.0	0.0	
PROP_P-16	PROP_J-28	PROP_J-23	153	300	120	-1.7	0.0	0.0	
PROP_P-11	PROP_J-20	PROP_J-22	115	200	110	0.7	0.0	0.0	
PROP_P-50	PROP_J-54	PROP_J-31	35	50	100	0.0	0.0	0.0	
PROP_P-52	PROP_J-55	PROP_J-32	40	50	100	0.0	0.0	0.0	
PROP_P-53	PROP_J-55	PROP_J-32	55	50	100	0.0	0.0	0.0	
PROP_P-51	PROP_J-54	PROP_J-31	48	50	100	0.0	0.0	0.0	
PROP_P-44	PROP_J-38	PROP_J-49	44	200	110	-0.6	0.0	0.0	
PROP_P-42	PROP_J-10	PROP_J-38	110	200	110	-0.6	0.0	0.0	
PROP_P-54	PROP_J-56	PROP_J-10	169	200	110	-0.6	0.0	0.0	
PROP_P-8	PROP_J-26	PROP_J-19	118	200	110	0.6	0.0	0.0	
PROP_P-7	PROP_J-18	PROP_J-26	60	200	110	0.6	0.0	0.0	
PROP_P-21	PROP_J-30	PROP_J-54	245	200	110	0.4	0.0	0.0	
PROP_P-17	PROP_J-23	PROP_J-24	95	200	110	0.4	0.0	0.0	
PROP_P-18	PROP_J-24	PROP_J-25	25	200	110	0.2	0.0	0.0	
PROP_P-41	PROP_J-12	PROP_J-55	125	200	110	0.2	0.0	0.0	
PROP_P-22	PROP_J-30	PROP_J-52	8	200	110	0.2	0.0	0.0	
PROP_P-12	PROP_J-22	PROP_J-21	58	200	110	-0.2	0.0	0.0	
PROP_P-46	PROP_J-52	PROP_J-12	49	200	110	0.2	0.0	0.0	
PROP_P-47	PROP_J-52	PROP_J-51	72	50	100	0.0	0.0	0.0	
PROP_P-49	PROP_J-51	PROP_J-12	15	200	110	0.0	0.0	0.0	
PROP_P-40	PROP_J-29	PROP_J-47	44	300	120	0.0	0.0	0.0	
PROP_P-48	PROP_J-43	PROP_J-53	31	50	100	0.0	0.0	0.0	
PROP_P-37	PROP_J-44	PROP_J-45	30	50	100	0.0	0.0	0.0	

Pipeline output under Maximum Day plus Fire Condition

ID	From Node	To Node	Length (m)	Diameter (mm)	Roughness	Flow (L/s)	Velocity (m/s)	Headloss (m)	Remark
Existing Pipelines (NW)									
EX_P-46	EX_J-23	EX_J-24	12	200	110	39.5	1.3	0.1	
EX_P-87	EX_J-67	EX_J-52	15	400	120	137.1	1.1	0.1	
EX_P-90	EX_J-52	EX_J-51	236	400	120	137.1	1.1	0.8	
EX_P-45	EX_J-22	EX_J-12	43	300	120	73.2	1.0	0.2	
EX_P-70	DUM_RES1	EX_J-67	52	600	120	218.0	0.8	0.1	
EX_P-40	EX_J-24	EX_J-20	104	200	110	23.3	0.7	0.4	
EX_P-26	EX_J-13	EX_J-22	9	200	110	22.6	0.7	0.0	
EX_P-3	EX_J-29	PROP_J-8	48	200	110	22.5	0.7	0.2	
EX_P-2	EX_J-29	EX_J-23	130	200	110	-22.5	0.7	0.5	
EX_P-72	EX_J-66	EX_J-56	313	250	110	33.5	0.7	0.9	
EX_P-91	EX_J-47	EX_J-51	255	400	120	-84.1	0.7	0.3	
EX_P-71	EX_J-53	EX_J-31	2309	400	120	77.1	0.6	2.6	
EX_P-25	EX_J-12	PROP_J-83	132	400	120	74.8	0.6	0.1	
EX_P-94	EX_J-64	EX_J-54	76	400	120	-70.1	0.6	0.1	
EX_P-63	EX_J-42	EX_J-20	257	200	110	-17.0	0.5	0.6	
EX_P-76	EX_J-10	EX_J-58	288	400	120	67.8	0.5	0.3	
EX_P-36	EX_J-31	EX_J-10	346	400	120	67.8	0.5	0.3	
EX_P-75	EX_J-23	EX_J-64	438	400	120	-66.3	0.5	0.4	
EX_P-47	EX_J-24	EX_J-13	468	200	110	16.3	0.5	1.0	
EX_P-95	EX_J-66	EX_J-65	387	300	120	-36.4	0.5	0.4	
EX_P-73	EX_J-56	EX_J-57	106	300	120	33.5	0.5	0.1	
EX_P-83	EX_J-65	EX_J-47	226	400	120	-56.6	0.5	0.1	
EX_P-88	EX_J-51	EX_J-50	307	400	120	53.0	0.4	0.2	
EX_P-84	EX_J-54	EX_J-48	288	400	120	-52.8	0.4	0.2	
EX_P-100	PROP_J-79	EX_J-36	80	200	110	-12.7	0.4	0.1	
EX_P-17	DUM_RES3	EX_J-22	6	400	120	49.4	0.4	0.0	
EX_P-78	EX_J-58	EX_J-60	166	400	120	47.8	0.4	0.1	
EX_P-98	EX_J-70	EX_J-36	121	250	110	17.9	0.4	0.1	
EX_P-22	EX_J-20	EX_J-13	320	150	100	6.3	0.4	0.6	
EX_P-51	PROP_J-61	PROP_J-33	45	400	120	-43.6	0.4	0.0	
EX_P-89	EX_J-50	EX_J-49	274	400	120	43.0	0.3	0.1	
EX_P-74	EX_J-57	EX_J-70	309	300	120	23.5	0.3	0.2	
EX_P-86	EX_J-48	EX_J-49	505	400	120	-35.3	0.3	0.1	
EX_P-93	EX_J-53	EX_J-67	28	600	120	-77.1	0.3	0.0	
EX_P-85	EX_J-47	EX_J-48	255	300	120	17.5	0.3	0.1	
EX_P-92	EX_J-54	EX_J-65	316	300	120	-17.4	0.3	0.1	
EX_P-35	EX_J-17	EX_J-27	274	200	110	7.4	0.2	0.1	
EX_P-6	EX_J-27	PROP_J-11	76	200	110	7.4	0.2	0.0	
EX_P-79	EX_J-60	EX_J-61	424	300	120	16.1	0.2	0.1	
EX_P-1	EX_J-30	EX_J-71	210	400	120	-27.7	0.2	0.0	
EX_P-13	PROP_J-33	EX_J-30	134	400	120	-27.7	0.2	0.0	
EX_P-57	EX_J-37	EX_J-62	73	150	100	3.8	0.2	0.1	
EX_P-81	EX_J-62	EX_J-38	72	150	100	3.8	0.2	0.1	
EX_P-69	EX_J-12	EX_J-63	76	150	100	-3.8	0.2	0.1	
EX_P-66	EX_J-38	EX_J-68	60	150	100	3.8	0.2	0.0	
EX_P-5	PROP_J-11	PROP_J-13	34	200	110	6.4	0.2	0.0	
EX_P-55	EX_J-35	PROP_J-79	10	200	110	-6.1	0.2	0.0	
EX_P-53	EX_J-17	EX_J-34	254	200	110	-5.8	0.2	0.1	
EX_P-97	EX_J-71	EX_J-59	38	400	120	-22.8	0.2	0.0	
EX_P-99	EX_J-70	EX_J-41	363	200	110	5.6	0.2	0.1	
EX_P-77	EX_J-60	EX_J-59	992	400	120	21.7	0.2	0.1	
EX_P-96	PROP_J-77	EX_J-71	1034	200	110	4.9	0.2	0.3	
EX_P-54	EX_J-34	EX_J-35	167	200	110	-4.7	0.2	0.0	
EX_P-62	EX_J-41	EX_J-42	171	200	110	3.9	0.1	0.0	
EX_P-14	PROP_J-34	EX_J-11	42	200	110	3.7	0.1	0.0	
EX_P-23	EX_J-21	EX_J-11	26	200	110	-3.7	0.1	0.0	
EX_P-67	EX_J-22	EX_J-42	330	300	120	-5.9	0.1	0.0	
EX_P-65	PROP_J-77	EX_J-35	107	150	100	-1.4	0.1	0.0	
EX_P-24	PROP_J-82	PROP_J-81	46	200	110	2.2	0.1	0.0	
EX_P-56	EX_J-36	PROP_J-76	64	200	110	2.2	0.1	0.0	
EX_P-82	PROP_J-76	EX_J-37	93	200	110	2.1	0.1	0.0	
EX_P-64	EX_J-34	PROP_J-77	328	150	100	-1.1	0.1	0.0	
EX_P-61	EX_J-37	EX_J-41	77	200	110	-1.7	0.1	0.0	
EX_P-50	PROP_J-46	EX_J-14	49	300	120	-3.7	0.1	0.0	
EX_P-7	PROP_J-13	PROP_J-39	41	200	110	1.6	0.1	0.0	
EX_P-52	PROP_J-67	EX_J-17	7	200	110	1.6	0.1	0.0	
EX_P-27	EX_J-14	EX_J-21	298	300	120	-2.8	0.0	0.0	
EX_P-29	EX_J-16	EX_J-21	235	200	110	-1.0	0.0	0.0	
EX_P-4	EX_J-28	PROP_J-34	81	200	110	-0.9	0.0	0.0	
EX_P-18	PROP_J-39	EX_J-28	50	200	110	-0.9	0.0	0.0	
EX_P-80	EX_J-61	EX_J-59	207	300	120	1.1	0.0	0.0	
EX_P-30	EX_J-16	EX_J-14	90	300	120	1.0	0.0	0.0	
EX_P-10	EX_J-33	EX_J-18	325	150	100	0.0	0.0	0.0	
EX_P-58	EX_J-38	EX_J-45	5	150	100	0.0	0.0	0.0	
EX_P-19	EX_J-11	EX_J-32	7	300	120	0.0	0.0	0.0	
EX_P-33	EX_J-19	EX_J-15	388	300	120	0.0	0.0	0.0	
EX_P-59	EX_J-39	EX_J-40	49	50	100	0.0	0.0	0.0	
EX_P-60	EX_J-40	EX_J-39	44	50	100	0.0	0.0	0.0	
EX_P-31	EX_J-15	EX_J-33	166	200	110	0.0	0.0	0.0	
EX_P-68	EX_J-45	EX_J-39	10	50	100	0.0	0.0	0.0	
EX_P-28	EX_J-15	PROP_J-47	46	300	120	0.0	0.0	0.0	

Junction output under Maximum Day plus Fire Condition

ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (m)	Pressure (kPa)	Remark
Junction Nodes within Subject Site (Glenway West site)						
PROP_J-80	0.0	289.5	305.3	15.8	155	
PROP_J-72*	84.0	289.0	305.3	16.3	160	Block 13 (Fire flow of 167 L/s near south end of the Block)
PROP_J-71*	85.9	287.5	306.7	19.2	188	
PROP_J-70	0.0	284.9	310.6	25.7	252	
PROP_J-69	0.0	284.5	310.9	26.4	258	
PROP_J-62	0.0	295.7	327.3	31.6	310	
PROP_J-73	0.0	294.5	327.3	32.8	321	
PROP_J-64	1.4	294.1	327.3	33.2	325	
PROP_J-68	0.0	282.9	316.8	33.9	332	
PROP_J-63	0.1	292.9	327.3	34.4	337	
PROP_J-78	0.0	282.9	318.2	35.2	345	
PROP_J-77	0.1	283.0	318.3	35.3	346	
PROP_J-82	0.0	291.0	327.1	36.1	353	
PROP_J-79	0.0	283.4	320.3	36.9	361	
PROP_J-83	0.0	289.0	327.3	38.3	375	
PROP_J-76	0.1	285.1	324.7	39.6	388	
PROP_J-60	0.1	284.2	326.6	42.4	415	
PROP_J-66	0.5	284.1	326.6	42.5	416	
PROP_J-75	0.0	282.0	326.6	44.6	437	
PROP_J-61	0.0	282.5	327.3	44.8	439	
PROP_J-59	0.0	280.4	326.6	46.2	452	
PROP_J-74	0.0	280.4	326.6	46.2	452	
PROP_J-81	0.0	280.4	326.7	46.3	454	
PROP_J-65	0.0	279.3	326.6	47.3	463	
PROP_J-58	0.1	278.0	326.6	48.6	476	
PROP_J-67	0.0	277.0	326.0	49.0	480	
Junction Nodes within Glenway East site						
PROP_J-16	0.0	281.7	326.9	45.2	443	
PROP_J-17	4.0	281.7	326.9	45.2	443	
PROP_J-38	0.0	281.9	327.4	45.5	446	
PROP_J-28	0.0	281.1	326.9	45.9	449	
PROP_J-47	0.0	281.0	327.0	46.0	450	
PROP_J-33	0.0	281.3	327.3	46.0	451	
PROP_J-18	0.0	280.2	326.9	46.7	458	
PROP_J-49	0.0	280.0	327.4	47.3	464	
PROP_J-10	0.0	280.0	327.4	47.4	464	
PROP_J-19	0.0	278.9	326.9	48.1	471	
PROP_J-35	0.0	279.1	327.3	48.2	472	
PROP_J-26	0.0	278.8	326.9	48.2	472	
PROP_J-37	1.4	278.3	327.5	49.2	482	
PROP_J-23	0.0	277.6	327.0	49.4	484	
PROP_J-20	0.0	277.3	326.9	49.6	486	
PROP_J-29	0.0	276.8	327.0	50.1	491	
PROP_J-24	0.0	276.6	327.0	50.3	493	
PROP_J-50	0.0	276.5	327.0	50.5	495	
PROP_J-57	0.2	276.3	326.9	50.6	496	
PROP_J-25	0.1	276.3	327.0	50.6	496	
PROP_J-54	0.3	276.0	327.0	51.0	499	
PROP_J-21	0.0	275.8	326.9	51.1	501	
PROP_J-56	0.5	276.0	327.4	51.4	503	
PROP_J-30	1.0	275.5	327.0	51.4	504	
PROP_J-52	0.0	275.5	327.0	51.4	504	
PROP_J-34	0.0	275.2	327.2	52.0	509	
PROP_J-41	0.0	274.6	326.9	52.3	513	
PROP_J-12	0.0	274.7	327.0	52.3	513	
PROP_J-51	0.0	274.7	327.0	52.3	513	
PROP_J-48	0.1	274.9	327.4	52.4	514	
PROP_J-22	0.0	274.4	326.9	52.5	514	
PROP_J-42	0.0	274.2	326.9	52.8	517	
PROP_J-44	0.0	274.1	326.9	52.8	518	
PROP_J-45	2.5	274.1	326.9	52.8	518	
PROP_J-43	0.0	273.6	326.9	53.3	523	
PROP_J-40	0.0	273.5	326.9	53.5	524	
PROP_J-39	0.0	273.5	326.9	53.5	524	
PROP_J-53	0.0	273.4	326.9	53.5	524	
PROP_J-36	0.0	274.1	327.8	53.7	526	
PROP_J-31	0.1	273.0	327.0	54.0	529	
PROP_J-8	0.0	273.9	327.9	54.0	529	
PROP_J-11	1.0	272.6	326.8	54.2	531	
PROP_J-13	0.0	272.4	326.9	54.5	534	
PROP_J-27	2.5	272.4	326.9	54.5	534	
PROP_J-46	0.0	272.5	327.0	54.5	534	
PROP_J-55	0.2	272.0	327.0	55.0	539	
PROP_J-14	0.0	271.9	326.9	55.0	539	
PROP_J-15	0.0	271.3	326.9	55.6	545	
PROP_J-32	0.1	270.7	327.0	56.3	551	

Junction output under Maximum Day plus Fire Condition

ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (m)	Pressure (kPa)	Remark
Existing Junction Nodes (NW)						
EX_J-63	0.0	299.0	326.9	27.9	273	
EX_J-13	0.0	296.7	327.5	30.8	302	
EX_J-57	10.0	294.0	325.6	31.6	310	
EX_J-66	2.8	296.0	327.9	31.9	313	
EX_J-56	0.0	293.0	325.8	32.8	322	
EX_J-34	0.0	287.0	321.7	34.7	340	
EX_J-68	0.0	292.0	326.7	34.7	340	
EX_J-41	0.0	290.6	325.7	35.1	344	
EX_J-62	0.0	290.0	325.9	35.9	352	
EX_J-12	0.0	291.0	327.3	36.3	356	
EX_J-22	4.6	291.0	327.5	36.5	358	
EX_J-37	0.0	288.5	325.4	36.9	362	
EX_J-38	0.0	289.3	326.3	37.0	363	
EX_J-45	0.0	289.0	326.3	37.3	366	
EX_J-39	0.0	289.0	326.3	37.3	366	
EX_J-35	0.0	283.0	320.3	37.3	366	
EX_J-53	0.0	292.3	330.5	38.3	375	
EX_J-40	0.0	288.0	326.3	38.3	376	
EX_J-42	15.0	288.4	327.2	38.8	380	
EX_J-52	0.0	291.6	330.5	38.8	381	
EX_J-70	0.0	285.0	325.1	40.1	393	
EX_J-67	3.9	290.0	330.5	40.5	397	
EX_J-36	3.0	283.5	324.2	40.7	399	
EX_J-51	0.0	287.4	329.5	42.2	413	
EX_J-65	2.9	286.5	328.9	42.4	415	
EX_J-47	10.0	286.6	329.1	42.5	416	
EX_J-20	0.0	284.0	327.9	43.9	430	
EX_J-10	0.0	282.3	327.7	45.4	445	
EX_J-15	0.0	281.0	327.0	46.0	450	
EX_J-33	0.0	279.5	327.0	47.5	465	
EX_J-23	4.3	281.0	328.5	47.5	465	
EX_J-64	3.8	280.0	328.8	48.8	478	
EX_J-24	0.0	279.5	328.4	48.9	479	
EX_J-50	10.0	280.4	329.3	48.9	479	
EX_J-17	0.0	277.0	326.0	49.0	480	
EX_J-71	0.0	278.0	327.3	49.3	483	
EX_J-59	0.0	278.0	327.3	49.3	483	
EX_J-48	0.0	278.2	329.0	50.8	498	
EX_J-54	0.0	277.7	328.9	51.2	501	
EX_J-30	0.0	276.0	327.3	51.3	503	
EX_J-58	20.0	276.0	327.5	51.5	504	
EX_J-29	0.0	276.3	328.1	51.8	508	
EX_J-18	0.0	275.0	327.0	52.0	509	
EX_J-28	0.0	274.5	327.0	52.5	514	
EX_J-19	0.0	274.0	327.0	53.0	519	
EX_J-21	0.0	274.1	327.0	53.0	519	
EX_J-32	0.0	274.1	327.1	53.0	520	
EX_J-11	0.0	274.1	327.1	53.0	520	
EX_J-49	7.8	276.1	329.2	53.1	521	
EX_J-27	0.0	273.3	326.6	53.3	522	
EX_J-60	10.0	274.0	327.4	53.4	523	
EX_J-61	15.0	273.0	327.3	54.3	532	
EX_J-14	0.0	272.5	327.0	54.5	534	
EX_J-16	0.0	272.0	327.0	55.0	539	
EX_J-31	9.3	268.0	328.0	60.0	588	

Reservoir			
ID	Flow (L/s)	Head (m)	Remark
DUM_RES1	-231.8	330.6	
DUM_RES3	-86.7	327.5	

Note:
*Two fire hydrants (PROP_J-71 and PROP_J-72) were used for the required fire flow of 167 L/s

Pipeline output under Maximum Day plus Fire Condition

ID	From Node	To Node	Length (m)	Diameter (mm)	Roughness	Flow (L/s)	Velocity (m/s)	Headloss (m)	Remark
Pipelines within Subject Site (Glenway West site)									
PROP_P-82	PROP_J-78	PROP_J-68	25	250	110	169.9	3.5	1.4	
PROP_P-74	PROP_J-68	PROP_J-69	98	200	110	97.5	3.1	5.9	
PROP_P-71	PROP_J-70	PROP_J-71	67	200	110	95.7	3.1	3.9	
PROP_P-73	PROP_J-71	PROP_J-72	30	200	110	84.0	2.7	1.4	
PROP_P-72	PROP_J-69	PROP_J-71	115	200	110	74.2	2.4	4.2	
PROP_P-69	PROP_J-68	PROP_J-70	178	200	110	72.4	2.3	6.2	
PROP_P-75	PROP_J-79	PROP_J-78	107	250	110	97.4	2.0	2.2	
PROP_P-68	PROP_J-77	PROP_J-78	12	250	110	72.6	1.5	0.1	
PROP_P-85	PROP_J-81	PROP_J-74	17	200	110	32.8	1.0	0.1	
PROP_P-58	PROP_J-67	PROP_J-74	69	200	110	-32.1	1.0	0.5	
PROP_P-70	PROP_J-70	PROP_J-69	64	200	110	-23.3	0.7	0.3	
PROP_P-77	EX_J-12	PROP_J-82	96	250	110	32.8	0.7	0.3	
PROP_P-81	EX_J-63	EX_J-68	126	200	110	12.1	0.4	0.2	
PROP_P-80	PROP_J-83	PROP_J-61	76	400	120	25.6	0.2	0.0	
PROP_P-60	PROP_J-61	PROP_J-73	233	250	110	1.4	0.0	0.0	
PROP_P-79	PROP_J-73	PROP_J-62	215	250	110	1.4	0.0	0.0	
PROP_P-61	PROP_J-62	PROP_J-64	71	250	110	1.4	0.0	0.0	
PROP_P-78	PROP_J-59	PROP_J-74	17	200	110	-0.6	0.0	0.0	
PROP_P-66	PROP_J-66	PROP_J-60	28	50	100	0.0	0.0	0.0	
PROP_P-64	PROP_J-65	PROP_J-58	22	50	100	0.0	0.0	0.0	
PROP_P-63	PROP_J-64	PROP_J-63	40	50	100	0.0	0.0	0.0	
PROP_P-76	PROP_J-75	PROP_J-66	151	200	110	0.6	0.0	0.0	
PROP_P-59	PROP_J-59	PROP_J-75	122	200	110	0.6	0.0	0.0	
PROP_P-62	PROP_J-64	PROP_J-63	50	50	100	0.0	0.0	0.0	
PROP_P-65	PROP_J-58	PROP_J-65	32	50	100	0.0	0.0	0.0	
PROP_P-67	PROP_J-60	PROP_J-66	41	50	100	0.0	0.0	0.0	
PROP_P-57	PROP_J-59	PROP_J-65	32	200	110	0.1	0.0	0.0	
PROP_P-83	PROP_J-72	PROP_J-80	25	50	100	0.0	0.0	0.0	
PROP_P-84	PROP_J-72	PROP_J-80	36	50	100	0.0	0.0	0.0	
Pipelines within Glenway East site									
PROP_P-27	PROP_J-35	PROP_J-34	169	300	120	28.9	0.4	0.1	
PROP_P-29	PROP_J-37	PROP_J-36	298	250	110	-19.5	0.4	0.3	
PROP_P-31	PROP_J-36	PROP_J-8	151	250	110	-19.5	0.4	0.2	
PROP_P-43	PROP_J-49	PROP_J-37	116	250	110	-18.1	0.4	0.1	
PROP_P-28	PROP_J-35	PROP_J-49	102	250	110	-17.5	0.4	0.1	
PROP_P-39	PROP_J-46	PROP_J-50	50	300	120	14.9	0.2	0.0	
PROP_P-45	PROP_J-50	PROP_J-29	39	300	120	13.3	0.2	0.0	
PROP_P-20	PROP_J-23	PROP_J-29	72	300	120	-13.3	0.2	0.0	
PROP_P-16	PROP_J-28	PROP_J-23	153	300	120	-12.9	0.2	0.0	
PROP_P-15	PROP_J-17	PROP_J-28	49	300	120	-12.9	0.2	0.0	
PROP_P-26	PROP_J-33	PROP_J-35	45	300	120	11.4	0.2	0.0	
PROP_P-4	PROP_J-16	PROP_J-17	17	300	120	-8.9	0.1	0.0	
PROP_P-1	PROP_J-13	PROP_J-14	42	300	120	-6.4	0.1	0.0	
PROP_P-3	PROP_J-15	PROP_J-16	502	300	120	-6.4	0.1	0.0	
PROP_P-2	PROP_J-14	PROP_J-15	26	300	120	-6.4	0.1	0.0	
PROP_P-33	PROP_J-40	PROP_J-41	30	200	110	2.5	0.1	0.0	
PROP_P-34	PROP_J-41	PROP_J-42	33	200	110	2.5	0.1	0.0	
PROP_P-32	PROP_J-39	PROP_J-40	7	200	110	2.5	0.1	0.0	
PROP_P-19	PROP_J-24	PROP_J-57	43	50	100	0.1	0.1	0.0	
PROP_P-56	PROP_J-57	PROP_J-25	55	50	100	-0.1	0.1	0.0	
PROP_P-23	PROP_J-30	PROP_J-50	35	200	110	-1.6	0.1	0.0	
PROP_P-9	PROP_J-19	PROP_J-20	76	250	110	2.5	0.1	0.0	
PROP_P-5	PROP_J-18	PROP_J-16	29	250	110	-2.5	0.1	0.0	
PROP_P-38	PROP_J-45	PROP_J-42	84	200	110	-1.5	0.1	0.0	
PROP_P-6	PROP_J-18	PROP_J-19	57	250	110	1.9	0.0	0.0	
PROP_P-10	PROP_J-20	PROP_J-21	61	250	110	1.8	0.0	0.0	
PROP_P-30	PROP_J-48	PROP_J-56	55	50	100	-0.1	0.0	0.0	
PROP_P-35	PROP_J-42	PROP_J-43	118	200	110	1.0	0.0	0.0	
PROP_P-36	PROP_J-43	PROP_J-45	70	200	110	1.0	0.0	0.0	
PROP_P-13	PROP_J-21	PROP_J-27	159	250	110	1.5	0.0	0.0	
PROP_P-14	PROP_J-27	PROP_J-22	122	200	110	-1.0	0.0	0.0	
PROP_P-55	PROP_J-56	PROP_J-48	73	50	100	0.1	0.0	0.0	
PROP_P-11	PROP_J-20	PROP_J-22	115	200	110	0.7	0.0	0.0	
PROP_P-50	PROP_J-54	PROP_J-31	35	50	100	0.0	0.0	0.0	
PROP_P-52	PROP_J-55	PROP_J-32	40	50	100	0.0	0.0	0.0	
PROP_P-53	PROP_J-55	PROP_J-32	55	50	100	0.0	0.0	0.0	
PROP_P-51	PROP_J-54	PROP_J-31	48	50	100	0.0	0.0	0.0	
PROP_P-44	PROP_J-38	PROP_J-49	44	200	110	-0.6	0.0	0.0	
PROP_P-54	PROP_J-56	PROP_J-10	169	200	110	-0.6	0.0	0.0	
PROP_P-42	PROP_J-10	PROP_J-38	110	200	110	-0.6	0.0	0.0	
PROP_P-8	PROP_J-26	PROP_J-19	118	200	110	0.6	0.0	0.0	
PROP_P-7	PROP_J-18	PROP_J-26	60	200	110	0.6	0.0	0.0	
PROP_P-21	PROP_J-30	PROP_J-54	245	200	110	0.4	0.0	0.0	
PROP_P-17	PROP_J-23	PROP_J-24	95	200	110	0.4	0.0	0.0	
PROP_P-18	PROP_J-24	PROP_J-25	25	200	110	0.2	0.0	0.0	
PROP_P-41	PROP_J-12	PROP_J-55	125	200	110	0.2	0.0	0.0	
PROP_P-22	PROP_J-30	PROP_J-52	8	200	110	0.2	0.0	0.0	
PROP_P-12	PROP_J-22	PROP_J-21	58	200	110	-0.2	0.0	0.0	
PROP_P-46	PROP_J-52	PROP_J-12	49	200	110	0.2	0.0	0.0	
PROP_P-47	PROP_J-52	PROP_J-51	72	50	100	0.0	0.0	0.0	
PROP_P-49	PROP_J-51	PROP_J-12	15	200	110	0.0	0.0	0.0	
PROP_P-48	PROP_J-43	PROP_J-53	31	50	100	0.0	0.0	0.0	
PROP_P-37	PROP_J-44	PROP_J-45	30	50	100	0.0	0.0	0.0	
PROP_P-40	PROP_J-29	PROP_J-47	44	300	120	0.0	0.0	0.0	

Pipeline output under Maximum Day plus Fire Condition

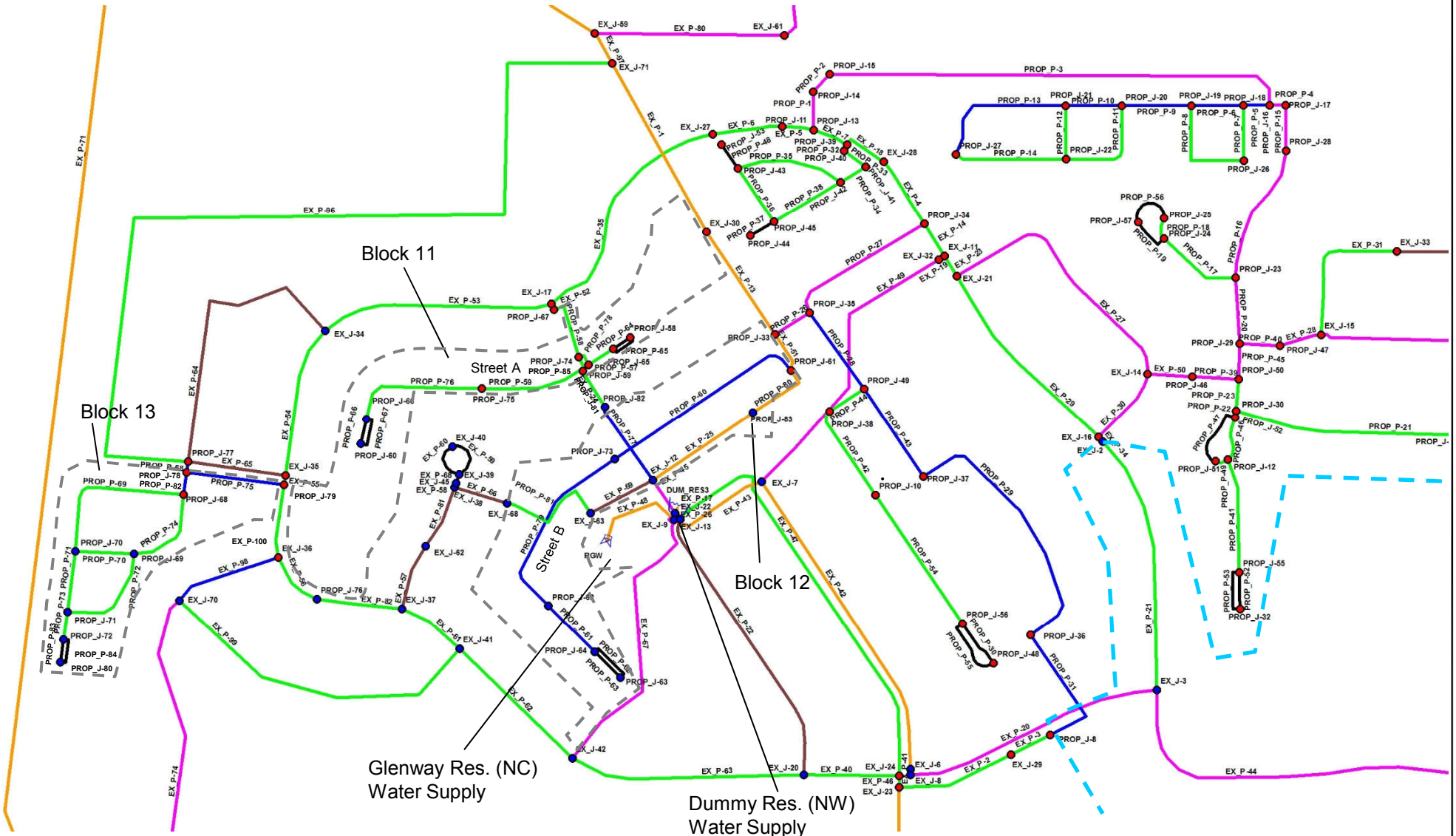
ID	From Node	To Node	Length (m)	Diameter (mm)	Roughness	Flow (L/s)	Velocity (m/s)	Headloss (m)	Remark
Existing Pipelines (NW)									
EX_P-100	PROP_J-79	EX_J-36	80	200	110	-86.7	2.8	3.9	
EX_P-53	EX_J-17	EX_J-34	254	200	110	49.1	1.6	4.3	
EX_P-65	PROP_J-77	EX_J-35	107	150	100	-22.3	1.3	2.0	
EX_P-87	EX_J-67	EX_J-52	15	400	120	152.1	1.2	0.1	
EX_P-90	EX_J-52	EX_J-51	236	400	120	152.1	1.2	0.9	
EX_P-46	EX_J-23	EX_J-24	12	200	110	37.9	1.2	0.1	
EX_P-98	EX_J-70	EX_J-36	121	250	110	57.2	1.2	0.9	
EX_P-62	EX_J-41	EX_J-42	171	200	110	-34.5	1.1	1.5	
EX_P-96	PROP_J-77	EX_J-71	1034	200	110	-34.3	1.1	9.0	
EX_P-72	EX_J-66	EX_J-56	313	250	110	53.2	1.1	2.1	
EX_P-54	EX_J-34	EX_J-35	167	200	110	33.0	1.1	1.4	
EX_P-24	PROP_J-82	PROP_J-81	46	200	110	32.8	1.0	0.4	
EX_P-82	PROP_J-76	EX_J-37	93	200	110	-32.6	1.0	0.7	
EX_P-56	EX_J-36	PROP_J-76	64	200	110	-32.5	1.0	0.5	
EX_P-52	PROP_J-67	EX_J-17	7	200	110	32.1	1.0	0.1	
EX_P-45	EX_J-22	EX_J-12	43	300	120	70.5	1.0	0.2	
EX_P-64	EX_J-34	PROP_J-77	328	150	100	16.1	0.9	3.4	
EX_P-70	DUM_RES1	EX_J-67	52	600	120	231.8	0.8	0.1	
EX_P-95	EX_J-66	EX_J-65	387	300	120	-56.1	0.8	1.0	
EX_P-91	EX_J-47	EX_J-51	255	400	120	-95.0	0.8	0.4	
EX_P-73	EX_J-56	EX_J-57	106	300	120	53.2	0.8	0.3	
EX_P-40	EX_J-24	EX_J-20	104	200	110	23.4	0.7	0.4	
EX_P-17	DUM_RES3	EX_J-22	6	400	120	86.7	0.7	0.0	
EX_P-66	EX_J-38	EX_J-68	60	150	100	-12.1	0.7	0.4	
EX_P-69	EX_J-12	EX_J-63	76	150	100	12.1	0.7	0.5	
EX_P-81	EX_J-62	EX_J-38	72	150	100	-12.1	0.7	0.4	
EX_P-57	EX_J-37	EX_J-62	73	150	100	-12.1	0.7	0.5	
EX_P-61	EX_J-37	EX_J-41	77	200	110	-20.5	0.7	0.3	
EX_P-26	EX_J-13	EX_J-22	9	200	110	19.6	0.6	0.0	
EX_P-2	EX_J-29	EX_J-23	130	200	110	-19.5	0.6	0.4	
EX_P-3	EX_J-29	PROP_J-8	48	200	110	19.5	0.6	0.2	
EX_P-74	EX_J-57	EX_J-70	309	300	120	43.2	0.6	0.5	
EX_P-71	EX_J-53	EX_J-31	2309	400	120	75.8	0.6	2.5	
EX_P-63	EX_J-42	EX_J-20	257	200	110	-18.3	0.6	0.7	
EX_P-5	PROP_J-11	PROP_J-13	34	200	110	-17.9	0.6	0.1	
EX_P-83	EX_J-65	EX_J-47	226	400	120	-68.9	0.6	0.2	
EX_P-35	EX_J-17	EX_J-27	274	200	110	-16.9	0.5	0.6	
EX_P-6	EX_J-27	PROP_J-11	76	200	110	-16.9	0.5	0.2	
EX_P-36	EX_J-31	EX_J-10	346	400	120	66.5	0.5	0.3	
EX_P-76	EX_J-10	EX_J-58	288	400	120	66.5	0.5	0.3	
EX_P-94	EX_J-64	EX_J-54	76	400	120	-65.5	0.5	0.1	
EX_P-75	EX_J-23	EX_J-64	438	400	120	-61.7	0.5	0.3	
EX_P-14	PROP_J-34	EX_J-11	42	200	110	14.9	0.5	0.1	
EX_P-23	EX_J-21	EX_J-11	26	200	110	-14.9	0.5	0.1	
EX_P-47	EX_J-24	EX_J-13	468	200	110	14.5	0.5	0.8	
EX_P-88	EX_J-51	EX_J-50	307	400	120	57.1	0.5	0.2	
EX_P-4	EX_J-28	PROP_J-34	81	200	110	-14.0	0.5	0.1	
EX_P-18	PROP_J-39	EX_J-28	50	200	110	-14.0	0.5	0.1	
EX_P-99	EX_J-70	EX_J-41	363	200	110	-13.9	0.4	0.6	
EX_P-84	EX_J-54	EX_J-48	288	400	120	-55.4	0.4	0.2	
EX_P-67	EX_J-22	EX_J-42	330	300	120	31.2	0.4	0.3	
EX_P-89	EX_J-50	EX_J-49	274	400	120	47.1	0.4	0.1	
EX_P-78	EX_J-58	EX_J-60	166	400	120	46.5	0.4	0.1	
EX_P-7	PROP_J-13	PROP_J-39	41	200	110	-11.5	0.4	0.1	
EX_P-55	EX_J-35	PROP_J-79	10	200	110	10.7	0.3	0.0	
EX_P-86	EX_J-48	EX_J-49	505	400	120	-39.4	0.3	0.2	
EX_P-22	EX_J-20	EX_J-13	320	150	100	5.1	0.3	0.4	
EX_P-93	EX_J-53	EX_J-67	28	600	120	-75.8	0.3	0.0	
EX_P-85	EX_J-47	EX_J-48	255	300	120	16.1	0.2	0.1	
EX_P-79	EX_J-60	EX_J-61	424	300	120	15.5	0.2	0.1	
EX_P-50	PROP_J-46	EX_J-14	49	300	120	-14.9	0.2	0.0	
EX_P-25	EX_J-12	PROP_J-83	132	400	120	25.6	0.2	0.0	
EX_P-51	PROP_J-61	PROP_J-33	45	400	120	24.2	0.2	0.0	
EX_P-97	EX_J-71	EX_J-59	38	400	120	-21.5	0.2	0.0	
EX_P-77	EX_J-60	EX_J-59	992	400	120	21.0	0.2	0.1	
EX_P-27	EX_J-14	EX_J-21	298	300	120	-11.0	0.2	0.0	
EX_P-92	EX_J-54	EX_J-65	316	300	120	-10.0	0.1	0.0	
EX_P-29	EX_J-16	EX_J-21	235	200	110	-3.9	0.1	0.0	
EX_P-13	PROP_J-33	EX_J-30	134	400	120	12.8	0.1	0.0	
EX_P-1	EX_J-30	EX_J-71	210	400	120	12.8	0.1	0.0	
EX_P-30	EX_J-16	EX_J-14	90	300	120	3.9	0.1	0.0	
EX_P-80	EX_J-61	EX_J-59	207	300	120	0.5	0.0	0.0	
EX_P-10	EX_J-33	EX_J-18	325	150	100	0.0	0.0	0.0	
EX_P-19	EX_J-11	EX_J-32	7	300	120	0.0	0.0	0.0	
EX_P-31	EX_J-15	EX_J-33	166	200	110	0.0	0.0	0.0	
EX_P-59	EX_J-39	EX_J-40	49	50	100	0.0	0.0	0.0	
EX_P-58	EX_J-38	EX_J-45	5	150	100	0.0	0.0	0.0	
EX_P-68	EX_J-45	EX_J-39	10	50	100	0.0	0.0	0.0	
EX_P-60	EX_J-40	EX_J-39	44	50	100	0.0	0.0	0.0	
EX_P-28	EX_J-15	PROP_J-47	46	300	120	0.0	0.0	0.0	
EX_P-33	EX_J-19	EX_J-15	388	300	120	0.0	0.0	0.0	

Junction Output for Available Fire Flow within the Subject Site under Max. day plus Fire

Junction Nodes within Subject Site									
ID	Static Demand (L/s)	Static Pressure (kPa)	Static Head (m)	Fire-Flow Demand (L/s)	Total Demand (L/s)	Residual Pressure (kPa)	Design Flow (L/s)*	Design Pressure (kPa)	Remark
PROP_J-66	0.5	426	327.5	117	117.5	150	120	140	
PROP_J-72**	0.0	379	327.6	167	169.9	160	176	140	
PROP_J-71**	1.9	393				188			
PROP_J-64	1.4	328	327.6	117	118.4	175	132	140	
PROP_J-62	0.0	312	327.6	117	117.0	180	135	140	
PROP_J-70	0.0	419	327.6	167	167.0	246	200	140	
PROP_J-73	0.0	324	327.6	117	117.0	253	189	140	
PROP_J-69	0.0	423	327.6	167	167.0	255	204	140	
PROP_J-75	0.0	446	327.5	117	117.0	297	156	140	
PROP_J-68	0.0	438	327.6	167	167.0	333	244	140	
PROP_J-82	0.0	358	327.5	117	117.0	340	325	140	
PROP_J-77	0.1	437	327.6	167	167.1	345	280	140	
PROP_J-78	0.0	438	327.6	167	167.0	346	278	140	
PROP_J-83	0.0	378	327.6	117	117.0	374	501	140	
PROP_J-76	0.1	417	327.7	117	117.1	375	273	140	
PROP_J-79	0.0	433	327.6	117	117.0	393	295	140	
PROP_J-65	0.0	473	327.5	117	117.0	399	156	140	
PROP_J-59	0.0	462	327.5	117	117.0	415	156	140	
PROP_J-74	0.0	462	327.6	117	117.0	429	262	140	
PROP_J-81	0.0	462	327.5	117	117.0	431	247	140	
PROP_J-61	0.0	442	327.6	117	117.0	437	518	140	
PROP_J-67	0.0	495	327.6	117	117.0	459	297	140	

Note:
*Available flow to maintain minimum residual pressure of 140 kPa (20 psi) at the junction nodes
*Two fire hydrants (PROP_J-71 and PROP_J-72) were used for the required fire flow of 167 L/s

APPENDIX A.1-4
Potential High System Pressure Areas



Legend

- System Pressure > 550 kPa
- System Pressure < 550 kPa
- Subject Site
- 50 mm Watermain
- 150 mm Watermain
- 200 mm Watermain
- 250 mm Watermain
- 300 mm Watermain
- 400 mm Watermain
- 600 mm Watermain
- NW/NC District Boundary

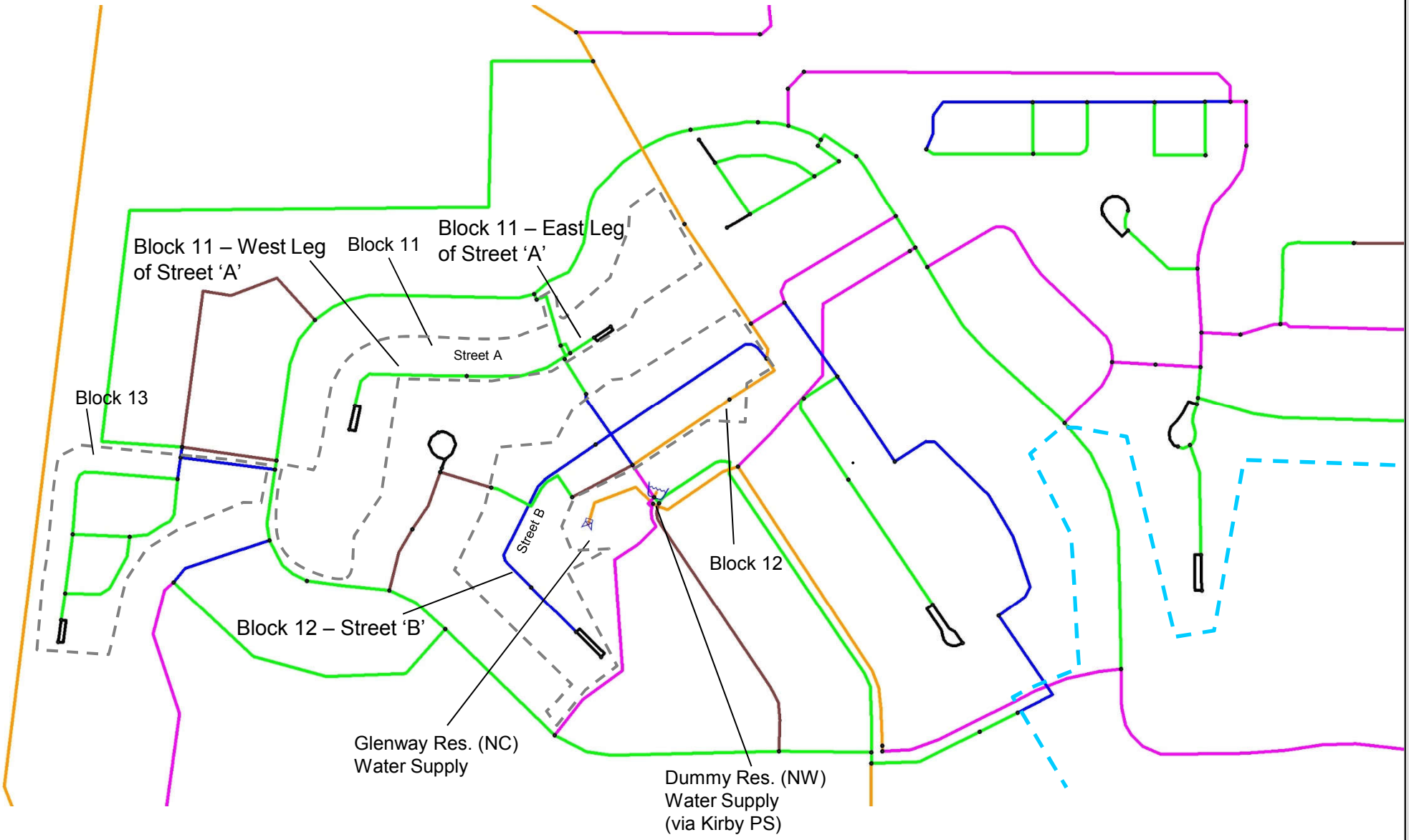
COLE ENGINEERING

Estates of Glenway West
Water Servicing Analysis

Potential High System Pressure Areas

DATE:	PROJ. No.:	FIGURE No:
January 2018	L09-301	Appendix A.1-4

APPENDIX A.1-5
Locations Of Single Feed Watermains



Legend

- 50 mm Watermain
- 150 mm Watermain
- 200 mm Watermain
- 250 mm Watermain
- 300 mm Watermain
- 400 mm Watermain
- 600 mm Watermain
- NW/NC District Boundary
- Subject Site

Locations of Single Feed Watermains

COLE ENGINEERING

Estates of Glenway West
Water Servicing Analysis

DATE: January 2018

PROJ. No.: L09-301

FIGURE No: Appendix A.1-5

APPENDIX A.1-6
Estimated Water Turnover Rates On Single Feed Watermains

Estimated Water Turnover Rates on Single Feed Watermains

Average Day Demand (L/d/cap)	300
Residential Type	persons per unit (ppu)
Low Density	3.38
Medium Density	2.88

Loction						Average day	Pipeline				Turnover Rate	Occupancy Rate (%)
	Type		No. of Unit	ppu	Population	Demand (L/d)	Length (m)	Diameter (mm)	Area (m^2)	Volume (m^3)	(hour)	(to meet Town's minimum 24-hour Criteria)
Block 11												
Street 'A'	Single Detached	Low Density	1	3.38	3	1,014	20	200	0.031	0.6	-	
(east leg dead end)		Low Density	2	3.38	7	2,028	80	50	0.002	0.2	-	
		Sub-total	3			3,042				0.8	6	33
Street 'A'	Single Detached	Low Density	17	3.38	57	17,238	270	200	0.031	8.5	-	
(west leg dead end)		Low Density	6	3.38	20	6,084	80	50	0.002	0.2	-	
		Sub-total	23			23,322				8.6	9	35
Block 12												
Street 'B'	Single Detached	Low Density	58	3.38	196	58,812	520	250	0.049	25.5	-	
(dead end)		Low Density	3	3.38	10	3,042	80	50	0.002	0.2	-	
		Sub-total	61			61,854				25.7	10	41
Block 13	Townhouse	Medium Density	90	2.88	259	77,760	40	250	0.049	2.0	-	
			6	2.88	17	5,184	550	200	0.031	17.3	-	
							80	50	0.002	0.2	-	
		Sub-total	96			82,944				19.4	6	23

Note: Water turnover rates at these locations (Block 11, Block 12 and Block 13) range from 6 to 10 hours;
and meet the Town's typical turnover rate requirement of 24 hours if approximately 41% of the units are occupied (e.g. at Block 12 - Street B).

Estimated head Loss along 50 mm watermains near the end of Single Feed watermains

Location						Peak Hour	Pipeline					
	Type		No. of Unit	ppu	Population	Demand (L/d)*	Length,one leg (m)	Diameter (mm)	Area (m^2)	Velocity (m/s)	C-factor	Head loss (m)
Block 11 - Street 'A' (east leg dead end)	Single Detached	Low Density	2	3.38	7	14,500	40	50	0.002	0.1	100	0.02
Block 11 - Street 'A' (west leg dead end)**	Single Detached	Low Density	6	3.38	20	43,501	40	50	0.002	0.3	100	0.14
Block 12 - Street 'B' (dead end)	Single Detached	Low Density	3	3.38	10	21,750	40	50	0.002	0.1	100	0.04
Block 13 (dead end)	Townhouse	Medium Density	6	2.88	17	37,066	40	50	0.002	0.2	100	0.11

Note: * Assuming flow via one leg of 50 mm pipeline and the peaking factor of 14.3 for residential areas less than or equal to 10 dwelling units, as per MOE design guideline

** No significant system head loss (e.g. maximum head loss of 0.14 m with a C-factor of 100, along the looped 80 m - 50 mm watermain on the west leg dead-end of Street A).

APPENDIX B
Pre-Development Sanitary Flow Calculations

Computed By: E.P.
Date: JULY 13/1992
Revision: JAN. 3/1995

TOWN OF NEWMARKET

SANITARY SEWER DESIGN
"AS CONSTRUCTED"

G.M. SERNAS & ASSOCIATES
141 BRUNEL ROAD
MISSISSAUGA, ONT L4Z 1X3
TEL: (416) 890-8483

Location: GLENWAY ESTATES AND COUNTRY CLUB
JOB NO. 8202.530

NOTE: CURRENT REVISIONS BY URBAN ECOSYSTEMS LIMITED(93002SN1)

	cms/ha.		cms/ha.
Single Family (15m)	0.0013	Apartment - 148 uph	0.0035
Single Family (9.75m)	0.0016	Apartment - 149 to 247 uph	0.0060
Commercial/Industrial	0.0017	Apartment - 248 to 296 uph	0.0070
School/Multi Family	0.0025		

LOCATION STREET NAME	From MH	To MH	AREA (HECTARES) Single Family (9.75m)	Single Family (15m)	Comm. Ind.	School Multi. Family	Apts. <148 u.p.h.	Apts. 149 to 247 u.p.h.	Apts. 248 to 296 u.p.h.	Cumul. Area (hec.)	DESIGN FLOWS Leg (cms)	Cumul. (cms)	PROPOSED SEWER Mann. n	Dia mm	Slope %	Capac. (cms)	Leng. m	VELOCITY Full (m/s)	Act. (m/s)	Actual Diam.
EAGLE ST. W.	1A	3A			2.98					2.98	0.0038									
	1A	3A			4.71					4.71	0.0310	0.0348	0.013	250	0.72	0.053		1.04	0.49	254.00
BOWSER CRES.	9A	3A		3.49						11.18	0.0045	0.0045	0.013	250	2.52	0.098		1.94	0.91	254.00
BOWSER CRES.	12A	5A		5.62						16.80	0.0073	0.0073	0.013	250	1.14	0.066		1.31	0.61	254.00
EVES COURT	PLUG	21A			1.57					1.57	0.0009	0.0009	0.013	250	0.50	0.044		0.87	0.28	254.00
MILLARD AVE.W.		32A			3.08					3.08	0.0122									
	21A	28A		5.64						10.29	0.0073	0.0204	0.013	250	0.58	0.047		0.93	0.44	254.00
EAGLE ST. W.	5A	35A		0.52						27.61	0.0007	0.0678	0.013	250	2.02	0.088		1.74	0.82	254.00
GLENWAY CIRCLE	40A	35A		3.17						3.17	0.0041	0.0041	0.013	250	0.39	0.039		0.76	0.36	254.00
EAGLE ST. W.	35A	36A		0.73						31.51	0.0009	0.0728	0.013	250	2.24	0.093		1.83	0.86	254.00

Computed By: E.P.
Date: JULY 13/1992
Revision: JAN. 3/1995

TOWN OF NEWMARKET

SANITARY SEWER DESIGN
"AS CONSTRUCTED"

G.M. SERNAS & ASSOCIATES
141 BRUNEL ROAD
MISSISSAUGA, ONT L4Z 1X3
TEL: (416) 890-8483

Location: GLENWAY ESTATES AND COUNTRY CLUB
JOB NO. 8202.530

NOTE: CURRENT REVISIONS BY URBAN ECOSYSTEMS LIMITED(93002SN1)

	cms/ha.		cms/ha.
Single Family (15m)	0.0013	Apartment - 148 uph	0.0035
Single Family (9.75m)	0.0016	Apartment - 149 to 247 uph	0.0060
Commercial/Industrial	0.0017	Apartment - 248 to 296 uph	0.0070
School/Multi Family	0.0025		

LOCATION STREET NAME	From MH	To MH	AREA (HECTARES) Single Family (9.75m)	Single Family (15m)	Comm. Ind.	School Multi. Family	Apts. <148 u.p.h.	Apts. 149 to 247 u.p.h.	Apts. 248 to 296 u.p.h.	Cumul. Area (hec.)	DESIGN FLOWS Leg (cms)	Cumul. (cms)	PROPOSED SEWER Mann. n	Dia mm	Slope %	Capac. (cms)	Leng. m	VELOCITY Full (m/s)	Act. (m/s)	Actual Diam.
GLENWAY CIRCLE	47A	36A		3.54						3.54	0.0046	0.0046	0.013	250	0.53	0.045		0.89	0.42	254.00
EAGLE ST. W.	36A	60A								35.05	0.0000	0.0774	0.013	375	0.35	0.108		0.95	0.45	381.00
DONER DRIVE	239A	223A		3.58						3.58	0.0047	0.0047	0.013	250	1.16	0.067		1.32	0.62	254.00
OTTON RD.	232A	223A		5.03						8.61	0.0065	0.0065	0.013	250	0.44	0.041		0.81	0.38	254.00
MATHEWS COURT	276A	217A		2.79						11.40	0.0036	0.0036	0.013	250	0.35	0.037		0.72	0.34	254.00
DONER DRIVE	223A	155A		6.53						17.93	0.0085	0.0233	0.013	250	0.44	0.041		0.81	0.38	254.00
DONER DRIVE	155A	88A			4.61					4.61	0.0080	0.0313	0.013	300	0.29	0.054		0.74	0.35	304.80
CROSSLAND GATE	88A	77A		2.86						25.40	0.0037	0.0350	0.013	300	0.40	0.064		0.87	0.41	304.80
FAIRWAY GARDEN	84A	77A		3.35						3.35	0.0044	0.0044	0.013	250	0.51	0.044		0.87	0.41	254.00
CROSSLAND GATE	77A	69A		3.09						31.84	0.0040	0.0434	0.013	375	0.42	0.119		1.04	0.49	381.00

Computed By: E.P.
Date: JULY 13/1992
Revision: JAN. 3/1995

TOWN OF NEWMARKET

SANITARY SEWER DESIGN
"AS CONSTRUCTED"

G.M. SERNAS & ASSOCIATES
141 BRUNEL ROAD
MISSISSAUGA, ONT L4Z 1X3
TEL: (416) 890-8483

Location: GLENWAY ESTATES AND COUNTRY CLUB
JOB NO. 8202.530

NOTE: CURRENT REVISIONS BY URBAN ECOSYSTEMS LIMITED(93002SN1)

	cms/ha.		cms/ha.
Single Family (15m)	0.0013	Apartment - 148 uph	0.0035
Single Family (9.75m)	0.0016	Apartment - 149 to 247 uph	0.0060
Commercial/Industrial	0.0017	Apartment - 248 to 296 uph	0.0070
School/Multi Family	0.0025		

LOCATION STREET NAME	From MH	To MH	AREA (HECTARES) Single Family (9.75m)	Single Family (15m)	Comm. Ind.	School Multi. Family	Apts. <148 u.p.h.	Apts. 149 to 247 u.p.h.	Apts. 248 to 296 u.p.h.	Cumul. Area (hec.)	DESIGN FLOWS Leg (cms)	Cumul. (cms)	PROPOSED SEWER Mann. n	Dia mm	Slope %	Capac. (cms)	Leng. m	VELOCITY Full (m/s)	Act. (m/s)	Actual Diam.
DONER DRIVE	240A	248A		4.65						4.65	0.0060	0.0060	0.013	250	0.68	0.051		1.01	0.47	254.00
KIRBY CRES.	257A	248A		2.92						2.92	0.0038	0.0038	0.013	250	0.46	0.042		0.83	0.39	254.00
DONER DRIVE	248A	274A		0.89						8.46	0.0012	0.0110	0.013	250	3.81	0.121		2.39	1.12	254.00
KIRBY CRES.	263A	274A		4.05						4.05	0.0053	0.0053	0.013	250	0.97	0.061		1.21	0.57	254.00
DONER DRIVE	274A	266A		2.71						15.22	0.0035	0.0198	0.013	250	2.00	0.088		1.73	0.81	254.00
CROSSLAND GATE	69A	60A		5.71						52.77	0.0074	0.0706	0.013	375	0.32	0.103		0.91	0.43	381.00
PEEVERS CRES.	60A	93A		1.68						89.50	0.0022	0.1502	0.013	450	0.35	0.176		1.07	0.50	457.20
BRAMMAR ST.	98A	93A		2.22						2.22	0.0029	0.0029	0.013	250	0.59	0.048		0.94	0.44	254.00
PEEVERS CRES.	93A	120A		0.50						92.22	0.0007	0.1538	0.013	450	0.34	0.173		1.06	0.50	457.20
PEEVERS CRES.	BLK.4	123A			3.67					3.67	0.0218	0.0218	0.013	250	0.50	0.044		0.87	0.41	254.00
PEEVERS CRES.	132A	120A		1.20						4.87	0.0016	0.0234	0.013	250	0.47	0.043		0.84	0.39	254.00

Computed By: E.P.
Date: JULY 13/1992
Revision: JAN. 3/1995

TOWN OF NEWMARKET

SANITARY SEWER DESIGN
"AS CONSTRUCTED"

G.M. SERNAS & ASSOCIATES
141 BRUNEL ROAD
MISSISSAUGA, ONT L4Z 1X3
TEL: (416) 890-8483

Location: GLENWAY ESTATES AND COUNTRY CLUB
JOB NO. 8202.530

NOTE: CURRENT REVISIONS BY URBAN ECOSYSTEMS LIMITED(93002SN1)

	cms/ha.		cms/ha.
Single Family (15m)	0.0013	Apartment - 148 uph	0.0035
Single Family (9.75m)	0.0016	Apartment - 149 to 247 uph	0.0060
Commercial/Industrial	0.0017	Apartment - 248 to 296 uph	0.0070
School/Multi Family	0.0025		

LOCATION STREET NAME	From MH	To MH	AREA (HECTARES) Single Family (9.75m)	Single Family (15m)	Comm. Ind.	School Multi. Family	Apts. <148 u.p.h.	Apts. 149 to 247 u.p.h.	Apts. 248 to 296 u.p.h.	Cumul. Area (hec.)	DESIGN FLOWS Leg (cms)	Cumul. (cms)	PROPOSED SEWER Mann. n	Dia mm	Slope %	Capac. (cms)	Leng. m	VELOCITY Full (m/s)	Act. (m/s)	Actual Diam.
EASEMENT	120A	104A								97.09	0.0000	0.1771	0.013	450	0.52	0.214		1.31	0.61	457.20
EASEMENT	104A	112A			4.85					101.94	0.0192	0.1963	0.013	450	0.48	0.206		1.26	0.59	457.20
EASEMENT	EX.MH	112A		11.33	16.19	8.90				36.42	0.0863									25.40
	EX.MH	112A		16.05	4.80					20.85	0.0329									25.40
	EX.MH	112A					2.50			59.77	0.0135	0.1327	0.013	375	1.70	0.238		2.09	0.98	381.00
EASEMENT	112A	TRUNK		6.00						6.00	0.0078									25.40
	112A	TRUNK			4.86					10.86	SEE NOTE		0.013	450	1.30	0.339		2.07		457.2

NOTE: FOR FLOWS EAST OF MN 112A TO TRUNK SEE G.M. SERNAS &ASSOC. LTD. WESTERN SUB-TRUNK REPORT (1985)

APPENDIX C
Stormwater Management

APPENDIX C.1
Pre-Development Model Input Parameters

COLE ENGINEERING

CN* Conversion Calculations

Marianneville - Glenway Estates (Phase 2)
File No.: L09-301
Date: April 2018

Estimation of CN* based on API		
CN_{AMCII} =	**74**	
CN_{AMCIII} =	87.5	
S =	36.3	mm
Ia =	7.26	mm
Total 100yr Rainfall, P =	117.5	mm
Q =	82.94	mm
Standard Ia =	1.5	mm
S* =	46.2	mm
CN^*_{AMCIII} =	85	
CN^*_{AMCII} =	**69**	

Design Chart 1.08: Hydrologic Soil Groups (Continued)

- Based on Soil Texture

Sands, Sandy Loams and Gravels	
- overlying sand, gravel or limestone bedrock, very well drained	A
- ditto, imperfectly drained	AB
- shallow, overlying Precambrian bedrock or clay subsoil	B
Medium to Coarse Loams	
- overlying sand, gravel or limestone, well drained	AB
- shallow, overlying Precambrian bedrock or clay subsoil	B
Medium Textured Loams	
- shallow, overlying limestone bedrock	B
- overlying medium textured subsoil	BC
Silt Loams, Some Loams	
- with good internal drainage	BC
- with slow internal drainage and good external drainage	C
Clays, Clay Loams, Silty Clay Loams	
- with good internal drainage	C
- with imperfect or poor external drainage	C
- with slow internal drainage and good external drainage	D

Source: U.S. Department of Agriculture (1972)

Design Chart 1.09: Soil Conservation Service Curve Numbers (Continued)

Land Use or Surface	Hydrologic Soil Group						
	A	AB	B	BC	C	CD	D
Fallow (special cases only)	77	82	86	89	91	93	94
Crop and other improved land	66** (62)	70** (68)	74	78	82	84	86 AMC I
Pasture & other unimproved land	58* (38)	62* (51)	65	71	76	79	81
Woodlots and forest	50* (30)	54* (44)	58	65	71	74	77
Impervious areas (paved)							98
Bare bedrock draining directly to stream by surface flow							98
Bare bedrock draining indirectly to stream as groundwater (usual case)							70
Lakes and wetlands							50

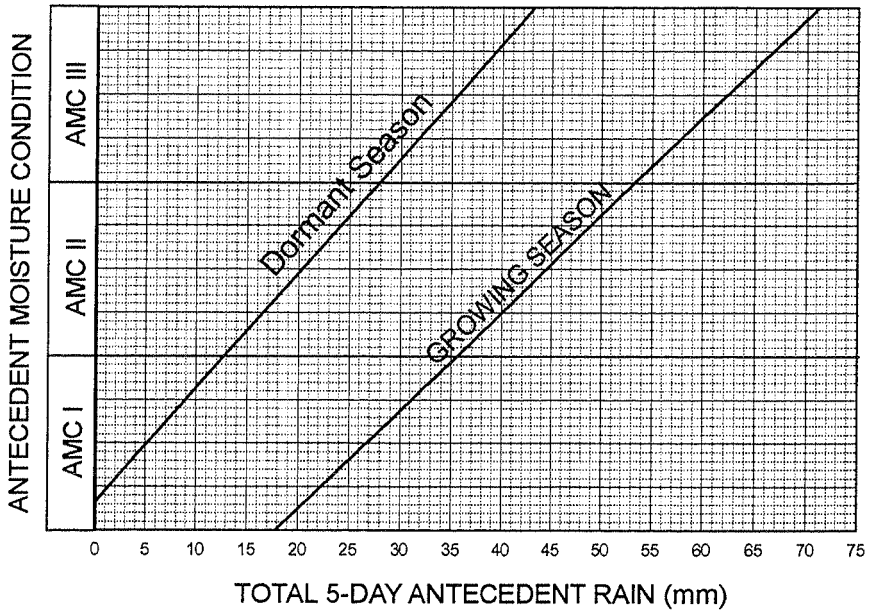
Notes

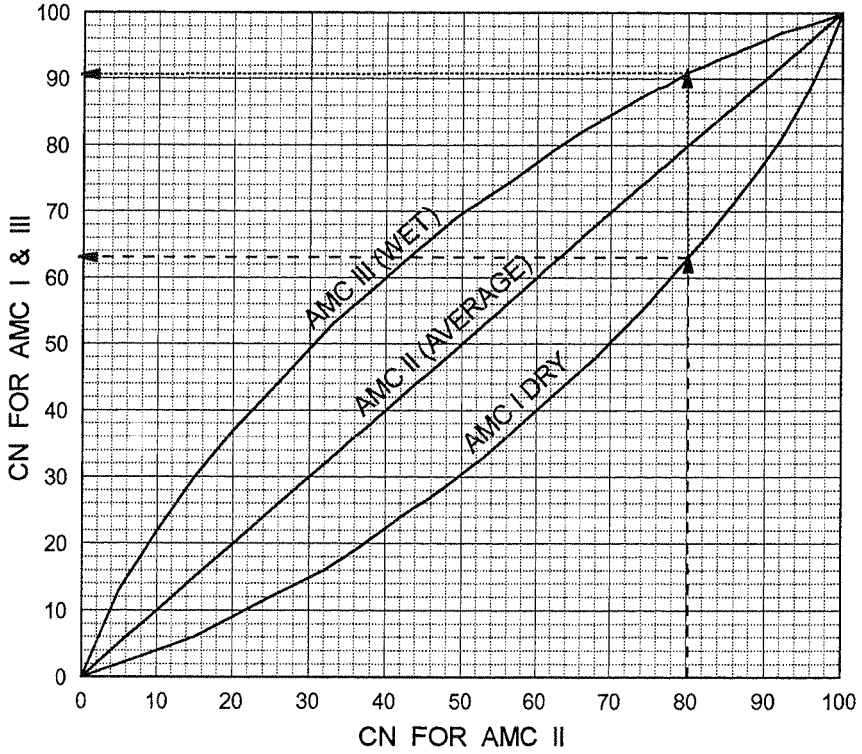
(i) All values are based on AMC II except those marked by * (AMC III) or ** (mean of AMC II and AMC III).

(ii) Values in brackets are AMC II and are to be used only for special cases.

(iii) Table is not applicable to frozen soils or to periods in which snowmelt contributes to runoff.

Design Chart 1.10: Antecedent Mosisture Condition





EXAMPLE

AMC II CN = 80
AMC I CN = 63
AMC III CN = 91

SECTION C

Storm Drainage and Stormwater Management

Town of Newmarket
Engineering Design Standards and Criteria

September 2015

C4.00 Storm Sewer Design

All storm drainage infrastructure, including sewers, manholes, catchbasins, etc., are to conform to the design standards outlined herein and MOECC criteria. Should any Provincial standards (i.e., MOECC) exceed the Town's standards, those standards shall dictate.

C4.01 Rational Method

The Rational Method is most appropriate when used to estimate peak flow rates from small urban areas. Its accuracy increases with imperviousness and decreases with the size of the drainage area. Its application should be limited to situations where the time of concentration is less than approximately 30 minutes.

C4.02 Runoff Coefficients

Table C-4 lists example Rational Method Runoff Coefficients as a function of the imperviousness of the catchment being considered. Composite runoff coefficients are to be calculated as a function of both total imperviousness and storm return period. The total imperviousness ratios listed in the table below are for example purposes only and Designers should calculate actual runoff coefficients on a site-specific basis for all designs.

Table C-4: Typical Runoff Coefficients and Initial Times of Concentration

	Return Period	**1:5**	**1:25**	**1:100**	**Initial Tc (Minutes)**
	C_{perv}	0.20	0.30	0.40	
	C_{imp}	0.90	0.95	1.00	
	Typical				
	Impervious	Composite "C"			
Parks	10%	0.27	0.37	0.46	14.0
Estate Res.	35%	0.45	0.53	0.61	9.5
Single Res.	55%	0.59	0.66	0.73	7.5
Semi-Det. Res.	65%	0.66	0.72	0.79	7.0
Townhouses	75%	0.73	0.79	0.85	6.5
Apartments	60%	0.62	0.69	0.76	7.0
School	60%	0.62	0.69	0.76	7.0
Church	70%	0.69	0.76	0.82	6.5
Industrial	80%	0.76	0.82	0.88	6.0
Commercial	90%	0.83	0.89	0.94	6.0

COLE ENGINEERING

Pond 1 Imperviousness Calculations (Pre-Development)

Marianneville - Glenway Estates (Phase 2)
File No.: L09-301
Date: April 2018

Catchment A1Pre

Block#	Descrip.	Area (ha)	% Total Area	TIMP (%)	XIMP (%)	Notes
89	SWMP#1	0.3284	3.2%	50	50	
89/121	Golf Course	5.6811	55.8%	10	10	Newmarket stds
	Prop. Single Res. (Phase 1)	0.4577	4.5%	63	7	Based on Lot 3 (53%) + Amenity Area (10%)
	Ex. Residential	2.828	27.8%	52	7	Based on Lot 50 (42%) + Amenity Area (10%)
Alex Doner Drive / Amberlee Court	Ex. 20m ROW	0.8824	8.7%	65	65	Calculated from typical road section
	Total	*10.1776*	*100.0%*	*30.1*	*15.1*	

COLE ENGINEERING

Pond 2 Imperviousness Calculations (Pre-Development)

Marianneville - Glenway Estates (Phase 2)
File No.: L09-301
Date: April 2018

Catchment A2Pre

Block#	Descrip.	Area (ha)	% Total Area	TIMP (%)	XIMP (%)	Notes
89	SWMP#2	0.702	5.0%	50	50	
89/121	Golf Course	2.0327	14.6%	10	10	Newmarket stds
	Ex. Residential	8.1416	58.4%	50	7	Based on Lot 73 (40%) + Amenity Area (10%)
Alex Doner Drive	Ex. 20m ROW	3.0604	22.0%	65	65	Calculated from typical road section
	Total	*13.9367*	*100.0%*	*47.5*	*22.3*	

COLE ENGINEERING

Pond 3 Imperviousness Calculations (Pre-Development)

Marianneville - Glenway Estates (Phase 2)
File No.: L09-301
Date: April 2018

Catchment A3-1Pre

Block#	Descrip.	Area (ha)	% Total Area	TIMP (%)	XIMP (%)	Notes
120	SWMP#3	0.7429	14.3%	50	50	
120	Golf Course	2.3369	45.0%	10	10	Newmarket stds
	Ex. Residential	1.6958	32.6%	45	8	Based on Lot 113 (35%) + Amenity Area (10%)
Alex Doner Drive	Ex. 20m ROW	0.4222	8.1%	65	65	Calculated from typical road section
	Total	*5.1978*	*100.0%*	*31.6*	*19.4*	

Catchment A3-2Pre

Block#	Descrip.	Area (ha)	% Total Area	TIMP (%)	XIMP (%)	Notes
142	Golf Course	1.272	100.0%	10	10	Newmarket stds
	Total	*1.272*	*100.0%*	*10.0*	*10.0*	

COLE ENGINEERING

Pond 4 Imperviousness Calculations (Pre-Development)

Marianneville - Glenway Estates (Phase 2)
File No.: L09-301
Date: April 2018

Catchment A4Pre

Block#	Descrip.	Area (ha)	% Total Area	TIMP (%)	XIMP (%)	Notes
170/171	SWMP#4 (Phase 1)	1.6633	7.1%	50	50	
155	Golf Course	5.2841	22.4%	10	10	Newmarket stds
	Prop. Commercial (Phase 1)	0.6526	2.8%	90	90	Newmarket stds
	Ex. Residential	2.7105	11.5%	36	5	Based on Lot 59 (26%) + Amenity Area (10%)
	Prop. Single Res. (Phase 1)	3.4168	14.5%	62	8	Based on Lot 12 (52%) + Amenity Area (10%)
	Prop. Med. Density (Phase 1)	5.2882	22.4%	65	35	Newmarket stds (Semi-Det. Res.)
	Prop. High Density (Phase 1)	2.1917	9.3%	60	60	Newmarket stds (Apartments and Schools)
Alex Doner Drive	Ex. 20m ROW	1.053	4.5%	65	65	Calculated from typical road section
Street A/StreetB/StreetC	Prop. 18m ROW (Phase 1)	1.2998	5.5%	55	55	Calculated from typical road section
	Total	*23.56*	*100.0%*	*47.5*	*29.3*	

COLE ENGINEERING

Pond 6 Imperviousness Calculations (Pre-Development)

Marianneville - Glenway Estates (Phase 2)
File No.: L09-301
Date: April 2018

Catchment A6.1Pre

Block#	Descrip.	Area (ha)	% Total Area	TIMP (%)	XIMP (%)	Notes
Crossland Gate & Alex Doner Dr	Ex. 20m ROW	2.48557	6.4%	65	65	Calculated from typical road section
Fairway Gardens & Kirby Cres	Ex. 20m ROW	2.2602	5.8%	51	51	Calculated from typical road section
Street A & Street B	Prop. 18m ROW (Phase 1)	1.3866	3.6%	55	55	Calculated from typical road section
Lane 1 & 2 & 3	Prop 10m ROW (Phase 1)	0.78385	2.0%	64	64	Calculated from typical road section
Ex. Lane to Rec Centre (along Block 145)	Ex. 11.8m ROW	0.0492	0.1%	63	63	Calculated from typical road section
Lots 23-67 & 91-108	Prop. Single Res. (Phase 1)	5.0418	13.0%	65	7	Based on Lot 97 (55%) + Amenity Area (10%)
Block 161, 162 & 163	Prop. Condo Res. (Phase 1)	2.9059	7.5%	55	7	Based on Condo Block 161 Lot 14 (45%) + Amenity Area (10%)
	Ex. Residential	15.6741	40.5%	59	10	Based on Ex. Lot 42 (49%) + Amenity Area (10%)
	Ex. Apartment	1.2443	3.2%	60	60	Newmarket stds
Ex. Parkland, Golf Course & Hydro Corridor	Greenspace	4.0022	10.3%	10	10	Newmarket stds
168	SWMP#6 (Phase 1)	2.1835	5.6%	50	50	
	Ex. Industrial	0.6997	1.8%	80	80	Newmarket stds
	Total	*38.71692*	*100.0%*	*54.2*	*23.2*	

Catchment A6.2Pre (Major Drainage Only)

Block#	Descrip.	Area (ha)	% Total Area	TIMP (%)	XIMP (%)	Notes
Crossland Gate	Ex. 20m ROW	0.1509	12.5%	65	65	Calculated from typical road section
Ex. Lane to Rec Centre (along Block 145)	Ex. 11.8m ROW	0.0744	6.2%	63	63	Calculated from typical road section
	Ex. Residential	0.7193	59.5%	59	10	Based on Ex. Lot 42 (49%) + Amenity Area (10%)
Ex. Parkland & Hydro Corridor	Greenspace	0.2648	21.9%	10	10	Newmarket stds
	Total	*1.2094*	*100.0%*	*49.3*	*20.1*	

Catchment A6.3Pre (Major Drainage Only)

Block#	Descrip.	Area (ha)	% Total Area	TIMP (%)	XIMP (%)	Notes
	Ex. Residential	0.8608	66.0%	51	8	Based on Ex. Lot 48 (41%) + Amenity Area (10%)
John Bowser Cres.	Ex. 20m ROW	0.4433	34.0%	50	50	Calculated from typical road section
	Total	*1.3041*	100.0%	*50.7*	*22.0*	

COLE ENGINEERING

Pre-Development (OTTHYMO)
Input Parameters (NASHYD)
Marianneville - Glenway Estates (Phase 2)
File No.: L09-301
Date: April 2018

Parameter	Unit	Description	A3-2Pre
Area	ha	Watershed Area	1.25
TP	hr	Unit Hydrograph Time to Peak	0.15
DT	min	Time Step Increment	12
DWF	cms	Dry Weather Flow (Base Flow)	0
CN	-	SCS Curve Number	72
IA	mm	Initial Abstraction	5
N	-	Number of Linear Reservior	3
Rain	mm/hr	Optional Rainfall Intensities	0-Without Rainfall

Time to Peak Calculation

Area Number	Area	Cpre	CN	L	Elevation Change	Sw	Tp (Airport Formula)
	(ha)			(m)	(m)	(%)	(hr)
A3-2Pre	1.25	0.30	72	99	6.5	6.6	0.15

COLE ENGINEERING

Pre-Development (OTTHYMO)
STANDHYD - Input Parameters

Marianneville - Glenway Estates (Phase 2)
File No. UD14-0550
Date: April 2018

Parameter	Units	Description	A1 Pre	A2 Pre	A3-1 Pre	A4 Pre	A6.1 Pre	A6.2 Pre	A6.3 Pre
AREA	ha	Drainage Area	10.23	13.94	5.15	24.32	39.16	1.21	1.50
XIMP	%	Impervious Area (Direct Connection)	15.1%	22.3%	19.4%	29.3%	23.2%	20.1%	22.0%
TIMP	%	Total Impervious Area	30.1%	47.5%	31.6%	47.5%	54.2%	49.3%	50.7%
C	-	Runoff Coefficient	0.41	0.53	0.42	0.53	0.58	0.55	0.55
LGI	-	Overland Flow Length (Impervious)	261.15	304.85	185.29	402.66	510.95	89.81	100.00
SLPI	%	Average Slope (Impervious)	1						
DT	min	Time Step Increment	12						
DWF	m^3/s	Dry Weather Flow (Base Flow)	0						
LOSS	-	Rainfall Loss Method	Loss = 2 - Modified SCS Curve Method, CN*= 69						
SLPP	%	Average Slope (Pervious)	2						
LGP	m	Overland Flow Length (Pervious)	40						
MNP	-	Manning's Roughness Coefficient (Pervious)	0.25						
DPSI	mm	Depression Storage (Impervious)	1						
MNI	-	Manning's Roughness Coefficient (Impervious)	0.013						

Glenway Builders

FILE COPY

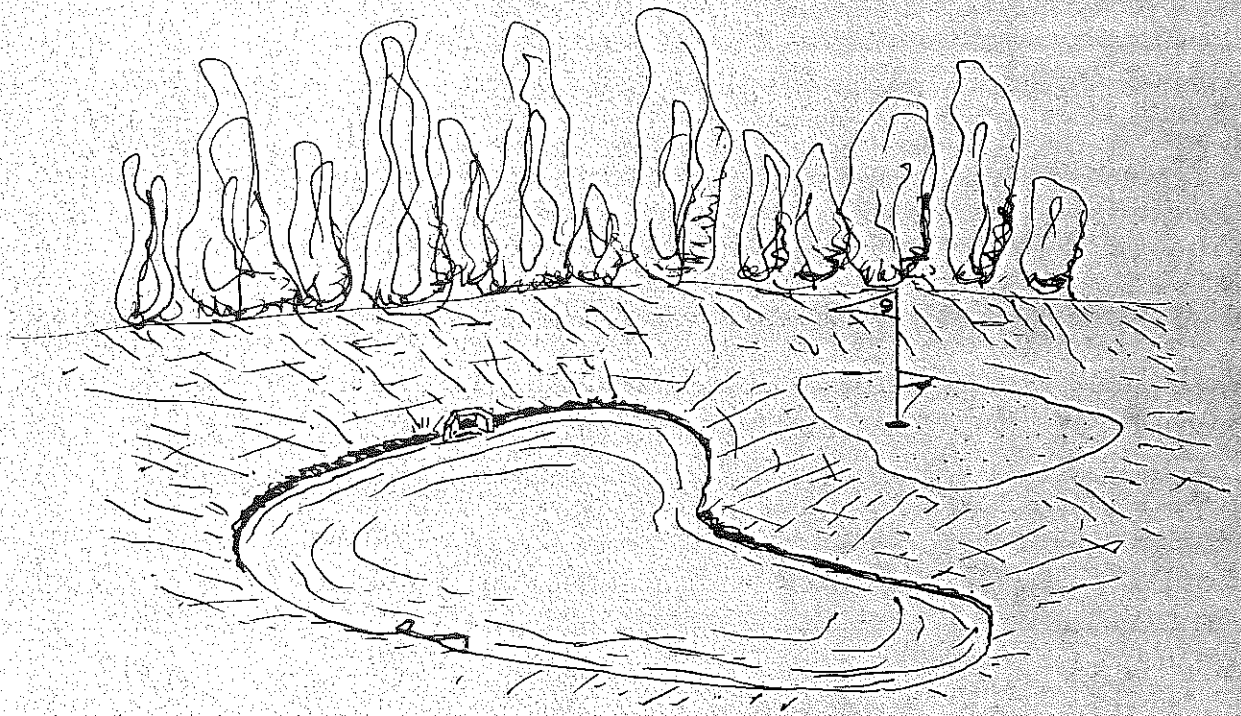
ST-11

Rcv'd. Nov. 23/2011

STORMWATER MANAGEMENT STUDY

Glenway Estates & Country Club

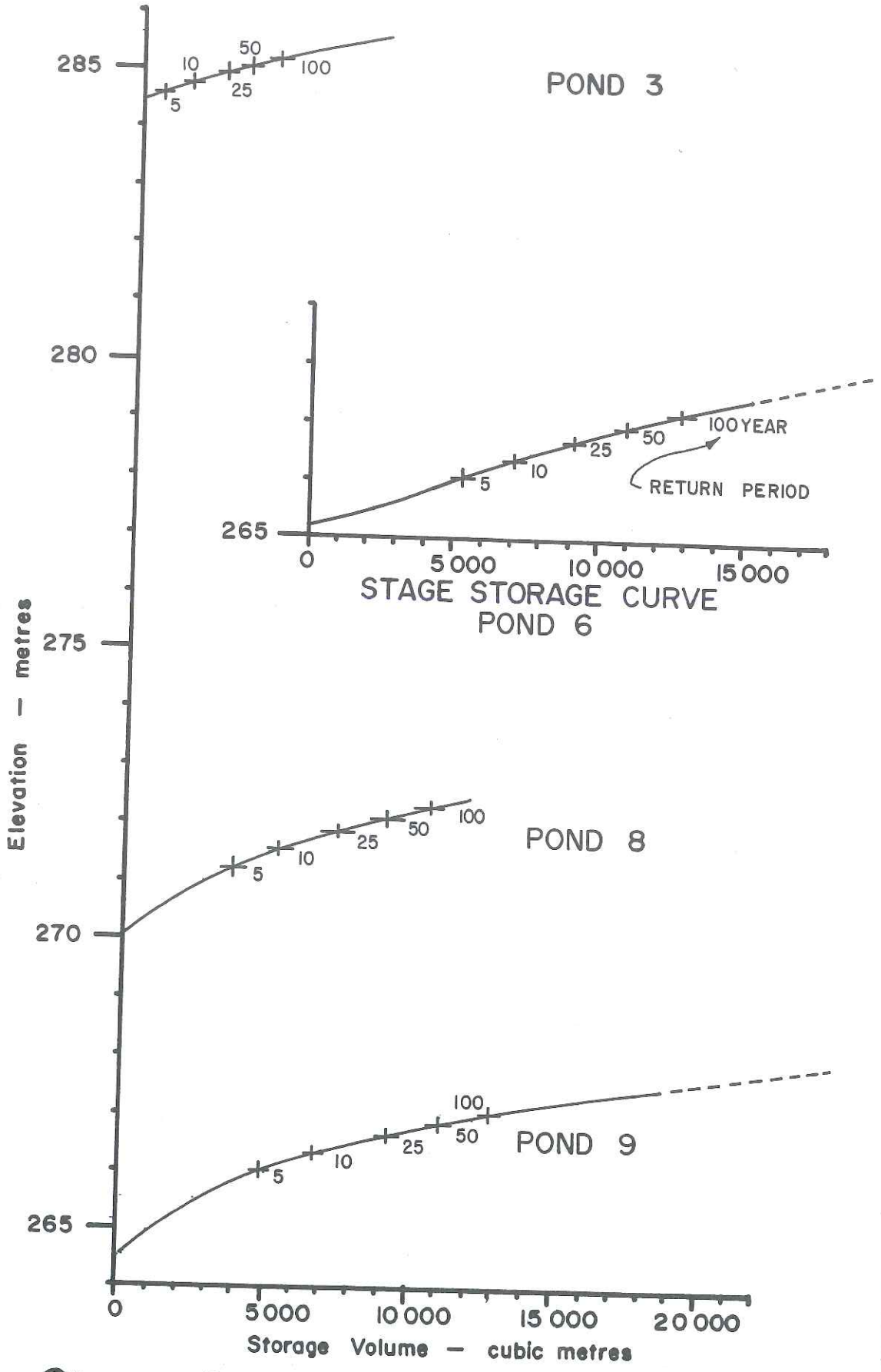
Newmarket, Ontario



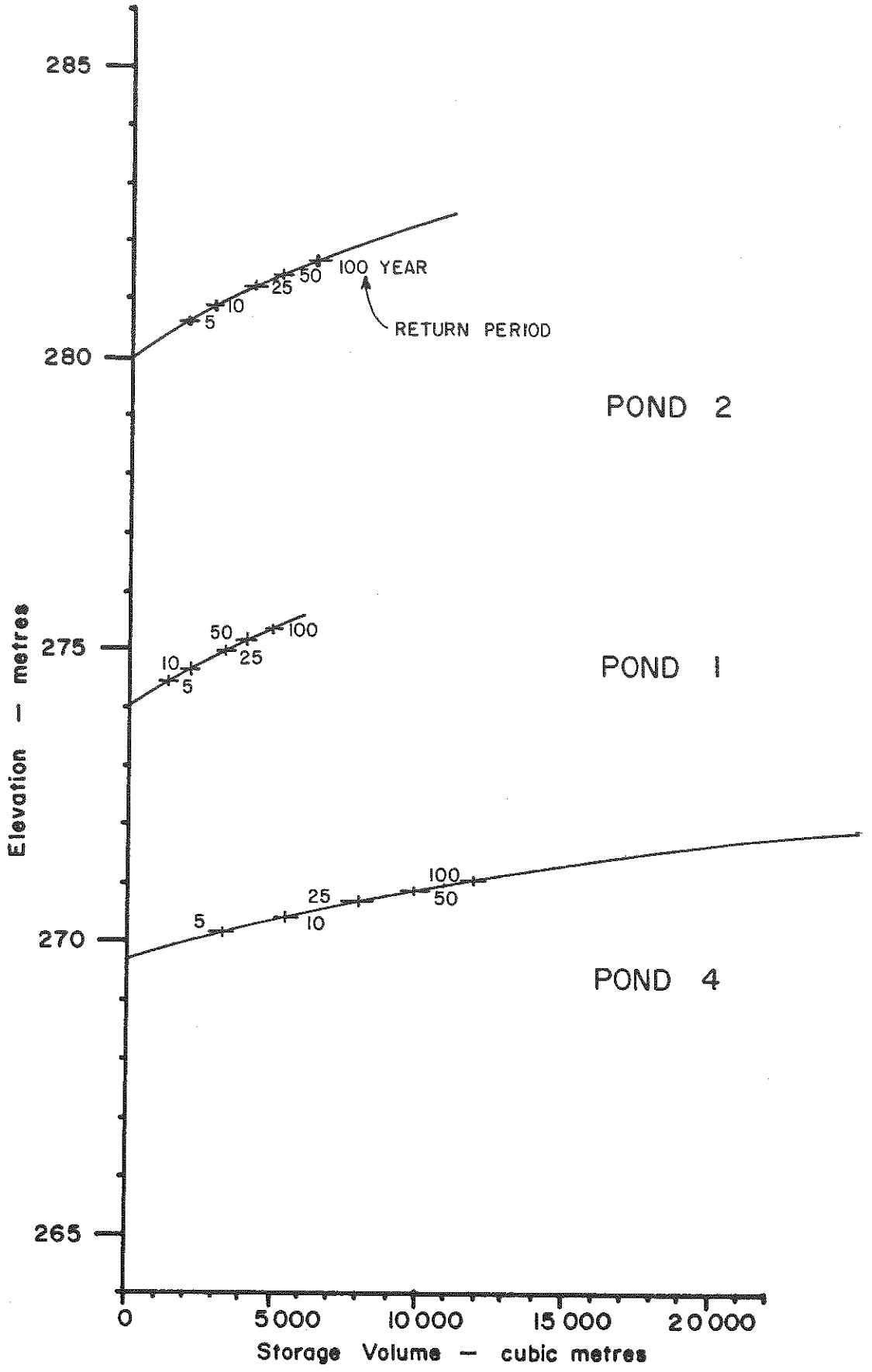
The LATHEM Group Inc.

CONSULTING ENGINEERS

Appendix II



Stage Storage Curves



Stage Storage Curves

IMPOUNDMENT NAME=3-100
TIME INCREMENT (HRS)= .0833333

DISCHARGE(CFS)	STORAGE (AC.FT)
.0	.0
2.8	1.5
8.0	3.2
11.5	6.5
14.0	7.3

DISCHARGE (CFS)	S/T+O/2
.0	.0
2.8	219.2
8.0	468.6
11.5	949.5
14.0	1066.9

T(HRS)	INFLOW(CFS)	OUTFLOW(CFS)
.0	.00	.00
.0	3.00	.02
.1	10.70	.12
.2	23.00	.33
.3	21.00	.61
.4	27.90	.91
.4	58.10	1.45
.5	61.20	2.19
.6	60.70	3.03
.7	59.50	4.22
.8	64.10	5.42
.9	62.00	6.63
.9	50.80	7.66
1.0	35.60	8.14
1.1	29.20	8.32
1.2	25.50	8.46
1.3	20.20	8.56
1.4	11.00	8.61
1.4	6.20	8.61
1.5	4.50	8.59
1.6	3.40	8.55
1.7	1.60	8.51
1.8	.20	8.45
1.9	.00	8.39
1.9	.00	8.33
2.0	.00	8.27
2.1	.00	8.21
2.2	.00	8.15
2.3	.00	8.09
2.4	.00	8.03
2.4	.00	7.93
2.5	.00	7.77
2.6	.00	7.60
2.7	.00	7.44
2.8	.00	7.29
2.9	.00	7.14
2.9	.00	6.99
3.0	.00	6.84

VOLUME STORED= 4668.93823 CUBIC METRES
VOLUME STORED= 3.79 AC. FT.

IMPOUNDMENT NAME=3-50
TIME INCREMENT (HRS)= .0833333

DISCHARGE(CFS)	STORAGE (AC.FT)
.0	.0
2.8	1.5
8.0	3.2
11.5	6.5
14.0	7.3

DISCHARGE (CFS)	S/T+Q/2
.0	.0
2.8	219.2
8.0	468.6
11.5	949.5
14.0	1066.9

T(HRS)	INFLOW(CFS)	OUTFLOW(CFS)
.0	.00	.00
.0	2.90	.02
.1	9.50	.10
.2	19.00	.20
.3	15.20	.49
.4	20.20	.71
.4	47.00	1.13
.5	43.10	1.73
.6	48.20	2.33
.7	48.10	2.99
.8	52.60	3.98
.9	51.20	4.98
.9	41.30	5.84
1.0	28.40	6.44
1.1	23.60	6.85
1.2	20.90	7.17
1.3	17.10	7.42
1.4	9.10	7.54
1.4	4.90	7.52
1.5	3.60	7.46
1.6	2.70	7.37
1.7	1.30	7.26
1.8	.20	7.12
1.9	.00	6.97
1.9	.00	6.83
2.0	.00	6.69
2.1	.00	6.55
2.2	.00	6.41
2.3	.00	6.28
2.4	.00	6.15
2.4	.00	6.02
2.5	.00	5.89
2.6	.00	5.77
2.7	.00	5.65
2.8	.00	5.53
2.9	.00	5.42
2.9	.00	5.30
3.0	.00	5.19

VOLUME STORED= 3766.68685 CUBIC METRES
VOLUME STORED= 3.05 AC. FT.

IMPOUNDMENT NAME=3-25
TIME INCREMENT (HRS)= .0833333

DISCHARGE(CFS)	STORAGE (AC.FT)
.0	.0
2.8	1.5
8.0	3.2
11.5	5.5
14.0	7.3

DISCHARGE (CFS)	S/T+0/2
.0	.0
2.8	219.2
8.0	468.6
11.5	949.5
14.0	1066.9

T(HRS)	INFLOW(CFS)	OUTFLOW(CFS)
.0	.00	.00
.0	2.00	.01
.1	8.30	.08
.2	14.60	.22
.3	9.60	.38
.4	13.80	.52
.4	35.50	.80
.5	36.80	1.28
.6	35.50	1.72
.7	36.10	2.16
.8	40.50	2.62
.9	39.70	3.29
.9	30.80	3.95
1.0	21.10	4.41
1.1	17.80	4.72
1.2	16.20	4.98
1.3	13.50	5.19
1.4	7.00	5.29
1.4	3.70	5.29
1.5	2.60	5.25
1.6	2.10	5.19
1.7	.90	5.11
1.8	.10	5.01
1.9	.00	4.91
1.9	.00	4.81
2.0	.00	4.71
2.1	.00	4.61
2.2	.00	4.51
2.3	.00	4.42
2.4	.00	4.33
2.4	.00	4.24
2.5	.00	4.15
2.6	.00	4.06
2.7	.00	3.98
2.8	.00	3.90
2.9	.00	3.81
2.9	.00	3.73
3.0	.00	3.66

VOLUME STORED= 2862.26429 CUBIC METRES
VOLUME STORED= 2.32 AC. FT.

IMPOUNDMENT NAME=3-10
TIME INCREMENT (HRS)= .083333

DISCHARGE(CFS)	STORAGE (AC.FT)
.0	.0
2.8	1.5
8.0	3.2
11.5	6.5
14.0	7.3

DISCHARGE (CFS)	S/T+O/2
.0	.0
2.8	219.2
8.0	468.6
11.5	949.5
14.0	1066.9

T(HRS)	INFLOW(CFS)	OUTFLOW(CFS)
.0	.00	.00
.0	.80	.01
.1	6.60	.05
.2	11.60	.17
.3	5.50	.27
.4	7.40	.35
.4	20.20	.53
.5	21.10	.78
.6	19.40	1.03
.7	18.90	1.26
.8	22.00	1.51
.9	22.30	1.77
.9	18.80	2.01
1.0	11.10	2.18
1.1	9.00	2.28
1.2	8.80	2.36
1.3	8.20	2.44
1.4	4.10	2.49
1.4	1.90	2.49
1.5	1.40	2.48
1.6	1.20	2.47
1.7	.50	2.45
1.8	.10	2.42
1.9	.00	2.39
1.9	.00	2.36
2.0	.00	2.33
2.1	.00	2.30
2.2	.00	2.27
2.3	.00	2.24
2.4	.00	2.21
2.4	.00	2.18
2.5	.00	2.16
2.6	.00	2.13
2.7	.00	2.10
2.8	.00	2.07
2.9	.00	2.05
2.9	.00	2.02

VOLUME STORED= 1650.64513 CUBIC METRES
VOLUME STORED= 1.34 AC. FT.

IMPOUNDMENT NAME=3-5
TIME INCREMENT (HRS)= .0833333

DISCHARGE(CFS)	STORAGE (AC.FT)
.0	.0
2.8	1.5
8.0	3.2
11.5	6.5
14.0	7.3

DISCHARGE (CFS)	S/T+O/2
.0	.0
2.8	219.2
8.0	468.6
11.5	949.5
14.0	1066.9

T(HRS)	INFLOW(CFS)	OUTFLOW(CFS)
.0	.00	.00
.0	.00	.00
.1	5.10	.03
.2	9.30	.12
.3	5.30	.22
.4	6.00	.29
.4	13.00	.40
.5	8.60	.54
.6	6.90	.63
.7	6.30	.70
.8	7.80	.79
.9	6.80	.87
.9	4.90	.93
1.0	3.60	.97
1.1	1.90	1.00
1.2	1.90	1.01
1.3	1.90	1.02
1.4	1.30	1.03
1.4	.50	1.03
1.5	.30	1.02
1.6	.30	1.01
1.7	.10	1.00
1.8	.10	.99
1.9	.00	.97
1.9	.00	.96
2.0	.00	.95
2.1	.00	.94
2.2	.00	.93
2.3	.00	.91
2.4	.00	.90
2.4	.00	.89
2.5	.00	.88
2.6	.00	.87
2.7	.00	.86
2.8	.00	.85
2.9	.00	.84
2.9	.00	.82

VOLUME STORED= 680.09143 CUBIC METRES
VOLUME STORED= .55 AC. FT.

IMPOUNDMENT NAME=2-100
TIME INCREMENT (HRS)= .0833333

DISCHARGE(CFS)	STORAGE (AC.FT)
.0	.0
4.3	.9
12.8	1.7
23.0	3.7
31.0	6.2

T(HRS)	INFLOW(CFS)	OUTFLOW(CFS)
.0	.00	.00
.0	12.20	.20
.1	40.30	1.04
.2	85.40	3.04
.3	78.60	7.13
.4	77.30	12.13
.4	145.00	15.89
.5	144.70	20.34
.6	106.60	23.62
.7	88.00	25.22
.8	94.60	26.66
.9	79.60	27.98
.9	44.80	28.73
1.0	21.40	28.82
1.1	12.80	28.57
1.2	7.70	28.17
1.3	2.10	27.66
1.4	.00	27.08
1.4	.00	26.49
1.5	.00	25.91
1.6	.00	25.35
1.7	.00	24.79
1.8	.00	24.25
1.9	.00	23.73
1.9	.00	23.21
2.0	.00	22.53
2.1	.00	21.75
2.2	.00	21.00
2.3	.00	20.28
2.4	.00	19.58
2.4	.00	18.90
2.5	.00	18.25
2.6	.00	17.62
2.7	.00	17.01
2.8	.00	16.42
2.9	.00	15.86
2.9	.00	15.31
3.0	.00	14.78
3.1	.00	14.27
3.2	.00	13.78
3.3	.00	13.30
3.4	.00	12.84
3.4	.00	11.98
3.5	.00	11.13

VOLUME STORED= 6839.46378 CUBIC METRES
VOLUME STORED= 5.54 AC. FT.

IMPOUNDMENT NAME=2-50
TIME INCREMENT (HRS)= .0833333

DISCHARGE(CFS)	STORAGE (AC.FT)
.0	.0
4.3	.9
12.8	1.7
23.0	3.7
31.0	6.2

T(HRS)	INFLOW(CFS)	OUTFLOW(CFS)
.0	.00	.00
.0	9.30	.15
.1	34.90	.86
.2	72.80	2.58
.3	66.00	5.26
.4	64.10	9.48
.4	123.70	14.09
.5	122.80	17.86
.6	89.70	20.91
.7	74.70	23.02
.8	81.00	24.21
.9	67.90	25.31
.9	37.70	25.91
1.0	17.40	25.94
1.1	10.30	25.68
1.2	6.20	25.30
1.3	1.70	24.83
1.4	.00	24.31
1.4	.00	23.78
1.5	.00	23.26
1.6	.00	22.61
1.7	.00	21.83
1.8	.00	21.08
1.9	.00	20.35
1.9	.00	19.65
2.0	.00	18.97
2.1	.00	18.31
2.2	.00	17.68
2.3	.00	17.07
2.4	.00	16.48
2.4	.00	15.91
2.5	.00	15.36
2.6	.00	14.83
2.7	.00	14.32
2.8	.00	13.83
2.9	.00	13.35
2.9	.00	12.89
3.0	.00	12.07
3.1	.00	11.22
3.2	.00	10.43
3.3	.00	9.69
3.4	.00	9.01
3.4	.00	8.37

VOLUME STORED= 5733.90756 CUBIC METRES
VOLUME STORED= 4.65 AC. FT.

IMPOUNDMENT NAME=2-25
TIME INCREMENT (HRS)= .083333

DISCHARGE(CFS)	STORAGE (AC.FT)
.0	.0
4.3	.9
12.8	1.7
23.0	3.7
31.0	6.2

T(HRS)	INFLOW(CFS)	OUTFLOW(CFS)
.0	.00	.00
.0	6.40	.10
.1	29.60	.68
.2	60.00	2.11
.3	53.10	3.87
.4	50.60	6.76
.4	101.50	11.65
.5	100.30	15.32
.6	72.60	17.77
.7	51.30	19.30
.8	67.00	20.67
.9	55.90	22.08
.9	30.30	22.81
1.0	13.30	22.77
1.1	7.70	22.35
1.2	4.70	21.79
1.3	1.20	21.14
1.4	.00	20.43
1.4	.00	19.73
1.5	.00	19.05
1.6	.00	18.39
1.7	.00	17.75
1.8	.00	17.14
1.9	.00	16.55
1.9	.00	15.98
2.0	.00	15.43
2.1	.00	14.89
2.2	.00	14.38
2.3	.00	13.88
2.4	.00	13.40
2.4	.00	12.94
2.5	.00	12.18
2.6	.00	11.32
2.7	.00	10.52
2.8	.00	9.77
2.9	.00	9.08
2.9	.00	8.44
3.0	.00	7.85
3.1	.00	7.29
3.2	.00	6.78
3.3	.00	6.30
3.4	.00	5.86
3.4	.00	5.44

VOLUME STORED= 4548.8358 CUBIC METRES
VOLUME STORED= 3.69 AC. FT.

IMPOUNDMENT NAME=2-10
TIME INCREMENT (HRS)= .083333

DISCHARGE(CFS)	STORAGE (AC.FT)
.0	.0
4.3	.9
12.8	1.7
23.0	3.7
31.0	6.2

T(HRS)	INFLOW(CFS)	OUTFLOW(CFS)
.0	.00	.00
.0	2.50	.04
.1	22.30	.44
.2	47.60	1.56
.3	40.10	2.93
.4	34.50	4.04
.4	72.90	7.24
.5	70.90	11.80
.6	48.00	13.96
.7	39.10	14.98
.8	45.30	15.92
.9	42.70	16.89
.9	25.00	17.49
1.0	11.00	17.52
1.1	5.30	17.19
1.2	3.20	16.75
1.3	1.30	16.25
1.4	.00	15.71
1.4	.00	15.17
1.5	.00	14.64
1.6	.00	14.14
1.7	.00	13.65
1.8	.00	13.18
1.9	.00	12.64
1.9	.00	11.75
2.0	.00	10.92
2.1	.00	10.15
2.2	.00	9.43
2.3	.00	8.77
2.4	.00	8.15
2.4	.00	7.57
2.5	.00	7.04
2.6	.00	6.54
2.7	.00	6.08
2.8	.00	5.65
2.9	.00	5.25
2.9	.00	4.88
3.0	.00	4.54
3.1	.00	4.26
3.2	.00	4.12
3.3	.00	3.99
3.4	.00	3.86
3.4	.00	3.74

VOLUME STORED= 3265.693344 CUBIC METRES
VOLUME STORED= 2.65 AC. FT.

IMPOUNDMENT NAME=2-5
TIME INCREMENT (HRS)= .0833333

DISCHARGE(CFS)	STORAGE (AC.FT)
.0	.0
4.3	.9
12.8	1.7
23.0	3.7
31.0	6.2

T(HRS)	INFLOW(CFS)	OUTFLOW(CFS)
.0	.00	.00
.0	.00	.00
.1	16.20	.26
.2	38.00	1.13
.3	32.20	2.23
.4	27.70	3.13
.4	50.90	4.30
.5	48.10	7.49
.6	28.70	9.67
.7	21.20	10.75
.8	25.10	11.62
.9	22.70	12.49
.9	12.30	12.82
1.0	3.20	12.49
1.1	1.00	11.75
1.2	.60	10.98
1.3	.10	10.23
1.4	.00	9.51
1.4	.00	8.84
1.5	.00	8.22
1.6	.00	7.64
1.7	.00	7.10
1.8	.00	6.60
1.9	.00	6.13
1.9	.00	5.70
2.0	.00	5.30
2.1	.00	4.92
2.2	.00	4.57
2.3	.00	4.28
2.4	.00	4.14
2.4	.00	4.01
2.5	.00	3.88
2.6	.00	3.75
2.7	.00	3.63
2.8	.00	3.51
2.9	.00	3.40
2.9	.00	3.29
3.0	.00	3.18
3.1	.00	3.08
3.2	.00	2.98
3.3	.00	2.88
3.4	.00	2.79
3.4	.00	2.70

VOLUME STORED= 2104.41401 CUBIC METRES
VOLUME STORED= 1.71 AC. FT.

IMPOUNDMENT NAME=1-100
TIME INCREMENT (HRS)= .0833333

DISCHARGE(CFS)	STORAGE (AC.FT)
.0	.0
4.3	.7
12.8	1.3
23.0	2.7
31.0	6.4

T(HRS)	INFLOW(CFS)	OUTFLOW(CFS)
.0	.00	.00
.0	3.80	.07
.1	11.90	.37
.2	31.00	1.19
.3	34.80	2.42
.4	46.30	3.90
.4	84.90	9.48
.5	93.80	15.10
.6	87.00	18.79
.7	83.20	22.03
.8	86.60	23.64
.9	71.80	24.46
.9	54.10	25.03
1.0	44.60	25.39
1.1	40.00	25.64
1.2	33.80	25.80
1.3	28.70	25.88
1.4	27.10	25.91
1.4	26.50	25.93
1.5	25.90	25.93
1.6	25.40	25.93
1.7	24.80	25.91
1.8	24.20	25.89
1.9	23.70	25.86
1.9	23.20	25.83
2.0	22.50	25.79
2.1	21.80	25.73
2.2	21.00	25.67
2.3	20.30	25.59
2.4	19.60	25.51
2.4	18.90	25.42
2.5	18.20	25.32
2.6	17.60	25.21
2.7	17.00	25.09
2.8	16.40	24.97
2.9	15.90	24.83
2.9	15.30	24.70
3.0	14.80	24.56
3.1	14.30	24.41
3.2	13.80	24.25
3.3	13.30	24.10
3.4	12.80	23.93
3.4	12.00	23.76
3.5	11.10	23.58

VOLUME STORED= 5002.46227 CUBIC METRES
VOLUME STORED= 4.06 AC. FT.

IMPOUNDMENT NAME=1-S0
TIME INCREMENT (HRS)= .08333333

DISCHARGE(CFS)	STORAGE (AC.FT)
.0	.0
4.3	.7
12.8	1.3
23.0	3.7
31.0	6.4

T(HRS)	INFLOW(CFS)	OUTFLOW(CFS)
.0	.00	.00
.0	2.90	.06
.1	10.50	.31
.2	24.60	.98
.3	26.20	1.93
.4	35.60	3.05
.4	70.50	6.09
.5	77.70	12.85
.6	73.30	14.65
.7	71.40	16.32
.8	74.70	17.95
.9	61.70	19.40
.9	46.60	20.41
1.0	38.50	21.04
1.1	34.90	21.50
1.2	29.80	21.81
1.3	25.40	21.98
1.4	24.30	22.06
1.4	23.80	22.12
1.5	23.30	22.16
1.6	22.60	22.18
1.7	21.80	22.18
1.8	21.10	22.16
1.9	20.40	22.12
1.9	19.60	22.06
2.0	19.00	21.98
2.1	18.30	21.88
2.2	17.70	21.77
2.3	17.10	21.64
2.4	16.50	21.51
2.4	15.90	21.35
2.5	15.40	21.19
2.6	14.80	21.01
2.7	14.30	20.83
2.8	13.80	20.63
2.9	13.40	20.43
2.9	13.00	20.22
3.0	12.10	20.00
3.1	11.20	19.76
3.2	10.40	19.50
3.3	9.60	19.22
3.4	9.00	18.94
3.4	8.40	18.64

VOLUME STORED= 4327.91191 CUBIC METRES
VOLUME STORED= 3.51 AC. FT.

IMPOUNDMENT NAME=1-25
TIME INCREMENT (HRS)= .0833333

DISCHARGE(CFS)	STORAGE (AC.FT)
.0	.0
4.3	.7
12.8	1.3
23.0	3.7
31.0	6.4

T(HRS)	INFLOW(CFS)	OUTFLOW(CFS)
.0	.00	.00
.0	1.90	.04
.1	8.90	.24
.2	17.90	.75
.3	18.00	1.42
.4	24.60	2.19
.4	55.00	3.65
.5	61.00	8.09
.6	58.90	12.95
.7	58.00	14.26
.8	61.60	15.58
.9	50.90	16.75
.9	38.60	17.56
1.0	32.10	18.07
1.1	29.40	18.44
1.2	25.10	18.69
1.3	21.70	18.83
1.4	20.40	18.89
1.4	19.70	18.92
1.5	19.00	18.94
1.6	18.40	18.93
1.7	17.80	18.91
1.8	17.10	18.86
1.9	16.60	18.81
1.9	16.00	18.73
2.0	15.40	18.65
2.1	14.90	18.55
2.2	14.40	18.43
2.3	13.90	18.31
2.4	13.40	18.17
2.4	12.90	18.03
2.5	12.20	17.87
2.6	11.30	17.70
2.7	10.50	17.50
2.8	9.80	17.29
2.9	9.10	17.06
2.9	8.40	16.82
3.0	7.80	16.57
3.1	7.30	16.31
3.2	6.80	16.04
3.3	6.30	15.77
3.4	5.90	15.49
3.4	5.40	15.21

VOLUME STORED= 3384.81334 CUBIC METRES
VOLUME STORED= 2.74 AC. FT.

IMPOUNDMENT NAME=1-10
TIME INCREMENT (HRS)= .0833333

DISCHARGE(CFS)	STORAGE (AC.FT)
.0	.0
4.3	.7
12.8	1.3
23.0	3.7
31.0	6.4

T(HRS)	INFLOW(CFS)	OUTFLOW(CFS)
.0	.00	.00
.0	.80	.02
.1	6.70	.16
.2	14.00	.55
.3	11.80	1.03
.4	12.60	1.47
.4	34.00	2.31
.5	39.50	3.64
.6	37.30	6.10
.7	37.00	9.24
.8	41.90	12.29
.9	35.20	13.41
.9	26.70	13.92
1.0	22.50	14.23
1.1	21.10	14.44
1.2	18.60	14.60
1.3	16.50	14.69
1.4	15.70	14.73
1.4	15.20	14.75
1.5	14.60	14.75
1.6	14.10	14.74
1.7	13.60	14.71
1.8	13.20	14.68
1.9	12.60	14.63
1.9	11.80	14.56
2.0	10.90	14.46
2.1	10.20	14.35
2.2	9.40	14.22
2.3	8.80	14.07
2.4	8.20	13.91
2.4	7.60	13.74
2.5	7.00	13.55
2.6	6.50	13.36
2.7	6.10	13.15
2.8	5.60	12.94
2.9	5.20	12.53
2.9	4.90	11.78
3.0	4.50	11.06
3.1	4.30	10.39
3.2	4.10	9.76
3.3	4.00	9.19
3.4	3.90	8.66
3.4	3.70	8.17

VOLUME STORED= 2170.66848 CUBIC METRES
VOLUME STORED= 1.76 AC. FT.

IMPOUNDMENT NAME=1-5
TIME INCREMENT (HRS)= .00333333

DISCHARGE(CFS)	STORAGE (AC.FT)
.0	.0
4.3	.7
12.8	1.3
23.0	3.7
31.0	6.4

T(HRS)	INFLOW(CFS)	OUTFLOW(CFS)
.0	.00	.00
.0	.00	.00
.1	5.00	.10
.2	11.10	.40
.3	9.40	.79
.4	10.00	1.13
.4	10.30	1.64
.5	21.20	2.34
.6	19.00	3.02
.7	18.70	3.64
.8	21.30	4.27
.9	20.80	5.92
.9	16.60	7.21
1.0	13.80	8.02
1.1	12.70	8.55
1.2	11.30	8.90
1.3	10.20	9.08
1.4	9.50	9.16
1.4	8.80	9.16
1.5	8.20	9.09
1.6	7.60	8.97
1.7	7.10	8.81
1.8	6.60	8.61
1.9	6.10	8.38
1.9	5.70	8.13
2.0	5.30	7.87
2.1	4.90	7.59
2.2	4.60	7.30
2.3	4.30	7.01
2.4	4.10	6.73
2.4	4.00	6.46
2.5	3.90	6.20
2.6	3.80	5.97
2.7	3.60	5.74
2.8	3.50	5.52
2.9	3.40	5.31
2.9	3.30	5.11
3.0	3.20	4.92
3.1	3.10	4.74
3.2	3.00	4.57
3.3	2.90	4.41
3.4	2.80	4.26
3.4	2.70	4.22

VOLUME STORED= 1314.50877 CUBIC METRES
VOLUME STORED= 1.07 AC. FT.

COLE ENGINEERING

Stage - Storage - Discharge Curve
Existing Pond 1

Marianneville - Glenway Estates
File No.: L09-301
Date: April 2018

		c	diam / length	control elev	inv	
	Outlet Pipe	0.80	0.600	273.920	273.620	600mm diam. conc pipe

	depth (m)	elev (m)	volume (ha/m)	Orifice Plate (cms)	Outlet Pipe (cms)	TOTAL FLOW (cms)	DATA POINTS for Otthymo
NWL	0.00	273.62	0.0000		0.000	0.000	1
	0.05	273.67	0.0000		0.016	0.000	
	0.10	273.72	0.0000		0.066	0.000	
	0.15	273.77	0.0000		0.150	0.000	
	0.20	273.82	0.0001		0.262	0.000	
	0.25	273.87	0.0001		0.397	0.000	
	0.30	273.92	0.0003		0.547	0.000	
	0.35	273.97	0.0004		0.704	0.704	
	0.40	274.02	0.0010		0.858	0.858	
	0.45	274.07	0.0086		0.998	0.998	2
	0.50	274.12	0.0210		1.111	1.111	
	0.55	274.17	0.0339		1.174	1.174	
	0.60	274.22	0.0472		1.095	1.095	
	0.65	274.27	0.0608		1.109	1.109	3
	0.70	274.32	0.0748		1.122	1.122	
	0.75	274.37	0.0892		1.135	1.135	
	0.80	274.42	0.1039		1.148	1.148	
	0.85	274.47	0.1191		1.161	1.161	4
	0.90	274.52	0.1346		1.174	1.174	
	0.95	274.57	0.1506		1.187	1.187	
	1.00	274.62	0.1669		1.199	1.199	
	1.05	274.67	0.1837		1.212	1.212	5
	1.10	274.72	0.2008		1.224	1.224	
	1.15	274.77	0.2183		1.236	1.236	
	1.20	274.82	0.2363		1.248	1.248	
	1.25	274.87	0.2546		1.260	1.260	6
	1.30	274.92	0.2734		1.272	1.272	
	1.35	274.97	0.2926		1.284	1.284	
	1.40	275.02	0.3123		1.295	1.295	
	1.45	275.07	0.3324		1.307	1.307	7
	1.50	275.12	0.3531		1.318	1.318	
	1.55	275.17	0.3741		1.330	1.330	
	1.60	275.22	0.3957		1.341	1.341	
	1.65	275.27	0.4178		1.352	1.352	8
	1.70	275.32	0.4404		1.363	1.363	
As Built 100-yr WL 275.36	1.75	275.37	0.4636		1.374	1.374	
	1.80	275.42	0.4873		1.385	1.385	
As Built Overflow Elv 275.45	1.85	275.47	0.5115		1.395	1.395	9

**Note: SSD based on October 29, 2014 survey done by Cole Engineering*

COLE ENGINEERING

Stage - Storage - Discharge Curve
Existing Pond 2

Marianneville - Glenway Estates
File No.: L09-301
Date: April 2018

		c	diam / length	control elev	inv	
	Outlet Plate	0.60	0.600	280.220	279.920	600mm diam. steel orifice plate
	Outlet Pipe	0.80	0.675	280.258	279.920	675mm diam. conc pipe

	depth (m)	elev (m)	volume (ha/m)	Orifice Plate (cms)	Outlet Pipe (cms)	TOTAL FLOW (cms)	DATA POINTS for Otthymo
NWL	0.00	279.92	0.00000	0.000	0.000	0.000	1
	0.05	279.97	0.00000	0.000	0.012	0.000	
	0.10	280.02	0.00001	0.000	0.050	0.000	
	0.15	280.07	0.00004	0.000	0.115	0.000	
	0.20	280.12	0.0001	0.000	0.203	0.000	
	0.25	280.17	0.0016	0.000	0.311	0.000	
	0.30	280.22	0.0064	0.000	0.433	0.000	
	0.35	280.27	0.0173	0.168	0.565	0.168	2
	0.40	280.32	0.0330	0.238	0.701	0.238	
	0.45	280.37	0.0501	0.291	0.833	0.291	
	0.50	280.42	0.0674	0.336	0.956	0.336	
	0.55	280.47	0.0851	0.376	1.058	0.376	
	0.60	280.52	0.1031	0.412	1.127	0.412	3
	0.65	280.57	0.1214	0.445	1.138	0.445	
	0.70	280.62	0.1399	0.475	1.072	0.475	
	0.75	280.67	0.1588	0.504	1.090	0.504	
	0.80	280.72	0.1780	0.531	1.108	0.531	
	0.85	280.77	0.1976	0.557	1.126	0.557	4
	0.90	280.82	0.2174	0.582	1.143	0.582	
	0.95	280.87	0.2376	0.606	1.160	0.606	
	1.00	280.92	0.2581	0.629	1.177	0.629	
	1.05	280.97	0.2789	0.651	1.193	0.651	
	1.10	281.02	0.3000	0.672	1.210	0.672	5
	1.15	281.07	0.3214	0.693	1.226	0.693	
	1.20	281.12	0.3432	0.713	1.242	0.713	
	1.25	281.17	0.3652	0.732	1.257	0.732	
	1.30	281.22	0.3876	0.751	1.273	0.751	
	1.35	281.27	0.4102	0.770	1.288	0.770	6
	1.40	281.32	0.4332	0.788	1.303	0.788	
	1.45	281.37	0.4565	0.806	1.318	0.806	
	1.50	281.42	0.4801	0.823	1.333	0.823	
	1.55	281.47	0.5040	0.840	1.348	0.840	
	1.60	281.52	0.5282	0.857	1.362	0.857	7
	1.65	281.57	0.5528	0.873	1.377	0.873	
	1.70	281.62	0.5776	0.889	1.391	0.889	
As Built 100-yr WL 281.65	1.75	281.67	0.6027	0.905	1.405	0.905	
	1.80	281.72	0.6281	0.920	1.419	0.920	
	1.85	281.77	0.6538	0.936	1.433	0.936	8
	1.90	281.82	0.6797	0.951	1.446	0.951	
	1.95	281.87	0.7059	0.965	1.460	0.965	
	2.00	281.92	0.7323	0.980	1.473	0.980	
	2.05	281.97	0.7590	0.994	1.486	0.994	
	2.10	282.02	0.7859	1.008	1.500	1.008	9
	2.15	282.07	0.8130	1.022	1.513	1.022	
	2.20	282.12	0.8403	1.036	1.525	1.036	
	2.25	282.17	0.8679	1.049	1.538	1.049	
	2.30	282.22	0.8955	1.063	1.551	1.063	
	2.35	282.27	0.9234	1.076	1.564	1.076	10
	2.40	282.32	0.9515	1.089	1.576	1.089	
	2.45	282.37	0.9798	1.102	1.588	1.102	
	2.50	282.42	1.0084	1.115	1.601	1.115	
	2.55	282.47	1.0373	1.127	1.613	1.127	11
	2.60	282.52	1.0665	1.140	1.625	1.140	
	2.65	282.57	1.0958	1.152	1.637	1.152	
	2.70	282.62	1.1254	1.164	1.649	1.164	
As Built Overflow Elv 282.68	2.75	282.67	1.1552	1.176	1.661	1.176	12

**Note: SSD based on October 29, 2014 survey done by Cole Engineering*

COLE ENGINEERING

Stage - Storage - Discharge Curve
Existing Pond 3

Marianneville - Glenway Estates
File No.: L09-301
Date: April 2018

		c	diam / length	control elev	inv		
	Outlet Pipe	0.80	0.450	284.675	284.450	450mm diam. conc pipe	
	depth (m)	elev (m)	volume (ha/m)	Orifice Plate (cms)	Outlet Pipe (cms)	TOTAL FLOW (cms)	DATA POINTS for Otthymo
NWL	0.00	284.45	0.0000		0.000	0.000	1
	0.05	284.50	0.0267		0.008	0.000	
	0.10	284.55	0.0541		0.033	0.000	
	0.15	284.60	0.0820		0.072	0.000	
	0.20	284.65	0.1102		0.123	0.123	2
	0.25	284.70	0.1388		0.180	0.180	
	0.30	284.75	0.1678		0.237	0.237	
	0.35	284.80	0.1971		0.287	0.287	3
	0.40	284.85	0.2269		0.320	0.320	
	0.45	284.90	0.2570		0.302	0.302	
	0.50	284.95	0.2876		0.309	0.309	4
	0.55	285.00	0.3189		0.317	0.317	
	0.60	285.05	0.3510		0.325	0.325	
	0.65	285.10	0.3838		0.333	0.333	5
As Built 100-yr WL 285.16	0.70	285.15	0.4173		0.341	0.341	
	0.75	285.20	0.4512		0.348	0.348	
	0.80	285.25	0.4855		0.355	0.355	
As Built Overflow Elv 285.27	0.85	285.30	0.5200		0.362	0.362	6

**Note: SSD based on December 3, 2014 and March 6, 2015 surveys done by Cole Engineering*

COLE ENGINEERING

Stage - Storage - Discharge Curve
Pond 4

Marianneville - Glenway Estates
File No.: L09-301
Date: April 2018

		c	diam / length	control elev	inv	
	BottomDraw	0.63	0.175	269.788	269.70	
	Ditch Inlet (OPSD 403.010 - No Blockage)			270.550		1.2m by 0.60m Ditch Inlet CB (4:1 grate slope)
	CB pipe	0.80	0.525	269.963	269.70	
	Weir / Channel	1.67	25.000	271.700		25m base broad crested weir

	depth (m)	elev (m)	volume (ha/m)	BottomDraw (cms)	DICB (cms)	CB Pipe (cms)	Emergency Spillway (cms)	TOTAL FLOW (cms)	DATA POINTS for Otthymo
	0.00	269.70	0.0000	0.000				0.000	1
	0.05	269.75	0.0273	0.000				0.000	
	0.10	269.80	0.0555	0.000				0.000	
	0.15	269.85	0.0847	0.017				0.017	
	0.20	269.90	0.1147	0.023				0.023	
	0.25	269.95	0.1457	0.027				0.027	2
	0.30	270.00	0.1777	0.031				0.031	
	0.35	270.05	0.2106	0.034				0.034	
	0.40	270.10	0.2445	0.038				0.038	
	0.45	270.15	0.2793	0.040				0.040	
	0.50	270.20	0.3152	0.043				0.043	3
	0.55	270.25	0.3518	0.046				0.046	
	0.60	270.30	0.3890	0.048				0.048	
	0.65	270.35	0.4268	0.050				0.050	
Top of Ext Det	0.70	270.40	0.4653	0.053				0.053	4
	0.75	270.45	0.5043	0.055				0.055	
	0.80	270.50	0.5440	0.057				0.057	
Orifice 1 + DI	0.85	270.55	0.5845	0.059	0.000	0.588		0.059	
CB Orifice Tube	0.90	270.60	0.6257	0.061	0.188	0.612		0.249	
	0.95	270.65	0.6677	0.062	0.266	0.636		0.328	5
	1.00	270.70	0.7106	0.064	0.326	0.659		0.390	
	1.05	270.75	0.7542	0.066	0.377	0.681		0.443	
	1.10	270.80	0.7986	0.068	0.421	0.702		0.489	
	1.15	270.85	0.8439	0.069	0.461	0.723		0.530	
	1.20	270.90	0.8900	0.071	0.498	0.743		0.569	
	1.25	270.95	0.9370	0.072	0.532	0.762		0.604	
	1.30	271.00	0.9848	0.074	0.565	0.781		0.639	6
	1.35	271.05	1.0334	0.075	0.595	0.800		0.670	
	1.40	271.10	1.0830	0.077		0.818		0.895	
	1.45	271.15	1.1334	0.078		0.836		0.914	
	1.50	271.20	1.1847	0.080		0.853		0.933	
	1.55	271.25	1.2369	0.081		0.870		0.952	
	1.60	271.30	1.2900	0.083		0.887		0.970	7
	1.65	271.35	1.3440	0.084		0.904		0.987	
	1.70	271.40	1.3989	0.085		0.920		1.005	
	1.75	271.45	1.4548	0.087		0.936		1.022	
	1.80	271.50	1.5115	0.088		0.951		1.039	
	1.85	271.55	1.5693	0.089		0.967		1.056	
	1.90	271.60	1.6279	0.090		0.982		1.072	
100-Year WL	1.95	271.65	1.6875	0.092		0.996		1.088	
Top of Spillway	2.00	271.70	1.7480	0.093		1.011	0.000	1.104	8
	2.05	271.75	1.8095	0.094		1.026	0.400	1.520	
	2.10	271.80	1.8718	0.095		1.040	1.150	2.285	
	2.15	271.85	1.9350	0.096		1.054	2.160	3.310	9
	2.20	271.90	1.9990	0.098		1.068	3.380	4.545	
	2.25	271.95	2.0639	0.099		1.081	4.810	5.990	
	2.30	272.00	2.1300	0.100		1.095	6.410	7.605	
	2.35	272.05	2.1973	0.101		1.108	8.170	9.379	
	2.40	272.10	2.2662	0.102		1.122	10.090	11.314	10

COLE ENGINEERING

Stage - Storage - Discharge Table
Pond 6

Marianneville - Glenway Estates
File No.: L09-301
Date: April 2018

	c	diam / length	control elev	inv	
BottomDraw	0.63	0.160	265.180	265.10	
Ditch Inlet 1 (MTO Chart 4.20 - No Blockage)			265.900		1 x 1.2 m by 0.60m Ditch Inlet CB (4:1 grate slope)
Ditch Inlet 2 (MTO Chart 4.20 - No Blockage)			265.900		1 x 1.2 m by 0.60m Ditch Inlet CB (4:1 grate slope)
DICB.1 pipe	0.80	0.525	265.463	265.20	
DICB.2 pipe	0.80	0.525	265.463	265.20	
Weir / Channel	1.67	15.000	267.150		15m base with 3.3cm width increase per 1cm in flow depth

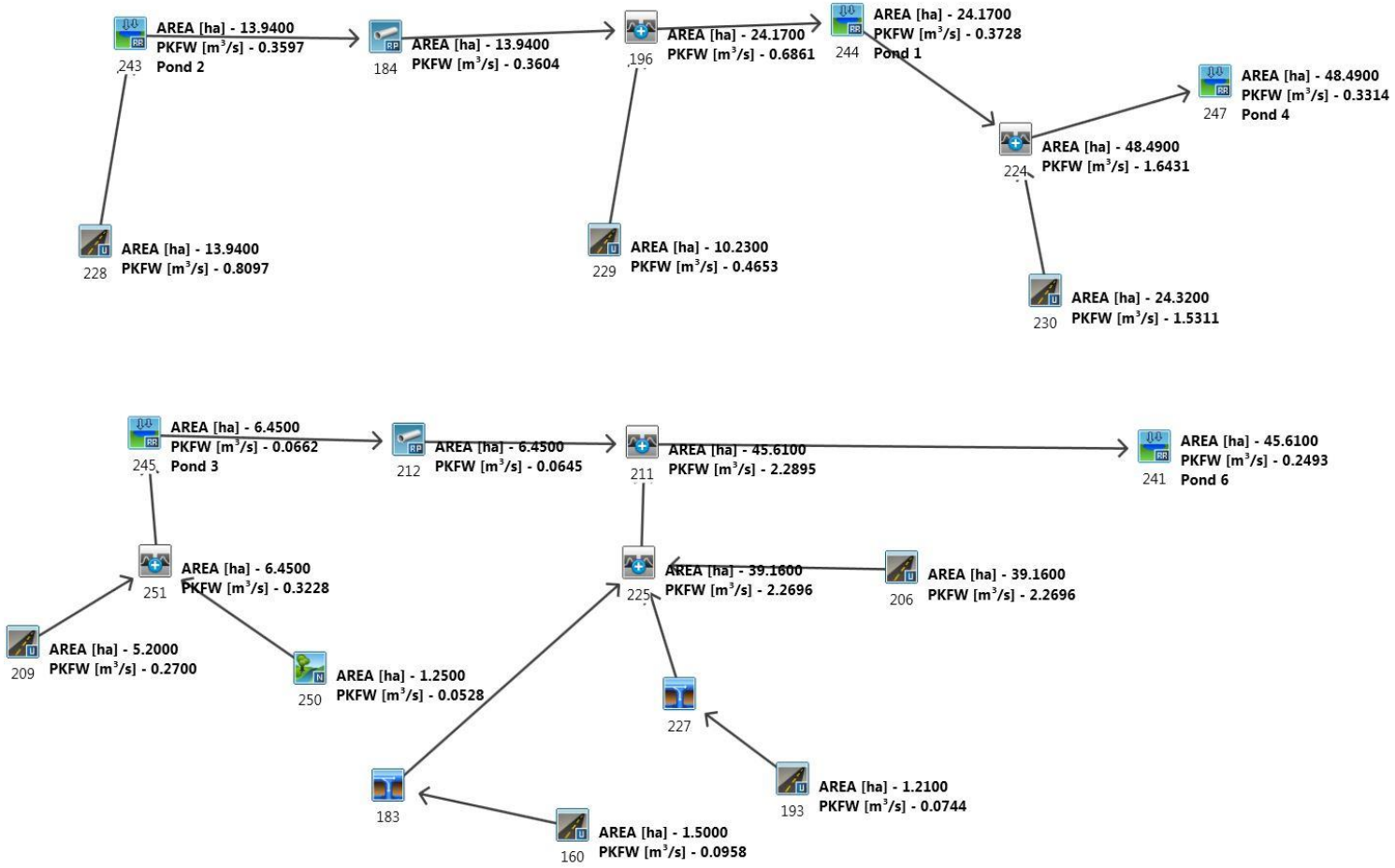
	depth (m)	elev (m)	volume (ha/m)	BottomDraw (cms)	DICB.1 (cms)	DICB.1 Pipe (cms)	DICB.2 (cms)	DICB.2 Pipe (cms)	Spillway (cms)	TOTAL FLOW (cms)	DATA POINTS for Otthymo
	0.00	265.10	0.0000	0.000						0.000	1
	0.05	265.15	0.0395	0.000						0.000	
	0.10	265.20	0.0798	0.000						0.000	
	0.15	265.25	0.1209	0.015						0.015	
	0.20	265.30	0.1627	0.019						0.019	2
	0.25	265.35	0.2054	0.023						0.023	
	0.30	265.40	0.2488	0.026						0.026	
	0.35	265.45	0.2930	0.029						0.029	
	0.40	265.50	0.3381	0.032						0.032	
	0.45	265.55	0.3840	0.034						0.034	
Top of Ext Det	0.50	265.60	0.4306	0.036						0.036	3
	0.55	265.65	0.4780	0.038						0.038	
	0.60	265.70	0.5258	0.040						0.040	
	0.65	265.75	0.5740	0.042						0.042	
	0.70	265.80	0.6228	0.044						0.044	
	0.75	265.85	0.6720	0.046						0.046	
	0.80	265.90	0.7217	0.048	0.000	0.562	0.000	0.562		0.048	4
	0.85	265.95	0.7718	0.049	0.042	0.588	0.042	0.588		0.133	5
	0.90	266.00	0.8225	0.051	0.108	0.612	0.108	0.612		0.267	
	0.95	266.05	0.8736	0.052	0.216	0.636	0.216	0.636		0.484	
	1.00	266.10	0.9252	0.054	0.348	0.659	0.348	0.659		0.750	
	1.05	266.15	0.9773	0.055	0.492	0.681	0.492	0.681		1.039	6
	1.10	266.20	1.0298	0.057	0.648	0.702	0.648	0.702		1.353	
	1.15	266.25	1.0828	0.058	0.960	0.723	0.960	0.723		1.503	
	1.20	266.30	1.1363	0.059	1.320	0.743	1.320	0.743		1.545	
	1.25	266.35	1.1903	0.061	1.560	0.762	1.560	0.762		1.585	
	1.30	266.40	1.2448	0.062	1.920	0.781	1.920	0.781		1.625	7
	1.35	266.45	1.2997	0.063		0.800		0.800		1.663	8
	1.40	266.50	1.3551	0.064		0.818		0.818		1.701	
	1.45	266.55	1.4110	0.066		0.836		0.836		1.738	
	1.50	266.60	1.4674	0.067		0.853		0.853		1.774	
	1.55	266.65	1.5243	0.068		0.870		0.870		1.809	
100yr WL	1.60	266.70	1.5816	0.069		0.887		0.887		1.843	9
	1.65	266.75	1.6394	0.070		0.904		0.904		1.877	
	1.70	266.80	1.6977	0.071		0.920		0.920		1.911	
	1.75	266.85	1.7565	0.073		0.936		0.936		1.944	
	1.80	266.90	1.8158	0.074		0.951		0.951		1.976	
	1.85	266.95	1.8756	0.075		0.967		0.967		2.008	
	1.90	267.00	1.9358	0.076		0.982		0.982		2.039	
	1.95	267.05	1.9965	0.077		0.996		0.996		2.070	
	2.00	267.10	2.0578	0.078		1.011		1.011		2.100	
Spillway Invert	2.05	267.15	2.1197	0.079		1.026		1.026	0.000	2.130	10
	2.10	267.20	2.1828	0.080		1.040		1.040	0.270	2.429	
	2.15	267.25	2.2465	0.081		1.054		1.054	0.780	2.968	11
	2.20	267.30	2.3109	0.082		1.068		1.068	1.450	3.667	
	2.25	267.35	2.3758	0.083		1.081		1.081	2.240	4.486	
	2.30	267.40	2.4413	0.084		1.095		1.095	3.140	5.414	
	2.35	267.45	2.5075	0.085		1.108		1.108	4.130	6.431	
	2.40	267.50	2.5741	0.085		1.122		1.122	5.210	7.538	12

APPENDIX C.2
Pre-Development Hydrologic Model Output

COLE ENGINEERING
Experience Enhancing Excellence

L09-301 – Marianneville – Glenway Estates (Phase 2)
2, 5, 10, 25, 50 & 100-Year 24 Hour SCS Storm
Existing Condition Model Output
April 2018

VO5 Model Schematic



COLE ENGINEERING

Experience Enhancing Excellence

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

       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 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)\Visual OTTHYMO 5.0\VO2\voin.dat
  Output  filename: C:\Users\JJohnston\AppData\Local\Civica\VH5\a379672b-db33-4372-b5e0-
ba58a07d1417\66eb9f0b-189f-43c9-adb2-a2a4305fbea5\sc
  Summary filename: C:\Users\JJohnston\AppData\Local\Civica\VH5\a379672b-db33-4372-b5e0-
ba58a07d1417\66eb9f0b-189f-43c9-adb2-a2a4305fbea5\sc


DATE: 03/21/2018                          TIME: 02:26:51

USER:


COMMENTS:


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


--------------------
|    READ STORM    |    Filename: C:\Users\JJohnston\AppD
|                  |              ata\Local\Temp\
|                  |              f0859609-8b31-45c8-a796-8ebb215965e5\bd5fe4d7
| Ptotal= 52.12 mm |    Comments: TWO YEAR SCS STORM  WITH A TWELVE MINUTE
--------------------
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.20    0.51 |  6.20    1.02 | 12.20   10.67 | 18.20    0.76
                0.40    0.51 |  6.40    1.02 | 12.40    6.60 | 18.40    0.76
                0.60    0.51 |  6.60    1.02 | 12.60    4.83 | 18.60    0.76
                0.80    0.51 |  6.80    1.02 | 12.80    4.57 | 18.80    0.76
                1.00    0.51 |  7.00    1.02 | 13.00    3.30 | 19.00    0.76
                1.20    0.51 |  7.20    1.02 | 13.20    2.79 | 19.20    0.76
                1.40    0.51 |  7.40    1.02 | 13.40    2.79 | 19.40    0.76
                1.60    0.51 |  7.60    1.02 | 13.60    2.79 | 19.60    0.76
                1.80    0.51 |  7.80    1.02 | 13.80    2.79 | 19.80    0.76
                2.00    0.51 |  8.00    1.02 | 14.00    2.79 | 20.00    0.76
                2.20    0.51 |  8.20    1.52 | 14.20    1.52 | 20.20    0.51
                2.40    0.51 |  8.40    1.52 | 14.40    1.52 | 20.40    0.51
                2.60    0.51 |  8.60    1.52 | 14.60    1.52 | 20.60    0.51
                2.80    0.51 |  8.80    1.52 | 14.80    1.52 | 20.80    0.51
                3.00    0.51 |  9.00    1.52 | 15.00    1.52 | 21.00    0.51
                3.20    0.51 |  9.20    1.52 | 15.20    1.52 | 21.20    0.51
                3.40    0.51 |  9.40    1.52 | 15.40    1.52 | 21.40    0.51
                3.60    0.51 |  9.60    1.52 | 15.60    1.52 | 21.60    0.51
                3.80    0.51 |  9.80    1.52 | 15.80    1.52 | 21.80    0.51
                4.00    0.51 | 10.00    1.52 | 16.00    1.52 | 22.00    0.51
                4.20    1.02 | 10.20    3.05 | 16.20    1.02 | 22.20    0.51
                4.40    1.02 | 10.40    3.05 | 16.40    1.02 | 22.40    0.51
                4.60    1.02 | 10.60    3.05 | 16.60    1.02 | 22.60    0.51
                4.80    1.02 | 10.80    3.05 | 16.80    1.02 | 22.80    0.51
                5.00    1.02 | 11.00    3.05 | 17.00    1.02 | 23.00    0.51
                5.20    1.02 | 11.20    4.06 | 17.20    1.02 | 23.20    0.51
                5.40    1.02 | 11.40    5.84 | 17.40    1.02 | 23.40    0.51
                5.60    1.02 | 11.60   13.21 | 17.60    1.02 | 23.60    0.51
                5.80    1.02 | 11.80   28.96 | 17.80    1.02 | 23.80    0.51
                6.00    1.02 | 12.00   60.45 | 18.00    1.02 | 24.00    0.51

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

--------------------
| CALIB            |
| NASHYD  (  0250)|  Area    (ha)=   1.25   Curve Number  (CN)= 72.0
|ID= 1 DT=12.0 min |  Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------  U.H. Tp(hrs)=   0.15

     Unit Hyd Qpeak  (cms)=   0.318

     PEAK FLOW       (cms)=   0.053 (i)
     TIME TO PEAK    (hrs)=  12.000
     RUNOFF VOLUME    (mm)=  13.308
     TOTAL RAINFALL   (mm)=  52.121
     RUNOFF COEFFICIENT   =   0.255

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0209)|  Area    (ha)=   5.20
|ID= 1 DT=12.0 min |  Total Imp(%)=  31.60   Dir. Conn.(%)=  19.40
--------------------

                                IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.64          3.56
     Dep. Storage     (mm)=       1.00          1.50
     Average Slope     (%)=       1.00          2.00
     Length            (m)=     186.19         40.00
     Mannings n             =     0.013         0.250

     Max.Eff.Inten.(mm/hr)=      60.45         27.84
               over (min)        12.00         24.00
     Storage Coeff.  (min)=       4.54 (ii)    16.31 (ii)
     Unit Hyd. Tpeak (min)=      12.00         24.00
     Unit Hyd. peak  (cms)=       0.13          0.06
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.16          0.15          0.270 (iii)
     TIME TO PEAK    (hrs)=      12.00         12.20          12.00
     RUNOFF VOLUME    (mm)=      51.12         17.51          24.03
     TOTAL RAINFALL   (mm)=      52.12         52.12          52.12
     RUNOFF COEFFICIENT   =       0.98          0.34           0.46

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
             YOU SHOULD CONSIDER SPLITTING THE AREA.

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  69.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

--------------------
| ADD HYD  (  0251)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0209):      5.20   0.270    12.00    24.03
     + ID2= 2 (  0250):      1.25   0.053    12.00    13.31
       ==========================================================
       ID = 3 (  0251):      6.45   0.323    12.00    21.95

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0245)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.3090     0.2876
                          0.0000     0.0000   |   0.3330     0.3838
                          0.1230     0.1102   |   0.3620     0.5200
                          0.2870     0.1971   |   0.0000     0.0000

                                    AREA     QPEAK     TPEAK      R.V.
                                    (ha)     (cms)     (hrs)      (mm)
   INFLOW : ID= 2 (  0251)         6.450     0.323     12.00     21.95
   OUTFLOW: ID= 1 (  0245)         6.450     0.066     12.80     21.92

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 20.52
                  TIME SHIFT OF PEAK FLOW       (min)= 48.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0594

--------------------------------------------------------------------------------
--------------------
| ROUTEPIPE(  0212)|     PIPE Number     =   1.00
```

```
| IN= 2---> OUT= 1 |     Diameter    (mm)=1650.00
| DT= 12.0 min     |     Length       (m)= 850.00
--------------------     Slope      (m/m)=  0.005
                         Manning n       =  0.013

     <------------------ TRAVEL TIME TABLE ---------------------->
       DEPTH      VOLUME     FLOW RATE    VELOCITY    TRAV.TIME
        (m)      (cu.m.)      (cms)        (m/s)        min
       0.09     .367E+02       0.0          0.80        17.68
       0.17     .102E+03       0.1          1.25        11.33
       0.26     .184E+03       0.3          1.61         8.81
       0.35     .278E+03       0.6          1.91         7.41
       0.43     .382E+03       1.0          2.18         6.51
       0.52     .492E+03       1.4          2.41         5.88
       0.61     .608E+03       1.9          2.61         5.43
       0.69     .727E+03       2.4          2.79         5.08
       0.78     .848E+03       2.9          2.95         4.81
       0.87     .970E+03       3.5          3.08         4.60
       0.96     .109E+04       4.1          3.20         4.43
       1.04     .121E+04       4.7          3.29         4.31
       1.13     .133E+04       5.2          3.36         4.22
       1.22     .144E+04       5.8          3.41         4.15
       1.30     .154E+04       6.2          3.44         4.12
       1.39     .163E+04       6.6          3.43         4.13
       1.48     .172E+04       6.9          3.40         4.17
       1.56     .178E+04       6.9          3.31         4.28
       1.65     .182E+04       6.5          3.02         4.70
                                <---- hydrograph ---->   <-pipe / channel->
                              AREA    OPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                              (ha)    (cms)   (hrs)   (mm)      (m)      (m/s)
   INFLOW : ID= 2 (   0245)    6.45     0.07   12.80  21.92      0.11      0.89
   OUTFLOW: ID= 1 (   0212)    6.45     0.06   13.00  21.91      0.11      0.88


--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0160)|   Area    (ha)=   1.50
|ID= 1 DT=12.0 min |   Total Imp(%)=  50.70   Dir. Conn.(%)=  22.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        0.76          0.74
     Dep. Storage     (mm)=        1.00          1.50
     Average Slope     (%)=        1.00          2.00
     Length            (m)=      100.00         40.00
     Mannings n            =       0.013         0.250

     Max.Eff.Inten.(mm/hr)=       60.45         45.53
                   over (min)     12.00         24.00
     Storage Coeff.  (min)=        3.12 (ii)    12.79 (ii)
     Unit Hyd. Tpeak (min)=       12.00         24.00
     Unit Hyd. peak  (cms)=        0.14          0.07
                                                      *TOTALS*
     PEAK FLOW       (cms)=        0.05          0.06          0.096 (iii)
     TIME TO PEAK    (hrs)=       12.00         12.20          12.00
     RUNOFF VOLUME    (mm)=       51.12         21.24          27.81
     TOTAL RAINFALL   (mm)=       52.12         52.12          52.12
     RUNOFF COEFFICIENT   =        0.98          0.41           0.53

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| DUHYD    (  0183)|
| Inlet Cap.= 0.152|
| #of Inlets=     1|
| Total(cms)=   0.2|      AREA     OPEAK     TPEAK    R.V.
--------------------      (ha)     (cms)     (hrs)    (mm)
     TOTAL HYD.(ID= 1):   1.50      0.10     12.00   27.81
     ==========================================================
     MAJOR SYS.(ID= 2):   0.00      0.00      0.00    0.00
     MINOR SYS.(ID= 3):   1.50      0.10     12.00   27.81

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0193)|   Area    (ha)=   1.21
|ID= 1 DT=12.0 min |   Total Imp(%)=  49.30   Dir. Conn.(%)=  20.10
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        0.60          0.61
     Dep. Storage     (mm)=        1.00          1.50
     Average Slope     (%)=        1.00          2.00
     Length            (m)=       89.81         40.00
     Mannings n            =       0.013         0.250

     Max.Eff.Inten.(mm/hr)=       60.45         45.24
                   over (min)     12.00         24.00
     Storage Coeff.  (min)=        2.93 (ii)    12.62 (ii)
     Unit Hyd. Tpeak (min)=       12.00         24.00
     Unit Hyd. peak  (cms)=        0.14          0.07
                                                      *TOTALS*
     PEAK FLOW       (cms)=        0.04          0.05          0.074 (iii)
     TIME TO PEAK    (hrs)=       12.00         12.20          12.00
     RUNOFF VOLUME    (mm)=       51.12         21.19          27.20
     TOTAL RAINFALL   (mm)=       52.12         52.12          52.12
     RUNOFF COEFFICIENT   =        0.98          0.41           0.52

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| DUHYD    (  0227)|
| Inlet Cap.= 0.120|
| #of Inlets=     1|
| Total(cms)=   0.1|      AREA     OPEAK     TPEAK    R.V.
--------------------      (ha)     (cms)     (hrs)    (mm)
     TOTAL HYD.(ID= 1):   1.21      0.07     12.00   27.20
     ==========================================================
     MAJOR SYS.(ID= 2):   0.00      0.00      0.00    0.00
     MINOR SYS.(ID= 3):   1.21      0.07     12.00   27.20

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0206)|   Area    (ha)=  39.16
|ID= 1 DT=12.0 min |   Total Imp(%)=  54.20   Dir. Conn.(%)=  23.20
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       21.22         17.94
     Dep. Storage     (mm)=        1.00          1.50
     Average Slope     (%)=        1.00          2.00
     Length            (m)=      510.95         40.00
     Mannings n            =       0.013         0.250

     Max.Eff.Inten.(mm/hr)=       60.45         50.02
                   over (min)     12.00         24.00
     Storage Coeff.  (min)=        8.31 (ii)    17.62 (ii)
     Unit Hyd. Tpeak (min)=       12.00         24.00
     Unit Hyd. peak  (cms)=        0.11          0.06
                                                      *TOTALS*
     PEAK FLOW       (cms)=        1.31          1.32          2.270 (iii)
     TIME TO PEAK    (hrs)=       12.00         12.20          12.00
     RUNOFF VOLUME    (mm)=       51.12         22.00          28.76
     TOTAL RAINFALL   (mm)=       52.12         52.12          52.12
     RUNOFF COEFFICIENT   =        0.98          0.42           0.55

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| ADD HYD  (  0225)|
|   1 +  2 =  3    |          AREA     OPEAK     TPEAK     R.V.
--------------------          (ha)     (cms)     (hrs)     (mm)
*** W A R N I N G :  HYDROGRAPH   0183 <ID= 1> IS DRY.
*** W A R N I N G :  HYDROGRAPH   0225 = HYDROGRAPH 0206
       ID1= 1 (   0183):     0.00    0.000     0.00     0.00
     + ID2= 2 (   0206):    39.16    2.270    12.00    28.76
       ==========================================================
```

```
          ID = 3 (  0225):    39.16   2.270    12.00    28.76

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD  (  0225)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)    (mm)
*** W A R N I N G :  HYDROGRAPH   0227 <ID= 2> IS DRY.
*** W A R N I N G :  HYDROGRAPH   0001 = HYDROGRAPH 0003
        ID1= 3 (  0225):    39.16   2.270    12.00    28.76
      + ID2= 2 (  0227):     0.00   0.000     0.00     0.00
        ==============================================
        ID = 1 (  0225):    39.16   2.270    12.00    28.76

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD  (  0211)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)    (mm)
        ID1= 1 (  0212):     6.45   0.065    13.00    21.91
      + ID2= 2 (  0225):    39.16   2.270    12.00    28.76
        ==============================================
        ID = 3 (  0211):    45.61   2.290    12.00    27.79

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| RESERVOIR(  0241)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW     STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000      0.0000   |   1.6250      1.2448
                          0.0190      0.1627   |   1.6630      1.2997
                          0.0360      0.4306   |   1.8430      1.5816
                          0.0480      0.7217   |   2.1300      2.1197
                          0.1330      0.7718   |   2.9680      2.2465
                          1.0390      0.9773   |   7.5380      2.5741

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0211)     45.610     2.290     12.00      27.79
   OUTFLOW: ID= 1 (  0241)     45.610     0.249     14.20      27.74

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 10.89
                  TIME SHIFT OF PEAK FLOW         (min)=132.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.7987

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

--------------------
| CALIB            |
| STANDHYD (  0228)|   Area    (ha)=  13.94
|ID= 1 DT=12.0 min |   Total Imp(%)=  47.50   Dir. Conn.(%)=  22.30
--------------------

                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      6.62          7.32
     Dep. Storage     (mm)=      1.00          1.50
     Average Slope     (%)=      1.00          2.00
     Length            (m)=    304.85         40.00
     Mannings n           =     0.013         0.250

     Max.Eff.Inten.(mm/hr)=     60.45         40.82
               over (min)       12.00         24.00
     Storage Coeff.  (min)=      6.10 (ii)    16.20 (ii)
     Unit Hyd. Tpeak (min)=     12.00         24.00
     Unit Hyd. peak  (cms)=      0.12          0.06
                                                        *TOTALS*
     PEAK FLOW       (cms)=      0.48          0.45          0.810 (iii)
     TIME TO PEAK    (hrs)=     12.00         12.20         12.00
     RUNOFF VOLUME    (mm)=     51.12         20.37         27.23
     TOTAL RAINFALL   (mm)=     52.12         52.12         52.12
     RUNOFF COEFFICIENT   =      0.98          0.39          0.52

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

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  69.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
```

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

--------------------
| RESERVOIR(  0243)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW     STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000      0.0000   |   0.8570      0.5282
                          0.1680      0.0173   |   0.9360      0.6538
                          0.4120      0.1031   |   1.0080      0.7859
                          0.5570      0.1976   |   1.0760      0.9234
                          0.6720      0.3000   |   1.1270      1.0373
                          0.7700      0.4102   |   1.1760      1.1552

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0228)     13.940     0.810     12.00      27.23
   OUTFLOW: ID= 1 (  0243)     13.940     0.360     12.40      27.23

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 44.43
                  TIME SHIFT OF PEAK FLOW         (min)= 24.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0848

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

--------------------
| ROUTEPIPE(  0184)|     PIPE Number      =   1.00
| IN= 2---> OUT= 1 |     Diameter    (mm)=1650.00
| DT= 12.0 min     |     Length       (m)= 500.00
--------------------     Slope      (m/m)=  0.005
                         Manning n        =  0.013

     <------------------ TRAVEL TIME TABLE ---------------------->
       DEPTH       VOLUME     FLOW RATE     VELOCITY     TRAV.TIME
        (m)      (cu.m.)         (cms)         (m/s)          min
       0.09     .216E+02          0.0          0.80         10.40
       0.17     .600E+02          0.1          1.25          6.67
       0.26     .108E+03          0.3          1.61          5.18
       0.35     .164E+03          0.6          1.91          4.36
       0.43     .225E+03          1.0          2.18          3.83
       0.52     .290E+03          1.4          2.41          3.46
       0.61     .358E+03          1.9          2.61          3.19
       0.69     .428E+03          2.4          2.79          2.99
       0.78     .499E+03          2.9          2.95          2.83
       0.87     .570E+03          3.5          3.08          2.70
       0.96     .642E+03          4.1          3.20          2.61
       1.04     .712E+03          4.7          3.29          2.53
       1.13     .780E+03          5.2          3.36          2.48
       1.22     .844E+03          5.8          3.41          2.44
       1.30     .905E+03          6.2          3.44          2.43
       1.39     .961E+03          6.6          3.43          2.43
       1.48     .101E+04          6.9          3.40          2.45
       1.56     .105E+04          6.9          3.31          2.52
       1.65     .107E+04          6.5          3.02          2.76
                                          <---- hydrograph ---->    <-pipe / channel->
                               AREA     QPEAK     TPEAK     R.V.    MAX DEPTH  MAX VEL
                               (ha)     (cms)     (hrs)     (mm)        (m)      (m/s)
   INFLOW : ID= 2 (  0243)     13.94     0.36     12.40    27.23       0.26      1.62
   OUTFLOW: ID= 1 (  0184)     13.94     0.36     12.40    27.23       0.26      1.62

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

--------------------
| CALIB            |
| STANDHYD (  0229)|   Area    (ha)=  10.23
|ID= 1 DT=12.0 min |   Total Imp(%)=  30.10   Dir. Conn.(%)=  15.10
--------------------

                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      3.08          7.15
     Dep. Storage     (mm)=      1.00          1.50
     Average Slope     (%)=      1.00          2.00
     Length            (m)=    261.15         40.00
     Mannings n           =     0.013         0.250

     Max.Eff.Inten.(mm/hr)=     60.45         29.32
               over (min)       12.00         24.00
     Storage Coeff.  (min)=      5.56 (ii)    17.09 (ii)
     Unit Hyd. Tpeak (min)=     12.00         24.00
     Unit Hyd. peak  (cms)=      0.13          0.06
                                                        *TOTALS*
     PEAK FLOW       (cms)=      0.24          0.31          0.465 (iii)
     TIME TO PEAK    (hrs)=     12.00         12.20         12.00
     RUNOFF VOLUME    (mm)=     51.12         17.88         22.90
     TOTAL RAINFALL   (mm)=     52.12         52.12         52.12
     RUNOFF COEFFICIENT   =      0.98          0.34          0.44

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

```
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  69.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

--------------------
| ADD HYD  (  0196)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0184):    13.94   0.360    12.40    27.23
     + ID2= 2 (  0229):    10.23   0.465    12.00    22.90
       ================================================
       ID = 3 (  0196):    24.17   0.686    12.00    25.39

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| RESERVOIR(  0244)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                         0.0000     0.0000    |  0.6510      0.4564
                         0.1220     0.0863    |  0.8770      0.7894
                         0.3620     0.1603    |  0.0000      0.0000

                              AREA     QPEAK     TPEAK       R.V.
                              (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0196)    24.170     0.686     12.00      25.39
   OUTFLOW: ID= 1 (  0244)    24.170     0.373     13.00      25.39

                PEAK   FLOW   REDUCTION [Qout/Qin](%)= 54.33
                TIME SHIFT OF PEAK FLOW         (min)= 60.00
                MAXIMUM  STORAGE   USED       (ha.m.)=  0.1718

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

--------------------
| CALIB            |
| STANDHYD (  0230)|   Area    (ha)=  24.32
|ID= 1 DT=12.0 min |   Total Imp(%)=  47.50   Dir. Conn.(%)=  29.30
--------------------

                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      11.55        12.77
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     402.66        40.00
     Mannings n            =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      60.45        34.90
               over (min)        12.00        24.00
     Storage Coeff. (min)=       7.21 (ii)   17.96 (ii)
     Unit Hyd. Tpeak (min)=     12.00        24.00
     Unit Hyd. peak  (cms)=      0.11         0.06
                                                    *TOTALS*
     PEAK FLOW       (cms)=      1.07         0.65          1.531 (iii)
     TIME TO PEAK    (hrs)=     12.00        12.20         12.00
     RUNOFF VOLUME    (mm)=     51.12        19.17         28.53
     TOTAL RAINFALL   (mm)=     52.12        52.12         52.12
     RUNOFF COEFFICIENT   =      0.98         0.37          0.55

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  69.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

--------------------
| ADD HYD  (  0224)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0230):    24.32   1.531    12.00    28.53
     + ID2= 2 (  0244):    24.17   0.373    13.00    25.39
       ================================================
       ID = 3 (  0224):    48.49   1.643    12.00    26.96

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| RESERVOIR(  0247)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                         0.0000     0.0000    |  0.6390      0.9848
                         0.0270     0.1457    |  0.9700      1.2900
                         0.0430     0.3152    |  1.1040      1.7480
                         0.0530     0.4653    |  3.3100      1.9350
                         0.3280     0.6677    | 11.3140      2.2662

                              AREA     QPEAK     TPEAK       R.V.
                              (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0224)    48.490     1.643     12.00      26.96
   OUTFLOW: ID= 1 (  0247)    48.490     0.331     14.40      26.93

                PEAK   FLOW   REDUCTION [Qout/Qin](%)= 20.17
                TIME SHIFT OF PEAK FLOW         (min)=144.00
                MAXIMUM  STORAGE   USED       (ha.m.)=  0.6715

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

       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 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)\Visual OTTHYMO 5.0\VO2\voin.dat
  Output  filename: C:\Users\JJohnston\AppData\Local\Civica\VH5\a379672b-db33-4372-b5e0-
ba58a07d1417\0837b5f9-b136-4795-b962-171c9828e280\sc
  Summary filename: C:\Users\JJohnston\AppData\Local\Civica\VH5\a379672b-db33-4372-b5e0-
ba58a07d1417\0837b5f9-b136-4795-b962-171c9828e280\sc


DATE: 03/21/2018                          TIME: 02:26:51

USER:


COMMENTS:

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


--------------------
|    READ STORM    |    Filename: C:\Users\JJohnston\AppD
|                  |              ata\Local\Temp\
|                  |              f0859609-8b31-45c8-a796-8ebb215965e5\fb5ff205
| Ptotal= 62.43 mm |    Comments: FIVE YR SCS STORM  WITH A TWELVE MINUTE
--------------------

               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.20    0.76 |  6.20    1.27 | 12.20   12.19 | 18.20    1.27
               0.40    0.76 |  6.40    1.27 | 12.40    7.62 | 18.40    1.27
               0.60    0.76 |  6.60    1.27 | 12.60    5.59 | 18.60    1.27
               0.80    0.76 |  6.80    1.27 | 12.80    5.08 | 18.80    1.27
               1.00    0.76 |  7.00    1.27 | 13.00    3.81 | 19.00    1.27
               1.20    0.76 |  7.20    1.27 | 13.20    3.05 | 19.20    1.02
               1.40    0.76 |  7.40    1.27 | 13.40    3.05 | 19.40    1.02
               1.60    0.76 |  7.60    1.27 | 13.60    3.05 | 19.60    1.02
               1.80    0.76 |  7.80    1.27 | 13.80    3.05 | 19.80    1.02
               2.00    0.76 |  8.00    1.27 | 14.00    3.05 | 20.00    1.02
               2.20    0.76 |  8.20    1.78 | 14.20    1.78 | 20.20    1.02
```

COLE ENGINEERING

Experience Enhancing Excellence

2.40	0.76	8.40	1.78	14.40	1.78	20.40	1.02
2.60	0.76	8.60	1.78	14.60	1.78	20.60	1.02
2.80	0.76	8.80	1.78	14.80	1.78	20.80	1.02
3.00	0.76	9.00	1.78	15.00	1.78	21.00	1.02
3.20	0.76	9.20	1.78	15.20	1.78	21.20	0.76
3.40	0.76	9.40	1.78	15.40	1.78	21.40	0.76
3.60	0.76	9.60	1.78	15.60	1.78	21.60	0.76
3.80	0.76	9.80	1.78	15.80	1.78	21.80	0.76
4.00	0.76	10.00	1.78	16.00	1.78	22.00	0.76
4.20	1.27	10.20	3.30	16.20	1.27	22.20	0.76
4.40	1.27	10.40	3.30	16.40	1.27	22.40	0.76
4.60	1.27	10.60	3.30	16.60	1.27	22.60	0.76
4.80	1.27	10.80	3.30	16.80	1.27	22.80	0.76
5.00	1.27	11.00	3.30	17.00	1.27	23.00	0.76
5.20	1.27	11.20	4.57	17.20	1.27	23.20	0.76
5.40	1.27	11.40	6.60	17.40	1.27	23.40	0.76
5.60	1.27	11.60	15.24	17.60	1.27	23.60	0.76
5.80	1.27	11.80	33.27	17.80	1.27	23.80	0.76
6.00	1.27	12.00	69.60	18.00	1.27	24.00	0.76

CALIB	
NASHYD (0250)	Area (ha) = 1.25 Curve Number (CN) = 72.0
ID= 1 DT=12.0 min	Ia (mm) = 5.00 # of Linear Res.(N) = 3.00
	U.H. Tp(hrs) = 0.15

Unit Hyd Qpeak (cms) = 0.318

PEAK FLOW (cms) = 0.070 (i)
TIME TO PEAK (hrs) = 12.000
RUNOFF VOLUME (mm) = 18.466
TOTAL RAINFALL (mm) = 62.433
RUNOFF COEFFICIENT = 0.296

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

CALIB	
STANDHYD (0209)	Area (ha) = 5.20
ID= 1 DT=12.0 min	Total Imp(%) = 31.60 Dir. Conn.(%) = 19.40

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha) =	1.64	3.56
Dep. Storage	(mm) =	1.00	1.50
Average Slope	(%) =	1.00	2.00
Length	(m) =	186.19	40.00
Mannings n	=	0.013	0.250
Max.Eff.Inten.(mm/hr)	=	69.60	35.98
over (min)		12.00	24.00
Storage Coeff.	(min) =	4.29 (ii)	14.91 (ii)
Unit Hyd. Tpeak	(min) =	12.00	24.00
Unit Hyd. peak	(cms) =	0.13	0.06
			TOTALS
PEAK FLOW	(cms) =	0.19	0.20 0.335 (iii)
TIME TO PEAK	(hrs) =	12.00	12.20 12.00
RUNOFF VOLUME	(mm) =	61.43	23.67 31.00
TOTAL RAINFALL	(mm) =	62.43	62.43 62.43
RUNOFF COEFFICIENT	=	0.98	0.38 0.50

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
YOU SHOULD CONSIDER SPLITTING THE AREA.

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0251)				
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0209):	5.20	0.335	12.00	31.00
+ ID2= 2 (0250):	1.25	0.070	12.00	18.47
ID = 3 (0251):	6.45	0.405	12.00	28.57

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR (0245)				
IN= 2---> OUT= 1				
DT= 12.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.3090	0.2876
	0.0000	0.0000	0.3330	0.3838
	0.1230	0.1102	0.3620	0.5200
	0.2870	0.1971	0.0000	0.0000

		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW :	ID= 2 (0251)	6.450	0.405	12.00	28.57
OUTFLOW:	ID= 1 (0245)	6.450	0.083	12.80	28.54

PEAK FLOW REDUCTION (Qout/Qin)(%) = 20.59
TIME SHIFT OF PEAK FLOW (min) = 48.00
MAXIMUM STORAGE USED (ha.m.) = 0.0749

ROUTEPIPE (0212)		
IN= 2---> OUT= 1	PIPE Number	= 1.00
DT= 12.0 min	Diameter	(mm) = 1650.00
	Length	(m) = 850.00
	Slope	(m/m) = 0.005
	Manning n	= 0.013

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

DEPTH (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME min
0.09	.367E+02	0.0	0.80	17.68
0.17	.102E+03	0.1	1.25	11.33
0.26	.184E+03	0.3	1.61	8.81
0.35	.278E+03	0.6	1.91	7.41
0.43	.382E+03	1.0	2.18	6.51
0.52	.492E+03	1.4	2.41	5.88
0.61	.608E+03	1.9	2.61	5.43
0.69	.727E+03	2.4	2.79	5.08
0.78	.848E+03	2.9	2.95	4.81
0.87	.970E+03	3.5	3.08	4.60
0.96	.109E+04	4.1	3.20	4.43
1.04	.121E+04	4.7	3.29	4.31
1.13	.133E+04	5.2	3.36	4.22
1.22	.144E+04	5.8	3.41	4.15
1.30	.154E+04	6.2	3.44	4.12
1.39	.163E+04	6.6	3.43	4.13
1.48	.172E+04	6.9	3.40	4.17
1.56	.178E+04	6.9	3.31	4.28
1.65	.182E+04	6.5	3.02	4.70

		AREA (ha)	<---- hydrograph ----> QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	<-pipe / channel-> MAX DEPTH (m)	MAX VEL (m/s)
INFLOW :	ID= 2 (0245)	6.45	0.08	12.80	28.54	0.12	0.94
OUTFLOW:	ID= 1 (0212)	6.45	0.08	13.00	28.53	0.12	0.94

CALIB	
STANDHYD (0160)	Area (ha) = 1.50
ID= 1 DT=12.0 min	Total Imp(%) = 50.70 Dir. Conn.(%) = 22.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha) =	0.76	0.74
Dep. Storage	(mm) =	1.00	1.50
Average Slope	(%) =	1.00	2.00
Length	(m) =	100.00	40.00
Mannings n	=	0.013	0.250
Max.Eff.Inten.(mm/hr)	=	69.60	57.99
over (min)		12.00	12.00
Storage Coeff.	(min) =	2.95 (ii)	11.73 (ii)
Unit Hyd. Tpeak	(min) =	12.00	12.00
Unit Hyd. peak	(cms) =	0.14	0.09
			TOTALS
PEAK FLOW	(cms) =	0.06	0.09 0.152 (iii)
TIME TO PEAK	(hrs) =	12.00	12.00 12.00
RUNOFF VOLUME	(mm) =	61.43	28.29 35.58
TOTAL RAINFALL	(mm) =	62.43	62.43 62.43
RUNOFF COEFFICIENT	=	0.98	0.45 0.57

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)

(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

DUHYD (0183)
Inlet Cap.= 0.152
#of Inlets= 1
Total(cms)= 0.21

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
TOTAL HYD.(ID= 1):	1.50	0.15	12.00	35.58
MAJOR SYS.(ID= 2):	0.00	0.00	0.00	0.00
MINOR SYS.(ID= 3):	1.50	0.15	12.00	35.58

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB	
STANDHYD (0193)|	Area (ha)= 1.21
ID= 1 DT=12.0 min		Total Imp(%)= 49.30 Dir. Conn.(%)= 20.10

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	0.60	0.61
Dep. Storage (mm)=	1.00	1.50
Average Slope (%)=	1.00	2.00
Length (m)=	89.81	40.00
Mannings n =	0.013	0.250
Max.Eff.Inten.(mm/hr)=	69.60	57.63
over (min)	12.00	12.00
Storage Coeff. (min)=	2.77 (ii)	11.57 (ii)
Unit Hyd. Tpeak (min)=	12.00	12.00
Unit Hyd. peak (cms)=	0.14	0.09

	TOTALS
PEAK FLOW (cms)=	0.05	0.07	0.120 (iii)
TIME TO PEAK (hrs)=	12.00	12.00	12.00
RUNOFF VOLUME (mm)=	61.43	28.23	34.90
TOTAL RAINFALL (mm)=	62.43	62.43	62.43
RUNOFF COEFFICIENT =	0.98	0.45	0.56

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

DUHYD (0227)
Inlet Cap.= 0.120
#of Inlets= 1
Total(cms)= 0.11

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
TOTAL HYD.(ID= 1):	1.21	0.12	12.00	34.90
MAJOR SYS.(ID= 2):	0.00	0.00	12.00	34.90
MINOR SYS.(ID= 3):	1.21	0.12	12.00	34.90

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB	
STANDHYD (0206)|	Area (ha)= 39.16
ID= 1 DT=12.0 min		Total Imp(%)= 54.20 Dir. Conn.(%)= 23.20

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	21.22	17.94
Dep. Storage (mm)=	1.00	1.50
Average Slope (%)=	1.00	2.00
Length (m)=	510.95	40.00
Mannings n =	0.013	0.250
Max.Eff.Inten.(mm/hr)=	69.60	63.51
over (min)	12.00	24.00
Storage Coeff. (min)=	7.86 (ii)	16.32 (ii)
Unit Hyd. Tpeak (min)=	12.00	24.00
Unit Hyd. peak (cms)=	0.11	0.06

	TOTALS
PEAK FLOW (cms)=	1.53	1.73	2.809 (iii)
TIME TO PEAK (hrs)=	12.00	12.20	12.00
RUNOFF VOLUME (mm)=	61.43	29.22	36.70
TOTAL RAINFALL (mm)=	62.43	62.43	62.43
RUNOFF COEFFICIENT =	0.98	0.47	0.59

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0225)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
*** W A R N I N G : HYDROGRAPH 0183 <ID= 1> IS DRY.				
*** W A R N I N G : HYDROGRAPH 0225 = HYDROGRAPH 0206				
ID1= 1 (0183):	0.00	0.000	0.00	0.00
+ ID2= 2 (0206):	39.16	2.809	12.00	36.70
ID = 3 (0225):	39.16	2.809	12.00	36.70

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0225)
3 + 2 = 1

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 3 (0225):	39.16	2.809	12.00	36.70
+ ID2= 2 (0227):	0.00	0.000	12.00	34.90
ID = 1 (0225):	39.16	2.809	12.00	36.70

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0211)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0212):	6.45	0.082	13.00	28.53
+ ID2= 2 (0225):	39.16	2.809	12.00	36.70
ID = 3 (0211):	45.61	2.835	12.00	35.54

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0241)
IN= 2---> OUT= 1
DT= 12.0 min

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	1.6250	1.2448
0.0190	0.1627	1.6630	1.2997
0.0360	0.4306	1.8430	1.5816
0.0480	0.7217	2.1300	2.1197
0.1330	0.7718	2.9680	2.2465
1.0390	0.9773	7.5380	2.5741

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0211)	45.610	2.835	12.00	35.54
OUTFLOW: ID= 1 (0241)	45.610	0.525	13.00	35.49

PEAK FLOW REDUCTION [Qout/Qin](%)= 18.54
TIME SHIFT OF PEAK FLOW (min)= 60.00
MAXIMUM STORAGE USED (ha.m.)= 0.8618

CALIB	
STANDHYD (0228)|	Area (ha)= 13.94
ID= 1 DT=12.0 min		Total Imp(%)= 47.50 Dir. Conn.(%)= 22.30

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	6.62	7.32
Dep. Storage (mm)=	1.00	1.50
Average Slope (%)=	1.00	2.00
Length (m)=	304.85	40.00

```
     Mannings n          =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     69.60        52.17
               over (min)       12.00        24.00
     Storage Coeff.  (min)=      5.76 (ii)   14.92 (ii)
     Unit Hyd. Tpeak (min)=     12.00        24.00
     Unit Hyd. peak  (cms)=      0.12         0.06
                                                    *TOTALS*
     PEAK FLOW       (cms)=      0.56         0.60          1.000 (iii)
     TIME TO PEAK    (hrs)=     12.00        12.20         12.00
     RUNOFF VOLUME    (mm)=     61.43        27.23         34.86
     TOTAL RAINFALL   (mm)=     62.43        62.43         62.43
     RUNOFF COEFFICIENT   =      0.98         0.44          0.56

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

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN* = 69.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0243)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.8570     0.5282
                          0.1680     0.0173   |   0.9360     0.6538
                          0.4120     0.1031   |   1.0080     0.7859
                          0.5570     0.1976   |   1.0760     0.9234
                          0.6720     0.3000   |   1.1270     1.0373
                          0.7700     0.4102   |   1.1760     1.1552

                                AREA     OPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0228)     13.940     1.000     12.00      34.86
   OUTFLOW: ID= 1 (  0243)     13.940     0.424     12.40      34.86

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 42.41
                  TIME SHIFT OF PEAK FLOW         (min)= 24.00
                  MAXIMUM  STORAGE   USED        (ha.m.)=  0.1119

--------------------------------------------------------------------------------
--------------------
| ROUTEPIPE(  0184)|     PIPE Number      =   1.00
| IN= 2---> OUT= 1 |     Diameter    (mm)=1650.00
| DT= 12.0 min     |     Length       (m)= 500.00
--------------------     Slope       (m/m)=  0.005
                         Manning n    =  0.013

     <----------------- TRAVEL TIME TABLE ---------------------->
       DEPTH      VOLUME     FLOW RATE     VELOCITY    TRAV.TIME
        (m)     (cu.m.)       (cms)         (m/s)         min
       0.09     .216E+02        0.0          0.80         10.40
       0.17     .600E+02        0.1          1.25          6.67
       0.26     .108E+03        0.3          1.61          5.18
       0.35     .164E+03        0.6          1.91          4.36
       0.43     .225E+03        1.0          2.18          3.83
       0.52     .290E+03        1.4          2.41          3.46
       0.61     .358E+03        1.9          2.61          3.19
       0.69     .428E+03        2.4          2.79          2.99
       0.78     .499E+03        2.9          2.95          2.83
       0.87     .570E+03        3.5          3.08          2.70
       0.96     .642E+03        4.1          3.20          2.61
       1.04     .712E+03        4.7          3.29          2.53
       1.13     .780E+03        5.2          3.36          2.48
       1.22     .844E+03        5.8          3.41          2.44
       1.30     .905E+03        6.2          3.44          2.43
       1.39     .961E+03        6.6          3.43          2.43
       1.48     .101E+04        6.9          3.40          2.45
       1.56     .105E+04        6.9          3.31          2.52
       1.65     .107E+04        6.5          3.02          2.76
                                    <---- hydrograph ---->   <-pipe / channel->
                               AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                               (ha)    (cms)   (hrs)   (mm)       (m)      (m/s)
   INFLOW : ID= 2 (  0243)   13.94     0.42   12.40  34.86      0.28      1.68
   OUTFLOW: ID= 1 (  0184)   13.94     0.43   12.40  34.86      0.28      1.68

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0229)|   Area    (ha)=  10.23
|ID= 1 DT=12.0 min |   Total Imp(%)=  30.10   Dir. Conn.(%)=  15.10
--------------------
                                IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       3.08         7.15
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     261.15        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      69.60        37.84
               over (min)        12.00        24.00
     Storage Coeff.  (min)=       5.25 (ii)   15.66 (ii)
     Unit Hyd. Tpeak (min)=      12.00        24.00
     Unit Hyd. peak  (cms)=       0.13         0.06
                                                    *TOTALS*
     PEAK FLOW       (cms)=       0.28         0.42          0.585 (iii)
     TIME TO PEAK    (hrs)=      12.00        12.20         12.00
     RUNOFF VOLUME    (mm)=      61.43        24.14         29.77
     TOTAL RAINFALL   (mm)=      62.43        62.43         62.43
     RUNOFF COEFFICIENT   =       0.98         0.39          0.48

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN* = 69.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| ADD HYD  (  0196)|
|   1 +  2 =  3    |                AREA     QPEAK     TPEAK      R.V.
--------------------                (ha)     (cms)     (hrs)      (mm)
       ID1= 1 (  0184):    13.94    0.428    12.40     34.86
     + ID2= 2 (  0229):    10.23    0.585    12.00     29.77
       ==========================================================
       ID = 3 (  0196):    24.17    0.852    12.20     32.70

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0244)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.6510     0.4564
                          0.1220     0.0863   |   0.8770     0.7894
                          0.3620     0.1603   |   0.0000     0.0000

                                AREA     OPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0196)     24.170     0.852     12.20      32.70
   OUTFLOW: ID= 1 (  0244)     24.170     0.415     13.20      32.70

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 48.77
                  TIME SHIFT OF PEAK FLOW         (min)= 60.00
                  MAXIMUM  STORAGE   USED        (ha.m.)=  0.2156

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0230)|   Area    (ha)=  24.32
|ID= 1 DT=12.0 min |   Total Imp(%)=  47.50   Dir. Conn.(%)=  29.30
--------------------
                                IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      11.55        12.77
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     402.66        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      69.60        44.81
               over (min)        12.00        24.00
     Storage Coeff.  (min)=       6.81 (ii)   16.54 (ii)
     Unit Hyd. Tpeak (min)=      12.00        24.00
     Unit Hyd. peak  (cms)=       0.12         0.06
                                                    *TOTALS*
     PEAK FLOW       (cms)=       1.24         0.86          1.871 (iii)
     TIME TO PEAK    (hrs)=      12.00        12.20         12.00
     RUNOFF VOLUME    (mm)=      61.43        25.74         36.20
     TOTAL RAINFALL   (mm)=      62.43        62.43         62.43
     RUNOFF COEFFICIENT   =       0.98         0.41          0.58
```

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =  69.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

--------------------
| ADD HYD  (  0224)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
      ID1= 1 (  0230):    24.32   1.871    12.00    36.20
    + ID2= 2 (  0244):    24.17   0.415    13.20    32.70
      ========================================================
      ID = 3 (  0224):    48.49   2.027    12.00    34.45

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| RESERVOIR(  0247)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000      0.0000   |   0.6390      0.9848
                          0.0270      0.1457   |   0.9700      1.2900
                          0.0430      0.3152   |   1.1040      1.7480
                          0.0530      0.4653   |   3.3100      1.9350
                          0.3280      0.6677   |  11.3140      2.2662

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0224)     48.490      2.027     12.00      34.45
   OUTFLOW: ID= 1 (  0247)     48.490      0.427     14.60      34.43

                PEAK   FLOW   REDUCTION (Qout/Qin)(%)= 21.05
                TIME SHIFT OF PEAK FLOW        (min)=156.00
                MAXIMUM  STORAGE   USED       (ha.m.)=  0.7683

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

       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)\Visual OTTHYMO 5.0\VO2\voin.dat
  Output  filename: C:\Users\JJohnston\AppData\Local\Civica\VH5\a379672b-db33-4372-b5e0-
ba58a07d1417\71e4a005-ec61-4bbb-b29b-c01cae468729\sc
  Summary filename: C:\Users\JJohnston\AppData\Local\Civica\VH5\a379672b-db33-4372-b5e0-
ba58a07d1417\71e4a005-ec61-4bbb-b29b-c01cae468729\sc


DATE: 03/21/2018                          TIME: 02:26:51

USER:



COMMENTS:


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

--------------------
|    READ STORM    |    Filename: C:\Users\JJohnston\AppD
|                  |              ata\Local\Temp\
|                  |              f0859609-8b31-45c8-a796-8ebb215965e5\975d2c25
| Ptotal= 82.45 mm |    Comments: TEN YR SCS STORM 24HR TWELVE MIN TIME ST
--------------------
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.20    0.76 |  6.20    1.78 | 12.20   92.20 | 18.20    1.78
                0.40    0.76 |  6.40    1.78 | 12.40   16.00 | 18.40    1.78
                0.60    0.76 |  6.60    1.78 | 12.60   10.16 | 18.60    1.78
                0.80    0.76 |  6.80    1.78 | 12.80    7.37 | 18.80    1.78
                1.00    0.76 |  7.00    1.78 | 13.00    6.86 | 19.00    1.78
                1.20    0.76 |  7.20    1.78 | 13.20    4.83 | 19.20    1.78
                1.40    0.76 |  7.40    1.78 | 13.40    4.06 | 19.40    1.27
                1.60    0.76 |  7.60    1.78 | 13.60    4.06 | 19.60    1.27
                1.80    0.76 |  7.80    1.78 | 13.80    4.06 | 19.80    1.27
                2.00    0.76 |  8.00    1.78 | 14.00    4.06 | 20.00    1.27
                2.20    0.76 |  8.20    1.78 | 14.20    4.06 | 20.20    1.27
                2.40    0.76 |  8.40    2.54 | 14.40    2.54 | 20.40    1.27
                2.60    0.76 |  8.60    2.54 | 14.60    2.54 | 20.60    1.27
                2.80    0.76 |  8.80    2.54 | 14.80    2.54 | 20.80    1.27
                3.00    0.76 |  9.00    2.54 | 15.00    2.54 | 21.00    1.27
                3.20    0.76 |  9.20    2.54 | 15.20    2.54 | 21.20    1.27
                3.40    0.76 |  9.40    2.54 | 15.40    2.54 | 21.40    0.76
                3.60    0.76 |  9.60    2.54 | 15.60    2.54 | 21.60    0.76
                3.80    0.76 |  9.80    2.54 | 15.80    2.54 | 21.80    0.76
                4.00    0.76 | 10.00    2.54 | 16.00    2.54 | 22.00    0.76
                4.20    0.76 | 10.20    2.54 | 16.20    2.54 | 22.20    0.76
                4.40    1.78 | 10.40    4.57 | 16.40    1.78 | 22.40    0.76
                4.60    1.78 | 10.60    4.57 | 16.60    1.78 | 22.60    0.76
                4.80    1.78 | 10.80    4.57 | 16.80    1.78 | 22.80    0.76
                5.00    1.78 | 11.00    4.57 | 17.00    1.78 | 23.00    0.76
                5.20    1.78 | 11.20    4.57 | 17.20    1.78 | 23.20    0.76
                5.40    1.78 | 11.40    6.10 | 17.40    1.78 | 23.40    0.76
                5.60    1.78 | 11.60    8.89 | 17.60    1.78 | 23.60    0.76
                5.80    1.78 | 11.80   20.07 | 17.80    1.78 | 23.80    0.76
                6.00    1.78 | 12.00   44.20 | 18.00    1.78 | 24.00    0.76

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

--------------------
| CALIB            |
| NASHYD  (  0250)|   Area    (ha)=   1.25   Curve Number   (CN)= 72.0
|ID= 1 DT=12.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.15

     Unit Hyd Qpeak  (cms)=   0.318

     PEAK FLOW       (cms)=   0.115 (i)
     TIME TO PEAK    (hrs)=  12.200
     RUNOFF VOLUME    (mm)=  29.764
     TOTAL RAINFALL   (mm)=  82.446
     RUNOFF COEFFICIENT   =   0.361

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

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

--------------------
| CALIB            |
| STANDHYD (  0209)|   Area    (ha)=   5.20
|ID= 1 DT=12.0 min |   Total Imp(%)=  31.60   Dir. Conn.(%)=  19.40
--------------------

                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.64          3.56
     Dep. Storage     (mm)=       1.00          1.50
     Average Slope     (%)=       1.00          2.00
     Length            (m)=     186.19         40.00
     Mannings n            =      0.013         0.250

     Max.Eff.Inten.(mm/hr)=      92.20         56.88
               over (min)        12.00         24.00
     Storage Coeff.  (min)=       3.83 (ii)    12.68 (ii)
     Unit Hyd. Tpeak (min)=      12.00         24.00
     Unit Hyd. peak  (cms)=       0.14          0.07
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.25          0.34          0.503 (iii)
     TIME TO PEAK    (hrs)=      12.20         12.40          12.20
     RUNOFF VOLUME    (mm)=      81.45         37.01          45.63
     TOTAL RAINFALL   (mm)=      82.45         82.45          82.45
     RUNOFF COEFFICIENT   =       0.99          0.45           0.55

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
```

```
            YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

--------------------
| ADD HYD  (  0251)|
|   1 +  2 =  3    |          AREA    OPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0209):     5.20   0.503    12.20    45.63
     + ID2= 2 (  0250):     1.25   0.115    12.20    29.76
       ========================================================
       ID = 3 (  0251):     6.45   0.618    12.20    42.56

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| RESERVOIR(  0245)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.3090     0.2876
                          0.0000     0.0000   |   0.3330     0.3838
                          0.1230     0.1102   |   0.3620     0.5200
                          0.2870     0.1971   |   0.0000     0.0000

                                AREA     OPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0251)     6.450     0.618     12.20      42.56
   OUTFLOW: ID= 1 (  0245)     6.450     0.130     12.80      42.52

                  PEAK   FLOW   REDUCTION (Qout/Qin)(%)= 21.11
                  TIME SHIFT OF PEAK FLOW       (min)= 36.00
                  MAXIMUM  STORAGE   USED      (ha.m.)=  0.1148

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

--------------------
| ROUTEPIPE(  0212)|     PIPE Number     =   1.00
| IN= 2---> OUT= 1 |     Diameter    (mm)=1650.00
| DT= 12.0 min     |     Length       (m)= 850.00
--------------------     Slope      (m/m)=  0.005
                         Manning n        =  0.013

     <------------------ TRAVEL TIME TABLE ---------------------->
       DEPTH      VOLUME     FLOW RATE     VELOCITY     TRAV.TIME
        (m)     (cu.m.)       (cms)         (m/s)          min
       0.09     .367E+02        0.0          0.80         17.68
       0.17     .102E+03        0.1          1.25         11.33
       0.26     .184E+03        0.3          1.61          8.81
       0.35     .278E+03        0.6          1.91          7.41
       0.43     .382E+03        1.0          2.18          6.51
       0.52     .492E+03        1.4          2.41          5.88
       0.61     .608E+03        1.9          2.61          5.43
       0.69     .727E+03        2.4          2.79          5.08
       0.78     .848E+03        2.9          2.95          4.81
       0.87     .970E+03        3.5          3.08          4.60
       0.96     .109E+04        4.1          3.20          4.43
       1.04     .121E+04        4.7          3.29          4.31
       1.13     .133E+04        5.2          3.36          4.22
       1.22     .144E+04        5.8          3.41          4.15
       1.30     .154E+04        6.2          3.44          4.12
       1.39     .163E+04        6.6          3.43          4.13
       1.48     .172E+04        6.9          3.40          4.17
       1.56     .178E+04        6.9          3.31          4.28
       1.65     .182E+04        6.5          3.02          4.70
                                <---- hydrograph ---->   <-pipe / channel->
                          AREA    OPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                          (ha)    (cms)   (hrs)   (mm)       (m)      (m/s)
   INFLOW : ID= 2 (  0245)  6.45     0.13   12.80  42.52      0.16      1.14
   OUTFLOW: ID= 1 (  0212)  6.45     0.13   13.00  42.52      0.16      1.14


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

--------------------
| CALIB            |
| STANDHYD (  0160)|   Area     (ha)=   1.50
|ID= 1 DT=12.0 min |   Total Imp(%)=  50.70   Dir. Conn.(%)=  22.00
--------------------

                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.76         0.74
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     100.00        40.00
     Mannings n            =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      92.20        89.33
               over (min)        12.00        12.00
     Storage Coeff.  (min)=       2.64 (ii)   10.02 (ii)
     Unit Hyd. Tpeak (min)=      12.00        12.00
     Unit Hyd. peak  (cms)=       0.14         0.10
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.08         0.15          0.230 (iii)
     TIME TO PEAK    (hrs)=      12.20        12.20         12.20
     RUNOFF VOLUME    (mm)=      81.45        43.23         51.64
     TOTAL RAINFALL   (mm)=      82.45        82.45         82.45
     RUNOFF COEFFICIENT   =       0.99         0.52          0.63

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

--------------------
| DUHYD    (  0183)|
| Inlet Cap.= 0.152|
| #of Inlets=    1 |
| Total(cms)=  0.2 |      AREA     OPEAK     TPEAK     R.V.
--------------------      (ha)     (cms)     (hrs)     (mm)
     TOTAL HYD.(ID= 1):   1.50      0.23     12.20    51.64
     ==========================================================
     MAJOR SYS.(ID= 2):   0.11      0.08     12.20    51.64
     MINOR SYS.(ID= 3):   1.39      0.15     12.20    51.64

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| CALIB            |
| STANDHYD (  0193)|   Area     (ha)=   1.21
|ID= 1 DT=12.0 min |   Total Imp(%)=  49.30   Dir. Conn.(%)=  20.10
--------------------

                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.60         0.61
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      89.81        40.00
     Mannings n            =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      92.20        88.81
               over (min)        12.00        12.00
     Storage Coeff.  (min)=       2.47 (ii)    9.88 (ii)
     Unit Hyd. Tpeak (min)=      12.00        12.00
     Unit Hyd. peak  (cms)=       0.14         0.10
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.06         0.12          0.183 (iii)
     TIME TO PEAK    (hrs)=      12.20        12.20         12.20
     RUNOFF VOLUME    (mm)=      81.45        43.15         50.85
     TOTAL RAINFALL   (mm)=      82.45        82.45         82.45
     RUNOFF COEFFICIENT   =       0.99         0.52          0.62

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

--------------------
| DUHYD    (  0227)|
| Inlet Cap.= 0.120|
| #of Inlets=    1 |
| Total(cms)=  0.1 |      AREA     OPEAK     TPEAK     R.V.
--------------------      (ha)     (cms)     (hrs)     (mm)
     TOTAL HYD.(ID= 1):   1.21      0.18     12.20    50.85
     ==========================================================
     MAJOR SYS.(ID= 2):   0.09      0.06     12.20    50.85
     MINOR SYS.(ID= 3):   1.12      0.12     12.20    50.85

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

COLE ENGINEERING

Experience Enhancing Excellence

```
--------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0206)|   Area    (ha)=  39.16
|ID= 1 DT=12.0 min |   Total Imp(%)=  54.20   Dir. Conn.(%)=  23.20
--------------------
                        IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      21.22        17.94
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     510.95        40.00
     Mannings n            =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      92.20        97.33
               over (min)        12.00        24.00
     Storage Coeff.  (min)=       7.02 (ii)   14.16 (ii)
     Unit Hyd. Tpeak (min)=      12.00        24.00
     Unit Hyd. peak  (cms)=       0.12         0.06
                                                      *TOTALS*
     PEAK FLOW       (cms)=       2.09         2.81      4.202 (iii)
     TIME TO PEAK    (hrs)=      12.20        12.40        12.20
     RUNOFF VOLUME    (mm)=      81.45        44.45        53.04
     TOTAL RAINFALL   (mm)=      82.45        82.45        82.45
     RUNOFF COEFFICIENT   =       0.99         0.54         0.64

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| ADD HYD  (  0225)|
|   1 +  2 =  3    |         AREA    OPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0183):     0.11   0.078    12.20    51.64
     + ID2= 2 (  0206):    39.16   4.202    12.20    53.04
       ================================================
       ID = 3 (  0225):    39.27   4.279    12.20    53.03

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| ADD HYD  (  0225)|
|   3 +  2 =  1    |         AREA    OPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0225):    39.27   4.279    12.20    53.03
     + ID2= 2 (  0227):     0.09   0.063    12.20    50.85
       ================================================
       ID = 1 (  0225):    39.36   4.342    12.20    53.03

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| ADD HYD  (  0211)|
|   1 +  2 =  3    |         AREA    OPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0212):     6.45   0.131    13.00    42.52
     + ID2= 2 (  0225):    39.36   4.342    12.20    53.03
       ================================================
       ID = 3 (  0211):    45.81   4.382    12.20    51.55

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0241)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)    (ha.m.)   |   (cms)    (ha.m.)
                         0.0000     0.0000   |   1.6250     1.2448
                         0.0190     0.1627   |   1.6630     1.2997
                         0.0360     0.4306   |   1.8430     1.5816
                         0.0480     0.7217   |   2.1300     2.1197
                         0.1330     0.7718   |   2.9680     2.2465
                         1.0390     0.9773   |   7.5380     2.5741

                              AREA      OPEAK      TPEAK       R.V.
                               (ha)      (cms)      (hrs)       (mm)
   INFLOW : ID= 2 (  0211)     45.807      4.382      12.20      51.55
   OUTFLOW: ID= 1 (  0241)     45.807      1.280      12.80      51.50

                  PEAK   FLOW   REDUCTION (Qout/Qin)(%)= 29.21
                  TIME SHIFT OF PEAK FLOW         (min)= 36.00
                  MAXIMUM  STORAGE   USED        (ha.m.)=  1.0900

--------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0228)|   Area    (ha)=  13.94
|ID= 1 DT=12.0 min |   Total Imp(%)=  47.50   Dir. Conn.(%)=  22.30
--------------------
                        IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       6.62         7.32
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     304.85        40.00
     Mannings n            =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      92.20        80.84
               over (min)        12.00        24.00
     Storage Coeff.  (min)=       5.15 (ii)   12.84 (ii)
     Unit Hyd. Tpeak (min)=      12.00        24.00
     Unit Hyd. peak  (cms)=       0.13         0.07
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.75         0.98      1.493 (iii)
     TIME TO PEAK    (hrs)=      12.20        12.40        12.20
     RUNOFF VOLUME    (mm)=      81.45        41.83        50.66
     TOTAL RAINFALL   (mm)=      82.45        82.45        82.45
     RUNOFF COEFFICIENT   =       0.99         0.51         0.61

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0243)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)    (ha.m.)   |   (cms)    (ha.m.)
                         0.0000     0.0000   |   0.8570     0.5282
                         0.1680     0.0173   |   0.9360     0.6538
                         0.4120     0.1031   |   1.0080     0.7859
                         0.5570     0.1976   |   1.0760     0.9234
                         0.6720     0.3000   |   1.1270     1.0373
                         0.7700     0.4102   |   1.1760     1.1552

                              AREA      OPEAK      TPEAK       R.V.
                               (ha)      (cms)      (hrs)       (mm)
   INFLOW : ID= 2 (  0228)     13.940      1.493      12.20      50.66
   OUTFLOW: ID= 1 (  0243)     13.940      0.538      12.60      50.66

                  PEAK   FLOW   REDUCTION (Qout/Qin)(%)= 36.06
                  TIME SHIFT OF PEAK FLOW         (min)= 24.00
                  MAXIMUM  STORAGE   USED        (ha.m.)=  0.1895

--------------------------------------------------------------------------------
--------------------
| ROUTEPIPE(  0184)|     PIPE Number      =   1.00
| IN= 2---> OUT= 1 |     Diameter    (mm)=1650.00
| DT= 12.0 min     |     Length        (m)= 500.00
--------------------     Slope       (m/m)=  0.005
                         Manning n         =  0.013

      <------------------ TRAVEL TIME TABLE ------------------->
        DEPTH      VOLUME     FLOW RATE     VELOCITY    TRAV.TIME
         (m)     (cu.m.)       (cms)         (m/s)         min
        0.09    .216E+02         0.0          0.80         10.40
        0.17    .600E+02         0.1          1.25          6.67
        0.26    .108E+03         0.3          1.61          5.18
        0.35    .164E+03         0.6          1.91          4.36
        0.43    .225E+03         1.0          2.18          3.83
        0.52    .290E+03         1.4          2.41          3.46
        0.61    .358E+03         1.9          2.61          3.19
        0.69    .428E+03         2.4          2.79          2.99
        0.78    .499E+03         2.9          2.95          2.83
        0.87    .570E+03         3.5          3.08          2.70
        0.96    .642E+03         4.1          3.20          2.61
        1.04    .712E+03         4.7          3.29          2.53
```

COLE ENGINEERING

Experience Enhancing Excellence

```
        1.13      .780E+03        5.2          3.36         2.48
        1.22      .844E+03        5.8          3.41         2.44
        1.30      .905E+03        6.2          3.44         2.43
        1.39      .961E+03        6.6          3.43         2.43
        1.48      .101E+04        6.9          3.40         2.45
        1.56      .105E+04        6.9          3.31         2.52
        1.65      .107E+04        6.5          3.02         2.76
                                        <---- hydrograph ---->   <-pipe / channel->
                                  AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                                  (ha)    (cms)   (hrs)   (mm)       (m)       (m/s)
   INFLOW : ID= 2 (  0243)   13.94     0.54   12.60  50.66       0.32      1.80
   OUTFLOW: ID= 1 (  0184)   13.94     0.54   12.80  50.66       0.32      1.81


--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0229)||   Area    (ha)=  10.23
|ID= 1 DT=12.0 min |   Total Imp(%)=  30.10   Dir. Conn.(%)=  15.10
--------------------

                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       3.08         7.15
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     261.15        40.00
     Mannings n            =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      92.20        59.66
               over (min)        12.00        24.00
     Storage Coeff.  (min)=       4.69 (ii)   13.37 (ii)
     Unit Hyd. Tpeak (min)=      12.00        24.00
     Unit Hyd. peak  (cms)=       0.13         0.06
                                                      *TOTALS*
     PEAK FLOW        (cms)=      0.38         0.70      0.898 (iii)
     TIME TO PEAK     (hrs)=     12.20        12.40        12.20
     RUNOFF VOLUME     (mm)=     81.45        37.65        44.26
     TOTAL RAINFALL    (mm)=     82.45        82.45        82.45
     RUNOFF COEFFICIENT   =      0.99         0.46         0.54

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
             YOU SHOULD CONSIDER SPLITTING THE AREA.

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  69.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

--------------------
| ADD HYD  (  0196)||
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0184):    13.94   0.542    12.80    50.66
     + ID2= 2 (  0229):    10.23   0.898    12.20    44.26
       ========================================================
       ID = 3 (  0196):    24.17   1.257    12.40    47.95

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0244)||
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000      0.0000   |   0.6510      0.4564
                          0.1220      0.0863   |   0.8770      0.7894
                          0.3620      0.1603   |   0.0000      0.0000

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0196)    24.170     1.257     12.40      47.95
   OUTFLOW: ID= 1 (  0244)    24.170     0.524     13.60      47.95

                 PEAK   FLOW   REDUCTION (Qout/Qin)(%)= 41.69
                 TIME SHIFT OF PEAK FLOW       (min)= 72.00
                 MAXIMUM  STORAGE   USED       (ha.m.)=  0.3265

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0230)||   Area    (ha)=  24.32
|ID= 1 DT=12.0 min |   Total Imp(%)=  47.50   Dir. Conn.(%)=  29.30
--------------------

                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      11.55        12.77
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     402.66        40.00
     Mannings n            =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      92.20        70.02
               over (min)        12.00        24.00
     Storage Coeff.  (min)=       6.09 (ii)   14.23 (ii)
     Unit Hyd. Tpeak (min)=      12.00        24.00
     Unit Hyd. peak  (cms)=       0.12         0.06
                                                      *TOTALS*
     PEAK FLOW        (cms)=      1.68         1.43      2.750 (iii)
     TIME TO PEAK     (hrs)=     12.20        12.40        12.20
     RUNOFF VOLUME     (mm)=     81.45        39.83        52.02
     TOTAL RAINFALL    (mm)=     82.45        82.45        82.45
     RUNOFF COEFFICIENT   =      0.99         0.48         0.63

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

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  69.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

--------------------
| ADD HYD  (  0224)||
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0230):    24.32   2.750    12.20    52.02
     + ID2= 2 (  0244):    24.17   0.524    13.60    47.95
       ========================================================
       ID = 3 (  0224):    48.49   3.055    12.20    49.99

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0247)||
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000      0.0000   |   0.6390      0.9848
                          0.0270      0.1457   |   0.9700      1.2900
                          0.0430      0.3152   |   1.1040      1.7480
                          0.0530      0.4653   |   3.3100      1.9350
                          0.3280      0.6677   |  11.3140      2.2662

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0224)    48.490     3.055     12.20      49.99
   OUTFLOW: ID= 1 (  0247)    48.490     0.643     14.60      49.96

                 PEAK   FLOW   REDUCTION (Qout/Qin)(%)= 21.05
                 TIME SHIFT OF PEAK FLOW       (min)=144.00
                 MAXIMUM  STORAGE   USED       (ha.m.)=  0.9886

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

       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 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)\Visual OTTHYMO 5.0\VO2\voin.dat
```

COLE ENGINEERING

Experience Enhancing Excellence

```
  Output  filename: C:\Users\JJohnston\AppData\Local\Civica\VH5\a379672b-db33-4372-b5e0-
ba58a07d1417\3079c323-a62e-42db-ac73-51b0867b042e\sc
  Summary filename: C:\Users\JJohnston\AppData\Local\Civica\VH5\a379672b-db33-4372-b5e0-
ba58a07d1417\3079c323-a62e-42db-ac73-51b0867b042e\sc

DATE: 03/21/2018                          TIME: 02:26:51

USER:


COMMENTS:

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


--------------------
|    READ STORM    |    Filename: C:\Users\JJohnston\AppD
|                  |              ata\Local\Temp\
|                  |              f0859609-8b31-45c8-a796-8ebb215965e5\4b569b1a
| Ptotal= 95.96 mm |    Comments: TWENTYFIVE YR SCS STORM WITH A TWELVE MI
--------------------
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.20    1.02 |  6.20    2.03 | 12.20   18.80 | 18.20    2.03
                0.40    1.02 |  6.40    2.03 | 12.40   11.68 | 18.40    2.03
                0.60    1.02 |  6.60    2.03 | 12.60    8.38 | 18.60    2.03
                0.80    1.02 |  6.80    2.03 | 12.80    8.13 | 18.80    2.03
                1.00    1.02 |  7.00    2.03 | 13.00    5.59 | 19.00    2.03
                1.20    1.02 |  7.20    2.03 | 13.20    4.83 | 19.20    1.52
                1.40    1.02 |  7.40    2.03 | 13.40    4.83 | 19.40    1.52
                1.60    1.02 |  7.60    2.03 | 13.60    4.83 | 19.60    1.52
                1.80    1.02 |  7.80    2.03 | 13.80    4.83 | 19.80    1.52
                2.00    1.02 |  8.00    2.03 | 14.00    4.83 | 20.00    1.52
                2.20    1.02 |  8.20    2.79 | 14.20    2.79 | 20.20    1.52
                2.40    1.02 |  8.40    2.79 | 14.40    2.79 | 20.40    1.52
                2.60    1.02 |  8.60    2.79 | 14.60    2.79 | 20.60    1.52
                2.80    1.02 |  8.80    2.79 | 14.80    2.79 | 20.80    1.52
                3.00    1.02 |  9.00    2.79 | 15.00    2.79 | 21.00    1.52
                3.20    1.02 |  9.20    2.79 | 15.20    2.79 | 21.20    1.02
                3.40    1.02 |  9.40    2.79 | 15.40    2.79 | 21.40    1.02
                3.60    1.02 |  9.60    2.79 | 15.60    2.79 | 21.60    1.02
                3.80    1.02 |  9.80    2.79 | 15.80    2.79 | 21.80    1.02
                4.00    1.02 | 10.00    2.79 | 16.00    2.79 | 22.00    1.02
                4.20    2.03 | 10.20    5.08 | 16.20    2.03 | 22.20    1.02
                4.40    2.03 | 10.40    5.08 | 16.40    2.03 | 22.40    1.02
                4.60    2.03 | 10.60    5.08 | 16.60    2.03 | 22.60    1.02
                4.80    2.03 | 10.80    5.08 | 16.80    2.03 | 22.80    1.02
                5.00    2.03 | 11.00    5.08 | 17.00    2.03 | 23.00    1.02
                5.20    2.03 | 11.20    7.11 | 17.20    2.03 | 23.20    1.02
                5.40    2.03 | 11.40   10.41 | 17.40    2.03 | 23.40    1.02
                5.60    2.03 | 11.60   23.37 | 17.60    2.03 | 23.60    1.02
                5.80    2.03 | 11.80   51.56 | 17.80    2.03 | 23.80    1.02
                6.00    2.03 | 12.00  107.44 | 18.00    2.03 | 24.00    1.02

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

--------------------
| CALIB            |
| NASHYD  (  0250)|  Area     (ha)=   1.25   Curve Number   (CN)= 72.0
|ID= 1 DT=12.0 min |  Ia       (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------  U.H. Tp(hrs)=   0.15

     Unit Hyd Qpeak  (cms)=   0.318

     PEAK FLOW       (cms)=   0.147 (i)
     TIME TO PEAK    (hrs)=  12.000
     RUNOFF VOLUME    (mm)=  38.134
     TOTAL RAINFALL   (mm)=  95.961
     RUNOFF COEFFICIENT   =   0.397

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

-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0209)|  Area     (ha)=   5.20
|ID= 1 DT=12.0 min |  Total Imp(%)=  31.60   Dir. Conn.(%)=  19.40
--------------------

                        IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=     1.64         3.56
     Dep. Storage     (mm)=     1.00         1.50
     Average Slope     (%)=     1.00         2.00
     Length            (m)=   186.19        40.00
     Mannings n            =    0.013        0.250

     Max.Eff.Inten.(mm/hr)=   107.44        71.86
               over (min)        12.00        12.00
     Storage Coeff.  (min)=     3.60 (ii)   11.66 (ii)
     Unit Hyd. Tpeak (min)=    12.00        12.00
     Unit Hyd. peak  (cms)=     0.14         0.09
                                                      *TOTALS*
     PEAK FLOW       (cms)=     0.30         0.53       0.825 (iii)
     TIME TO PEAK    (hrs)=    12.00        12.00        12.00
     RUNOFF VOLUME    (mm)=    94.96        46.81        56.15
     TOTAL RAINFALL   (mm)=    95.96        95.96        95.96
     RUNOFF COEFFICIENT   =     0.99         0.49         0.59

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  69.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

--------------------
| ADD HYD  (  0251)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0209):     5.20    0.825    12.00    56.15
     + ID2= 2 (  0250):     1.25    0.147    12.00    38.13
       ================================================
       ID = 3 (  0251):     6.45    0.973    12.00    52.66

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0245)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000      0.0000   |   0.3090      0.2876
                          0.0000      0.0000   |   0.3330      0.3838
                          0.1230      0.1102   |   0.3620      0.5200
                          0.2870      0.1971   |   0.0000      0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0251)     6.450     0.973     12.00      52.66
   OUTFLOW: ID= 1 (  0245)     6.450     0.180     12.40      52.63

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 18.54
                  TIME SHIFT OF PEAK FLOW       (min)= 24.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.1420

-------------------------------------------------------------------------------
--------------------
| ROUTEPIPE(  0212)|     PIPE Number     =   1.00
| IN= 2---> OUT= 1 |     Diameter    (mm)=1650.00
| DT= 12.0 min     |     Length       (m)= 850.00
--------------------     Slope     (m/m)=  0.005
                         Manning n        =  0.013

      <------------------ TRAVEL TIME TABLE ------------------->
        DEPTH       VOLUME     FLOW RATE     VELOCITY     TRAV.TIME
         (m)      (cu.m.)       (cms)         (m/s)          min
        0.09     .367E+02        0.0          0.80         17.68
        0.17     .102E+03        0.1          1.25         11.33
        0.26     .184E+03        0.3          1.61          8.81
        0.35     .278E+03        0.6          1.91          7.41
        0.43     .382E+03        1.0          2.18          6.51
        0.52     .492E+03        1.4          2.41          5.88
        0.61     .608E+03        1.9          2.61          5.43
        0.69     .727E+03        2.4          2.79          5.08
        0.78     .848E+03        2.9          2.95          4.81
        0.87     .970E+03        3.5          3.08          4.60
        0.96     .109E+04        4.1          3.20          4.43
        1.04     .121E+04        4.7          3.29          4.31
        1.13     .133E+04        5.2          3.36          4.22
        1.22     .144E+04        5.8          3.41          4.15
```

```
      1.30     .154E+04       6.2          3.44         4.12
      1.39     .163E+04       6.6          3.43         4.13
      1.48     .172E+04       6.9          3.40         4.17
      1.56     .178E+04       6.9          3.31         4.28
      1.65     .182E+04       6.5          3.02         4.70
                              <---- hydrograph ---->   <-pipe / channel->
                            AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                            (ha)    (cms)   (hrs)   (mm)       (m)      (m/s)
 INFLOW : ID= 2 (  0245)    6.45     0.18   12.40  52.63      0.19      1.29
 OUTFLOW: ID= 1 (  0212)    6.45     0.18   12.60  52.62      0.19      1.30


--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0160)|   Area    (ha)=   1.50
|ID= 1 DT=12.0 min |   Total Imp(%)=  50.70   Dir. Conn.(%)=  22.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.76         0.74
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     100.00        40.00
     Mannings n            =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     107.44       111.35
               over (min)       12.00        12.00
     Storage Coeff.  (min)=       2.48 (ii)    9.24 (ii)
     Unit Hyd. Tpeak (min)=      12.00        12.00
     Unit Hyd. peak  (cms)=       0.14         0.10
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.10         0.19          0.285 (iii)
     TIME TO PEAK    (hrs)=      12.00        12.00         12.00
     RUNOFF VOLUME    (mm)=      94.96        54.01         63.02
     TOTAL RAINFALL   (mm)=      95.96        95.96         95.96
     RUNOFF COEFFICIENT   =       0.99         0.56          0.66

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =  69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| DUHYD    (  0183)|
| Inlet Cap.= 0.152|
| #of Inlets=    1|
| Total(cms)=  0.2|      AREA     QPEAK     TPEAK     R.V.
--------------------      (ha)     (cms)     (hrs)     (mm)
     TOTAL HYD.(ID= 1):   1.50      0.28     12.00    63.02
     ==========================================================
     MAJOR SYS.(ID= 2):   0.15      0.13     12.00    63.02
     MINOR SYS.(ID= 3):   1.35      0.15     12.00    63.02

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0193)|   Area    (ha)=   1.21
|ID= 1 DT=12.0 min |   Total Imp(%)=  49.30   Dir. Conn.(%)=  20.10
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.60         0.61
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      89.81        40.00
     Mannings n            =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     107.44       110.72
               over (min)       12.00        12.00
     Storage Coeff.  (min)=       2.33 (ii)    9.10 (ii)
     Unit Hyd. Tpeak (min)=      12.00        12.00
     Unit Hyd. peak  (cms)=       0.14         0.10
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.07         0.15          0.227 (iii)
     TIME TO PEAK    (hrs)=      12.00        12.00         12.00
     RUNOFF VOLUME    (mm)=      94.96        53.92         62.16
     TOTAL RAINFALL   (mm)=      95.96        95.96         95.96
     RUNOFF COEFFICIENT   =       0.99         0.56          0.65

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =  69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| DUHYD    (  0227)|
| Inlet Cap.= 0.120|
| #of Inlets=    1|
| Total(cms)=  0.1|      AREA     QPEAK     TPEAK     R.V.
--------------------      (ha)     (cms)     (hrs)     (mm)
     TOTAL HYD.(ID= 1):   1.21      0.23     12.00    62.16
     ==========================================================
     MAJOR SYS.(ID= 2):   0.12      0.11     12.00    62.16
     MINOR SYS.(ID= 3):   1.09      0.12     12.00    62.16

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0206)|   Area    (ha)=  39.16
|ID= 1 DT=12.0 min |   Total Imp(%)=  54.20   Dir. Conn.(%)=  23.20
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      21.22        17.94
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     510.95        40.00
     Mannings n            =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     107.44       121.01
               over (min)       12.00        24.00
     Storage Coeff.  (min)=       6.61 (ii)   13.14 (ii)
     Unit Hyd. Tpeak (min)=      12.00        24.00
     Unit Hyd. peak  (cms)=       0.12         0.07
                                                      *TOTALS*
     PEAK FLOW       (cms)=       2.46         3.58          5.193 (iii)
     TIME TO PEAK    (hrs)=      12.00        12.20         12.00
     RUNOFF VOLUME    (mm)=      94.96        55.40         64.58
     TOTAL RAINFALL   (mm)=      95.96        95.96         95.96
     RUNOFF COEFFICIENT   =       0.99         0.58          0.67

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =  69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| ADD HYD  (  0225)|
|   1 +  2 =  3    |          AREA     QPEAK     TPEAK     R.V.
--------------------          (ha)     (cms)     (hrs)     (mm)
       ID1= 1 (  0183):      0.15     0.133     12.00    63.02
     + ID2= 2 (  0206):     39.16     5.193     12.00    64.58
       ==========================================================
       ID = 3 (  0225):     39.31     5.326     12.00    64.58

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| ADD HYD  (  0225)|
|   3 +  2 =  1    |          AREA     QPEAK     TPEAK     R.V.
--------------------          (ha)     (cms)     (hrs)     (mm)
       ID1= 3 (  0225):     39.31     5.326     12.00    64.58
     + ID2= 2 (  0227):      0.12     0.107     12.00    62.16
       ==========================================================
       ID = 1 (  0225):     39.44     5.433     12.00    64.57

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| ADD HYD  (  0211)|
|   1 +  2 =  3    |          AREA     QPEAK     TPEAK     R.V.
--------------------          (ha)     (cms)     (hrs)     (mm)
       ID1= 1 (  0212):      6.45     0.182     12.60    52.62
```

COLE ENGINEERING

Experience Enhancing Excellence

```
      + ID2= 2 (  0225):    39.44   5.433    12.00     64.57
        ========================================================
        ID = 3 (  0211):    45.89   5.491    12.00     62.89

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0241)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   1.6250     1.2448
                          0.0190     0.1627   |   1.6630     1.2997
                          0.0360     0.4306   |   1.8430     1.5816
                          0.0480     0.7217   |   2.1300     2.1197
                          0.1330     0.7718   |   2.9680     2.2465
                          1.0390     0.9773   |   7.5380     2.5741

                                AREA     OPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0211)     45.886     5.491     12.00      62.89
   OUTFLOW: ID= 1 (  0241)     45.886     1.656     12.60      62.84

                  PEAK   FLOW   REDUCTION (Out/Oin)(%)= 30.15
                  TIME SHIFT OF PEAK FLOW          (min)= 36.00
                  MAXIMUM  STORAGE   USED        (ha.m.)=  1.2903

------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0228)|   Area    (ha)=  13.94
|ID= 1 DT=12.0 min |   Total Imp(%)=  47.50   Dir. Conn.(%)=  22.30
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      6.62         7.32
     Dep. Storage     (mm)=      1.00         1.50
     Average Slope     (%)=      1.00         2.00
     Length            (m)=    304.85        40.00
     Mannings n            =     0.013        0.250

     Max.Eff.Inten.(mm/hr)=    107.44       101.07
               over (min)      12.00        12.00
     Storage Coeff.  (min)=     4.85 (ii)   11.87 (ii)
     Unit Hyd. Tpeak (min)=    12.00        12.00
     Unit Hyd. peak  (cms)=     0.13         0.09
                                                      *TOTALS*
     PEAK FLOW       (cms)=     0.89         1.53         2.414 (iii)
     TIME TO PEAK    (hrs)=    12.00        12.00         12.00
     RUNOFF VOLUME    (mm)=    94.96        52.40         61.89
     TOTAL RAINFALL   (mm)=    95.96        95.96         95.96
     RUNOFF COEFFICIENT   =     0.99         0.55          0.64

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  = 69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0243)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.8570     0.5282
                          0.1680     0.0173   |   0.9360     0.6538
                          0.4120     0.1031   |   1.0080     0.7859
                          0.5570     0.1976   |   1.0760     0.9234
                          0.6720     0.3000   |   1.1270     1.0373
                          0.7700     0.4102   |   1.1760     1.1552

                                AREA     OPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0228)    13.940     2.414     12.00      61.89
   OUTFLOW: ID= 1 (  0243)    13.940     0.621     12.40      61.89

                  PEAK   FLOW   REDUCTION (Out/Oin)(%)= 25.72
                  TIME SHIFT OF PEAK FLOW          (min)= 24.00
                  MAXIMUM  STORAGE   USED        (ha.m.)=  0.2565

------------------------------------------------------------------------------
--------------------
| ROUTEPIPE(  0184)|     PIPE Number     =   1.00
| IN= 2---> OUT= 1 |     Diameter    (mm)=1650.00
| DT= 12.0 min     |     Length       (m)= 500.00
--------------------     Slope      (m/m)=  0.005
                         Manning n        =  0.013

     <------------------ TRAVEL TIME TABLE ---------------------->
       DEPTH      VOLUME     FLOW RATE     VELOCITY     TRAV.TIME
        (m)     (cu.m.)       (cms)         (m/s)         min
       0.09     .216E+02        0.0          0.80         10.40
       0.17     .600E+02        0.1          1.25          6.67
       0.26     .108E+03        0.3          1.61          5.18
       0.35     .164E+03        0.6          1.91          4.36
       0.43     .225E+03        1.0          2.18          3.83
       0.52     .290E+03        1.4          2.41          3.46
       0.61     .358E+03        1.9          2.61          3.19
       0.69     .428E+03        2.4          2.79          2.99
       0.78     .499E+03        2.9          2.95          2.83
       0.87     .570E+03        3.5          3.08          2.70
       0.96     .642E+03        4.1          3.20          2.61
       1.04     .712E+03        4.7          3.29          2.53
       1.13     .780E+03        5.2          3.36          2.48
       1.22     .844E+03        5.8          3.41          2.44
       1.30     .905E+03        6.2          3.44          2.43
       1.39     .961E+03        6.6          3.43          2.43
       1.48     .101E+04        6.9          3.40          2.45
       1.56     .105E+04        6.9          3.31          2.52
       1.65     .107E+04        6.5          3.02          2.76
                                          <---- hydrograph ---->   <-pipe / channel->
                                AREA     OPEAK     TPEAK    R.V.   MAX DEPTH  MAX VEL
                                (ha)     (cms)     (hrs)    (mm)       (m)      (m/s)
   INFLOW : ID= 2 (  0243)    13.94      0.62      12.40    61.89      0.35       1.91
   OUTFLOW: ID= 1 (  0184)    13.94      0.63      12.40    61.89      0.35       1.91

------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0229)|   Area    (ha)=  10.23
|ID= 1 DT=12.0 min |   Total Imp(%)=  30.10   Dir. Conn.(%)=  15.10
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      3.08         7.15
     Dep. Storage     (mm)=      1.00         1.50
     Average Slope     (%)=      1.00         2.00
     Length            (m)=    261.15        40.00
     Mannings n            =     0.013        0.250

     Max.Eff.Inten.(mm/hr)=    107.44        75.26
               over (min)      12.00        24.00
     Storage Coeff.  (min)=     4.42 (ii)   12.32 (ii)
     Unit Hyd. Tpeak (min)=    12.00        24.00
     Unit Hyd. peak  (cms)=     0.13         0.07
                                                      *TOTALS*
     PEAK FLOW       (cms)=     0.44         0.90         1.125 (iii)
     TIME TO PEAK    (hrs)=    12.00        12.20         12.00
     RUNOFF VOLUME    (mm)=    94.96        47.56         54.71
     TOTAL RAINFALL   (mm)=    95.96        95.96         95.96
     RUNOFF COEFFICIENT   =     0.99         0.50          0.57

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
             YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  = 69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------
--------------------
| ADD HYD  (  0196)|
|   1 +  2 =  3    |          AREA    OPEAK     TPEAK      R.V.
--------------------          (ha)    (cms)     (hrs)      (mm)
        ID1= 1 (  0184):    13.94    0.630     12.40     61.89
      + ID2= 2 (  0229):    10.23    1.125     12.00     54.71
        ========================================================
        ID = 3 (  0196):    24.17    1.599     12.20     58.85

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0244)|
| IN= 2---> OUT= 1 |
```

COLE ENGINEERING

Experience Enhancing Excellence

```
| DT= 12.0 min     |     OUTFLOW     STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)      (ha.m.)   |   (cms)     (ha.m.)
                          0.0000      0.0000   |   0.6510      0.4564
                          0.1220      0.0863   |   0.8770      0.7894
                          0.3620      0.1603   |   0.0000      0.0000

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0196)     24.170     1.599     12.20      58.85
   OUTFLOW: ID= 1 (  0244)     24.170     0.603     13.40      58.84

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 37.70
                  TIME SHIFT OF PEAK FLOW          (min)= 72.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.4071

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0230)|   Area    (ha)=  24.32
|ID= 1 DT=12.0 min |   Total Imp(%)=  47.50   Dir. Conn.(%)=  29.30
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=     11.55        12.77
     Dep. Storage     (mm)=      1.00         1.50
     Average Slope     (%)=      1.00         2.00
     Length            (m)=    402.66        40.00
     Mannings n             =    0.013        0.250

     Max.Eff.Inten.(mm/hr)=    107.44        87.93
               over (min)      12.00        24.00
     Storage Coeff. (min)=      5.73 (ii)   13.16 (ii)
     Unit Hyd. Tpeak (min)=    12.00        24.00
     Unit Hyd. peak  (cms)=     0.12         0.07
                                                  *TOTALS*
     PEAK FLOW        (cms)=    1.98         1.85          3.375 (iii)
     TIME TO PEAK     (hrs)=   12.00        12.20         12.00
     RUNOFF VOLUME     (mm)=   94.96        50.09         63.24
     TOTAL RAINFALL    (mm)=   95.96        95.96         95.96
     RUNOFF COEFFICIENT   =     0.99         0.52          0.66

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EOUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| ADD HYD  (  0224)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0230):    24.32   3.375    12.00    63.24
     + ID2= 2 (  0244):    24.17   0.603    13.40    58.84
       ================================================
       ID = 3 (  0224):    48.49   3.752    12.00    61.05

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0247)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW     STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)      (ha.m.)   |   (cms)     (ha.m.)
                          0.0000      0.0000   |   0.6390      0.9848
                          0.0270      0.1457   |   0.9700      1.2900
                          0.0430      0.3152   |   1.1040      1.7480
                          0.0530      0.4653   |   3.3100      1.9350
                          0.3280      0.6677   |  11.3140      2.2662

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0224)     48.490     3.752     12.00      61.05
   OUTFLOW: ID= 1 (  0247)     48.490     0.805     14.20      61.02

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 21.45
                  TIME SHIFT OF PEAK FLOW          (min)=132.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  1.1382

--------------------------------------------------------------------------------
================================================================================================================
=====
```

```
       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 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)\Visual OTTHYMO 5.0\VO2\voin.dat
  Output  filename: C:\Users\JJohnston\AppData\Local\Civica\VH5\a379672b-db33-4372-b5e0-
ba58a07d1417\f5baa478-61fd-4c7a-ab29-171597ea6b3c\sc
  Summary filename: C:\Users\JJohnston\AppData\Local\Civica\VH5\a379672b-db33-4372-b5e0-
ba58a07d1417\f5baa478-61fd-4c7a-ab29-171597ea6b3c\sc


DATE: 03/21/2018                          TIME: 02:26:51

USER:


COMMENTS:

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


--------------------
|    READ STORM    |    Filename: C:\Users\JJohnston\AppD
|                  |              ata\Local\Temp\
|                  |              f0859609-8b31-45c8-a796-8ebb215965e5\35bb3c6a
| Ptotal=108.06 mm |    Comments: FIFTY YR SCS STORM 12 MIN TIME STEP 24 H
--------------------
```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.20	1.10	6.20	2.20	12.20	22.04	18.20	2.20
0.40	1.10	6.40	2.20	12.40	13.78	18.40	2.20
0.60	1.10	6.60	2.20	12.60	9.92	18.60	2.20
0.80	1.10	6.80	2.20	12.80	9.37	18.80	2.20
1.00	1.10	7.00	2.20	13.00	6.61	19.00	2.20
1.20	1.10	7.20	2.20	13.20	5.51	19.20	1.65
1.40	1.10	7.40	2.20	13.40	5.51	19.40	1.65
1.60	1.10	7.60	2.20	13.60	5.51	19.60	1.65
1.80	1.10	7.80	2.20	13.80	5.51	19.80	1.65
2.00	1.10	8.00	2.20	14.00	5.51	20.00	1.65
2.20	1.10	8.20	3.31	14.20	3.31	20.20	1.65
2.40	1.10	8.40	3.31	14.40	3.31	20.40	1.65
2.60	1.10	8.60	3.31	14.60	3.31	20.60	1.65
2.80	1.10	8.80	3.31	14.80	3.31	20.80	1.65
3.00	1.10	9.00	3.31	15.00	3.31	21.00	1.65
3.20	1.10	9.20	3.31	15.20	3.31	21.20	1.10
3.40	1.10	9.40	3.31	15.40	3.31	21.40	1.10
3.60	1.10	9.60	3.31	15.60	3.31	21.60	1.10
3.80	1.10	9.80	3.31	15.80	3.31	21.80	1.10
4.00	1.10	10.00	3.31	16.00	3.31	22.00	1.10
4.20	2.20	10.20	6.05	16.20	2.20	22.20	1.10
4.40	2.20	10.40	6.05	16.40	2.20	22.40	1.10
4.60	2.20	10.60	6.05	16.60	2.20	22.60	1.10
4.80	2.20	10.80	6.05	16.80	2.20	22.80	1.10
5.00	2.20	11.00	6.05	17.00	2.20	23.00	1.10
5.20	2.20	11.20	8.26	17.20	2.20	23.20	1.10
5.40	2.20	11.40	12.12	17.40	2.20	23.40	1.10
5.60	2.20	11.60	27.55	17.60	2.20	23.60	1.10
5.80	2.20	11.80	60.61	17.80	2.20	23.80	1.10
6.00	2.20	12.00	114.06	18.00	2.20	24.00	1.10

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

--------------------
| CALIB            |
| NASHYD  (  0250)|   Area    (ha)=   1.25   Curve Number   (CN)= 72.0
|ID= 1 DT=12.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
```

```
--------------------   U.H. Tp(hrs)=   0.15

     Unit Hyd Qpeak  (cms)=   0.318

     PEAK FLOW       (cms)=   0.170 (i)
     TIME TO PEAK    (hrs)=  12.000
     RUNOFF VOLUME    (mm)=  46.021
     TOTAL RAINFALL   (mm)= 108.064
     RUNOFF COEFFICIENT   =   0.426

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

------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0209)|   Area    (ha)=   5.20
|ID= 1 DT=12.0 min |   Total Imp(%)=  31.60   Dir. Conn.(%)=  19.40
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      1.64          3.56
     Dep. Storage     (mm)=      1.00          1.50
     Average Slope     (%)=      1.00          2.00
     Length            (m)=    186.19         40.00
     Mannings n            =     0.013         0.250

     Max.Eff.Inten.(mm/hr)=    114.06         81.35
               over (min)        12.00         12.00
     Storage Coeff.  (min)=      3.52 (ii)    11.18 (ii)
     Unit Hyd. Tpeak (min)=     12.00         12.00
     Unit Hyd. peak  (cms)=      0.14          0.09
                                                    *TOTALS*
     PEAK FLOW       (cms)=      0.31          0.62          0.935 (iii)
     TIME TO PEAK    (hrs)=     12.00         12.00          12.00
     RUNOFF VOLUME    (mm)=    107.06         56.00          65.91
     TOTAL RAINFALL   (mm)=    108.06        108.06         108.06
     RUNOFF COEFFICIENT   =      0.99          0.52           0.61

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
             YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------
--------------------
| ADD HYD  (  0251)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0209):     5.20   0.935    12.00    65.91
     + ID2= 2 (  0250):     1.25   0.170    12.00    46.02
       ========================================================
       ID = 3 (  0251):     6.45   1.106    12.00    62.05

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0245)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.3090     0.2876
                          0.0000     0.0000   |   0.3330     0.3838
                          0.1230     0.1102   |   0.3620     0.5200
                          0.2870     0.1971   |   0.0000     0.0000

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0251)     6.450     1.106     12.00      62.05
   OUTFLOW: ID= 1 (  0245)     6.450     0.226     12.40      62.02

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 20.47
                  TIME SHIFT OF PEAK FLOW         (min)= 24.00
                  MAXIMUM  STORAGE   USED        (ha.m.)=  0.1661

------------------------------------------------------------------------------
--------------------
| ROUTEPIPE(  0212)|     PIPE Number      =   1.00
| IN= 2---> OUT= 1 |     Diameter    (mm)=1650.00
| DT= 12.0 min     |     Length       (m)= 850.00
--------------------     Slope      (m/m)=  0.005
                         Manning n        =  0.013

      <----------------- TRAVEL TIME TABLE ------------------->
        DEPTH      VOLUME     FLOW RATE     VELOCITY     TRAV.TIME
         (m)      (cu.m.)       (cms)        (m/s)         min
        0.09     .367E+02        0.0         0.80         17.68
        0.17     .102E+03        0.1         1.25         11.33
        0.26     .184E+03        0.3         1.61          8.81
        0.35     .278E+03        0.6         1.91          7.41
        0.43     .382E+03        1.0         2.18          6.51
        0.52     .492E+03        1.4         2.41          5.88
        0.61     .608E+03        1.9         2.61          5.43
        0.69     .727E+03        2.4         2.79          5.08
        0.78     .848E+03        2.9         2.95          4.81
        0.87     .970E+03        3.5         3.08          4.60
        0.96     .109E+04        4.1         3.20          4.43
        1.04     .121E+04        4.7         3.29          4.31
        1.13     .133E+04        5.2         3.36          4.22
        1.22     .144E+04        5.8         3.41          4.15
        1.30     .154E+04        6.2         3.44          4.12
        1.39     .163E+04        6.6         3.43          4.13
        1.48     .172E+04        6.9         3.40          4.17
        1.56     .178E+04        6.9         3.31          4.28
        1.65     .182E+04        6.5         3.02          4.70
                                      <---- hydrograph ---->   <-pipe / channel->
                                AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                                (ha)    (cms)   (hrs)   (mm)       (m)      (m/s)
   INFLOW : ID= 2 (  0245)     6.45     0.23   12.40   62.02      0.21       1.37
   OUTFLOW: ID= 1 (  0212)     6.45     0.23   12.60   62.02      0.21       1.37

------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0160)|   Area    (ha)=   1.50
|ID= 1 DT=12.0 min |   Total Imp(%)=  50.70   Dir. Conn.(%)=  22.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      0.76          0.74
     Dep. Storage     (mm)=      1.00          1.50
     Average Slope     (%)=      1.00          2.00
     Length            (m)=    100.00         40.00
     Mannings n            =     0.013         0.250

     Max.Eff.Inten.(mm/hr)=    114.06        124.62
               over (min)        12.00         12.00
     Storage Coeff.  (min)=      2.42 (ii)     8.89 (ii)
     Unit Hyd. Tpeak (min)=     12.00         12.00
     Unit Hyd. peak  (cms)=      0.14          0.10
                                                    *TOTALS*
     PEAK FLOW       (cms)=      0.10          0.21          0.319 (iii)
     TIME TO PEAK    (hrs)=     12.00         12.00          12.00
     RUNOFF VOLUME    (mm)=    107.06         64.01          73.48
     TOTAL RAINFALL   (mm)=    108.06        108.06         108.06
     RUNOFF COEFFICIENT   =      0.99          0.59           0.68

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------
--------------------
| DUHYD    (  0183)|
| Inlet Cap.= 0.152|
| #of Inlets=    1|
| Total(cms)=  0.2|      AREA     QPEAK     TPEAK     R.V.
--------------------      (ha)     (cms)     (hrs)     (mm)
     TOTAL HYD.(ID= 1):   1.50      0.32     12.00    73.48
     ==========================================================
     MAJOR SYS.(ID= 2):   0.16      0.17     12.00    73.48
     MINOR SYS.(ID= 3):   1.34      0.15     12.00    73.48

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0193)|   Area    (ha)=   1.21
|ID= 1 DT=12.0 min |   Total Imp(%)=  49.30   Dir. Conn.(%)=  20.10
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      0.60          0.61
```

```
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope    (%)=       1.00         2.00
     Length           (m)=      89.81        40.00
     Mannings n          =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     114.06       123.93
               over (min)       12.00        12.00
     Storage Coeff.  (min)=       2.27 (ii)    8.75 (ii)
     Unit Hyd. Tpeak (min)=      12.00        12.00
     Unit Hyd. peak  (cms)=       0.14         0.11
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.08         0.18       0.255 (iii)
     TIME TO PEAK    (hrs)=      12.00        12.00        12.00
     RUNOFF VOLUME    (mm)=     107.06        63.91        72.58
     TOTAL RAINFALL   (mm)=     108.06       108.06       108.06
     RUNOFF COEFFICIENT   =       0.99         0.59         0.67

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| DUHYD    (  0227)|
| Inlet Cap.= 0.120|
| #of Inlets=     1|
| Total(cms)=   0.1|      AREA     OPEAK     TPEAK     R.V.
--------------------      (ha)     (cms)     (hrs)     (mm)
     TOTAL HYD.(ID= 1):   1.21      0.25     12.00    72.58
     ==========================================================
     MAJOR SYS.(ID= 2):   0.13      0.13     12.00    72.58
     MINOR SYS.(ID= 3):   1.08      0.12     11.80    72.58

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0206)|   Area    (ha)=  39.16
|ID= 1 DT=12.0 min |   Total Imp(%)=  54.20   Dir. Conn.(%)=  23.20
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      21.22        17.94
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope    (%)=       1.00         2.00
     Length           (m)=     510.95        40.00
     Mannings n          =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     114.06       135.14
               over (min)       12.00        24.00
     Storage Coeff.  (min)=       6.45 (ii)   12.71 (ii)
     Unit Hyd. Tpeak (min)=      12.00        24.00
     Unit Hyd. peak  (cms)=       0.12         0.07
                                                      *TOTALS*
     PEAK FLOW       (cms)=       2.65         4.15       5.933 (iii)
     TIME TO PEAK    (hrs)=      12.00        12.20        12.00
     RUNOFF VOLUME    (mm)=     107.06        65.55        75.18
     TOTAL RAINFALL   (mm)=     108.06       108.06       108.06
     RUNOFF COEFFICIENT   =       0.99         0.61         0.70

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| ADD HYD  (  0225)|
|   1 +  2 =  3    |          AREA    OPEAK    TPEAK     R.V.
--------------------          (ha)     (cms)    (hrs)     (mm)
       ID1= 1 (  0183):      0.16    0.167    12.00    73.48
     + ID2= 2 (  0206):     39.16    5.933    12.00    75.18
       ==========================================================
       ID = 3 (  0225):     39.32    6.100    12.00    75.17

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| ADD HYD  (  0225)|
|   3 +  2 =  1    |          AREA    OPEAK    TPEAK     R.V.
--------------------          (ha)     (cms)    (hrs)     (mm)
       ID1= 3 (  0225):     39.32    6.100    12.00    75.17
     + ID2= 2 (  0227):      0.13    0.135    12.00    72.58
       ==========================================================
       ID = 1 (  0225):     39.46    6.235    12.00    75.16

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| ADD HYD  (  0211)|
|   1 +  2 =  3    |          AREA    OPEAK    TPEAK     R.V.
--------------------          (ha)     (cms)    (hrs)     (mm)
       ID1= 1 (  0212):      6.45    0.226    12.60    62.02
     + ID2= 2 (  0225):     39.46    6.235    12.00    75.16
       ==========================================================
       ID = 3 (  0211):     45.91    6.309    12.00    73.32

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0241)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000      0.0000   |   1.6250      1.2448
                          0.0190      0.1627   |   1.6630      1.2997
                          0.0360      0.4306   |   1.8430      1.5816
                          0.0480      0.7217   |   2.1300      2.1197
                          0.1330      0.7718   |   2.9680      2.2465
                          1.0390      0.9773   |   7.5380      2.5741

                               AREA      OPEAK      TPEAK       R.V.
                               (ha)      (cms)      (hrs)       (mm)
   INFLOW : ID= 2 (  0211)     45.907      6.309      12.00      73.32
   OUTFLOW: ID= 1 (  0241)     45.907      1.784      12.60      73.27

                PEAK   FLOW   REDUCTION [Qout/Qin](%)= 28.28
                TIME SHIFT OF PEAK FLOW          (min)= 36.00
                MAXIMUM  STORAGE   USED        (ha.m.)=  1.4937

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0228)|   Area    (ha)=  13.94
|ID= 1 DT=12.0 min |   Total Imp(%)=  47.50   Dir. Conn.(%)=  22.30
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       6.62         7.32
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope    (%)=       1.00         2.00
     Length           (m)=     304.85        40.00
     Mannings n          =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     114.06       113.41
               over (min)       12.00        12.00
     Storage Coeff.  (min)=       4.73 (ii)   11.44 (ii)
     Unit Hyd. Tpeak (min)=      12.00        12.00
     Unit Hyd. peak  (cms)=       0.13         0.09
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.95         1.77       2.719 (iii)
     TIME TO PEAK    (hrs)=      12.00        12.00        12.00
     RUNOFF VOLUME    (mm)=     107.06        62.23        72.23
     TOTAL RAINFALL   (mm)=     108.06       108.06       108.06
     RUNOFF COEFFICIENT   =       0.99         0.58         0.67

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0243)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
```

	0.0000	0.0000	0.8570	0.5282
	0.1680	0.0173	0.9360	0.6538
	0.4120	0.1031	1.0080	0.7859
	0.5570	0.1976	1.0760	0.9234
	0.6720	0.3000	1.1270	1.0373
	0.7700	0.4102	1.1760	1.1552

	AREA (ha)	OPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0228)	13.940	2.719	12.00	72.23
OUTFLOW: ID= 1 (0243)	13.940	0.677	12.40	72.23

PEAK FLOW REDUCTION [Qout/Qin](%)= 24.91
TIME SHIFT OF PEAK FLOW (min)= 24.00
MAXIMUM STORAGE USED (ha.m.)= 0.3069

ROUTEPIPE(0184)
IN= 2---> OUT= 1
DT= 12.0 min

PIPE Number = 1.00
Diameter (mm)=1650.00
Length (m)= 500.00
Slope (m/m)= 0.005
Manning n = 0.013

TRAVEL TIME TABLE

DEPTH (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME min
0.09	.216E+02	0.0	0.80	10.40
0.17	.600E+02	0.1	1.25	6.67
0.26	.108E+03	0.3	1.61	5.18
0.35	.164E+03	0.6	1.91	4.36
0.43	.225E+03	1.0	2.18	3.83
0.52	.290E+03	1.4	2.41	3.46
0.61	.358E+03	1.9	2.61	3.19
0.69	.428E+03	2.4	2.79	2.99
0.78	.499E+03	2.9	2.95	2.83
0.87	.570E+03	3.5	3.08	2.70
0.96	.642E+03	4.1	3.20	2.61
1.04	.712E+03	4.7	3.29	2.53
1.13	.780E+03	5.2	3.36	2.48
1.22	.844E+03	5.8	3.41	2.44
1.30	.905E+03	6.2	3.44	2.43
1.39	.961E+03	6.6	3.43	2.43
1.48	.101E+04	6.9	3.40	2.45
1.56	.105E+04	6.9	3.31	2.52
1.65	.107E+04	6.5	3.02	2.76

	AREA (ha)	<---- hydrograph ----> OPEAK (cms)	TPEAK (hrs)	R.V. (mm)	<-pipe / channel-> MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 2 (0243)	13.94	0.68	12.40	72.23	0.36	1.95
OUTFLOW: ID= 1 (0184)	13.94	0.68	12.40	72.22	0.36	1.95

CALIB
STANDHYD (0229)
ID= 1 DT=12.0 min

Area (ha)= 10.23
Total Imp(%)= 30.10 Dir. Conn.(%)= 15.10

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	3.08	7.15
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	261.15	40.00
Mannings n	=	0.013	0.250
Max.Eff.Inten.(mm/hr)=		114.06	85.10
over (min)		12.00	12.00
Storage Coeff. (min)=		4.31 (ii)	11.84 (ii)
Unit Hyd. Tpeak (min)=		12.00	12.00
Unit Hyd. peak (cms)=		0.13	0.09

		TOTALS
PEAK FLOW	(cms)=	0.47	1.28	1.753 (iii)
TIME TO PEAK	(hrs)=	12.00	12.00	12.00
RUNOFF VOLUME	(mm)=	107.06	56.84	64.42
TOTAL RAINFALL	(mm)=	108.06	108.06	108.06
RUNOFF COEFFICIENT	=	0.99	0.53	0.60

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
YOU SHOULD CONSIDER SPLITTING THE AREA.

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0196)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0184):	13.94	0.684	12.40	72.22
+ ID2= 2 (0229):	10.23	1.753	12.00	64.42
ID = 3 (0196):	24.17	2.231	12.00	68.92

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0244)
IN= 2---> OUT= 1
DT= 12.0 min

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.6510	0.4564
0.1220	0.0863	0.8770	0.7894
0.3620	0.1603	0.0000	0.0000

	AREA (ha)	OPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0196)	24.170	2.231	12.00	68.92
OUTFLOW: ID= 1 (0244)	24.170	0.662	13.60	68.92

PEAK FLOW REDUCTION [Qout/Qin](%)= 29.66
TIME SHIFT OF PEAK FLOW (min)= 96.00
MAXIMUM STORAGE USED (ha.m.)= 0.4727

CALIB
STANDHYD (0230)
ID= 1 DT=12.0 min

Area (ha)= 24.32
Total Imp(%)= 47.50 Dir. Conn.(%)= 29.30

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	11.55	12.77
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	402.66	40.00
Mannings n	=	0.013	0.250
Max.Eff.Inten.(mm/hr)=		114.06	99.02
over (min)		12.00	24.00
Storage Coeff. (min)=		5.59 (ii)	12.68 (ii)
Unit Hyd. Tpeak (min)=		12.00	24.00
Unit Hyd. peak (cms)=		0.13	0.07

		TOTALS
PEAK FLOW	(cms)=	2.12	2.16	3.817 (iii)
TIME TO PEAK	(hrs)=	12.00	12.20	12.00
RUNOFF VOLUME	(mm)=	107.06	59.67	73.56
TOTAL RAINFALL	(mm)=	108.06	108.06	108.06
RUNOFF COEFFICIENT	=	0.99	0.55	0.68

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0224)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0230):	24.32	3.817	12.00	73.56
+ ID2= 2 (0244):	24.17	0.662	13.60	68.92
ID = 3 (0224):	48.49	4.258	12.00	71.24

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0247)
IN= 2---> OUT= 1
DT= 12.0 min

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)

```
                    0.0000    0.0000   |   0.6390     0.9848
                    0.0270    0.1457   |   0.9700     1.2900
                    0.0430    0.3152   |   1.1040     1.7480
                    0.0530    0.4653   |   3.3100     1.9350
                    0.3280    0.6677   |  11.3140     2.2662

                              AREA      QPEAK     TPEAK      R.V.
                             (ha)      (cms)     (hrs)      (mm)
  INFLOW : ID= 2 (  0224)     48.490     4.258     12.00     71.24
  OUTFLOW: ID= 1 (  0247)     48.490     0.959     14.00     71.22

            PEAK   FLOW   REDUCTION [Qout/Qin](%)= 22.52
            TIME SHIFT OF PEAK FLOW          (min)=120.00
            MAXIMUM  STORAGE   USED        (ha.m.)=  1.2801

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

 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)\Visual OTTHYMO 5.0\VO2\voin.dat
  Output  filename: C:\Users\JJohnston\AppData\Local\Civica\VH5\a379672b-db33-4372-b5e0-
ba58a07d1417\4b686129-8b18-4264-ad25-71fa1929c181\sc
  Summary filename: C:\Users\JJohnston\AppData\Local\Civica\VH5\a379672b-db33-4372-b5e0-
ba58a07d1417\4b686129-8b18-4264-ad25-71fa1929c181\sc


DATE: 03/21/2018                          TIME: 02:26:51

USER:


COMMENTS:

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


--------------------
|    READ STORM    |    Filename: C:\Users\JJohnston\AppD
|                  |              ata\Local\Temp\
|                  |              f0859609-8b31-45c8-a796-8ebb215965e5\f5882d70
| Ptotal=112.42 mm |    Comments: SCS TYPE II TWENTY FOUR HOUR. HUNDRED YE
--------------------
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.20    1.27 |  6.20    2.29 | 12.20   21.84 | 18.20    2.29
                0.40    1.27 |  6.40    2.29 | 12.40   13.72 | 18.40    2.29
                0.60    1.27 |  6.60    2.29 | 12.60    9.91 | 18.60    2.29
                0.80    1.27 |  6.80    2.29 | 12.80    9.40 | 18.80    2.29
                1.00    1.27 |  7.00    2.29 | 13.00    6.60 | 19.00    2.29
                1.20    1.27 |  7.20    2.29 | 13.20    5.59 | 19.20    1.78
                1.40    1.27 |  7.40    2.29 | 13.40    5.59 | 19.40    1.78
                1.60    1.27 |  7.60    2.29 | 13.60    5.59 | 19.60    1.78
                1.80    1.27 |  7.80    2.29 | 13.80    5.59 | 19.80    1.78
                2.00    1.27 |  8.00    2.29 | 14.00    5.59 | 20.00    1.78
                2.20    1.27 |  8.20    3.30 | 14.20    3.30 | 20.20    1.78
                2.40    1.27 |  8.40    3.30 | 14.40    3.30 | 20.40    1.78
                2.60    1.27 |  8.60    3.30 | 14.60    3.30 | 20.60    1.78
                2.80    1.27 |  8.80    3.30 | 14.80    3.30 | 20.80    1.78
                3.00    1.27 |  9.00    3.30 | 15.00    3.30 | 21.00    1.78
                3.20    1.27 |  9.20    3.30 | 15.20    3.30 | 21.20    1.27
                3.40    1.27 |  9.40    3.30 | 15.40    3.30 | 21.40    1.27
                3.60    1.27 |  9.60    3.30 | 15.60    3.30 | 21.60    1.27
                3.80    1.27 |  9.80    3.30 | 15.80    3.30 | 21.80    1.27
                4.00    1.27 | 10.00    3.30 | 16.00    3.30 | 22.00    1.27
                4.20    2.29 | 10.20    6.10 | 16.20    2.29 | 22.20    1.27
                4.40    2.29 | 10.40    6.10 | 16.40    2.29 | 22.40    1.27
                4.60    2.29 | 10.60    6.10 | 16.60    2.29 | 22.60    1.27
                4.80    2.29 | 10.80    6.10 | 16.80    2.29 | 22.80    1.27
                5.00    2.29 | 11.00    6.10 | 17.00    2.29 | 23.00    1.27
                5.20    2.29 | 11.20    8.13 | 17.20    2.29 | 23.20    1.27
                5.40    2.29 | 11.40   11.94 | 17.40    2.29 | 23.40    1.27
                5.60    2.29 | 11.60   27.43 | 17.60    2.29 | 23.60    1.27
                5.80    2.29 | 11.80   59.94 | 17.80    2.29 | 23.80    1.27
                6.00    2.29 | 12.00  126.49 | 18.00    2.29 | 24.00    1.27

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

--------------------
| CALIB            |
| NASHYD  (  0250)|   Area    (ha)=   1.25   Curve Number   (CN)= 72.0
|ID= 1 DT=12.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.15

     Unit Hyd Qpeak  (cms)=    0.318

     PEAK FLOW       (cms)=    0.190 (i)
     TIME TO PEAK    (hrs)=   12.000
     RUNOFF VOLUME    (mm)=   48.938
     TOTAL RAINFALL   (mm)= 112.420
     RUNOFF COEFFICIENT   =    0.435

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0209)|   Area    (ha)=   5.20
|ID= 1 DT=12.0 min |   Total Imp(%)=  31.60   Dir. Conn.(%)=  19.40
--------------------

                                IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        1.64          3.56
     Dep. Storage     (mm)=        1.00          1.50
     Average Slope     (%)=        1.00          2.00
     Length            (m)=      186.19         40.00
     Mannings n             =      0.013         0.250

     Max.Eff.Inten.(mm/hr)=      126.49         91.70
               over (min)        12.00         12.00
     Storage Coeff.  (min)=        3.38 (ii)    10.68 (ii)
     Unit Hyd. Tpeak (min)=       12.00         12.00
     Unit Hyd. peak  (cms)=        0.14          0.10
                                                      *TOTALS*
     PEAK FLOW       (cms)=        0.35          0.70          1.050 (iii)
     TIME TO PEAK    (hrs)=       12.00         12.00         12.00
     RUNOFF VOLUME    (mm)=      111.42         59.40         69.49
     TOTAL RAINFALL   (mm)=      112.42        112.42        112.42
     RUNOFF COEFFICIENT   =        0.99          0.53          0.62

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
             YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

--------------------
| ADD HYD  (  0251)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK      R.V.
--------------------          (ha)    (cms)    (hrs)      (mm)
       ID1= 1 (  0209):      5.20    1.050    12.00     69.49
     + ID2= 2 (  0250):      1.25    0.190    12.00     48.94
       ==========================================================
       ID = 3 (  0251):      6.45    1.240    12.00     65.51

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

```
| RESERVOIR(  0245)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.3090     0.2876
                          0.0000     0.0000   |   0.3330     0.3838
                          0.1230     0.1102   |   0.3620     0.5200
                          0.2870     0.1971   |   0.0000     0.0000

                                AREA     OPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0251)      6.450     1.240     12.00      65.51
   OUTFLOW: ID= 1 (  0245)      6.450     0.245     12.40      65.47

                  PEAK   FLOW  REDUCTION (Qout/Qin)(%)= 19.79
                  TIME SHIFT OF PEAK FLOW       (min)= 24.00
                  MAXIMUM  STORAGE   USED      (ha.m.)=  0.1757

--------------------------------------------------------------------------------
--------------------
| ROUTEPIPE(  0212)|     PIPE Number     =   1.00
| IN= 2---> OUT= 1 |     Diameter    (mm)=1650.00
| DT= 12.0 min     |     Length       (m)= 850.00
--------------------     Slope      (m/m)=  0.005
                         Manning n        =  0.013

     <------------------ TRAVEL TIME TABLE ------------------->
       DEPTH      VOLUME     FLOW RATE    VELOCITY    TRAV.TIME
        (m)      (cu.m.)      (cms)        (m/s)        min
       0.09     .367E+02       0.0          0.80        17.68
       0.17     .102E+03       0.1          1.25        11.33
       0.26     .184E+03       0.3          1.61         8.81
       0.35     .278E+03       0.6          1.91         7.41
       0.43     .382E+03       1.0          2.18         6.51
       0.52     .492E+03       1.4          2.41         5.88
       0.61     .608E+03       1.9          2.61         5.43
       0.69     .727E+03       2.4          2.79         5.08
       0.78     .848E+03       2.9          2.95         4.81
       0.87     .970E+03       3.5          3.08         4.60
       0.96     .109E+04       4.1          3.20         4.43
       1.04     .121E+04       4.7          3.29         4.31
       1.13     .133E+04       5.2          3.36         4.22
       1.22     .144E+04       5.8          3.41         4.15
       1.30     .154E+04       6.2          3.44         4.12
       1.39     .163E+04       6.6          3.43         4.13
       1.48     .172E+04       6.9          3.40         4.17
       1.56     .178E+04       6.9          3.31         4.28
       1.65     .182E+04       6.5          3.02         4.70
                                <---- hydrograph ---->   <-pipe / channel->
                              AREA    OPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                              (ha)    (cms)   (hrs)   (mm)       (m)      (m/s)
   INFLOW : ID= 2 (  0245)    6.45     0.25   12.40  65.47      0.22       1.40
   OUTFLOW: ID= 1 (  0212)    6.45     0.24   12.60  65.47      0.21       1.40


--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0160)|   Area    (ha)=   1.50
|ID= 1 DT=12.0 min |   Total Imp(%)=  50.70   Dir. Conn.(%)=  22.00
--------------------

                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        0.76          0.74
     Dep. Storage     (mm)=        1.00          1.50
     Average Slope     (%)=        1.00          2.00
     Length            (m)=      100.00         40.00
     Mannings n             =     0.013         0.250

     Max.Eff.Inten.(mm/hr)=      126.49        140.04
               over (min)        12.00         12.00
     Storage Coeff.  (min)=       2.33 (ii)     8.49 (ii)
     Unit Hyd. Tpeak (min)=      12.00         12.00
     Unit Hyd. peak  (cms)=       0.14          0.11
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.12          0.24      0.357 (iii)
     TIME TO PEAK    (hrs)=      12.00         12.00        12.00
     RUNOFF VOLUME    (mm)=     111.42         67.68        77.30
     TOTAL RAINFALL   (mm)=     112.42        112.42       112.42
     RUNOFF COEFFICIENT   =       0.99          0.60         0.69

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| DUHYD    (  0183)|
| Inlet Cap.= 0.152|
| #of Inlets=     1|
| Total(cms)=   0.2|      AREA     QPEAK     TPEAK     R.V.
--------------------      (ha)     (cms)     (hrs)     (mm)
     TOTAL HYD.(ID= 1):   1.50      0.36     12.00    77.30
     ================================================
     MAJOR SYS.(ID= 2):   0.19      0.20     12.00    77.30
     MINOR SYS.(ID= 3):   1.31      0.15     11.80    77.30

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0193)|   Area    (ha)=   1.21
|ID= 1 DT=12.0 min |   Total Imp(%)=  49.30   Dir. Conn.(%)=  20.10
--------------------

                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        0.60          0.61
     Dep. Storage     (mm)=        1.00          1.50
     Average Slope     (%)=        1.00          2.00
     Length            (m)=       89.81         40.00
     Mannings n             =     0.013         0.250

     Max.Eff.Inten.(mm/hr)=      126.49        139.28
               over (min)        12.00         12.00
     Storage Coeff.  (min)=       2.18 (ii)     8.36 (ii)
     Unit Hyd. Tpeak (min)=      12.00         12.00
     Unit Hyd. peak  (cms)=       0.14          0.11
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.09          0.20      0.285 (iii)
     TIME TO PEAK    (hrs)=      12.00         12.00        12.00
     RUNOFF VOLUME    (mm)=     111.42         67.57        76.38
     TOTAL RAINFALL   (mm)=     112.42        112.42       112.42
     RUNOFF COEFFICIENT   =       0.99          0.60         0.68

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| DUHYD    (  0227)|
| Inlet Cap.= 0.120|
| #of Inlets=     1|
| Total(cms)=   0.1|      AREA     QPEAK     TPEAK     R.V.
--------------------      (ha)     (cms)     (hrs)     (mm)
     TOTAL HYD.(ID= 1):   1.21      0.29     12.00    76.38
     ================================================
     MAJOR SYS.(ID= 2):   0.16      0.17     12.00    76.38
     MINOR SYS.(ID= 3):   1.05      0.12     11.80    76.38

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0206)|   Area    (ha)=  39.16
|ID= 1 DT=12.0 min |   Total Imp(%)=  54.20   Dir. Conn.(%)=  23.20
--------------------

                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       21.22         17.94
     Dep. Storage     (mm)=        1.00          1.50
     Average Slope     (%)=        1.00          2.00
     Length            (m)=      510.95         40.00
     Mannings n             =     0.013         0.250

     Max.Eff.Inten.(mm/hr)=      126.49        151.77
               over (min)        12.00         24.00
     Storage Coeff.  (min)=       6.19 (ii)    12.16 (ii)
     Unit Hyd. Tpeak (min)=      12.00         24.00
     Unit Hyd. peak  (cms)=       0.12          0.07
                                                      *TOTALS*
     PEAK FLOW       (cms)=       2.93          4.59      6.471 (iii)
     TIME TO PEAK    (hrs)=      12.00         12.00        12.00
     RUNOFF VOLUME    (mm)=     111.42         69.26        79.04
     TOTAL RAINFALL   (mm)=     112.42        112.42       112.42
```

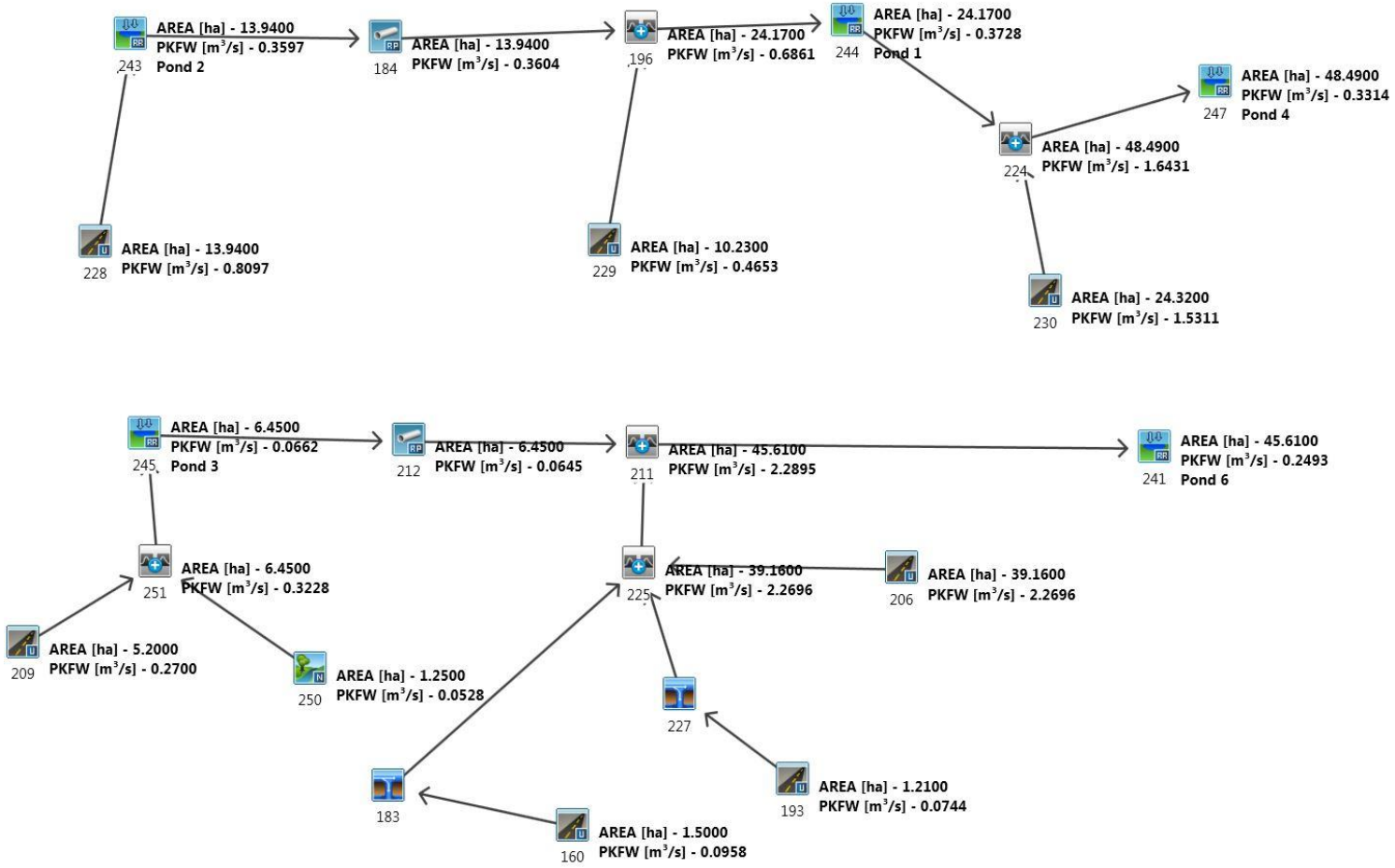
```
     RUNOFF COEFFICIENT   =       0.99          0.62          0.70

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

--------------------
| ADD HYD  (  0225)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0183):      0.19   0.205    12.00    77.30
     + ID2= 2 (  0206):     39.16   6.471    12.00    79.04
       ==========================================================
       ID = 3 (  0225):     39.35   6.676    12.00    79.03

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD  (  0225)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0225):     39.35   6.676    12.00    79.03
     + ID2= 2 (  0227):      0.16   0.165    12.00    76.38
       ==========================================================
       ID = 1 (  0225):     39.51   6.841    12.00    79.02

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD  (  0211)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0212):      6.45   0.245    12.60    65.47
     + ID2= 2 (  0225):     39.51   6.841    12.00    79.02
       ==========================================================
       ID = 3 (  0211):     45.96   6.920    12.00    77.12

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| RESERVOIR(  0241)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000      0.0000   |   1.6250      1.2448
                          0.0190      0.1627   |   1.6630      1.2997
                          0.0360      0.4306   |   1.8430      1.5816
                          0.0480      0.7217   |   2.1300      2.1197
                          0.1330      0.7718   |   2.9680      2.2465
                          1.0390      0.9773   |   7.5380      2.5741

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0211)     45.958     6.920     12.00      77.12
   OUTFLOW: ID= 1 (  0241)     45.958     1.844     12.60      77.07

                  PEAK   FLOW   REDUCTION (Out/Oin)(%)= 26.65
                  TIME SHIFT OF PEAK FLOW         (min)= 36.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  1.5876

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

--------------------
| CALIB            |
| STANDHYD (  0228)|   Area    (ha)=  13.94
|ID= 1 DT=12.0 min |   Total Imp(%)=  47.50   Dir. Conn.(%)=  22.30
--------------------

                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      6.62          7.32
     Dep. Storage     (mm)=      1.00          1.50
     Average Slope     (%)=      1.00          2.00
     Length            (m)=    304.85         40.00
     Mannings n            =     0.013         0.250

     Max.Eff.Inten.(mm/hr)=    126.49        127.53
               over (min)      12.00         12.00
     Storage Coeff.  (min)=      4.54 (ii)    10.94 (ii)
     Unit Hyd. Tpeak (min)=     12.00         12.00
     Unit Hyd. peak  (cms)=      0.13          0.09

                                                *TOTALS*
     PEAK FLOW       (cms)=      1.05          1.99          3.044 (iii)
     TIME TO PEAK    (hrs)=     12.00         12.00         12.00
     RUNOFF VOLUME    (mm)=    111.42         65.84         76.00
     TOTAL RAINFALL   (mm)=    112.42        112.42        112.42
     RUNOFF COEFFICIENT   =      0.99          0.59          0.68

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

--------------------
| RESERVOIR(  0243)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000      0.0000   |   0.8570      0.5282
                          0.1680      0.0173   |   0.9360      0.6538
                          0.4120      0.1031   |   1.0080      0.7859
                          0.5570      0.1976   |   1.0760      0.9234
                          0.6720      0.3000   |   1.1270      1.0373
                          0.7700      0.4102   |   1.1760      1.1552

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0228)     13.940     3.044     12.00      76.00
   OUTFLOW: ID= 1 (  0243)     13.940     0.700     12.40      76.00

                  PEAK   FLOW   REDUCTION (Out/Oin)(%)= 22.99
                  TIME SHIFT OF PEAK FLOW         (min)= 24.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.3326

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

--------------------
| ROUTEPIPE(  0184)|     PIPE Number      =   1.00
| IN= 2---> OUT= 1 |     Diameter    (mm)=1650.00
| DT= 12.0 min     |     Length       (m)= 500.00
--------------------     Slope      (m/m)=  0.005
                         Manning n        =  0.013

      <------------------- TRAVEL TIME TABLE ------------------->
        DEPTH      VOLUME     FLOW RATE     VELOCITY     TRAV.TIME
         (m)     (cu.m.)       (cms)         (m/s)          min
        0.09    .216E+02          0.0          0.80        10.40
        0.17    .600E+02          0.1          1.25         6.67
        0.26    .108E+03          0.3          1.61         5.18
        0.35    .164E+03          0.6          1.91         4.36
        0.43    .225E+03          1.0          2.18         3.83
        0.52    .290E+03          1.4          2.41         3.46
        0.61    .358E+03          1.9          2.61         3.19
        0.69    .428E+03          2.4          2.79         2.99
        0.78    .499E+03          2.9          2.95         2.83
        0.87    .570E+03          3.5          3.08         2.70
        0.96    .642E+03          4.1          3.20         2.61
        1.04    .712E+03          4.7          3.29         2.53
        1.13    .780E+03          5.2          3.36         2.48
        1.22    .844E+03          5.8          3.41         2.44
        1.30    .905E+03          6.2          3.44         2.43
        1.39    .961E+03          6.6          3.43         2.43
        1.48    .101E+04          6.9          3.40         2.45
        1.56    .105E+04          6.9          3.31         2.52
        1.65    .107E+04          6.5          3.02         2.76

                                <---- hydrograph ---->   <-pipe / channel->
                                AREA    QPEAK    TPEAK    R.V.   MAX DEPTH  MAX VEL
                                (ha)    (cms)    (hrs)    (mm)       (m)      (m/s)
   INFLOW : ID= 2 (  0243)    13.94     0.70    12.40   76.00      0.37      1.96
   OUTFLOW: ID= 1 (  0184)    13.94     0.71    12.40   76.00      0.37      1.97

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

--------------------
| CALIB            |
| STANDHYD (  0229)|   Area    (ha)=  10.23
|ID= 1 DT=12.0 min |   Total Imp(%)=  30.10   Dir. Conn.(%)=  15.10
--------------------

                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      3.08          7.15
     Dep. Storage     (mm)=      1.00          1.50
```

```
     Average Slope      (%)=       1.00          2.00
     Length             (m)=     261.15         40.00
     Mannings n             =      0.013         0.250

     Max.Eff.Inten.(mm/hr)=     126.49         95.90
                 over (min)       12.00         12.00
     Storage Coeff.  (min)=       4.14 (ii)     11.31 (ii)
     Unit Hyd. Tpeak (min)=      12.00         12.00
     Unit Hyd. peak  (cms)=       0.13          0.09
                                                    *TOTALS*
     PEAK FLOW       (cms)=       0.53          1.44          1.968 (iii)
     TIME TO PEAK    (hrs)=      12.00         12.00         12.00
     RUNOFF VOLUME    (mm)=     111.42         60.26         67.99
     TOTAL RAINFALL   (mm)=     112.42        112.42        112.42
     RUNOFF COEFFICIENT   =       0.99          0.54          0.60

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
             YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

--------------------
| ADD HYD  (  0196)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0184):    13.94   0.708    12.40    76.00
     + ID2= 2 (  0229):    10.23   1.968    12.00    67.99
       ========================================================
       ID = 3 (  0196):    24.17   2.459    12.00    72.61

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| RESERVOIR(  0244)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000      0.0000   |   0.6510      0.4564
                          0.1220      0.0863   |   0.8770      0.7894
                          0.3620      0.1603   |   0.0000      0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0196)     24.170     2.459     12.00      72.61
   OUTFLOW: ID= 1 (  0244)     24.170     0.679     13.60      72.60

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 27.60
                  TIME SHIFT OF PEAK FLOW         (min)= 96.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.4973

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

--------------------
| CALIB            |
| STANDHYD (  0230)|   Area    (ha)=  24.32
|ID= 1 DT=12.0 min |   Total Imp(%)=  47.50   Dir. Conn.(%)=  29.30
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      11.55         12.77
     Dep. Storage     (mm)=       1.00          1.50
     Average Slope     (%)=       1.00          2.00
     Length            (m)=     402.66         40.00
     Mannings n             =      0.013         0.250

     Max.Eff.Inten.(mm/hr)=     126.49        111.46
                 over (min)       12.00         24.00
     Storage Coeff.  (min)=       5.36 (ii)     12.12 (ii)
     Unit Hyd. Tpeak (min)=      12.00         24.00
     Unit Hyd. peak  (cms)=       0.13          0.07
                                                    *TOTALS*
     PEAK FLOW       (cms)=       2.36          2.40          4.183 (iii)
     TIME TO PEAK    (hrs)=      12.00         12.20         12.00
     RUNOFF VOLUME    (mm)=     111.42         63.19         77.32
     TOTAL RAINFALL   (mm)=     112.42        112.42        112.42
     RUNOFF COEFFICIENT   =       0.99          0.56          0.69

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

--------------------
| ADD HYD  (  0224)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0230):    24.32   4.183    12.00    77.32
     + ID2= 2 (  0244):    24.17   0.679    13.60    72.60
       ========================================================
       ID = 3 (  0224):    48.49   4.635    12.00    74.97

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| RESERVOIR(  0247)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000      0.0000   |   0.6390      0.9848
                          0.0270      0.1457   |   0.9700      1.2900
                          0.0430      0.3152   |   1.1040      1.7480
                          0.0530      0.4653   |   3.3100      1.9350
                          0.3280      0.6677   |  11.3140      2.2662

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0224)     48.490     4.635     12.00      74.97
   OUTFLOW: ID= 1 (  0247)     48.490     0.983     14.00      74.94

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 21.20
                  TIME SHIFT OF PEAK FLOW         (min)=120.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  1.3337

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

COLE ENGINEERING
Experience Enhancing Excellence

L09-301 – Marianneville – Glenway Estates (Phase 2)
2, 5, 10, 25, 50 & 100-Year 12 Hour SCS Storm
Existing Condition Model Output
April 2018

VO5 Model Schematic



COLE ENGINEERING

Experience Enhancing Excellence

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

       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 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)\Visual OTTHYMO 5.0\VO2\voin.dat
  Output  filename: C:\Users\JJohnston\AppData\Local\Civica\VH5\a379672b-db33-4372-b5e0-
ba58a07d1417\66eb9f0b-189f-43c9-adb2-a2a4305fbea5\sc
  Summary filename: C:\Users\JJohnston\AppData\Local\Civica\VH5\a379672b-db33-4372-b5e0-
ba58a07d1417\66eb9f0b-189f-43c9-adb2-a2a4305fbea5\sc


DATE: 03/21/2018                          TIME: 02:36:59

USER:


COMMENTS:

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


--------------------
|    READ STORM    |    Filename: C:\Users\JJohnston\AppD
|                  |              ata\Local\Temp\
|                  |              baa61f21-ed59-4247-96b4-d9df3dc6eb52\a0ec6f58
| Ptotal= 42.00 mm |    Comments: 2 YR 12 HOUR SCS
--------------------
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.25    1.05 |  3.25    1.68 |  6.25    7.56 |  9.25    1.47
                0.50    1.05 |  3.50    1.68 |  6.50    7.56 |  9.50    1.47
                0.75    1.05 |  3.75    1.68 |  6.75    3.36 |  9.75    1.47
                1.00    1.05 |  4.00    1.68 |  7.00    3.36 | 10.00    1.47
                1.25    1.05 |  4.25    2.52 |  7.25    2.52 | 10.25    0.84
                1.50    1.05 |  4.50    2.52 |  7.50    2.52 | 10.50    0.84
                1.75    1.05 |  4.75    3.36 |  7.75    2.52 | 10.75    0.84
                2.00    1.05 |  5.00    3.36 |  8.00    2.52 | 11.00    0.84
                2.25    1.26 |  5.25    5.04 |  8.25    1.47 | 11.25    0.84
                2.50    1.26 |  5.50    5.04 |  8.50    1.47 | 11.50    0.84
                2.75    1.26 |  5.75   20.16 |  8.75    1.47 | 11.75    0.84
                3.00    1.26 |  6.00   55.44 |  9.00    1.47 | 12.00    0.84

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

--------------------
| CALIB            |
| NASHYD   (  0250)|   Area     (ha)=   1.25   Curve Number   (CN)= 72.0
|ID= 1 DT=12.0 min |   Ia       (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.15

        NOTE:  RAINFALL WAS TRANSFORMED TO  12.0 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
                0.200    1.05 | 3.200    1.68 | 6.200    7.56 |  9.20    1.47
                0.400    1.05 | 3.400    1.68 | 6.400    7.56 |  9.40    1.47
                0.600    1.05 | 3.600    1.68 | 6.600    5.46 |  9.60    1.47
                0.800    1.05 | 3.800    1.68 | 6.800    3.36 |  9.80    1.47
                1.000    1.05 | 4.000    1.68 | 7.000    3.36 | 10.00    1.47
                1.200    1.05 | 4.200    2.52 | 7.200    2.52 | 10.20    0.84
                1.400    1.05 | 4.400    2.52 | 7.400    2.52 | 10.40    0.84
                1.600    1.05 | 4.600    2.94 | 7.600    2.52 | 10.60    0.84
                1.800    1.05 | 4.800    3.36 | 7.800    2.52 | 10.80    0.84
                2.000    1.05 | 5.000    3.36 | 8.000    2.52 | 11.00    0.84
                2.200    1.26 | 5.200    5.04 | 8.200    1.47 | 11.20    0.84
                2.400    1.26 | 5.400    5.04 | 8.400    1.47 | 11.40    0.84
                2.600    1.26 | 5.600   12.60 | 8.600    1.47 | 11.60    0.84
                2.800    1.26 | 5.800   28.98 | 8.800    1.47 | 11.80    0.84
                3.000    1.26 | 6.000   55.44 | 9.000    1.47 | 12.00    0.84

     Unit Hyd Qpeak (cms)=   0.318

     PEAK FLOW      (cms)=   0.041 (i)
     TIME TO PEAK   (hrs)=   6.000
     RUNOFF VOLUME  (mm)=   8.817
     TOTAL RAINFALL (mm)=  42.000
     RUNOFF COEFFICIENT  =   0.210

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0209)|   Area     (ha)=   5.20
|ID= 1 DT=12.0 min |   Total Imp(%)=  31.60   Dir. Conn.(%)=  19.40
--------------------
                                IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.64          3.56
     Dep. Storage     (mm)=       1.00          1.50
     Average Slope     (%)=       1.00          2.00
     Length           (m)=     186.19         40.00
     Mannings n            =     0.013         0.250

     Max.Eff.Inten.(mm/hr)=      55.44         15.20
               over (min)        12.00         24.00
     Storage Coeff. (min)=       4.70 (ii)     19.69 (ii)
     Unit Hyd. Tpeak (min)=      12.00         24.00
     Unit Hyd. peak  (cms)=       0.13          0.05
                                                      *TOTALS*
     PEAK FLOW      (cms)=       0.15          0.11      0.227 (iii)
     TIME TO PEAK   (hrs)=       6.00          6.20      6.00
     RUNOFF VOLUME  (mm)=      41.00         12.06     17.67
     TOTAL RAINFALL (mm)=      42.00         42.00     42.00
     RUNOFF COEFFICIENT  =      0.98          0.29      0.42

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
             YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

--------------------
| ADD HYD  (  0251)|
|  1 +  2 =  3     |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0209):     5.20    0.227     6.00    17.67
     + ID2= 2 (  0250):     1.25    0.041     6.00     8.82
       ================================================
       ID = 3 (  0251):     6.45    0.268     6.00    15.95

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0245)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                        0.0000     0.0000    |   0.3090     0.2876
                        0.0000     0.0000    |   0.3330     0.3838
                        0.1230     0.1102    |   0.3620     0.5200
                        0.2870     0.1971    |   0.0000     0.0000

                                  AREA     QPEAK     TPEAK      R.V.
                                  (ha)     (cms)     (hrs)      (mm)
   INFLOW : ID= 2 (  0251)       6.450     0.268      6.00      15.95
   OUTFLOW: ID= 1 (  0245)       6.450     0.054      6.80      15.92

                PEAK   FLOW   REDUCTION [Qout/Qin](%)= 20.33
                TIME SHIFT OF PEAK FLOW          (min)= 48.00
                MAXIMUM  STORAGE   USED        (ha.m.)=  0.0488
```

```
-------------------------------------------------------------------------------
-------------------
| ROUTEPIPE(  0212)|     PIPE Number     =   1.00
| IN= 2---> OUT= 1 |     Diameter    (mm)=1650.00
| DT= 12.0 min     |     Length      (m)= 850.00
-------------------     Slope     (m/m)=  0.005
                        Manning n       =  0.013

     <----------------- TRAVEL TIME TABLE ------------------->
       DEPTH      VOLUME     FLOW RATE    VELOCITY    TRAV.TIME
        (m)     (cu.m.)       (cms)        (m/s)        min
       0.09     .367E+02        0.0         0.80        17.68
       0.17     .102E+03        0.1         1.25        11.33
       0.26     .184E+03        0.3         1.61         8.81
       0.35     .278E+03        0.6         1.91         7.41
       0.43     .382E+03        1.0         2.18         6.51
       0.52     .492E+03        1.4         2.41         5.88
       0.61     .608E+03        1.9         2.61         5.43
       0.69     .727E+03        2.4         2.79         5.08
       0.78     .848E+03        2.9         2.95         4.81
       0.87     .970E+03        3.5         3.08         4.60
       0.96     .109E+04        4.1         3.20         4.43
       1.04     .121E+04        4.7         3.29         4.31
       1.13     .133E+04        5.2         3.36         4.22
       1.22     .144E+04        5.8         3.41         4.15
       1.30     .154E+04        6.2         3.44         4.12
       1.39     .163E+04        6.6         3.43         4.13
       1.48     .172E+04        6.9         3.40         4.17
       1.56     .178E+04        6.9         3.31         4.28
       1.65     .182E+04        6.5         3.02         4.70
                                <---- hydrograph ---->   <-pipe / channel->
                           AREA    OPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                           (ha)    (cms)   (hrs)   (mm)       (m)      (m/s)
   INFLOW : ID= 2 (  0245)  6.45     0.05    6.80  15.92      0.10      0.85
   OUTFLOW: ID= 1 (  0212)  6.45     0.05    7.20  15.92      0.10      0.85


-------------------------------------------------------------------------------
-------------------
| CALIB             |
| STANDHYD (  0160)|   Area    (ha)=   1.50
|ID= 1 DT=12.0 min |   Total Imp(%)=  50.70   Dir. Conn.(%)=  22.00
-------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.76         0.74
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     100.00        40.00
     Mannings n            =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      55.44        37.02
               over (min)        12.00        24.00
     Storage Coeff.  (min)=       3.23 (ii)   13.74 (ii)
     Unit Hyd. Tpeak (min)=      12.00        24.00
     Unit Hyd. peak  (cms)=       0.14         0.06
                                                    *TOTALS*
     PEAK FLOW       (cms)=       0.05         0.04          0.083 (iii)
     TIME TO PEAK    (hrs)=       6.00         6.20          6.00
     RUNOFF VOLUME    (mm)=      41.00        14.89         20.63
     TOTAL RAINFALL   (mm)=      42.00        42.00         42.00
     RUNOFF COEFFICIENT   =       0.98         0.35          0.49

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
-------------------
| DUHYD    (  0183)|
| Inlet Cap.= 0.152|
| #of Inlets=    1|
| Total(cms)=   0.2|      AREA     OPEAK     TPEAK     R.V.
-------------------      (ha)      (cms)     (hrs)     (mm)
     TOTAL HYD.(ID= 1):   1.50      0.08      6.00    20.63
     ================================================
     MAJOR SYS.(ID= 2):   0.00      0.00      0.00     0.00
     MINOR SYS.(ID= 3):   1.50      0.08      6.00    20.63

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
-------------------
| CALIB             |
| STANDHYD (  0193)|   Area    (ha)=   1.21
|ID= 1 DT=12.0 min |   Total Imp(%)=  49.30   Dir. Conn.(%)=  20.10
-------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.60         0.61
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      89.81        40.00
     Mannings n            =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      55.44        36.77
               over (min)        12.00        24.00
     Storage Coeff.  (min)=       3.03 (ii)   13.56 (ii)
     Unit Hyd. Tpeak (min)=      12.00        24.00
     Unit Hyd. peak  (cms)=       0.14         0.06
                                                    *TOTALS*
     PEAK FLOW       (cms)=       0.04         0.04          0.064 (iii)
     TIME TO PEAK    (hrs)=       6.00         6.20          6.00
     RUNOFF VOLUME    (mm)=      41.00        14.85         20.10
     TOTAL RAINFALL   (mm)=      42.00        42.00         42.00
     RUNOFF COEFFICIENT   =       0.98         0.35          0.48

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
-------------------
| DUHYD    (  0227)|
| Inlet Cap.= 0.120|
| #of Inlets=    1|
| Total(cms)=   0.1|      AREA     OPEAK     TPEAK     R.V.
-------------------      (ha)      (cms)     (hrs)     (mm)
     TOTAL HYD.(ID= 1):   1.21      0.06      6.00    20.10
     ================================================
     MAJOR SYS.(ID= 2):   0.00      0.00      0.00     0.00
     MINOR SYS.(ID= 3):   1.21      0.06      6.00    20.10

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
-------------------
| CALIB             |
| STANDHYD (  0206)|   Area    (ha)=  39.16
|ID= 1 DT=12.0 min |   Total Imp(%)=  54.20   Dir. Conn.(%)=  23.20
-------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      21.22        17.94
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     510.95        40.00
     Mannings n            =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      55.44        40.80
               over (min)        12.00        24.00
     Storage Coeff.  (min)=       8.61 (ii)   18.71 (ii)
     Unit Hyd. Tpeak (min)=      12.00        24.00
     Unit Hyd. peak  (cms)=       0.11         0.05
                                                    *TOTALS*
     PEAK FLOW       (cms)=       1.21         1.03          1.960 (iii)
     TIME TO PEAK    (hrs)=       6.00         6.20          6.00
     RUNOFF VOLUME    (mm)=      41.00        15.48         21.40
     TOTAL RAINFALL   (mm)=      42.00        42.00         42.00
     RUNOFF COEFFICIENT   =       0.98         0.37          0.51

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
-------------------
| ADD HYD  (  0225)|
|   1 +  2 =  3    |         AREA     OPEAK     TPEAK     R.V.
-------------------      (ha)      (cms)     (hrs)     (mm)
*** W A R N I N G :  HYDROGRAPH   0183 <ID= 1> IS DRY.
```

```
*** W A R N I N G :  HYDROGRAPH   0225 = HYDROGRAPH 0206
       ID1= 1 (  0183):     0.00   0.000     0.00     0.00
     + ID2= 2 (  0206):    39.16   1.960     6.00    21.40
       ==========================================================
       ID = 3 (  0225):    39.16   1.960     6.00    21.40

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD  (  0225)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
*** W A R N I N G :  HYDROGRAPH   0227 <ID= 2> IS DRY.
*** W A R N I N G :  HYDROGRAPH   0001 = HYDROGRAPH 0003
       ID1= 3 (  0225):    39.16   1.960     6.00    21.40
     + ID2= 2 (  0227):     0.00   0.000     0.00     0.00
       ==========================================================
       ID = 1 (  0225):    39.16   1.960     6.00    21.40

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD  (  0211)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0212):     6.45   0.053     7.20    15.92
     + ID2= 2 (  0225):    39.16   1.960     6.00    21.40
       ==========================================================
       ID = 3 (  0211):    45.61   1.976     6.00    20.62

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| RESERVOIR(  0241)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   1.6250      1.2448
                          0.0190     0.1627   |   1.6630      1.2997
                          0.0360     0.4306   |   1.8430      1.5816
                          0.0480     0.7217   |   2.1300      2.1197
                          0.1330     0.7718   |   2.9680      2.2465
                          1.0390     0.9773   |   7.5380      2.5741

                                AREA     QPEAK     TPEAK      R.V.
                                (ha)     (cms)     (hrs)      (mm)
   INFLOW : ID= 2 (  0211)     45.610     1.976     6.00      20.62
   OUTFLOW: ID= 1 (  0241)     45.610     0.108    10.40      20.58

                  PEAK   FLOW   REDUCTION (Qout/Qin)(%)=  5.46
                  TIME SHIFT OF PEAK FLOW          (min)=264.00
                  MAXIMUM  STORAGE   USED        (ha.m.)=  0.7571

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

--------------------
| CALIB            |
| STANDHYD (  0228)|   Area    (ha)=  13.94
|ID= 1 DT=12.0 min |   Total Imp(%)=  47.50   Dir. Conn.(%)=  22.30
--------------------

                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       6.62         7.32
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     304.85        40.00
     Mannings n            =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      55.44        33.07
               over (min)        12.00        24.00
     Storage Coeff.  (min)=       6.31 (ii)   17.30 (ii)
     Unit Hyd. Tpeak (min)=      12.00        24.00
     Unit Hyd. peak  (cms)=       0.12         0.06
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.44         0.35      0.698 (iii)
     TIME TO PEAK    (hrs)=       6.00         6.20      6.00
     RUNOFF VOLUME    (mm)=      41.00        14.23     20.20
     TOTAL RAINFALL   (mm)=      42.00        42.00     42.00
     RUNOFF COEFFICIENT   =       0.98         0.34      0.48

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  69.0    Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
       (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

--------------------
| RESERVOIR(  0243)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.8570      0.5282
                          0.1680     0.0173   |   0.9360      0.6538
                          0.4120     0.1031   |   1.0080      0.7859
                          0.5570     0.1976   |   1.0760      0.9234
                          0.6720     0.3000   |   1.1270      1.0373
                          0.7700     0.4102   |   1.1760      1.1552

                                AREA     QPEAK     TPEAK      R.V.
                                (ha)     (cms)     (hrs)      (mm)
   INFLOW : ID= 2 (  0228)     13.940     0.698     6.00      20.20
   OUTFLOW: ID= 1 (  0243)     13.940     0.313     6.40      20.19

                  PEAK   FLOW   REDUCTION (Qout/Qin)(%)= 44.80
                  TIME SHIFT OF PEAK FLOW          (min)= 24.00
                  MAXIMUM  STORAGE   USED        (ha.m.)=  0.0685

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

--------------------
| ROUTEPIPE(  0184)|     PIPE Number      =   1.00
| IN= 2---> OUT= 1 |     Diameter    (mm)=1650.00
| DT= 12.0 min     |     Length       (m)= 500.00
--------------------     Slope     (m/m)=  0.005
                         Manning n        =  0.013

      <------------------ TRAVEL TIME TABLE ------------------->
        DEPTH      VOLUME     FLOW RATE     VELOCITY     TRAV.TIME
         (m)     (cu.m.)        (cms)        (m/s)          min
        0.09     .216E+02          0.0         0.80        10.40
        0.17     .600E+02          0.1         1.25         6.67
        0.26     .108E+03          0.3         1.61         5.18
        0.35     .164E+03          0.6         1.91         4.36
        0.43     .225E+03          1.0         2.18         3.83
        0.52     .290E+03          1.4         2.41         3.46
        0.61     .358E+03          1.9         2.61         3.19
        0.69     .428E+03          2.4         2.79         2.99
        0.78     .499E+03          2.9         2.95         2.83
        0.87     .570E+03          3.5         3.08         2.70
        0.96     .642E+03          4.1         3.20         2.61
        1.04     .712E+03          4.7         3.29         2.53
        1.13     .780E+03          5.2         3.36         2.48
        1.22     .844E+03          5.8         3.41         2.44
        1.30     .905E+03          6.2         3.44         2.43
        1.39     .961E+03          6.6         3.43         2.43
        1.48     .101E+04          6.9         3.40         2.45
        1.56     .105E+04          6.9         3.31         2.52
        1.65     .107E+04          6.5         3.02         2.76
                                <---- hydrograph ---->   <-pipe / channel->
                                AREA     QPEAK    TPEAK    R.V.   MAX DEPTH  MAX VEL
                                (ha)     (cms)    (hrs)    (mm)       (m)      (m/s)
   INFLOW : ID= 2 (  0243)     13.94     0.31     6.40    20.19      0.24      1.53
   OUTFLOW: ID= 1 (  0184)     13.94     0.31     6.40    20.19      0.24      1.53

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

--------------------
| CALIB            |
| STANDHYD (  0229)|   Area    (ha)=  10.23
|ID= 1 DT=12.0 min |   Total Imp(%)=  30.10   Dir. Conn.(%)=  15.10
--------------------

                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       3.08         7.15
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     261.15        40.00
     Mannings n            =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      55.44        16.05
               over (min)        12.00        24.00
     Storage Coeff.  (min)=       5.75 (ii)   20.42 (ii)
     Unit Hyd. Tpeak (min)=      12.00        24.00
     Unit Hyd. peak  (cms)=       0.12         0.05
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.22         0.23      0.385 (iii)
     TIME TO PEAK    (hrs)=       6.00         6.20      6.00
     RUNOFF VOLUME    (mm)=      41.00        12.34     16.66
```

COLE ENGINEERING

Experience Enhancing Excellence

```
     TOTAL RAINFALL   (mm)=      42.00        42.00          42.00
     RUNOFF COEFFICIENT   =       0.98         0.29           0.40

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

--------------------
| ADD HYD  (  0196)|
|  1 +  2 =  3     |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0184):    13.94   0.314     6.40    20.19
     + ID2= 2 (  0229):    10.23   0.385     6.00    16.66
       ================================================
       ID = 3 (  0196):    24.17   0.587     6.00    18.70

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0244)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                         0.0000      0.0000   |   0.6510      0.4564
                         0.1220      0.0863   |   0.8770      0.7894
                         0.3620      0.1603   |   0.0000      0.0000

                              AREA     QPEAK     TPEAK       R.V.
                              (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0196)     24.170      0.587      6.00      18.70
   OUTFLOW: ID= 1 (  0244)     24.170      0.328      7.00      18.69

                PEAK   FLOW   REDUCTION [Qout/Qin](%)= 55.90
                TIME SHIFT OF PEAK FLOW          (min)= 60.00
                MAXIMUM  STORAGE   USED       (ha.m.)=  0.1503

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0230)|   Area    (ha)=  24.32
|ID= 1 DT=12.0 min |   Total Imp(%)=  47.50   Dir. Conn.(%)=  29.30
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      11.55        12.77
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     402.66        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      55.44        28.13
               over (min)        12.00        24.00
     Storage Coeff.  (min)=       7.46 (ii)   19.18 (ii)
     Unit Hyd. Tpeak (min)=      12.00        24.00
     Unit Hyd. peak  (cms)=       0.11         0.05
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.98         0.50          1.339 (iii)
     TIME TO PEAK    (hrs)=       6.00         6.20          6.00
     RUNOFF VOLUME    (mm)=      41.00        13.31         21.42
     TOTAL RAINFALL   (mm)=      42.00        42.00         42.00
     RUNOFF COEFFICIENT   =       0.98         0.32          0.51

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

--------------------
| ADD HYD  (  0224)|
|  1 +  2 =  3     |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0230):    24.32   1.339     6.00    21.42
     + ID2= 2 (  0244):    24.17   0.328     7.00    18.69
       ================================================
       ID = 3 (  0224):    48.49   1.432     6.00    20.06

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0247)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                         0.0000      0.0000   |   0.6390      0.9848
                         0.0270      0.1457   |   0.9700      1.2900
                         0.0430      0.3152   |   1.1040      1.7480
                         0.0530      0.4653   |   3.3100      1.9350
                         0.3280      0.6677   |  11.3140      2.2662

                              AREA     QPEAK     TPEAK       R.V.
                              (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0224)     48.490      1.432      6.00      20.06
   OUTFLOW: ID= 1 (  0247)     48.490      0.232      8.80      20.03

                PEAK   FLOW   REDUCTION [Qout/Qin](%)= 16.23
                TIME SHIFT OF PEAK FLOW          (min)=168.00
                MAXIMUM  STORAGE   USED       (ha.m.)=  0.5975

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

       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 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)\Visual OTTHYMO 5.0\VO2\voin.dat
  Output  filename: C:\Users\JJohnston\AppData\Local\Civica\VH5\a379672b-db33-4372-b5e0-
ba58a07d1417\0837b5f9-b136-4795-b962-171c9828e280\sc
  Summary filename: C:\Users\JJohnston\AppData\Local\Civica\VH5\a379672b-db33-4372-b5e0-
ba58a07d1417\0837b5f9-b136-4795-b962-171c9828e280\sc


DATE: 03/21/2018                          TIME: 02:36:58

USER:



COMMENTS:

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


--------------------
|    READ STORM    |    Filename: C:\Users\JJohnston\AppD
|                  |              ata\Local\Temp\
|                  |              baa61f21-ed59-4247-96b4-d9df3dc6eb52\e04745ee
| Ptotal= 54.40 mm |    Comments: 5YR 12HR SCS
--------------------
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.25    1.36 |  3.25    2.18 |  6.25    9.79 |  9.25    1.90
                0.50    1.36 |  3.50    2.18 |  6.50    9.79 |  9.50    1.90
                0.75    1.36 |  3.75    2.18 |  6.75    4.35 |  9.75    1.90
                1.00    1.36 |  4.00    2.18 |  7.00    4.35 | 10.00    1.90
                1.25    1.36 |  4.25    3.26 |  7.25    3.26 | 10.25    1.09
                1.50    1.36 |  4.50    3.26 |  7.50    3.26 | 10.50    1.09
                1.75    1.36 |  4.75    4.35 |  7.75    3.26 | 10.75    1.09
```

2.00	1.36	5.00	4.35	8.00	3.26	11.00	1.09
2.25	1.63	5.25	6.53	8.25	1.90	11.25	1.09
2.50	1.63	5.50	6.53	8.50	1.90	11.50	1.09
2.75	1.63	5.75	26.11	8.75	1.90	11.75	1.09
3.00	1.63	6.00	71.81	9.00	1.90	12.00	1.09

CALIB					
NASHYD (0250)| ID= 1 DT=12.0 min	Area (ha)= 1.25	Curve Number (CN)= 72.0	Ia (mm)= 5.00	# of Linear Res.(N)= 3.00	U.H. Tp(hrs)= 0.15

NOTE: RAINFALL WAS TRANSFORMED TO 12.0 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
0.200	1.36	3.200	2.18	6.200	9.79	9.20	1.90
0.400	1.36	3.400	2.18	6.400	9.79	9.40	1.90
0.600	1.36	3.600	2.18	6.600	7.07	9.60	1.90
0.800	1.36	3.800	2.18	6.800	4.35	9.80	1.90
1.000	1.36	4.000	2.18	7.000	4.35	10.00	1.90
1.200	1.36	4.200	3.26	7.200	3.26	10.20	1.09
1.400	1.36	4.400	3.26	7.400	3.26	10.40	1.09
1.600	1.36	4.600	3.81	7.600	3.26	10.60	1.09
1.800	1.36	4.800	4.35	7.800	3.26	10.80	1.09
2.000	1.36	5.000	4.35	8.000	3.26	11.00	1.09
2.200	1.63	5.200	6.53	8.200	1.90	11.20	1.09
2.400	1.63	5.400	6.53	8.400	1.90	11.40	1.09
2.600	1.63	5.600	16.32	8.600	1.90	11.60	1.09
2.800	1.63	5.800	37.54	8.800	1.90	11.80	1.09
3.000	1.63	6.000	71.81	9.000	1.90	12.00	1.09

Unit Hyd Qpeak (cms)= 0.318

PEAK FLOW (cms)= 0.067 (i)
TIME TO PEAK (hrs)= 6.000
RUNOFF VOLUME (mm)= 14.402
TOTAL RAINFALL (mm)= 54.400
RUNOFF COEFFICIENT = 0.265

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

CALIB				
STANDHYD (0209)| ID= 1 DT=12.0 min	Area (ha)= 5.20	Total Imp(%)= 31.60	Dir. Conn.(%)= 19.40	

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	1.64	3.56
Dep. Storage (mm)=	1.00	1.50
Average Slope (%)=	1.00	2.00
Length (m)=	186.19	40.00
Mannings n =	0.013	0.250
Max.Eff.Inten.(mm/hr)=	71.81	34.84
over (min)	12.00	24.00
Storage Coeff. (min)=	4.23 (ii)	15.00 (ii)
Unit Hyd. Tpeak (min)=	12.00	24.00
Unit Hyd. peak (cms)=	0.13	0.06

	TOTALS
PEAK FLOW (cms)=	0.20 0.19 0.336 (iii)
TIME TO PEAK (hrs)=	6.00 6.20 6.00
RUNOFF VOLUME (mm)=	53.40 18.82 25.53
TOTAL RAINFALL (mm)=	54.40 54.40 54.40
RUNOFF COEFFICIENT =	0.98 0.35 0.47

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
YOU SHOULD CONSIDER SPLITTING THE AREA.

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0251)|				
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0209):	5.20	0.336	6.00	25.53
+ ID2= 2 (0250):	1.25	0.067	6.00	14.40
ID = 3 (0251):	6.45	0.403	6.00	23.37

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0245)| IN= 2---> OUT= 1 | DT= 12.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.3090	0.2876
	0.0000	0.0000	0.3330	0.3838
	0.1230	0.1102	0.3620	0.5200
	0.2870	0.1971	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0251)	6.450	0.403	6.00	23.37
OUTFLOW: ID= 1 (0245)	6.450	0.082	6.80	23.34

PEAK FLOW REDUCTION (Qout/Qin)(%)= 20.28
TIME SHIFT OF PEAK FLOW (min)= 48.00
MAXIMUM STORAGE USED (ha.m.)= 0.0734

ROUTEPIPE(0212)| IN= 2---> OUT= 1 | DT= 12.0 min	PIPE Number = 1.00	Diameter (mm)=1650.00	Length (m)= 850.00	Slope (m/m)= 0.005	Manning n = 0.013

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

DEPTH (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME min
0.09	.367E+02	0.0	0.80	17.68
0.17	.102E+03	0.1	1.25	11.33
0.26	.184E+03	0.3	1.61	8.81
0.35	.278E+03	0.6	1.91	7.41
0.43	.382E+03	1.0	2.18	6.51
0.52	.492E+03	1.4	2.41	5.88
0.61	.608E+03	1.9	2.61	5.43
0.69	.727E+03	2.4	2.79	5.08
0.78	.848E+03	2.9	2.95	4.81
0.87	.970E+03	3.5	3.08	4.60
0.96	.109E+04	4.1	3.20	4.43
1.04	.121E+04	4.7	3.29	4.31
1.13	.133E+04	5.2	3.36	4.22
1.22	.144E+04	5.8	3.41	4.15
1.30	.154E+04	6.2	3.44	4.12
1.39	.163E+04	6.6	3.43	4.13
1.48	.172E+04	6.9	3.40	4.17
1.56	.178E+04	6.9	3.31	4.28
1.65	.182E+04	6.5	3.02	4.70

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	<---- hydrograph ----> MAX DEPTH (m)	<-pipe / channel-> MAX VEL (m/s)
INFLOW : ID= 2 (0245)	6.45	0.08	6.80	23.34	0.12	0.94
OUTFLOW: ID= 1 (0212)	6.45	0.08	7.00	23.33	0.12	0.93

CALIB				
STANDHYD (0160)| ID= 1 DT=12.0 min	Area (ha)= 1.50	Total Imp(%)= 50.70	Dir. Conn.(%)= 22.00	

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	0.76	0.74
Dep. Storage (mm)=	1.00	1.50
Average Slope (%)=	1.00	2.00
Length (m)=	100.00	40.00
Mannings n =	0.013	0.250
Max.Eff.Inten.(mm/hr)=	71.81	56.61
over (min)	12.00	12.00
Storage Coeff. (min)=	2.92 (ii)	11.78 (ii)
Unit Hyd. Tpeak (min)=	12.00	12.00
Unit Hyd. peak (cms)=	0.14	0.09

	TOTALS
PEAK FLOW (cms)=	0.07 0.09 0.152 (iii)
TIME TO PEAK (hrs)=	6.00 6.00 6.00

```
     RUNOFF VOLUME     (mm)=      53.40        22.75          29.49
     TOTAL RAINFALL    (mm)=      54.40        54.40          54.40
     RUNOFF COEFFICIENT   =       0.98         0.42           0.54

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| DUHYD    (  0183)|
| Inlet Cap.= 0.152|
| #of Inlets=     1|
| Total(cms)=   0.2|      AREA     QPEAK     TPEAK    R.V.
--------------------      (ha)     (cms)     (hrs)    (mm)
     TOTAL HYD.(ID= 1):   1.50      0.15      6.00   29.49
     ==========================================================
     MAJOR SYS.(ID= 2):   0.00      0.00      0.00    0.00
     MINOR SYS.(ID= 3):   1.50      0.15      6.00   29.49

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0193)|   Area    (ha)=   1.21
|ID= 1 DT=12.0 min |   Total Imp(%)=  49.30   Dir. Conn.(%)=  20.10
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      0.60         0.61
     Dep. Storage     (mm)=      1.00         1.50
     Average Slope     (%)=      1.00         2.00
     Length            (m)=     89.81        40.00
     Mannings n           =     0.013        0.250

     Max.Eff.Inten.(mm/hr)=     71.81        56.25
               over (min)       12.00        12.00
     Storage Coeff.  (min)=      2.73 (ii)   11.62 (ii)
     Unit Hyd. Tpeak (min)=     12.00        12.00
     Unit Hyd. peak  (cms)=      0.14         0.09
                                                        *TOTALS*
     PEAK FLOW       (cms)=      0.05         0.07          0.120 (iii)
     TIME TO PEAK    (hrs)=      6.00         6.00           6.00
     RUNOFF VOLUME    (mm)=     53.40        22.70          28.86
     TOTAL RAINFALL   (mm)=     54.40        54.40          54.40
     RUNOFF COEFFICIENT   =      0.98         0.42           0.53

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| DUHYD    (  0227)|
| Inlet Cap.= 0.120|
| #of Inlets=     1|
| Total(cms)=   0.1|      AREA     QPEAK     TPEAK    R.V.
--------------------      (ha)     (cms)     (hrs)    (mm)
     TOTAL HYD.(ID= 1):   1.21      0.12      6.00   28.86
     ==========================================================
     MAJOR SYS.(ID= 2):   0.00      0.00      0.00    0.00
     MINOR SYS.(ID= 3):   1.21      0.12      6.00   28.86

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0206)|   Area    (ha)=  39.16
|ID= 1 DT=12.0 min |   Total Imp(%)=  54.20   Dir. Conn.(%)=  23.20
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=     21.22        17.94
     Dep. Storage     (mm)=      1.00         1.50
     Average Slope     (%)=      1.00         2.00
     Length            (m)=    510.95        40.00
     Mannings n           =     0.013        0.250

     Max.Eff.Inten.(mm/hr)=     71.81        62.10
               over (min)       12.00        24.00
     Storage Coeff.  (min)=      7.76 (ii)   16.30 (ii)
     Unit Hyd. Tpeak (min)=     12.00        24.00
     Unit Hyd. peak  (cms)=      0.11         0.06
                                                        *TOTALS*
     PEAK FLOW       (cms)=      1.60         1.67          2.850 (iii)
     TIME TO PEAK    (hrs)=      6.00         6.20           6.00
     RUNOFF VOLUME    (mm)=     53.40        23.55          30.48
     TOTAL RAINFALL   (mm)=     54.40        54.40          54.40
     RUNOFF COEFFICIENT   =      0.98         0.43           0.56

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

--------------------
| ADD HYD  (  0225)|
|  1 +  2 =  3     |          AREA     QPEAK     TPEAK      R.V.
--------------------          (ha)     (cms)     (hrs)      (mm)
*** W A R N I N G :  HYDROGRAPH   0183 <ID= 1> IS DRY.
*** W A R N I N G :  HYDROGRAPH   0225 = HYDROGRAPH 0206
       ID1= 1 (  0183):     0.00    0.000      0.00      0.00
     + ID2= 2 (  0206):    39.16    2.850      6.00     30.48
       ==========================================================
       ID = 3 (  0225):    39.16    2.850      6.00     30.48

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD  (  0225)|
|  3 +  2 =  1     |          AREA     QPEAK     TPEAK      R.V.
--------------------          (ha)     (cms)     (hrs)      (mm)
*** W A R N I N G :  HYDROGRAPH   0227 <ID= 2> IS DRY.
*** W A R N I N G :  HYDROGRAPH   0001 = HYDROGRAPH 0003
       ID1= 3 (  0225):    39.16    2.850      6.00     30.48
     + ID2= 2 (  0227):     0.00    0.000      0.00      0.00
       ==========================================================
       ID = 1 (  0225):    39.16    2.850      6.00     30.48

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD  (  0211)|
|  1 +  2 =  3     |          AREA     QPEAK     TPEAK      R.V.
--------------------          (ha)     (cms)     (hrs)      (mm)
       ID1= 1 (  0212):     6.45    0.080      7.00     23.33
     + ID2= 2 (  0225):    39.16    2.850      6.00     30.48
       ==========================================================
       ID = 3 (  0211):    45.61    2.874      6.00     29.47

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0241)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW     STORAGE   |  OUTFLOW     STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                         0.0000      0.0000   |   1.6250      1.2448
                         0.0190      0.1627   |   1.6630      1.2997
                         0.0360      0.4306   |   1.8430      1.5816
                         0.0480      0.7217   |   2.1300      2.1197
                         0.1330      0.7718   |   2.9680      2.2465
                         1.0390      0.9773   |   7.5380      2.5741

                                   AREA      QPEAK     TPEAK       R.V.
                                   (ha)      (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0211)      45.610      2.874      6.00       29.47
   OUTFLOW: ID= 1 (  0241)      45.610      0.434      7.20       29.42

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 15.12
                  TIME SHIFT OF PEAK FLOW        (min)= 72.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.8408

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

```
--------------------
| CALIB            |
| STANDHYD (  0228)|   Area    (ha)=  13.94
|ID= 1 DT=12.0 min |   Total Imp(%)=  47.50   Dir. Conn.(%)=  22.30
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      6.62         7.32
     Dep. Storage     (mm)=      1.00         1.50
     Average Slope     (%)=      1.00         2.00
     Length            (m)=    304.85        40.00
     Mannings n            =     0.013        0.250

     Max.Eff.Inten.(mm/hr)=     71.81        50.83
               over (min)       12.00        24.00
     Storage Coeff.  (min)=      5.69 (ii)   14.94 (ii)
     Unit Hyd. Tpeak (min)=     12.00        24.00
     Unit Hyd. peak  (cms)=      0.12         0.06
                                                    *TOTALS*
     PEAK FLOW       (cms)=      0.58         0.57      1.011 (iii)
     TIME TO PEAK    (hrs)=      6.00         6.20      6.00
     RUNOFF VOLUME    (mm)=     53.40        21.84     28.88
     TOTAL RAINFALL   (mm)=     54.40        54.40     54.40
     RUNOFF COEFFICIENT    =     0.98         0.40      0.53

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EOUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
```

```
--------------------
| RESERVOIR(  0243)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |      OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------       (cms)     (ha.m.)   |   (cms)     (ha.m.)
                           0.0000     0.0000   |   0.8570     0.5282
                           0.1680     0.0173   |   0.9360     0.6538
                           0.4120     0.1031   |   1.0080     0.7859
                           0.5570     0.1976   |   1.0760     0.9234
                           0.6720     0.3000   |   1.1270     1.0373
                           0.7700     0.4102   |   1.1760     1.1552

                                 AREA     OPEAK     TPEAK      R.V.
                                 (ha)     (cms)     (hrs)      (mm)
   INFLOW : ID= 2 (  0228)     13.940     1.011      6.00      28.88
   OUTFLOW: ID= 1 (  0243)     13.940     0.422      6.40      28.88

                PEAK   FLOW   REDUCTION [Qout/Qin](%)= 41.77
                TIME SHIFT OF PEAK FLOW         (min)= 24.00
                MAXIMUM  STORAGE   USED        (ha.m.)=  0.1104
```

```
--------------------
| ROUTEPIPE(  0184)|     PIPE Number      =   1.00
| IN= 2---> OUT= 1 |     Diameter    (mm)=1650.00
| DT= 12.0 min     |     Length      (m)= 500.00
--------------------     Slope     (m/m)=  0.005
                         Manning n     =  0.013

     <----------------- TRAVEL TIME TABLE ------------------->
       DEPTH      VOLUME     FLOW RATE    VELOCITY    TRAV.TIME
        (m)     (cu.m.)       (cms)        (m/s)         min
       0.09     .216E+02        0.0         0.80        10.40
       0.17     .600E+02        0.1         1.25         6.67
       0.26     .108E+03        0.3         1.61         5.18
       0.35     .164E+03        0.6         1.91         4.36
       0.43     .225E+03        1.0         2.18         3.83
       0.52     .290E+03        1.4         2.41         3.46
       0.61     .358E+03        1.9         2.61         3.19
       0.69     .428E+03        2.4         2.79         2.99
       0.78     .499E+03        2.9         2.95         2.83
       0.87     .570E+03        3.5         3.08         2.70
       0.96     .642E+03        4.1         3.20         2.61
       1.04     .712E+03        4.7         3.29         2.53
       1.13     .780E+03        5.2         3.36         2.48
       1.22     .844E+03        5.8         3.41         2.44
       1.30     .905E+03        6.2         3.44         2.43
       1.39     .961E+03        6.6         3.43         2.43
       1.48     .101E+04        6.9         3.40         2.45
       1.56     .105E+04        6.9         3.31         2.52
       1.65     .107E+04        6.5         3.02         2.76
                                <---- hydrograph ---->   <-pipe / channel->
                           AREA    OPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                                                              (ha)     (cms)   (hrs)   (mm)       (m)       (m/s)
   INFLOW : ID= 2 (  0243)   13.94     0.42    6.40   28.88      0.28      1.68
   OUTFLOW: ID= 1 (  0184)   13.94     0.43    6.40   28.88      0.28      1.68
```

```
--------------------
| CALIB            |
| STANDHYD (  0229)|   Area    (ha)=  10.23
|ID= 1 DT=12.0 min |   Total Imp(%)=  30.10   Dir. Conn.(%)=  15.10
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      3.08         7.15
     Dep. Storage     (mm)=      1.00         1.50
     Average Slope     (%)=      1.00         2.00
     Length            (m)=    261.15        40.00
     Mannings n            =     0.013        0.250

     Max.Eff.Inten.(mm/hr)=     71.81        36.67
               over (min)       12.00        24.00
     Storage Coeff.  (min)=      5.19 (ii)   15.73 (ii)
     Unit Hyd. Tpeak (min)=     12.00        24.00
     Unit Hyd. peak  (cms)=      0.13         0.06
                                                    *TOTALS*
     PEAK FLOW       (cms)=      0.29         0.40      0.585 (iii)
     TIME TO PEAK    (hrs)=      6.00         6.20      6.00
     RUNOFF VOLUME    (mm)=     53.40        19.21     24.37
     TOTAL RAINFALL   (mm)=     54.40        54.40     54.40
     RUNOFF COEFFICIENT    =     0.98         0.35      0.45

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EOUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
```

```
--------------------
| ADD HYD  (  0196)|
|   1 +  2 =  3    |          AREA    OPEAK    TPEAK     R.V.
--------------------          (ha)     (cms)    (hrs)     (mm)
        ID1= 1 (  0184):    13.94    0.426     6.40    28.88
      + ID2= 2 (  0229):    10.23    0.585     6.00    24.37
        ================================================
        ID = 3 (  0196):    24.17    0.838     6.00    26.97

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

```
--------------------
| RESERVOIR(  0244)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |      OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------       (cms)     (ha.m.)   |   (cms)     (ha.m.)
                           0.0000     0.0000   |   0.6510     0.4564
                           0.1220     0.0863   |   0.8770     0.7894
                           0.3620     0.1603   |   0.0000     0.0000

                                 AREA     OPEAK     TPEAK      R.V.
                                 (ha)     (cms)     (hrs)      (mm)
   INFLOW : ID= 2 (  0196)     24.170     0.838      6.00      26.97
   OUTFLOW: ID= 1 (  0244)     24.170     0.414      7.20      26.96

                PEAK   FLOW   REDUCTION [Qout/Qin](%)= 49.37
                TIME SHIFT OF PEAK FLOW         (min)= 72.00
                MAXIMUM  STORAGE   USED        (ha.m.)=  0.2135
```

```
--------------------
| CALIB            |
| STANDHYD (  0230)|   Area    (ha)=  24.32
|ID= 1 DT=12.0 min |   Total Imp(%)=  47.50   Dir. Conn.(%)=  29.30
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=     11.55        12.77
     Dep. Storage     (mm)=      1.00         1.50
     Average Slope     (%)=      1.00         2.00
     Length            (m)=    402.66        40.00
     Mannings n            =     0.013        0.250

     Max.Eff.Inten.(mm/hr)=     71.81        43.55
```

```
                over (min)        12.00         24.00
     Storage Coeff.  (min)=        6.73 (ii)    16.57 (ii)
     Unit Hyd. Tpeak (min)=       12.00         24.00
     Unit Hyd. peak  (cms)=        0.12          0.06
                                                *TOTALS*
     PEAK FLOW       (cms)=        1.29          0.82          1.904 (iii)
     TIME TO PEAK    (hrs)=        6.00          6.20          6.00
     RUNOFF VOLUME    (mm)=       53.40         20.57         30.19
     TOTAL RAINFALL   (mm)=       54.40         54.40         54.40
     RUNOFF COEFFICIENT   =        0.98          0.38          0.55

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

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN*  =  69.0     Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

--------------------
| ADD HYD  (  0224)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0230):     24.32    1.904     6.00     30.19
     + ID2= 2 (  0244):     24.17    0.414     7.20     26.96
       ================================================
       ID = 3 (  0224):     48.49    2.053     6.00     28.58

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0247)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |        OUTFLOW     STORAGE   |  OUTFLOW     STORAGE
--------------------          (cms)      (ha.m.)  |   (cms)      (ha.m.)
                              0.0000      0.0000  |   0.6390      0.9848
                              0.0270      0.1457  |   0.9700      1.2900
                              0.0430      0.3152  |   1.1040      1.7480
                              0.0530      0.4653  |   3.3100      1.9350
                              0.3280      0.6677  |  11.3140      2.2662

                                   AREA      QPEAK      TPEAK       R.V.
                                   (ha)      (cms)      (hrs)       (mm)
   INFLOW : ID= 2 (  0224)      48.490      2.053      6.00       28.58
   OUTFLOW: ID= 1 (  0247)      48.490      0.408      8.80       28.55

                  PEAK   FLOW   REDUCTION [Out/Oin](%)= 19.89
                  TIME SHIFT OF PEAK FLOW          (min)=168.00
                  MAXIMUM  STORAGE   USED        (ha.m.)=  0.7502

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

       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 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)\Visual OTTHYMO 5.0\VO2\voin.dat
  Output  filename: C:\Users\JJohnston\AppData\Local\Civica\VH5\a379672b-db33-4372-b5e0-
ba58a07d1417\71e4a005-ec61-4bbb-b29b-c01cae468729\sc
  Summary filename: C:\Users\JJohnston\AppData\Local\Civica\VH5\a379672b-db33-4372-b5e0-
ba58a07d1417\71e4a005-ec61-4bbb-b29b-c01cae468729\sc


DATE: 03/21/2018                          TIME: 02:36:59

USER:

COMMENTS:

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


--------------------
|    READ STORM    |    Filename: C:\Users\JJohnston\AppD
|                  |              ata\Local\Temp\
|                  |              baa61f21-ed59-4247-96b4-d9df3dc6eb52\c75abbfd
| Ptotal= 62.70 mm |    Comments: 10YR 12HR SCS
--------------------
                TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
                0.25    1.57 |  3.25    2.51 |  6.25   11.29 |  9.25    2.19
                0.50    1.57 |  3.50    2.51 |  6.50   11.29 |  9.50    2.19
                0.75    1.57 |  3.75    2.51 |  6.75    5.02 |  9.75    2.19
                1.00    1.57 |  4.00    2.51 |  7.00    5.02 | 10.00    2.19
                1.25    1.57 |  4.25    3.76 |  7.25    3.76 | 10.25    1.25
                1.50    1.57 |  4.50    3.76 |  7.50    3.76 | 10.50    1.25
                1.75    1.57 |  4.75    5.02 |  7.75    3.76 | 10.75    1.25
                2.00    1.57 |  5.00    5.02 |  8.00    3.76 | 11.00    1.25
                2.25    1.88 |  5.25    7.52 |  8.25    2.19 | 11.25    1.25
                2.50    1.88 |  5.50    7.52 |  8.50    2.19 | 11.50    1.25
                2.75    1.88 |  5.75   30.10 |  8.75    2.19 | 11.75    1.25
                3.00    1.88 |  6.00   82.76 |  9.00    2.19 | 12.00    1.25

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

--------------------
| CALIB            |
| NASHYD  (  0250)|   Area    (ha)=   1.25   Curve Number   (CN)= 72.0
|ID= 1 DT=12.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.15

        NOTE:  RAINFALL WAS TRANSFORMED TO  12.0 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
               0.200    1.57 | 3.200    2.51 | 6.200   11.29 |  9.20    2.19
               0.400    1.57 | 3.400    2.51 | 6.400   11.29 |  9.40    2.19
               0.600    1.57 | 3.600    2.51 | 6.600    8.15 |  9.60    2.19
               0.800    1.57 | 3.800    2.51 | 6.800    5.02 |  9.80    2.19
               1.000    1.57 | 4.000    2.51 | 7.000    5.02 | 10.00    2.19
               1.200    1.57 | 4.200    3.76 | 7.200    3.76 | 10.20    1.25
               1.400    1.57 | 4.400    3.76 | 7.400    3.76 | 10.40    1.25
               1.600    1.57 | 4.600    4.39 | 7.600    3.76 | 10.60    1.25
               1.800    1.57 | 4.800    5.02 | 7.800    3.76 | 10.80    1.25
               2.000    1.57 | 5.000    5.02 | 8.000    3.76 | 11.00    1.25
               2.200    1.88 | 5.200    7.52 | 8.200    2.19 | 11.20    1.25
               2.400    1.88 | 5.400    7.52 | 8.400    2.19 | 11.40    1.25
               2.600    1.88 | 5.600   18.81 | 8.600    2.19 | 11.60    1.25
               2.800    1.88 | 5.800   43.26 | 8.800    2.19 | 11.80    1.25
               3.000    1.88 | 6.000   82.76 | 9.000    2.19 | 12.00    1.25

     Unit Hyd Qpeak  (cms)=    0.318

     PEAK FLOW       (cms)=    0.087 (i)
     TIME TO PEAK    (hrs)=    6.000
     RUNOFF VOLUME    (mm)=   18.606
     TOTAL RAINFALL   (mm)=   62.700
     RUNOFF COEFFICIENT   =    0.297

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

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

--------------------
| CALIB            |
| STANDHYD (  0209)|   Area    (ha)=   5.20
|ID= 1 DT=12.0 min |   Total Imp(%)=  31.60   Dir. Conn.(%)=  19.40
--------------------

                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      1.64          3.56
     Dep. Storage     (mm)=      1.00          1.50
     Average Slope     (%)=      1.00          2.00
     Length            (m)=    186.19         40.00
     Mannings n             =     0.013         0.250
```

```
     Max.Eff.Inten.(mm/hr)=      82.76        44.16
               over (min)        12.00        24.00
     Storage Coeff.  (min)=       4.00 (ii)   13.79 (ii)
     Unit Hyd. Tpeak (min)=      12.00        24.00
     Unit Hyd. peak  (cms)=       0.13         0.06
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.23         0.25       0.413 (iii)
     TIME TO PEAK    (hrs)=       6.00         6.20       6.00
     RUNOFF VOLUME    (mm)=      61.70        23.84      31.18
     TOTAL RAINFALL   (mm)=      62.70        62.70      62.70
     RUNOFF COEFFICIENT   =       0.98         0.38       0.50

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
             YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| ADD HYD  (  0251)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0209):     5.20   0.413     6.00    31.18
      + ID2= 2 (  0250):     1.25   0.087     6.00    18.61
        ========================================================
        ID = 3 (  0251):     6.45   0.500     6.00    28.75

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0245)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.3090     0.2876
                          0.0000     0.0000   |   0.3330     0.3838
                          0.1230     0.1102   |   0.3620     0.5200
                          0.2870     0.1971   |   0.0000     0.0000

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0251)     6.450     0.500     6.00      28.75
   OUTFLOW: ID= 1 (  0245)     6.450     0.101     6.80      28.71

                 PEAK   FLOW   REDUCTION (Qout/Qin)(%)= 20.29
                 TIME SHIFT OF PEAK FLOW          (min)= 48.00
                 MAXIMUM  STORAGE   USED        (ha.m.)=  0.0912

--------------------------------------------------------------------------------
--------------------
| ROUTEPIPE(  0212)|     PIPE Number      =   1.00
| IN= 2---> OUT= 1 |     Diameter    (mm)=1650.00
| DT= 12.0 min     |     Length      (m)= 850.00
--------------------     Slope     (m/m)=  0.005
                         Manning n        =  0.013

     <------------------ TRAVEL TIME TABLE ------------------->
       DEPTH      VOLUME     FLOW RATE     VELOCITY     TRAV.TIME
        (m)     (cu.m.)       (cms)         (m/s)         min
       0.09     .367E+02        0.0          0.80         17.68
       0.17     .102E+03        0.1          1.25         11.33
       0.26     .184E+03        0.3          1.61          8.81
       0.35     .278E+03        0.6          1.91          7.41
       0.43     .382E+03        1.0          2.18          6.51
       0.52     .492E+03        1.4          2.41          5.88
       0.61     .608E+03        1.9          2.61          5.43
       0.69     .727E+03        2.4          2.79          5.08
       0.78     .848E+03        2.9          2.95          4.81
       0.87     .970E+03        3.5          3.08          4.60
       0.96     .109E+04        4.1          3.20          4.43
       1.04     .121E+04        4.7          3.29          4.31
       1.13     .133E+04        5.2          3.36          4.22
       1.22     .144E+04        5.8          3.41          4.15
       1.30     .154E+04        6.2          3.44          4.12
       1.39     .163E+04        6.6          3.43          4.13
       1.48     .172E+04        6.9          3.40          4.17
       1.56     .178E+04        6.9          3.31          4.28
       1.65     .182E+04        6.5          3.02          4.70
                                <---- hydrograph ---->   <-pipe / channel->
```

```
                               AREA     QPEAK     TPEAK     R.V.    MAX DEPTH  MAX VEL
                               (ha)     (cms)     (hrs)     (mm)      (m)      (m/s)
   INFLOW : ID= 2 (  0245)     6.45      0.10      6.80    28.71      0.14      1.01
   OUTFLOW: ID= 1 (  0212)     6.45      0.10      7.00    28.71      0.14      1.01

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0160)|   Area     (ha)=   1.50
|ID= 1 DT=12.0 min |   Total Imp(%)=  50.70   Dir. Conn.(%)=  22.00
--------------------                    IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.76         0.74
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     100.00        40.00
     Mannings n            =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      82.76        70.85
               over (min)        12.00        12.00
     Storage Coeff.  (min)=       2.76 (ii)   10.86 (ii)
     Unit Hyd. Tpeak (min)=      12.00        12.00
     Unit Hyd. peak  (cms)=       0.14         0.09
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.08         0.11       0.187 (iii)
     TIME TO PEAK    (hrs)=       6.00         6.00       6.00
     RUNOFF VOLUME    (mm)=      61.70        28.48      35.79
     TOTAL RAINFALL   (mm)=      62.70        62.70      62.70
     RUNOFF COEFFICIENT   =       0.98         0.45       0.57

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| DUHYD    (  0183)|
| Inlet Cap.= 0.152|
| #of Inlets=    1|
| Total(cms)=  0.2|      AREA     QPEAK     TPEAK     R.V.
--------------------      (ha)     (cms)     (hrs)     (mm)
     TOTAL HYD.(ID= 1):   1.50      0.19      6.00    35.79
     ========================================================
     MAJOR SYS.(ID= 2):   0.07      0.04      6.00    35.79
     MINOR SYS.(ID= 3):   1.43      0.15      6.00    35.79

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0193)|   Area     (ha)=   1.21
|ID= 1 DT=12.0 min |   Total Imp(%)=  49.30   Dir. Conn.(%)=  20.10
--------------------                    IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.60         0.61
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      89.81        40.00
     Mannings n            =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      82.76        70.42
               over (min)        12.00        12.00
     Storage Coeff.  (min)=       2.58 (ii)   10.70 (ii)
     Unit Hyd. Tpeak (min)=      12.00        12.00
     Unit Hyd. peak  (cms)=       0.14         0.10
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.06         0.09       0.148 (iii)
     TIME TO PEAK    (hrs)=       6.00         6.00       6.00
     RUNOFF VOLUME    (mm)=      61.70        28.42      35.10
     TOTAL RAINFALL   (mm)=      62.70        62.70      62.70
     RUNOFF COEFFICIENT   =       0.98         0.45       0.56

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
```

COLE ENGINEERING

Experience Enhancing Excellence

```
--------------------
| DUHYD    (  0227)|
| Inlet Cap.= 0.120|
| #of Inlets=     1|
| Total(cms)=   0.1|      AREA     QPEAK     TPEAK    R.V.
--------------------      (ha)     (cms)     (hrs)    (mm)
     TOTAL HYD.(ID= 1):   1.21      0.15      6.00   35.10
     ==========================================================
     MAJOR SYS.(ID= 2):   0.06      0.03      6.00   35.10
     MINOR SYS.(ID= 3):   1.15      0.12      6.00   35.10

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------
| CALIB            |
| STANDHYD (  0206)|   Area    (ha)=  39.16
|ID= 1 DT=12.0 min |   Total Imp(%)=  54.20   Dir. Conn.(%)=  23.20
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       21.22         17.94
     Dep. Storage     (mm)=        1.00          1.50
     Average Slope     (%)=        1.00          2.00
     Length            (m)=      510.95         40.00
     Mannings n            =       0.013         0.250

     Max.Eff.Inten.(mm/hr)=       82.76         77.53
               over (min)         12.00         24.00
     Storage Coeff. (min)=        7.33 (ii)     15.15 (ii)
     Unit Hyd. Tpeak (min)=       12.00         24.00
     Unit Hyd. peak  (cms)=        0.11          0.06
                                                          *TOTALS*
     PEAK FLOW       (cms)=        1.87          2.15          3.497 (iii)
     TIME TO PEAK    (hrs)=        6.00          6.20          6.00
     RUNOFF VOLUME    (mm)=       61.70         29.42         36.91
     TOTAL RAINFALL   (mm)=       62.70         62.70         62.70
     RUNOFF COEFFICIENT   =        0.98          0.47          0.59

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------
| ADD HYD  (  0225)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)     (cms)    (hrs)     (mm)
       ID1= 1 (  0183):      0.07   0.035     6.00     35.79
     + ID2= 2 (  0206):     39.16   3.497     6.00     36.91
       ==========================================================
       ID = 3 (  0225):     39.23   3.532     6.00     36.90

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------
| ADD HYD  (  0225)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)     (cms)    (hrs)     (mm)
       ID1= 3 (  0225):     39.23   3.532     6.00     36.90
     + ID2= 2 (  0227):      0.06   0.028     6.00     35.10
       ==========================================================
       ID = 1 (  0225):     39.29   3.560     6.00     36.90

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------
| ADD HYD  (  0211)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)     (cms)    (hrs)     (mm)
       ID1= 1 (  0212):      6.45   0.100     7.00     28.71
     + ID2= 2 (  0225):     39.29   3.560     6.00     36.90
       ==========================================================
       ID = 3 (  0211):     45.74   3.590     6.00     35.75

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------
| RESERVOIR(  0241)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   1.6250      1.2448
                          0.0190     0.1627   |   1.6630      1.2997
                          0.0360     0.4306   |   1.8430      1.5816
                          0.0480     0.7217   |   2.1300      2.1197
                          0.1330     0.7718   |   2.9680      2.2465
                          1.0390     0.9773   |   7.5380      2.5741

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0211)     45.739     3.590      6.00      35.75
   OUTFLOW: ID= 1 (  0241)     45.739     0.792      6.80      35.70

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 22.07
                  TIME SHIFT OF PEAK FLOW          (min)= 48.00
                  MAXIMUM  STORAGE   USED        (ha.m.)=  0.9236

--------------------
| CALIB            |
| STANDHYD (  0228)|   Area    (ha)=  13.94
|ID= 1 DT=12.0 min |   Total Imp(%)=  47.50   Dir. Conn.(%)=  22.30
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        6.62          7.32
     Dep. Storage     (mm)=        1.00          1.50
     Average Slope     (%)=        1.00          2.00
     Length            (m)=      304.85         40.00
     Mannings n            =       0.013         0.250

     Max.Eff.Inten.(mm/hr)=       82.76         63.81
               over (min)         12.00         24.00
     Storage Coeff. (min)=        5.38 (ii)     13.83 (ii)
     Unit Hyd. Tpeak (min)=       12.00         24.00
     Unit Hyd. peak  (cms)=        0.13          0.06
                                                          *TOTALS*
     PEAK FLOW       (cms)=        0.68          0.74          1.238 (iii)
     TIME TO PEAK    (hrs)=        6.00          6.20          6.00
     RUNOFF VOLUME    (mm)=       61.70         27.42         35.06
     TOTAL RAINFALL   (mm)=       62.70         62.70         62.70
     RUNOFF COEFFICIENT   =        0.98          0.44          0.56

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------
| RESERVOIR(  0243)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.8570      0.5282
                          0.1680     0.0173   |   0.9360      0.6538
                          0.4120     0.1031   |   1.0080      0.7859
                          0.5570     0.1976   |   1.0760      0.9234
                          0.6720     0.3000   |   1.1270      1.0373
                          0.7700     0.4102   |   1.1760      1.1552

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0228)     13.940     1.238      6.00      35.06
   OUTFLOW: ID= 1 (  0243)     13.940     0.474      6.40      35.06

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 38.25
                  TIME SHIFT OF PEAK FLOW          (min)= 24.00
                  MAXIMUM  STORAGE   USED        (ha.m.)=  0.1454

--------------------
| ROUTEPIPE(  0184)|     PIPE Number      =   1.00
| IN= 2---> OUT= 1 |     Diameter     (mm)=1650.00
| DT= 12.0 min     |     Length        (m)= 500.00
--------------------     Slope        (m/m)=  0.005
                         Manning n         =  0.013

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

DEPTH (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME min
0.09	.216E+02	0.0	0.80	10.40
0.17	.600E+02	0.1	1.25	6.67
0.26	.108E+03	0.3	1.61	5.18
0.35	.164E+03	0.6	1.91	4.36
0.43	.225E+03	1.0	2.18	3.83
0.52	.290E+03	1.4	2.41	3.46
0.61	.358E+03	1.9	2.61	3.19
0.69	.428E+03	2.4	2.79	2.99
0.78	.499E+03	2.9	2.95	2.83
0.87	.570E+03	3.5	3.08	2.70
0.96	.642E+03	4.1	3.20	2.61
1.04	.712E+03	4.7	3.29	2.53
1.13	.780E+03	5.2	3.36	2.48
1.22	.844E+03	5.8	3.41	2.44
1.30	.905E+03	6.2	3.44	2.43
1.39	.961E+03	6.6	3.43	2.43
1.48	.101E+04	6.9	3.40	2.45
1.56	.105E+04	6.9	3.31	2.52
1.65	.107E+04	6.5	3.02	2.76

		AREA (ha)	OPEAK (cms)	TPEAK (hrs)	R.V. (mm)	<-pipe / channel-> MAX DEPTH (m)	MAX VEL (m/s)
		<---- hydrograph ---->					
INFLOW :	ID= 2 (0243)	13.94	0.47	6.40	35.06	0.30	1.73
OUTFLOW:	ID= 1 (0184)	13.94	0.48	6.40	35.06	0.30	1.73

CALIB			
STANDHYD (0229)	Area (ha)=	10.23	
ID= 1 DT=12.0 min	Total Imp(%)=	30.10	Dir. Conn.(%)= 15.10

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	3.08	7.15
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	261.15	40.00
Mannings n	=	0.013	0.250
Max.Eff.Inten.(mm/hr)=		82.76	46.42
over (min)		12.00	24.00
Storage Coeff. (min)=		4.90 (ii)	14.50 (ii)
Unit Hyd. Tpeak (min)=		12.00	24.00
Unit Hyd. peak (cms)=		0.13	0.06
			TOTALS
PEAK FLOW	(cms)=	0.34	0.52 0.727 (iii)
TIME TO PEAK	(hrs)=	6.00	6.20 6.00
RUNOFF VOLUME	(mm)=	61.70	24.31 29.95
TOTAL RAINFALL	(mm)=	62.70	62.70 62.70
RUNOFF COEFFICIENT	=	0.98	0.39 0.48

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
YOU SHOULD CONSIDER SPLITTING THE AREA.

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0196)					
1 + 2 = 3		AREA (ha)	OPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0184):		13.94	0.476	6.40	35.06
+ ID2= 2 (0229):		10.23	0.727	6.00	29.95
ID = 3 (0196):		24.17	1.012	6.00	32.90

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0244)				
IN= 2---> OUT= 1				
DT= 12.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.6510	0.4564
	0.1220	0.0863	0.8770	0.7894
	0.3620	0.1603	0.0000	0.0000

		AREA (ha)	OPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW :	ID= 2 (0196)	24.170	1.012	6.00	32.90
OUTFLOW:	ID= 1 (0244)	24.170	0.462	7.40	32.89

PEAK FLOW REDUCTION [Qout/Qin](%)= 45.70
TIME SHIFT OF PEAK FLOW (min)= 84.00
MAXIMUM STORAGE USED (ha.m.)= 0.2639

CALIB			
STANDHYD (0230)	Area (ha)=	24.32	
ID= 1 DT=12.0 min	Total Imp(%)=	47.50	Dir. Conn.(%)= 29.30

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	11.55	12.77
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	402.66	40.00
Mannings n	=	0.013	0.250
Max.Eff.Inten.(mm/hr)=		82.76	54.89
over (min)		12.00	24.00
Storage Coeff. (min)=		6.36 (ii)	15.33 (ii)
Unit Hyd. Tpeak (min)=		12.00	24.00
Unit Hyd. peak (cms)=		0.12	0.06
			TOTALS
PEAK FLOW	(cms)=	1.51	1.07 2.311 (iii)
TIME TO PEAK	(hrs)=	6.00	6.20 6.00
RUNOFF VOLUME	(mm)=	61.70	25.92 36.40
TOTAL RAINFALL	(mm)=	62.70	62.70 62.70
RUNOFF COEFFICIENT	=	0.98	0.41 0.58

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0224)					
1 + 2 = 3		AREA (ha)	OPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0230):		24.32	2.311	6.00	36.40
+ ID2= 2 (0244):		24.17	0.462	7.40	32.89
ID = 3 (0224):		48.49	2.523	6.00	34.65

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0247)				
IN= 2---> OUT= 1				
DT= 12.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.6390	0.9848
	0.0270	0.1457	0.9700	1.2900
	0.0430	0.3152	1.1040	1.7480
	0.0530	0.4653	3.3100	1.9350
	0.3280	0.6677	11.3140	2.2662

		AREA (ha)	OPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW :	ID= 2 (0224)	48.490	2.523	6.00	34.65
OUTFLOW:	ID= 1 (0247)	48.490	0.502	8.80	34.63

PEAK FLOW REDUCTION [Qout/Qin](%)= 19.91
TIME SHIFT OF PEAK FLOW (min)=168.00
MAXIMUM STORAGE USED (ha.m.)= 0.8456

```
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
```

COLE ENGINEERING

Experience Enhancing Excellence

```
       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 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)\Visual OTTHYMO 5.0\VO2\voin.dat
  Output  filename: C:\Users\JJohnston\AppData\Local\Civica\VH5\a379672b-db33-4372-b5e0-
ba58a07d1417\3079c323-a62e-42db-ac73-51b0867b042e\sc
  Summary filename: C:\Users\JJohnston\AppData\Local\Civica\VH5\a379672b-db33-4372-b5e0-
ba58a07d1417\3079c323-a62e-42db-ac73-51b0867b042e\sc


DATE: 03/21/2018                          TIME: 02:36:58

USER:


COMMENTS:

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


--------------------
|    READ STORM    |    Filename: C:\Users\JJohnston\AppD
|                  |              ata\Local\Temp\
|                  |              baa61f21-ed59-4247-96b4-d9df3dc6eb52\24d7f49a
| Ptotal= 73.10 mm |    Comments: 25YR 12HR SCS
--------------------
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.25    1.83 |  3.25    2.92 |'  6.25   13.16 |  9.25    2.56
               0.50    1.83 |  3.50    2.92 |'  6.50   13.16 |  9.50    2.56
               0.75    1.83 |  3.75    2.92 |'  6.75    5.85 |  9.75    2.56
               1.00    1.83 |  4.00    2.92 |'  7.00    5.85 | 10.00    2.56
               1.25    1.83 |  4.25    4.39 |'  7.25    4.39 | 10.25    1.46
               1.50    1.83 |  4.50    4.39 |'  7.50    4.39 | 10.50    1.46
               1.75    1.83 |  4.75    5.85 |'  7.75    4.39 | 10.75    1.46
               2.00    1.83 |  5.00    5.85 |'  8.00    4.39 | 11.00    1.46
               2.25    2.19 |  5.25    8.77 |'  8.25    2.56 | 11.25    1.46
               2.50    2.19 |  5.50    8.77 |'  8.50    2.56 | 11.50    1.46
               2.75    2.19 |  5.75   35.09 |'  8.75    2.56 | 11.75    1.46
               3.00    2.19 |  6.00   96.49 |'  9.00    2.56 | 12.00    1.46

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

--------------------
| CALIB            |
| NASHYD  (  0250)|   Area    (ha)=   1.25   Curve Number   (CN)= 72.0
|ID= 1 DT=12.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.15

        NOTE:  RAINFALL WAS TRANSFORMED TO  12.0 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
               0.200    1.83 | 3.200    2.92 | 6.200   13.16 |  9.20    2.56
               0.400    1.83 | 3.400    2.92 | 6.400   13.16 |  9.40    2.56
               0.600    1.83 | 3.600    2.92 | 6.600    9.50 |  9.60    2.56
               0.800    1.83 | 3.800    2.92 | 6.800    5.85 |  9.80    2.56
               1.000    1.83 | 4.000    2.92 | 7.000    5.85 | 10.00    2.56
               1.200    1.83 | 4.200    4.39 | 7.200    4.39 | 10.20    1.46
               1.400    1.83 | 4.400    4.39 | 7.400    4.39 | 10.40    1.46
               1.600    1.83 | 4.600    5.12 | 7.600    4.39 | 10.60    1.46
               1.800    1.83 | 4.800    5.85 | 7.800    4.39 | 10.80    1.46
               2.000    1.83 | 5.000    5.85 | 8.000    4.39 | 11.00    1.46
               2.200    2.19 | 5.200    8.77 | 8.200    2.56 | 11.20    1.46
               2.400    2.19 | 5.400    8.77 | 8.400    2.56 | 11.40    1.46
               2.600    2.19 | 5.600   21.93 | 8.600    2.56 | 11.60    1.46
               2.800    2.19 | 5.800   50.44 | 8.800    2.56 | 11.80    1.46
               3.000    2.19 | 6.000   96.49 | 9.000    2.56 | 12.00    1.46

    Unit Hyd Qpeak  (cms)=   0.318

    PEAK FLOW       (cms)=   0.114 (i)
    TIME TO PEAK    (hrs)=   6.000
    RUNOFF VOLUME    (mm)=  24.303
    TOTAL RAINFALL   (mm)=  73.100
    RUNOFF COEFFICIENT   =   0.332

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0209)|   Area    (ha)=   5.20
|ID= 1 DT=12.0 min |   Total Imp(%)=  31.60   Dir. Conn.(%)=  19.40
--------------------
                                IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=        1.64          3.56
    Dep. Storage     (mm)=        1.00          1.50
    Average Slope     (%)=        1.00          2.00
    Length            (m)=      186.19         40.00
    Mannings n            =       0.013         0.250

    Max.Eff.Inten.(mm/hr)=       96.49         56.68
              over (min)         12.00         24.00
    Storage Coeff.  (min)=        3.76 (ii)    12.62 (ii)
    Unit Hyd. Tpeak (min)=       12.00         24.00
    Unit Hyd. peak  (cms)=        0.14          0.07
                                                          *TOTALS*
    PEAK FLOW       (cms)=        0.26          0.33          0.515 (iii)
    TIME TO PEAK    (hrs)=        6.00          6.20          6.00
    RUNOFF VOLUME    (mm)=       72.10         30.59         38.64
    TOTAL RAINFALL   (mm)=       73.10         73.10         73.10
    RUNOFF COEFFICIENT   =        0.99          0.42          0.53

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN*  =  69.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

--------------------
| ADD HYD  (  0251)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0209):     5.20    0.515     6.00    38.64
     + ID2= 2 (  0250):     1.25    0.114     6.00    24.30
       ========================================================
       ID = 3 (  0251):     6.45    0.629     6.00    35.86

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0245)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.3090     0.2876
                          0.0000     0.0000   |   0.3330     0.3838
                          0.1230     0.1102   |   0.3620     0.5200
                          0.2870     0.1971   |   0.0000     0.0000

                             AREA     QPEAK     TPEAK       R.V.
                             (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0251)     6.450     0.629     6.00       35.86
   OUTFLOW: ID= 1 (  0245)     6.450     0.130     6.80       35.83

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 20.67
                  TIME SHIFT OF PEAK FLOW          (min)= 48.00
                  MAXIMUM  STORAGE   USED        (ha.m.)=  0.1146

--------------------------------------------------------------------------------
--------------------
| ROUTEPIPE(  0212)|     PIPE Number      =   1.00
| IN= 2---> OUT= 1 |     Diameter     (mm)=1650.00
| DT= 12.0 min     |     Length        (m)= 850.00
--------------------     Slope       (m/m)=  0.005
                         Manning n         =  0.013
```

COLE ENGINEERING

Experience Enhancing Excellence

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

DEPTH (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME min
0.09	.367E+02	0.0	0.80	17.68
0.17	.102E+03	0.1	1.25	11.33
0.26	.184E+03	0.3	1.61	8.81
0.35	.278E+03	0.6	1.91	7.41
0.43	.382E+03	1.0	2.18	6.51
0.52	.492E+03	1.4	2.41	5.88
0.61	.608E+03	1.9	2.61	5.43
0.69	.727E+03	2.4	2.79	5.08
0.78	.848E+03	2.9	2.95	4.81
0.87	.970E+03	3.5	3.08	4.60
0.96	.109E+04	4.1	3.20	4.43
1.04	.121E+04	4.7	3.29	4.31
1.13	.133E+04	5.2	3.36	4.22
1.22	.144E+04	5.8	3.41	4.15
1.30	.154E+04	6.2	3.44	4.12
1.39	.163E+04	6.6	3.43	4.13
1.48	.172E+04	6.9	3.40	4.17
1.56	.178E+04	6.9	3.31	4.28
1.65	.182E+04	6.5	3.02	4.70

	<---- hydrograph ----> AREA (ha)	OPEAK (cms)	TPEAK (hrs)	R.V. (mm)	<-pipe / channel-> MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 2 (0245)	6.45	0.13	6.80	35.83	0.16	1.14
OUTFLOW: ID= 1 (0212)	6.45	0.13	6.80	35.82	0.16	1.13

CALIB
STANDHYD (0160) ID= 1 DT=12.0 min

Area (ha)= 1.50 Total Imp(%)= 50.70 Dir. Conn.(%)= 22.00

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	0.76	0.74
Dep. Storage (mm)=	1.00	1.50
Average Slope (%)=	1.00	2.00
Length (m)=	100.00	40.00
Mannings n =	0.013	0.250
Max.Eff.Inten.(mm/hr)= over (min)	96.49 12.00	89.67 12.00
Storage Coeff. (min)=	2.59 (ii)	9.96 (ii)
Unit Hyd. Tpeak (min)=	12.00	12.00
Unit Hyd. peak (cms)=	0.14	0.10

		TOTALS
PEAK FLOW	(cms)=	0.09 0.15 0.235 (iii)
TIME TO PEAK	(hrs)=	6.00 6.00 6.00
RUNOFF VOLUME	(mm)=	72.10 36.08 44.00
TOTAL RAINFALL	(mm)=	73.10 73.10 73.10
RUNOFF COEFFICIENT	=	0.99 0.49 0.60

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

DUHYD (0183)
Inlet Cap.= 0.152
#of Inlets= 1
Total(cms)= 0.2

	AREA (ha)	OPEAK (cms)	TPEAK (hrs)	R.V. (mm)
TOTAL HYD.(ID= 1):	1.50	0.23	6.00	44.00
MAJOR SYS.(ID= 2):	0.14	0.08	6.00	44.00
MINOR SYS.(ID= 3):	1.36	0.15	6.00	44.00

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB
STANDHYD (0193) ID= 1 DT=12.0 min

Area (ha)= 1.21 Total Imp(%)= 49.30 Dir. Conn.(%)= 20.10

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	0.60	0.61
Dep. Storage (mm)=	1.00	1.50
Average Slope (%)=	1.00	2.00
Length (m)=	89.81	40.00
Mannings n =	0.013	0.250
Max.Eff.Inten.(mm/hr)= over (min)	96.49 12.00	89.14 12.00
Storage Coeff. (min)=	2.43 (ii)	9.82 (ii)
Unit Hyd. Tpeak (min)=	12.00	12.00
Unit Hyd. peak (cms)=	0.14	0.10

		TOTALS
PEAK FLOW	(cms)=	0.06 0.12 0.186 (iii)
TIME TO PEAK	(hrs)=	6.00 6.00 6.00
RUNOFF VOLUME	(mm)=	72.10 36.01 43.26
TOTAL RAINFALL	(mm)=	73.10 73.10 73.10
RUNOFF COEFFICIENT	=	0.99 0.49 0.59

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

DUHYD (0227)
Inlet Cap.= 0.120
#of Inlets= 1
Total(cms)= 0.1

	AREA (ha)	OPEAK (cms)	TPEAK (hrs)	R.V. (mm)
TOTAL HYD.(ID= 1):	1.21	0.19	6.00	43.26
MAJOR SYS.(ID= 2):	0.11	0.07	6.00	43.26
MINOR SYS.(ID= 3):	1.10	0.12	6.00	43.26

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB
STANDHYD (0206) ID= 1 DT=12.0 min

Area (ha)= 39.16 Total Imp(%)= 54.20 Dir. Conn.(%)= 23.20

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	21.22	17.94
Dep. Storage (mm)=	1.00	1.50
Average Slope (%)=	1.00	2.00
Length (m)=	510.95	40.00
Mannings n =	0.013	0.250
Max.Eff.Inten.(mm/hr)= over (min)	96.49 12.00	97.85 24.00
Storage Coeff. (min)=	6.90 (ii)	14.01 (ii)
Unit Hyd. Tpeak (min)=	12.00	24.00
Unit Hyd. peak (cms)=	0.12	0.06

		TOTALS
PEAK FLOW	(cms)=	2.21 2.79 4.353 (iii)
TIME TO PEAK	(hrs)=	6.00 6.20 6.00
RUNOFF VOLUME	(mm)=	72.10 37.17 45.27
TOTAL RAINFALL	(mm)=	73.10 73.10 73.10
RUNOFF COEFFICIENT	=	0.99 0.51 0.62

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0225)
1 + 2 = 3

	AREA (ha)	OPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0183):	0.14	0.083	6.00	44.00
+ ID2= 2 (0206):	39.16	4.353	6.00	45.27
ID = 3 (0225):	39.30	4.436	6.00	45.27

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```
| ADD HYD  (  0225)|
|   3 +  2 =  1    |          AREA    OPEAK    TPEAK     R.V.
-------------------           (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0225):    39.30   4.436     6.00     45.27
      + ID2= 2 (  0227):     0.11   0.066     6.00     43.26
        ==============================================
        ID = 1 (  0225):    39.41   4.503     6.00     45.26

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
-------------------
| ADD HYD  (  0211)|
|   1 +  2 =  3    |          AREA    OPEAK    TPEAK     R.V.
-------------------           (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0212):     6.45   0.130     6.80     35.82
      + ID2= 2 (  0225):    39.41   4.503     6.00     45.26
        ==============================================
        ID = 3 (  0211):    45.86   4.540     6.00     43.94

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
-------------------
| RESERVOIR(  0241)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
-------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                         0.0000     0.0000   |   1.6250      1.2448
                         0.0190     0.1627   |   1.6630      1.2997
                         0.0360     0.4306   |   1.8430      1.5816
                         0.0480     0.7217   |   2.1300      2.1197
                         0.1330     0.7718   |   2.9680      2.2465
                         1.0390     0.9773   |   7.5380      2.5741

                                    AREA     OPEAK     TPEAK       R.V.
                                    (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0211)        45.856     4.540      6.00      43.94
   OUTFLOW: ID= 1 (  0241)        45.856     1.192      6.80      43.89

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 26.25
                  TIME SHIFT OF PEAK FLOW         (min)= 48.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  1.0529

--------------------------------------------------------------------------------
-------------------
| CALIB            |
| STANDHYD (  0228)|   Area    (ha)=  13.94
|ID= 1 DT=12.0 min |   Total Imp(%)=  47.50   Dir. Conn.(%)=  22.30
-------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       6.62         7.32
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     304.85        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      96.49        81.01
           over (min)     =      12.00        24.00
     Storage Coeff.  (min)=       5.06 (ii)   12.74 (ii)
     Unit Hyd. Tpeak (min)=      12.00        24.00
     Unit Hyd. peak  (cms)=       0.13         0.07
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.79         0.97          1.540 (iii)
     TIME TO PEAK    (hrs)=       6.00         6.20          6.00
     RUNOFF VOLUME    (mm)=      72.10        34.83         43.14
     TOTAL RAINFALL   (mm)=      73.10        73.10         73.10
     RUNOFF COEFFICIENT   =       0.99         0.48          0.59

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =  69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
             THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
-------------------
| RESERVOIR(  0243)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
-------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                         0.0000     0.0000   |   0.8570      0.5282
                         0.1680     0.0173   |   0.9360      0.6538
                         0.4120     0.1031   |   1.0080      0.7859
                         0.5570     0.1976   |   1.0760      0.9234
                         0.6720     0.3000   |   1.1270      1.0373
                         0.7700     0.4102   |   1.1760      1.1552

                                    AREA     OPEAK     TPEAK       R.V.
                                    (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0228)        13.940     1.540      6.00      43.14
   OUTFLOW: ID= 1 (  0243)        13.940     0.543      6.60      43.14

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 35.26
                  TIME SHIFT OF PEAK FLOW         (min)= 36.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.1923

--------------------------------------------------------------------------------
-------------------
| ROUTEPIPE(  0184)|     PIPE Number      =   1.00
| IN= 2---> OUT= 1 |     Diameter     (mm)=1650.00
| DT= 12.0 min     |     Length        (m)= 500.00
-------------------      Slope       (m/m)=  0.005
                         Manning n         =  0.013

     <----------------- TRAVEL TIME TABLE ------------------->
       DEPTH      VOLUME     FLOW RATE     VELOCITY     TRAV.TIME
        (m)     (cu.m.)        (cms)        (m/s)          min
       0.09     .216E+02        0.0         0.80          10.40
       0.17     .600E+02        0.1         1.25           6.67
       0.26     .108E+03        0.3         1.61           5.18
       0.35     .164E+03        0.6         1.91           4.36
       0.43     .225E+03        1.0         2.18           3.83
       0.52     .290E+03        1.4         2.41           3.46
       0.61     .358E+03        1.9         2.61           3.19
       0.69     .428E+03        2.4         2.79           2.99
       0.78     .499E+03        2.9         2.95           2.83
       0.87     .570E+03        3.5         3.08           2.70
       0.96     .642E+03        4.1         3.20           2.61
       1.04     .712E+03        4.7         3.29           2.53
       1.13     .780E+03        5.2         3.36           2.48
       1.22     .844E+03        5.8         3.41           2.44
       1.30     .905E+03        6.2         3.44           2.43
       1.39     .961E+03        6.6         3.43           2.43
       1.48     .101E+04        6.9         3.40           2.45
       1.56     .105E+04        6.9         3.31           2.52
       1.65     .107E+04        6.5         3.02           2.76

                                    <---- hydrograph ---->    <-pipe / channel->
                                    AREA     OPEAK    TPEAK   R.V.   MAX DEPTH  MAX VEL
                                    (ha)     (cms)    (hrs)   (mm)       (m)      (m/s)
   INFLOW : ID= 2 (  0243)        13.94      0.54     6.60   43.14      0.32       1.81
   OUTFLOW: ID= 1 (  0184)        13.94      0.55     6.60   43.14      0.32       1.81

--------------------------------------------------------------------------------
-------------------
| CALIB            |
| STANDHYD (  0229)|   Area    (ha)=  10.23
|ID= 1 DT=12.0 min |   Total Imp(%)=  30.10   Dir. Conn.(%)=  15.10
-------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       3.08         7.15
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     261.15        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      96.49        59.49
           over (min)     =      12.00        24.00
     Storage Coeff.  (min)=       4.61 (ii)   13.30 (ii)
     Unit Hyd. Tpeak (min)=      12.00        24.00
     Unit Hyd. peak  (cms)=       0.13         0.06
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.40         0.68          0.918 (iii)
     TIME TO PEAK    (hrs)=       6.00         6.20          6.00
     RUNOFF VOLUME    (mm)=      72.10        31.15         37.33
     TOTAL RAINFALL   (mm)=      73.10        73.10         73.10
     RUNOFF COEFFICIENT   =       0.99         0.43          0.51

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =  69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
             THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
```

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

-------------------
| ADD HYD  (  0196)|
|   1 +  2 =  3    |          AREA     QPEAK     TPEAK      R.V.
-------------------           (ha)     (cms)     (hrs)      (mm)
        ID1= 1 (  0184):     13.94    0.547      6.60     43.14
      + ID2= 2 (  0229):     10.23    0.918      6.00     37.33
        =====================================================
        ID = 3 (  0196):     24.17    1.246      6.20     40.68

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

-------------------
| RESERVOIR(  0244)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
-------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                         0.0000     0.0000   |   0.6510      0.4564
                         0.1220     0.0863   |   0.8770      0.7894
                         0.3620     0.1603   |   0.0000      0.0000

                                   AREA      QPEAK      TPEAK       R.V.
                                   (ha)      (cms)      (hrs)       (mm)
   INFLOW : ID= 2 (  0196)      24.170       1.246       6.20       40.68
   OUTFLOW: ID= 1 (  0244)      24.170       0.528       7.40       40.67

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 42.37
                  TIME SHIFT OF PEAK FLOW          (min)= 72.00
                  MAXIMUM  STORAGE   USED        (ha.m.)=  0.3305

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

-------------------
| CALIB            |
| STANDHYD (  0230)|   Area     (ha)=  24.32
|ID= 1 DT=12.0 min |   Total Imp(%)=  47.50   Dir. Conn.(%)=  29.30
-------------------

                         IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=    11.55         12.77
     Dep. Storage     (mm)=     1.00          1.50
     Average Slope     (%)=     1.00          2.00
     Length            (m)=   402.66         40.00
     Mannings n           =     0.013         0.250

     Max.Eff.Inten.(mm/hr)=    96.49         70.01
               over (min)      12.00         24.00
     Storage Coeff.  (min)=     5.98 (ii)    14.12 (ii)
     Unit Hyd. Tpeak (min)=    12.00         24.00
     Unit Hyd. peak  (cms)=     0.12          0.06
                                                    *TOTALS*
     PEAK FLOW       (cms)=     1.78          1.41      2.849 (iii)
     TIME TO PEAK    (hrs)=     6.00          6.20      6.00
     RUNOFF VOLUME    (mm)=    72.10         33.06     44.50
     TOTAL RAINFALL   (mm)=    73.10         73.10     73.10
     RUNOFF COEFFICIENT   =     0.99          0.45      0.61

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

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN*  =  69.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

-------------------
| ADD HYD  (  0224)|
|   1 +  2 =  3    |          AREA     QPEAK     TPEAK      R.V.
-------------------           (ha)     (cms)     (hrs)      (mm)
        ID1= 1 (  0230):     24.32    2.849      6.00     44.50
      + ID2= 2 (  0244):     24.17    0.528      7.40     40.67
        =====================================================
        ID = 3 (  0224):     48.49    3.144      6.00     42.59

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

-------------------
| RESERVOIR(  0247)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
-------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                         0.0000     0.0000   |   0.6390      0.9848
                         0.0270     0.1457   |   0.9700      1.2900
                         0.0430     0.3152   |   1.1040      1.7480
                         0.0530     0.4653   |   3.3100      1.9350
                         0.3280     0.6677   |  11.3140      2.2662

                                   AREA      QPEAK      TPEAK       R.V.
                                   (ha)      (cms)      (hrs)       (mm)
   INFLOW : ID= 2 (  0224)      48.490       3.144       6.00       42.59
   OUTFLOW: ID= 1 (  0247)      48.490       0.622       8.60       42.57

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 19.80
                  TIME SHIFT OF PEAK FLOW          (min)=156.00
                  MAXIMUM  STORAGE   USED        (ha.m.)=  0.9680

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

       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)\Visual OTTHYMO 5.0\VO2\voin.dat
  Output  filename: C:\Users\JJohnston\AppData\Local\Civica\VH5\a379672b-db33-4372-b5e0-
ba58a07d1417\f5baa478-61fd-4c7a-ab29-171597ea6b3c\sc
  Summary filename: C:\Users\JJohnston\AppData\Local\Civica\VH5\a379672b-db33-4372-b5e0-
ba58a07d1417\f5baa478-61fd-4c7a-ab29-171597ea6b3c\sc


DATE: 03/21/2018                          TIME: 02:36:59

USER:


COMMENTS:

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


--------------------
|    READ STORM    |    Filename: C:\Users\JJohnston\AppD
|                  |              ata\Local\Temp\
|                  |              baa61f21-ed59-4247-96b4-d9df3dc6eb52\4ca97a92
| Ptotal= 80.80 mm |    Comments: 50YR 12HR SCS
--------------------
                TIME     RAIN |  TIME     RAIN |  TIME     RAIN |  TIME     RAIN
                 hrs    mm/hr |   hrs    mm/hr |   hrs    mm/hr |   hrs    mm/hr
                0.25     2.02 |  3.25     3.23 |  6.25    14.54 |  9.25     2.83
                0.50     2.02 |  3.50     3.23 |  6.50    14.54 |  9.50     2.83
                0.75     2.02 |  3.75     3.23 |  6.75     6.46 |  9.75     2.83
                1.00     2.02 |  4.00     3.23 |  7.00     6.46 | 10.00     2.83
                1.25     2.02 |  4.25     4.85 |  7.25     4.85 | 10.25     1.62
                1.50     2.02 |  4.50     4.85 |  7.50     4.85 | 10.50     1.62
                1.75     2.02 |  4.75     6.46 |  7.75     4.85 | 10.75     1.62
                2.00     2.02 |  5.00     6.46 |  8.00     4.85 | 11.00     1.62
                2.25     2.42 |  5.25     9.70 |  8.25     2.83 | 11.25     1.62
                2.50     2.42 |  5.50     9.70 |  8.50     2.83 | 11.50     1.62
                2.75     2.42 |  5.75    38.78 |  8.75     2.83 | 11.75     1.62
                3.00     2.42 |  6.00   106.66 |  9.00     2.83 | 12.00     1.62

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

-------------------
| CALIB            |
| NASHYD  (  0250)|   Area     (ha)=   1.25   Curve Number    (CN)= 72.0
|ID= 1 DT=12.0 min |   Ia       (mm)=   5.00   # of Linear Res.(N)= 3.00
-------------------   U.H. Tp(hrs)=   0.15
```

NOTE: RAINFALL WAS TRANSFORMED TO 12.0 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
0.200	2.02	3.200	3.23	6.200	14.54	9.20	2.83
0.400	2.02	3.400	3.23	6.400	14.54	9.40	2.83
0.600	2.02	3.600	3.23	6.600	10.50	9.60	2.83
0.800	2.02	3.800	3.23	6.800	6.46	9.80	2.83
1.000	2.02	4.000	3.23	7.000	6.46	10.00	2.83
1.200	2.02	4.200	4.85	7.200	4.85	10.20	1.62
1.400	2.02	4.400	4.85	7.400	4.85	10.40	1.62
1.600	2.02	4.600	5.66	7.600	4.85	10.60	1.62
1.800	2.02	4.800	6.46	7.800	4.85	10.80	1.62
2.000	2.02	5.000	6.46	8.000	4.85	11.00	1.62
2.200	2.42	5.200	9.70	8.200	2.83	11.20	1.62
2.400	2.42	5.400	9.70	8.400	2.83	11.40	1.62
2.600	2.42	5.600	24.24	8.600	2.83	11.60	1.62
2.800	2.42	5.800	55.75	8.800	2.83	11.80	1.62
3.000	2.42	6.000	106.66	9.000	2.83	12.00	1.62

Unit Hyd Qpeak (cms)= 0.318

PEAK FLOW (cms)= 0.135 (i)
TIME TO PEAK (hrs)= 6.000
RUNOFF VOLUME (mm)= 28.781
TOTAL RAINFALL (mm)= 80.800
RUNOFF COEFFICIENT = 0.356

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

CALIB
STANDHYD (0209)| Area (ha)= 5.20
ID= 1 DT=12.0 min | Total Imp(%)= 31.60 Dir. Conn.(%)= 19.40

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	1.64	3.56
Dep. Storage (mm)=	1.00	1.50
Average Slope (%)=	1.00	2.00
Length (m)=	186.19	40.00
Mannings n =	0.013	0.250
Max.Eff.Inten.(mm/hr)=	106.66	66.44
over (min)	12.00	12.00
Storage Coeff. (min)=	3.62 (ii)	11.93 (ii)
Unit Hyd. Tpeak (min)=	12.00	12.00
Unit Hyd. peak (cms)=	0.14	0.09

		TOTALS
PEAK FLOW (cms)=	0.29	0.779 (iii)
TIME TO PEAK (hrs)=	6.00	6.00
RUNOFF VOLUME (mm)=	79.80	35.86	44.38
TOTAL RAINFALL (mm)=	80.80	80.80	80.80
RUNOFF COEFFICIENT =	0.99	0.44	0.55

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
YOU SHOULD CONSIDER SPLITTING THE AREA.

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0251)|
1 + 2 = 3 |

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0209):	5.20	0.779	6.00	44.38
+ ID2= 2 (0250):	1.25	0.135	6.00	28.78
ID = 3 (0251):	6.45	0.914	6.00	41.36

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0245)|
IN= 2---> OUT= 1 |
DT= 12.0 min | OUTFLOW STORAGE | OUTFLOW STORAGE

(cms)	(ha.m.)	(cms)	(ha.m.)
0.0000	0.0000	0.3090	0.2876
0.0000	0.0000	0.3330	0.3838
0.1230	0.1102	0.3620	0.5200
0.2870	0.1971	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0251)	6.450	0.914	6.00	41.36
OUTFLOW: ID= 1 (0245)	6.450	0.164	6.60	41.33

PEAK FLOW REDUCTION [Qout/Qin](%)= 17.94
TIME SHIFT OF PEAK FLOW (min)= 36.00
MAXIMUM STORAGE USED (ha.m.)= 0.1322

ROUTEPIPE(0212)|
IN= 2---> OUT= 1 |
DT= 12.0 min |

PIPE Number = 1.00
Diameter (mm)=1650.00
Length (m)= 850.00
Slope (m/m)= 0.005
Manning n = 0.013

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

DEPTH (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME min
0.09	.367E+02	0.0	0.80	17.68
0.17	.102E+03	0.1	1.25	11.33
0.26	.184E+03	0.3	1.61	8.81
0.35	.278E+03	0.6	1.91	7.41
0.43	.382E+03	1.0	2.18	6.51
0.52	.492E+03	1.4	2.41	5.88
0.61	.608E+03	1.9	2.61	5.43
0.69	.727E+03	2.4	2.79	5.08
0.78	.848E+03	2.9	2.95	4.81
0.87	.970E+03	3.5	3.08	4.60
0.96	.109E+04	4.1	3.20	4.43
1.04	.121E+04	4.7	3.29	4.31
1.13	.133E+04	5.2	3.36	4.22
1.22	.144E+04	5.8	3.41	4.15
1.30	.154E+04	6.2	3.44	4.12
1.39	.163E+04	6.6	3.43	4.13
1.48	.172E+04	6.9	3.40	4.17
1.56	.178E+04	6.9	3.31	4.28
1.65	.182E+04	6.5	3.02	4.70

<---- hydrograph ----> <-pipe / channel->

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 2 (0245)	6.45	0.16	6.60	41.33	0.18	1.27
OUTFLOW: ID= 1 (0212)	6.45	0.16	6.80	41.32	0.18	1.27

CALIB
STANDHYD (0160)| Area (ha)= 1.50
ID= 1 DT=12.0 min | Total Imp(%)= 50.70 Dir. Conn.(%)= 22.00

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	0.76	0.74
Dep. Storage (mm)=	1.00	1.50
Average Slope (%)=	1.00	2.00
Length (m)=	100.00	40.00
Mannings n =	0.013	0.250
Max.Eff.Inten.(mm/hr)=	106.66	104.16
over (min)	12.00	12.00
Storage Coeff. (min)=	2.49 (ii)	9.43 (ii)
Unit Hyd. Tpeak (min)=	12.00	12.00
Unit Hyd. peak (cms)=	0.14	0.10

		TOTALS
PEAK FLOW (cms)=	0.10	0.17	0.271 (iii)
TIME TO PEAK (hrs)=	6.00	6.00	6.00
RUNOFF VOLUME (mm)=	79.80	41.96	50.28
TOTAL RAINFALL (mm)=	80.80	80.80	80.80
RUNOFF COEFFICIENT =	0.99	0.52	0.62

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

```
-------------------
| DUHYD    (  0183)|
| Inlet Cap.= 0.152|
| #of Inlets=    1|
| Total(cms)=  0.2|      AREA     QPEAK     TPEAK    R.V.
-------------------      (ha)     (cms)     (hrs)    (mm)
     TOTAL HYD.(ID= 1):   1.50      0.27      6.00   50.28
     ==========================================================
     MAJOR SYS.(ID= 2):   0.17      0.12      6.00   50.28
     MINOR SYS.(ID= 3):   1.33      0.15      6.00   50.28

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
-------------------
| CALIB             |
| STANDHYD (  0193)|   Area    (ha)=   1.21
|ID= 1 DT=12.0 min |   Total Imp(%)=  49.30   Dir. Conn.(%)=  20.10
-------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        0.60          0.61
     Dep. Storage     (mm)=        1.00          1.50
     Average Slope     (%)=        1.00          2.00
     Length            (m)=       89.81         40.00
     Mannings n            =       0.013         0.250

     Max.Eff.Inten.(mm/hr)=      106.66        103.56
               over (min)        12.00         12.00
     Storage Coeff.  (min)=        2.33 (ii)     9.29 (ii)
     Unit Hyd. Tpeak (min)=       12.00         12.00
     Unit Hyd. peak  (cms)=        0.14          0.10
                                                      *TOTALS*
     PEAK FLOW       (cms)=        0.07          0.14          0.216 (iii)
     TIME TO PEAK    (hrs)=        6.00          6.00          6.00
     RUNOFF VOLUME    (mm)=       79.80         41.87         49.49
     TOTAL RAINFALL   (mm)=       80.80         80.80         80.80
     RUNOFF COEFFICIENT   =        0.99          0.52          0.61

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
-------------------
| DUHYD    (  0227)|
| Inlet Cap.= 0.120|
| #of Inlets=    1|
| Total(cms)=  0.1|      AREA     QPEAK     TPEAK    R.V.
-------------------      (ha)     (cms)     (hrs)    (mm)
     TOTAL HYD.(ID= 1):   1.21      0.22      6.00   49.49
     ==========================================================
     MAJOR SYS.(ID= 2):   0.14      0.10      6.00   49.49
     MINOR SYS.(ID= 3):   1.07      0.12      6.00   49.49

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
-------------------
| CALIB             |
| STANDHYD (  0206)|   Area    (ha)=  39.16
|ID= 1 DT=12.0 min |   Total Imp(%)=  54.20   Dir. Conn.(%)=  23.20
-------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       21.22         17.94
     Dep. Storage     (mm)=        1.00          1.50
     Average Slope     (%)=        1.00          2.00
     Length            (m)=      510.95         40.00
     Mannings n            =       0.013         0.250

     Max.Eff.Inten.(mm/hr)=      106.66        113.46
               over (min)        12.00         24.00
     Storage Coeff.  (min)=        6.62 (ii)    13.33 (ii)
     Unit Hyd. Tpeak (min)=       12.00         24.00
     Unit Hyd. peak  (cms)=        0.12          0.06
                                                      *TOTALS*
     PEAK FLOW       (cms)=        2.46          3.30          5.016 (iii)
     TIME TO PEAK    (hrs)=        6.00          6.20          6.00
     RUNOFF VOLUME    (mm)=       79.80         43.15         51.65
     TOTAL RAINFALL   (mm)=       80.80         80.80         80.80
     RUNOFF COEFFICIENT   =        0.99          0.53          0.64

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
-------------------
| ADD HYD  (  0225)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0183):      0.17    0.119     6.00    50.28
     + ID2= 2 (  0206):     39.16    5.016     6.00    51.65
       ========================================================
       ID = 3 (  0225):     39.33    5.135     6.00    51.65

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
-------------------
| ADD HYD  (  0225)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0225):     39.33    5.135     6.00    51.65
     + ID2= 2 (  0227):      0.14    0.096     6.00    49.49
       ========================================================
       ID = 1 (  0225):     39.47    5.231     6.00    51.64

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
-------------------
| ADD HYD  (  0211)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0212):      6.45    0.164     6.80    41.32
     + ID2= 2 (  0225):     39.47    5.231     6.00    51.64
       ========================================================
       ID = 3 (  0211):     45.92    5.283     6.00    50.19

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
-------------------
| RESERVOIR(  0241)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
-------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                         0.0000     0.0000   |   1.6250      1.2448
                         0.0190     0.1627   |   1.6630      1.2997
                         0.0360     0.4306   |   1.8430      1.5816
                         0.0480     0.7217   |   2.1300      2.1197
                         0.1330     0.7718   |   2.9680      2.2465
                         1.0390     0.9773   |   7.5380      2.5741

                              AREA     QPEAK     TPEAK       R.V.
                              (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0211)     45.920     5.283      6.00      50.19
   OUTFLOW: ID= 1 (  0241)     45.920     1.450      6.60      50.14

                PEAK   FLOW   REDUCTION [Qout/Qin](%)= 27.45
                TIME SHIFT OF PEAK FLOW          (min)= 36.00
                MAXIMUM  STORAGE   USED        (ha.m.)=  1.1729

-------------------------------------------------------------------------------
-------------------
| CALIB             |
| STANDHYD (  0228)|   Area    (ha)=  13.94
|ID= 1 DT=12.0 min |   Total Imp(%)=  47.50   Dir. Conn.(%)=  22.30
-------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        6.62          7.32
     Dep. Storage     (mm)=        1.00          1.50
     Average Slope     (%)=        1.00          2.00
     Length            (m)=      304.85         40.00
     Mannings n            =       0.013         0.250

     Max.Eff.Inten.(mm/hr)=      106.66         94.30
               over (min)        12.00         24.00
     Storage Coeff.  (min)=        4.86 (ii)    12.08 (ii)
     Unit Hyd. Tpeak (min)=       12.00         24.00
     Unit Hyd. peak  (cms)=        0.13          0.07
```

			TOTALS
PEAK FLOW	(cms)=	0.88	1.15	1.774 (iii)
TIME TO PEAK	(hrs)=	6.00	6.20	6.00
RUNOFF VOLUME	(mm)=	79.80	40.57	49.32
TOTAL RAINFALL	(mm)=	80.80	80.80	80.80
RUNOFF COEFFICIENT	=	0.99	0.50	0.61

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EOUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

| RESERVOIR(0243)
| IN= 2---> OUT= 1
| DT= 12.0 min

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.8570	0.5282
0.1680	0.0173	0.9360	0.6538
0.4120	0.1031	1.0080	0.7859
0.5570	0.1976	1.0760	0.9234
0.6720	0.3000	1.1270	1.0373
0.7700	0.4102	1.1760	1.1552

		AREA (ha)	OPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0228)		13.940	1.774	6.00	49.32
OUTFLOW: ID= 1 (0243)		13.940	0.590	6.60	49.32

PEAK FLOW REDUCTION (Qout/Qin)(%)= 33.26
TIME SHIFT OF PEAK FLOW (min)= 36.00
MAXIMUM STORAGE USED (ha.m.)= 0.2306

| ROUTEPIPE(0184)
| IN= 2---> OUT= 1
| DT= 12.0 min

PIPE Number = 1.00
Diameter (mm)=1650.00
Length (m)= 500.00
Slope (m/m)= 0.005
Manning n = 0.013

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

DEPTH (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME min
0.09	.216E+02	0.0	0.80	10.40
0.17	.600E+02	0.1	1.25	6.67
0.26	.108E+03	0.3	1.61	5.18
0.35	.164E+03	0.6	1.91	4.36
0.43	.225E+03	1.0	2.18	3.83
0.52	.290E+03	1.4	2.41	3.46
0.61	.358E+03	1.9	2.61	3.19
0.69	.428E+03	2.4	2.79	2.99
0.78	.499E+03	2.9	2.95	2.83
0.87	.570E+03	3.5	3.08	2.70
0.96	.642E+03	4.1	3.20	2.61
1.04	.712E+03	4.7	3.29	2.53
1.13	.780E+03	5.2	3.36	2.48
1.22	.844E+03	5.8	3.41	2.44
1.30	.905E+03	6.2	3.44	2.43
1.39	.961E+03	6.6	3.43	2.43
1.48	.101E+04	6.9	3.40	2.45
1.56	.105E+04	6.9	3.31	2.52
1.65	.107E+04	6.5	3.02	2.76

		AREA (ha)	<---- hydrograph ----> OPEAK (cms)	TPEAK (hrs)	R.V. (mm)	<-pipe / channel-> MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 2 (0243)		13.94	0.59	6.60	49.32	0.34	1.87
OUTFLOW: ID= 1 (0184)		13.94	0.59	6.60	49.32	0.34	1.87

| CALIB
| STANDHYD (0229)
|ID= 1 DT=12.0 min

Area (ha)= 10.23
Total Imp(%)= 30.10 Dir. Conn.(%)= 15.10

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	3.08	7.15
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	261.15	40.00
Manning n	=	0.013	0.250

Max.Eff.Inten.(mm/hr)=	106.66	69.67	
over (min)	12.00	24.00	
Storage Coeff. (min)=	4.43 (ii)	12.58 (ii)	
Unit Hyd. Tpeak (min)=	12.00	24.00	
Unit Hyd. peak (cms)=	0.13	0.07	

			TOTALS
PEAK FLOW	(cms)=	0.44	0.82	1.068 (iii)
TIME TO PEAK	(hrs)=	6.00	6.20	6.00
RUNOFF VOLUME	(mm)=	79.80	36.48	43.02
TOTAL RAINFALL	(mm)=	80.80	80.80	80.80
RUNOFF COEFFICIENT	=	0.99	0.45	0.53

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
YOU SHOULD CONSIDER SPLITTING THE AREA.

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EOUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

| ADD HYD (0196)
| 1 + 2 = 3

	AREA (ha)	OPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0184):	13.94	0.594	6.60	49.32
+ ID2= 2 (0229):	10.23	1.068	6.00	43.02
ID = 3 (0196):	24.17	1.429	6.20	46.65

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

| RESERVOIR(0244)
| IN= 2---> OUT= 1
| DT= 12.0 min

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.6510	0.4564
0.1220	0.0863	0.8770	0.7894
0.3620	0.1603	0.0000	0.0000

		AREA (ha)	OPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0196)		24.170	1.429	6.20	46.65
OUTFLOW: ID= 1 (0244)		24.170	0.576	7.60	46.65

PEAK FLOW REDUCTION (Qout/Qin)(%)= 40.28
TIME SHIFT OF PEAK FLOW (min)= 84.00
MAXIMUM STORAGE USED (ha.m.)= 0.3799

| CALIB
| STANDHYD (0230)
|ID= 1 DT=12.0 min

Area (ha)= 24.32
Total Imp(%)= 47.50 Dir. Conn.(%)= 29.30

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	11.55	12.77
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	402.66	40.00
Manning n	=	0.013	0.250

Max.Eff.Inten.(mm/hr)=	106.66	81.73	
over (min)	12.00	24.00	
Storage Coeff. (min)=	5.74 (ii)	13.39 (ii)	
Unit Hyd. Tpeak (min)=	12.00	24.00	
Unit Hyd. peak (cms)=	0.12	0.06	

			TOTALS
PEAK FLOW	(cms)=	1.98	1.68	3.265 (iii)
TIME TO PEAK	(hrs)=	6.00	6.20	6.00
RUNOFF VOLUME	(mm)=	79.80	38.62	50.68
TOTAL RAINFALL	(mm)=	80.80	80.80	80.80
RUNOFF COEFFICIENT	=	0.99	0.48	0.63

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EOUAL
THAN THE STORAGE COEFFICIENT.

COLE ENGINEERING

Experience Enhancing Excellence

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

ADD HYD (0224)|	1 + 2 = 3		AREA	QPEAK	TPEAK	R.V.
		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0230):		24.32	3.265	6.00	50.68
+ ID2= 2 (0244):		24.17	0.576	7.60	46.65
ID = 3 (0224):		48.49	3.618	6.00	48.67

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0247)| IN= 2---> OUT= 1	DT= 12.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.6390	0.9848
	0.0270	0.1457	0.9700	1.2900
	0.0430	0.3152	1.1040	1.7480
	0.0530	0.4653	3.3100	1.9350
	0.3280	0.6677	11.3140	2.2662

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0224)	48.490	3.618	6.00	48.67
OUTFLOW: ID= 1 (0247)	48.490	0.720	8.40	48.64

PEAK FLOW REDUCTION [Qout/Qin](%)= 19.91
TIME SHIFT OF PEAK FLOW (min)=144.00
MAXIMUM STORAGE USED (ha.m.)= 1.0600

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 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)\Visual OTTHYMO 5.0\VO2\voin.dat
Output filename: C:\Users\JJohnston\AppData\Local\Civica\VH5\a379672b-db33-4372-b5e0-ba58a07d1417\4b686129-8b18-4264-ad25-71fa1929c181\sc
Summary filename: C:\Users\JJohnston\AppData\Local\Civica\VH5\a379672b-db33-4372-b5e0-ba58a07d1417\4b686129-8b18-4264-ad25-71fa1929c181\sc

DATE: 03/21/2018 TIME: 02:36:59

USER:

COMMENTS:

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

READ STORM	Filename: C:\Users\JJohnston\AppData\Local\Temp\baa61f21-ed59-4247-96b4-d9df3dc6eb52\67b6f165
Ptotal= 88.50 mm	Comments: 100YR 12HR SCS

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	2.21	3.25	3.54	6.25	15.93	9.25	3.10
0.50	2.21	3.50	3.54	6.50	15.93	9.50	3.10
0.75	2.21	3.75	3.54	6.75	7.08	9.75	3.10
1.00	2.21	4.00	3.54	7.00	7.08	10.00	3.10
1.25	2.21	4.25	5.31	7.25	5.31	10.25	1.77
1.50	2.21	4.50	5.31	7.50	5.31	10.50	1.77
1.75	2.21	4.75	7.08	7.75	5.31	10.75	1.77
2.00	2.21	5.00	7.08	8.00	5.31	11.00	1.77
2.25	2.65	5.25	10.62	8.25	3.10	11.25	1.77
2.50	2.65	5.50	10.62	8.50	3.10	11.50	1.77
2.75	2.65	5.75	42.48	8.75	3.10	11.75	1.77
3.00	2.65	6.00	116.82	9.00	3.10	12.00	1.77

CALIB	NASHYD (0250)| ID= 1 DT=12.0 min	Area (ha)= 1.25	Curve Number (CN)= 72.0	Ia (mm)= 5.00	# of Linear Res.(N)= 3.00	U.H. Tp(hrs)= 0.15

NOTE: RAINFALL WAS TRANSFORMED TO 12.0 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
0.200	2.21	3.200	3.54	6.200	15.93	9.20	3.10
0.400	2.21	3.400	3.54	6.400	15.93	9.40	3.10
0.600	2.21	3.600	3.54	6.600	11.51	9.60	3.10
0.800	2.21	3.800	3.54	6.800	7.08	9.80	3.10
1.000	2.21	4.000	3.54	7.000	7.08	10.00	3.10
1.200	2.21	4.200	5.31	7.200	5.31	10.20	1.77
1.400	2.21	4.400	5.31	7.400	5.31	10.40	1.77
1.600	2.21	4.600	6.19	7.600	5.31	10.60	1.77
1.800	2.21	4.800	7.08	7.800	5.31	10.80	1.77
2.000	2.21	5.000	7.08	8.000	5.31	11.00	1.77
2.200	2.65	5.200	10.62	8.200	3.10	11.20	1.77
2.400	2.66	5.400	10.62	8.400	3.10	11.40	1.77
2.600	2.66	5.600	26.55	8.600	3.10	11.60	1.77
2.800	2.66	5.800	61.06	8.800	3.10	11.80	1.77
3.000	2.66	6.000	116.82	9.000	3.10	12.00	1.77

Unit Hyd Qpeak (cms)= 0.318

PEAK FLOW (cms)= 0.157 (i)
TIME TO PEAK (hrs)= 6.000
RUNOFF VOLUME (mm)= 33.450
TOTAL RAINFALL (mm)= 88.500
RUNOFF COEFFICIENT = 0.378

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

CALIB	STANDHYD (0209)| ID= 1 DT=12.0 min	Area (ha)= 5.20	Total Imp(%)= 31.60	Dir. Conn.(%)= 19.40

	IMPERVIOUS	PERVIOUS (i)	
Surface Area (ha)=	1.64	3.56	
Dep. Storage (mm)=	1.00	1.50	
Average Slope (%)=	1.00	2.00	
Length (m)=	186.19	40.00	
Mannings n =	0.013	0.250	
Max.Eff.Inten.(mm/hr)=	116.82	76.56	
over (min)	12.00	12.00	
Storage Coeff. (min)=	3.49 (ii)	11.34 (ii)	
Unit Hyd. Tpeak (min)=	12.00	12.00	
Unit Hyd. peak (cms)=	0.14	0.09	
			TOTALS
PEAK FLOW (cms)=	0.32	0.57	0.895 (iii)
TIME TO PEAK (hrs)=	6.00	6.00	6.00
RUNOFF VOLUME (mm)=	87.50	41.34	50.29
TOTAL RAINFALL (mm)=	88.50	88.50	88.50
RUNOFF COEFFICIENT =	0.99	0.47	0.57

```
***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
             YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| ADD HYD  (  0251)|
|   1 +  2 =  3    |          AREA    OPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0209):     5.20   0.895     6.00    50.29
    + ID2= 2 (  0250):     1.25   0.157     6.00    33.45
      ================================================
      ID = 3 (  0251):     6.45   1.051     6.00    47.03

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0245)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.3090      0.2876
                          0.0000     0.0000   |   0.3330      0.3838
                          0.1230     0.1102   |   0.3620      0.5200
                          0.2870     0.1971   |   0.0000      0.0000

                               AREA     OPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0251)     6.450     1.051      6.00      47.03
   OUTFLOW: ID= 1 (  0245)     6.450     0.196      6.60      46.99

                PEAK   FLOW   REDUCTION (Qout/Qin)(%)= 18.63
                TIME SHIFT OF PEAK FLOW         (min)= 36.00
                MAXIMUM  STORAGE   USED        (ha.m.)=  0.1496

--------------------------------------------------------------------------------
--------------------
| ROUTEPIPE(  0212)|     PIPE Number     =   1.00
| IN= 2---> OUT= 1 |     Diameter    (mm)=1650.00
| DT= 12.0 min     |     Length       (m)= 850.00
--------------------     Slope      (m/m)=  0.005
                         Manning n        =  0.013

     <------------------ TRAVEL TIME TABLE ---------------------->
       DEPTH      VOLUME     FLOW RATE    VELOCITY    TRAV.TIME
        (m)      (cu.m.)       (cms)        (m/s)        min
       0.09     .367E+02        0.0          0.80       17.68
       0.17     .102E+03        0.1          1.25       11.33
       0.26     .184E+03        0.3          1.61        8.81
       0.35     .278E+03        0.6          1.91        7.41
       0.43     .382E+03        1.0          2.18        6.51
       0.52     .492E+03        1.4          2.41        5.88
       0.61     .608E+03        1.9          2.61        5.43
       0.69     .727E+03        2.4          2.79        5.08
       0.78     .848E+03        2.9          2.95        4.81
       0.87     .970E+03        3.5          3.08        4.60
       0.96     .109E+04        4.1          3.20        4.43
       1.04     .121E+04        4.7          3.29        4.31
       1.13     .133E+04        5.2          3.36        4.22
       1.22     .144E+04        5.8          3.41        4.15
       1.30     .154E+04        6.2          3.44        4.12
       1.39     .163E+04        6.6          3.43        4.13
       1.48     .172E+04        6.9          3.40        4.17
       1.56     .178E+04        6.9          3.31        4.28
       1.65     .182E+04        6.5          3.02        4.70
                                <---- hydrograph ---->   <-pipe / channel->
                           AREA    OPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                           (ha)    (cms)   (hrs)   (mm)       (m)      (m/s)
   INFLOW : ID= 2 (  0245)  6.45     0.20    6.60  46.99       0.19      1.32
   OUTFLOW: ID= 1 (  0212)  6.45     0.20    6.60  46.99       0.19      1.32

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0160)|   Area    (ha)=   1.50
|ID= 1 DT=12.0 min |   Total Imp(%)=  50.70   Dir. Conn.(%)=  22.00
--------------------
                                                  IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.76          0.74
     Dep. Storage     (mm)=       1.00          1.50
     Average Slope     (%)=       1.00          2.00
     Length            (m)=     100.00         40.00
     Mannings n           =      0.013         0.250

     Max.Eff.Inten.(mm/hr)=     116.82        119.03
               over (min)       12.00         12.00
     Storage Coeff.  (min)=       2.40 (ii)     8.98 (ii)
     Unit Hyd. Tpeak (min)=      12.00         12.00
     Unit Hyd. peak  (cms)=       0.14          0.10
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.11          0.20          0.309 (iii)
     TIME TO PEAK    (hrs)=       6.00          6.00          6.00
     RUNOFF VOLUME    (mm)=      87.50         48.00         56.69
     TOTAL RAINFALL   (mm)=      88.50         88.50         88.50
     RUNOFF COEFFICIENT   =       0.99          0.54          0.64

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| DUHYD    (  0183)|
| Inlet Cap.= 0.152|
| #of Inlets=    1|
| Total(cms)=   0.2|      AREA     OPEAK     TPEAK     R.V.
--------------------      (ha)     (cms)     (hrs)     (mm)
     TOTAL HYD.(ID= 1):   1.50      0.31      6.00    56.69
     ================================================
     MAJOR SYS.(ID= 2):   0.20      0.16      6.00    56.69
     MINOR SYS.(ID= 3):   1.30      0.15      6.00    56.69

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0193)|   Area    (ha)=   1.21
|ID= 1 DT=12.0 min |   Total Imp(%)=  49.30   Dir. Conn.(%)=  20.10
--------------------
                                                  IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.60          0.61
     Dep. Storage     (mm)=       1.00          1.50
     Average Slope     (%)=       1.00          2.00
     Length            (m)=      89.81         40.00
     Mannings n           =      0.013         0.250

     Max.Eff.Inten.(mm/hr)=     116.82        118.35
               over (min)       12.00         12.00
     Storage Coeff.  (min)=       2.25 (ii)     8.85 (ii)
     Unit Hyd. Tpeak (min)=      12.00         12.00
     Unit Hyd. peak  (cms)=       0.14          0.11
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.08          0.17          0.246 (iii)
     TIME TO PEAK    (hrs)=       6.00          6.00          6.00
     RUNOFF VOLUME    (mm)=      87.50         47.92         55.87
     TOTAL RAINFALL   (mm)=      88.50         88.50         88.50
     RUNOFF COEFFICIENT   =       0.99          0.54          0.63

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| DUHYD    (  0227)|
| Inlet Cap.= 0.120|
| #of Inlets=    1|
| Total(cms)=   0.1|      AREA     OPEAK     TPEAK     R.V.
--------------------      (ha)     (cms)     (hrs)     (mm)
     TOTAL HYD.(ID= 1):   1.21      0.25      6.00    55.87
     ================================================
     MAJOR SYS.(ID= 2):   0.16      0.13      6.00    55.87
     MINOR SYS.(ID= 3):   1.05      0.12      6.00    55.87
```

COLE ENGINEERING

Experience Enhancing Excellence

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

| CALIB | STANDHYD (0206)| ID= 1 DT=12.0 min |

Area (ha)= 39.16
Total Imp(%)= 54.20 Dir. Conn.(%)= 23.20

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	21.22	17.94
Dep. Storage (mm)=	1.00	1.50
Average Slope (%)=	1.00	2.00
Length (m)=	510.95	40.00
Mannings n =	0.013	0.250
Max.Eff.Inten.(mm/hr)=	116.82	129.44
over (min)	12.00	24.00
Storage Coeff. (min)=	6.39 (ii)	12.75 (ii)
Unit Hyd. Tpeak (min)=	12.00	24.00
Unit Hyd. peak (cms)=	0.12	0.07

			TOTALS
PEAK FLOW	(cms)=	2.71	3.82	5.700 (iii)
TIME TO PEAK	(hrs)=	6.00	6.20	6.00
RUNOFF VOLUME	(mm)=	87.50	49.30	58.17
TOTAL RAINFALL	(mm)=	88.50	88.50	88.50
RUNOFF COEFFICIENT	=	0.99	0.56	0.66

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

| ADD HYD (0225)| 1 + 2 = 3 |

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0183):	0.20	0.157	6.00	56.69
+ ID2= 2 (0206):	39.16	5.700	6.00	58.17
ID = 3 (0225):	39.36	5.857	6.00	58.16

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

| ADD HYD (0225)| 3 + 2 = 1 |

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 3 (0225):	39.36	5.857	6.00	58.16
+ ID2= 2 (0227):	0.16	0.126	6.00	55.87
ID = 1 (0225):	39.52	5.983	6.00	58.15

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

| ADD HYD (0211)| 1 + 2 = 3 |

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0212):	6.45	0.196	6.60	46.99
+ ID2= 2 (0225):	39.52	5.983	6.00	58.15
ID = 3 (0211):	45.97	6.043	6.00	56.58

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

| RESERVOIR(0241)| IN= 2---> OUT= 1 | DT= 12.0 min |

OUTFLOW (cms)	STORAGE (ha.m.)		OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000		1.6250	1.2448
0.0190	0.1627		1.6630	1.2997
0.0360	0.4306		1.8430	1.5816
0.0480	0.7217		2.1300	2.1197
0.1330	0.7718		2.9680	2.2465
1.0390	0.9773		7.5380	2.5741

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0211)	45.972	6.043	6.00	56.58
OUTFLOW: ID= 1 (0241)	45.972	1.665	6.60	56.54

PEAK FLOW REDUCTION [Qout/Qin](%)= 27.55
TIME SHIFT OF PEAK FLOW (min)= 36.00
MAXIMUM STORAGE USED (ha.m.)= 1.3096

| CALIB | STANDHYD (0228)| ID= 1 DT=12.0 min |

Area (ha)= 13.94
Total Imp(%)= 47.50 Dir. Conn.(%)= 22.30

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	6.62	7.32
Dep. Storage (mm)=	1.00	1.50
Average Slope (%)=	1.00	2.00
Length (m)=	304.85	40.00
Mannings n =	0.013	0.250
Max.Eff.Inten.(mm/hr)=	116.82	107.96
over (min)	12.00	12.00
Storage Coeff. (min)=	4.69 (ii)	11.53 (ii)
Unit Hyd. Tpeak (min)=	12.00	12.00
Unit Hyd. peak (cms)=	0.13	0.09

			TOTALS
PEAK FLOW	(cms)=	0.97	1.66	2.627 (iii)
TIME TO PEAK	(hrs)=	6.00	6.00	6.00
RUNOFF VOLUME	(mm)=	87.50	46.50	55.64
TOTAL RAINFALL	(mm)=	88.50	88.50	88.50
RUNOFF COEFFICIENT	=	0.99	0.53	0.63

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

| RESERVOIR(0243)| IN= 2---> OUT= 1 | DT= 12.0 min |

OUTFLOW (cms)	STORAGE (ha.m.)		OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000		0.8570	0.5282
0.1680	0.0173		0.9360	0.6538
0.4120	0.1031		1.0080	0.7859
0.5570	0.1976		1.0760	0.9234
0.6720	0.3000		1.1270	1.0373
0.7700	0.4102		1.1760	1.1552

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0228)	13.940	2.627	6.00	55.64
OUTFLOW: ID= 1 (0243)	13.940	0.647	6.40	55.64

PEAK FLOW REDUCTION [Qout/Qin](%)= 24.61
TIME SHIFT OF PEAK FLOW (min)= 24.00
MAXIMUM STORAGE USED (ha.m.)= 0.2775

| ROUTEPIPE(0184)| IN= 2---> OUT= 1 | DT= 12.0 min |

PIPE Number = 1.00
Diameter (mm)=1650.00
Length (m)= 500.00
Slope (m/m)= 0.005
Manning n = 0.013

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

DEPTH (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME min
0.09	.216E+02	0.0	0.80	10.40
0.17	.600E+02	0.1	1.25	6.67
0.26	.108E+03	0.3	1.61	5.18
0.35	.164E+03	0.6	1.91	4.36
0.43	.225E+03	1.0	2.18	3.83
0.52	.290E+03	1.4	2.41	3.46
0.61	.358E+03	1.9	2.61	3.19
0.69	.428E+03	2.4	2.79	2.99
0.78	.499E+03	2.9	2.95	2.83
0.87	.570E+03	3.5	3.08	2.70

0.96	.642E+03	4.1	3.20	2.61
1.04	.712E+03	4.7	3.29	2.53
1.13	.780E+03	5.2	3.36	2.48
1.22	.844E+03	5.8	3.41	2.44
1.30	.905E+03	6.2	3.44	2.43
1.39	.961E+03	6.6	3.43	2.43
1.48	.101E+04	6.9	3.40	2.45
1.56	.105E+04	6.9	3.31	2.52
1.65	.107E+04	6.5	3.02	2.76

	<---- hydrograph ---->			<-pipe / channel->	
	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 2 (0243)	13.94	0.65	6.40	55.64	0.35	1.93
OUTFLOW: ID= 1 (0184)	13.94	0.66	6.40	55.64	0.35	1.93

CALIB
STANDHYD (0229) ID= 1 DT=12.0 min

Area (ha)= 10.23
Total Imp(%)= 30.10 Dir. Conn.(%)= 15.10

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	3.08	7.15
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	261.15	40.00
Mannings n	=	0.013	0.250
Max.Eff.Inten.(mm/hr)=		116.82	80.22
over (min)		12.00	12.00
Storage Coeff. (min)=		4.27 (ii)	11.98 (ii)
Unit Hyd. Tpeak (min)=		12.00	12.00
Unit Hyd. peak (cms)=		0.13	0.09
			TOTALS
PEAK FLOW	(cms)=	0.49	1.18	1.666 (iii)
TIME TO PEAK	(hrs)=	6.00	6.00	6.00
RUNOFF VOLUME	(mm)=	87.50	42.02	48.89
TOTAL RAINFALL	(mm)=	88.50	88.50	88.50
RUNOFF COEFFICIENT	=	0.99	0.47	0.55

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
YOU SHOULD CONSIDER SPLITTING THE AREA.

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0196)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0184):	13.94	0.655	6.40	55.64
+ ID2= 2 (0229):	10.23	1.666	6.00	48.89
ID = 3 (0196):	24.17	2.114	6.00	52.78

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0244)
IN= 2---> OUT= 1
DT= 12.0 min

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.6510	0.4564
0.1220	0.0863	0.8770	0.7894
0.3620	0.1603	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0196)	24.170	2.114	6.00	52.78
OUTFLOW: ID= 1 (0244)	24.170	0.627	7.60	52.78

PEAK FLOW REDUCTION [Qout/Qin](%)= 29.65
TIME SHIFT OF PEAK FLOW (min)= 96.00
MAXIMUM STORAGE USED (ha.m.)= 0.4323

CALIB

STANDHYD (0230) ID= 1 DT=12.0 min

Area (ha)= 24.32
Total Imp(%)= 47.50 Dir. Conn.(%)= 29.30

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	11.55	12.77
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	402.66	40.00
Mannings n	=	0.013	0.250
Max.Eff.Inten.(mm/hr)=		116.82	93.82
over (min)		12.00	24.00
Storage Coeff. (min)=		5.54 (ii)	12.78 (ii)
Unit Hyd. Tpeak (min)=		12.00	24.00
Unit Hyd. peak (cms)=		0.13	0.07
			TOTALS
PEAK FLOW	(cms)=	2.18	1.96	3.693 (iii)
TIME TO PEAK	(hrs)=	6.00	6.20	6.00
RUNOFF VOLUME	(mm)=	87.50	44.36	57.00
TOTAL RAINFALL	(mm)=	88.50	88.50	88.50
RUNOFF COEFFICIENT	=	0.99	0.50	0.64

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0224)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0230):	24.32	3.693	6.00	57.00
+ ID2= 2 (0244):	24.17	0.627	7.60	52.78
ID = 3 (0224):	48.49	4.108	6.00	54.90

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0247)
IN= 2---> OUT= 1
DT= 12.0 min

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.6390	0.9848
0.0270	0.1457	0.9700	1.2900
0.0430	0.3152	1.1040	1.7480
0.0530	0.4653	3.3100	1.9350
0.3280	0.6677	11.3140	2.2662

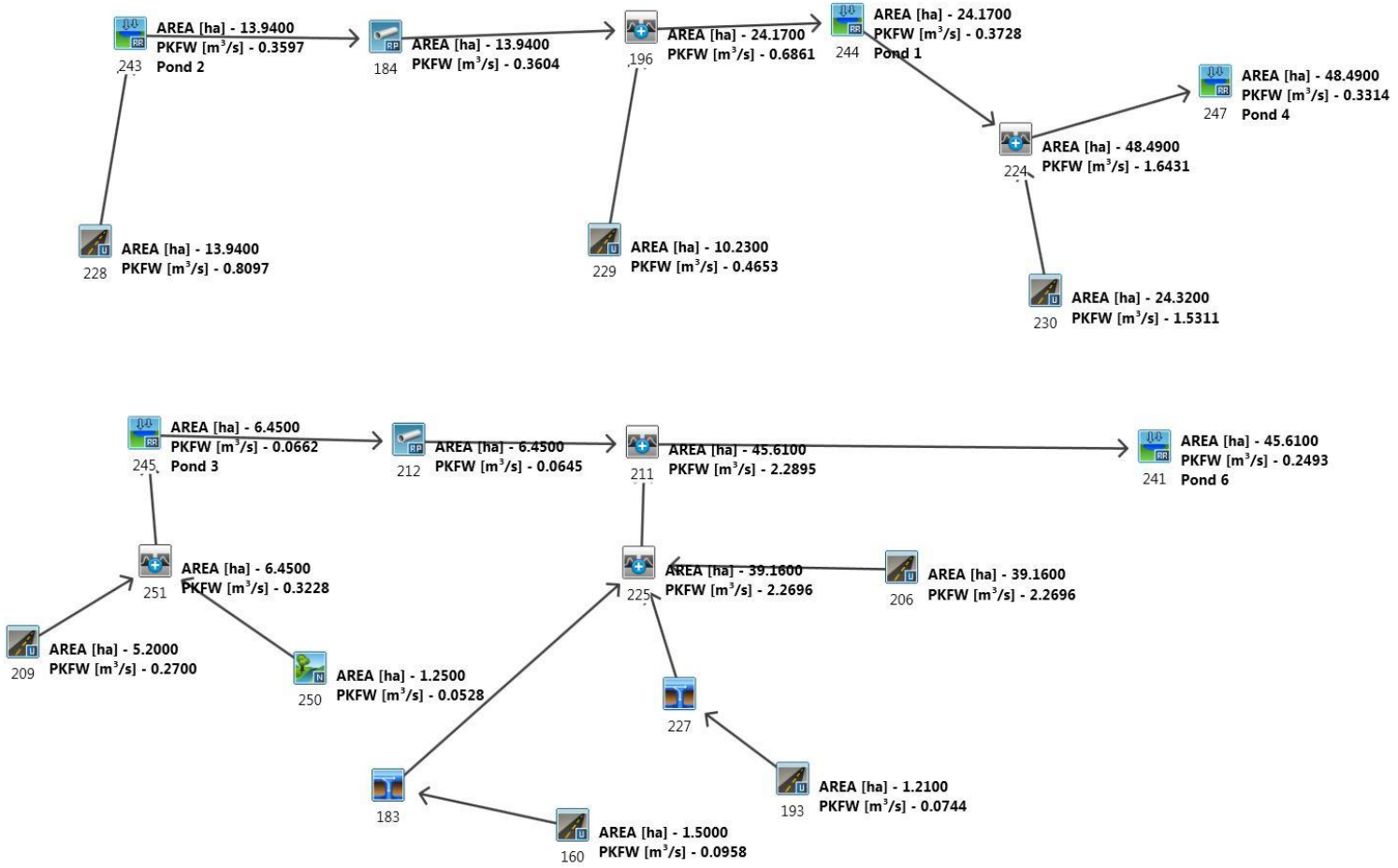
	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0224)	48.490	4.108	6.00	54.90
OUTFLOW: ID= 1 (0247)	48.490	0.827	8.20	54.87

PEAK FLOW REDUCTION [Qout/Qin](%)= 20.13
TIME SHIFT OF PEAK FLOW (min)=132.00
MAXIMUM STORAGE USED (ha.m.)= 1.1589

COLE ENGINEERING
Experience Enhancing Excellence

L09-301 – Marianneville – Glenway Estates (Phase 2)
2, 5, 10, 25, 50 & 100-Year 4 Hour Chicago Storm
Existing Condition Model Output
April 2018

VO5 Model Schematic



COLE ENGINEERING

Experience Enhancing Excellence

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

       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 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)\Visual OTTHYMO 5.0\VO2\voin.dat
  Output  filename: C:\Users\JJohnston\AppData\Local\Civica\VH5\a379672b-db33-4372-b5e0-
ba58a07d1417\66eb9f0b-189f-43c9-adb2-a2a4305fbea5\sc
  Summary filename: C:\Users\JJohnston\AppData\Local\Civica\VH5\a379672b-db33-4372-b5e0-
ba58a07d1417\66eb9f0b-189f-43c9-adb2-a2a4305fbea5\sc


DATE: 03/21/2018                          TIME: 02:39:46

USER:


COMMENTS:

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

--------------------
| CHICAGO STORM    |     IDF curve parameters: A= 648.000
| Ptotal= 34.82 mm |                           B=   4.000
--------------------                           C=   0.784
                        used in:    INTENSITY =  A / (t + B)^C

                        Duration of storm  =  4.00 hrs
                        Storm time step    = 10.00 min
                        Time to peak ratio =  0.33

                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.17    2.27 |  1.17   17.18 |  2.17    5.25 |  3.17    2.69
                0.33    2.60 |  1.33   81.85 |  2.33    4.49 |  3.33    2.50
                0.50    3.04 |  1.50   22.51 |  2.50    3.93 |  3.50    2.34
                0.67    3.72 |  1.67   11.87 |  2.67    3.51 |  3.67    2.21
                0.83    4.86 |  1.83    8.23 |  2.83    3.18 |  3.83    2.08
                1.00    7.30 |  2.00    6.38 |  3.00    2.91 |  4.00    1.98


--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0250)|   Area    (ha)=   1.25   Curve Number   (CN)= 72.0
|ID= 1 DT=12.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.15

        NOTE:  RAINFALL WAS TRANSFORMED TO  12.0 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
               0.200    2.33 | 1.200   27.96 | 2.200    5.12 |  3.20    2.66
               0.400    2.75 | 1.400   62.07 | 2.400    4.30 |  3.40    2.45
               0.600    3.38 | 1.600   17.19 | 2.600    3.72 |  3.60    2.28
               0.800    4.48 | 1.800    9.44 | 2.800    3.29 |  3.80    2.12
               1.000    6.89 | 2.000    6.69 | 3.000    2.96 |  4.00    1.99

     Unit Hyd Qpeak  (cms)=   0.318

     PEAK FLOW       (cms)=   0.027 (i)
     TIME TO PEAK    (hrs)=   1.400
     RUNOFF VOLUME   (mm)=   6.045
     TOTAL RAINFALL  (mm)=  34.816
     RUNOFF COEFFICIENT  =   0.174

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0209)|   Area    (ha)=   5.20
|ID= 1 DT=12.0 min |   Total Imp(%)=  31.60   Dir. Conn.(%)=  19.40
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.64          3.56
     Dep. Storage     (mm)=       1.00          1.50
     Average Slope     (%)=       1.00          2.00
     Length            (m)=     186.19         40.00
     Mannings n            =      0.013         0.250

     Max.Eff.Inten.(mm/hr)=      62.07         12.26
               over (min)        12.00         24.00
     Storage Coeff.  (min)=       4.49 (ii)    20.83 (ii)
     Unit Hyd. Tpeak (min)=      12.00         24.00
     Unit Hyd. peak  (cms)=       0.13          0.05
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.17          0.08          0.211 (iii)
     TIME TO PEAK    (hrs)=       1.40          1.60           1.40
     RUNOFF VOLUME    (mm)=      33.82          8.63          13.51
     TOTAL RAINFALL   (mm)=      34.82         34.82          34.82
     RUNOFF COEFFICIENT   =       0.97          0.25           0.39

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
             YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  69.0    Ia = Dep. Storage    (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| ADD HYD  (  0251)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0209):      5.20    0.211     1.40    13.51
     + ID2= 2 (  0250):      1.25    0.027     1.40     6.05
       ==========================================================
       ID = 3 (  0251):      6.45    0.238     1.40    12.07

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0245)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.3090     0.2876
                          0.0000     0.0000   |   0.3330     0.3838
                          0.1230     0.1102   |   0.3620     0.5200
                          0.2870     0.1971   |   0.0000     0.0000

                              AREA     QPEAK     TPEAK       R.V.
                              (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0251)     6.450     0.238     1.40       12.07
   OUTFLOW: ID= 1 (  0245)     6.450     0.047     2.40       12.03

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 19.91
                  TIME SHIFT OF PEAK FLOW          (min)= 60.00
                  MAXIMUM  STORAGE   USED        (ha.m.)=  0.0426

--------------------------------------------------------------------------------
--------------------
| ROUTEPIPE(  0212)|     PIPE Number      =   1.00
| IN= 2---> OUT= 1 |     Diameter    (mm)=1650.00
| DT= 12.0 min     |     Length       (m)= 850.00
--------------------     Slope     (m/m)=  0.005
                         Manning n       =  0.013

      <------------------ TRAVEL TIME TABLE ------------------->
        DEPTH      VOLUME    FLOW RATE     VELOCITY    TRAV.TIME
         (m)     (cu.m.)       (cms)         (m/s)         min
        0.09    .367E+02         0.0          0.80         17.68
```

```
        0.17     .102E+03       0.1          1.25        11.33
        0.26     .184E+03       0.3          1.61         8.81
        0.35     .278E+03       0.6          1.91         7.41
        0.43     .382E+03       1.0          2.18         6.51
        0.52     .492E+03       1.4          2.41         5.88
        0.61     .608E+03       1.9          2.61         5.43
        0.69     .727E+03       2.4          2.79         5.08
        0.78     .848E+03       2.9          2.95         4.81
        0.87     .970E+03       3.5          3.08         4.60
        0.96     .109E+04       4.1          3.20         4.43
        1.04     .121E+04       4.7          3.29         4.31
        1.13     .133E+04       5.2          3.36         4.22
        1.22     .144E+04       5.8          3.41         4.15
        1.30     .154E+04       6.2          3.44         4.12
        1.39     .163E+04       6.6          3.43         4.13
        1.48     .172E+04       6.9          3.40         4.17
        1.56     .178E+04       6.9          3.31         4.28
        1.65     .182E+04       6.5          3.02         4.70
                                     <---- hydrograph ---->   <-pipe / channel->
                                AREA    QPEAK   TPEAK   R.V.    MAX DEPTH  MAX VEL
                                (ha)    (cms)   (hrs)   (mm)      (m)       (m/s)
   INFLOW : ID= 2 (  0245)    6.45     0.05    2.40   12.03      0.10       0.83
   OUTFLOW: ID= 1 (  0212)    6.45     0.05    2.80   12.03      0.10       0.83


--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0160)|   Area    (ha)=   1.50
|ID= 1 DT=12.0 min |   Total Imp(%)=  50.70   Dir. Conn.(%)=  22.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.76          0.74
     Dep. Storage     (mm)=       1.00          1.50
     Average Slope     (%)=       1.00          2.00
     Length            (m)=     100.00         40.00
     Mannings n            =      0.013         0.250

     Max.Eff.Inten.(mm/hr)=      62.07         30.27
               over (min)        12.00         24.00
     Storage Coeff.  (min)=       3.09 (ii)    14.47 (ii)
     Unit Hyd. Tpeak (min)=      12.00         24.00
     Unit Hyd. peak  (cms)=       0.14          0.06
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.06          0.04      0.076 (iii)
     TIME TO PEAK    (hrs)=       1.40          1.60       1.40
     RUNOFF VOLUME    (mm)=      33.82         10.82      15.88
     TOTAL RAINFALL   (mm)=      34.82         34.82      34.82
     RUNOFF COEFFICIENT   =       0.97          0.31       0.46

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| DUHYD    (  0183)|
| Inlet Cap.= 0.152|
| #of Inlets=    1|
| Total(cms)=   0.2|      AREA     QPEAK     TPEAK    R.V.
--------------------      (ha)     (cms)     (hrs)    (mm)
     TOTAL HYD.(ID= 1):   1.50      0.08      1.40   15.88
     ==========================================================
     MAJOR SYS.(ID= 2):   0.00      0.00      0.00    0.00
     MINOR SYS.(ID= 3):   1.50      0.08      1.40   15.88

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0193)|   Area    (ha)=   1.21
|ID= 1 DT=12.0 min |   Total Imp(%)=  49.30   Dir. Conn.(%)=  20.10
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.60          0.61
     Dep. Storage     (mm)=       1.00          1.50
     Average Slope     (%)=       1.00          2.00
     Length            (m)=      89.81         40.00
     Mannings n            =      0.013         0.250

     Max.Eff.Inten.(mm/hr)=      62.07         30.06
               over (min)        12.00         24.00
     Storage Coeff.  (min)=       2.90 (ii)    14.31 (ii)
     Unit Hyd. Tpeak (min)=      12.00         24.00
     Unit Hyd. peak  (cms)=       0.14          0.06
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.04          0.03      0.058 (iii)
     TIME TO PEAK    (hrs)=       1.40          1.60       1.40
     RUNOFF VOLUME    (mm)=      33.82         10.79      15.41
     TOTAL RAINFALL   (mm)=      34.82         34.82      34.82
     RUNOFF COEFFICIENT   =       0.97          0.31       0.44

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| DUHYD    (  0227)|
| Inlet Cap.= 0.120|
| #of Inlets=    1|
| Total(cms)=   0.1|      AREA     QPEAK     TPEAK    R.V.
--------------------      (ha)     (cms)     (hrs)    (mm)
     TOTAL HYD.(ID= 1):   1.21      0.06      1.40   15.41
     ==========================================================
     MAJOR SYS.(ID= 2):   0.00      0.00      0.00    0.00
     MINOR SYS.(ID= 3):   1.21      0.06      1.40   15.41

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0206)|   Area    (ha)=  39.16
|ID= 1 DT=12.0 min |   Total Imp(%)=  54.20   Dir. Conn.(%)=  23.20
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      21.22         17.94
     Dep. Storage     (mm)=       1.00          1.50
     Average Slope     (%)=       1.00          2.00
     Length            (m)=     510.95         40.00
     Mannings n            =      0.013         0.250

     Max.Eff.Inten.(mm/hr)=      62.07         33.58
               over (min)        12.00         24.00
     Storage Coeff.  (min)=       8.23 (ii)    19.15 (ii)
     Unit Hyd. Tpeak (min)=      12.00         24.00
     Unit Hyd. peak  (cms)=       0.11          0.05
                                                      *TOTALS*
     PEAK FLOW       (cms)=       1.34          0.83      1.795 (iii)
     TIME TO PEAK    (hrs)=       1.40          1.60       1.40
     RUNOFF VOLUME    (mm)=      33.82         11.28      16.51
     TOTAL RAINFALL   (mm)=      34.82         34.82      34.82
     RUNOFF COEFFICIENT   =       0.97          0.32       0.47

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| ADD HYD  (  0225)|
|   1 +  2 =  3    |          AREA     QPEAK     TPEAK     R.V.
--------------------          (ha)     (cms)     (hrs)     (mm)
*** W A R N I N G :  HYDROGRAPH   0183 <ID= 1> IS DRY.
*** W A R N I N G :  HYDROGRAPH   0225 = HYDROGRAPH 0206
       ID1= 1 (  0183):      0.00    0.000      0.00      0.00
     + ID2= 2 (  0206):     39.16    1.795      1.40     16.51
       ==========================================================
       ID = 3 (  0225):     39.16    1.795      1.40     16.51

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| ADD HYD  (  0225)|
|   3 +  2 =  1    |          AREA     QPEAK     TPEAK     R.V.
```

```
                    (ha)     (cms)     (hrs)      (mm)
*** W A R N I N G :  HYDROGRAPH   0227 (ID= 2) IS DRY.
*** W A R N I N G :  HYDROGRAPH   0001 = HYDROGRAPH 0003
      ID1= 3 (  0225):     39.16   1.795     1.40     16.51
    + ID2= 2 (  0227):      0.00   0.000     0.00      0.00
      ==========================================================
      ID = 1 (  0225):     39.16   1.795     1.40     16.51

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| ADD HYD (  0211)|
|   1 +  2 =  3   |          AREA    QPEAK    TPEAK     R.V.
--------------------       (ha)     (cms)    (hrs)     (mm)
      ID1= 1 (  0212):      6.45   0.047     2.80     12.03
    + ID2= 2 (  0225):     39.16   1.795     1.40     16.51
      ==========================================================
      ID = 3 (  0211):     45.61   1.803     1.40     15.88

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0241)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   1.6250      1.2448
                          0.0190     0.1627   |   1.6630      1.2997
                          0.0360     0.4306   |   1.8430      1.5816
                          0.0480     0.7217   |   2.1300      2.1197
                          0.1330     0.7718   |   2.9680      2.2465
                          1.0390     0.9773   |   7.5380      2.5741

                                AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0211)     45.610     1.803      1.40      15.88
   OUTFLOW: ID= 1 (  0241)     45.610     0.045      4.80      15.83

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  2.48
                  TIME SHIFT OF PEAK FLOW          (min)=204.00
                  MAXIMUM  STORAGE   USED        (ha.m.)=  0.6433

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0228)|   Area    (ha)=  13.94
|ID= 1 DT=12.0 min |   Total Imp(%)=  47.50   Dir. Conn.(%)=  22.30
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       6.62         7.32
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     304.85        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      62.07        26.84
               over (min)        12.00        24.00
     Storage Coeff.  (min)=       6.03 (ii)   17.98 (ii)
     Unit Hyd. Tpeak (min)=      12.00        24.00
     Unit Hyd. peak  (cms)=       0.12         0.06
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.49         0.28          0.646 (iii)
     TIME TO PEAK    (hrs)=       1.40         1.60          1.40
     RUNOFF VOLUME    (mm)=      33.82        10.30         15.55
     TOTAL RAINFALL   (mm)=      34.82        34.82         34.82
     RUNOFF COEFFICIENT   =       0.97         0.30          0.45

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =  69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
             THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0243)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.8570      0.5282
                          0.1680     0.0173   |   0.9360      0.6538
                          0.4120     0.1031   |   1.0080      0.7859
                          0.5570     0.1976   |   1.0760      0.9234
                          0.6720     0.3000   |   1.1270      1.0373
                          0.7700     0.4102   |   1.1760      1.1552

                                AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0228)     13.940     0.646      1.40      15.55
   OUTFLOW: ID= 1 (  0243)     13.940     0.296      1.80      15.54

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 45.84
                  TIME SHIFT OF PEAK FLOW          (min)= 24.00
                  MAXIMUM  STORAGE   USED        (ha.m.)=  0.0633

--------------------------------------------------------------------------------
--------------------
| ROUTEPIPE(  0184)|     PIPE Number      =   1.00
| IN= 2---> OUT= 1 |     Diameter     (mm)=1650.00
| DT= 12.0 min     |     Length        (m)= 500.00
--------------------     Slope       (m/m)=  0.005
                         Manning n         =  0.013

     <----------------- TRAVEL TIME TABLE ------------------->
       DEPTH      VOLUME     FLOW RATE     VELOCITY     TRAV.TIME
        (m)     (cu.m.)        (cms)        (m/s)          min
       0.09     .216E+02        0.0         0.80          10.40
       0.17     .600E+02        0.1         1.25           6.67
       0.26     .108E+03        0.3         1.61           5.18
       0.35     .164E+03        0.6         1.91           4.36
       0.43     .225E+03        1.0         2.18           3.83
       0.52     .290E+03        1.4         2.41           3.46
       0.61     .358E+03        1.9         2.61           3.19
       0.69     .428E+03        2.4         2.79           2.99
       0.78     .499E+03        2.9         2.95           2.83
       0.87     .570E+03        3.5         3.08           2.70
       0.96     .642E+03        4.1         3.20           2.61
       1.04     .712E+03        4.7         3.29           2.53
       1.13     .780E+03        5.2         3.36           2.48
       1.22     .844E+03        5.8         3.41           2.44
       1.30     .905E+03        6.2         3.44           2.43
       1.39     .961E+03        6.6         3.43           2.43
       1.48     .101E+04        6.9         3.40           2.45
       1.56     .105E+04        6.9         3.31           2.52
       1.65     .107E+04        6.5         3.02           2.76
                                    <---- hydrograph ---->    <-pipe / channel->
                               AREA    QPEAK    TPEAK   R.V.   MAX DEPTH  MAX VEL
                               (ha)    (cms)    (hrs)   (mm)       (m)      (m/s)
   INFLOW : ID= 2 (  0243)   13.94     0.30     1.80  15.54       0.24      1.50
   OUTFLOW: ID= 1 (  0184)   13.94     0.30     2.00  15.54       0.24      1.50

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0229)|   Area    (ha)=  10.23
|ID= 1 DT=12.0 min |   Total Imp(%)=  30.10   Dir. Conn.(%)=  15.10
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       3.08         7.15
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     261.15        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      62.07        12.96
               over (min)        12.00        24.00
     Storage Coeff.  (min)=       5.50 (ii)   21.48 (ii)
     Unit Hyd. Tpeak (min)=      12.00        24.00
     Unit Hyd. peak  (cms)=       0.13         0.05
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.25         0.17          0.341 (iii)
     TIME TO PEAK    (hrs)=       1.40         1.60          1.40
     RUNOFF VOLUME    (mm)=      33.82         8.84         12.61
     TOTAL RAINFALL   (mm)=      34.82        34.82         34.82
     RUNOFF COEFFICIENT   =       0.97         0.25          0.36

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =  69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
             THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
```

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

--------------------
| ADD HYD  (  0196)|
|   1 +  2 =  3    |          AREA     QPEAK     TPEAK      R.V.
--------------------          (ha)     (cms)     (hrs)      (mm)
       ID1= 1 (  0184):     13.94    0.297     2.00     15.54
     + ID2= 2 (  0229):     10.23    0.341     1.40     12.61
       ====================================================
       ID = 3 (  0196):     24.17    0.523     1.60     14.30

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| RESERVOIR(  0244)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.6510      0.4564
                          0.1220     0.0863   |   0.8770      0.7894
                          0.3620     0.1603   |   0.0000      0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0196)     24.170     0.523     1.60       14.30
   OUTFLOW: ID= 1 (  0244)     24.170     0.293     2.80       14.30

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 56.02
                  TIME SHIFT OF PEAK FLOW          (min)= 72.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.1396

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

--------------------
| CALIB            |
| STANDHYD (  0230)|   Area    (ha)=  24.32
|ID= 1 DT=12.0 min |   Total Imp(%)=  47.50   Dir. Conn.(%)=  29.30
--------------------

                         IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=     11.55         12.77
     Dep. Storage     (mm)=      1.00          1.50
     Average Slope     (%)=      1.00          2.00
     Length            (m)=    402.66         40.00
     Mannings n           =     0.013         0.250

     Max.Eff.Inten.(mm/hr)=     62.07         15.65
               over (min)       12.00         24.00
     Storage Coeff.  (min)=      7.13 (ii)    21.95 (ii)
     Unit Hyd. Tpeak (min)=     12.00         24.00
     Unit Hyd. peak  (cms)=      0.12          0.05
                                                    *TOTALS*
     PEAK FLOW       (cms)=      1.09          0.37      1.287 (iii)
     TIME TO PEAK    (hrs)=      1.40          1.60      1.40
     RUNOFF VOLUME    (mm)=     33.82          9.59     16.69
     TOTAL RAINFALL   (mm)=     34.82         34.82     34.82
     RUNOFF COEFFICIENT   =      0.97          0.28      0.48

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

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN*  =  69.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

--------------------
| ADD HYD  (  0224)|
|   1 +  2 =  3    |          AREA     QPEAK     TPEAK      R.V.
--------------------          (ha)     (cms)     (hrs)      (mm)
       ID1= 1 (  0230):     24.32    1.287     1.40     16.69
     + ID2= 2 (  0244):     24.17    0.293     2.80     14.30
       ====================================================
       ID = 3 (  0224):     48.49    1.336     1.40     15.50

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| RESERVOIR(  0247)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.6390      0.9848
                          0.0270     0.1457   |   0.9700      1.2900
                          0.0430     0.3152   |   1.1040      1.7480
                          0.0530     0.4653   |   3.3100      1.9350
                          0.3280     0.6677   |  11.3140      2.2662

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0224)     48.490     1.336     1.40       15.50
   OUTFLOW: ID= 1 (  0247)     48.490     0.173     4.40       15.47

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 12.96
                  TIME SHIFT OF PEAK FLOW          (min)=180.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.5538

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

       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)\Visual OTTHYMO 5.0\VO2\voin.dat
  Output  filename: C:\Users\JJohnston\AppData\Local\Civica\VH5\a379672b-db33-4372-b5e0-
ba58a07d1417\0837b5f9-b136-4795-b962-171c9828e280\sc
  Summary filename: C:\Users\JJohnston\AppData\Local\Civica\VH5\a379672b-db33-4372-b5e0-
ba58a07d1417\0837b5f9-b136-4795-b962-171c9828e280\sc


DATE: 03/21/2018                          TIME: 02:39:46

USER:


COMMENTS:


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

--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 930.000
| Ptotal= 46.27 mm |                          B=   4.000
--------------------                          C=   0.798
                       used in:   INTENSITY =  A / (t + B)^C

                       Duration of storm  =  4.00 hrs
                       Storm time step    = 10.00 min
                       Time to peak ratio =  0.33

    TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
     hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
    0.17    2.85 |  1.17   22.78 |  2.17    6.72 |  3.17    3.39
    0.33    3.26 |  1.33  113.21 |  2.33    5.72 |  3.33    3.14
    0.50    3.84 |  1.50   30.05 |  2.50    4.99 |  3.50    2.94
    0.67    4.72 |  1.67   15.54 |  2.67    4.45 |  3.67    2.76
    0.83    6.21 |  1.83   10.66 |  2.83    4.02 |  3.83    2.61
    1.00    9.42 |  2.00    8.20 |  3.00    3.67 |  4.00    2.47

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

--------------------
| CALIB            |
| NASHYD  (  0250)|   Area    (ha)=   1.25   Curve Number   (CN)= 72.0
|ID= 1 DT=12.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.15

        NOTE:  RAINFALL WAS TRANSFORMED TO  12.0 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
0.200	2.92	1.200	37.85	2.200	6.55	3.20	3.35
0.400	3.45	1.400	85.49	2.400	5.48	3.40	3.08
0.600	4.28	1.600	22.80	2.600	4.72	3.60	2.85
0.800	5.71	1.800	12.29	2.800	4.16	3.80	2.66
1.000	8.88	2.000	8.61	3.000	3.73	4.00	2.49

Unit Hyd Qpeak (cms)= 0.318

PEAK FLOW (cms)= 0.052 (i)
TIME TO PEAK (hrs)= 1.400
RUNOFF VOLUME (mm)= 10.634
TOTAL RAINFALL (mm)= 46.267
RUNOFF COEFFICIENT = 0.230

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

CALIB
STANDHYD (0209)
ID= 1 DT=12.0 min | Area (ha)= 5.20 | Total Imp(%)= 31.60 | Dir. Conn.(%)= 19.40

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	1.64	3.56
Dep. Storage (mm)=	1.00	1.50
Average Slope (%)=	1.00	2.00
Length (m)=	186.19	40.00
Mannings n =	0.013	0.250
Max.Eff.Inten.(mm/hr)=	85.49	31.04
over (min)	12.00	24.00
Storage Coeff. (min)=	3.95 (ii)	15.22 (ii)
Unit Hyd. Tpeak (min)=	12.00	24.00
Unit Hyd. peak (cms)=	0.13	0.06

	TOTALS
PEAK FLOW (cms)=	0.23	0.17	0.326 (iii)
TIME TO PEAK (hrs)=	1.40	1.60	1.40
RUNOFF VOLUME (mm)=	45.27	14.27	20.28
TOTAL RAINFALL (mm)=	46.27	46.27	46.27
RUNOFF COEFFICIENT =	0.98	0.31	0.44

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING: FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
YOU SHOULD CONSIDER SPLITTING THE AREA.

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0251)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0209):	5.20	0.326	1.40	20.28
+ ID2= 2 (0250):	1.25	0.052	1.40	10.63
ID = 3 (0251):	6.45	0.378	1.40	18.41

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0245)
IN= 2---> OUT= 1
DT= 12.0 min

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.3090	0.2876
0.0000	0.0000	0.3330	0.3838
0.1230	0.1102	0.3620	0.5200
0.2870	0.1971	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0251)	6.450	0.378	1.40	18.41
OUTFLOW: ID= 1 (0245)	6.450	0.075	2.40	18.38

PEAK FLOW REDUCTION [Qout/Qin](%)= 19.83
TIME SHIFT OF PEAK FLOW (min)= 60.00

MAXIMUM STORAGE USED (ha.m.)= 0.0673

ROUTEPIPE(0212)
IN= 2---> OUT= 1
DT= 12.0 min

PIPE Number = 1.00
Diameter (mm)=1650.00
Length (m)= 850.00
Slope (m/m)= 0.005
Manning n = 0.013

TRAVEL TIME TABLE

DEPTH (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME min
0.09	.367E+02	0.0	0.80	17.68
0.17	.102E+03	0.1	1.25	11.33
0.26	.184E+03	0.3	1.61	8.81
0.35	.278E+03	0.6	1.91	7.41
0.43	.382E+03	1.0	2.18	6.51
0.52	.492E+03	1.4	2.41	5.88
0.61	.608E+03	1.9	2.61	5.43
0.69	.727E+03	2.4	2.79	5.08
0.78	.848E+03	2.9	2.95	4.81
0.87	.970E+03	3.5	3.08	4.60
0.96	.109E+04	4.1	3.20	4.43
1.04	.121E+04	4.7	3.29	4.31
1.13	.133E+04	5.2	3.36	4.22
1.22	.144E+04	5.8	3.41	4.15
1.30	.154E+04	6.2	3.44	4.12
1.39	.163E+04	6.6	3.43	4.13
1.48	.172E+04	6.9	3.40	4.17
1.56	.178E+04	6.9	3.31	4.28
1.65	.182E+04	6.5	3.02	4.70

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 2 (0245)	6.45	0.08	2.40	18.38	0.12	0.92
OUTFLOW: ID= 1 (0212)	6.45	0.07	2.60	18.38	0.12	0.91

CALIB
STANDHYD (0160)
ID= 1 DT=12.0 min | Area (ha)= 1.50 | Total Imp(%)= 50.70 | Dir. Conn.(%)= 22.00

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	0.76	0.74
Dep. Storage (mm)=	1.00	1.50
Average Slope (%)=	1.00	2.00
Length (m)=	100.00	40.00
Mannings n =	0.013	0.250
Max.Eff.Inten.(mm/hr)=	85.49	52.03
over (min)	12.00	12.00
Storage Coeff. (min)=	2.72 (ii)	11.89 (ii)
Unit Hyd. Tpeak (min)=	12.00	12.00
Unit Hyd. peak (cms)=	0.14	0.09

	TOTALS
PEAK FLOW (cms)=	0.08	0.07	0.151 (iii)
TIME TO PEAK (hrs)=	1.40	1.40	1.40
RUNOFF VOLUME (mm)=	45.27	17.49	23.59
TOTAL RAINFALL (mm)=	46.27	46.27	46.27
RUNOFF COEFFICIENT =	0.98	0.38	0.51

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

DUHYD (0183)
Inlet Cap.= 0.152
#of Inlets= 1
Total(cms)= 0.2

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
TOTAL HYD.(ID= 1):	1.50	0.15	1.40	23.59
MAJOR SYS.(ID= 2):	0.00	0.00	0.00	0.00
MINOR SYS.(ID= 3):	1.50	0.15	1.40	23.59

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

COLE ENGINEERING

Experience Enhancing Excellence

```
--------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0193)||   Area    (ha)=   1.21
|ID= 1 DT=12.0 min |   Total Imp(%)=  49.30   Dir. Conn.(%)=  20.10
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.60         0.61
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      89.81        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      85.49        51.68
               over (min)        12.00        12.00
     Storage Coeff.  (min)=       2.55 (ii)   11.74 (ii)
     Unit Hyd. Tpeak (min)=      12.00        12.00
     Unit Hyd. peak  (cms)=       0.14         0.09
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.06         0.06          0.118 (iii)
     TIME TO PEAK    (hrs)=       1.40         1.40           1.40
     RUNOFF VOLUME    (mm)=      45.27        17.44          23.03
     TOTAL RAINFALL   (mm)=      46.27        46.27          46.27
     RUNOFF COEFFICIENT   =       0.98         0.38           0.50

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| DUHYD   (  0227)||
| Inlet Cap.= 0.120||
| #of Inlets=    1||
| Total(cms)=   0.1||      AREA     QPEAK     TPEAK    R.V.
--------------------      (ha)     (cms)     (hrs)    (mm)
     TOTAL HYD.(ID= 1):   1.21      0.12      1.40   23.03
     ==================================================
     MAJOR SYS.(ID= 2):   0.00      0.00      0.00    0.00
     MINOR SYS.(ID= 3):   1.21      0.12      1.40   23.03

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0206)||   Area    (ha)=  39.16
|ID= 1 DT=12.0 min |   Total Imp(%)=  54.20   Dir. Conn.(%)=  23.20
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      21.22        17.94
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     510.95        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      85.49        57.45
               over (min)        12.00        24.00
     Storage Coeff.  (min)=       7.24 (ii)   16.05 (ii)
     Unit Hyd. Tpeak (min)=      12.00        24.00
     Unit Hyd. peak  (cms)=       0.11         0.06
                                                      *TOTALS*
     PEAK FLOW       (cms)=       1.90         1.53          2.772 (iii)
     TIME TO PEAK    (hrs)=       1.40         1.60           1.40
     RUNOFF VOLUME    (mm)=      45.27        18.15          24.44
     TOTAL RAINFALL   (mm)=      46.27        46.27          46.27
     RUNOFF COEFFICIENT   =       0.98         0.39           0.53

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

--------------------
| ADD HYD  (  0225)||
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
*** W A R N I N G :  HYDROGRAPH   0183 <ID= 1> IS DRY.
*** W A R N I N G :  HYDROGRAPH   0225 = HYDROGRAPH 0206
       ID1= 1 (  0183):     0.00   0.000     0.00     0.00
     + ID2= 2 (  0206):    39.16   2.772     1.40    24.44
       ==================================================
       ID = 3 (  0225):    39.16   2.772     1.40    24.44

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD  (  0225)||
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
*** W A R N I N G :  HYDROGRAPH   0227 <ID= 2> IS DRY.
*** W A R N I N G :  HYDROGRAPH   0001 = HYDROGRAPH 0003
       ID1= 3 (  0225):    39.16   2.772     1.40    24.44
     + ID2= 2 (  0227):     0.00   0.000     0.00     0.00
       ==================================================
       ID = 1 (  0225):    39.16   2.772     1.40    24.44

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD  (  0211)||
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0212):     6.45   0.074     2.60    18.38
     + ID2= 2 (  0225):    39.16   2.772     1.40    24.44
       ==================================================
       ID = 3 (  0211):    45.61   2.783     1.40    23.58

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0241)||
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   1.6250      1.2448
                          0.0190     0.1627   |   1.6630      1.2997
                          0.0360     0.4306   |   1.8430      1.5816
                          0.0480     0.7217   |   2.1300      2.1197
                          0.1330     0.7718   |   2.9680      2.2465
                          1.0390     0.9773   |   7.5380      2.5741

                             AREA      QPEAK      TPEAK        R.V.
                             (ha)      (cms)      (hrs)        (mm)
   INFLOW : ID= 2 (  0211)     45.610      2.783      1.40       23.58
   OUTFLOW: ID= 1 (  0241)     45.610      0.335      3.40       23.54

                PEAK   FLOW   REDUCTION [Qout/Qin](%)= 12.03
                TIME SHIFT OF PEAK FLOW         (min)=120.00
                MAXIMUM  STORAGE   USED        (ha.m.)=  0.8177

--------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0228)||   Area    (ha)=  13.94
|ID= 1 DT=12.0 min |   Total Imp(%)=  47.50   Dir. Conn.(%)=  22.30
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       6.62         7.32
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     304.85        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      85.49        46.38
               over (min)        12.00        24.00
     Storage Coeff.  (min)=       5.31 (ii)   14.91 (ii)
     Unit Hyd. Tpeak (min)=      12.00        24.00
     Unit Hyd. peak  (cms)=       0.13         0.06
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.69         0.52          0.987 (iii)
     TIME TO PEAK    (hrs)=       1.40         1.60           1.40
     RUNOFF VOLUME    (mm)=      45.27        16.74          23.10
     TOTAL RAINFALL   (mm)=      46.27        46.27          46.27
     RUNOFF COEFFICIENT   =       0.98         0.36           0.50

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

```
      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  69.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0243)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.8570     0.5282
                          0.1680     0.0173   |   0.9360     0.6538
                          0.4120     0.1031   |   1.0080     0.7859
                          0.5570     0.1976   |   1.0760     0.9234
                          0.6720     0.3000   |   1.1270     1.0373
                          0.7700     0.4102   |   1.1760     1.1552

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0228)     13.940     0.987      1.40      23.10
   OUTFLOW: ID= 1 (  0243)     13.940     0.418      2.00      23.10

                  PEAK   FLOW   REDUCTION (Out/Oin)(%)= 42.39
                  TIME SHIFT OF PEAK FLOW         (min)= 36.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.1099

--------------------------------------------------------------------------------
--------------------
| ROUTEPIPE(  0184)|     PIPE Number     =   1.00
| IN= 2---> OUT= 1 |     Diameter    (mm)=1650.00
| DT= 12.0 min     |     Length       (m)= 500.00
--------------------     Slope      (m/m)=  0.005
                         Manning n        =  0.013

      <------------------ TRAVEL TIME TABLE ------------------->
        DEPTH      VOLUME     FLOW RATE    VELOCITY    TRAV.TIME
         (m)     (cu.m.)       (cms)        (m/s)         min
        0.09    .216E+02          0.0         0.80        10.40
        0.17    .600E+02          0.1         1.25         6.67
        0.26    .108E+03          0.3         1.61         5.18
        0.35    .164E+03          0.6         1.91         4.36
        0.43    .225E+03          1.0         2.18         3.83
        0.52    .290E+03          1.4         2.41         3.46
        0.61    .358E+03          1.9         2.61         3.19
        0.69    .428E+03          2.4         2.79         2.99
        0.78    .499E+03          2.9         2.95         2.83
        0.87    .570E+03          3.5         3.08         2.70
        0.96    .642E+03          4.1         3.20         2.61
        1.04    .712E+03          4.7         3.29         2.53
        1.13    .780E+03          5.2         3.36         2.48
        1.22    .844E+03          5.8         3.41         2.44
        1.30    .905E+03          6.2         3.44         2.43
        1.39    .961E+03          6.6         3.43         2.43
        1.48    .101E+04          6.9         3.40         2.45
        1.56    .105E+04          6.9         3.31         2.52
        1.65    .107E+04          6.5         3.02         2.76
                          <---- hydrograph ---->   <-pipe / channel->
                        AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                        (ha)    (cms)   (hrs)   (mm)       (m)      (m/s)
   INFLOW : ID= 2 (  0243)   13.94     0.42    2.00  23.10      0.28      1.68
   OUTFLOW: ID= 1 (  0184)   13.94     0.42    2.00  23.10      0.28      1.68

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0229)|   Area    (ha)=  10.23
|ID= 1 DT=12.0 min |   Total Imp(%)=  30.10   Dir. Conn.(%)=  15.10
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       3.08         7.15
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     261.15        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      85.49        32.77
           over (min)            12.00        24.00
     Storage Coeff.  (min)=       4.84 (ii)   15.87 (ii)
     Unit Hyd. Tpeak (min)=      12.00        24.00
     Unit Hyd. peak  (cms)=       0.13         0.06
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.35         0.35        0.543 (iii)
     TIME TO PEAK    (hrs)=       1.40         1.60         1.40
     RUNOFF VOLUME    (mm)=      45.27        14.59        19.22
     TOTAL RAINFALL   (mm)=      46.27        46.27        46.27
     RUNOFF COEFFICIENT   =       0.98         0.32         0.42

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =  69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| ADD HYD  (  0196)|
|  1 +  2 =  3     |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0184):    13.94    0.422     2.00    23.10
     + ID2= 2 (  0229):    10.23    0.543     1.40    19.22
       ==========================================================
       ID = 3 (  0196):    24.17    0.810     1.60    21.46

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0244)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.6510     0.4564
                          0.1220     0.0863   |   0.8770     0.7894
                          0.3620     0.1603   |   0.0000     0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0196)     24.170     0.810      1.60      21.46
   OUTFLOW: ID= 1 (  0244)     24.170     0.401      2.80      21.45

                  PEAK   FLOW   REDUCTION (Out/Oin)(%)= 49.48
                  TIME SHIFT OF PEAK FLOW         (min)= 72.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.2003

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0230)|   Area    (ha)=  24.32
|ID= 1 DT=12.0 min |   Total Imp(%)=  47.50   Dir. Conn.(%)=  29.30
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      11.55        12.77
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     402.66        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      85.49        39.34
           over (min)            12.00        24.00
     Storage Coeff.  (min)=       6.27 (ii)   16.52 (ii)
     Unit Hyd. Tpeak (min)=      12.00        24.00
     Unit Hyd. peak  (cms)=       0.12         0.06
                                                      *TOTALS*
     PEAK FLOW       (cms)=       1.54         0.74        1.951 (iii)
     TIME TO PEAK    (hrs)=       1.40         1.60         1.40
     RUNOFF VOLUME    (mm)=      45.27        15.70        24.36
     TOTAL RAINFALL   (mm)=      46.27        46.27        46.27
     RUNOFF COEFFICIENT   =       0.98         0.34         0.53

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =  69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| ADD HYD  (  0224)|
|  1 +  2 =  3     |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0230):    24.32    1.951     1.40    24.36
```

```
      + ID2= 2 (  0244):    24.17   0.401     2.80     21.45
        ================================================
        ID = 3 (  0224):    48.49   2.023     1.40     22.91

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0247)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.6390     0.9848
                          0.0270     0.1457   |   0.9700     1.2900
                          0.0430     0.3152   |   1.1040     1.7480
                          0.0530     0.4653   |   3.3100     1.9350
                          0.3280     0.6677   |  11.3140     2.2662

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0224)     48.490     2.023      1.40      22.91
   OUTFLOW: ID= 1 (  0247)     48.490     0.374      4.20      22.88

                  PEAK   FLOW   REDUCTION (Qout/Qin)(%)= 18.50
                  TIME SHIFT OF PEAK FLOW         (min)=168.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.7149

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

       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)\Visual OTTHYMO 5.0\VO2\voin.dat
  Output  filename: C:\Users\JJohnston\AppData\Local\Civica\VH5\a379672b-db33-4372-b5e0-
ba58a07d1417\71e4a005-ec61-4bbb-b29b-c01cae468729\sc
  Summary filename: C:\Users\JJohnston\AppData\Local\Civica\VH5\a379672b-db33-4372-b5e0-
ba58a07d1417\71e4a005-ec61-4bbb-b29b-c01cae468729\sc


DATE: 03/21/2018                          TIME: 02:39:46

USER:


COMMENTS:


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

--------------------
| CHICAGO STORM    |    IDF curve parameters: A=1021.000
| Ptotal= 54.13 mm |                          B=   3.000
--------------------                          C=   0.787
                         used in:   INTENSITY =  A / (t + B)^C

                         Duration of storm  =  4.00 hrs
                         Storm time step    = 10.00 min
                         Time to peak ratio =  0.33

                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.17    3.43 |  1.17   25.32 |'  2.17    7.85 |  3.17    4.06
                0.33    3.92 |  1.33  135.63 |'  2.33    6.73 |  3.33    3.78
                0.50    4.59 |  1.50   33.17 |'  2.50    5.91 |  3.50    3.54
                0.67    5.59 |  1.67   17.50 |'  2.67    5.29 |  3.67    3.33
                0.83    7.28 |  1.83   12.21 |'  2.83    4.79 |  3.83    3.15
                1.00   10.84 |  2.00    9.50 |'  3.00    4.39 |  4.00    2.99

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD  (  0250)|   Area    (ha)=   1.25   Curve Number   (CN)= 72.0
|ID= 1 DT=12.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.15

        NOTE:  RAINFALL WAS TRANSFORMED TO  12.0 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
                0.200    3.52 | 1.200   43.70 | 2.200    7.66 |  3.20    4.02
                0.400    4.14 | 1.400  101.48 | 2.400    6.45 |  3.40    3.70
                0.600    5.09 | 1.600   25.33 | 2.600    5.60 |  3.60    3.44
                0.800    6.72 | 1.800   13.97 | 2.800    4.96 |  3.80    3.21
                1.000   10.25 | 2.000    9.95 | 3.000    4.46 |  4.00    3.02

     Unit Hyd Qpeak  (cms)=   0.318

     PEAK FLOW       (cms)=   0.073 (i)
     TIME TO PEAK    (hrs)=   1.400
     RUNOFF VOLUME    (mm)=  14.273
     TOTAL RAINFALL   (mm)=  54.135
     RUNOFF COEFFICIENT   =   0.264

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0209)|   Area    (ha)=   5.20
|ID= 1 DT=12.0 min |   Total Imp(%)=  31.60   Dir. Conn.(%)=  19.40
--------------------

                                IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=        1.64          3.56
     Dep. Storage      (mm)=        1.00          1.50
     Average Slope     (%)=         1.00          2.00
     Length            (m)=      186.19         40.00
     Mannings n              =      0.013         0.250

     Max.Eff.Inten.(mm/hr)=      101.48         41.66
               over (min)        12.00         24.00
     Storage Coeff.  (min)=        3.69 (ii)    13.71 (ii)
     Unit Hyd. Tpeak (min)=       12.00         24.00
     Unit Hyd. peak  (cms)=        0.14          0.06
                                                          *TOTALS*
     PEAK FLOW       (cms)=        0.28          0.23        0.410 (iii)
     TIME TO PEAK    (hrs)=        1.40          1.60         1.40
     RUNOFF VOLUME    (mm)=       53.13         18.67        25.35
     TOTAL RAINFALL   (mm)=       54.13         54.13        54.13
     RUNOFF COEFFICIENT   =        0.98          0.34         0.47

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
             YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| ADD HYD  (  0251)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK      R.V.
--------------------          (ha)    (cms)    (hrs)      (mm)
        ID1= 1 (  0209):     5.20   0.410     1.40     25.35
      + ID2= 2 (  0250):     1.25   0.073     1.40     14.27
        ================================================
        ID = 3 (  0251):     6.45   0.483     1.40     23.20

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0245)|
| IN= 2---> OUT= 1 |
```

COLE ENGINEERING

Experience Enhancing Excellence

DT= 12.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.3090	0.2876
	0.0000	0.0000	0.3330	0.3838
	0.1230	0.1102	0.3620	0.5200
	0.2870	0.1971	0.0000	0.0000

	AREA (ha)	OPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0251)	6.450	0.483	1.40	23.20
OUTFLOW: ID= 1 (0245)	6.450	0.095	2.40	23.17

PEAK FLOW REDUCTION [Qout/Qin](%)= 19.60
TIME SHIFT OF PEAK FLOW (min)= 60.00
MAXIMUM STORAGE USED (ha.m.)= 0.0850

ROUTEPIPE(0212)	PIPE Number = 1.00
IN= 2---> OUT= 1	Diameter (mm)=1650.00
DT= 12.0 min	Length (m)= 850.00
	Slope (m/m)= 0.005
	Manning n = 0.013

<TRAVEL TIME TABLE>

DEPTH (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME min
0.09	.367E+02	0.0	0.80	17.68
0.17	.102E+03	0.1	1.25	11.33
0.26	.184E+03	0.3	1.61	8.81
0.35	.278E+03	0.6	1.91	7.41
0.43	.382E+03	1.0	2.18	6.51
0.52	.492E+03	1.4	2.41	5.88
0.61	.608E+03	1.9	2.61	5.43
0.69	.727E+03	2.4	2.79	5.08
0.78	.848E+03	2.9	2.95	4.81
0.87	.970E+03	3.5	3.08	4.60
0.96	.109E+04	4.1	3.20	4.43
1.04	.121E+04	4.7	3.29	4.31
1.13	.133E+04	5.2	3.36	4.22
1.22	.144E+04	5.8	3.41	4.15
1.30	.154E+04	6.2	3.44	4.12
1.39	.163E+04	6.6	3.43	4.13
1.48	.172E+04	6.9	3.40	4.17
1.56	.178E+04	6.9	3.31	4.28
1.65	.182E+04	6.5	3.02	4.70

<---- hydrograph ----> <-pipe / channel->

	AREA (ha)	OPEAK (cms)	TPEAK (hrs)	R.V. (mm)	MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 2 (0245)	6.45	0.09	2.40	23.17	0.13	0.99
OUTFLOW: ID= 1 (0212)	6.45	0.09	2.60	23.17	0.13	0.98

CALIB	
STANDHYD (0160)	Area (ha)= 1.50
ID= 1 DT=12.0 min	Total Imp(%)= 50.70 Dir. Conn.(%)= 22.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.76	0.74
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	100.00	40.00
Mannings n	=	0.013	0.250
Max.Eff.Inten.(mm/hr)=		101.48	68.92
over (min)		12.00	12.00
Storage Coeff. (min)=		2.54 (ii)	10.73 (ii)
Unit Hyd. Tpeak (min)=		12.00	12.00
Unit Hyd. peak (cms)=		0.14	0.10

		TOTALS
PEAK FLOW	(cms)=	0.09 0.10 0.195 (iii)
TIME TO PEAK	(hrs)=	1.40 1.40 1.40
RUNOFF VOLUME	(mm)=	53.13 22.57 29.29
TOTAL RAINFALL	(mm)=	54.13 54.13 54.13
RUNOFF COEFFICIENT	=	0.98 0.42 0.54

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

DUHYD (0183)				
Inlet Cap.= 0.152				
#of Inlets= 1				
Total(cms)= 0.2	AREA (ha)	OPEAK (cms)	TPEAK (hrs)	R.V. (mm)
TOTAL HYD.(ID= 1):	1.50	0.19	1.40	29.29
MAJOR SYS.(ID= 2):	0.11	0.04	1.40	29.29
MINOR SYS.(ID= 3):	1.39	0.15	1.40	29.29

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB	
STANDHYD (0193)	Area (ha)= 1.21
ID= 1 DT=12.0 min	Total Imp(%)= 49.30 Dir. Conn.(%)= 20.10

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.60	0.61
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	89.81	40.00
Mannings n	=	0.013	0.250
Max.Eff.Inten.(mm/hr)=		101.48	68.47
over (min)		12.00	12.00
Storage Coeff. (min)=		2.38 (ii)	10.59 (ii)
Unit Hyd. Tpeak (min)=		12.00	12.00
Unit Hyd. peak (cms)=		0.14	0.10

		TOTALS
PEAK FLOW	(cms)=	0.07 0.08 0.153 (iii)
TIME TO PEAK	(hrs)=	1.40 1.40 1.40
RUNOFF VOLUME	(mm)=	53.13 22.52 28.67
TOTAL RAINFALL	(mm)=	54.13 54.13 54.13
RUNOFF COEFFICIENT	=	0.98 0.42 0.53

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

DUHYD (0227)				
Inlet Cap.= 0.120				
#of Inlets= 1				
Total(cms)= 0.1	AREA (ha)	OPEAK (cms)	TPEAK (hrs)	R.V. (mm)
TOTAL HYD.(ID= 1):	1.21	0.15	1.40	28.67
MAJOR SYS.(ID= 2):	0.08	0.03	1.40	28.67
MINOR SYS.(ID= 3):	1.13	0.12	1.40	28.67

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB	
STANDHYD (0206)	Area (ha)= 39.16
ID= 1 DT=12.0 min	Total Imp(%)= 54.20 Dir. Conn.(%)= 23.20

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	21.22	17.94
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	510.95	40.00
Mannings n	=	0.013	0.250
Max.Eff.Inten.(mm/hr)=		101.48	75.89
over (min)		12.00	24.00
Storage Coeff. (min)=		6.76 (ii)	14.64 (ii)
Unit Hyd. Tpeak (min)=		12.00	24.00
Unit Hyd. peak (cms)=		0.12	0.06

		TOTALS
PEAK FLOW	(cms)=	2.29 2.09 3.498 (iii)
TIME TO PEAK	(hrs)=	1.40 1.60 1.40
RUNOFF VOLUME	(mm)=	53.13 23.37 30.27
TOTAL RAINFALL	(mm)=	54.13 54.13 54.13
RUNOFF COEFFICIENT	=	0.98 0.43 0.56

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

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  69.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

--------------------
| ADD HYD  (  0225)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0183):      0.11    0.043     1.40    29.29
     + ID2= 2 (  0206):     39.16    3.498     1.40    30.27
       ==========================================================
       ID = 3 (  0225):     39.27    3.541     1.40    30.27

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD  (  0225)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0225):     39.27    3.541     1.40    30.27
     + ID2= 2 (  0227):      0.08    0.033     1.40    28.67
       ==========================================================
       ID = 1 (  0225):     39.35    3.574     1.40    30.27

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD  (  0211)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0212):      6.45    0.094     2.60    23.17
     + ID2= 2 (  0225):     39.35    3.574     1.40    30.27
       ==========================================================
       ID = 3 (  0211):     45.80    3.588     1.40    29.27

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| RESERVOIR(  0241)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000      0.0000   |   1.6250      1.2448
                          0.0190      0.1627   |   1.6630      1.2997
                          0.0360      0.4306   |   1.8430      1.5816
                          0.0480      0.7217   |   2.1300      2.1197
                          0.1330      0.7718   |   2.9680      2.2465
                          1.0390      0.9773   |   7.5380      2.5741

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0211)     45.798     3.588      1.40      29.27
   OUTFLOW: ID= 1 (  0241)     45.798     0.624      2.60      29.22

                  PEAK   FLOW   REDUCTION (Out/Oin)(%)= 17.38
                  TIME SHIFT OF PEAK FLOW          (min)= 72.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.8843

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

--------------------
| CALIB            |
| STANDHYD (  0228)|   Area    (ha)=  13.94
|ID= 1 DT=12.0 min |   Total Imp(%)=  47.50   Dir. Conn.(%)=  22.30
--------------------

                         IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      6.62         7.32
     Dep. Storage     (mm)=      1.00         1.50
     Average Slope     (%)=      1.00         2.00
     Length            (m)=    304.85        40.00
     Mannings n            =     0.013        0.250

     Max.Eff.Inten.(mm/hr)=    101.48        61.63
           over (min)          12.00        24.00
     Storage Coeff.  (min)=     4.96 (ii)   13.52 (ii)
     Unit Hyd. Tpeak (min)=    12.00        24.00
     Unit Hyd. peak  (cms)=     0.13         0.06

                                                  *TOTALS*
     PEAK FLOW       (cms)=     0.83         0.72      1.241 (iii)
     TIME TO PEAK    (hrs)=     1.40         1.60       1.40
     RUNOFF VOLUME    (mm)=    53.13        21.67      28.68
     TOTAL RAINFALL   (mm)=    54.13        54.13      54.13
     RUNOFF COEFFICIENT   =     0.98         0.40       0.53

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

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  69.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

--------------------
| RESERVOIR(  0243)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000      0.0000   |   0.8570      0.5282
                          0.1680      0.0173   |   0.9360      0.6538
                          0.4120      0.1031   |   1.0080      0.7859
                          0.5570      0.1976   |   1.0760      0.9234
                          0.6720      0.3000   |   1.1270      1.0373
                          0.7700      0.4102   |   1.1760      1.1552

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0228)     13.940     1.241      1.40      28.68
   OUTFLOW: ID= 1 (  0243)     13.940     0.476      2.00      28.68

                  PEAK   FLOW   REDUCTION (Out/Oin)(%)= 38.33
                  TIME SHIFT OF PEAK FLOW          (min)= 36.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.1466

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

--------------------
| ROUTEPIPE(  0184)|     PIPE Number      =   1.00
| IN= 2---> OUT= 1 |     Diameter     (mm)=1650.00
| DT= 12.0 min     |     Length        (m)= 500.00
--------------------     Slope       (m/m)=  0.005
                         Manning n         =  0.013

      <------------------ TRAVEL TIME TABLE ---------------------->
        DEPTH       VOLUME     FLOW RATE     VELOCITY     TRAV.TIME
         (m)      (cu.m.)       (cms)         (m/s)          min
        0.09     .216E+02        0.0          0.80          10.40
        0.17     .600E+02        0.1          1.25           6.67
        0.26     .108E+03        0.3          1.61           5.18
        0.35     .164E+03        0.6          1.91           4.36
        0.43     .225E+03        1.0          2.18           3.83
        0.52     .290E+03        1.4          2.41           3.46
        0.61     .358E+03        1.9          2.61           3.19
        0.69     .428E+03        2.4          2.79           2.99
        0.78     .499E+03        2.9          2.95           2.83
        0.87     .570E+03        3.5          3.08           2.70
        0.96     .642E+03        4.1          3.20           2.61
        1.04     .712E+03        4.7          3.29           2.53
        1.13     .780E+03        5.2          3.36           2.48
        1.22     .844E+03        5.8          3.41           2.44
        1.30     .905E+03        6.2          3.44           2.43
        1.39     .961E+03        6.6          3.43           2.43
        1.48     .101E+04        6.9          3.40           2.45
        1.56     .105E+04        6.9          3.31           2.52
        1.65     .107E+04        6.5          3.02           2.76

                                <---- hydrograph ---->    <-pipe / channel->
                          AREA    QPEAK    TPEAK   R.V.   MAX DEPTH  MAX VEL
                          (ha)    (cms)    (hrs)   (mm)       (m)      (m/s)
   INFLOW : ID= 2 (  0243)  13.94     0.48     2.00  28.68      0.30      1.73
   OUTFLOW: ID= 1 (  0184)  13.94     0.48     2.00  28.68      0.30      1.74

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

--------------------
| CALIB            |
| STANDHYD (  0229)|   Area    (ha)=  10.23
|ID= 1 DT=12.0 min |   Total Imp(%)=  30.10   Dir. Conn.(%)=  15.10
--------------------

                         IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      3.08         7.15
     Dep. Storage     (mm)=      1.00         1.50
     Average Slope     (%)=      1.00         2.00
     Length            (m)=    261.15        40.00
```

```
     Mannings n            =      0.013         0.250

     Max.Eff.Inten.(mm/hr)=     101.48         43.92
               over (min)       12.00         24.00
     Storage Coeff.  (min)=       4.52 (ii)   14.33 (ii)
     Unit Hyd. Tpeak (min)=      12.00         24.00
     Unit Hyd. peak  (cms)=       0.13          0.06
                                                    *TOTALS*
     PEAK FLOW       (cms)=       0.42          0.49          0.692 (iii)
     TIME TO PEAK    (hrs)=       1.40          1.60          1.40
     RUNOFF VOLUME    (mm)=      53.13         19.06         24.20
     TOTAL RAINFALL   (mm)=      54.13         54.13         54.13
     RUNOFF COEFFICIENT   =       0.98          0.35          0.45

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
             YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

--------------------
| ADD HYD  (  0196)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0184):    13.94   0.477     2.00     28.68
     + ID2= 2 (  0229):    10.23   0.692     1.40     24.20
       ==========================================================
       ID = 3 (  0196):    24.17   1.008     1.60     26.79

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| RESERVOIR(  0244)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000      0.0000   |   0.6510      0.4564
                          0.1220      0.0863   |   0.8770      0.7894
                          0.3620      0.1603   |   0.0000      0.0000

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0196)    24.170     1.008     1.60       26.79
   OUTFLOW: ID= 1 (  0244)    24.170     0.453     3.00       26.78

                 PEAK   FLOW   REDUCTION [Qout/Qin](%)= 44.91
                 TIME SHIFT OF PEAK FLOW         (min)= 84.00
                 MAXIMUM  STORAGE   USED       (ha.m.)=  0.2535

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

--------------------
| CALIB            |
| STANDHYD (  0230)|   Area     (ha)=  24.32
|ID= 1 DT=12.0 min |   Total Imp(%)=  47.50   Dir. Conn.(%)=  29.30
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      11.55         12.77
     Dep. Storage     (mm)=       1.00          1.50
     Average Slope     (%)=       1.00          2.00
     Length            (m)=     402.66         40.00
     Mannings n            =      0.013         0.250

     Max.Eff.Inten.(mm/hr)=     101.48         52.49
               over (min)       12.00         24.00
     Storage Coeff.  (min)=       5.86 (ii)   14.99 (ii)
     Unit Hyd. Tpeak (min)=      12.00         24.00
     Unit Hyd. peak  (cms)=       0.12          0.06
                                                    *TOTALS*
     PEAK FLOW       (cms)=       1.85          1.02          2.428 (iii)
     TIME TO PEAK    (hrs)=       1.40          1.60          1.40
     RUNOFF VOLUME    (mm)=      53.13         20.41         30.00
     TOTAL RAINFALL   (mm)=      54.13         54.13         54.13
     RUNOFF COEFFICIENT   =       0.98          0.38          0.55

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

--------------------
| ADD HYD  (  0224)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0230):    24.32   2.428     1.40     30.00
     + ID2= 2 (  0244):    24.17   0.453     3.00     26.78
       ==========================================================
       ID = 3 (  0224):    48.49   2.518     1.40     28.39

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| RESERVOIR(  0247)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000      0.0000   |   0.6390      0.9848
                          0.0270      0.1457   |   0.9700      1.2900
                          0.0430      0.3152   |   1.1040      1.7480
                          0.0530      0.4653   |   3.3100      1.9350
                          0.3280      0.6677   |  11.3140      2.2662

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0224)    48.490     2.518     1.40       28.39
   OUTFLOW: ID= 1 (  0247)    48.490     0.472     4.20       28.36

                 PEAK   FLOW   REDUCTION [Qout/Qin](%)= 18.73
                 TIME SHIFT OF PEAK FLOW         (min)=168.00
                 MAXIMUM  STORAGE   USED       (ha.m.)=  0.8146

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

       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)\Visual OTTHYMO 5.0\VO2\voin.dat
  Output  filename: C:\Users\JJohnston\AppData\Local\Civica\VH5\a379672b-db33-4372-b5e0-
ba58a07d1417\3079c323-a62e-42db-ac73-51b0867b042e\sc
  Summary filename: C:\Users\JJohnston\AppData\Local\Civica\VH5\a379672b-db33-4372-b5e0-
ba58a07d1417\3079c323-a62e-42db-ac73-51b0867b042e\sc


DATE: 03/21/2018                          TIME: 02:39:46

USER:


COMMENTS:

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

--------------------
| CHICAGO STORM    |    IDF curve parameters: A=1100.000
| Ptotal= 62.15 mm |                          B=   2.000
--------------------                          C=   0.776
                          used in:   INTENSITY =  A / (t + B)^C
```

```
                Duration of storm  =  4.00 hrs
                Storm time step    = 10.00 min
                Time to peak ratio =  0.33

  TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
   hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
  0.17    4.06 |  1.17   27.34 |'  2.17    9.00 |  3.17    4.78
  0.33    4.62 |  1.33  159.94 |'  2.33    7.77 |  3.33    4.46
  0.50    5.38 |  1.50   35.45 |'  2.50    6.86 |  3.50    4.19
  0.67    6.51 |  1.67   19.27 |'  2.67    6.16 |  3.67    3.95
  0.83    8.38 |  1.83   13.70 |'  2.83    5.61 |  3.83    3.74
  1.00   12.24 |  2.00   10.80 |'  3.00    5.16 |  4.00    3.55


--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD  (  0250)|   Area    (ha)=   1.25   Curve Number   (CN)= 72.0
|ID= 1 DT=12.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.15

        NOTE:  RAINFALL WAS TRANSFORMED TO  12.0 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
 0.200    4.16 | 1.200   49.44 | 2.200    8.80 |  3.20    4.73
 0.400    4.87 | 1.400  118.44 | 2.400    7.47 |  3.40    4.37
 0.600    5.94 | 1.600   27.36 | 2.600    6.51 |  3.60    4.07
 0.800    7.75 | 1.800   15.56 | 2.800    5.79 |  3.80    3.81
 1.000   11.60 | 2.000   11.29 | 3.000    5.23 |  4.00    3.59

     Unit Hyd Qpeak  (cms)=   0.318

     PEAK FLOW       (cms)=   0.097 (i)
     TIME TO PEAK    (hrs)=   1.400
     RUNOFF VOLUME    (mm)=  18.320
     TOTAL RAINFALL   (mm)=  62.155
     RUNOFF COEFFICIENT   =   0.295

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0209)|   Area    (ha)=   5.20
|ID= 1 DT=12.0 min |   Total Imp(%)=  31.60   Dir. Conn.(%)=  19.40
--------------------

                         IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.64         3.56
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     186.19        40.00
     Mannings n            =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     118.44        53.89
               over (min)         12.00        24.00
     Storage Coeff.  (min)=      3.47 (ii)   12.50 (ii)
     Unit Hyd. Tpeak (min)=     12.00        24.00
     Unit Hyd. peak  (cms)=      0.14         0.07
                                                      *TOTALS*
     PEAK FLOW       (cms)=      0.33         0.31         0.504 (iii)
     TIME TO PEAK    (hrs)=      1.40         1.60          1.40
     RUNOFF VOLUME    (mm)=     61.15        23.50         30.80
     TOTAL RAINFALL   (mm)=     62.15        62.15         62.15
     RUNOFF COEFFICIENT   =      0.98         0.38          0.50

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
             YOU SHOULD CONSIDER SPLITTING THE AREA.

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  69.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| ADD HYD  (  0251)|
|  1 +  2 =  3     |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0209):     5.20   0.504     1.40    30.80
   + ID2= 2 (  0250):     1.25   0.097     1.40    18.32
     ================================================
     ID = 3 (  0251):     6.45   0.600     1.40    28.38

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0245)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.3090     0.2876
                          0.0000     0.0000   |   0.3330     0.3838
                          0.1230     0.1102   |   0.3620     0.5200
                          0.2870     0.1971   |   0.0000     0.0000

                                AREA     QPEAK     TPEAK      R.V.
                                (ha)     (cms)     (hrs)      (mm)
     INFLOW : ID= 2 (  0251)     6.450     0.600     1.40      28.38
     OUTFLOW: ID= 1 (  0245)     6.450     0.116     2.40      28.35

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 19.26
                   TIME SHIFT OF PEAK FLOW          (min)= 60.00
                   MAXIMUM  STORAGE   USED        (ha.m.)=  0.1041

--------------------------------------------------------------------------------
--------------------
| ROUTEPIPE(  0212)|     PIPE Number     =   1.00
| IN= 2---> OUT= 1 |     Diameter    (mm)=1650.00
| DT= 12.0 min     |     Length       (m)= 850.00
--------------------     Slope       (m/m)=  0.005
                         Manning n        =  0.013

     <----------------- TRAVEL TIME TABLE ------------------->
       DEPTH      VOLUME     FLOW RATE     VELOCITY     TRAV.TIME
         (m)    (cu.m.)          (cms)        (m/s)          min
        0.09    .367E+02           0.0         0.80        17.68
        0.17    .102E+03           0.1         1.25        11.33
        0.26    .184E+03           0.3         1.61         8.81
        0.35    .278E+03           0.6         1.91         7.41
        0.43    .382E+03           1.0         2.18         6.51
        0.52    .492E+03           1.4         2.41         5.88
        0.61    .608E+03           1.9         2.61         5.43
        0.69    .727E+03           2.4         2.79         5.08
        0.78    .848E+03           2.9         2.95         4.81
        0.87    .970E+03           3.5         3.08         4.60
        0.96    .109E+04           4.1         3.20         4.43
        1.04    .121E+04           4.7         3.29         4.31
        1.13    .133E+04           5.2         3.36         4.22
        1.22    .144E+04           5.8         3.41         4.15
        1.30    .154E+04           6.2         3.44         4.12
        1.39    .163E+04           6.6         3.43         4.13
        1.48    .172E+04           6.9         3.40         4.17
        1.56    .178E+04           6.9         3.31         4.28
        1.65    .182E+04           6.5         3.02         4.70
                                <---- hydrograph ---->   <-pipe / channel->
                               AREA    QPEAK    TPEAK    R.V.   MAX DEPTH  MAX VEL
                               (ha)    (cms)    (hrs)    (mm)       (m)      (m/s)
     INFLOW : ID= 2 (  0245)    6.45     0.12     2.40   28.35      0.15      1.07
     OUTFLOW: ID= 1 (  0212)    6.45     0.12     2.60   28.35      0.15      1.07

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0160)|   Area    (ha)=   1.50
|ID= 1 DT=12.0 min |   Total Imp(%)=  50.70   Dir. Conn.(%)=  22.00
--------------------

                         IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.76         0.74
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     100.00        40.00
     Mannings n            =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     118.44        88.07
               over (min)         12.00        12.00
     Storage Coeff.  (min)=      2.39 (ii)    9.81 (ii)
     Unit Hyd. Tpeak (min)=     12.00        12.00
     Unit Hyd. peak  (cms)=      0.14         0.10
                                                      *TOTALS*
     PEAK FLOW       (cms)=      0.11         0.14         0.244 (iii)
     TIME TO PEAK    (hrs)=      1.40         1.40          1.40
     RUNOFF VOLUME    (mm)=     61.15        28.10         35.36
     TOTAL RAINFALL   (mm)=     62.15        62.15         62.15
```

```
     RUNOFF COEFFICIENT   =       0.98          0.45          0.57

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| DUHYD    (  0183)|
| Inlet Cap.= 0.152|
| #of Inlets=    1|
| Total(cms)=   0.2|       AREA     OPEAK     TPEAK     R.V.
--------------------       (ha)     (cms)     (hrs)     (mm)
     TOTAL HYD.(ID= 1):   1.50      0.24      1.40    35.36
     ==========================================================
     MAJOR SYS.(ID= 2):   0.19      0.09      1.40    35.36
     MINOR SYS.(ID= 3):   1.31      0.15      1.40    35.36

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0193)|   Area    (ha)=   1.21
|ID= 1 DT=12.0 min |   Total Imp(%)=  49.30   Dir. Conn.(%)=  20.10
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.60          0.61
     Dep. Storage     (mm)=       1.00          1.50
     Average Slope     (%)=       1.00          2.00
     Length            (m)=      89.81         40.00
     Mannings n            =      0.013         0.250

     Max.Eff.Inten.(mm/hr)=     118.44         87.50
               over (min)       12.00         12.00
     Storage Coeff.  (min)=      2.24 (ii)     9.68 (ii)
     Unit Hyd. Tpeak (min)=      12.00         12.00
     Unit Hyd. peak  (cms)=       0.14          0.10
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.08          0.11          0.193 (iii)
     TIME TO PEAK    (hrs)=       1.40          1.40           1.40
     RUNOFF VOLUME    (mm)=      61.15         28.03          34.69
     TOTAL RAINFALL   (mm)=      62.15         62.15          62.15
     RUNOFF COEFFICIENT   =       0.98          0.45           0.56

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| DUHYD    (  0227)|
| Inlet Cap.= 0.120|
| #of Inlets=    1|
| Total(cms)=   0.1|       AREA     OPEAK     TPEAK     R.V.
--------------------       (ha)     (cms)     (hrs)     (mm)
     TOTAL HYD.(ID= 1):   1.21      0.19      1.40    34.69
     ==========================================================
     MAJOR SYS.(ID= 2):   0.15      0.07      1.40    34.69
     MINOR SYS.(ID= 3):   1.06      0.12      1.40    34.69

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0206)|   Area    (ha)=  39.16
|ID= 1 DT=12.0 min |   Total Imp(%)=  54.20   Dir. Conn.(%)=  23.20
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      21.22         17.94
     Dep. Storage     (mm)=       1.00          1.50
     Average Slope     (%)=       1.00          2.00
     Length            (m)=     510.95         40.00
     Mannings n            =      0.013         0.250

     Max.Eff.Inten.(mm/hr)=     118.44         96.73
               over (min)       12.00         24.00
     Storage Coeff.  (min)=       6.35 (ii)    13.50 (ii)
     Unit Hyd. Tpeak (min)=      12.00         24.00
     Unit Hyd. peak  (cms)=       0.12          0.06
                                                      *TOTALS*
     PEAK FLOW       (cms)=       2.70          2.72          4.305 (iii)
     TIME TO PEAK    (hrs)=       1.40          1.60           1.40
     RUNOFF VOLUME    (mm)=      61.15         29.02          36.48
     TOTAL RAINFALL   (mm)=      62.15         62.15          62.15
     RUNOFF COEFFICIENT   =       0.98          0.47           0.59

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| ADD HYD  (  0225)|
|   1 +  2 =  3    |         AREA    OPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0183):      0.19    0.092     1.40    35.36
     + ID2= 2 (  0206):     39.16    4.305     1.40    36.48
       ==========================================================
       ID = 3 (  0225):     39.35    4.397     1.40    36.47

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| ADD HYD  (  0225)|
|   3 +  2 =  1    |         AREA    OPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0225):     39.35    4.397     1.40    36.47
     + ID2= 2 (  0227):      0.15    0.073     1.40    34.69
       ==========================================================
       ID = 1 (  0225):     39.50    4.470     1.40    36.46

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| ADD HYD  (  0211)|
|   1 +  2 =  3    |         AREA    OPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0212):      6.45    0.115     2.60    28.35
     + ID2= 2 (  0225):     39.50    4.470     1.40    36.46
       ==========================================================
       ID = 3 (  0211):     45.95    4.487     1.40    35.32

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0241)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   1.6250      1.2448
                          0.0190     0.1627   |   1.6630      1.2997
                          0.0360     0.4306   |   1.8430      1.5816
                          0.0480     0.7217   |   2.1300      2.1197
                          0.1330     0.7718   |   2.9680      2.2465
                          1.0390     0.9773   |   7.5380      2.5741

                                 AREA     OPEAK     TPEAK      R.V.
                                 (ha)     (cms)     (hrs)      (mm)
   INFLOW : ID= 2 (  0211)     45.948     4.487      1.40      35.32
   OUTFLOW: ID= 1 (  0241)     45.948     0.982      2.40      35.28

                  PEAK   FLOW   REDUCTION (Qout/Qin)(%)= 21.89
                  TIME SHIFT OF PEAK FLOW          (min)= 60.00
                  MAXIMUM  STORAGE   USED        (ha.m.)=  0.9663

--------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0228)|   Area    (ha)=  13.94
|ID= 1 DT=12.0 min |   Total Imp(%)=  47.50   Dir. Conn.(%)=  22.30
--------------------
                            IMPERVIOUS    PERVIOUS (i)
```

COLE ENGINEERING

Experience Enhancing Excellence

```
     Surface Area      (ha)=        6.62          7.32
     Dep. Storage      (mm)=        1.00          1.50
     Average Slope      (%)=        1.00          2.00
     Length             (m)=      304.85         40.00
     Mannings n            =       0.013         0.250

     Max.Eff.Inten.(mm/hr)=      118.44         78.97
               over (min)        12.00         24.00
     Storage Coeff.  (min)=        4.66 (ii)    12.42 (ii)
     Unit Hyd. Tpeak (min)=       12.00         24.00
     Unit Hyd. peak  (cms)=        0.13          0.07
                                                      *TOTALS*
     PEAK FLOW       (cms)=        0.98          0.94          1.524 (iii)
     TIME TO PEAK    (hrs)=        1.40          1.60          1.40
     RUNOFF VOLUME    (mm)=       61.15         27.04         34.65
     TOTAL RAINFALL   (mm)=       62.15         62.15         62.15
     RUNOFF COEFFICIENT    =       0.98          0.44          0.56

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

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN*  =  69.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EOUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0243)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000      0.0000   |   0.8570      0.5282
                          0.1680      0.0173   |   0.9360      0.6538
                          0.4120      0.1031   |   1.0080      0.7859
                          0.5570      0.1976   |   1.0760      0.9234
                          0.6720      0.3000   |   1.1270      1.0373
                          0.7700      0.4102   |   1.1760      1.1552

                                AREA     OPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0228)     13.940     1.524      1.40      34.65
   OUTFLOW: ID= 1 (  0243)     13.940     0.540      2.00      34.65

                  PEAK   FLOW   REDUCTION (Out/Oin)(%)= 35.45
                  TIME SHIFT OF PEAK FLOW          (min)= 36.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.1884

--------------------------------------------------------------------------------
--------------------
| ROUTEPIPE(  0184)|     PIPE Number     =   1.00
| IN= 2---> OUT= 1 |     Diameter    (mm)=1650.00
| DT= 12.0 min     |     Length       (m)= 500.00
--------------------     Slope       (m/m)=  0.005
                         Manning n       =  0.013

     <------------------ TRAVEL TIME TABLE ------------------->
       DEPTH      VOLUME     FLOW RATE    VELOCITY    TRAV.TIME
        (m)     (cu.m.)        (cms)        (m/s)         min
       0.09     .216E+02         0.0         0.80       10.40
       0.17     .600E+02         0.1         1.25        6.67
       0.26     .108E+03         0.3         1.61        5.18
       0.35     .164E+03         0.6         1.91        4.36
       0.43     .225E+03         1.0         2.18        3.83
       0.52     .290E+03         1.4         2.41        3.46
       0.61     .358E+03         1.9         2.61        3.19
       0.69     .428E+03         2.4         2.79        2.99
       0.78     .499E+03         2.9         2.95        2.83
       0.87     .570E+03         3.5         3.08        2.70
       0.96     .642E+03         4.1         3.20        2.61
       1.04     .712E+03         4.7         3.29        2.53
       1.13     .780E+03         5.2         3.36        2.48
       1.22     .844E+03         5.8         3.41        2.44
       1.30     .905E+03         6.2         3.44        2.43
       1.39     .961E+03         6.6         3.43        2.43
       1.48     .101E+04         6.9         3.40        2.45
       1.56     .105E+04         6.9         3.31        2.52
       1.65     .107E+04         6.5         3.02        2.76
                                <---- hydrograph ---->   <-pipe / channel->
                              AREA     OPEAK    TPEAK   R.V.   MAX DEPTH  MAX VEL
                              (ha)     (cms)    (hrs)   (mm)       (m)      (m/s)
   INFLOW : ID= 2 (  0243)   13.94      0.54     2.00  34.65      0.32      1.81
   OUTFLOW: ID= 1 (  0184)   13.94      0.54     2.00  34.64      0.32      1.81

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0229)|   Area    (ha)=  10.23
|ID= 1 DT=12.0 min |   Total Imp(%)=  30.10   Dir. Conn.(%)=  15.10
--------------------
                                IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=        3.08          7.15
     Dep. Storage      (mm)=        1.00          1.50
     Average Slope      (%)=        1.00          2.00
     Length             (m)=      261.15         40.00
     Mannings n            =       0.013         0.250

     Max.Eff.Inten.(mm/hr)=      118.44         56.74
               over (min)        12.00         24.00
     Storage Coeff.  (min)=        4.25 (ii)    13.10 (ii)
     Unit Hyd. Tpeak (min)=       12.00         24.00
     Unit Hyd. peak  (cms)=        0.13          0.07
                                                      *TOTALS*
     PEAK FLOW       (cms)=        0.49          0.64          0.860 (iii)
     TIME TO PEAK    (hrs)=        1.40          1.60          1.40
     RUNOFF VOLUME    (mm)=       61.15         23.96         29.58
     TOTAL RAINFALL   (mm)=       62.15         62.15         62.15
     RUNOFF COEFFICIENT    =       0.98          0.39          0.48

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN*  =  69.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EOUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

--------------------
| ADD HYD  (  0196)|
|  1 +  2 =  3     |          AREA    OPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0184):    13.94   0.542     2.00    34.64
      + ID2= 2 (  0229):    10.23   0.860     1.40    29.58
        ================================================
        ID = 3 (  0196):    24.17   1.224     1.60    32.50

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0244)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000      0.0000   |   0.6510      0.4564
                          0.1220      0.0863   |   0.8770      0.7894
                          0.3620      0.1603   |   0.0000      0.0000

                                AREA     OPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0196)     24.170     1.224      1.60      32.50
   OUTFLOW: ID= 1 (  0244)     24.170     0.508      3.20      32.49

                  PEAK   FLOW   REDUCTION (Out/Oin)(%)= 41.53
                  TIME SHIFT OF PEAK FLOW          (min)= 96.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.3109

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0230)|   Area    (ha)=  24.32
|ID= 1 DT=12.0 min |   Total Imp(%)=  47.50   Dir. Conn.(%)=  29.30
--------------------
                                IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=       11.55         12.77
     Dep. Storage      (mm)=        1.00          1.50
     Average Slope      (%)=        1.00          2.00
     Length             (m)=      402.66         40.00
     Mannings n            =       0.013         0.250

     Max.Eff.Inten.(mm/hr)=      118.44         67.53
               over (min)        12.00         24.00
     Storage Coeff.  (min)=        5.51 (ii)    13.76 (ii)
     Unit Hyd. Tpeak (min)=       12.00         24.00
     Unit Hyd. peak  (cms)=        0.13          0.06
                                                      *TOTALS*
     PEAK FLOW       (cms)=        2.18          1.34          2.955 (iii)
```

COLE ENGINEERING

Experience Enhancing Excellence

```
     TIME TO PEAK     (hrs)=       1.40         1.60         1.40
     RUNOFF VOLUME    (mm)=       61.15        25.56        35.99
     TOTAL RAINFALL   (mm)=       62.15        62.15        62.15
     RUNOFF COEFFICIENT   =        0.98         0.41         0.58

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

--------------------
| ADD HYD  (  0224)|
|  1 +  2 =  3     |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0230):    24.32   2.955     1.40     35.99
     + ID2= 2 (  0244):    24.17   0.508     3.20     32.49
       ================================================
       ID = 3 (  0224):    48.49   3.064     1.40     34.25

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0247)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000      0.0000   |   0.6390      0.9848
                          0.0270      0.1457   |   0.9700      1.2900
                          0.0430      0.3152   |   1.1040      1.7480
                          0.0530      0.4653   |   3.3100      1.9350
                          0.3280      0.6677   |  11.3140      2.2662

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0224)     48.490     3.064     1.40       34.25
   OUTFLOW: ID= 1 (  0247)     48.490     0.572     4.20       34.22

                 PEAK   FLOW   REDUCTION (Qout/Qin)(%)= 18.68
                 TIME SHIFT OF PEAK FLOW         (min)=168.00
                 MAXIMUM  STORAGE   USED        (ha.m.)=  0.9168

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

       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 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)\Visual OTTHYMO 5.0\VO2\voin.dat
  Output  filename: C:\Users\JJohnston\AppData\Local\Civica\VH5\a379672b-db33-4372-b5e0-
ba58a07d1417\f5baa478-61fd-4c7a-ab29-171597ea6b3c\sc
  Summary filename: C:\Users\JJohnston\AppData\Local\Civica\VH5\a379672b-db33-4372-b5e0-
ba58a07d1417\f5baa478-61fd-4c7a-ab29-171597ea6b3c\sc


DATE: 03/21/2018                          TIME: 02:39:46

USER:


COMMENTS:
```

```
--------------------------------------------------------------------------------
-----
  ***********************************************
  ** SIMULATION : Run 05                       **
  ***********************************************

------------------
| CHICAGO STORM  |    IDF curve parameters: A=1488.000
| Ptotal= 72.26 mm |                          B=   3.000
------------------                          C=   0.803
                        used in:   INTENSITY =  A / (t + B)^C

                        Duration of storm  =  4.00 hrs
                        Storm time step    = 10.00 min
                        Time to peak ratio =  0.33

      TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
       hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
      0.17    4.27 |  1.17   33.54 |'  2.17    9.99 |  3.17    5.08
      0.33    4.89 |  1.33  189.72 |'  2.33    8.52 |  3.33    4.72
      0.50    5.75 |  1.50   44.29 |'  2.50    7.46 |  3.50    4.41
      0.67    7.05 |  1.67   22.84 |'  2.67    6.65 |  3.67    4.15
      0.83    9.24 |  1.83   15.74 |'  2.83    6.02 |  3.83    3.91
      1.00   13.94 |  2.00   12.16 |'  3.00    5.50 |  4.00    3.71

--------------------------------------------------------------------------------
------------------
| CALIB            |
| NASHYD  (  0250)|   Area     (ha)=   1.25   Curve Number   (CN)= 72.0
|ID= 1 DT=12.0 min |   Ia       (mm)=   5.00   # of Linear Res.(N)= 3.00
------------------   U.H. Tp(hrs)=   0.15

        NOTE:  RAINFALL WAS TRANSFORMED TO  12.0 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
     0.200    4.38 | 1.200   59.57 | 2.200    9.74 |  3.20    5.02
     0.400    5.18 | 1.400  141.24 | 2.400    8.17 |  3.40    4.62
     0.600    6.40 | 1.600   33.57 | 2.600    7.05 |  3.60    4.28
     0.800    8.51 | 1.800   18.11 | 2.800    6.23 |  3.80    3.99
     1.000   13.16 | 2.000   12.76 | 3.000    5.59 |  4.00    3.74

    Unit Hyd Qpeak  (cms)=   0.318

    PEAK FLOW       (cms)=   0.132 (i)
    TIME TO PEAK    (hrs)=   1.400
    RUNOFF VOLUME    (mm)=  23.826
    TOTAL RAINFALL   (mm)=  72.259
    RUNOFF COEFFICIENT   =   0.330

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0209)|   Area     (ha)=   5.20
|ID= 1 DT=12.0 min |   Total Imp(%)=  31.60   Dir. Conn.(%)=  19.40
--------------------

                             IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=       1.64          3.56
    Dep. Storage     (mm)=       1.00          1.50
    Average Slope     (%)=       1.00          2.00
    Length            (m)=     186.19         40.00
    Mannings n           =      0.013         0.250

    Max.Eff.Inten.(mm/hr)=     141.24         71.69
              over (min)         12.00         12.00
    Storage Coeff.  (min)=       3.23 (ii)     11.29 (ii)
    Unit Hyd. Tpeak (min)=      12.00         12.00
    Unit Hyd. peak  (cms)=       0.14          0.09
                                                      *TOTALS*
    PEAK FLOW       (cms)=       0.39          0.50          0.888 (iii)
    TIME TO PEAK    (hrs)=       1.40          1.40          1.40
    RUNOFF VOLUME    (mm)=      71.26         30.02         38.02
    TOTAL RAINFALL   (mm)=      72.26         72.26         72.26
    RUNOFF COEFFICIENT   =       0.99          0.42          0.53

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
             YOU SHOULD CONSIDER SPLITTING THE AREA.

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN*  =  69.0    Ia = Dep. Storage  (Above)
```

```
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| ADD HYD  (  0251)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0209):     5.20   0.888     1.40    38.02
      + ID2= 2 (  0250):     1.25   0.132     1.40    23.83
        ================================================
        ID = 3 (  0251):     6.45   1.020     1.40    35.27

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0245)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.3090     0.2876
                          0.0000     0.0000   |   0.3330     0.3838
                          0.1230     0.1102   |   0.3620     0.5200
                          0.2870     0.1971   |   0.0000     0.0000

                               AREA     QPEAK     TPEAK      R.V.
                               (ha)     (cms)     (hrs)      (mm)
   INFLOW : ID= 2 (  0251)     6.450     1.020      1.40      35.27
   OUTFLOW: ID= 1 (  0245)     6.450     0.164      2.00      35.24

                  PEAK   FLOW   REDUCTION (Qout/Qin)(%)= 16.04
                  TIME SHIFT OF PEAK FLOW          (min)= 36.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.1326

--------------------------------------------------------------------------------
--------------------
| ROUTEPIPE(  0212)|     PIPE Number     =   1.00
| IN= 2---> OUT= 1 |     Diameter    (mm)=1650.00
| DT= 12.0 min     |     Length      (m)= 850.00
--------------------     Slope       (m/m)=  0.005
                         Manning n       =  0.013

     <------------------ TRAVEL TIME TABLE ---------------------->
       DEPTH      VOLUME     FLOW RATE    VELOCITY    TRAV.TIME
        (m)     (cu.m.)       (cms)        (m/s)        min
       0.09    .367E+02        0.0          0.80        17.68
       0.17    .102E+03        0.1          1.25        11.33
       0.26    .184E+03        0.3          1.61         8.81
       0.35    .278E+03        0.6          1.91         7.41
       0.43    .382E+03        1.0          2.18         6.51
       0.52    .492E+03        1.4          2.41         5.88
       0.61    .608E+03        1.9          2.61         5.43
       0.69    .727E+03        2.4          2.79         5.08
       0.78    .848E+03        2.9          2.95         4.81
       0.87    .970E+03        3.5          3.08         4.60
       0.96    .109E+04        4.1          3.20         4.43
       1.04    .121E+04        4.7          3.29         4.31
       1.13    .133E+04        5.2          3.36         4.22
       1.22    .144E+04        5.8          3.41         4.15
       1.30    .154E+04        6.2          3.44         4.12
       1.39    .163E+04        6.6          3.43         4.13
       1.48    .172E+04        6.9          3.40         4.17
       1.56    .178E+04        6.9          3.31         4.28
       1.65    .182E+04        6.5          3.02         4.70
                                    <---- hydrograph ---->   <-pipe / channel->
                               AREA    QPEAK    TPEAK   R.V.   MAX DEPTH  MAX VEL
                               (ha)    (cms)    (hrs)   (mm)       (m)      (m/s)
   INFLOW : ID= 2 (  0245)     6.45     0.16     2.00  35.24      0.18       1.27
   OUTFLOW: ID= 1 (  0212)     6.45     0.17     2.20  35.23      0.18       1.27


--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0160)|   Area    (ha)=   1.50
|ID= 1 DT=12.0 min |   Total Imp(%)=  50.70   Dir. Conn.(%)=  22.00
--------------------

                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.76         0.74
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     100.00        40.00
     Manning n            =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     141.24       115.54
               over (min)       12.00        12.00
     Storage Coeff.  (min)=       2.23 (ii)    8.89 (ii)
     Unit Hyd. Tpeak (min)=      12.00        12.00
     Unit Hyd. peak  (cms)=       0.14         0.10
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.13         0.19          0.315 (iii)
     TIME TO PEAK    (hrs)=       1.40         1.40           1.40
     RUNOFF VOLUME    (mm)=      71.26        35.45          43.33
     TOTAL RAINFALL   (mm)=      72.26        72.26          72.26
     RUNOFF COEFFICIENT   =       0.99         0.49           0.60

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  69.0     Ia = Dep. Storage    (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| DUHYD    (  0183)|
| Inlet Cap.= 0.152|
| #of Inlets=     1|
| Total(cms)=   0.2|      AREA     QPEAK     TPEAK     R.V.
--------------------      (ha)     (cms)     (hrs)     (mm)
     TOTAL HYD.(ID= 1):   1.50      0.32      1.40    43.33
     ================================================
     MAJOR SYS.(ID= 2):   0.27      0.16      1.40    43.33
     MINOR SYS.(ID= 3):   1.23      0.15      1.40    43.33

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0193)|   Area    (ha)=   1.21
|ID= 1 DT=12.0 min |   Total Imp(%)=  49.30   Dir. Conn.(%)=  20.10
--------------------

                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.60         0.61
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      89.81        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     141.24       114.82
               over (min)       12.00        12.00
     Storage Coeff.  (min)=       2.09 (ii)    8.76 (ii)
     Unit Hyd. Tpeak (min)=      12.00        12.00
     Unit Hyd. peak  (cms)=       0.14         0.11
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.10         0.15          0.250 (iii)
     TIME TO PEAK    (hrs)=       1.40         1.40           1.40
     RUNOFF VOLUME    (mm)=      71.26        35.38          42.59
     TOTAL RAINFALL   (mm)=      72.26        72.26          72.26
     RUNOFF COEFFICIENT   =       0.99         0.49           0.59

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  69.0     Ia = Dep. Storage    (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| DUHYD    (  0227)|
| Inlet Cap.= 0.120|
| #of Inlets=     1|
| Total(cms)=   0.1|      AREA     QPEAK     TPEAK     R.V.
--------------------      (ha)     (cms)     (hrs)     (mm)
     TOTAL HYD.(ID= 1):   1.21      0.25      1.40    42.59
     ================================================
     MAJOR SYS.(ID= 2):   0.22      0.13      1.40    42.59
     MINOR SYS.(ID= 3):   0.99      0.12      1.40    42.59

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0206)|   Area    (ha)=  39.16
```

```
|ID= 1 DT=12.0 min |   Total Imp(%)=  54.20   Dir. Conn.(%)=  23.20
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      21.22        17.94
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     510.95        40.00
     Mannings n            =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     141.24       126.55
               over (min)       12.00        24.00
     Storage Coeff.  (min)=       5.92 (ii)   12.34 (ii)
     Unit Hyd. Tpeak (min)=      12.00        24.00
     Unit Hyd. peak  (cms)=       0.12         0.07
                                                    *TOTALS*
     PEAK FLOW       (cms)=       3.27         3.70          5.470 (iii)
     TIME TO PEAK    (hrs)=       1.40         1.60          1.40
     RUNOFF VOLUME    (mm)=      71.26        36.53         44.59
     TOTAL RAINFALL   (mm)=      72.26        72.26         72.26
     RUNOFF COEFFICIENT   =       0.99         0.51          0.62

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

--------------------
| ADD HYD  (  0225)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0183):      0.27   0.163     1.40     43.33
     + ID2= 2 (  0206):     39.16   5.470     1.40     44.59
       ====================================================
       ID = 3 (  0225):     39.43   5.633     1.40     44.58

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD  (  0225)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0225):     39.43   5.633     1.40     44.58
     + ID2= 2 (  0227):      0.22   0.130     1.40     42.59
       ====================================================
       ID = 1 (  0225):     39.65   5.763     1.40     44.57

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD  (  0211)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0212):      6.45   0.166     2.20     35.23
     + ID2= 2 (  0225):     39.65   5.763     1.40     44.57
       ====================================================
       ID = 3 (  0211):     46.10   5.789     1.40     43.26

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| RESERVOIR(  0241)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------       (cms)     (ha.m.)   |   (cms)     (ha.m.)
                         0.0000      0.0000   |   1.6250      1.2448
                         0.0190      0.1627   |   1.6630      1.2997
                         0.0360      0.4306   |   1.8430      1.5816
                         0.0480      0.7217   |   2.1300      2.1197
                         0.1330      0.7718   |   2.9680      2.2465
                         1.0390      0.9773   |   7.5380      2.5741

                                AREA     QPEAK      TPEAK       R.V.
                                (ha)     (cms)      (hrs)       (mm)
   INFLOW : ID= 2 (  0211)     46.100     5.789       1.40      43.26
   OUTFLOW: ID= 1 (  0241)     46.100     1.384       2.20      43.21

                          PEAK   FLOW   REDUCTION (Qout/Qin)(%)= 23.91
                          TIME SHIFT OF PEAK FLOW         (min)= 48.00
                          MAXIMUM  STORAGE   USED       (ha.m.)=  1.1359

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

--------------------
| CALIB            |
| STANDHYD (  0228)|   Area     (ha)=  13.94
|ID= 1 DT=12.0 min |   Total Imp(%)=  47.50   Dir. Conn.(%)=  22.30
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       6.62         7.32
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     304.85        40.00
     Mannings n            =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     141.24       103.94
               over (min)       12.00        12.00
     Storage Coeff.  (min)=       4.34 (ii)   11.29 (ii)
     Unit Hyd. Tpeak (min)=      12.00        12.00
     Unit Hyd. peak  (cms)=       0.13         0.09
                                                    *TOTALS*
     PEAK FLOW       (cms)=       1.17         1.49          2.664 (iii)
     TIME TO PEAK    (hrs)=       1.40         1.40          1.40
     RUNOFF VOLUME    (mm)=      71.26        34.22         42.48
     TOTAL RAINFALL   (mm)=      72.26        72.26         72.26
     RUNOFF COEFFICIENT   =       0.99         0.47          0.59

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

--------------------
| RESERVOIR(  0243)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------       (cms)     (ha.m.)   |   (cms)     (ha.m.)
                         0.0000      0.0000   |   0.8570      0.5282
                         0.1680      0.0173   |   0.9360      0.6538
                         0.4120      0.1031   |   1.0080      0.7859
                         0.5570      0.1976   |   1.0760      0.9234
                         0.6720      0.3000   |   1.1270      1.0373
                         0.7700      0.4102   |   1.1760      1.1552

                                AREA     QPEAK      TPEAK       R.V.
                                (ha)     (cms)      (hrs)       (mm)
   INFLOW : ID= 2 (  0228)     13.940     2.664       1.40      42.48
   OUTFLOW: ID= 1 (  0243)     13.940     0.632       1.80      42.47

                          PEAK   FLOW   REDUCTION (Qout/Qin)(%)= 23.73
                          TIME SHIFT OF PEAK FLOW         (min)= 24.00
                          MAXIMUM  STORAGE   USED       (ha.m.)=  0.2680

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

--------------------
| ROUTEPIPE(  0184)|     PIPE Number      =   1.00
| IN= 2---> OUT= 1 |     Diameter    (mm)=1650.00
| DT= 12.0 min     |     Length        (m)= 500.00
--------------------     Slope       (m/m)=  0.005
                         Manning n         =  0.013

      <------------------ TRAVEL TIME TABLE ---------------------->
        DEPTH      VOLUME      FLOW RATE     VELOCITY     TRAV.TIME
          (m)    (cu.m.)          (cms)         (m/s)          min
         0.09   .216E+02            0.0          0.80        10.40
         0.17   .600E+02            0.1          1.25         6.67
         0.26   .108E+03            0.3          1.61         5.18
         0.35   .164E+03            0.6          1.91         4.36
         0.43   .225E+03            1.0          2.18         3.83
         0.52   .290E+03            1.4          2.41         3.46
         0.61   .358E+03            1.9          2.61         3.19
         0.69   .428E+03            2.4          2.79         2.99
         0.78   .499E+03            2.9          2.95         2.83
         0.87   .570E+03            3.5          3.08         2.70
         0.96   .642E+03            4.1          3.20         2.61
         1.04   .712E+03            4.7          3.29         2.53
         1.13   .780E+03            5.2          3.36         2.48
         1.22   .844E+03            5.8          3.41         2.44
         1.30   .905E+03            6.2          3.44         2.43
         1.39   .961E+03            6.6          3.43         2.43
```

```
      1.48     .101E+04       6.9          3.40         2.45
      1.56     .105E+04       6.9          3.31         2.52
      1.65     .107E+04       6.5          3.02         2.76
                                <---- hydrograph ---->   <-pipe / channel->
                              AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                              (ha)    (cms)   (hrs)   (mm)       (m)      (m/s)
  INFLOW : ID= 2 (  0243)   13.94     0.63    1.80   42.47      0.35      1.92
  OUTFLOW: ID= 1 (  0184)   13.94     0.64    1.80   42.47      0.35      1.92


--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0229)|   Area    (ha)=  10.23
|ID= 1 DT=12.0 min |   Total Imp(%)=  30.10   Dir. Conn.(%)=  15.10
--------------------

                           IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=       3.08          7.15
    Dep. Storage     (mm)=       1.00          1.50
    Average Slope     (%)=       1.00          2.00
    Length            (m)=     261.15         40.00
    Mannings n            =      0.013         0.250

    Max.Eff.Inten.(mm/hr)=     141.24         75.39
              over (min)       12.00         12.00
    Storage Coeff.  (min)=       3.96 (ii)    11.86 (ii)
    Unit Hyd. Tpeak (min)=      12.00         12.00
    Unit Hyd. peak  (cms)=       0.13          0.09
                                                    *TOTALS*
    PEAK FLOW        (cms)=      0.59          1.03          1.616 (iii)
    TIME TO PEAK     (hrs)=      1.40          1.40          1.40
    RUNOFF VOLUME     (mm)=     71.26         30.58         36.72
    TOTAL RAINFALL    (mm)=     72.26         72.26         72.26
    RUNOFF COEFFICIENT   =       0.99          0.42          0.51

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
             YOU SHOULD CONSIDER SPLITTING THE AREA.

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  69.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| ADD HYD  (  0196)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0184):    13.94    0.639     1.80    42.47
     + ID2= 2 (  0229):    10.23    1.616     1.40    36.72
       ========================================================
       ID = 3 (  0196):    24.17    1.980     1.40    40.04

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0244)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                         0.0000      0.0000   |   0.6510      0.4564
                         0.1220      0.0863   |   0.8770      0.7894
                         0.3620      0.1603   |   0.0000      0.0000

                              AREA     QPEAK     TPEAK       R.V.
                              (ha)     (cms)     (hrs)       (mm)
  INFLOW : ID= 2 (  0196)    24.170     1.980      1.40      40.04
  OUTFLOW: ID= 1 (  0244)    24.170     0.588      3.20      40.03

                 PEAK   FLOW   REDUCTION [Qout/Qin](%)= 29.67
                 TIME SHIFT OF PEAK FLOW         (min)=108.00
                 MAXIMUM  STORAGE   USED       (ha.m.)=  0.3919

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0230)|   Area    (ha)=  24.32
|ID= 1 DT=12.0 min |   Total Imp(%)=  47.50   Dir. Conn.(%)=  29.30
--------------------

                           IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=      11.55         12.77
    Dep. Storage     (mm)=       1.00          1.50
    Average Slope     (%)=       1.00          2.00
    Length            (m)=     402.66         40.00
    Mannings n            =      0.013         0.250

    Max.Eff.Inten.(mm/hr)=     141.24         89.28
              over (min)       12.00         24.00
    Storage Coeff.  (min)=       5.13 (ii)    12.52 (ii)
    Unit Hyd. Tpeak (min)=      12.00         24.00
    Unit Hyd. peak  (cms)=       0.13          0.07
                                                    *TOTALS*
    PEAK FLOW        (cms)=      2.63          1.85          3.708 (iii)
    TIME TO PEAK     (hrs)=      1.40          1.60          1.40
    RUNOFF VOLUME     (mm)=     71.26         32.47         43.83
    TOTAL RAINFALL    (mm)=     72.26         72.26         72.26
    RUNOFF COEFFICIENT   =       0.99          0.45          0.61

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

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  69.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| ADD HYD  (  0224)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0230):    24.32    3.708     1.40    43.83
     + ID2= 2 (  0244):    24.17    0.588     3.20    40.03
       ========================================================
       ID = 3 (  0224):    48.49    3.940     1.40    41.94

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0247)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                         0.0000      0.0000   |   0.6390      0.9848
                         0.0270      0.1457   |   0.9700      1.2900
                         0.0430      0.3152   |   1.1040      1.7480
                         0.0530      0.4653   |   3.3100      1.9350
                         0.3280      0.6677   |  11.3140      2.2662

                              AREA     QPEAK     TPEAK       R.V.
                              (ha)     (cms)     (hrs)       (mm)
  INFLOW : ID= 2 (  0224)    48.490     3.940      1.40      41.94
  OUTFLOW: ID= 1 (  0247)    48.490     0.711      4.20      41.91

                 PEAK   FLOW   REDUCTION [Qout/Qin](%)= 18.04
                 TIME SHIFT OF PEAK FLOW         (min)=168.00
                 MAXIMUM  STORAGE   USED       (ha.m.)=  1.0529

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

 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)\Visual OTTHYMO 5.0\VO2\voin.dat
```

```
  Output  filename: C:\Users\JJohnston\AppData\Local\Civica\VH5\a379672b-db33-4372-b5e0-
ba58a07d1417\4b686129-8b18-4264-ad25-71fa1929c181\sc
  Summary filename: C:\Users\JJohnston\AppData\Local\Civica\VH5\a379672b-db33-4372-b5e0-
ba58a07d1417\4b686129-8b18-4264-ad25-71fa1929c181\sc


DATE: 03/21/2018                          TIME: 02:39:46

USER:


COMMENTS:


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

--------------------
| CHICAGO STORM    |     IDF curve parameters: A=1770.000
| Ptotal= 78.03 mm |                           B=    4.000
--------------------                           C=    0.820
                        used in:    INTENSITY =  A / (t + B)^C

                        Duration of storm  =  4.00 hrs
                        Storm time step    = 10.00 min
                        Time to peak ratio =  0.33

                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.17    4.34 |  1.17   38.21 |  2.17   10.60 |  3.17    5.19
                0.33    5.00 |  1.33  203.31 |  2.33    8.96 |  3.33    4.81
                0.50    5.92 |  1.50   50.96 |  2.50    7.78 |  3.50    4.48
                0.67    7.33 |  1.67   25.51 |  2.67    6.90 |  3.67    4.20
                0.83    9.77 |  1.83   17.18 |  2.83    6.21 |  3.83    3.96
                1.00   15.10 |  2.00   13.06 |  3.00    5.65 |  4.00    3.74


--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD  (  0250)|   Area    (ha)=   1.25   Curve Number   (CN)= 72.0
|ID= 1 DT=12.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.15

        NOTE:  RAINFALL WAS TRANSFORMED TO  12.0 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
               0.200    4.45 | 1.200   65.72 | 2.200   10.32 |  3.20    5.13
               0.400    5.30 | 1.400  152.52 | 2.400    8.56 |  3.40    4.70
               0.600    6.63 | 1.600   38.23 | 2.600    7.34 |  3.60    4.34
               0.800    8.95 | 1.800   19.96 | 2.800    6.44 |  3.80    4.04
               1.000   14.21 | 2.000   13.75 | 3.000    5.74 |  4.00    3.78

     Unit Hyd Qpeak  (cms)=   0.318

     PEAK FLOW       (cms)=   0.152 (i)
     TIME TO PEAK    (hrs)=   1.400
     RUNOFF VOLUME    (mm)=  27.145
     TOTAL RAINFALL   (mm)=  78.027
     RUNOFF COEFFICIENT   =   0.348

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0209)|   Area    (ha)=   5.20
|ID= 1 DT=12.0 min |   Total Imp(%)=  31.60   Dir. Conn.(%)=  19.40
--------------------

                        IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=     1.64         3.56
     Dep. Storage     (mm)=     1.00         1.50
     Average Slope     (%)=     1.00         2.00
     Length            (m)=   186.19        40.00
     Mannings n             =    0.013        0.250

     Max.Eff.Inten.(mm/hr)=   152.52        81.49
               over (min)     12.00        12.00
     Storage Coeff.  (min)=     3.13 (ii)   10.79 (ii)
     Unit Hyd. Tpeak (min)=    12.00        12.00
     Unit Hyd. peak  (cms)=     0.14         0.10
                                                      *TOTALS*
     PEAK FLOW       (cms)=     0.42         0.58       1.001 (iii)
     TIME TO PEAK    (hrs)=     1.40         1.40       1.40
     RUNOFF VOLUME    (mm)=    77.03        33.94      42.29
     TOTAL RAINFALL   (mm)=    78.03        78.03      78.03
     RUNOFF COEFFICIENT   =     0.99         0.43       0.54

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
             YOU SHOULD CONSIDER SPLITTING THE AREA.

     (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
         CN* =  69.0    Ia = Dep. Storage    (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| ADD HYD  (  0251)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0209):     5.20    1.001     1.40    42.29
     + ID2= 2 (  0250):     1.25    0.152     1.40    27.14
       ================================================
       ID = 3 (  0251):     6.45    1.153     1.40    39.36

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0245)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                         0.0000      0.0000   |   0.3090      0.2876
                         0.0000      0.0000   |   0.3330      0.3838
                         0.1230      0.1102   |   0.3620      0.5200
                         0.2870      0.1971   |   0.0000      0.0000

                                  AREA     QPEAK     TPEAK      R.V.
                                  (ha)     (cms)     (hrs)      (mm)
   INFLOW : ID= 2 (  0251)       6.450     1.153      1.40      39.36
   OUTFLOW: ID= 1 (  0245)       6.450     0.194      2.00      39.33

                PEAK   FLOW   REDUCTION [Qout/Qin](%)= 16.83
                TIME SHIFT OF PEAK FLOW          (min)= 36.00
                MAXIMUM  STORAGE   USED        (ha.m.)=  0.1484

--------------------------------------------------------------------------------
--------------------
| ROUTEPIPE(  0212)|     PIPE Number      =   1.00
| IN= 2---> OUT= 1 |     Diameter     (mm)=1650.00
| DT= 12.0 min     |     Length        (m)= 850.00
--------------------     Slope      (m/m)=  0.005
                         Manning n        =  0.013

     <------------------ TRAVEL TIME TABLE ------------------->
       DEPTH      VOLUME     FLOW RATE     VELOCITY     TRAV.TIME
         (m)    (cu.m.)         (cms)         (m/s)          min
        0.09   .367E+02           0.0          0.80         17.68
        0.17   .102E+03           0.1          1.25         11.33
        0.26   .184E+03           0.3          1.61          8.81
        0.35   .278E+03           0.6          1.91          7.41
        0.43   .382E+03           1.0          2.18          6.51
        0.52   .492E+03           1.4          2.41          5.88
        0.61   .608E+03           1.9          2.61          5.43
        0.69   .727E+03           2.4          2.79          5.08
        0.78   .848E+03           2.9          2.95          4.81
        0.87   .970E+03           3.5          3.08          4.60
        0.96   .109E+04           4.1          3.20          4.43
        1.04   .121E+04           4.7          3.29          4.31
        1.13   .133E+04           5.2          3.36          4.22
        1.22   .144E+04           5.8          3.41          4.15
        1.30   .154E+04           6.2          3.44          4.12
        1.39   .163E+04           6.6          3.43          4.13
        1.48   .172E+04           6.9          3.40          4.17
        1.56   .178E+04           6.9          3.31          4.28
        1.65   .182E+04           6.5          3.02          4.70
                                          <---- hydrograph ---->   <-pipe / channel->
                                  AREA     QPEAK     TPEAK     R.V.   MAX DEPTH  MAX VEL
                                  (ha)     (cms)     (hrs)     (mm)       (m)      (m/s)
   INFLOW : ID= 2 (  0245)       6.45      0.19      2.00     39.33      0.19      1.32
```

COLE ENGINEERING

Experience Enhancing Excellence

```
   OUTFLOW: ID= 1 (  0212)    6.45     0.19    2.20  39.32      0.19      1.31


--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0160)|   Area    (ha)=   1.50
|ID= 1 DT=12.0 min |   Total Imp(%)=  50.70   Dir. Conn.(%)=  22.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      0.76         0.74
     Dep. Storage     (mm)=      1.00         1.50
     Average Slope     (%)=      1.00         2.00
     Length            (m)=    100.00        40.00
     Mannings n            =     0.013        0.250

     Max.Eff.Inten.(mm/hr)=    152.52       130.42
               over (min)      12.00        12.00
     Storage Coeff.  (min)=     2.16 (ii)    8.50 (ii)
     Unit Hyd. Tpeak (min)=    12.00        12.00
     Unit Hyd. peak  (cms)=     0.14         0.11
                                                      *TOTALS*
     PEAK FLOW       (cms)=     0.14         0.21          0.354 (iii)
     TIME TO PEAK    (hrs)=     1.40         1.40          1.40
     RUNOFF VOLUME    (mm)=    77.03        39.82         48.00
     TOTAL RAINFALL   (mm)=    78.03        78.03         78.03
     RUNOFF COEFFICIENT   =     0.99         0.51          0.62

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EOUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| DUHYD    (  0183)|
| Inlet Cap.= 0.152|
| #of Inlets=    1|
| Total(cms)=   0.2|      AREA     QPEAK     TPEAK    R.V.
--------------------      (ha)     (cms)     (hrs)    (mm)
     TOTAL HYD.(ID= 1):   1.50      0.35      1.40   48.00
     ==========================================================
     MAJOR SYS.(ID= 2):   0.30      0.20      1.40   48.00
     MINOR SYS.(ID= 3):   1.20      0.15      1.40   48.00

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0193)|   Area    (ha)=   1.21
|ID= 1 DT=12.0 min |   Total Imp(%)=  49.30   Dir. Conn.(%)=  20.10
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      0.60         0.61
     Dep. Storage     (mm)=      1.00         1.50
     Average Slope     (%)=      1.00         2.00
     Length            (m)=     89.81        40.00
     Mannings n            =     0.013        0.250

     Max.Eff.Inten.(mm/hr)=    152.52       129.62
               over (min)      12.00        12.00
     Storage Coeff.  (min)=     2.02 (ii)    8.38 (ii)
     Unit Hyd. Tpeak (min)=    12.00        12.00
     Unit Hyd. peak  (cms)=     0.14         0.11
                                                      *TOTALS*
     PEAK FLOW       (cms)=     0.10         0.18          0.280 (iii)
     TIME TO PEAK    (hrs)=     1.40         1.40          1.40
     RUNOFF VOLUME    (mm)=    77.03        39.74         47.23
     TOTAL RAINFALL   (mm)=    78.03        78.03         78.03
     RUNOFF COEFFICIENT   =     0.99         0.51          0.61

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EOUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| DUHYD    (  0227)|
| Inlet Cap.= 0.120|
| #of Inlets=    1|
| Total(cms)=   0.1|      AREA     QPEAK     TPEAK    R.V.
--------------------      (ha)     (cms)     (hrs)    (mm)
     TOTAL HYD.(ID= 1):   1.21      0.28      1.40   47.23
     ==========================================================
     MAJOR SYS.(ID= 2):   0.25      0.16      1.40   47.23
     MINOR SYS.(ID= 3):   0.96      0.12      1.40   47.23

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0206)|   Area    (ha)=  39.16
|ID= 1 DT=12.0 min |   Total Imp(%)=  54.20   Dir. Conn.(%)=  23.20
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=     21.22        17.94
     Dep. Storage     (mm)=      1.00         1.50
     Average Slope     (%)=      1.00         2.00
     Length            (m)=    510.95        40.00
     Mannings n            =     0.013        0.250

     Max.Eff.Inten.(mm/hr)=    152.52       142.65
               over (min)      12.00        12.00
     Storage Coeff.  (min)=     5.74 (ii)   11.86 (ii)
     Unit Hyd. Tpeak (min)=    12.00        12.00
     Unit Hyd. peak  (cms)=     0.12         0.09
                                                      *TOTALS*
     PEAK FLOW       (cms)=     3.56         4.92          8.479 (iii)
     TIME TO PEAK    (hrs)=     1.40         1.40          1.40
     RUNOFF VOLUME    (mm)=    77.03        40.98         49.34
     TOTAL RAINFALL   (mm)=    78.03        78.03         78.03
     RUNOFF COEFFICIENT   =     0.99         0.53          0.63

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EOUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| ADD HYD  (  0225)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0183):      0.30    0.202     1.40    48.00
     + ID2= 2 (  0206):     39.16    8.479     1.40    49.34
       ==========================================================
       ID = 3 (  0225):     39.46    8.681     1.40    49.33

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| ADD HYD  (  0225)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0225):     39.46    8.681     1.40    49.33
     + ID2= 2 (  0227):      0.25    0.160     1.40    47.23
       ==========================================================
       ID = 1 (  0225):     39.71    8.841     1.40    49.32

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| ADD HYD  (  0211)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0212):      6.45    0.194     2.20    39.32
     + ID2= 2 (  0225):     39.71    8.841     1.40    49.32
       ==========================================================
       ID = 3 (  0211):     46.16    8.871     1.40    47.92

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0241)|
```

COLE ENGINEERING

Experience Enhancing Excellence

```
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   1.6250     1.2448
                          0.0190     0.1627   |   1.6630     1.2997
                          0.0360     0.4306   |   1.8430     1.5816
                          0.0480     0.7217   |   2.1300     2.1197
                          0.1330     0.7718   |   2.9680     2.2465
                          1.0390     0.9773   |   7.5380     2.5741

                                AREA     QPEAK     TPEAK      R.V.
                                (ha)     (cms)     (hrs)      (mm)
   INFLOW : ID= 2 (  0211)     46.159     8.871     1.40      47.92
   OUTFLOW: ID= 1 (  0241)     46.159     1.601     2.00      47.87

                PEAK   FLOW   REDUCTION [Qout/Qin](%)= 18.05
                TIME SHIFT OF PEAK FLOW       (min)= 36.00
                MAXIMUM  STORAGE   USED       (ha.m.)=  1.2412

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0228)|   Area    (ha)=  13.94
|ID= 1 DT=12.0 min |   Total Imp(%)=  47.50   Dir. Conn.(%)=  22.30
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      6.62         7.32
     Dep. Storage     (mm)=      1.00         1.50
     Average Slope     (%)=      1.00         2.00
     Length            (m)=    304.85        40.00
     Mannings n            =     0.013        0.250

     Max.Eff.Inten.(mm/hr)=    152.52       117.51
           over (min)          12.00        12.00
     Storage Coeff.  (min)=     4.21 (ii)   10.83 (ii)
     Unit Hyd. Tpeak (min)=    12.00        12.00
     Unit Hyd. peak  (cms)=     0.13         0.09
                                             *TOTALS*
     PEAK FLOW       (cms)=     1.27         1.72         2.996 (iii)
     TIME TO PEAK    (hrs)=     1.40         1.40          1.40
     RUNOFF VOLUME    (mm)=    77.03        38.48         47.08
     TOTAL RAINFALL   (mm)=    78.03        78.03         78.03
     RUNOFF COEFFICIENT   =     0.99         0.49          0.60

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0243)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.8570     0.5282
                          0.1680     0.0173   |   0.9360     0.6538
                          0.4120     0.1031   |   1.0080     0.7859
                          0.5570     0.1976   |   1.0760     0.9234
                          0.6720     0.3000   |   1.1270     1.0373
                          0.7700     0.4102   |   1.1760     1.1552

                                AREA     QPEAK     TPEAK      R.V.
                                (ha)     (cms)     (hrs)      (mm)
   INFLOW : ID= 2 (  0228)     13.940     2.996     1.40      47.08
   OUTFLOW: ID= 1 (  0243)     13.940     0.678     1.80      47.08

                PEAK   FLOW   REDUCTION [Qout/Qin](%)= 22.62
                TIME SHIFT OF PEAK FLOW       (min)= 24.00
                MAXIMUM  STORAGE   USED       (ha.m.)=  0.3112

--------------------------------------------------------------------------------
--------------------
| ROUTEPIPE(  0184)|     PIPE Number      =   1.00
| IN= 2---> OUT= 1 |     Diameter    (mm)=1650.00
| DT= 12.0 min     |     Length        (m)= 500.00
--------------------     Slope     (m/m)=  0.005
                         Manning n        =  0.013

     <------------------ TRAVEL TIME TABLE ------------------->
       DEPTH      VOLUME     FLOW RATE     VELOCITY    TRAV.TIME
        (m)     (cu.m.)        (cms)         (m/s)         min
       0.09     .216E+02        0.0          0.80         10.40
       0.17     .600E+02        0.1          1.25          6.67
       0.26     .108E+03        0.3          1.61          5.18
       0.35     .164E+03        0.6          1.91          4.36
       0.43     .225E+03        1.0          2.18          3.83
       0.52     .290E+03        1.4          2.41          3.46
       0.61     .358E+03        1.9          2.61          3.19
       0.69     .428E+03        2.4          2.79          2.99
       0.78     .499E+03        2.9          2.95          2.83
       0.87     .570E+03        3.5          3.08          2.70
       0.96     .642E+03        4.1          3.20          2.61
       1.04     .712E+03        4.7          3.29          2.53
       1.13     .780E+03        5.2          3.36          2.48
       1.22     .844E+03        5.8          3.41          2.44
       1.30     .905E+03        6.2          3.44          2.43
       1.39     .961E+03        6.6          3.43          2.43
       1.48     .101E+04        6.9          3.40          2.45
       1.56     .105E+04        6.9          3.31          2.52
       1.65     .107E+04        6.5          3.02          2.76

                                <---- hydrograph ---->   <-pipe / channel->
                                AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                                (ha)    (cms)   (hrs)   (mm)      (m)      (m/s)
   INFLOW : ID= 2 (  0243)    13.94     0.68    1.80   47.08      0.36      1.95
   OUTFLOW: ID= 1 (  0184)    13.94     0.68    1.80   47.08      0.36      1.95

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0229)|   Area    (ha)=  10.23
|ID= 1 DT=12.0 min |   Total Imp(%)=  30.10   Dir. Conn.(%)=  15.10
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      3.08         7.15
     Dep. Storage     (mm)=      1.00         1.50
     Average Slope     (%)=      1.00         2.00
     Length            (m)=    261.15        40.00
     Mannings n            =     0.013        0.250

     Max.Eff.Inten.(mm/hr)=    152.52        85.63
           over (min)          12.00        12.00
     Storage Coeff.  (min)=     3.84 (ii)   11.35 (ii)
     Unit Hyd. Tpeak (min)=    12.00        12.00
     Unit Hyd. peak  (cms)=     0.14         0.09
                                             *TOTALS*
     PEAK FLOW       (cms)=     0.64         1.20         1.833 (iii)
     TIME TO PEAK    (hrs)=     1.40         1.40          1.40
     RUNOFF VOLUME    (mm)=    77.03        34.54         40.95
     TOTAL RAINFALL   (mm)=    78.03        78.03         78.03
     RUNOFF COEFFICIENT   =     0.99         0.44          0.52

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| ADD HYD  (  0196)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0184):    13.94    0.683     1.80     47.08
     + ID2= 2 (  0229):    10.23    1.833     1.40     40.95
       ================================================
       ID = 3 (  0196):    24.17    2.223     1.40     44.48

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0244)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.6510     0.4564
                          0.1220     0.0863   |   0.8770     0.7894
                          0.3620     0.1603   |   0.0000     0.0000

                                AREA     QPEAK     TPEAK      R.V.
                                (ha)     (cms)     (hrs)      (mm)
   INFLOW : ID= 2 (  0196)     24.170     2.223     1.40      44.48
```

```
   OUTFLOW: ID= 1 (  0244)     24.170      0.633      3.20      44.48

                  PEAK   FLOW   REDUCTION [Out/Oin](%)= 28.46
                  TIME SHIFT OF PEAK FLOW         (min)=108.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.4376

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0230)|   Area    (ha)=  24.32
|ID= 1 DT=12.0 min |   Total Imp(%)=  47.50   Dir. Conn.(%)=  29.30
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      11.55        12.77
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     402.66        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     152.52       101.17
               over (min)       12.00        24.00
     Storage Coeff.  (min)=       4.98 (ii)    12.00 (ii)
     Unit Hyd. Tpeak (min)=      12.00        24.00
     Unit Hyd. peak  (cms)=       0.13         0.07
                                                          *TOTALS*
     PEAK FLOW       (cms)=       2.86         2.14          4.112 (iii)
     TIME TO PEAK    (hrs)=       1.40         1.60           1.40
     RUNOFF VOLUME    (mm)=      77.03        36.59          48.44
     TOTAL RAINFALL   (mm)=      78.03        78.03          78.03
     RUNOFF COEFFICIENT   =       0.99         0.47           0.62

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  69.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| ADD HYD  (  0224)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0230):    24.32   4.112     1.40     48.44
     + ID2= 2 (  0244):    24.17   0.633     3.20     44.48
       ==========================================================
       ID = 3 (  0224):    48.49   4.389     1.40     46.47

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0247)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000      0.0000   |   0.6390      0.9848
                          0.0270      0.1457   |   0.9700      1.2900
                          0.0430      0.3152   |   1.1040      1.7480
                          0.0530      0.4653   |   3.3100      1.9350
                          0.3280      0.6677   |  11.3140      2.2662

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0224)     48.490      4.389      1.40      46.47
   OUTFLOW: ID= 1 (  0247)     48.490      0.791      4.00      46.44

                  PEAK   FLOW   REDUCTION [Out/Oin](%)= 18.02
                  TIME SHIFT OF PEAK FLOW         (min)=156.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  1.1260

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

APPENDIX C.3
Post-Development Model Input Parameters

COLE ENGINEERING

Pond 1 Imperviousness Calculations (Post-Development)

Marianneville - Glenway Estates (Phase 2)
File No.: L09-301
Date: April 2018

Catchment A1Post

Block#	Descrip.	Area (ha)	% Total Area	TIMP (%)	XIMP (%)	Notes
89	SWMP#1	0.8876475	7.3%	50	50	
89/121	Golf Course	1.6016928	13.2%	10	10	Newmarket stds
	Prop. Single Res. (Phase 1)	0.4618929	3.8%	63	7	Based on Lot 3 (53%) + Amenity Area (10%)
	Prop. Single Res. (Phase 2)	4.3751558	36.1%	65	7	Based on Lot 6 (55%) + Amenity Area (10%)
	Prop. 8.5 ROW	0.7226223	6.0%	88	88	6m Road with 1.5m Sidewalk
	Ex. Residential	3.2009	26.4%	52	7	Based on Lot 50 (42%) + Amenity Area (10%)
Alex Doner Drive / Amberlee Court	Ex. 20m ROW	0.8824	7.3%	65	65	Calculated from typical road section
	Total	*12.1323011*	*100.0%*	*54.5*	*19.7*	

COLE ENGINEERING

Pond 2 Imperviousness Calculations (Post-Development)

Marianneville - Glenway Estates (Phase 2)
File No.: L09-301
Date: April 2018

Catchment A2Post

Block#	Descrip.	Area (ha)	% Total Area	TIMP (%)	XIMP (%)	Notes
89	SWMP#2	1.1452984	9.1%	50	50	
89/121	Golf Course		0.0%	10	10	Newmarket stds
	Ex. Residential	7.8781469	62.7%	50	7	Based on Lot 73 (40%) + Amenity Area (10%)
Alex Doner Drive	Ex. 20m ROW	3.0604	24.4%	65	65	Calculated from typical road section
	Proposed Residential	0.4776803	3.8%	63	7	Copied from A-1 proposed Residential to be verified
	Total	*12.5615256*	*100.0%*	*54.1*	*25.0*	

Catchment A2-EXT Post

Block#	Descrip.	Area (ha)	% Total Area	TIMP (%)	XIMP (%)	Notes
	Townhouses + ROW	2.5654162	82.7%	75	50	
	Green Space	0.2914242	9.4%	10	10	Assumed it's similar to golf course
	Single Lot	0.2434058	7.9%	63	7	Taken from A2 calculations
	Total	*3.1002462*	*100.0%*	*67.9*	*42.9*	

COLE ENGINEERING

Pond 3 Imperviousness Calculations (Post-Development)

Marianneville - Glenway Estates (Phase 2)
File No.: L09-301
Date: April 2018

Catchment A3-1Post

Block#	Descrip.	Area (ha)	% Total Area	TIMP (%)	XIMP (%)	Notes
120	SWMP#3	0.7429	14.3%	50	50	
120	Golf Course	2.3369	45.0%	10	10	Newmarket stds
	Ex. Residential	1.6958	32.6%	45	8	Based on Lot 113 (35%) + Amenity Area (10%)
Alex Doner Drive	Ex. 20m ROW	0.4222	8.1%	65	65	Calculated from typical road section
	Total	*5.1978*	*100.0%*	*31.6*	*19.4*	

Catchment A3-2Post

Block#	Descrip.	Area (ha)	% Total Area	TIMP (%)	XIMP (%)	Notes
142	Golf Course	0.37293	31.1%	10	10	Newmarket stds
	Prop. Residential (Phase 2)	0.648381	54.0%	67	7	Based on Lot 49 (57%) + Amenity Area (10%)
	Prop. 8.5 ROW (Phase 2)	0.178783	14.9%	88	88	6m Road with 1.5m Sidewalk
	Total	*1.200093*	*100.0%*	*52.4*	*20.1*	

COLE ENGINEERING

Pond 4 Imperviousness Calculations (Post-Development)

Marianneville - Glenway Estates (Phase 2)
File No.: L09-301
Date: April 2018

Catchment A4Post

Block#	Descrip.	Area (ha)	% Total Area	TIMP (%)	XIMP (%)	Notes
170/171	SWMP#4 (Phase 1)	1.6633	8.2%	50	50	
155	Golf Course	2.038724	10.0%	10	10	Newmarket stds
	Prop. Commercial (Phase 1)	0.6526	3.2%	90	90	Newmarket stds
	Ex. Residential	2.59898	12.8%	36	5	Based on Lot 59 (26%) + Amenity Area (10%)
	Prop. Single Res. (Phase 1)	3.5604607	17.5%	62	8	Based on Lot 12 (52%) + Amenity Area (10%)
	Prop. Med. Density (Phase 1)	5.2882	26.0%	65	35	Newmarket stds (Semi-Det. Res.)
	Prop. High Density (Phase 1)	2.1917	10.8%	60	60	Newmarket stds (Apartments and Schools)
Alex Doner Drive	Ex. 20m ROW	1.053	5.2%	65	65	Calculated from typical road section
Street A/StreetB/StreetC	Prop. 18m ROW (Phase 1)	1.2998	6.4%	55	55	Calculated from typical road section
	Total	*20.3467647*	*100.0%*	*53.7*	*32.4*	

COLE ENGINEERING

Pond 6 Imperviousness Calculations (Post-Development)

Marianneville - Glenway Estates (Phase 2)
File No.: L09-301
Date: April 2018

Catchment A6.1Post

Block#	Descrip.	Area (ha)	% Total Area	TIMP (%)	XIMP (%)	Notes
Crossland Gate & Alex Doner Dr	Ex. 20m ROW	2.48557	6.4%	65	65	Calculated from typical road section
Fairway Gardens & Kirby Cres	Ex. 20m ROW	2.2602	5.9%	51	51	Calculated from typical road section
Street A & Street B	Prop. 18m ROW (Phase 1)	1.3866	3.6%	55	55	Calculated from typical road section
Lane 1 & 2 & 3	Prop 10m ROW (Phase 1)	0.78385	2.0%	64	64	Calculated from typical road section
Ex. Lane to Rec Centre (along Block 145)	Ex. 11.8m ROW	0.0492	0.1%	63	63	Calculated from typical road section
Lots 23-67 & 91-108	Prop. Single Res. (Phase 1)	5.2623666	13.6%	65	7	Based on Lot 97 (55%) + Amenity Area (10%)
Block 161, 162 & 163	Prop. Condo Res. (Phase 1)	2.9059	7.5%	55	7	Based on Condo Block 161 Lot 14 (45%) + Amenity Area (10%)
	Ex. Residential	15.6741	40.6%	59	10	Based on Ex. Lot 42 (49%) + Amenity Area (10%)
	Ex. Apartment	1.2443	3.2%	60	60	Newmarket stds
Ex. Parkland, Golf Course & Hydro Corridor	Greenspace	3.6611	9.5%	10	10	Newmarket stds
168	SWMP#6 (Phase 1)	2.1835	5.7%	50	50	
	Ex. Industrial	0.6997	1.8%	80	80	Newmarket stds
	Total	*38.5963866*	*100.0%*	*54.7*	*23.2*	

Catchment A6.2Post (Major Drainage Only)

Block#	Descrip.	Area (ha)	% Total Area	TIMP (%)	XIMP (%)	Notes
Crossland Gate	Ex. 20m ROW	0.1509	12.5%	65	65	Calculated from typical road section
Ex. Lane to Rec Centre (along Block 145)	Ex. 11.8m ROW	0.0744	6.2%	63	63	Calculated from typical road section
	Ex. Residential	0.7193	59.5%	59	10	Based on Ex. Lot 42 (49%) + Amenity Area (10%)
Ex. Parkland & Hydro Corridor	Greenspace	0.2648	21.9%	10	10	Newmarket stds
	Total	*1.2094*	*100.0%*	*49.3*	*20.1*	

Catchment A6.3Post (Major Drainage Only)

Block#	Descrip.	Area (ha)	% Total Area	TIMP (%)	XIMP (%)	Notes
	Ex. Residential	0.8608	66.0%	51	8	Based on Ex. Lot 48 (41%) + Amenity Area (10%)
John Bowser Cres.	Ex. 20m ROW	0.4433	34.0%	50	50	Calculated from typical road section
	Total	*1.3041*	100.0%	*50.7*	*22.0*	

COLE ENGINEERING

Post-Development (OTTHYMO)
STANDHYD - Input Parameters
Marianneville - Glenway Estates (Phase 2)
File No. L09-301
Date: April 2018

Parameter	Units	Description	A1 Post	A2 Post	A2-Ext Post	A3-1 Post	A3-2 Post	A4 Post	A6.1 Post	A6.2 Post	A6.3 Post
AREA	ha	Drainage Area	12.13	12.56	3.10	5.20	1.20	20.35	38.60	1.21	1.30
XIMP	%	Impervious Area (Direct Connection)	19.7%	25.0%	42.9%	19.4%	20.1%	32.4%	23.2%	20.1%	22.0%
TIMP	%	Total Impervious Area	54.5%	54.1%	67.9%	31.6%	52.4%	53.7%	54.7%	49.3%	50.7%
C	-	Runoff Coefficient	0.58	0.58	0.68	0.42	0.57	0.58	0.58	0.55	0.55
LGI	-	Overland Flow Length (Impervious)	276.28	289.37	143.76	186.19	89.44	368.33	507.28	89.81	93.09
SLPI	%	Average Slope (Impervious)	1								
DT	min	Time Step Increment	12								
DWF	m^3/s	Dry Weather Flow (Base Flow)	0								
LOSS	-	Rainfall Loss Method	Loss = 2 - Modified SCS Curve Method, CN*= 69								
SLPP	%	Average Slope (Pervious)	2								
LGP	m	Overland Flow Length (Pervious)	40								
MNP	-	Manning's Roughness Coefficient (Pervious)	0.25								
DPSI	mm	Depression Storage (Impervious)	1								
MNI	-	Manning's Roughness Coefficient (Impervious)	0.013								

COLE ENGINEERING

Prepared by: Jessica Lysecki, P.Eng.

SWM Pond 1 Stage-Storage-Discharge Curve

Marianneville - Glenway Estates (Phase 2)
File No. L09-301
Date: January 2020

	c	diam / length	height	control elev	inv	
Orifice Control	0.60	0.120	0.120	274.060	274.00	
Circular Orifice Control	0.60	0.400	0.400	274.650	274.45	
Rectangular Weir	1.84	0.300	0.800	274.800	274.80	
Rectangular Orifice	0.60	0.300	0.800	275.200	274.80	
Emergency Spillway				275.550		30m wide emergency spillway (w 10:1 side slopes)

	Depth (m)	Elevation (m)	Volume (m^3)	Volume (ha-m)	Orifice Control (cms)	Circular Orifice Control (cms)	Rectangular Weir Control (cms)	Rectangular Orifice (cms)	Emergency Spillway (cms)	Total Flow (cms)	VO Rating Table
NWL = 274.00	0.00	274.00	0.0	0.0000	0.000					0.000	1
	0.05	274.05	123.8	0.0124	0.003					0.003	
	0.10	274.10	252.1	0.0252	0.006					0.006	
	0.15	274.15	385.0	0.0385	0.009					0.009	2
	0.20	274.20	522.6	0.0523	0.011					0.011	
	0.25	274.25	664.9	0.0665	0.013					0.013	
	0.30	274.30	811.9	0.0812	0.015					0.015	3
	0.35	274.35	964.2	0.0964	0.016					0.016	
	0.40	274.40	1122.1	0.1122	0.018					0.018	
ED = 274.45	0.45	274.45	1285.9	0.1286	0.019					0.019	
	0.50	274.50	1455.9	0.1456	0.020					0.020	4
	0.55	274.55	1630.6	0.1631	0.021					0.021	5
	0.60	274.60	1808.0	0.1808	0.022					0.022	
	0.65	274.65	1988.4	0.1988	0.023					0.023	
	0.70	274.70	2171.6	0.2172	0.024	0.075				0.099	6
2 Year W.L. = 274.76	0.75	274.75	2357.7	0.2358	0.025	0.106				0.131	7
	0.80	274.80	2546.7	0.2547	0.026	0.129				0.155	
5 Year W.L. = 274.86	0.85	274.85	2738.6	0.2739	0.027	0.149				0.176	8
	0.90	274.90	2933.5	0.2934	0.028	0.167	0.017			0.212	9
	0.95	274.95	3131.3	0.3131	0.028	0.183	0.032			0.243	10
	1.00	275.00	3332.1	0.3332	0.029	0.198	0.049			0.276	11
	1.05	275.05	3535.9	0.3536	0.030	0.211	0.069			0.310	12
10 Year W.L. = 275.11	1.10	275.10	3742.7	0.3743	0.031	0.224	0.091			0.345	13
	1.15	275.15	3952.5	0.3952	0.031	0.236	0.114			0.382	14
	1.20	275.20	4165.3	0.4165	0.032	0.248	0.140			0.419	15
25 Year W.L. = 275.27	1.25	275.25	4381.2	0.4381	0.033	0.259	0.167			0.458	16
	1.30	275.30	4600.1	0.4600	0.033	0.269	0.195			0.498	17
	1.35	275.35	4822.1	0.4822	0.034	0.279	0.225			0.539	
50 Year W.L. = 275.42	1.40	275.40	5047.2	0.5047	0.035	0.289	0.257			0.581	18
	1.45	275.45	5275.4	0.5275	0.035	0.299	0.289			0.623	19
100 Year W.L. = 275.48	1.50	275.50	5506.8	0.5507	0.036	0.308	0.323			0.667	
Emergency Spillway	1.55	275.55	5741.5	0.5742	0.037	0.317	0.359		0.000	0.712	20
	1.60	275.60	5979.6	0.5980	0.037	0.326		0.403	0.563	1.329	
	1.65	275.65	6221.2	0.6221	0.038	0.334		0.428	1.618	2.418	
	1.70	275.70	6466.3	0.6466	0.038	0.342		0.451	3.019	3.851	
	1.75	275.75	6715.0	0.6715	0.039	0.350		0.473	4.723	5.585	
Top of Pond = 275.80	1.80	275.80	6967.4	0.6967	0.040	0.358		0.494	6.703	7.595	

COLE ENGINEERING

Prepared by: Jessica Lysecki, P.Eng.

SWM Pond 2 Stage-Storage-Discharge Curve

Marianneville - Glenway Estates (Phase 2)
File No. L09-301
Date: January 2020

	c	diam / length	height	control elev	inv	
Orifice Control	0.60	0.125	0.125	280.063	280.00	
Circular Orifice Control	0.60	0.250	0.250	280.675	280.55	
Rectangular Weir	1.84	0.100	0.750	281.000	281.00	
Rectangular Orifice	0.60	0.100	0.750	281.375	281.00	
Emergency Overflow DICB (MTO Chart 4.20)				281.800	Three (3) 1.8m x 0.9m Super CBs & One (1) 1.2m x 0.6m Ditch Inlet (4:1 grate slope)	

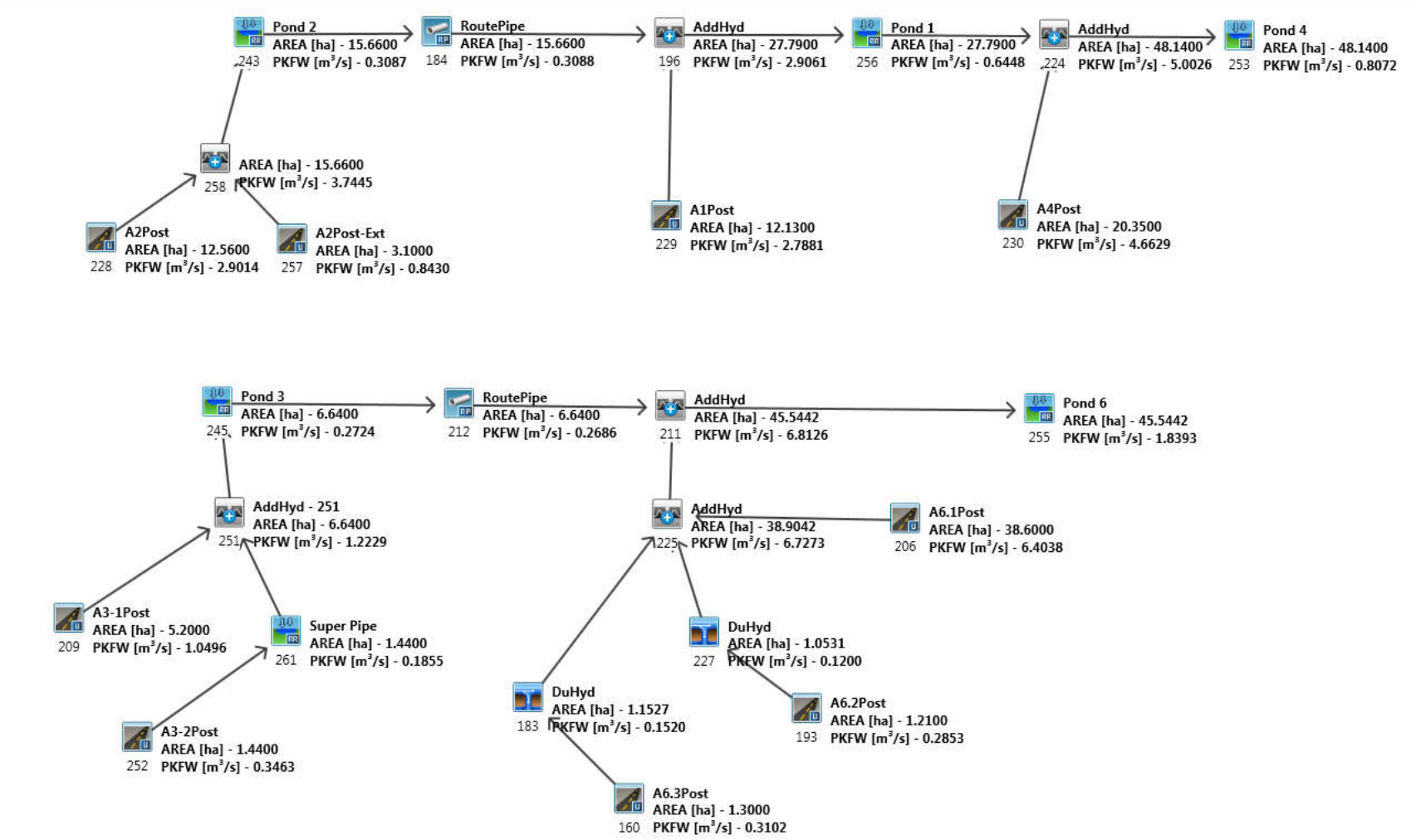
	Depth (m)	Elevation (m)	Volume (m^3)	Volume (ha-m)	Orifice Control (cms)	Circular Orifice Control (cms)	Rectangular Weir Control (cms)	Rectangular Orifice Control (cms)	Super CBs (cms)	Total Flow (cms)	VO Rating Table
NWL = 280.00	0.00	280.00	0.0	0.0000	0.000					0.000	1
	0.05	280.05	135.5	0.0136	0.003					0.003	
	0.10	280.10	275.7	0.0276	0.006					0.006	
	0.15	280.15	420.7	0.0421	0.010					0.010	2
	0.20	280.20	570.6	0.0571	0.012					0.012	
	0.25	280.25	725.7	0.0726	0.014					0.014	
	0.30	280.30	885.9	0.0886	0.016					0.016	3
	0.35	280.35	1051.4	0.1051	0.017					0.017	
	0.40	280.40	1222.4	0.1222	0.019					0.019	
	0.45	280.45	1399.0	0.1399	0.020					0.020	4
	0.50	280.50	1581.4	0.1581	0.022					0.022	
ED = 280.55	0.55	280.55	1768.0	0.1768	0.023					0.023	5
	0.60	280.60	1957.6	0.1958	0.024					0.024	
	0.65	280.65	2150.1	0.2150	0.025					0.025	6
	0.70	280.70	2345.6	0.2346	0.026	0.021				0.047	
	0.75	280.75	2544.0	0.2544	0.027	0.036				0.063	7
	0.80	280.80	2745.4	0.2745	0.028	0.046				0.074	
2 Year W.L. = 280.85	0.85	280.85	2949.8	0.2950	0.029	0.055				0.084	8
	0.90	280.90	3157.3	0.3157	0.030	0.062				0.092	
	0.95	280.95	3367.8	0.3368	0.031	0.068				0.099	9
5 Year W.L. = 280.99	1.00	281.00	3581.5	0.3581	0.032	0.074	0.000			0.106	
	1.05	281.05	3798.2	0.3798	0.032	0.080	0.002			0.114	10
	1.10	281.10	4018.1	0.4018	0.033	0.085	0.006			0.124	
	1.15	281.15	4241.1	0.4241	0.034	0.090	0.011			0.135	11
	1.20	281.20	4467.3	0.4467	0.035	0.095	0.016			0.146	
	1.25	281.25	4696.8	0.4697	0.036	0.099	0.023			0.157	12
	1.30	281.30	4929.4	0.4929	0.036	0.103	0.030			0.170	
10 Year W.L. = 281.33	1.35	281.35	5165.3	0.5165	0.037	0.107	0.038			0.182	13
	1.40	281.40	5404.5	0.5405	0.038	0.111	0.047			0.195	
	1.45	281.45	5647.0	0.5647	0.038	0.115	0.056			0.209	14
	1.50	281.50	5892.8	0.5893	0.039	0.118	0.065			0.223	
25 Year W.L. = 281.54	1.55	281.55	6141.9	0.6142	0.040	0.122	0.075			0.237	15
	1.60	281.60	6394.4	0.6394	0.040	0.125	0.086			0.251	16
	1.65	281.65	6650.3	0.6650	0.041	0.129	0.096			0.266	17
	1.70	281.70	6909.7	0.6910	0.042	0.132	0.108			0.282	18
50 Year W.L. = 281.73	1.75	281.75	7172.4	0.7172	0.042	0.135		0.122		0.300	19
100 Year W.L. = 281.79 / Emergency Overflow = 281.80	1.80	281.80	7438.6	0.7439	0.043	0.138		0.130	0.000	0.311	20
	1.85	281.85	7708.2	0.7708	0.044	0.141		0.137	0.179	0.501	
	1.90	281.90	7981.3	0.7981	0.044	0.144		0.144	0.358	0.691	
	1.95	281.95	8257.9	0.8258	0.045	0.147		0.151	0.706	1.049	
	2.00	282.00	8538.0	0.8538	0.045	0.150		0.158	1.054	1.407	
	2.05	282.05	8821.7	0.8822	0.046	0.153		0.164	1.600	1.962	
	2.10	282.10	9108.9	0.9109	0.047	0.156		0.170	2.146	2.518	
	2.15	282.15	9399.8	0.9400	0.047	0.158		0.175	2.974	3.355	
Top of Pond = 282.20	2.20	282.20	9694.3	0.9694	0.048	0.161		0.181	3.802	4.192	

APPENDIX C.4
Post-Development Hydrologic Model Output

COLE ENGINEERING
Experience Enhancing Excellence

L09-301 – Marianneville – Glenway Estates (Phase 2)
2, 5, 10, 25, 50 & 100-Year 24 Hour SCS Storm
Proposed Condition Model Output
January 2020

VO5 Model Schematic



COLE ENGINEERING

Experience Enhancing Excellence

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

       V    V   I    SSSSS  U   U    A    L              (v 5.1.2004)
       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)\Visual OTTHYMO 5.1\VO2\voin.dat
  Output  filename: C:\Users\jlysecki\AppData\Local\Civica\VH5\a379672b-db33-4372-b5e0-
ba58a07d1417\e64dabb8-3787-4e28-ae35-0ca49fb1b093\sce
  Summary filename: C:\Users\jlysecki\AppData\Local\Civica\VH5\a379672b-db33-4372-b5e0-
ba58a07d1417\e64dabb8-3787-4e28-ae35-0ca49fb1b093\sce


DATE: 01/15/2020                          TIME: 04:10:47

USER:


COMMENTS: _____________________________________________________


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


-------------------
|    READ STORM    |    Filename: C:\Users\jlysecki\AppD
|                  |              ata\Local\Temp\
|                  |              aad80675-a0b4-4fc2-876a-2640adc73013\bd5fe4d7
| Ptotal= 52.12 mm |    Comments: TWO YEAR SCS STORM  WITH A TWELVE MINUTE
-------------------
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.20    0.51 |  6.20    1.02 | 12.20   10.67 | 18.20    0.76
                0.40    0.51 |  6.40    1.02 | 12.40    6.60 | 18.40    0.76
                0.60    0.51 |  6.60    1.02 | 12.60    4.83 | 18.60    0.76
                0.80    0.51 |  6.80    1.02 | 12.80    4.57 | 18.80    0.76
                1.00    0.51 |  7.00    1.02 | 13.00    3.30 | 19.00    0.76
                1.20    0.51 |  7.20    1.02 | 13.20    2.79 | 19.20    0.76
                1.40    0.51 |  7.40    1.02 | 13.40    2.79 | 19.40    0.76
                1.60    0.51 |  7.60    1.02 | 13.60    2.79 | 19.60    0.76
                1.80    0.51 |  7.80    1.02 | 13.80    2.79 | 19.80    0.76
                2.00    0.51 |  8.00    1.02 | 14.00    2.79 | 20.00    0.76
                2.20    0.51 |  8.20    1.52 | 14.20    1.52 | 20.20    0.51
                2.40    0.51 |  8.40    1.52 | 14.40    1.52 | 20.40    0.51
                2.60    0.51 |  8.60    1.52 | 14.60    1.52 | 20.60    0.51
                2.80    0.51 |  8.80    1.52 | 14.80    1.52 | 20.80    0.51
                3.00    0.51 |  9.00    1.52 | 15.00    1.52 | 21.00    0.51
                3.20    0.51 |  9.20    1.52 | 15.20    1.52 | 21.20    0.51
                3.40    0.51 |  9.40    1.52 | 15.40    1.52 | 21.40    0.51
                3.60    0.51 |  9.60    1.52 | 15.60    1.52 | 21.60    0.51
                3.80    0.51 |  9.80    1.52 | 15.80    1.52 | 21.80    0.51
                4.00    0.51 | 10.00    1.52 | 16.00    1.52 | 22.00    0.51
                4.20    1.02 | 10.20    3.05 | 16.20    1.02 | 22.20    0.51
                4.40    1.02 | 10.40    3.05 | 16.40    1.02 | 22.40    0.51
                4.60    1.02 | 10.60    3.05 | 16.60    1.02 | 22.60    0.51
                4.80    1.02 | 10.80    3.05 | 16.80    1.02 | 22.80    0.51
                5.00    1.02 | 11.00    3.05 | 17.00    1.02 | 23.00    0.51
                5.20    1.02 | 11.20    4.06 | 17.20    1.02 | 23.20    0.51
                5.40    1.02 | 11.40    5.84 | 17.40    1.02 | 23.40    0.51
                5.60    1.02 | 11.60   13.21 | 17.60    1.02 | 23.60    0.51
                5.80    1.02 | 11.80   28.96 | 17.80    1.02 | 23.80    0.51
                6.00    1.02 | 12.00   60.45 | 18.00    1.02 | 24.00    0.51

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


-------------------
| CALIB            |
| STANDHYD (  0228)|   Area     (ha)=  12.56
|ID= 1 DT=12.0 min |   Total Imp(%)=  54.10   Dir. Conn.(%)=  25.00
-------------------
                                  IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=          6.79           5.77
     Dep. Storage      (mm)=          1.00           1.50
     Average Slope      (%)=          1.00           2.00
     Length             (m)=        289.37          40.00
     Mannings n            =         0.013          0.250

     Max.Eff.Inten.(mm/hr)=         60.45          47.98
                   over (min)         12.00          24.00
     Storage Coeff.  (min)=          5.91 (ii)      15.38 (ii)
     Unit Hyd. Tpeak (min)=         12.00          24.00
     Unit Hyd. peak  (cms)=          0.12           0.06
                                                              *TOTALS*
     PEAK FLOW       (cms)=          0.49           0.43          0.802 (iii)
     TIME TO PEAK    (hrs)=         12.00          12.20         12.00
     RUNOFF VOLUME    (mm)=         51.12          21.66         29.02
     TOTAL RAINFALL   (mm)=         52.12          52.12         52.12
     RUNOFF COEFFICIENT   =          0.98           0.42          0.56

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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


-------------------
|    READ STORM    |    Filename: C:\Users\jlysecki\AppD
|                  |              ata\Local\Temp\
|                  |              aad80675-a0b4-4fc2-876a-2640adc73013\bd5fe4d7
| Ptotal= 52.12 mm |    Comments: TWO YEAR SCS STORM  WITH A TWELVE MINUTE
-------------------
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.20    0.51 |  6.20    1.02 | 12.20   10.67 | 18.20    0.76
                0.40    0.51 |  6.40    1.02 | 12.40    6.60 | 18.40    0.76
                0.60    0.51 |  6.60    1.02 | 12.60    4.83 | 18.60    0.76
                0.80    0.51 |  6.80    1.02 | 12.80    4.57 | 18.80    0.76
                1.00    0.51 |  7.00    1.02 | 13.00    3.30 | 19.00    0.76
                1.20    0.51 |  7.20    1.02 | 13.20    2.79 | 19.20    0.76
                1.40    0.51 |  7.40    1.02 | 13.40    2.79 | 19.40    0.76
                1.60    0.51 |  7.60    1.02 | 13.60    2.79 | 19.60    0.76
                1.80    0.51 |  7.80    1.02 | 13.80    2.79 | 19.80    0.76
                2.00    0.51 |  8.00    1.02 | 14.00    2.79 | 20.00    0.76
                2.20    0.51 |  8.20    1.52 | 14.20    1.52 | 20.20    0.51
                2.40    0.51 |  8.40    1.52 | 14.40    1.52 | 20.40    0.51
                2.60    0.51 |  8.60    1.52 | 14.60    1.52 | 20.60    0.51
                2.80    0.51 |  8.80    1.52 | 14.80    1.52 | 20.80    0.51
                3.00    0.51 |  9.00    1.52 | 15.00    1.52 | 21.00    0.51
                3.20    0.51 |  9.20    1.52 | 15.20    1.52 | 21.20    0.51
                3.40    0.51 |  9.40    1.52 | 15.40    1.52 | 21.40    0.51
                3.60    0.51 |  9.60    1.52 | 15.60    1.52 | 21.60    0.51
                3.80    0.51 |  9.80    1.52 | 15.80    1.52 | 21.80    0.51
                4.00    0.51 | 10.00    1.52 | 16.00    1.52 | 22.00    0.51
                4.20    1.02 | 10.20    3.05 | 16.20    1.02 | 22.20    0.51
                4.40    1.02 | 10.40    3.05 | 16.40    1.02 | 22.40    0.51
                4.60    1.02 | 10.60    3.05 | 16.60    1.02 | 22.60    0.51
                4.80    1.02 | 10.80    3.05 | 16.80    1.02 | 22.80    0.51
                5.00    1.02 | 11.00    3.05 | 17.00    1.02 | 23.00    0.51
```

5.20	1.02	11.20	4.06	17.20	1.02	23.20	0.51
5.40	1.02	11.40	5.84	17.40	1.02	23.40	0.51
5.60	1.02	11.60	13.21	17.60	1.02	23.60	0.51
5.80	1.02	11.80	28.96	17.80	1.02	23.80	0.51
6.00	1.02	12.00	60.45	18.00	1.02	24.00	0.51

CALIB	
STANDHYD (0257)	Area (ha)= 3.10
ID= 1 DT=12.0 min	Total Imp(%)= 67.90 Dir. Conn.(%)= 42.90

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	2.10	1.00
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	143.76	40.00
Mannings n	=	0.013	0.250
Max.Eff.Inten.	(mm/hr)=	60.45	54.97
over	(min)	12.00	24.00
Storage Coeff.	(min)=	3.88 (ii)	12.85 (ii)
Unit Hyd. Tpeak	(min)=	12.00	24.00
Unit Hyd. peak	(cms)=	0.14	0.07

				TOTALS
PEAK FLOW	(cms)=	0.22	0.09	0.285 (iii)
TIME TO PEAK	(hrs)=	12.00	12.20	12.00
RUNOFF VOLUME	(mm)=	51.12	22.78	34.93
TOTAL RAINFALL	(mm)=	52.12	52.12	52.12
RUNOFF COEFFICIENT	=	0.98	0.44	0.67

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0258)					
1 + 2 = 3		AREA	QPEAK	TPEAK	R.V.
		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0228):		12.56	0.802	12.00	29.02
+ ID2= 2 (0257):		3.10	0.285	12.00	34.93
ID = 3 (0258):		15.66	1.086	12.00	30.19

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0243)				
IN= 2---> OUT= 1				
DT= 12.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.1346	0.4241
	0.0096	0.0421	0.1575	0.4697
	0.0159	0.0886	0.1823	0.5165
	0.0203	0.1399	0.2088	0.5647
	0.0228	0.1768	0.2369	0.6142
	0.0250	0.2150	0.2514	0.6394
	0.0628	0.2544	0.2663	0.6650
	0.0835	0.2950	0.2816	0.6910
	0.0991	0.3368	0.2997	0.7172
	0.1144	0.3798	0.3113	0.7439

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0258)	15.660	1.086	12.00	30.19
OUTFLOW: ID= 1 (0243)	15.660	0.084	14.00	30.12

PEAK FLOW REDUCTION [Qout/Qin](%)= 7.70

TIME SHIFT OF PEAK FLOW (min)=120.00
MAXIMUM STORAGE USED (ha.m.)= 0.2956

ROUTEPIPE(0184)		
IN= 2---> OUT= 1	Diameter (mm)=	1650.00
DT= 12.0 min	Length (m)=	500.00
	Slope (m/m)=	0.005
	Manning n =	0.013

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

DEPTH (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME min
0.09	.216E+02	0.0	0.80	10.40
0.17	.600E+02	0.1	1.25	6.67
0.26	.108E+03	0.3	1.61	5.18
0.35	.164E+03	0.6	1.91	4.36
0.43	.225E+03	1.0	2.18	3.83
0.52	.290E+03	1.4	2.41	3.46
0.61	.358E+03	1.9	2.61	3.19
0.69	.428E+03	2.4	2.79	2.99
0.78	.499E+03	2.9	2.95	2.83
0.87	.570E+03	3.5	3.08	2.70
0.96	.642E+03	4.1	3.20	2.61
1.04	.712E+03	4.7	3.29	2.53
1.13	.780E+03	5.2	3.36	2.48
1.22	.844E+03	5.8	3.41	2.44
1.30	.905E+03	6.2	3.44	2.43
1.39	.961E+03	6.6	3.43	2.43
1.48	.101E+04	6.9	3.40	2.45
1.56	.105E+04	6.9	3.31	2.52
1.65	.107E+04	6.5	3.02	2.76

		<---- hydrograph ---->			<-pipe / channel->	
	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 2 (0243)	15.66	0.08	14.00	30.12	0.12	0.95
OUTFLOW: ID= 1 (0184)	15.66	0.08	14.00	30.12	0.12	0.94

READ STORM	Filename: C:\Users\jlysecki\AppData\Local\Temp\aad80675-a0b4-4fc2-876a-2640adc73013\bd5fe4d7
Ptotal= 52.12 mm	Comments: TWO YEAR SCS STORM WITH A TWELVE MINUTE

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.20	0.51	6.20	1.02	12.20	10.67	18.20	0.76
0.40	0.51	6.40	1.02	12.40	6.60	18.40	0.76
0.60	0.51	6.60	1.02	12.60	4.83	18.60	0.76
0.80	0.51	6.80	1.02	12.80	4.57	18.80	0.76
1.00	0.51	7.00	1.02	13.00	3.30	19.00	0.76
1.20	0.51	7.20	1.02	13.20	2.79	19.20	0.76
1.40	0.51	7.40	1.02	13.40	2.79	19.40	0.76
1.60	0.51	7.60	1.02	13.60	2.79	19.60	0.76
1.80	0.51	7.80	1.02	13.80	2.79	19.80	0.76
2.00	0.51	8.00	1.02	14.00	2.79	20.00	0.76
2.20	0.51	8.20	1.52	14.20	1.52	20.20	0.51
2.40	0.51	8.40	1.52	14.40	1.52	20.40	0.51
2.60	0.51	8.60	1.52	14.60	1.52	20.60	0.51
2.80	0.51	8.80	1.52	14.80	1.52	20.80	0.51
3.00	0.51	9.00	1.52	15.00	1.52	21.00	0.51
3.20	0.51	9.20	1.52	15.20	1.52	21.20	0.51
3.40	0.51	9.40	1.52	15.40	1.52	21.40	0.51
3.60	0.51	9.60	1.52	15.60	1.52	21.60	0.51
3.80	0.51	9.80	1.52	15.80	1.52	21.80	0.51
4.00	0.51	10.00	1.52	16.00	1.52	22.00	0.51
4.20	1.02	10.20	3.05	16.20	1.02	22.20	0.51
4.40	1.02	10.40	3.05	16.40	1.02	22.40	0.51
4.60	1.02	10.60	3.05	16.60	1.02	22.60	0.51
4.80	1.02	10.80	3.05	16.80	1.02	22.80	0.51
5.00	1.02	11.00	3.05	17.00	1.02	23.00	0.51
5.20	1.02	11.20	4.06	17.20	1.02	23.20	0.51

5.40	1.02	11.40	5.84	17.40	1.02	23.40	0.51
5.60	1.02	11.60	13.21	17.60	1.02	23.60	0.51
5.80	1.02	11.80	28.96	17.80	1.02	23.80	0.51
6.00	1.02	12.00	60.45	18.00	1.02	24.00	0.51

CALIB	
STANDHYD (0229)	Area (ha)= 12.13
ID= 1 DT=12.0 min	Total Imp(%)= 54.50 Dir. Conn.(%)= 19.70

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	6.61	5.52	
Dep. Storage	(mm)=	1.00	1.50	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	284.37	40.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.(mm/hr)=		60.45	54.29	
over (min)		12.00	24.00	
Storage Coeff.	(min)=	5.85 (ii)	14.86 (ii)	
Unit Hyd. Tpeak	(min)=	12.00	24.00	
Unit Hyd. peak	(cms)=	0.12	0.06	
				TOTALS
PEAK FLOW	(cms)=	0.37	0.47	0.718 (iii)
TIME TO PEAK	(hrs)=	12.00	12.20	12.00
RUNOFF VOLUME	(mm)=	51.12	22.67	28.28
TOTAL RAINFALL	(mm)=	52.12	52.12	52.12
RUNOFF COEFFICIENT	=	0.98	0.44	0.54

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
YOU SHOULD CONSIDER SPLITTING THE AREA.

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0196)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0184):		15.66	0.084	14.00	30.12
+ ID2= 2 (0229):		12.13	0.718	12.00	28.28
ID = 3 (0196):		27.79	0.736	12.00	29.32

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0256)				
IN= 2---> OUT= 1				
DT= 12.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.2761	0.3332
	0.0090	0.0385	0.3101	0.3536
	0.0147	0.0812	0.3454	0.3743
	0.0199	0.1456	0.3818	0.3952
	0.0210	0.1631	0.4194	0.4165
	0.0987	0.2172	0.4581	0.4381
	0.1306	0.2358	0.4979	0.4600
	0.1761	0.2739	0.5806	0.5047
	0.2120	0.2934	0.6234	0.5275
	0.2433	0.3131	0.7121	0.5742

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0196)	27.790	0.736	12.00	29.32
OUTFLOW: ID= 1 (0256)	27.790	0.135	14.20	29.28

PEAK FLOW REDUCTION [Qout/Qin](%)= 18.30
TIME SHIFT OF PEAK FLOW (min)=132.00
MAXIMUM STORAGE USED (ha.m.)= 0.2393

READ STORM	Filename: C:\Users\jlysecki\AppD
	ata\Local\Temp\
	aad80675-a0b4-4fc2-876a-2640adc73013\bd5fe4d7
Ptotal= 52.12 mm	Comments: TWO YEAR SCS STORM WITH A TWELVE MINUTE

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.20	0.51	6.20	1.02	12.20	10.67	18.20	0.76
0.40	0.51	6.40	1.02	12.40	6.60	18.40	0.76
0.60	0.51	6.60	1.02	12.60	4.83	18.60	0.76
0.80	0.51	6.80	1.02	12.80	4.57	18.80	0.76
1.00	0.51	7.00	1.02	13.00	3.30	19.00	0.76
1.20	0.51	7.20	1.02	13.20	2.79	19.20	0.76
1.40	0.51	7.40	1.02	13.40	2.79	19.40	0.76
1.60	0.51	7.60	1.02	13.60	2.79	19.60	0.76
1.80	0.51	7.80	1.02	13.80	2.79	19.80	0.76
2.00	0.51	8.00	1.02	14.00	2.79	20.00	0.76
2.20	0.51	8.20	1.52	14.20	1.52	20.20	0.51
2.40	0.51	8.40	1.52	14.40	1.52	20.40	0.51
2.60	0.51	8.60	1.52	14.60	1.52	20.60	0.51
2.80	0.51	8.80	1.52	14.80	1.52	20.80	0.51
3.00	0.51	9.00	1.52	15.00	1.52	21.00	0.51
3.20	0.51	9.20	1.52	15.20	1.52	21.20	0.51
3.40	0.51	9.40	1.52	15.40	1.52	21.40	0.51
3.60	0.51	9.60	1.52	15.60	1.52	21.60	0.51
3.80	0.51	9.80	1.52	15.80	1.52	21.80	0.51
4.00	0.51	10.00	1.52	16.00	1.52	22.00	0.51
4.20	1.02	10.20	3.05	16.20	1.02	22.20	0.51
4.40	1.02	10.40	3.05	16.40	1.02	22.40	0.51
4.60	1.02	10.60	3.05	16.60	1.02	22.60	0.51
4.80	1.02	10.80	3.05	16.80	1.02	22.80	0.51
5.00	1.02	11.00	3.05	17.00	1.02	23.00	0.51
5.20	1.02	11.20	4.06	17.20	1.02	23.20	0.51
5.40	1.02	11.40	5.84	17.40	1.02	23.40	0.51
5.60	1.02	11.60	13.21	17.60	1.02	23.60	0.51
5.80	1.02	11.80	28.96	17.80	1.02	23.80	0.51
6.00	1.02	12.00	60.45	18.00	1.02	24.00	0.51

CALIB	
STANDHYD (0230)	Area (ha)= 20.35
ID= 1 DT=12.0 min	Total Imp(%)= 53.70 Dir. Conn.(%)= 32.40

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	10.93	9.42	
Dep. Storage	(mm)=	1.00	1.50	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	368.33	40.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.(mm/hr)=		60.45	39.92	
over (min)		12.00	24.00	
Storage Coeff.	(min)=	6.83 (ii)	17.02 (ii)	
Unit Hyd. Tpeak	(min)=	12.00	24.00	
Unit Hyd. peak	(cms)=	0.12	0.06	
				TOTALS
PEAK FLOW	(cms)=	1.00	0.56	1.402 (iii)
TIME TO PEAK	(hrs)=	12.00	12.20	12.00
RUNOFF VOLUME	(mm)=	51.12	20.20	30.22
TOTAL RAINFALL	(mm)=	52.12	52.12	52.12
RUNOFF COEFFICIENT	=	0.98	0.39	0.58

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL

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

ADD HYD (0224)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0230):		20.35	1.402	12.00	30.22
+ ID2= 2 (0256):		27.79	0.135	14.20	29.28
ID = 3 (0224):		48.14	1.419	12.00	29.67

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0253)		OUTFLOW	STORAGE	OUTFLOW	STORAGE
IN= 2---> OUT= 1		(cms)	(ha.m.)	(cms)	(ha.m.)
DT= 12.0 min		0.0000	0.0000	0.6390	0.9848
		0.0270	0.1457	0.9700	1.2900
		0.0430	0.3152	1.1040	1.7480
		0.0530	0.4653	3.3100	1.9350
		0.3280	0.6677	11.3140	2.2662

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0224)	48.140	1.419	12.00	29.67
OUTFLOW: ID= 1 (0253)	48.140	0.162	16.60	29.65

PEAK FLOW REDUCTION [Qout/Qin](%)= 11.38
TIME SHIFT OF PEAK FLOW (min)=276.00
MAXIMUM STORAGE USED (ha.m.)= 0.5452

READ STORM	Filename: C:\Users\jlysecki\AppData\Local\Temp\aad80675-a0b4-4fc2-876a-2640adc73013\bd5fe4d7
Ptotal= 52.12 mm	Comments: TWO YEAR SCS STORM WITH A TWELVE MINUTE

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.20	0.51	6.20	1.02	12.20	10.67	18.20	0.76
0.40	0.51	6.40	1.02	12.40	6.60	18.40	0.76
0.60	0.51	6.60	1.02	12.60	4.83	18.60	0.76
0.80	0.51	6.80	1.02	12.80	4.57	18.80	0.76
1.00	0.51	7.00	1.02	13.00	3.30	19.00	0.76
1.20	0.51	7.20	1.02	13.20	2.79	19.20	0.76
1.40	0.51	7.40	1.02	13.40	2.79	19.40	0.76
1.60	0.51	7.60	1.02	13.60	2.79	19.60	0.76
1.80	0.51	7.80	1.02	13.80	2.79	19.80	0.76
2.00	0.51	8.00	1.02	14.00	2.79	20.00	0.76
2.20	0.51	8.20	1.52	14.20	1.52	20.20	0.51
2.40	0.51	8.40	1.52	14.40	1.52	20.40	0.51
2.60	0.51	8.60	1.52	14.60	1.52	20.60	0.51
2.80	0.51	8.80	1.52	14.80	1.52	20.80	0.51
3.00	0.51	9.00	1.52	15.00	1.52	21.00	0.51
3.20	0.51	9.20	1.52	15.20	1.52	21.20	0.51
3.40	0.51	9.40	1.52	15.40	1.52	21.40	0.51
3.60	0.51	9.60	1.52	15.60	1.52	21.60	0.51
3.80	0.51	9.80	1.52	15.80	1.52	21.80	0.51
4.00	0.51	10.00	1.52	16.00	1.52	22.00	0.51
4.20	1.02	10.20	3.05	16.20	1.02	22.20	0.51
4.40	1.02	10.40	3.05	16.40	1.02	22.40	0.51
4.60	1.02	10.60	3.05	16.60	1.02	22.60	0.51
4.80	1.02	10.80	3.05	16.80	1.02	22.80	0.51
5.00	1.02	11.00	3.05	17.00	1.02	23.00	0.51
5.20	1.02	11.20	4.06	17.20	1.02	23.20	0.51
5.40	1.02	11.40	5.84	17.40	1.02	23.40	0.51
5.60	1.02	11.60	13.21	17.60	1.02	23.60	0.51
5.80	1.02	11.80	28.96	17.80	1.02	23.80	0.51
6.00	1.02	12.00	60.45	18.00	1.02	24.00	0.51

CALIB			
STANDHYD (0160)	Area (ha)= 1.30		
ID= 1 DT=12.0 min	Total Imp(%)= 50.70	Dir. Conn.(%)= 22.00	
	IMPERVIOUS	PERVIOUS (i)	
Surface Area (ha)=	0.66	0.64	
Dep. Storage (mm)=	1.00	1.50	
Average Slope (%)=	1.00	2.00	
Length (m)=	93.09	40.00	
Mannings n =	0.013	0.250	
Max.Eff.Inten.(mm/hr)=	60.45	45.53	
over (min)	12.00	24.00	
Storage Coeff. (min)=	2.99 (ii)	12.66 (ii)	
Unit Hyd. Tpeak (min)=	12.00	24.00	
Unit Hyd. peak (cms)=	0.14	0.07	
			TOTALS
PEAK FLOW (cms)=	0.05	0.05	0.083 (iii)
TIME TO PEAK (hrs)=	12.00	12.20	12.00
RUNOFF VOLUME (mm)=	51.12	21.24	27.81
TOTAL RAINFALL (mm)=	52.12	52.12	52.12
RUNOFF COEFFICIENT =	0.98	0.41	0.53

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

DUHYD (0183)					
Inlet Cap.= 0.152					
#of Inlets= 1					
Total(cms)= 0.2	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	
TOTAL HYD.(ID= 1):	1.30	0.08	12.00	27.81	
MAJOR SYS.(ID= 2):	0.00	0.00	0.00	0.00	
MINOR SYS.(ID= 3):	1.30	0.08	12.00	27.81	

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

READ STORM	Filename: C:\Users\jlysecki\AppData\Local\Temp\aad80675-a0b4-4fc2-876a-2640adc73013\bd5fe4d7
Ptotal= 52.12 mm	Comments: TWO YEAR SCS STORM WITH A TWELVE MINUTE

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.20	0.51	6.20	1.02	12.20	10.67	18.20	0.76
0.40	0.51	6.40	1.02	12.40	6.60	18.40	0.76
0.60	0.51	6.60	1.02	12.60	4.83	18.60	0.76
0.80	0.51	6.80	1.02	12.80	4.57	18.80	0.76
1.00	0.51	7.00	1.02	13.00	3.30	19.00	0.76
1.20	0.51	7.20	1.02	13.20	2.79	19.20	0.76
1.40	0.51	7.40	1.02	13.40	2.79	19.40	0.76
1.60	0.51	7.60	1.02	13.60	2.79	19.60	0.76
1.80	0.51	7.80	1.02	13.80	2.79	19.80	0.76
2.00	0.51	8.00	1.02	14.00	2.79	20.00	0.76
2.20	0.51	8.20	1.52	14.20	1.52	20.20	0.51
2.40	0.51	8.40	1.52	14.40	1.52	20.40	0.51
2.60	0.51	8.60	1.52	14.60	1.52	20.60	0.51
2.80	0.51	8.80	1.52	14.80	1.52	20.80	0.51
3.00	0.51	9.00	1.52	15.00	1.52	21.00	0.51
3.20	0.51	9.20	1.52	15.20	1.52	21.20	0.51

3.40	0.51	9.40	1.52	15.40	1.52	21.40	0.51
3.60	0.51	9.60	1.52	15.60	1.52	21.60	0.51
3.80	0.51	9.80	1.52	15.80	1.52	21.80	0.51
4.00	0.51	10.00	1.52	16.00	1.52	22.00	0.51
4.20	1.02	10.20	3.05	16.20	1.02	22.20	0.51
4.40	1.02	10.40	3.05	16.40	1.02	22.40	0.51
4.60	1.02	10.60	3.05	16.60	1.02	22.60	0.51
4.80	1.02	10.80	3.05	16.80	1.02	22.80	0.51
5.00	1.02	11.00	3.05	17.00	1.02	23.00	0.51
5.20	1.02	11.20	4.06	17.20	1.02	23.20	0.51
5.40	1.02	11.40	5.84	17.40	1.02	23.40	0.51
5.60	1.02	11.60	13.21	17.60	1.02	23.60	0.51
5.80	1.02	11.80	28.96	17.80	1.02	23.80	0.51
6.00	1.02	12.00	60.45	18.00	1.02	24.00	0.51

CALIB			
STANDHYD (0193)	Area (ha)= 1.21		
ID= 1 DT=12.0 min	Total Imp(%)= 49.30	Dir. Conn.(%)= 20.10	

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.60	0.61
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	89.81	40.00
Mannings n	=	0.013	0.250
Max.Eff.Inten.	(mm/hr)=	60.45	45.24
over	(min)	12.00	24.00
Storage Coeff.	(min)=	2.93 (ii)	12.62 (ii)
Unit Hyd. Tpeak	(min)=	12.00	24.00
Unit Hyd. peak	(cms)=	0.14	0.07

				TOTALS
PEAK FLOW	(cms)=	0.04	0.05	0.074 (iii)
TIME TO PEAK	(hrs)=	12.00	12.20	12.00
RUNOFF VOLUME	(mm)=	51.12	21.19	27.20
TOTAL RAINFALL	(mm)=	52.12	52.12	52.12
RUNOFF COEFFICIENT	=	0.98	0.41	0.52

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

DUHYD (0227)					
Inlet Cap.= 0.120					
#of Inlets= 1					
Total(cms)= 0.1		AREA	QPEAK	TPEAK	R.V.
		(ha)	(cms)	(hrs)	(mm)
TOTAL HYD.(ID= 1):		1.21	0.07	12.00	27.20
MAJOR SYS.(ID= 2):		0.00	0.00	0.00	0.00
MINOR SYS.(ID= 3):		1.21	0.07	12.00	27.20

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

READ STORM	Filename: C:\Users\jlysecki\AppData\Local\Temp\aad80675-a0b4-4fc2-876a-2640adc73013\bd5fe4d7
Ptotal= 52.12 mm	Comments: TWO YEAR SCS STORM WITH A TWELVE MINUTE

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.20	0.51	6.20	1.02	12.20	10.67	18.20	0.76
0.40	0.51	6.40	1.02	12.40	6.60	18.40	0.76
0.60	0.51	6.60	1.02	12.60	4.83	18.60	0.76
0.80	0.51	6.80	1.02	12.80	4.57	18.80	0.76
1.00	0.51	7.00	1.02	13.00	3.30	19.00	0.76
1.20	0.51	7.20	1.02	13.20	2.79	19.20	0.76
1.40	0.51	7.40	1.02	13.40	2.79	19.40	0.76
1.60	0.51	7.60	1.02	13.60	2.79	19.60	0.76
1.80	0.51	7.80	1.02	13.80	2.79	19.80	0.76
2.00	0.51	8.00	1.02	14.00	2.79	20.00	0.76
2.20	0.51	8.20	1.52	14.20	1.52	20.20	0.51
2.40	0.51	8.40	1.52	14.40	1.52	20.40	0.51
2.60	0.51	8.60	1.52	14.60	1.52	20.60	0.51
2.80	0.51	8.80	1.52	14.80	1.52	20.80	0.51
3.00	0.51	9.00	1.52	15.00	1.52	21.00	0.51
3.20	0.51	9.20	1.52	15.20	1.52	21.20	0.51
3.40	0.51	9.40	1.52	15.40	1.52	21.40	0.51
3.60	0.51	9.60	1.52	15.60	1.52	21.60	0.51
3.80	0.51	9.80	1.52	15.80	1.52	21.80	0.51
4.00	0.51	10.00	1.52	16.00	1.52	22.00	0.51
4.20	1.02	10.20	3.05	16.20	1.02	22.20	0.51
4.40	1.02	10.40	3.05	16.40	1.02	22.40	0.51
4.60	1.02	10.60	3.05	16.60	1.02	22.60	0.51
4.80	1.02	10.80	3.05	16.80	1.02	22.80	0.51
5.00	1.02	11.00	3.05	17.00	1.02	23.00	0.51
5.20	1.02	11.20	4.06	17.20	1.02	23.20	0.51
5.40	1.02	11.40	5.84	17.40	1.02	23.40	0.51
5.60	1.02	11.60	13.21	17.60	1.02	23.60	0.51
5.80	1.02	11.80	28.96	17.80	1.02	23.80	0.51
6.00	1.02	12.00	60.45	18.00	1.02	24.00	0.51

CALIB			
STANDHYD (0206)	Area (ha)= 38.60		
ID= 1 DT=12.0 min	Total Imp(%)= 54.70	Dir. Conn.(%)= 23.20	

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	21.11	17.49
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	507.28	40.00
Mannings n	=	0.013	0.250
Max.Eff.Inten.	(mm/hr)=	60.45	50.91
over	(min)	12.00	24.00
Storage Coeff.	(min)=	8.28 (ii)	17.52 (ii)
Unit Hyd. Tpeak	(min)=	12.00	24.00
Unit Hyd. peak	(cms)=	0.11	0.06

				TOTALS
PEAK FLOW	(cms)=	1.30	1.31	2.248 (iii)
TIME TO PEAK	(hrs)=	12.00	12.20	12.00
RUNOFF VOLUME	(mm)=	51.12	22.14	28.87
TOTAL RAINFALL	(mm)=	52.12	52.12	52.12
RUNOFF COEFFICIENT	=	0.98	0.42	0.55

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0225)					
1 + 2 = 3		AREA	QPEAK	TPEAK	R.V.
		(ha)	(cms)	(hrs)	(mm)
*** W A R N I N G : HYDROGRAPH 0183 <ID= 1> IS DRY.					
*** W A R N I N G : HYDROGRAPH 0225 = HYDROGRAPH 0206					
ID1= 1 (0183):		0.00	0.000	0.00	0.00
+ ID2= 2 (0206):		38.60	2.248	12.00	28.87
ID = 3 (0225):		38.60	2.248	12.00	28.87

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

COLE ENGINEERING

Experience Enhancing Excellence

ADD HYD (0225)		AREA	QPEAK	TPEAK	R.V.
3 + 2 = 1		(ha)	(cms)	(hrs)	(mm)

*** W A R N I N G : HYDROGRAPH 0227 <ID= 2> IS DRY.
*** W A R N I N G : HYDROGRAPH 0001 = HYDROGRAPH 0003

ID1= 3 (0225):	38.60	2.248	12.00	28.87
+ ID2= 2 (0227):	0.00	0.000	0.00	0.00
ID = 1 (0225):	38.60	2.248	12.00	28.87

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

READ STORM	Filename: C:\Users\jlysecki\AppData\Local\Temp\aad80675-a0b4-4fc2-876a-2640adc73013\bd5fe4d7
Ptotal= 52.12 mm	Comments: TWO YEAR SCS STORM WITH A TWELVE MINUTE

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.20	0.51	6.20	1.02	12.20	10.67	18.20	0.76
0.40	0.51	6.40	1.02	12.40	6.60	18.40	0.76
0.60	0.51	6.60	1.02	12.60	4.83	18.60	0.76
0.80	0.51	6.80	1.02	12.80	4.57	18.80	0.76
1.00	0.51	7.00	1.02	13.00	3.30	19.00	0.76
1.20	0.51	7.20	1.02	13.20	2.79	19.20	0.76
1.40	0.51	7.40	1.02	13.40	2.79	19.40	0.76
1.60	0.51	7.60	1.02	13.60	2.79	19.60	0.76
1.80	0.51	7.80	1.02	13.80	2.79	19.80	0.76
2.00	0.51	8.00	1.02	14.00	2.79	20.00	0.76
2.20	0.51	8.20	1.52	14.20	1.52	20.20	0.51
2.40	0.51	8.40	1.52	14.40	1.52	20.40	0.51
2.60	0.51	8.60	1.52	14.60	1.52	20.60	0.51
2.80	0.51	8.80	1.52	14.80	1.52	20.80	0.51
3.00	0.51	9.00	1.52	15.00	1.52	21.00	0.51
3.20	0.51	9.20	1.52	15.20	1.52	21.20	0.51
3.40	0.51	9.40	1.52	15.40	1.52	21.40	0.51
3.60	0.51	9.60	1.52	15.60	1.52	21.60	0.51
3.80	0.51	9.80	1.52	15.80	1.52	21.80	0.51
4.00	0.51	10.00	1.52	16.00	1.52	22.00	0.51
4.20	1.02	10.20	3.05	16.20	1.02	22.20	0.51
4.40	1.02	10.40	3.05	16.40	1.02	22.40	0.51
4.60	1.02	10.60	3.05	16.60	1.02	22.60	0.51
4.80	1.02	10.80	3.05	16.80	1.02	22.80	0.51
5.00	1.02	11.00	3.05	17.00	1.02	23.00	0.51
5.20	1.02	11.20	4.06	17.20	1.02	23.20	0.51
5.40	1.02	11.40	5.84	17.40	1.02	23.40	0.51
5.60	1.02	11.60	13.21	17.60	1.02	23.60	0.51
5.80	1.02	11.80	28.96	17.80	1.02	23.80	0.51
6.00	1.02	12.00	60.45	18.00	1.02	24.00	0.51

CALIB		
STANDHYD (0209)	Area (ha)=	5.20
ID= 1 DT=12.0 min	Total Imp(%)=	31.60 Dir. Conn.(%)= 19.40

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	1.64	3.56
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	186.19	40.00
Mannings n	=	0.013	0.250
Max.Eff.Inten.(mm/hr)=		60.45	27.84
over (min)		12.00	24.00
Storage Coeff. (min)=		4.54 (ii)	16.31 (ii)
Unit Hyd. Tpeak (min)=		12.00	24.00
Unit Hyd. peak (cms)=		0.13	0.06

			TOTALS
PEAK FLOW	(cms)=	0.16	0.15	0.270 (iii)
TIME TO PEAK	(hrs)=	12.00	12.20	12.00
RUNOFF VOLUME	(mm)=	51.12	17.51	24.03
TOTAL RAINFALL	(mm)=	52.12	52.12	52.12
RUNOFF COEFFICIENT	=	0.98	0.34	0.46

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
YOU SHOULD CONSIDER SPLITTING THE AREA.

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

READ STORM	Filename: C:\Users\jlysecki\AppData\Local\Temp\aad80675-a0b4-4fc2-876a-2640adc73013\bd5fe4d7
Ptotal= 52.12 mm	Comments: TWO YEAR SCS STORM WITH A TWELVE MINUTE

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.20	0.51	6.20	1.02	12.20	10.67	18.20	0.76
0.40	0.51	6.40	1.02	12.40	6.60	18.40	0.76
0.60	0.51	6.60	1.02	12.60	4.83	18.60	0.76
0.80	0.51	6.80	1.02	12.80	4.57	18.80	0.76
1.00	0.51	7.00	1.02	13.00	3.30	19.00	0.76
1.20	0.51	7.20	1.02	13.20	2.79	19.20	0.76
1.40	0.51	7.40	1.02	13.40	2.79	19.40	0.76
1.60	0.51	7.60	1.02	13.60	2.79	19.60	0.76
1.80	0.51	7.80	1.02	13.80	2.79	19.80	0.76
2.00	0.51	8.00	1.02	14.00	2.79	20.00	0.76
2.20	0.51	8.20	1.52	14.20	1.52	20.20	0.51
2.40	0.51	8.40	1.52	14.40	1.52	20.40	0.51
2.60	0.51	8.60	1.52	14.60	1.52	20.60	0.51
2.80	0.51	8.80	1.52	14.80	1.52	20.80	0.51
3.00	0.51	9.00	1.52	15.00	1.52	21.00	0.51
3.20	0.51	9.20	1.52	15.20	1.52	21.20	0.51
3.40	0.51	9.40	1.52	15.40	1.52	21.40	0.51
3.60	0.51	9.60	1.52	15.60	1.52	21.60	0.51
3.80	0.51	9.80	1.52	15.80	1.52	21.80	0.51
4.00	0.51	10.00	1.52	16.00	1.52	22.00	0.51
4.20	1.02	10.20	3.05	16.20	1.02	22.20	0.51
4.40	1.02	10.40	3.05	16.40	1.02	22.40	0.51
4.60	1.02	10.60	3.05	16.60	1.02	22.60	0.51
4.80	1.02	10.80	3.05	16.80	1.02	22.80	0.51
5.00	1.02	11.00	3.05	17.00	1.02	23.00	0.51
5.20	1.02	11.20	4.06	17.20	1.02	23.20	0.51
5.40	1.02	11.40	5.84	17.40	1.02	23.40	0.51
5.60	1.02	11.60	13.21	17.60	1.02	23.60	0.51
5.80	1.02	11.80	28.96	17.80	1.02	23.80	0.51
6.00	1.02	12.00	60.45	18.00	1.02	24.00	0.51

CALIB		
STANDHYD (0252)	Area (ha)=	1.44
ID= 1 DT=12.0 min	Total Imp(%)=	52.40 Dir. Conn.(%)= 20.10

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.75	0.69
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	97.98	40.00
Mannings n	=	0.013	0.250
Max.Eff.Inten.(mm/hr)=		60.45	50.10
over (min)		12.00	24.00
Storage Coeff. (min)=		3.09 (ii)	12.39 (ii)
Unit Hyd. Tpeak (min)=		12.00	24.00

```
     Unit Hyd. peak  (cms)=       0.14         0.07
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.05         0.06          0.091 (iii)
     TIME TO PEAK    (hrs)=      12.00        12.20         12.00
     RUNOFF VOLUME    (mm)=      51.12        22.01         27.86
     TOTAL RAINFALL   (mm)=      52.12        52.12         52.12
     RUNOFF COEFFICIENT   =       0.98         0.42          0.53

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  69.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0261)|
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.1470     0.0137
                          0.0530     0.0050   |   0.1700     0.0155
                          0.0700     0.0076   |   0.1900     0.0220
                          0.1150     0.0113   |   0.0000     0.0000

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0252)     1.440     0.091     12.00      27.86
   OUTFLOW: ID= 1 (  0261)     1.440     0.060     12.20      27.85

                PEAK   FLOW   REDUCTION [Qout/Qin](%)= 66.04
                TIME SHIFT OF PEAK FLOW          (min)= 12.00
                MAXIMUM  STORAGE   USED       (ha.m.)=  0.0062

--------------------------------------------------------------------------------
--------------------
| ADD HYD  (  0251)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)     (cms)    (hrs)      (mm)
       ID1= 1 (  0209):      5.20    0.270    12.00     24.03
     + ID2= 2 (  0261):      1.44    0.060    12.20     27.85
       ================================================
       ID = 3 (  0251):      6.64    0.316    12.00     24.85

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0245)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.3090     0.2876
                          0.0000     0.0000   |   0.3330     0.3838
                          0.1230     0.1102   |   0.3620     0.5200
                          0.2870     0.1971   |   0.0000     0.0000

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0251)     6.640     0.316     12.00      24.85
   OUTFLOW: ID= 1 (  0245)     6.640     0.077     12.90      24.82

                PEAK   FLOW   REDUCTION [Qout/Qin](%)= 24.25
                TIME SHIFT OF PEAK FLOW          (min)= 54.00
                MAXIMUM  STORAGE   USED       (ha.m.)=  0.0686

--------------------------------------------------------------------------------
--------------------
| ROUTEPIPE(  0212)|     PIPE Number     =   1.00
| IN= 2---> OUT= 1 |     Diameter    (mm)=1650.00
| DT= 12.0 min     |     Length       (m)= 850.00
--------------------     Slope      (m/m)=  0.005
                         Manning n       =  0.013

<---------------- TRAVEL TIME TABLE ---------------------->
  DEPTH      VOLUME     FLOW RATE     VELOCITY     TRAV.TIME
    (m)     (cu.m.)       (cms)         (m/s)        min
   0.09    .367E+02        0.0          0.80        17.68
   0.17    .102E+03        0.1          1.25        11.33
   0.26    .184E+03        0.3          1.61         8.81
   0.35    .278E+03        0.6          1.91         7.41
   0.43    .382E+03        1.0          2.18         6.51
   0.52    .492E+03        1.4          2.41         5.88
   0.61    .608E+03        1.9          2.61         5.43
   0.69    .727E+03        2.4          2.79         5.08
   0.78    .848E+03        2.9          2.95         4.81
   0.87    .970E+03        3.5          3.08         4.60
   0.96    .109E+04        4.1          3.20         4.43
   1.04    .121E+04        4.7          3.29         4.31
   1.13    .133E+04        5.2          3.36         4.22
   1.22    .144E+04        5.8          3.41         4.15
   1.30    .154E+04        6.2          3.44         4.12
   1.39    .163E+04        6.6          3.43         4.13
   1.48    .172E+04        6.9          3.40         4.17
   1.56    .178E+04        6.9          3.31         4.28
   1.65    .182E+04        6.5          3.02         4.70
                                <---- hydrograph ---->   <-pipe / channel->
                               AREA    QPEAK    TPEAK    R.V.   MAX DEPTH  MAX VEL
                               (ha)    (cms)    (hrs)    (mm)     (m)       (m/s)
   INFLOW : ID= 2 (  0245)     6.64     0.08    12.90   24.82      0.12       0.92
   OUTFLOW: ID= 1 (  0212)     6.64     0.07    13.20   24.82      0.12       0.91

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

--------------------
| ADD HYD  (  0211)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)     (cms)    (hrs)      (mm)
       ID1= 1 (  0212):      6.64    0.075    13.20     24.82
     + ID2= 2 (  0225):     38.60    2.248    12.00     28.87
       ================================================
       ID = 3 (  0211):     45.24    2.270    12.00     28.27

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0255)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   1.6250     1.2448
                          0.0190     0.1627   |   1.6630     1.2997
                          0.0360     0.4306   |   1.8430     1.5816
                          0.0480     0.7217   |   2.1300     2.1197
                          0.1330     0.7718   |   2.9680     2.2465
                          1.0390     0.9773   |   7.5380     2.5741

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0211)     45.240     2.270     12.00      28.27
   OUTFLOW: ID= 1 (  0255)     45.240     0.253     14.10      28.22

                PEAK   FLOW   REDUCTION [Qout/Qin](%)= 11.15
                TIME SHIFT OF PEAK FLOW          (min)=126.00
                MAXIMUM  STORAGE   USED       (ha.m.)=  0.7992

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

      V    V   I    SSSSS  U   U    A    L              (v 5.1.2004)
      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
```

COLE ENGINEERING

Experience Enhancing Excellence

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


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

Input filename: C:\Program Files (x86)\Visual OTTHYMO 5.1\VO2\voin.dat
Output filename: C:\Users\jlysecki\AppData\Local\Civica\VH5\a379672b-db33-4372-b5e0-ba58a07d1417\23747553-4d7e-4c04-bb88-cc4607d005cb\sce
Summary filename: C:\Users\jlysecki\AppData\Local\Civica\VH5\a379672b-db33-4372-b5e0-ba58a07d1417\23747553-4d7e-4c04-bb88-cc4607d005cb\sce

DATE: 01/15/2020 TIME: 04:10:47

USER:

COMMENTS: _____

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

| READ STORM | Filename: C:\Users\jlysecki\AppData\Local\Temp\aad80675-a0b4-4fc2-876a-2640adc73013\fb5ff205
| Ptotal= 62.43 mm | Comments: FIVE YR SCS STORM WITH A TWELVE MINUTE

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.20	0.76	6.20	1.27	12.20	12.19	18.20	1.27
0.40	0.76	6.40	1.27	12.40	7.62	18.40	1.27
0.60	0.76	6.60	1.27	12.60	5.59	18.60	1.27
0.80	0.76	6.80	1.27	12.80	5.08	18.80	1.27
1.00	0.76	7.00	1.27	13.00	3.81	19.00	1.27
1.20	0.76	7.20	1.27	13.20	3.05	19.20	1.02
1.40	0.76	7.40	1.27	13.40	3.05	19.40	1.02
1.60	0.76	7.60	1.27	13.60	3.05	19.60	1.02
1.80	0.76	7.80	1.27	13.80	3.05	19.80	1.02
2.00	0.76	8.00	1.27	14.00	3.05	20.00	1.02
2.20	0.76	8.20	1.78	14.20	1.78	20.20	1.02
2.40	0.76	8.40	1.78	14.40	1.78	20.40	1.02
2.60	0.76	8.60	1.78	14.60	1.78	20.60	1.02
2.80	0.76	8.80	1.78	14.80	1.78	20.80	1.02
3.00	0.76	9.00	1.78	15.00	1.78	21.00	1.02
3.20	0.76	9.20	1.78	15.20	1.78	21.20	0.76
3.40	0.76	9.40	1.78	15.40	1.78	21.40	0.76
3.60	0.76	9.60	1.78	15.60	1.78	21.60	0.76
3.80	0.76	9.80	1.78	15.80	1.78	21.80	0.76
4.00	0.76	10.00	1.78	16.00	1.78	22.00	0.76
4.20	1.27	10.20	3.30	16.20	1.27	22.20	0.76
4.40	1.27	10.40	3.30	16.40	1.27	22.40	0.76
4.60	1.27	10.60	3.30	16.60	1.27	22.60	0.76
4.80	1.27	10.80	3.30	16.80	1.27	22.80	0.76
5.00	1.27	11.00	3.30	17.00	1.27	23.00	0.76
5.20	1.27	11.20	4.57	17.20	1.27	23.20	0.76
5.40	1.27	11.40	6.60	17.40	1.27	23.40	0.76
5.60	1.27	11.60	15.24	17.60	1.27	23.60	0.76
5.80	1.27	11.80	33.27	17.80	1.27	23.80	0.76
6.00	1.27	12.00	69.60	18.00	1.27	24.00	0.76

| CALIB |
| STANDHYD (0228) | Area (ha)= 12.56
| ID= 1 DT=12.0 min | Total Imp(%)= 54.10 Dir. Conn.(%)= 25.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	6.79	5.77
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	289.37	40.00
Mannings n	=	0.013	0.250
Max.Eff.Inten.	(mm/hr)=	69.60	61.00
over	(min)	12.00	24.00
Storage Coeff.	(min)=	5.59 (ii)	14.19 (ii)
Unit Hyd. Tpeak	(min)=	12.00	24.00
Unit Hyd. peak	(cms)=	0.13	0.06

				TOTALS
PEAK FLOW	(cms)=	0.57	0.56	0.985 (iii)
TIME TO PEAK	(hrs)=	12.00	12.20	12.00
RUNOFF VOLUME	(mm)=	61.43	28.81	36.96
TOTAL RAINFALL	(mm)=	62.43	62.43	62.43
RUNOFF COEFFICIENT	=	0.98	0.46	0.59

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

| READ STORM | Filename: C:\Users\jlysecki\AppData\Local\Temp\aad80675-a0b4-4fc2-876a-2640adc73013\fb5ff205
| Ptotal= 62.43 mm | Comments: FIVE YR SCS STORM WITH A TWELVE MINUTE

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.20	0.76	6.20	1.27	12.20	12.19	18.20	1.27
0.40	0.76	6.40	1.27	12.40	7.62	18.40	1.27
0.60	0.76	6.60	1.27	12.60	5.59	18.60	1.27
0.80	0.76	6.80	1.27	12.80	5.08	18.80	1.27
1.00	0.76	7.00	1.27	13.00	3.81	19.00	1.27
1.20	0.76	7.20	1.27	13.20	3.05	19.20	1.02
1.40	0.76	7.40	1.27	13.40	3.05	19.40	1.02
1.60	0.76	7.60	1.27	13.60	3.05	19.60	1.02
1.80	0.76	7.80	1.27	13.80	3.05	19.80	1.02
2.00	0.76	8.00	1.27	14.00	3.05	20.00	1.02
2.20	0.76	8.20	1.78	14.20	1.78	20.20	1.02
2.40	0.76	8.40	1.78	14.40	1.78	20.40	1.02
2.60	0.76	8.60	1.78	14.60	1.78	20.60	1.02
2.80	0.76	8.80	1.78	14.80	1.78	20.80	1.02
3.00	0.76	9.00	1.78	15.00	1.78	21.00	1.02
3.20	0.76	9.20	1.78	15.20	1.78	21.20	0.76
3.40	0.76	9.40	1.78	15.40	1.78	21.40	0.76
3.60	0.76	9.60	1.78	15.60	1.78	21.60	0.76
3.80	0.76	9.80	1.78	15.80	1.78	21.80	0.76
4.00	0.76	10.00	1.78	16.00	1.78	22.00	0.76
4.20	1.27	10.20	3.30	16.20	1.27	22.20	0.76
4.40	1.27	10.40	3.30	16.40	1.27	22.40	0.76
4.60	1.27	10.60	3.30	16.60	1.27	22.60	0.76
4.80	1.27	10.80	3.30	16.80	1.27	22.80	0.76
5.00	1.27	11.00	3.30	17.00	1.27	23.00	0.76
5.20	1.27	11.20	4.57	17.20	1.27	23.20	0.76
5.40	1.27	11.40	6.60	17.40	1.27	23.40	0.76
5.60	1.27	11.60	15.24	17.60	1.27	23.60	0.76
5.80	1.27	11.80	33.27	17.80	1.27	23.80	0.76
6.00	1.27	12.00	69.60	18.00	1.27	24.00	0.76

| CALIB |

COLE ENGINEERING

Experience Enhancing Excellence

```
| STANDHYD (  0257)|   Area     (ha)=   3.10
|ID= 1 DT=12.0 min |   Total Imp(%)=  67.90   Dir. Conn.(%)=  42.90
-------------------

                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.10         1.00
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     143.76        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      69.60        69.58
               over (min)        12.00        12.00
     Storage Coeff.  (min)=       3.67 (ii)   11.83 (ii)
     Unit Hyd. Tpeak (min)=      12.00        12.00
     Unit Hyd. peak  (cms)=       0.14         0.09
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.25         0.14          0.395 (iii)
     TIME TO PEAK    (hrs)=      12.00        12.00          12.00
     RUNOFF VOLUME    (mm)=      61.43        30.17          43.58
     TOTAL RAINFALL   (mm)=      62.43        62.43          62.43
     RUNOFF COEFFICIENT   =       0.98         0.48           0.70

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  69.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
```

```
-------------------
| ADD HYD  (  0258)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)    (cms)    (hrs)      (mm)
       ID1= 1 (  0228):    12.56   0.985    12.00     36.96
     + ID2= 2 (  0257):     3.10   0.395    12.00     43.58
       ================================================
       ID = 3 (  0258):    15.66   1.380    12.00     38.27

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

```
-------------------
| RESERVOIR(  0243)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
-------------------       (cms)     (ha.m.)   |   (cms)     (ha.m.)
                         0.0000      0.0000   |  0.1346      0.4241
                         0.0096      0.0421   |  0.1575      0.4697
                         0.0159      0.0886   |  0.1823      0.5165
                         0.0203      0.1399   |  0.2088      0.5647
                         0.0228      0.1768   |  0.2369      0.6142
                         0.0250      0.2150   |  0.2514      0.6394
                         0.0628      0.2544   |  0.2663      0.6650
                         0.0835      0.2950   |  0.2816      0.6910
                         0.0991      0.3368   |  0.2997      0.7172
                         0.1144      0.3798   |  0.3113      0.7439

                              AREA     QPEAK     TPEAK       R.V.
                              (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0258)   15.660     1.380     12.00      38.27
   OUTFLOW: ID= 1 (  0243)   15.660     0.106     13.60      38.20

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  7.66
                  TIME SHIFT OF PEAK FLOW          (min)= 96.00
                  MAXIMUM  STORAGE   USED        (ha.m.)=  0.3555
```

```
-------------------
| ROUTEPIPE(  0184)|     PIPE Number     =   1.00
| IN= 2---> OUT= 1 |     Diameter    (mm)=1650.00
| DT= 12.0 min     |     Length       (m)= 500.00
-------------------     Slope      (m/m)=  0.005
                        Manning n       =  0.013
```

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

DEPTH (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME min
0.09	.216E+02	0.0	0.80	10.40
0.17	.600E+02	0.1	1.25	6.67
0.26	.108E+03	0.3	1.61	5.18
0.35	.164E+03	0.6	1.91	4.36
0.43	.225E+03	1.0	2.18	3.83
0.52	.290E+03	1.4	2.41	3.46
0.61	.358E+03	1.9	2.61	3.19
0.69	.428E+03	2.4	2.79	2.99
0.78	.499E+03	2.9	2.95	2.83
0.87	.570E+03	3.5	3.08	2.70
0.96	.642E+03	4.1	3.20	2.61
1.04	.712E+03	4.7	3.29	2.53
1.13	.780E+03	5.2	3.36	2.48
1.22	.844E+03	5.8	3.41	2.44
1.30	.905E+03	6.2	3.44	2.43
1.39	.961E+03	6.6	3.43	2.43
1.48	.101E+04	6.9	3.40	2.45
1.56	.105E+04	6.9	3.31	2.52
1.65	.107E+04	6.5	3.02	2.76

	<---- hydrograph ----> AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	<-pipe / channel-> MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 2 (0243)	15.66	0.11	13.60	38.20	0.14	1.03
OUTFLOW: ID= 1 (0184)	15.66	0.11	13.60	38.20	0.14	1.03

```
-------------------
|    READ STORM    |    Filename: C:\Users\jlysecki\AppD
|                  |              ata\Local\Temp\
|                  |              aad80675-a0b4-4fc2-876a-2640adc73013\fb5ff205
| Ptotal= 62.43 mm |    Comments: FIVE YR SCS STORM  WITH A TWELVE MINUTE
-------------------
```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.20	0.76	6.20	1.27	12.20	12.19	18.20	1.27
0.40	0.76	6.40	1.27	12.40	7.62	18.40	1.27
0.60	0.76	6.60	1.27	12.60	5.59	18.60	1.27
0.80	0.76	6.80	1.27	12.80	5.08	18.80	1.27
1.00	0.76	7.00	1.27	13.00	3.81	19.00	1.27
1.20	0.76	7.20	1.27	13.20	3.05	19.20	1.02
1.40	0.76	7.40	1.27	13.40	3.05	19.40	1.02
1.60	0.76	7.60	1.27	13.60	3.05	19.60	1.02
1.80	0.76	7.80	1.27	13.80	3.05	19.80	1.02
2.00	0.76	8.00	1.27	14.00	3.05	20.00	1.02
2.20	0.76	8.20	1.78	14.20	1.78	20.20	1.02
2.40	0.76	8.40	1.78	14.40	1.78	20.40	1.02
2.60	0.76	8.60	1.78	14.60	1.78	20.60	1.02
2.80	0.76	8.80	1.78	14.80	1.78	20.80	1.02
3.00	0.76	9.00	1.78	15.00	1.78	21.00	1.02
3.20	0.76	9.20	1.78	15.20	1.78	21.20	0.76
3.40	0.76	9.40	1.78	15.40	1.78	21.40	0.76
3.60	0.76	9.60	1.78	15.60	1.78	21.60	0.76
3.80	0.76	9.80	1.78	15.80	1.78	21.80	0.76
4.00	0.76	10.00	1.78	16.00	1.78	22.00	0.76
4.20	1.27	10.20	3.30	16.20	1.27	22.20	0.76
4.40	1.27	10.40	3.30	16.40	1.27	22.40	0.76
4.60	1.27	10.60	3.30	16.60	1.27	22.60	0.76
4.80	1.27	10.80	3.30	16.80	1.27	22.80	0.76
5.00	1.27	11.00	3.30	17.00	1.27	23.00	0.76
5.20	1.27	11.20	4.57	17.20	1.27	23.20	0.76
5.40	1.27	11.40	6.60	17.40	1.27	23.40	0.76
5.60	1.27	11.60	15.24	17.60	1.27	23.60	0.76
5.80	1.27	11.80	33.27	17.80	1.27	23.80	0.76
6.00	1.27	12.00	69.60	18.00	1.27	24.00	0.76

```
-------------------
| CALIB            |
| STANDHYD (  0229)|   Area     (ha)=  12.13
```

|ID= 1 DT=12.0 min | Total Imp(%)= 54.50 Dir. Conn.(%)= 19.70

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	6.61	5.52
Dep. Storage (mm)=	1.00	1.50
Average Slope (%)=	1.00	2.00
Length (m)=	284.37	40.00
Mannings n =	0.013	0.250
Max.Eff.Inten.(mm/hr)=	69.60	68.74
over (min)	12.00	24.00
Storage Coeff. (min)=	5.53 (ii)	13.73 (ii)
Unit Hyd. Tpeak (min)=	12.00	24.00
Unit Hyd. peak (cms)=	0.13	0.06

		TOTALS
PEAK FLOW (cms)=	0.43	0.61	0.891 (iii)
TIME TO PEAK (hrs)=	12.00	12.20	12.00
RUNOFF VOLUME (mm)=	61.43	30.04	36.22
TOTAL RAINFALL (mm)=	62.43	62.43	62.43
RUNOFF COEFFICIENT =	0.98	0.48	0.58

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
YOU SHOULD CONSIDER SPLITTING THE AREA.

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0196)|	AREA	QPEAK	TPEAK	R.V.
		(ha)	(cms)	(hrs)	(mm)
1 + 2 = 3	ID1= 1 (0184):	15.66	0.106	13.60	38.20
	+ ID2= 2 (0229):	12.13	0.891	12.00	36.22
	ID = 3 (0196):	27.79	0.911	12.00	37.34

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0256)| IN= 2---> OUT= 1	DT= 12.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.2761	0.3332
	0.0090	0.0385	0.3101	0.3536
	0.0147	0.0812	0.3454	0.3743
	0.0199	0.1456	0.3818	0.3952
	0.0210	0.1631	0.4194	0.4165
	0.0987	0.2172	0.4581	0.4381
	0.1306	0.2358	0.4979	0.4600
	0.1761	0.2739	0.5806	0.5047
	0.2120	0.2934	0.6234	0.5275
	0.2433	0.3131	0.7121	0.5742

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0196)	27.790	0.911	12.00	37.34
OUTFLOW: ID= 1 (0256)	27.790	0.185	13.60	37.30

PEAK FLOW REDUCTION [Qout/Qin](%)= 20.31
TIME SHIFT OF PEAK FLOW (min)= 96.00
MAXIMUM STORAGE USED (ha.m.)= 0.2788

| READ STORM | Filename: C:\Users\jlysecki\AppData\Local\Temp\aad80675-a0b4-4fc2-876a-2640adc73013\fb5ff205

| Ptotal= 62.43 mm | Comments: FIVE YR SCS STORM WITH A TWELVE MINUTE

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.20	0.76	6.20	1.27	12.20	12.19	18.20	1.27
0.40	0.76	6.40	1.27	12.40	7.62	18.40	1.27
0.60	0.76	6.60	1.27	12.60	5.59	18.60	1.27
0.80	0.76	6.80	1.27	12.80	5.08	18.80	1.27
1.00	0.76	7.00	1.27	13.00	3.81	19.00	1.27
1.20	0.76	7.20	1.27	13.20	3.05	19.20	1.02
1.40	0.76	7.40	1.27	13.40	3.05	19.40	1.02
1.60	0.76	7.60	1.27	13.60	3.05	19.60	1.02
1.80	0.76	7.80	1.27	13.80	3.05	19.80	1.02
2.00	0.76	8.00	1.27	14.00	3.05	20.00	1.02
2.20	0.76	8.20	1.78	14.20	1.78	20.20	1.02
2.40	0.76	8.40	1.78	14.40	1.78	20.40	1.02
2.60	0.76	8.60	1.78	14.60	1.78	20.60	1.02
2.80	0.76	8.80	1.78	14.80	1.78	20.80	1.02
3.00	0.76	9.00	1.78	15.00	1.78	21.00	1.02
3.20	0.76	9.20	1.78	15.20	1.78	21.20	0.76
3.40	0.76	9.40	1.78	15.40	1.78	21.40	0.76
3.60	0.76	9.60	1.78	15.60	1.78	21.60	0.76
3.80	0.76	9.80	1.78	15.80	1.78	21.80	0.76
4.00	0.76	10.00	1.78	16.00	1.78	22.00	0.76
4.20	1.27	10.20	3.30	16.20	1.27	22.20	0.76
4.40	1.27	10.40	3.30	16.40	1.27	22.40	0.76
4.60	1.27	10.60	3.30	16.60	1.27	22.60	0.76
4.80	1.27	10.80	3.30	16.80	1.27	22.80	0.76
5.00	1.27	11.00	3.30	17.00	1.27	23.00	0.76
5.20	1.27	11.20	4.57	17.20	1.27	23.20	0.76
5.40	1.27	11.40	6.60	17.40	1.27	23.40	0.76
5.60	1.27	11.60	15.24	17.60	1.27	23.60	0.76
5.80	1.27	11.80	33.27	17.80	1.27	23.80	0.76
6.00	1.27	12.00	69.60	18.00	1.27	24.00	0.76

| CALIB | STANDHYD (0230)| ID= 1 DT=12.0 min | Area (ha)= 20.35 Total Imp(%)= 53.70 Dir. Conn.(%)= 32.40

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	10.93	9.42
Dep. Storage (mm)=	1.00	1.50
Average Slope (%)=	1.00	2.00
Length (m)=	368.33	40.00
Mannings n =	0.013	0.250
Max.Eff.Inten.(mm/hr)=	69.60	51.05
over (min)	12.00	24.00
Storage Coeff. (min)=	6.46 (ii)	15.69 (ii)
Unit Hyd. Tpeak (min)=	12.00	24.00
Unit Hyd. peak (cms)=	0.12	0.06

		TOTALS
PEAK FLOW (cms)=	1.16	0.74	1.706 (iii)
TIME TO PEAK (hrs)=	12.00	12.20	12.00
RUNOFF VOLUME (mm)=	61.43	27.02	38.17
TOTAL RAINFALL (mm)=	62.43	62.43	62.43
RUNOFF COEFFICIENT =	0.98	0.43	0.61

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0224)|	AREA	QPEAK	TPEAK	R.V.
		(ha)	(cms)	(hrs)	(mm)
1 + 2 = 3	ID1= 1 (0230):	20.35	1.706	12.00	38.17

```
      + ID2= 2 (  0256):    27.79   0.185    13.60    37.30
        ====================================================
        ID = 3 (  0224):    48.14   1.725    12.00    37.67

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
------------------
| RESERVOIR(  0253)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
------------------      (cms)      (ha.m.)   |   (cms)      (ha.m.)
                        0.0000     0.0000    |  0.6390      0.9848
                        0.0270     0.1457    |  0.9700      1.2900
                        0.0430     0.3152    |  1.1040      1.7480
                        0.0530     0.4653    |  3.3100      1.9350
                        0.3280     0.6677    | 11.3140      2.2662

                              AREA     QPEAK     TPEAK       R.V.
                              (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0224)    48.140     1.725     12.00      37.67
   OUTFLOW: ID= 1 (  0253)    48.140     0.239     16.00      37.64

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 13.84
                  TIME SHIFT OF PEAK FLOW         (min)=240.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.6021

--------------------------------------------------------------------------------
------------------
|    READ STORM    |    Filename: C:\Users\jlysecki\AppD
|                  |              ata\Local\Temp\
|                  |              aad80675-a0b4-4fc2-876a-2640adc73013\fb5ff205
| Ptotal= 62.43 mm |    Comments: FIVE YR SCS STORM  WITH A TWELVE MINUTE
------------------
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.20    0.76 |  6.20    1.27 | 12.20   12.19 | 18.20    1.27
               0.40    0.76 |  6.40    1.27 | 12.40    7.62 | 18.40    1.27
               0.60    0.76 |  6.60    1.27 | 12.60    5.59 | 18.60    1.27
               0.80    0.76 |  6.80    1.27 | 12.80    5.08 | 18.80    1.27
               1.00    0.76 |  7.00    1.27 | 13.00    3.81 | 19.00    1.27
               1.20    0.76 |  7.20    1.27 | 13.20    3.05 | 19.20    1.02
               1.40    0.76 |  7.40    1.27 | 13.40    3.05 | 19.40    1.02
               1.60    0.76 |  7.60    1.27 | 13.60    3.05 | 19.60    1.02
               1.80    0.76 |  7.80    1.27 | 13.80    3.05 | 19.80    1.02
               2.00    0.76 |  8.00    1.27 | 14.00    3.05 | 20.00    1.02
               2.20    0.76 |  8.20    1.78 | 14.20    1.78 | 20.20    1.02
               2.40    0.76 |  8.40    1.78 | 14.40    1.78 | 20.40    1.02
               2.60    0.76 |  8.60    1.78 | 14.60    1.78 | 20.60    1.02
               2.80    0.76 |  8.80    1.78 | 14.80    1.78 | 20.80    1.02
               3.00    0.76 |  9.00    1.78 | 15.00    1.78 | 21.00    1.02
               3.20    0.76 |  9.20    1.78 | 15.20    1.78 | 21.20    0.76
               3.40    0.76 |  9.40    1.78 | 15.40    1.78 | 21.40    0.76
               3.60    0.76 |  9.60    1.78 | 15.60    1.78 | 21.60    0.76
               3.80    0.76 |  9.80    1.78 | 15.80    1.78 | 21.80    0.76
               4.00    0.76 | 10.00    1.78 | 16.00    1.78 | 22.00    0.76
               4.20    1.27 | 10.20    3.30 | 16.20    1.27 | 22.20    0.76
               4.40    1.27 | 10.40    3.30 | 16.40    1.27 | 22.40    0.76
               4.60    1.27 | 10.60    3.30 | 16.60    1.27 | 22.60    0.76
               4.80    1.27 | 10.80    3.30 | 16.80    1.27 | 22.80    0.76
               5.00    1.27 | 11.00    3.30 | 17.00    1.27 | 23.00    0.76
               5.20    1.27 | 11.20    4.57 | 17.20    1.27 | 23.20    0.76
               5.40    1.27 | 11.40    6.60 | 17.40    1.27 | 23.40    0.76
               5.60    1.27 | 11.60   15.24 | 17.60    1.27 | 23.60    0.76
               5.80    1.27 | 11.80   33.27 | 17.80    1.27 | 23.80    0.76
               6.00    1.27 | 12.00   69.60 | 18.00    1.27 | 24.00    0.76

--------------------------------------------------------------------------------
------------------
| CALIB            |
| STANDHYD (  0160)|   Area     (ha)=   1.30
|ID= 1 DT=12.0 min |   Total Imp(%)=  50.70   Dir. Conn.(%)=  22.00
------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      0.66         0.64
     Dep. Storage     (mm)=      1.00         1.50
     Average Slope     (%)=      1.00         2.00
     Length            (m)=     93.09        40.00
     Mannings n           =     0.013        0.250

     Max.Eff.Inten.(mm/hr)=     69.60        57.99
                   over (min)     12.00        12.00
     Storage Coeff.  (min)=      2.83 (ii)    11.61 (ii)
     Unit Hyd. Tpeak (min)=     12.00        12.00
     Unit Hyd. peak  (cms)=      0.14         0.09

                                                        *TOTALS*
     PEAK FLOW        (cms)=     0.05         0.08         0.132 (iii)
     TIME TO PEAK     (hrs)=    12.00        12.00        12.00
     RUNOFF VOLUME     (mm)=    61.43        28.29        35.58
     TOTAL RAINFALL    (mm)=    62.43        62.43        62.43
     RUNOFF COEFFICIENT   =     0.98         0.45         0.57

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

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN*  =  69.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
------------------
| DUHYD    (  0183)|
| Inlet Cap.= 0.152|
| #of Inlets=    1|
| Total(cms)=  0.2|      AREA     QPEAK     TPEAK     R.V.
------------------       (ha)     (cms)     (hrs)     (mm)
     TOTAL HYD.(ID= 1):   1.30      0.13     12.00    35.58
     ==========================================================
     MAJOR SYS.(ID= 2):   0.00      0.00      0.00     0.00
     MINOR SYS.(ID= 3):   1.30      0.13     12.00    35.58

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
------------------
|    READ STORM    |    Filename: C:\Users\jlysecki\AppD
|                  |              ata\Local\Temp\
|                  |              aad80675-a0b4-4fc2-876a-2640adc73013\fb5ff205
| Ptotal= 62.43 mm |    Comments: FIVE YR SCS STORM  WITH A TWELVE MINUTE
------------------
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.20    0.76 |  6.20    1.27 | 12.20   12.19 | 18.20    1.27
               0.40    0.76 |  6.40    1.27 | 12.40    7.62 | 18.40    1.27
               0.60    0.76 |  6.60    1.27 | 12.60    5.59 | 18.60    1.27
               0.80    0.76 |  6.80    1.27 | 12.80    5.08 | 18.80    1.27
               1.00    0.76 |  7.00    1.27 | 13.00    3.81 | 19.00    1.27
               1.20    0.76 |  7.20    1.27 | 13.20    3.05 | 19.20    1.02
               1.40    0.76 |  7.40    1.27 | 13.40    3.05 | 19.40    1.02
               1.60    0.76 |  7.60    1.27 | 13.60    3.05 | 19.60    1.02
               1.80    0.76 |  7.80    1.27 | 13.80    3.05 | 19.80    1.02
               2.00    0.76 |  8.00    1.27 | 14.00    3.05 | 20.00    1.02
               2.20    0.76 |  8.20    1.78 | 14.20    1.78 | 20.20    1.02
               2.40    0.76 |  8.40    1.78 | 14.40    1.78 | 20.40    1.02
               2.60    0.76 |  8.60    1.78 | 14.60    1.78 | 20.60    1.02
               2.80    0.76 |  8.80    1.78 | 14.80    1.78 | 20.80    1.02
               3.00    0.76 |  9.00    1.78 | 15.00    1.78 | 21.00    1.02
               3.20    0.76 |  9.20    1.78 | 15.20    1.78 | 21.20    0.76
               3.40    0.76 |  9.40    1.78 | 15.40    1.78 | 21.40    0.76
               3.60    0.76 |  9.60    1.78 | 15.60    1.78 | 21.60    0.76
               3.80    0.76 |  9.80    1.78 | 15.80    1.78 | 21.80    0.76
               4.00    0.76 | 10.00    1.78 | 16.00    1.78 | 22.00    0.76
               4.20    1.27 | 10.20    3.30 | 16.20    1.27 | 22.20    0.76
               4.40    1.27 | 10.40    3.30 | 16.40    1.27 | 22.40    0.76
               4.60    1.27 | 10.60    3.30 | 16.60    1.27 | 22.60    0.76
               4.80    1.27 | 10.80    3.30 | 16.80    1.27 | 22.80    0.76
               5.00    1.27 | 11.00    3.30 | 17.00    1.27 | 23.00    0.76
               5.20    1.27 | 11.20    4.57 | 17.20    1.27 | 23.20    0.76
```

```
                5.40    1.27 | 11.40    6.60 | 17.40    1.27 | 23.40    0.76
                5.60    1.27 | 11.60   15.24 | 17.60    1.27 | 23.60    0.76
                5.80    1.27 | 11.80   33.27 | 17.80    1.27 | 23.80    0.76
                6.00    1.27 | 12.00   69.60 | 18.00    1.27 | 24.00    0.76

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

--------------------
| CALIB            |
| STANDHYD (  0193)|   Area    (ha)=   1.21
|ID= 1 DT=12.0 min |   Total Imp(%)=  49.30   Dir. Conn.(%)=  20.10
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.60         0.61
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      89.81        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      69.60        57.63
                  over (min)      12.00        12.00
     Storage Coeff.  (min)=       2.77 (ii)   11.57 (ii)
     Unit Hyd. Tpeak (min)=      12.00        12.00
     Unit Hyd. peak  (cms)=       0.14         0.09
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.05         0.07          0.120 (iii)
     TIME TO PEAK    (hrs)=      12.00        12.00         12.00
     RUNOFF VOLUME    (mm)=      61.43        28.23         34.90
     TOTAL RAINFALL   (mm)=      62.43        62.43         62.43
     RUNOFF COEFFICIENT   =       0.98         0.45          0.56

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

--------------------
| DUHYD    (  0227)|
| Inlet Cap.= 0.120|
| #of Inlets=     1|
| Total(cms)=   0.1|      AREA     QPEAK     TPEAK     R.V.
--------------------      (ha)     (cms)     (hrs)     (mm)
     TOTAL HYD.(ID= 1):   1.21      0.12     12.00    34.90
     ==========================================================
     MAJOR SYS.(ID= 2):   0.00      0.00     12.00    34.90
     MINOR SYS.(ID= 3):   1.21      0.12     12.00    34.90

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
|    READ STORM    |    Filename: C:\Users\jlysecki\AppD
|                  |              ata\Local\Temp\
|                  |              aad80675-a0b4-4fc2-876a-2640adc73013\fb5ff205
| Ptotal= 62.43 mm |    Comments: FIVE YR SCS STORM  WITH A TWELVE MINUTE
--------------------
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.20    0.76 |  6.20    1.27 | 12.20   12.19 | 18.20    1.27
                0.40    0.76 |  6.40    1.27 | 12.40    7.62 | 18.40    1.27
                0.60    0.76 |  6.60    1.27 | 12.60    5.59 | 18.60    1.27
                0.80    0.76 |  6.80    1.27 | 12.80    5.08 | 18.80    1.27
                1.00    0.76 |  7.00    1.27 | 13.00    3.81 | 19.00    1.27
                1.20    0.76 |  7.20    1.27 | 13.20    3.05 | 19.20    1.02
                1.40    0.76 |  7.40    1.27 | 13.40    3.05 | 19.40    1.02
                1.60    0.76 |  7.60    1.27 | 13.60    3.05 | 19.60    1.02
                1.80    0.76 |  7.80    1.27 | 13.80    3.05 | 19.80    1.02
                2.00    0.76 |  8.00    1.27 | 14.00    3.05 | 20.00    1.02
                2.20    0.76 |  8.20    1.78 | 14.20    1.78 | 20.20    1.02
                2.40    0.76 |  8.40    1.78 | 14.40    1.78 | 20.40    1.02
                2.60    0.76 |  8.60    1.78 | 14.60    1.78 | 20.60    1.02
                2.80    0.76 |  8.80    1.78 | 14.80    1.78 | 20.80    1.02
                3.00    0.76 |  9.00    1.78 | 15.00    1.78 | 21.00    1.02
                3.20    0.76 |  9.20    1.78 | 15.20    1.78 | 21.20    0.76
                3.40    0.76 |  9.40    1.78 | 15.40    1.78 | 21.40    0.76
                3.60    0.76 |  9.60    1.78 | 15.60    1.78 | 21.60    0.76
                3.80    0.76 |  9.80    1.78 | 15.80    1.78 | 21.80    0.76
                4.00    0.76 | 10.00    1.78 | 16.00    1.78 | 22.00    0.76
                4.20    1.27 | 10.20    3.30 | 16.20    1.27 | 22.20    0.76
                4.40    1.27 | 10.40    3.30 | 16.40    1.27 | 22.40    0.76
                4.60    1.27 | 10.60    3.30 | 16.60    1.27 | 22.60    0.76
                4.80    1.27 | 10.80    3.30 | 16.80    1.27 | 22.80    0.76
                5.00    1.27 | 11.00    3.30 | 17.00    1.27 | 23.00    0.76
                5.20    1.27 | 11.20    4.57 | 17.20    1.27 | 23.20    0.76
                5.40    1.27 | 11.40    6.60 | 17.40    1.27 | 23.40    0.76
                5.60    1.27 | 11.60   15.24 | 17.60    1.27 | 23.60    0.76
                5.80    1.27 | 11.80   33.27 | 17.80    1.27 | 23.80    0.76
                6.00    1.27 | 12.00   69.60 | 18.00    1.27 | 24.00    0.76

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

--------------------
| CALIB            |
| STANDHYD (  0206)|   Area    (ha)=  38.60
|ID= 1 DT=12.0 min |   Total Imp(%)=  54.70   Dir. Conn.(%)=  23.20
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      21.11        17.49
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     507.28        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      69.60        64.60
                  over (min)      12.00        24.00
     Storage Coeff.  (min)=       7.82 (ii)   16.23 (ii)
     Unit Hyd. Tpeak (min)=      12.00        24.00
     Unit Hyd. peak  (cms)=       0.11         0.06
                                                        *TOTALS*
     PEAK FLOW       (cms)=       1.51         1.72          2.782 (iii)
     TIME TO PEAK    (hrs)=      12.00        12.20         12.00
     RUNOFF VOLUME    (mm)=      61.43        29.40         36.83
     TOTAL RAINFALL   (mm)=      62.43        62.43         62.43
     RUNOFF COEFFICIENT   =       0.98         0.47          0.59

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

--------------------
| ADD HYD  (  0225)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)     (cms)    (hrs)     (mm)
*** W A R N I N G :  HYDROGRAPH   0183 <ID= 1> IS DRY.
*** W A R N I N G :  HYDROGRAPH   0225 = HYDROGRAPH 0206
       ID1= 1 (  0183):     0.00   0.000     0.00     0.00
     + ID2= 2 (  0206):    38.60   2.782    12.00    36.83
       ==========================================================
       ID = 3 (  0225):    38.60   2.782    12.00    36.83

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD  (  0225)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)     (cms)    (hrs)     (mm)
       ID1= 3 (  0225):    38.60   2.782    12.00    36.83
     + ID2= 2 (  0227):     0.00   0.000    12.00    34.90
       ==========================================================
```

ID = 1 (0225): 38.60 2.783 12.00 36.83

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

READ STORM	Filename: C:\Users\jlysecki\AppData\Local\Temp\aad80675-a0b4-4fc2-876a-2640adc73013\fb5ff205
Ptotal= 62.43 mm	Comments: FIVE YR SCS STORM WITH A TWELVE MINUTE

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.20	0.76	6.20	1.27	12.20	12.19	18.20	1.27
0.40	0.76	6.40	1.27	12.40	7.62	18.40	1.27
0.60	0.76	6.60	1.27	12.60	5.59	18.60	1.27
0.80	0.76	6.80	1.27	12.80	5.08	18.80	1.27
1.00	0.76	7.00	1.27	13.00	3.81	19.00	1.27
1.20	0.76	7.20	1.27	13.20	3.05	19.20	1.02
1.40	0.76	7.40	1.27	13.40	3.05	19.40	1.02
1.60	0.76	7.60	1.27	13.60	3.05	19.60	1.02
1.80	0.76	7.80	1.27	13.80	3.05	19.80	1.02
2.00	0.76	8.00	1.27	14.00	3.05	20.00	1.02
2.20	0.76	8.20	1.78	14.20	1.78	20.20	1.02
2.40	0.76	8.40	1.78	14.40	1.78	20.40	1.02
2.60	0.76	8.60	1.78	14.60	1.78	20.60	1.02
2.80	0.76	8.80	1.78	14.80	1.78	20.80	1.02
3.00	0.76	9.00	1.78	15.00	1.78	21.00	1.02
3.20	0.76	9.20	1.78	15.20	1.78	21.20	0.76
3.40	0.76	9.40	1.78	15.40	1.78	21.40	0.76
3.60	0.76	9.60	1.78	15.60	1.78	21.60	0.76
3.80	0.76	9.80	1.78	15.80	1.78	21.80	0.76
4.00	0.76	10.00	1.78	16.00	1.78	22.00	0.76
4.20	1.27	10.20	3.30	16.20	1.27	22.20	0.76
4.40	1.27	10.40	3.30	16.40	1.27	22.40	0.76
4.60	1.27	10.60	3.30	16.60	1.27	22.60	0.76
4.80	1.27	10.80	3.30	16.80	1.27	22.80	0.76
5.00	1.27	11.00	3.30	17.00	1.27	23.00	0.76
5.20	1.27	11.20	4.57	17.20	1.27	23.20	0.76
5.40	1.27	11.40	6.60	17.40	1.27	23.40	0.76
5.60	1.27	11.60	15.24	17.60	1.27	23.60	0.76
5.80	1.27	11.80	33.27	17.80	1.27	23.80	0.76
6.00	1.27	12.00	69.60	18.00	1.27	24.00	0.76

CALIB	
STANDHYD (0209)	Area (ha)= 5.20
ID= 1 DT=12.0 min	Total Imp(%)= 31.60 Dir. Conn.(%)= 19.40

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	1.64	3.56	
Dep. Storage	(mm)=	1.00	1.50	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	186.19	40.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.	(mm/hr)=	69.60	35.98	
over	(min)	12.00	24.00	
Storage Coeff.	(min)=	4.29 (ii)	14.91 (ii)	
Unit Hyd. Tpeak	(min)=	12.00	24.00	
Unit Hyd. peak	(cms)=	0.13	0.06	
				TOTALS
PEAK FLOW	(cms)=	0.19	0.20	0.335 (iii)
TIME TO PEAK	(hrs)=	12.00	12.20	12.00
RUNOFF VOLUME	(mm)=	61.43	23.67	31.00
TOTAL RAINFALL	(mm)=	62.43	62.43	62.43
RUNOFF COEFFICIENT	=	0.98	0.38	0.50

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
YOU SHOULD CONSIDER SPLITTING THE AREA.

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

READ STORM	Filename: C:\Users\jlysecki\AppData\Local\Temp\aad80675-a0b4-4fc2-876a-2640adc73013\fb5ff205
Ptotal= 62.43 mm	Comments: FIVE YR SCS STORM WITH A TWELVE MINUTE

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.20	0.76	6.20	1.27	12.20	12.19	18.20	1.27
0.40	0.76	6.40	1.27	12.40	7.62	18.40	1.27
0.60	0.76	6.60	1.27	12.60	5.59	18.60	1.27
0.80	0.76	6.80	1.27	12.80	5.08	18.80	1.27
1.00	0.76	7.00	1.27	13.00	3.81	19.00	1.27
1.20	0.76	7.20	1.27	13.20	3.05	19.20	1.02
1.40	0.76	7.40	1.27	13.40	3.05	19.40	1.02
1.60	0.76	7.60	1.27	13.60	3.05	19.60	1.02
1.80	0.76	7.80	1.27	13.80	3.05	19.80	1.02
2.00	0.76	8.00	1.27	14.00	3.05	20.00	1.02
2.20	0.76	8.20	1.78	14.20	1.78	20.20	1.02
2.40	0.76	8.40	1.78	14.40	1.78	20.40	1.02
2.60	0.76	8.60	1.78	14.60	1.78	20.60	1.02
2.80	0.76	8.80	1.78	14.80	1.78	20.80	1.02
3.00	0.76	9.00	1.78	15.00	1.78	21.00	1.02
3.20	0.76	9.20	1.78	15.20	1.78	21.20	0.76
3.40	0.76	9.40	1.78	15.40	1.78	21.40	0.76
3.60	0.76	9.60	1.78	15.60	1.78	21.60	0.76
3.80	0.76	9.80	1.78	15.80	1.78	21.80	0.76
4.00	0.76	10.00	1.78	16.00	1.78	22.00	0.76
4.20	1.27	10.20	3.30	16.20	1.27	22.20	0.76
4.40	1.27	10.40	3.30	16.40	1.27	22.40	0.76
4.60	1.27	10.60	3.30	16.60	1.27	22.60	0.76
4.80	1.27	10.80	3.30	16.80	1.27	22.80	0.76
5.00	1.27	11.00	3.30	17.00	1.27	23.00	0.76
5.20	1.27	11.20	4.57	17.20	1.27	23.20	0.76
5.40	1.27	11.40	6.60	17.40	1.27	23.40	0.76
5.60	1.27	11.60	15.24	17.60	1.27	23.60	0.76
5.80	1.27	11.80	33.27	17.80	1.27	23.80	0.76
6.00	1.27	12.00	69.60	18.00	1.27	24.00	0.76

CALIB	
STANDHYD (0252)	Area (ha)= 1.44
ID= 1 DT=12.0 min	Total Imp(%)= 52.40 Dir. Conn.(%)= 20.10

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	0.75	0.69	
Dep. Storage	(mm)=	1.00	1.50	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	97.98	40.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.	(mm/hr)=	69.60	63.61	
over	(min)	12.00	12.00	
Storage Coeff.	(min)=	2.92 (ii)	11.37 (ii)	
Unit Hyd. Tpeak	(min)=	12.00	12.00	
Unit Hyd. peak	(cms)=	0.14	0.09	
				TOTALS
PEAK FLOW	(cms)=	0.06	0.09	0.147 (iii)
TIME TO PEAK	(hrs)=	12.00	12.00	12.00
RUNOFF VOLUME	(mm)=	61.43	29.24	35.70
TOTAL RAINFALL	(mm)=	62.43	62.43	62.43
RUNOFF COEFFICIENT	=	0.98	0.47	0.57

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)

```
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0261)|
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                        0.0000     0.0000    |  0.1470      0.0137
                        0.0530     0.0050    |  0.1700      0.0155
                        0.0700     0.0076    |  0.1900      0.0220
                        0.1150     0.0113    |  0.0000      0.0000

                                  AREA     QPEAK     TPEAK       R.V.
                                  (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0252)       1.440     0.147     12.00      35.70
   OUTFLOW: ID= 1 (  0261)       1.440     0.084     12.10      35.69

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 57.30
                  TIME SHIFT OF PEAK FLOW          (min)=  6.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0091

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

--------------------
| ADD HYD  (  0251)|
|  1 +  2 =  3     |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0209):     5.20    0.335    12.00    31.00
     + ID2= 2 (  0261):     1.44    0.084    12.10    35.69
       ================================================
       ID = 3 (  0251):     6.64    0.401    12.00    32.01

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0245)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                        0.0000     0.0000    |  0.3090      0.2876
                        0.0000     0.0000    |  0.3330      0.3838
                        0.1230     0.1102    |  0.3620      0.5200
                        0.2870     0.1971    |  0.0000      0.0000

                                  AREA     QPEAK     TPEAK       R.V.
                                  (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0251)       6.640     0.401     12.00      32.01
   OUTFLOW: ID= 1 (  0245)       6.640     0.096     12.80      31.98

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 23.89
                  TIME SHIFT OF PEAK FLOW          (min)= 48.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0858

--------------------------------------------------------------------------------
--------------------
| ROUTEPIPE(  0212)|     PIPE Number     =   1.00
| IN= 2---> OUT= 1 |     Diameter    (mm)=1650.00
| DT= 12.0 min     |     Length       (m)= 850.00
--------------------     Slope      (m/m)=  0.005
                         Manning n        =  0.013

     <----------------- TRAVEL TIME TABLE ------------------->
       DEPTH      VOLUME     FLOW RATE    VELOCITY    TRAV.TIME
         (m)     (cu.m.)       (cms)        (m/s)        min
        0.09    .367E+02        0.0         0.80        17.68
        0.17    .102E+03        0.1         1.25        11.33
        0.26    .184E+03        0.3         1.61         8.81
        0.35    .278E+03        0.6         1.91         7.41
        0.43    .382E+03        1.0         2.18         6.51
        0.52    .492E+03        1.4         2.41         5.88
        0.61    .608E+03        1.9         2.61         5.43
        0.69    .727E+03        2.4         2.79         5.08
        0.78    .848E+03        2.9         2.95         4.81
        0.87    .970E+03        3.5         3.08         4.60
        0.96    .109E+04        4.1         3.20         4.43
        1.04    .121E+04        4.7         3.29         4.31
        1.13    .133E+04        5.2         3.36         4.22
        1.22    .144E+04        5.8         3.41         4.15
        1.30    .154E+04        6.2         3.44         4.12
        1.39    .163E+04        6.6         3.43         4.13
        1.48    .172E+04        6.9         3.40         4.17
        1.56    .178E+04        6.9         3.31         4.28
        1.65    .182E+04        6.5         3.02         4.70

                                  <---- hydrograph ---->   <-pipe / channel->
                                  AREA    QPEAK    TPEAK   R.V.   MAX DEPTH  MAX VEL
                                  (ha)    (cms)    (hrs)   (mm)       (m)      (m/s)
   INFLOW : ID= 2 (  0245)       6.64     0.10    12.80   31.98      0.13      0.99
   OUTFLOW: ID= 1 (  0212)       6.64     0.09    13.10   31.98      0.13      0.98

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

--------------------
| ADD HYD  (  0211)|
|  1 +  2 =  3     |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0212):     6.64    0.094    13.10    31.98
     + ID2= 2 (  0225):    38.60    2.783    12.00    36.83
       ================================================
       ID = 3 (  0211):    45.24    2.810    12.00    36.12

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0255)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                        0.0000     0.0000    |  1.6250      1.2448
                        0.0190     0.1627    |  1.6630      1.2997
                        0.0360     0.4306    |  1.8430      1.5816
                        0.0480     0.7217    |  2.1300      2.1197
                        0.1330     0.7718    |  2.9680      2.2465
                        1.0390     0.9773    |  7.5380      2.5741

                                  AREA     QPEAK     TPEAK       R.V.
                                  (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0211)      45.240     2.810     12.00      36.12
   OUTFLOW: ID= 1 (  0255)      45.240     0.521     13.10      36.07

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 18.54
                  TIME SHIFT OF PEAK FLOW          (min)= 66.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.8602

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

      V    V   I    SSSSS  U   U    A    L              (v 5.1.2004)
      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)\Visual OTTHYMO 5.1\VO2\voin.dat
```

COLE ENGINEERING

Experience Enhancing Excellence

Output filename: C:\Users\jlysecki\AppData\Local\Civica\VH5\a379672b-db33-4372-b5e0-ba58a07d1417\c0ae392b-4dd0-4eeb-a73b-1b58ccae5ce5\sce
Summary filename: C:\Users\jlysecki\AppData\Local\Civica\VH5\a379672b-db33-4372-b5e0-ba58a07d1417\c0ae392b-4dd0-4eeb-a73b-1b58ccae5ce5\sce

DATE: 01/15/2020 TIME: 04:10:47

USER:

COMMENTS: _____

** SIMULATION : Run 03 **

READ STORM	Filename: C:\Users\jlysecki\AppData\Local\Temp\aad80675-a0b4-4fc2-876a-2640adc73013\975d2c25
Ptotal= 82.45 mm	Comments: TEN YR SCS STORM 24HR TWELVE MIN TIME ST

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.20	0.76	6.20	1.78	12.20	92.20	18.20	1.78
0.40	0.76	6.40	1.78	12.40	16.00	18.40	1.78
0.60	0.76	6.60	1.78	12.60	10.16	18.60	1.78
0.80	0.76	6.80	1.78	12.80	7.37	18.80	1.78
1.00	0.76	7.00	1.78	13.00	6.86	19.00	1.78
1.20	0.76	7.20	1.78	13.20	4.83	19.20	1.78
1.40	0.76	7.40	1.78	13.40	4.06	19.40	1.27
1.60	0.76	7.60	1.78	13.60	4.06	19.60	1.27
1.80	0.76	7.80	1.78	13.80	4.06	19.80	1.27
2.00	0.76	8.00	1.78	14.00	4.06	20.00	1.27
2.20	0.76	8.20	1.78	14.20	4.06	20.20	1.27
2.40	0.76	8.40	2.54	14.40	2.54	20.40	1.27
2.60	0.76	8.60	2.54	14.60	2.54	20.60	1.27
2.80	0.76	8.80	2.54	14.80	2.54	20.80	1.27
3.00	0.76	9.00	2.54	15.00	2.54	21.00	1.27
3.20	0.76	9.20	2.54	15.20	2.54	21.20	1.27
3.40	0.76	9.40	2.54	15.40	2.54	21.40	0.76
3.60	0.76	9.60	2.54	15.60	2.54	21.60	0.76
3.80	0.76	9.80	2.54	15.80	2.54	21.80	0.76
4.00	0.76	10.00	2.54	16.00	2.54	22.00	0.76
4.20	0.76	10.20	2.54	16.20	2.54	22.20	0.76
4.40	1.78	10.40	4.57	16.40	1.78	22.40	0.76
4.60	1.78	10.60	4.57	16.60	1.78	22.60	0.76
4.80	1.78	10.80	4.57	16.80	1.78	22.80	0.76
5.00	1.78	11.00	4.57	17.00	1.78	23.00	0.76
5.20	1.78	11.20	4.57	17.20	1.78	23.20	0.76
5.40	1.78	11.40	6.10	17.40	1.78	23.40	0.76
5.60	1.78	11.60	8.89	17.60	1.78	23.60	0.76
5.80	1.78	11.80	20.07	17.80	1.78	23.80	0.76
6.00	1.78	12.00	44.20	18.00	1.78	24.00	0.76

CALIB	
STANDHYD (0228)	Area (ha)= 12.56
ID= 1 DT=12.0 min	Total Imp(%)= 54.10 Dir. Conn.(%)= 25.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	6.79	5.77
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	289.37	40.00
Mannings n	=	0.013	0.250
Max.Eff.Inten.	(mm/hr)=	92.20	93.69
	over (min)	12.00	24.00
Storage Coeff.	(min)=	4.99 (ii)	12.24 (ii)
Unit Hyd. Tpeak	(min)=	12.00	24.00
Unit Hyd. peak	(cms)=	0.13	0.07

				TOTALS
PEAK FLOW	(cms)=	0.76	0.91	1.456 (iii)
TIME TO PEAK	(hrs)=	12.20	12.40	12.20
RUNOFF VOLUME	(mm)=	81.45	43.91	53.29
TOTAL RAINFALL	(mm)=	82.45	82.45	82.45
RUNOFF COEFFICIENT	=	0.99	0.53	0.65

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

READ STORM	Filename: C:\Users\jlysecki\AppData\Local\Temp\aad80675-a0b4-4fc2-876a-2640adc73013\975d2c25
Ptotal= 82.45 mm	Comments: TEN YR SCS STORM 24HR TWELVE MIN TIME ST

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.20	0.76	6.20	1.78	12.20	92.20	18.20	1.78
0.40	0.76	6.40	1.78	12.40	16.00	18.40	1.78
0.60	0.76	6.60	1.78	12.60	10.16	18.60	1.78
0.80	0.76	6.80	1.78	12.80	7.37	18.80	1.78
1.00	0.76	7.00	1.78	13.00	6.86	19.00	1.78
1.20	0.76	7.20	1.78	13.20	4.83	19.20	1.78
1.40	0.76	7.40	1.78	13.40	4.06	19.40	1.27
1.60	0.76	7.60	1.78	13.60	4.06	19.60	1.27
1.80	0.76	7.80	1.78	13.80	4.06	19.80	1.27
2.00	0.76	8.00	1.78	14.00	4.06	20.00	1.27
2.20	0.76	8.20	1.78	14.20	4.06	20.20	1.27
2.40	0.76	8.40	2.54	14.40	2.54	20.40	1.27
2.60	0.76	8.60	2.54	14.60	2.54	20.60	1.27
2.80	0.76	8.80	2.54	14.80	2.54	20.80	1.27
3.00	0.76	9.00	2.54	15.00	2.54	21.00	1.27
3.20	0.76	9.20	2.54	15.20	2.54	21.20	1.27
3.40	0.76	9.40	2.54	15.40	2.54	21.40	0.76
3.60	0.76	9.60	2.54	15.60	2.54	21.60	0.76
3.80	0.76	9.80	2.54	15.80	2.54	21.80	0.76
4.00	0.76	10.00	2.54	16.00	2.54	22.00	0.76
4.20	0.76	10.20	2.54	16.20	2.54	22.20	0.76
4.40	1.78	10.40	4.57	16.40	1.78	22.40	0.76
4.60	1.78	10.60	4.57	16.60	1.78	22.60	0.76
4.80	1.78	10.80	4.57	16.80	1.78	22.80	0.76
5.00	1.78	11.00	4.57	17.00	1.78	23.00	0.76
5.20	1.78	11.20	4.57	17.20	1.78	23.20	0.76
5.40	1.78	11.40	6.10	17.40	1.78	23.40	0.76
5.60	1.78	11.60	8.89	17.60	1.78	23.60	0.76
5.80	1.78	11.80	20.07	17.80	1.78	23.80	0.76
6.00	1.78	12.00	44.20	18.00	1.78	24.00	0.76

CALIB	
STANDHYD (0257)	Area (ha)= 3.10
ID= 1 DT=12.0 min	Total Imp(%)= 67.90 Dir. Conn.(%)= 42.90

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	2.10	1.00
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	143.76	40.00
Mannings n	=	0.013	0.250
Max.Eff.Inten.	(mm/hr)=	92.20	106.08
	over (min)	12.00	12.00

COLE ENGINEERING

Experience Enhancing Excellence

```
     Storage Coeff.  (min)=       3.28 (ii)   10.17 (ii)
     Unit Hyd. Tpeak (min)=      12.00        12.00
     Unit Hyd. peak  (cms)=       0.14         0.10
                                                *TOTALS*
     PEAK FLOW       (cms)=       0.34         0.23          0.568 (iii)
     TIME TO PEAK    (hrs)=      12.20        12.20         12.20
     RUNOFF VOLUME    (mm)=      81.45        45.69         61.02
     TOTAL RAINFALL   (mm)=      82.45        82.45         82.45
     RUNOFF COEFFICIENT   =       0.99         0.55          0.74

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
```

```
-------------------
| ADD HYD  (  0258)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
-------------------           (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0228):     12.56    1.456    12.20    53.29
     + ID2= 2 (  0257):      3.10    0.568    12.20    61.02
       ================================================
       ID = 3 (  0258):     15.66    2.023    12.20    54.82

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

```
-------------------
| RESERVOIR(  0243)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
-------------------       (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.1346     0.4241
                          0.0096     0.0421   |   0.1575     0.4697
                          0.0159     0.0886   |   0.1823     0.5165
                          0.0203     0.1399   |   0.2088     0.5647
                          0.0228     0.1768   |   0.2369     0.6142
                          0.0250     0.2150   |   0.2514     0.6394
                          0.0628     0.2544   |   0.2663     0.6650
                          0.0835     0.2950   |   0.2816     0.6910
                          0.0991     0.3368   |   0.2997     0.7172
                          0.1144     0.3798   |   0.3113     0.7439

                              AREA     QPEAK     TPEAK       R.V.
                              (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0258)   15.660     2.023     12.20      54.82
   OUTFLOW: ID= 1 (  0243)   15.660     0.177     13.40      54.75

                PEAK   FLOW   REDUCTION [Qout/Qin](%)=  8.77
                TIME SHIFT OF PEAK FLOW         (min)= 72.00
                MAXIMUM  STORAGE   USED        (ha.m.)=  0.5073
```

```
-------------------
| ROUTEPIPE(  0184)|     PIPE Number     =   1.00
| IN= 2---> OUT= 1 |     Diameter    (mm)=1650.00
| DT= 12.0 min     |     Length       (m)= 500.00
-------------------      Slope      (m/m)=  0.005
                         Manning n       =  0.013

     <----------------- TRAVEL TIME TABLE ------------------->
       DEPTH      VOLUME     FLOW RATE    VELOCITY    TRAV.TIME
         (m)     (cu.m.)       (cms)        (m/s)        min
        0.09    .216E+02         0.0         0.80        10.40
        0.17    .600E+02         0.1         1.25         6.67
        0.26    .108E+03         0.3         1.61         5.18
        0.35    .164E+03         0.6         1.91         4.36
        0.43    .225E+03         1.0         2.18         3.83
        0.52    .290E+03         1.4         2.41         3.46
        0.61    .358E+03         1.9         2.61         3.19
        0.69    .428E+03         2.4         2.79         2.99
        0.78    .499E+03         2.9         2.95         2.83
        0.87    .570E+03         3.5         3.08         2.70
        0.96    .642E+03         4.1         3.20         2.61
        1.04    .712E+03         4.7         3.29         2.53
        1.13    .780E+03         5.2         3.36         2.48
        1.22    .844E+03         5.8         3.41         2.44
        1.30    .905E+03         6.2         3.44         2.43
        1.39    .961E+03         6.6         3.43         2.43
        1.48    .101E+04         6.9         3.40         2.45
        1.56    .105E+04         6.9         3.31         2.52
        1.65    .107E+04         6.5         3.02         2.76

                                      <---- hydrograph ---->   <-pipe / channel->
                                 AREA    QPEAK    TPEAK   R.V.   MAX DEPTH  MAX VEL
                                 (ha)    (cms)    (hrs)   (mm)       (m)      (m/s)
     INFLOW : ID= 2 (  0243)   15.66     0.18    13.40   54.75      0.19      1.29
     OUTFLOW: ID= 1 (  0184)   15.66     0.18    13.60   54.75      0.19      1.29
```

```
-------------------
|    READ STORM    |    Filename: C:\Users\jlysecki\AppD
|                  |              ata\Local\Temp\
|                  |              aad80675-a0b4-4fc2-876a-2640adc73013\975d2c25
| Ptotal= 82.45 mm |    Comments: TEN YR SCS STORM 24HR TWELVE MIN TIME ST
-------------------
```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.20	0.76	6.20	1.78	12.20	92.20	18.20	1.78
0.40	0.76	6.40	1.78	12.40	16.00	18.40	1.78
0.60	0.76	6.60	1.78	12.60	10.16	18.60	1.78
0.80	0.76	6.80	1.78	12.80	7.37	18.80	1.78
1.00	0.76	7.00	1.78	13.00	6.86	19.00	1.78
1.20	0.76	7.20	1.78	13.20	4.83	19.20	1.78
1.40	0.76	7.40	1.78	13.40	4.06	19.40	1.27
1.60	0.76	7.60	1.78	13.60	4.06	19.60	1.27
1.80	0.76	7.80	1.78	13.80	4.06	19.80	1.27
2.00	0.76	8.00	1.78	14.00	4.06	20.00	1.27
2.20	0.76	8.20	1.78	14.20	4.06	20.20	1.27
2.40	0.76	8.40	2.54	14.40	2.54	20.40	1.27
2.60	0.76	8.60	2.54	14.60	2.54	20.60	1.27
2.80	0.76	8.80	2.54	14.80	2.54	20.80	1.27
3.00	0.76	9.00	2.54	15.00	2.54	21.00	1.27
3.20	0.76	9.20	2.54	15.20	2.54	21.20	1.27
3.40	0.76	9.40	2.54	15.40	2.54	21.40	0.76
3.60	0.76	9.60	2.54	15.60	2.54	21.60	0.76
3.80	0.76	9.80	2.54	15.80	2.54	21.80	0.76
4.00	0.76	10.00	2.54	16.00	2.54	22.00	0.76
4.20	0.76	10.20	2.54	16.20	2.54	22.20	0.76
4.40	1.78	10.40	4.57	16.40	1.78	22.40	0.76
4.60	1.78	10.60	4.57	16.60	1.78	22.60	0.76
4.80	1.78	10.80	4.57	16.80	1.78	22.80	0.76
5.00	1.78	11.00	4.57	17.00	1.78	23.00	0.76
5.20	1.78	11.20	4.57	17.20	1.78	23.20	0.76
5.40	1.78	11.40	6.10	17.40	1.78	23.40	0.76
5.60	1.78	11.60	8.89	17.60	1.78	23.60	0.76
5.80	1.78	11.80	20.07	17.80	1.78	23.80	0.76
6.00	1.78	12.00	44.20	18.00	1.78	24.00	0.76

```
-------------------
| CALIB            |
| STANDHYD (  0229)|   Area     (ha)=  12.13
|ID= 1 DT=12.0 min |   Total Imp(%)=  54.50   Dir. Conn.(%)=  19.70
-------------------

                                    IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=           6.61          5.52
     Dep. Storage     (mm)=           1.00          1.50
     Average Slope     (%)=           1.00          2.00
     Length            (m)=         284.37         40.00
     Mannings n             =         0.013         0.250

     Max.Eff.Inten.(mm/hr)=          92.20        104.88
               over (min)            12.00         12.00
     Storage Coeff.  (min)=           4.94 (ii)    11.87 (ii)
```

```
     Unit Hyd. Tpeak (min)=      12.00        12.00
     Unit Hyd. peak  (cms)=       0.13         0.09
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.58         1.20          1.780 (iii)
     TIME TO PEAK    (hrs)=      12.20        12.20         12.20
     RUNOFF VOLUME    (mm)=      81.45        45.52         52.60
     TOTAL RAINFALL   (mm)=      82.45        82.45         82.45
     RUNOFF COEFFICIENT   =       0.99         0.55          0.64

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
             YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

-------------------
| ADD HYD  (  0196)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0184):    15.66   0.177    13.60    54.75
     + ID2= 2 (  0229):    12.13   1.780    12.20    52.60
       ================================================
       ID = 3 (  0196):    27.79   1.824    12.20    53.81

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

-------------------
| RESERVOIR(  0256)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
-------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                         0.0000     0.0000   |   0.2761     0.3332
                         0.0090     0.0385   |   0.3101     0.3536
                         0.0147     0.0812   |   0.3454     0.3743
                         0.0199     0.1456   |   0.3818     0.3952
                         0.0210     0.1631   |   0.4194     0.4165
                         0.0987     0.2172   |   0.4581     0.4381
                         0.1306     0.2358   |   0.4979     0.4600
                         0.1761     0.2739   |   0.5806     0.5047
                         0.2120     0.2934   |   0.6234     0.5275
                         0.2433     0.3131   |   0.7121     0.5742

                                  AREA     QPEAK     TPEAK       R.V.
                                  (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0196)     27.790     1.824     12.20      53.81
   OUTFLOW: ID= 1 (  0256)     27.790     0.349     13.20      53.77

                PEAK   FLOW   REDUCTION [Qout/Qin](%)= 19.13
                TIME SHIFT OF PEAK FLOW         (min)= 60.00
                MAXIMUM  STORAGE   USED       (ha.m.)=  0.3770

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

-------------------
|    READ STORM    |    Filename: C:\Users\jlysecki\AppD
|                  |              ata\Local\Temp\
|                  |              aad80675-a0b4-4fc2-876a-2640adc73013\975d2c25
| Ptotal= 82.45 mm |    Comments: TEN YR SCS STORM 24HR TWELVE MIN TIME ST
-------------------
               TIME    RAIN |  TIME    RAIN |' TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'  hrs   mm/hr |   hrs   mm/hr
               0.20    0.76 |  6.20    1.78 | 12.20   92.20 | 18.20    1.78
               0.40    0.76 |  6.40    1.78 | 12.40   16.00 | 18.40    1.78
               0.60    0.76 |  6.60    1.78 | 12.60   10.16 | 18.60    1.78
               0.80    0.76 |  6.80    1.78 | 12.80    7.37 | 18.80    1.78
               1.00    0.76 |  7.00    1.78 | 13.00    6.86 | 19.00    1.78
               1.20    0.76 |  7.20    1.78 | 13.20    4.83 | 19.20    1.78
               1.40    0.76 |  7.40    1.78 | 13.40    4.06 | 19.40    1.27
               1.60    0.76 |  7.60    1.78 | 13.60    4.06 | 19.60    1.27
               1.80    0.76 |  7.80    1.78 | 13.80    4.06 | 19.80    1.27
               2.00    0.76 |  8.00    1.78 | 14.00    4.06 | 20.00    1.27
               2.20    0.76 |  8.20    1.78 | 14.20    4.06 | 20.20    1.27
               2.40    0.76 |  8.40    2.54 | 14.40    2.54 | 20.40    1.27
               2.60    0.76 |  8.60    2.54 | 14.60    2.54 | 20.60    1.27
               2.80    0.76 |  8.80    2.54 | 14.80    2.54 | 20.80    1.27
               3.00    0.76 |  9.00    2.54 | 15.00    2.54 | 21.00    1.27
               3.20    0.76 |  9.20    2.54 | 15.20    2.54 | 21.20    1.27
               3.40    0.76 |  9.40    2.54 | 15.40    2.54 | 21.40    0.76
               3.60    0.76 |  9.60    2.54 | 15.60    2.54 | 21.60    0.76
               3.80    0.76 |  9.80    2.54 | 15.80    2.54 | 21.80    0.76
               4.00    0.76 | 10.00    2.54 | 16.00    2.54 | 22.00    0.76
               4.20    0.76 | 10.20    2.54 | 16.20    2.54 | 22.20    0.76
               4.40    1.78 | 10.40    4.57 | 16.40    1.78 | 22.40    0.76
               4.60    1.78 | 10.60    4.57 | 16.60    1.78 | 22.60    0.76
               4.80    1.78 | 10.80    4.57 | 16.80    1.78 | 22.80    0.76
               5.00    1.78 | 11.00    4.57 | 17.00    1.78 | 23.00    0.76
               5.20    1.78 | 11.20    4.57 | 17.20    1.78 | 23.20    0.76
               5.40    1.78 | 11.40    6.10 | 17.40    1.78 | 23.40    0.76
               5.60    1.78 | 11.60    8.89 | 17.60    1.78 | 23.60    0.76
               5.80    1.78 | 11.80   20.07 | 17.80    1.78 | 23.80    0.76
               6.00    1.78 | 12.00   44.20 | 18.00    1.78 | 24.00    0.76

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

-------------------
| CALIB            |
| STANDHYD (  0230)|   Area     (ha)=  20.35
|ID= 1 DT=12.0 min |   Total Imp(%)=  53.70   Dir. Conn.(%)=  32.40
-------------------
                                IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      10.93          9.42
     Dep. Storage     (mm)=       1.00          1.50
     Average Slope     (%)=       1.00          2.00
     Length            (m)=     368.33         40.00
     Mannings n           =      0.013         0.250

     Max.Eff.Inten.(mm/hr)=      92.20         79.20
               over (min)        12.00         24.00
     Storage Coeff.  (min)=       5.77 (ii)    13.52 (ii)
     Unit Hyd. Tpeak (min)=      12.00         24.00
     Unit Hyd. peak  (cms)=       0.12          0.06
                                                        *TOTALS*
     PEAK FLOW       (cms)=       1.57          1.22          2.485 (iii)
     TIME TO PEAK    (hrs)=      12.20         12.40         12.20
     RUNOFF VOLUME    (mm)=      81.45         41.54         54.47
     TOTAL RAINFALL   (mm)=      82.45         82.45         82.45
     RUNOFF COEFFICIENT   =       0.99          0.50          0.66

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

-------------------
| ADD HYD  (  0224)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0230):    20.35   2.485    12.20    54.47
     + ID2= 2 (  0256):    27.79   0.349    13.20    53.77
       ================================================
       ID = 3 (  0224):    48.14   2.626    12.20    54.07

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

-------------------
| RESERVOIR(  0253)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
-------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
```

	0.0000	0.0000	0.6390	0.9848
	0.0270	0.1457	0.9700	1.2900
	0.0430	0.3152	1.1040	1.7480
	0.0530	0.4653	3.3100	1.9350
	0.3280	0.6677	11.3140	2.2662

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0224)	48.140	2.626	12.20	54.07
OUTFLOW: ID= 1 (0253)	48.140	0.454	14.40	54.04

PEAK FLOW REDUCTION [Qout/Qin](%)= 17.29
TIME SHIFT OF PEAK FLOW (min)=132.00
MAXIMUM STORAGE USED (ha.m.)= 0.7968

READ STORM | Filename: C:\Users\jlysecki\AppData\Local\Temp\aad80675-a0b4-4fc2-876a-2640adc73013\975d2c25
Ptotal= 82.45 mm | Comments: TEN YR SCS STORM 24HR TWELVE MIN TIME ST

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.20	0.76	6.20	1.78	12.20	92.20	18.20	1.78
0.40	0.76	6.40	1.78	12.40	16.00	18.40	1.78
0.60	0.76	6.60	1.78	12.60	10.16	18.60	1.78
0.80	0.76	6.80	1.78	12.80	7.37	18.80	1.78
1.00	0.76	7.00	1.78	13.00	6.86	19.00	1.78
1.20	0.76	7.20	1.78	13.20	4.83	19.20	1.78
1.40	0.76	7.40	1.78	13.40	4.06	19.40	1.27
1.60	0.76	7.60	1.78	13.60	4.06	19.60	1.27
1.80	0.76	7.80	1.78	13.80	4.06	19.80	1.27
2.00	0.76	8.00	1.78	14.00	4.06	20.00	1.27
2.20	0.76	8.20	1.78	14.20	4.06	20.20	1.27
2.40	0.76	8.40	2.54	14.40	2.54	20.40	1.27
2.60	0.76	8.60	2.54	14.60	2.54	20.60	1.27
2.80	0.76	8.80	2.54	14.80	2.54	20.80	1.27
3.00	0.76	9.00	2.54	15.00	2.54	21.00	1.27
3.20	0.76	9.20	2.54	15.20	2.54	21.20	1.27
3.40	0.76	9.40	2.54	15.40	2.54	21.40	0.76
3.60	0.76	9.60	2.54	15.60	2.54	21.60	0.76
3.80	0.76	9.80	2.54	15.80	2.54	21.80	0.76
4.00	0.76	10.00	2.54	16.00	2.54	22.00	0.76
4.20	0.76	10.20	2.54	16.20	2.54	22.20	0.76
4.40	1.78	10.40	4.57	16.40	1.78	22.40	0.76
4.60	1.78	10.60	4.57	16.60	1.78	22.60	0.76
4.80	1.78	10.80	4.57	16.80	1.78	22.80	0.76
5.00	1.78	11.00	4.57	17.00	1.78	23.00	0.76
5.20	1.78	11.20	4.57	17.20	1.78	23.20	0.76
5.40	1.78	11.40	6.10	17.40	1.78	23.40	0.76
5.60	1.78	11.60	8.89	17.60	1.78	23.60	0.76
5.80	1.78	11.80	20.07	17.80	1.78	23.80	0.76
6.00	1.78	12.00	44.20	18.00	1.78	24.00	0.76

CALIB
STANDHYD (0160) | Area (ha)= 1.30
ID= 1 DT=12.0 min | Total Imp(%)= 50.70 Dir. Conn.(%)= 22.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.66	0.64
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	93.09	40.00
Mannings n	=	0.013	0.250
Max.Eff.Inten.(mm/hr)=		92.20	89.33
over (min)		12.00	12.00
Storage Coeff. (min)=		2.53 (ii)	9.91 (ii)
Unit Hyd. Tpeak (min)=		12.00	12.00
Unit Hyd. peak (cms)=		0.14	0.10

TOTALS

PEAK FLOW	(cms)=	0.07	0.13	0.199 (iii)
TIME TO PEAK	(hrs)=	12.20	12.20	12.20
RUNOFF VOLUME	(mm)=	81.45	43.23	51.64
TOTAL RAINFALL	(mm)=	82.45	82.45	82.45
RUNOFF COEFFICIENT	=	0.99	0.52	0.63

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

DUHYD (0183)
Inlet Cap.= 0.152
#of Inlets= 1
Total(cms)= 0.2

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
TOTAL HYD.(ID= 1):	1.30	0.20	12.20	51.64
MAJOR SYS.(ID= 2):	0.07	0.05	12.20	51.64
MINOR SYS.(ID= 3):	1.23	0.15	12.20	51.64

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

READ STORM | Filename: C:\Users\jlysecki\AppData\Local\Temp\aad80675-a0b4-4fc2-876a-2640adc73013\975d2c25
Ptotal= 82.45 mm | Comments: TEN YR SCS STORM 24HR TWELVE MIN TIME ST

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.20	0.76	6.20	1.78	12.20	92.20	18.20	1.78
0.40	0.76	6.40	1.78	12.40	16.00	18.40	1.78
0.60	0.76	6.60	1.78	12.60	10.16	18.60	1.78
0.80	0.76	6.80	1.78	12.80	7.37	18.80	1.78
1.00	0.76	7.00	1.78	13.00	6.86	19.00	1.78
1.20	0.76	7.20	1.78	13.20	4.83	19.20	1.78
1.40	0.76	7.40	1.78	13.40	4.06	19.40	1.27
1.60	0.76	7.60	1.78	13.60	4.06	19.60	1.27
1.80	0.76	7.80	1.78	13.80	4.06	19.80	1.27
2.00	0.76	8.00	1.78	14.00	4.06	20.00	1.27
2.20	0.76	8.20	1.78	14.20	4.06	20.20	1.27
2.40	0.76	8.40	2.54	14.40	2.54	20.40	1.27
2.60	0.76	8.60	2.54	14.60	2.54	20.60	1.27
2.80	0.76	8.80	2.54	14.80	2.54	20.80	1.27
3.00	0.76	9.00	2.54	15.00	2.54	21.00	1.27
3.20	0.76	9.20	2.54	15.20	2.54	21.20	1.27
3.40	0.76	9.40	2.54	15.40	2.54	21.40	0.76
3.60	0.76	9.60	2.54	15.60	2.54	21.60	0.76
3.80	0.76	9.80	2.54	15.80	2.54	21.80	0.76
4.00	0.76	10.00	2.54	16.00	2.54	22.00	0.76
4.20	0.76	10.20	2.54	16.20	2.54	22.20	0.76
4.40	1.78	10.40	4.57	16.40	1.78	22.40	0.76
4.60	1.78	10.60	4.57	16.60	1.78	22.60	0.76
4.80	1.78	10.80	4.57	16.80	1.78	22.80	0.76
5.00	1.78	11.00	4.57	17.00	1.78	23.00	0.76
5.20	1.78	11.20	4.57	17.20	1.78	23.20	0.76
5.40	1.78	11.40	6.10	17.40	1.78	23.40	0.76
5.60	1.78	11.60	8.89	17.60	1.78	23.60	0.76
5.80	1.78	11.80	20.07	17.80	1.78	23.80	0.76
6.00	1.78	12.00	44.20	18.00	1.78	24.00	0.76

CALIB
STANDHYD (0193) | Area (ha)= 1.21
ID= 1 DT=12.0 min | Total Imp(%)= 49.30 Dir. Conn.(%)= 20.10

COLE ENGINEERING

Experience Enhancing Excellence

```
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.60         0.61
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      89.81        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      92.20        88.81
                 over (min)      12.00        12.00
     Storage Coeff.  (min)=       2.47 (ii)    9.88 (ii)
     Unit Hyd. Tpeak (min)=      12.00        12.00
     Unit Hyd. peak  (cms)=       0.14         0.10
                                                      *TOTALS*
     PEAK FLOW        (cms)=      0.06         0.12        0.183 (iii)
     TIME TO PEAK     (hrs)=     12.20        12.20        12.20
     RUNOFF VOLUME     (mm)=     81.45        43.15        50.85
     TOTAL RAINFALL    (mm)=     82.45        82.45        82.45
     RUNOFF COEFFICIENT   =      0.99         0.52         0.62

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  69.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| DUHYD     (  0227)|
| Inlet Cap.= 0.120|
| #of Inlets=     1|
| Total(cms)=   0.1|      AREA     QPEAK     TPEAK     R.V.
--------------------      (ha)      (cms)     (hrs)     (mm)
     TOTAL HYD.(ID= 1):   1.21      0.18     12.20    50.85
     ==========================================================
     MAJOR SYS.(ID= 2):   0.09      0.06     12.20    50.85
     MINOR SYS.(ID= 3):   1.12      0.12     12.20    50.85

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
|    READ STORM    |    Filename: C:\Users\jlysecki\AppD
|                  |              ata\Local\Temp\
|                  |              aad80675-a0b4-4fc2-876a-2640adc73013\975d2c25
| Ptotal= 82.45 mm |    Comments: TEN YR SCS STORM 24HR TWELVE MIN TIME ST
--------------------
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.20    0.76 |  6.20    1.78 | 12.20   92.20 | 18.20    1.78
                0.40    0.76 |  6.40    1.78 | 12.40   16.00 | 18.40    1.78
                0.60    0.76 |  6.60    1.78 | 12.60   10.16 | 18.60    1.78
                0.80    0.76 |  6.80    1.78 | 12.80    7.37 | 18.80    1.78
                1.00    0.76 |  7.00    1.78 | 13.00    6.86 | 19.00    1.78
                1.20    0.76 |  7.20    1.78 | 13.20    4.83 | 19.20    1.78
                1.40    0.76 |  7.40    1.78 | 13.40    4.06 | 19.40    1.27
                1.60    0.76 |  7.60    1.78 | 13.60    4.06 | 19.60    1.27
                1.80    0.76 |  7.80    1.78 | 13.80    4.06 | 19.80    1.27
                2.00    0.76 |  8.00    1.78 | 14.00    4.06 | 20.00    1.27
                2.20    0.76 |  8.20    1.78 | 14.20    4.06 | 20.20    1.27
                2.40    0.76 |  8.40    2.54 | 14.40    2.54 | 20.40    1.27
                2.60    0.76 |  8.60    2.54 | 14.60    2.54 | 20.60    1.27
                2.80    0.76 |  8.80    2.54 | 14.80    2.54 | 20.80    1.27
                3.00    0.76 |  9.00    2.54 | 15.00    2.54 | 21.00    1.27
                3.20    0.76 |  9.20    2.54 | 15.20    2.54 | 21.20    1.27
                3.40    0.76 |  9.40    2.54 | 15.40    2.54 | 21.40    0.76
                3.60    0.76 |  9.60    2.54 | 15.60    2.54 | 21.60    0.76
                3.80    0.76 |  9.80    2.54 | 15.80    2.54 | 21.80    0.76
                4.00    0.76 | 10.00    2.54 | 16.00    2.54 | 22.00    0.76
                4.20    0.76 | 10.20    2.54 | 16.20    2.54 | 22.20    0.76
                4.40    1.78 | 10.40    4.57 | 16.40    1.78 | 22.40    0.76
                4.60    1.78 | 10.60    4.57 | 16.60    1.78 | 22.60    0.76
                4.80    1.78 | 10.80    4.57 | 16.80    1.78 | 22.80    0.76
                5.00    1.78 | 11.00    4.57 | 17.00    1.78 | 23.00    0.76
                5.20    1.78 | 11.20    4.57 | 17.20    1.78 | 23.20    0.76
                5.40    1.78 | 11.40    6.10 | 17.40    1.78 | 23.40    0.76
                5.60    1.78 | 11.60    8.89 | 17.60    1.78 | 23.60    0.76
                5.80    1.78 | 11.80   20.07 | 17.80    1.78 | 23.80    0.76
                6.00    1.78 | 12.00   44.20 | 18.00    1.78 | 24.00    0.76

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

--------------------
| CALIB            |
| STANDHYD (  0206)|   Area     (ha)=  38.60
|ID= 1 DT=12.0 min |   Total Imp(%)=  54.70   Dir. Conn.(%)=  23.20
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      21.11        17.49
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     507.28        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      92.20        98.91
                 over (min)      12.00        24.00
     Storage Coeff.  (min)=       6.99 (ii)   14.08 (ii)
     Unit Hyd. Tpeak (min)=      12.00        24.00
     Unit Hyd. peak  (cms)=       0.12         0.06
                                                      *TOTALS*
     PEAK FLOW        (cms)=      2.06         2.79        4.160 (iii)
     TIME TO PEAK     (hrs)=     12.20        12.40        12.20
     RUNOFF VOLUME     (mm)=     81.45        44.68        53.21
     TOTAL RAINFALL    (mm)=     82.45        82.45        82.45
     RUNOFF COEFFICIENT   =      0.99         0.54         0.65

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  69.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

--------------------
| ADD HYD  (  0225)|
|   1 +  2 =  3    |        AREA    QPEAK    TPEAK     R.V.
--------------------      (ha)      (cms)    (hrs)     (mm)
       ID1= 1 (  0183):    0.07    0.047    12.20    51.64
     + ID2= 2 (  0206):   38.60    4.160    12.20    53.21
       ================================================
       ID = 3 (  0225):   38.67    4.208    12.20    53.21

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD  (  0225)|
|   3 +  2 =  1    |        AREA    QPEAK    TPEAK     R.V.
--------------------      (ha)      (cms)    (hrs)     (mm)
       ID1= 3 (  0225):   38.67    4.208    12.20    53.21
     + ID2= 2 (  0227):    0.09    0.063    12.20    50.85
       ================================================
       ID = 1 (  0225):   38.75    4.271    12.20    53.20

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
|    READ STORM    |    Filename: C:\Users\jlysecki\AppD
|                  |              ata\Local\Temp\
|                  |              aad80675-a0b4-4fc2-876a-2640adc73013\975d2c25
| Ptotal= 82.45 mm |    Comments: TEN YR SCS STORM 24HR TWELVE MIN TIME ST
--------------------
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
```

COLE ENGINEERING

Experience Enhancing Excellence

hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.20	0.76	6.20	1.78	12.20	92.20	18.20	1.78
0.40	0.76	6.40	1.78	12.40	16.00	18.40	1.78
0.60	0.76	6.60	1.78	12.60	10.16	18.60	1.78
0.80	0.76	6.80	1.78	12.80	7.37	18.80	1.78
1.00	0.76	7.00	1.78	13.00	6.86	19.00	1.78
1.20	0.76	7.20	1.78	13.20	4.83	19.20	1.78
1.40	0.76	7.40	1.78	13.40	4.06	19.40	1.27
1.60	0.76	7.60	1.78	13.60	4.06	19.60	1.27
1.80	0.76	7.80	1.78	13.80	4.06	19.80	1.27
2.00	0.76	8.00	1.78	14.00	4.06	20.00	1.27
2.20	0.76	8.20	1.78	14.20	4.06	20.20	1.27
2.40	0.76	8.40	2.54	14.40	2.54	20.40	1.27
2.60	0.76	8.60	2.54	14.60	2.54	20.60	1.27
2.80	0.76	8.80	2.54	14.80	2.54	20.80	1.27
3.00	0.76	9.00	2.54	15.00	2.54	21.00	1.27
3.20	0.76	9.20	2.54	15.20	2.54	21.20	1.27
3.40	0.76	9.40	2.54	15.40	2.54	21.40	0.76
3.60	0.76	9.60	2.54	15.60	2.54	21.60	0.76
3.80	0.76	9.80	2.54	15.80	2.54	21.80	0.76
4.00	0.76	10.00	2.54	16.00	2.54	22.00	0.76
4.20	0.76	10.20	2.54	16.20	2.54	22.20	0.76
4.40	1.78	10.40	4.57	16.40	1.78	22.40	0.76
4.60	1.78	10.60	4.57	16.60	1.78	22.60	0.76
4.80	1.78	10.80	4.57	16.80	1.78	22.80	0.76
5.00	1.78	11.00	4.57	17.00	1.78	23.00	0.76
5.20	1.78	11.20	4.57	17.20	1.78	23.20	0.76
5.40	1.78	11.40	6.10	17.40	1.78	23.40	0.76
5.60	1.78	11.60	8.89	17.60	1.78	23.60	0.76
5.80	1.78	11.80	20.07	17.80	1.78	23.80	0.76
6.00	1.78	12.00	44.20	18.00	1.78	24.00	0.76

CALIB	
STANDHYD (0209)	Area (ha)= 5.20
ID= 1 DT=12.0 min	Total Imp(%)= 31.60 Dir. Conn.(%)= 19.40

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	1.64	3.56	
Dep. Storage	(mm)=	1.00	1.50	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	186.19	40.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.	(mm/hr)=	92.20	56.88	
over	(min)	12.00	24.00	
Storage Coeff.	(min)=	3.83 (ii)	12.68 (ii)	
Unit Hyd. Tpeak	(min)=	12.00	24.00	
Unit Hyd. peak	(cms)=	0.14	0.07	
				TOTALS
PEAK FLOW	(cms)=	0.25	0.34	0.503 (iii)
TIME TO PEAK	(hrs)=	12.20	12.40	12.20
RUNOFF VOLUME	(mm)=	81.45	37.01	45.63
TOTAL RAINFALL	(mm)=	82.45	82.45	82.45
RUNOFF COEFFICIENT	=	0.99	0.45	0.55

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
YOU SHOULD CONSIDER SPLITTING THE AREA.

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

READ STORM	Filename: C:\Users\jlysecki\AppD
	ata\Local\Temp\
	aad80675-a0b4-4fc2-876a-2640adc73013\975d2c25
Ptotal= 82.45 mm	Comments: TEN YR SCS STORM 24HR TWELVE MIN TIME ST

TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN

CALIB	
STANDHYD (0252)	Area (ha)= 1.44
ID= 1 DT=12.0 min	Total Imp(%)= 52.40 Dir. Conn.(%)= 20.10

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	0.75	0.69	
Dep. Storage	(mm)=	1.00	1.50	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	97.98	40.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.	(mm/hr)=	92.20	97.48	
over	(min)	12.00	12.00	
Storage Coeff.	(min)=	2.61 (ii)	9.74 (ii)	
Unit Hyd. Tpeak	(min)=	12.00	12.00	
Unit Hyd. peak	(cms)=	0.14	0.10	
				TOTALS
PEAK FLOW	(cms)=	0.07	0.15	0.222 (iii)
TIME TO PEAK	(hrs)=	12.20	12.20	12.20
RUNOFF VOLUME	(mm)=	81.45	44.48	51.90
TOTAL RAINFALL	(mm)=	82.45	82.45	82.45
RUNOFF COEFFICIENT	=	0.99	0.54	0.63

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

RESERVOIR(0261)				
IN= 2---> OUT= 1				
DT= 5.0 min	OUTFLOW	STORAGE	OUTFLOW	STORAGE
	(cms)	(ha.m.)	(cms)	(ha.m.)
	0.0000	0.0000	0.1470	0.0137
	0.0530	0.0050	0.1700	0.0155
	0.0700	0.0076	0.1900	0.0220
	0.1150	0.0113	0.0000	0.0000

COLE ENGINEERING

Experience Enhancing Excellence

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0252)	1.440	0.222	12.20	51.90
OUTFLOW: ID= 1 (0261)	1.440	0.138	12.30	51.89

PEAK FLOW REDUCTION [Qout/Qin](%)= 62.11
TIME SHIFT OF PEAK FLOW (min)= 6.00
MAXIMUM STORAGE USED (ha.m.)= 0.0133

ADD HYD (0251)	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0209):	5.20	0.503	12.20	45.63
+ ID2= 2 (0261):	1.44	0.138	12.30	51.89
ID = 3 (0251):	6.64	0.611	12.20	46.99

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0245)	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
IN= 2---> OUT= 1	0.0000	0.0000	0.3090	0.2876
DT= 12.0 min	0.0000	0.0000	0.3330	0.3838
	0.1230	0.1102	0.3620	0.5200
	0.2870	0.1971	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0251)	6.640	0.611	12.20	46.99
OUTFLOW: ID= 1 (0245)	6.640	0.155	12.90	46.96

PEAK FLOW REDUCTION [Qout/Qin](%)= 25.45
TIME SHIFT OF PEAK FLOW (min)= 42.00
MAXIMUM STORAGE USED (ha.m.)= 0.1277

ROUTEPIPE(0212)		
IN= 2---> OUT= 1	Pipe Number	= 1.00
DT= 12.0 min	Diameter	(mm)=1650.00
	Length	(m)= 850.00
	Slope	(m/m)= 0.005
	Manning n	= 0.013

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

DEPTH (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME min
0.09	.367E+02	0.0	0.80	17.68
0.17	.102E+03	0.1	1.25	11.33
0.26	.184E+03	0.3	1.61	8.81
0.35	.278E+03	0.6	1.91	7.41
0.43	.382E+03	1.0	2.18	6.51
0.52	.492E+03	1.4	2.41	5.88
0.61	.608E+03	1.9	2.61	5.43
0.69	.727E+03	2.4	2.79	5.08
0.78	.848E+03	2.9	2.95	4.81
0.87	.970E+03	3.5	3.08	4.60
0.96	.109E+04	4.1	3.20	4.43
1.04	.121E+04	4.7	3.29	4.31
1.13	.133E+04	5.2	3.36	4.22
1.22	.144E+04	5.8	3.41	4.15
1.30	.154E+04	6.2	3.44	4.12
1.39	.163E+04	6.6	3.43	4.13
1.48	.172E+04	6.9	3.40	4.17
1.56	.178E+04	6.9	3.31	4.28
1.65	.182E+04	6.5	3.02	4.70

<---- hydrograph ----> <-pipe / channel->

AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	MAX DEPTH (m)	MAX VEL (m/s)
6.64	0.16	12.90	46.96	0.18	1.26
6.64	0.15	13.10	46.95	0.18	1.26

ADD HYD (0211)	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0212):	6.64	0.154	13.10	46.95
+ ID2= 2 (0225):	38.75	4.271	12.20	53.20
ID = 3 (0211):	45.39	4.314	12.20	52.29

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0255)	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
IN= 2---> OUT= 1	0.0000	0.0000	1.6250	1.2448
DT= 12.0 min	0.0190	0.1627	1.6630	1.2997
	0.0360	0.4306	1.8430	1.5816
	0.0480	0.7217	2.1300	2.1197
	0.1330	0.7718	2.9680	2.2465
	1.0390	0.9773	7.5380	2.5741

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0211)	45.395	4.314	12.20	52.29
OUTFLOW: ID= 1 (0255)	45.395	1.269	12.90	52.24

PEAK FLOW REDUCTION [Qout/Qin](%)= 29.42
TIME SHIFT OF PEAK FLOW (min)= 42.00
MAXIMUM STORAGE USED (ha.m.)= 1.0839

```
V    V   I    SSSSS  U   U    A    L              (v 5.1.2004)
V    V   I    SS     U   U   A A   L
 V  V    I     SS    U   U  AAAAA  L
 V  V    I      SS   U   U  A   A  L
  VV     I    SSSSS  UUUUU  A   A  LLLLL

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


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

Input filename: C:\Program Files (x86)\Visual OTTHYMO 5.1\VO2\voin.dat
Output filename: C:\Users\jlysecki\AppData\Local\Civica\VH5\a379672b-db33-4372-b5e0-ba58a07d1417\0049ae68-b26b-4d63-9af7-adcd871bf1b3\sce
Summary filename: C:\Users\jlysecki\AppData\Local\Civica\VH5\a379672b-db33-4372-b5e0-ba58a07d1417\0049ae68-b26b-4d63-9af7-adcd871bf1b3\sce

DATE: 01/15/2020 TIME: 04:10:47

USER:

COMMENTS: _____

```
------------------------------------------------------------------------------------------------------------------------
------
  ************************************************
  ** SIMULATION : Run 04                         **
  ************************************************


--------------------
|    READ STORM    |    Filename: C:\Users\jlysecki\AppD
|                  |              ata\Local\Temp\
|                  |              aad80675-a0b4-4fc2-876a-2640adc73013\4b569b1a
| Ptotal= 95.96 mm |    Comments: TWENTYFIVE YR SCS STORM WITH A TWELVE MI
--------------------
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.20    1.02 |  6.20    2.03 | 12.20   18.80 | 18.20    2.03
                0.40    1.02 |  6.40    2.03 | 12.40   11.68 | 18.40    2.03
                0.60    1.02 |  6.60    2.03 | 12.60    8.38 | 18.60    2.03
                0.80    1.02 |  6.80    2.03 | 12.80    8.13 | 18.80    2.03
                1.00    1.02 |  7.00    2.03 | 13.00    5.59 | 19.00    2.03
                1.20    1.02 |  7.20    2.03 | 13.20    4.83 | 19.20    1.52
                1.40    1.02 |  7.40    2.03 | 13.40    4.83 | 19.40    1.52
                1.60    1.02 |  7.60    2.03 | 13.60    4.83 | 19.60    1.52
                1.80    1.02 |  7.80    2.03 | 13.80    4.83 | 19.80    1.52
                2.00    1.02 |  8.00    2.03 | 14.00    4.83 | 20.00    1.52
                2.20    1.02 |  8.20    2.79 | 14.20    2.79 | 20.20    1.52
                2.40    1.02 |  8.40    2.79 | 14.40    2.79 | 20.40    1.52
                2.60    1.02 |  8.60    2.79 | 14.60    2.79 | 20.60    1.52
                2.80    1.02 |  8.80    2.79 | 14.80    2.79 | 20.80    1.52
                3.00    1.02 |  9.00    2.79 | 15.00    2.79 | 21.00    1.52
                3.20    1.02 |  9.20    2.79 | 15.20    2.79 | 21.20    1.02
                3.40    1.02 |  9.40    2.79 | 15.40    2.79 | 21.40    1.02
                3.60    1.02 |  9.60    2.79 | 15.60    2.79 | 21.60    1.02
                3.80    1.02 |  9.80    2.79 | 15.80    2.79 | 21.80    1.02
                4.00    1.02 | 10.00    2.79 | 16.00    2.79 | 22.00    1.02
                4.20    2.03 | 10.20    5.08 | 16.20    2.03 | 22.20    1.02
                4.40    2.03 | 10.40    5.08 | 16.40    2.03 | 22.40    1.02
                4.60    2.03 | 10.60    5.08 | 16.60    2.03 | 22.60    1.02
                4.80    2.03 | 10.80    5.08 | 16.80    2.03 | 22.80    1.02
                5.00    2.03 | 11.00    5.08 | 17.00    2.03 | 23.00    1.02
                5.20    2.03 | 11.20    7.11 | 17.20    2.03 | 23.20    1.02
                5.40    2.03 | 11.40   10.41 | 17.40    2.03 | 23.40    1.02
                5.60    2.03 | 11.60   23.37 | 17.60    2.03 | 23.60    1.02
                5.80    2.03 | 11.80   51.56 | 17.80    2.03 | 23.80    1.02
                6.00    2.03 | 12.00  107.44 | 18.00    2.03 | 24.00    1.02

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

--------------------
| CALIB            |
| STANDHYD (  0228)|   Area     (ha)=  12.56
|ID= 1 DT=12.0 min |   Total Imp(%)=  54.10   Dir. Conn.(%)=  25.00
--------------------
                                IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=        6.79          5.77
     Dep. Storage      (mm)=        1.00          1.50
     Average Slope      (%)=        1.00          2.00
     Length             (m)=      289.37         40.00
     Mannings n            =       0.013         0.250

     Max.Eff.Inten.(mm/hr)=      107.44        116.62
               over (min)         12.00         12.00
     Storage Coeff.  (min)=        4.70 (ii)    11.33 (ii)
     Unit Hyd. Tpeak (min)=       12.00         12.00
     Unit Hyd. peak  (cms)=        0.13          0.09
                                                    *TOTALS*
     PEAK FLOW       (cms)=        0.90          1.42          2.316 (iii)
     TIME TO PEAK    (hrs)=       12.00         12.00          12.00
     RUNOFF VOLUME    (mm)=       94.96         54.79          64.83
     TOTAL RAINFALL   (mm)=       95.96         95.96          95.96
     RUNOFF COEFFICIENT    =       0.99          0.57           0.68

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  69.0    Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
       (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

--------------------
|    READ STORM    |    Filename: C:\Users\jlysecki\AppD
|                  |              ata\Local\Temp\
|                  |              aad80675-a0b4-4fc2-876a-2640adc73013\4b569b1a
| Ptotal= 95.96 mm |    Comments: TWENTYFIVE YR SCS STORM WITH A TWELVE MI
--------------------
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.20    1.02 |  6.20    2.03 | 12.20   18.80 | 18.20    2.03
                0.40    1.02 |  6.40    2.03 | 12.40   11.68 | 18.40    2.03
                0.60    1.02 |  6.60    2.03 | 12.60    8.38 | 18.60    2.03
                0.80    1.02 |  6.80    2.03 | 12.80    8.13 | 18.80    2.03
                1.00    1.02 |  7.00    2.03 | 13.00    5.59 | 19.00    2.03
                1.20    1.02 |  7.20    2.03 | 13.20    4.83 | 19.20    1.52
                1.40    1.02 |  7.40    2.03 | 13.40    4.83 | 19.40    1.52
                1.60    1.02 |  7.60    2.03 | 13.60    4.83 | 19.60    1.52
                1.80    1.02 |  7.80    2.03 | 13.80    4.83 | 19.80    1.52
                2.00    1.02 |  8.00    2.03 | 14.00    4.83 | 20.00    1.52
                2.20    1.02 |  8.20    2.79 | 14.20    2.79 | 20.20    1.52
                2.40    1.02 |  8.40    2.79 | 14.40    2.79 | 20.40    1.52
                2.60    1.02 |  8.60    2.79 | 14.60    2.79 | 20.60    1.52
                2.80    1.02 |  8.80    2.79 | 14.80    2.79 | 20.80    1.52
                3.00    1.02 |  9.00    2.79 | 15.00    2.79 | 21.00    1.52
                3.20    1.02 |  9.20    2.79 | 15.20    2.79 | 21.20    1.02
                3.40    1.02 |  9.40    2.79 | 15.40    2.79 | 21.40    1.02
                3.60    1.02 |  9.60    2.79 | 15.60    2.79 | 21.60    1.02
                3.80    1.02 |  9.80    2.79 | 15.80    2.79 | 21.80    1.02
                4.00    1.02 | 10.00    2.79 | 16.00    2.79 | 22.00    1.02
                4.20    2.03 | 10.20    5.08 | 16.20    2.03 | 22.20    1.02
                4.40    2.03 | 10.40    5.08 | 16.40    2.03 | 22.40    1.02
                4.60    2.03 | 10.60    5.08 | 16.60    2.03 | 22.60    1.02
                4.80    2.03 | 10.80    5.08 | 16.80    2.03 | 22.80    1.02
                5.00    2.03 | 11.00    5.08 | 17.00    2.03 | 23.00    1.02
                5.20    2.03 | 11.20    7.11 | 17.20    2.03 | 23.20    1.02
                5.40    2.03 | 11.40   10.41 | 17.40    2.03 | 23.40    1.02
                5.60    2.03 | 11.60   23.37 | 17.60    2.03 | 23.60    1.02
                5.80    2.03 | 11.80   51.56 | 17.80    2.03 | 23.80    1.02
                6.00    2.03 | 12.00  107.44 | 18.00    2.03 | 24.00    1.02

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

--------------------
| CALIB            |
| STANDHYD (  0257)|   Area     (ha)=   3.10
|ID= 1 DT=12.0 min |   Total Imp(%)=  67.90   Dir. Conn.(%)=  42.90
--------------------
                                IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=        2.10          1.00
     Dep. Storage      (mm)=        1.00          1.50
     Average Slope      (%)=        1.00          2.00
     Length             (m)=      143.76         40.00
     Mannings n            =       0.013         0.250

     Max.Eff.Inten.(mm/hr)=      107.44        131.54
               over (min)         12.00         12.00
     Storage Coeff.  (min)=        3.09 (ii)     9.41 (ii)
     Unit Hyd. Tpeak (min)=       12.00         12.00
     Unit Hyd. peak  (cms)=        0.14          0.10
                                                    *TOTALS*
     PEAK FLOW       (cms)=        0.39          0.30          0.688 (iii)
     TIME TO PEAK    (hrs)=       12.00         12.00          12.00
     RUNOFF VOLUME    (mm)=       94.96         56.81          73.17
     TOTAL RAINFALL   (mm)=       95.96         95.96          95.96
     RUNOFF COEFFICIENT    =       0.99          0.59           0.76

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  69.0    Ia = Dep. Storage  (Above)
```

(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0258)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0228):		12.56	2.316	12.00	64.83
+ ID2= 2 (0257):		3.10	0.688	12.00	73.17
ID = 3 (0258):		15.66	3.004	12.00	66.48

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0243)				
IN= 2---> OUT= 1				
DT= 12.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.1346	0.4241
	0.0096	0.0421	0.1575	0.4697
	0.0159	0.0886	0.1823	0.5165
	0.0203	0.1399	0.2088	0.5647
	0.0228	0.1768	0.2369	0.6142
	0.0250	0.2150	0.2514	0.6394
	0.0628	0.2544	0.2663	0.6650
	0.0835	0.2950	0.2816	0.6910
	0.0991	0.3368	0.2997	0.7172
	0.1144	0.3798	0.3113	0.7439

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0258)	15.660	3.004	12.00	66.48
OUTFLOW: ID= 1 (0243)	15.660	0.234	13.00	66.41

PEAK FLOW REDUCTION [Qout/Qin](%)= 7.79
TIME SHIFT OF PEAK FLOW (min)= 60.00
MAXIMUM STORAGE USED (ha.m.)= 0.6089

ROUTEPIPE(0184)		
IN= 2---> OUT= 1	Pipe Number	= 1.00
DT= 12.0 min	Diameter	(mm)=1650.00
	Length	(m)= 500.00
	Slope	(m/m)= 0.005
	Manning n	= 0.013

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

DEPTH (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME min
0.09	.216E+02	0.0	0.80	10.40
0.17	.600E+02	0.1	1.25	6.67
0.26	.108E+03	0.3	1.61	5.18
0.35	.164E+03	0.6	1.91	4.36
0.43	.225E+03	1.0	2.18	3.83
0.52	.290E+03	1.4	2.41	3.46
0.61	.358E+03	1.9	2.61	3.19
0.69	.428E+03	2.4	2.79	2.99
0.78	.499E+03	2.9	2.95	2.83
0.87	.570E+03	3.5	3.08	2.70
0.96	.642E+03	4.1	3.20	2.61
1.04	.712E+03	4.7	3.29	2.53
1.13	.780E+03	5.2	3.36	2.48
1.22	.844E+03	5.8	3.41	2.44
1.30	.905E+03	6.2	3.44	2.43
1.39	.961E+03	6.6	3.43	2.43
1.48	.101E+04	6.9	3.40	2.45
1.56	.105E+04	6.9	3.31	2.52
1.65	.107E+04	6.5	3.02	2.76

<---- hydrograph ----> <-pipe / channel->

AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 2 (0243)	15.66	0.23	13.00	66.41	0.21	1.38
OUTFLOW: ID= 1 (0184)	15.66	0.23	13.20	66.41	0.21	1.38

READ STORM	Filename: C:\Users\jlysecki\AppData\Local\Temp\aad80675-a0b4-4fc2-876a-2640adc73013\4b569b1a
Ptotal= 95.96 mm	Comments: TWENTYFIVE YR SCS STORM WITH A TWELVE MI

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.20	1.02	6.20	2.03	12.20	18.80	18.20	2.03
0.40	1.02	6.40	2.03	12.40	11.68	18.40	2.03
0.60	1.02	6.60	2.03	12.60	8.38	18.60	2.03
0.80	1.02	6.80	2.03	12.80	8.13	18.80	2.03
1.00	1.02	7.00	2.03	13.00	5.59	19.00	2.03
1.20	1.02	7.20	2.03	13.20	4.83	19.20	1.52
1.40	1.02	7.40	2.03	13.40	4.83	19.40	1.52
1.60	1.02	7.60	2.03	13.60	4.83	19.60	1.52
1.80	1.02	7.80	2.03	13.80	4.83	19.80	1.52
2.00	1.02	8.00	2.03	14.00	4.83	20.00	1.52
2.20	1.02	8.20	2.79	14.20	2.79	20.20	1.52
2.40	1.02	8.40	2.79	14.40	2.79	20.40	1.52
2.60	1.02	8.60	2.79	14.60	2.79	20.60	1.52
2.80	1.02	8.80	2.79	14.80	2.79	20.80	1.52
3.00	1.02	9.00	2.79	15.00	2.79	21.00	1.52
3.20	1.02	9.20	2.79	15.20	2.79	21.20	1.02
3.40	1.02	9.40	2.79	15.40	2.79	21.40	1.02
3.60	1.02	9.60	2.79	15.60	2.79	21.60	1.02
3.80	1.02	9.80	2.79	15.80	2.79	21.80	1.02
4.00	1.02	10.00	2.79	16.00	2.79	22.00	1.02
4.20	2.03	10.20	5.08	16.20	2.03	22.20	1.02
4.40	2.03	10.40	5.08	16.40	2.03	22.40	1.02
4.60	2.03	10.60	5.08	16.60	2.03	22.60	1.02
4.80	2.03	10.80	5.08	16.80	2.03	22.80	1.02
5.00	2.03	11.00	5.08	17.00	2.03	23.00	1.02
5.20	2.03	11.20	7.11	17.20	2.03	23.20	1.02
5.40	2.03	11.40	10.41	17.40	2.03	23.40	1.02
5.60	2.03	11.60	23.37	17.60	2.03	23.60	1.02
5.80	2.03	11.80	51.56	17.80	2.03	23.80	1.02
6.00	2.03	12.00	107.44	18.00	2.03	24.00	1.02

CALIB				
STANDHYD (0229)	Area (ha)= 12.13			
ID= 1 DT=12.0 min	Total Imp(%)= 54.50	Dir. Conn.(%)= 19.70		
		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	6.61	5.52	
Dep. Storage	(mm)=	1.00	1.50	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	284.37	40.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.	(mm/hr)=	107.44	130.09	
over	(min)	12.00	12.00	
Storage Coeff.	(min)=	4.65 (ii)	11.00 (ii)	
Unit Hyd. Tpeak	(min)=	12.00	12.00	
Unit Hyd. peak	(cms)=	0.13	0.09	
				TOTALS
PEAK FLOW	(cms)=	0.68	1.53	2.218 (iii)
TIME TO PEAK	(hrs)=	12.00	12.00	12.00
RUNOFF VOLUME	(mm)=	94.96	56.62	64.17
TOTAL RAINFALL	(mm)=	95.96	95.96	95.96
RUNOFF COEFFICIENT	=	0.99	0.59	0.67

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
YOU SHOULD CONSIDER SPLITTING THE AREA.

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:

CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0196)		AREA	QPEAK	TPEAK	R.V.
		(ha)	(cms)	(hrs)	(mm)
1 + 2 = 3	ID1= 1 (0184):	15.66	0.234	13.20	66.41
	+ ID2= 2 (0229):	12.13	2.218	12.00	64.17
	ID = 3 (0196):	27.79	2.291	12.00	65.43

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0256)	OUTFLOW	STORAGE	OUTFLOW	STORAGE
IN= 2---> OUT= 1	(cms)	(ha.m.)	(cms)	(ha.m.)
DT= 12.0 min	0.0000	0.0000	0.2761	0.3332
	0.0090	0.0385	0.3101	0.3536
	0.0147	0.0812	0.3454	0.3743
	0.0199	0.1456	0.3818	0.3952
	0.0210	0.1631	0.4194	0.4165
	0.0987	0.2172	0.4581	0.4381
	0.1306	0.2358	0.4979	0.4600
	0.1761	0.2739	0.5806	0.5047
	0.2120	0.2934	0.6234	0.5275
	0.2433	0.3131	0.7121	0.5742

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0196)	27.790	2.291	12.00	65.43
OUTFLOW: ID= 1 (0256)	27.790	0.477	12.80	65.39

PEAK FLOW REDUCTION [Qout/Qin](%)= 20.82
TIME SHIFT OF PEAK FLOW (min)= 48.00
MAXIMUM STORAGE USED (ha.m.)= 0.4488

READ STORM	Filename: C:\Users\jlysecki\AppData\Local\Temp\aad80675-a0b4-4fc2-876a-2640adc73013\4b569b1a
Ptotal= 95.96 mm	Comments: TWENTYFIVE YR SCS STORM WITH A TWELVE MI

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.20	1.02	6.20	2.03	12.20	18.80	18.20	2.03
0.40	1.02	6.40	2.03	12.40	11.68	18.40	2.03
0.60	1.02	6.60	2.03	12.60	8.38	18.60	2.03
0.80	1.02	6.80	2.03	12.80	8.13	18.80	2.03
1.00	1.02	7.00	2.03	13.00	5.59	19.00	2.03
1.20	1.02	7.20	2.03	13.20	4.83	19.20	1.52
1.40	1.02	7.40	2.03	13.40	4.83	19.40	1.52
1.60	1.02	7.60	2.03	13.60	4.83	19.60	1.52
1.80	1.02	7.80	2.03	13.80	4.83	19.80	1.52
2.00	1.02	8.00	2.03	14.00	4.83	20.00	1.52
2.20	1.02	8.20	2.79	14.20	2.79	20.20	1.52
2.40	1.02	8.40	2.79	14.40	2.79	20.40	1.52
2.60	1.02	8.60	2.79	14.60	2.79	20.60	1.52
2.80	1.02	8.80	2.79	14.80	2.79	20.80	1.52
3.00	1.02	9.00	2.79	15.00	2.79	21.00	1.52
3.20	1.02	9.20	2.79	15.20	2.79	21.20	1.02
3.40	1.02	9.40	2.79	15.40	2.79	21.40	1.02
3.60	1.02	9.60	2.79	15.60	2.79	21.60	1.02
3.80	1.02	9.80	2.79	15.80	2.79	21.80	1.02
4.00	1.02	10.00	2.79	16.00	2.79	22.00	1.02
4.20	2.03	10.20	5.08	16.20	2.03	22.20	1.02
4.40	2.03	10.40	5.08	16.40	2.03	22.40	1.02
4.60	2.03	10.60	5.08	16.60	2.03	22.60	1.02
4.80	2.03	10.80	5.08	16.80	2.03	22.80	1.02
5.00	2.03	11.00	5.08	17.00	2.03	23.00	1.02
5.20	2.03	11.20	7.11	17.20	2.03	23.20	1.02
5.40	2.03	11.40	10.41	17.40	2.03	23.40	1.02
5.60	2.03	11.60	23.37	17.60	2.03	23.60	1.02
5.80	2.03	11.80	51.56	17.80	2.03	23.80	1.02
6.00	2.03	12.00	107.44	18.00	2.03	24.00	1.02

CALIB			
STANDHYD (0230)	Area (ha)= 20.35		
ID= 1 DT=12.0 min	Total Imp(%)= 53.70	Dir. Conn.(%)= 32.40	
		IMPERVIOUS	PERVIOUS (i)
	Surface Area (ha)=	10.93	9.42
	Dep. Storage (mm)=	1.00	1.50
	Average Slope (%)=	1.00	2.00
	Length (m)=	368.33	40.00
	Mannings n =	0.013	0.250
	Max.Eff.Inten.(mm/hr)=	107.44	99.09
	over (min)	12.00	24.00
	Storage Coeff. (min)=	5.43 (ii)	12.51 (ii)
	Unit Hyd. Tpeak (min)=	12.00	24.00
	Unit Hyd. peak (cms)=	0.13	0.07
			TOTALS
	PEAK FLOW (cms)=	1.85	1.56 3.035 (iii)
	TIME TO PEAK (hrs)=	12.00	12.20 12.00
	RUNOFF VOLUME (mm)=	94.96	52.07 65.96
	TOTAL RAINFALL (mm)=	95.96	95.96 95.96
	RUNOFF COEFFICIENT =	0.99	0.54 0.69

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0224)		AREA	QPEAK	TPEAK	R.V.
		(ha)	(cms)	(hrs)	(mm)
1 + 2 = 3	ID1= 1 (0230):	20.35	3.035	12.00	65.96
	+ ID2= 2 (0256):	27.79	0.477	12.80	65.39
	ID = 3 (0224):	48.14	3.258	12.00	65.64

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0253)	OUTFLOW	STORAGE	OUTFLOW	STORAGE
IN= 2---> OUT= 1	(cms)	(ha.m.)	(cms)	(ha.m.)
DT= 12.0 min	0.0000	0.0000	0.6390	0.9848
	0.0270	0.1457	0.9700	1.2900
	0.0430	0.3152	1.1040	1.7480
	0.0530	0.4653	3.3100	1.9350
	0.3280	0.6677	11.3140	2.2662

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0224)	48.140	3.258	12.00	65.64
OUTFLOW: ID= 1 (0253)	48.140	0.607	14.20	65.61

PEAK FLOW REDUCTION [Qout/Qin](%)= 18.63
TIME SHIFT OF PEAK FLOW (min)=132.00
MAXIMUM STORAGE USED (ha.m.)= 0.9526

COLE ENGINEERING

Experience Enhancing Excellence

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

-------------------
|    READ STORM    |    Filename: C:\Users\jlysecki\AppD
|                  |              ata\Local\Temp\
|                  |              aad80675-a0b4-4fc2-876a-2640adc73013\4b569b1a
| Ptotal= 95.96 mm |    Comments: TWENTYFIVE YR SCS STORM WITH A TWELVE MI
-------------------
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.20    1.02 |  6.20    2.03 | 12.20   18.80 | 18.20    2.03
                0.40    1.02 |  6.40    2.03 | 12.40   11.68 | 18.40    2.03
                0.60    1.02 |  6.60    2.03 | 12.60    8.38 | 18.60    2.03
                0.80    1.02 |  6.80    2.03 | 12.80    8.13 | 18.80    2.03
                1.00    1.02 |  7.00    2.03 | 13.00    5.59 | 19.00    2.03
                1.20    1.02 |  7.20    2.03 | 13.20    4.83 | 19.20    1.52
                1.40    1.02 |  7.40    2.03 | 13.40    4.83 | 19.40    1.52
                1.60    1.02 |  7.60    2.03 | 13.60    4.83 | 19.60    1.52
                1.80    1.02 |  7.80    2.03 | 13.80    4.83 | 19.80    1.52
                2.00    1.02 |  8.00    2.03 | 14.00    4.83 | 20.00    1.52
                2.20    1.02 |  8.20    2.79 | 14.20    2.79 | 20.20    1.52
                2.40    1.02 |  8.40    2.79 | 14.40    2.79 | 20.40    1.52
                2.60    1.02 |  8.60    2.79 | 14.60    2.79 | 20.60    1.52
                2.80    1.02 |  8.80    2.79 | 14.80    2.79 | 20.80    1.52
                3.00    1.02 |  9.00    2.79 | 15.00    2.79 | 21.00    1.52
                3.20    1.02 |  9.20    2.79 | 15.20    2.79 | 21.20    1.02
                3.40    1.02 |  9.40    2.79 | 15.40    2.79 | 21.40    1.02
                3.60    1.02 |  9.60    2.79 | 15.60    2.79 | 21.60    1.02
                3.80    1.02 |  9.80    2.79 | 15.80    2.79 | 21.80    1.02
                4.00    1.02 | 10.00    2.79 | 16.00    2.79 | 22.00    1.02
                4.20    2.03 | 10.20    5.08 | 16.20    2.03 | 22.20    1.02
                4.40    2.03 | 10.40    5.08 | 16.40    2.03 | 22.40    1.02
                4.60    2.03 | 10.60    5.08 | 16.60    2.03 | 22.60    1.02
                4.80    2.03 | 10.80    5.08 | 16.80    2.03 | 22.80    1.02
                5.00    2.03 | 11.00    5.08 | 17.00    2.03 | 23.00    1.02
                5.20    2.03 | 11.20    7.11 | 17.20    2.03 | 23.20    1.02
                5.40    2.03 | 11.40   10.41 | 17.40    2.03 | 23.40    1.02
                5.60    2.03 | 11.60   23.37 | 17.60    2.03 | 23.60    1.02
                5.80    2.03 | 11.80   51.56 | 17.80    2.03 | 23.80    1.02
                6.00    2.03 | 12.00  107.44 | 18.00    2.03 | 24.00    1.02

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

-------------------
| CALIB            |
| STANDHYD (  0160)|   Area     (ha)=   1.30
|ID= 1 DT=12.0 min |   Total Imp(%)=  50.70   Dir. Conn.(%)=  22.00
-------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.66          0.64
     Dep. Storage     (mm)=       1.00          1.50
     Average Slope     (%)=       1.00          2.00
     Length            (m)=      93.09         40.00
     Mannings n           =      0.013         0.250

     Max.Eff.Inten.(mm/hr)=     107.44        111.35
               over (min)        12.00         12.00
     Storage Coeff.  (min)=       2.38 (ii)     9.14 (ii)
     Unit Hyd. Tpeak (min)=      12.00         12.00
     Unit Hyd. peak  (cms)=       0.14          0.10
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.09          0.16          0.248 (iii)
     TIME TO PEAK    (hrs)=      12.00         12.00         12.00
     RUNOFF VOLUME    (mm)=      94.96         54.01         63.02
     TOTAL RAINFALL   (mm)=      95.96         95.96         95.96
     RUNOFF COEFFICIENT   =       0.99          0.56          0.66

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

-------------------
| DUHYD    (  0183)|
| Inlet Cap.= 0.152|
| #of Inlets=     1|
| Total(cms)=   0.2|      AREA     QPEAK     TPEAK     R.V.
-------------------      (ha)      (cms)     (hrs)     (mm)
     TOTAL HYD.(ID= 1):   1.30      0.25      12.00     63.02
     ==========================================================
     MAJOR SYS.(ID= 2):   0.11      0.10      12.00     63.02
     MINOR SYS.(ID= 3):   1.19      0.15      12.00     63.02

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

-------------------
|    READ STORM    |    Filename: C:\Users\jlysecki\AppD
|                  |              ata\Local\Temp\
|                  |              aad80675-a0b4-4fc2-876a-2640adc73013\4b569b1a
| Ptotal= 95.96 mm |    Comments: TWENTYFIVE YR SCS STORM WITH A TWELVE MI
-------------------
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.20    1.02 |  6.20    2.03 | 12.20   18.80 | 18.20    2.03
                0.40    1.02 |  6.40    2.03 | 12.40   11.68 | 18.40    2.03
                0.60    1.02 |  6.60    2.03 | 12.60    8.38 | 18.60    2.03
                0.80    1.02 |  6.80    2.03 | 12.80    8.13 | 18.80    2.03
                1.00    1.02 |  7.00    2.03 | 13.00    5.59 | 19.00    2.03
                1.20    1.02 |  7.20    2.03 | 13.20    4.83 | 19.20    1.52
                1.40    1.02 |  7.40    2.03 | 13.40    4.83 | 19.40    1.52
                1.60    1.02 |  7.60    2.03 | 13.60    4.83 | 19.60    1.52
                1.80    1.02 |  7.80    2.03 | 13.80    4.83 | 19.80    1.52
                2.00    1.02 |  8.00    2.03 | 14.00    4.83 | 20.00    1.52
                2.20    1.02 |  8.20    2.79 | 14.20    2.79 | 20.20    1.52
                2.40    1.02 |  8.40    2.79 | 14.40    2.79 | 20.40    1.52
                2.60    1.02 |  8.60    2.79 | 14.60    2.79 | 20.60    1.52
                2.80    1.02 |  8.80    2.79 | 14.80    2.79 | 20.80    1.52
                3.00    1.02 |  9.00    2.79 | 15.00    2.79 | 21.00    1.52
                3.20    1.02 |  9.20    2.79 | 15.20    2.79 | 21.20    1.02
                3.40    1.02 |  9.40    2.79 | 15.40    2.79 | 21.40    1.02
                3.60    1.02 |  9.60    2.79 | 15.60    2.79 | 21.60    1.02
                3.80    1.02 |  9.80    2.79 | 15.80    2.79 | 21.80    1.02
                4.00    1.02 | 10.00    2.79 | 16.00    2.79 | 22.00    1.02
                4.20    2.03 | 10.20    5.08 | 16.20    2.03 | 22.20    1.02
                4.40    2.03 | 10.40    5.08 | 16.40    2.03 | 22.40    1.02
                4.60    2.03 | 10.60    5.08 | 16.60    2.03 | 22.60    1.02
                4.80    2.03 | 10.80    5.08 | 16.80    2.03 | 22.80    1.02
                5.00    2.03 | 11.00    5.08 | 17.00    2.03 | 23.00    1.02
                5.20    2.03 | 11.20    7.11 | 17.20    2.03 | 23.20    1.02
                5.40    2.03 | 11.40   10.41 | 17.40    2.03 | 23.40    1.02
                5.60    2.03 | 11.60   23.37 | 17.60    2.03 | 23.60    1.02
                5.80    2.03 | 11.80   51.56 | 17.80    2.03 | 23.80    1.02
                6.00    2.03 | 12.00  107.44 | 18.00    2.03 | 24.00    1.02

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

-------------------
| CALIB            |
| STANDHYD (  0193)|   Area     (ha)=   1.21
|ID= 1 DT=12.0 min |   Total Imp(%)=  49.30   Dir. Conn.(%)=  20.10
-------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.60          0.61
     Dep. Storage     (mm)=       1.00          1.50
     Average Slope     (%)=       1.00          2.00
     Length            (m)=      89.81         40.00
     Mannings n           =      0.013         0.250

     Max.Eff.Inten.(mm/hr)=     107.44        110.72
               over (min)        12.00         12.00
     Storage Coeff.  (min)=       2.33 (ii)     9.10 (ii)
     Unit Hyd. Tpeak (min)=      12.00         12.00
     Unit Hyd. peak  (cms)=       0.14          0.10
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.07          0.15          0.227 (iii)
```

TIME TO PEAK	(hrs)=	12.00	12.00	12.00
RUNOFF VOLUME	(mm)=	94.96	53.92	62.16
TOTAL RAINFALL	(mm)=	95.96	95.96	95.96
RUNOFF COEFFICIENT	=	0.99	0.56	0.65

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

DUHYD (0227)				
Inlet Cap.= 0.120				
#of Inlets= 1				
Total(cms)= 0.1	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
TOTAL HYD.(ID= 1):	1.21	0.23	12.00	62.16
MAJOR SYS.(ID= 2):	0.12	0.11	12.00	62.16
MINOR SYS.(ID= 3):	1.09	0.12	12.00	62.16

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

READ STORM	Filename: C:\Users\jlysecki\AppData\Local\Temp\aad80675-a0b4-4fc2-876a-2640adc73013\4b569b1a
Ptotal= 95.96 mm	Comments: TWENTYFIVE YR SCS STORM WITH A TWELVE MI

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.20	1.02	6.20	2.03	12.20	18.80	18.20	2.03
0.40	1.02	6.40	2.03	12.40	11.68	18.40	2.03
0.60	1.02	6.60	2.03	12.60	8.38	18.60	2.03
0.80	1.02	6.80	2.03	12.80	8.13	18.80	2.03
1.00	1.02	7.00	2.03	13.00	5.59	19.00	2.03
1.20	1.02	7.20	2.03	13.20	4.83	19.20	1.52
1.40	1.02	7.40	2.03	13.40	4.83	19.40	1.52
1.60	1.02	7.60	2.03	13.60	4.83	19.60	1.52
1.80	1.02	7.80	2.03	13.80	4.83	19.80	1.52
2.00	1.02	8.00	2.03	14.00	4.83	20.00	1.52
2.20	1.02	8.20	2.79	14.20	2.79	20.20	1.52
2.40	1.02	8.40	2.79	14.40	2.79	20.40	1.52
2.60	1.02	8.60	2.79	14.60	2.79	20.60	1.52
2.80	1.02	8.80	2.79	14.80	2.79	20.80	1.52
3.00	1.02	9.00	2.79	15.00	2.79	21.00	1.52
3.20	1.02	9.20	2.79	15.20	2.79	21.20	1.02
3.40	1.02	9.40	2.79	15.40	2.79	21.40	1.02
3.60	1.02	9.60	2.79	15.60	2.79	21.60	1.02
3.80	1.02	9.80	2.79	15.80	2.79	21.80	1.02
4.00	1.02	10.00	2.79	16.00	2.79	22.00	1.02
4.20	2.03	10.20	5.08	16.20	2.03	22.20	1.02
4.40	2.03	10.40	5.08	16.40	2.03	22.40	1.02
4.60	2.03	10.60	5.08	16.60	2.03	22.60	1.02
4.80	2.03	10.80	5.08	16.80	2.03	22.80	1.02
5.00	2.03	11.00	5.08	17.00	2.03	23.00	1.02
5.20	2.03	11.20	7.11	17.20	2.03	23.20	1.02
5.40	2.03	11.40	10.41	17.40	2.03	23.40	1.02
5.60	2.03	11.60	23.37	17.60	2.03	23.60	1.02
5.80	2.03	11.80	51.56	17.80	2.03	23.80	1.02
6.00	2.03	12.00	107.44	18.00	2.03	24.00	1.02

CALIB		
STANDHYD (0206)	Area (ha)= 38.60	
ID= 1 DT=12.0 min	Total Imp(%)= 54.70	Dir. Conn.(%)= 23.20
	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	21.11	17.49
Dep. Storage (mm)=	1.00	1.50
Average Slope (%)=	1.00	2.00
Length (m)=	507.28	40.00
Mannings n =	0.013	0.250
Max.Eff.Inten.(mm/hr)=	107.44	122.92
over (min)	12.00	24.00
Storage Coeff. (min)=	6.58 (ii)	13.08 (ii)
Unit Hyd. Tpeak (min)=	12.00	24.00
Unit Hyd. peak (cms)=	0.12	0.07

				TOTALS
PEAK FLOW	(cms)=	2.43	3.55	5.140 (iii)
TIME TO PEAK	(hrs)=	12.00	12.20	12.00
RUNOFF VOLUME	(mm)=	94.96	55.67	64.78
TOTAL RAINFALL	(mm)=	95.96	95.96	95.96
RUNOFF COEFFICIENT	=	0.99	0.58	0.68

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0225)				
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0183):	0.11	0.096	12.00	63.02
+ ID2= 2 (0206):	38.60	5.140	12.00	64.78
ID = 3 (0225):	38.71	5.236	12.00	64.78

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0225)				
3 + 2 = 1	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 3 (0225):	38.71	5.236	12.00	64.78
+ ID2= 2 (0227):	0.12	0.107	12.00	62.16
ID = 1 (0225):	38.83	5.343	12.00	64.77

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

READ STORM	Filename: C:\Users\jlysecki\AppData\Local\Temp\aad80675-a0b4-4fc2-876a-2640adc73013\4b569b1a
Ptotal= 95.96 mm	Comments: TWENTYFIVE YR SCS STORM WITH A TWELVE MI

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.20	1.02	6.20	2.03	12.20	18.80	18.20	2.03
0.40	1.02	6.40	2.03	12.40	11.68	18.40	2.03
0.60	1.02	6.60	2.03	12.60	8.38	18.60	2.03
0.80	1.02	6.80	2.03	12.80	8.13	18.80	2.03
1.00	1.02	7.00	2.03	13.00	5.59	19.00	2.03
1.20	1.02	7.20	2.03	13.20	4.83	19.20	1.52
1.40	1.02	7.40	2.03	13.40	4.83	19.40	1.52
1.60	1.02	7.60	2.03	13.60	4.83	19.60	1.52
1.80	1.02	7.80	2.03	13.80	4.83	19.80	1.52
2.00	1.02	8.00	2.03	14.00	4.83	20.00	1.52
2.20	1.02	8.20	2.79	14.20	2.79	20.20	1.52
2.40	1.02	8.40	2.79	14.40	2.79	20.40	1.52
2.60	1.02	8.60	2.79	14.60	2.79	20.60	1.52
2.80	1.02	8.80	2.79	14.80	2.79	20.80	1.52

3.00	1.02	9.00	2.79	15.00	2.79	21.00	1.52
3.20	1.02	9.20	2.79	15.20	2.79	21.20	1.02
3.40	1.02	9.40	2.79	15.40	2.79	21.40	1.02
3.60	1.02	9.60	2.79	15.60	2.79	21.60	1.02
3.80	1.02	9.80	2.79	15.80	2.79	21.80	1.02
4.00	1.02	10.00	2.79	16.00	2.79	22.00	1.02
4.20	2.03	10.20	5.08	16.20	2.03	22.20	1.02
4.40	2.03	10.40	5.08	16.40	2.03	22.40	1.02
4.60	2.03	10.60	5.08	16.60	2.03	22.60	1.02
4.80	2.03	10.80	5.08	16.80	2.03	22.80	1.02
5.00	2.03	11.00	5.08	17.00	2.03	23.00	1.02
5.20	2.03	11.20	7.11	17.20	2.03	23.20	1.02
5.40	2.03	11.40	10.41	17.40	2.03	23.40	1.02
5.60	2.03	11.60	23.37	17.60	2.03	23.60	1.02
5.80	2.03	11.80	51.56	17.80	2.03	23.80	1.02
6.00	2.03	12.00	107.44	18.00	2.03	24.00	1.02

CALIB				
STANDHYD (0209)	Area (ha)= 5.20			
ID= 1 DT=12.0 min	Total Imp(%)= 31.60	Dir. Conn.(%)= 19.40		
		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	1.64	3.56	
Dep. Storage	(mm)=	1.00	1.50	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	186.19	40.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.	(mm/hr)=	107.44	71.86	
over	(min)	12.00	12.00	
Storage Coeff.	(min)=	3.60 (ii)	11.66 (ii)	
Unit Hyd. Tpeak	(min)=	12.00	12.00	
Unit Hyd. peak	(cms)=	0.14	0.09	
				TOTALS
PEAK FLOW	(cms)=	0.30	0.53	0.825 (iii)
TIME TO PEAK	(hrs)=	12.00	12.00	12.00
RUNOFF VOLUME	(mm)=	94.96	46.81	56.15
TOTAL RAINFALL	(mm)=	95.96	95.96	95.96
RUNOFF COEFFICIENT	=	0.99	0.49	0.59

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
YOU SHOULD CONSIDER SPLITTING THE AREA.

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

READ STORM	Filename: C:\Users\jlysecki\AppData\Local\Temp\aad80675-a0b4-4fc2-876a-2640adc73013\4b569b1a
Ptotal= 95.96 mm	Comments: TWENTYFIVE YR SCS STORM WITH A TWELVE MI

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.20	1.02	6.20	2.03	12.20	18.80	18.20	2.03
0.40	1.02	6.40	2.03	12.40	11.68	18.40	2.03
0.60	1.02	6.60	2.03	12.60	8.38	18.60	2.03
0.80	1.02	6.80	2.03	12.80	8.13	18.80	2.03
1.00	1.02	7.00	2.03	13.00	5.59	19.00	2.03
1.20	1.02	7.20	2.03	13.20	4.83	19.20	1.52
1.40	1.02	7.40	2.03	13.40	4.83	19.40	1.52
1.60	1.02	7.60	2.03	13.60	4.83	19.60	1.52
1.80	1.02	7.80	2.03	13.80	4.83	19.80	1.52
2.00	1.02	8.00	2.03	14.00	4.83	20.00	1.52
2.20	1.02	8.20	2.79	14.20	2.79	20.20	1.52
2.40	1.02	8.40	2.79	14.40	2.79	20.40	1.52
2.60	1.02	8.60	2.79	14.60	2.79	20.60	1.52
2.80	1.02	8.80	2.79	14.80	2.79	20.80	1.52
3.00	1.02	9.00	2.79	15.00	2.79	21.00	1.52
3.20	1.02	9.20	2.79	15.20	2.79	21.20	1.02
3.40	1.02	9.40	2.79	15.40	2.79	21.40	1.02
3.60	1.02	9.60	2.79	15.60	2.79	21.60	1.02
3.80	1.02	9.80	2.79	15.80	2.79	21.80	1.02
4.00	1.02	10.00	2.79	16.00	2.79	22.00	1.02
4.20	2.03	10.20	5.08	16.20	2.03	22.20	1.02
4.40	2.03	10.40	5.08	16.40	2.03	22.40	1.02
4.60	2.03	10.60	5.08	16.60	2.03	22.60	1.02
4.80	2.03	10.80	5.08	16.80	2.03	22.80	1.02
5.00	2.03	11.00	5.08	17.00	2.03	23.00	1.02
5.20	2.03	11.20	7.11	17.20	2.03	23.20	1.02
5.40	2.03	11.40	10.41	17.40	2.03	23.40	1.02
5.60	2.03	11.60	23.37	17.60	2.03	23.60	1.02
5.80	2.03	11.80	51.56	17.80	2.03	23.80	1.02
6.00	2.03	12.00	107.44	18.00	2.03	24.00	1.02

CALIB				
STANDHYD (0252)	Area (ha)= 1.44			
ID= 1 DT=12.0 min	Total Imp(%)= 52.40	Dir. Conn.(%)= 20.10		
		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	0.75	0.69	
Dep. Storage	(mm)=	1.00	1.50	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	97.98	40.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.	(mm/hr)=	107.44	121.19	
over	(min)	12.00	12.00	
Storage Coeff.	(min)=	2.45 (ii)	8.99 (ii)	
Unit Hyd. Tpeak	(min)=	12.00	12.00	
Unit Hyd. peak	(cms)=	0.14	0.10	
				TOTALS
PEAK FLOW	(cms)=	0.09	0.19	0.276 (iii)
TIME TO PEAK	(hrs)=	12.00	12.00	12.00
RUNOFF VOLUME	(mm)=	94.96	55.43	63.37
TOTAL RAINFALL	(mm)=	95.96	95.96	95.96
RUNOFF COEFFICIENT	=	0.99	0.58	0.66

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

RESERVOIR(0261)				
IN= 2---> OUT= 1				
DT= 5.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.1470	0.0137
	0.0530	0.0050	0.1700	0.0155
	0.0700	0.0076	0.1900	0.0220
	0.1150	0.0113	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0252)	1.440	0.276	12.00	63.37
OUTFLOW: ID= 1 (0261)	1.440	0.171	12.10	63.36

PEAK FLOW REDUCTION [Qout/Qin](%)= 62.05
TIME SHIFT OF PEAK FLOW (min)= 6.00
MAXIMUM STORAGE USED (ha.m.)= 0.0162

ADD HYD (0251)

COLE ENGINEERING

Experience Enhancing Excellence

```
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0209):     5.20   0.825    12.00    56.15
     + ID2= 2 (  0261):     1.44   0.171    12.10    63.36
       ================================================
       ID = 3 (  0251):     6.64   0.966    12.00    57.71

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
-------------------
| RESERVOIR(  0245)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
-------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                         0.0000     0.0000   |   0.3090     0.2876
                         0.0000     0.0000   |   0.3330     0.3838
                         0.1230     0.1102   |   0.3620     0.5200
                         0.2870     0.1971   |   0.0000     0.0000

                              AREA     QPEAK     TPEAK       R.V.
                              (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0251)     6.640     0.966     12.00      57.71
   OUTFLOW: ID= 1 (  0245)     6.640     0.207     12.60      57.68

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 21.39
                  TIME SHIFT OF PEAK FLOW         (min)= 36.00
                  MAXIMUM  STORAGE   USED        (ha.m.)=  0.1548

--------------------------------------------------------------------------------
-------------------
| ROUTEPIPE(  0212)|     PIPE Number     =   1.00
| IN= 2---> OUT= 1 |     Diameter    (mm)=1650.00
| DT= 12.0 min     |     Length       (m)= 850.00
-------------------      Slope      (m/m)=  0.005
                         Manning n        =  0.013

     <----------------- TRAVEL TIME TABLE ------------------->
       DEPTH      VOLUME     FLOW RATE    VELOCITY    TRAV.TIME
        (m)      (cu.m.)       (cms)        (m/s)        min
       0.09     .367E+02        0.0         0.80        17.68
       0.17     .102E+03        0.1         1.25        11.33
       0.26     .184E+03        0.3         1.61         8.81
       0.35     .278E+03        0.6         1.91         7.41
       0.43     .382E+03        1.0         2.18         6.51
       0.52     .492E+03        1.4         2.41         5.88
       0.61     .608E+03        1.9         2.61         5.43
       0.69     .727E+03        2.4         2.79         5.08
       0.78     .848E+03        2.9         2.95         4.81
       0.87     .970E+03        3.5         3.08         4.60
       0.96     .109E+04        4.1         3.20         4.43
       1.04     .121E+04        4.7         3.29         4.31
       1.13     .133E+04        5.2         3.36         4.22
       1.22     .144E+04        5.8         3.41         4.15
       1.30     .154E+04        6.2         3.44         4.12
       1.39     .163E+04        6.6         3.43         4.13
       1.48     .172E+04        6.9         3.40         4.17
       1.56     .178E+04        6.9         3.31         4.28
       1.65     .182E+04        6.5         3.02         4.70
                                  <---- hydrograph ---->   <-pipe / channel->
                               AREA    QPEAK    TPEAK    R.V.    MAX DEPTH  MAX VEL
                               (ha)    (cms)    (hrs)    (mm)       (m)       (m/s)
   INFLOW : ID= 2 (  0245)    6.64     0.21    12.60   57.68      0.20       1.33
   OUTFLOW: ID= 1 (  0212)    6.64     0.20    12.80   57.68      0.20       1.33


--------------------------------------------------------------------------------
-------------------
| ADD HYD  (  0211)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0212):     6.64   0.203    12.80    57.68
     + ID2= 2 (  0225):    38.83   5.343    12.00    64.77
       ================================================
       ID = 3 (  0211):    45.47   5.406    12.00    63.73

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
-------------------
| RESERVOIR(  0255)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
-------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                         0.0000     0.0000   |   1.6250     1.2448
                         0.0190     0.1627   |   1.6630     1.2997
                         0.0360     0.4306   |   1.8430     1.5816
                         0.0480     0.7217   |   2.1300     2.1197
                         0.1330     0.7718   |   2.9680     2.2465
                         1.0390     0.9773   |   7.5380     2.5741

                              AREA     QPEAK     TPEAK       R.V.
                              (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0211)    45.473     5.406     12.00      63.73
   OUTFLOW: ID= 1 (  0255)    45.473     1.647     12.60      63.69

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 30.47
                  TIME SHIFT OF PEAK FLOW         (min)= 36.00
                  MAXIMUM  STORAGE   USED        (ha.m.)=  1.2773

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

       V    V   I    SSSSS  U   U    A    L              (v 5.1.2004)
       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)\Visual OTTHYMO 5.1\VO2\voin.dat
  Output  filename: C:\Users\jlysecki\AppData\Local\Civica\VH5\a379672b-db33-4372-b5e0-
ba58a07d1417\06906fc5-14e1-4a79-ac02-0f6daa9448ea\sce
  Summary filename: C:\Users\jlysecki\AppData\Local\Civica\VH5\a379672b-db33-4372-b5e0-
ba58a07d1417\06906fc5-14e1-4a79-ac02-0f6daa9448ea\sce


DATE: 01/15/2020                          TIME: 04:10:47

USER:


COMMENTS: _____


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


-------------------
|    READ STORM    |    Filename: C:\Users\jlysecki\AppD
|                  |              ata\Local\Temp\
|                  |              aad80675-a0b4-4fc2-876a-2640adc73013\35bb3c6a
| Ptotal=108.06 mm |    Comments: FIFTY YR SCS STORM 12 MIN TIME STEP 24 H
-------------------
```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.20	1.10	6.20	2.20	12.20	22.04	18.20	2.20
0.40	1.10	6.40	2.20	12.40	13.78	18.40	2.20
0.60	1.10	6.60	2.20	12.60	9.92	18.60	2.20
0.80	1.10	6.80	2.20	12.80	9.37	18.80	2.20
1.00	1.10	7.00	2.20	13.00	6.61	19.00	2.20
1.20	1.10	7.20	2.20	13.20	5.51	19.20	1.65
1.40	1.10	7.40	2.20	13.40	5.51	19.40	1.65
1.60	1.10	7.60	2.20	13.60	5.51	19.60	1.65
1.80	1.10	7.80	2.20	13.80	5.51	19.80	1.65
2.00	1.10	8.00	2.20	14.00	5.51	20.00	1.65
2.20	1.10	8.20	3.31	14.20	3.31	20.20	1.65
2.40	1.10	8.40	3.31	14.40	3.31	20.40	1.65
2.60	1.10	8.60	3.31	14.60	3.31	20.60	1.65
2.80	1.10	8.80	3.31	14.80	3.31	20.80	1.65
3.00	1.10	9.00	3.31	15.00	3.31	21.00	1.65
3.20	1.10	9.20	3.31	15.20	3.31	21.20	1.10
3.40	1.10	9.40	3.31	15.40	3.31	21.40	1.10
3.60	1.10	9.60	3.31	15.60	3.31	21.60	1.10
3.80	1.10	9.80	3.31	15.80	3.31	21.80	1.10
4.00	1.10	10.00	3.31	16.00	3.31	22.00	1.10
4.20	2.20	10.20	6.05	16.20	2.20	22.20	1.10
4.40	2.20	10.40	6.05	16.40	2.20	22.40	1.10
4.60	2.20	10.60	6.05	16.60	2.20	22.60	1.10
4.80	2.20	10.80	6.05	16.80	2.20	22.80	1.10
5.00	2.20	11.00	6.05	17.00	2.20	23.00	1.10
5.20	2.20	11.20	8.26	17.20	2.20	23.20	1.10
5.40	2.20	11.40	12.12	17.40	2.20	23.40	1.10
5.60	2.20	11.60	27.55	17.60	2.20	23.60	1.10
5.80	2.20	11.80	60.61	17.80	2.20	23.80	1.10
6.00	2.20	12.00	114.06	18.00	2.20	24.00	1.10

CALIB	
STANDHYD (0228)	Area (ha)= 12.56
ID= 1 DT=12.0 min	Total Imp(%)= 54.10 Dir. Conn.(%)= 25.00

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	6.79	5.77	
Dep. Storage	(mm)=	1.00	1.50	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	289.37	40.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.	(mm/hr)=	114.06	130.36	
over	(min)	12.00	12.00	
Storage Coeff.	(min)=	4.59 (ii)	10.93 (ii)	
Unit Hyd. Tpeak	(min)=	12.00	12.00	
Unit Hyd. peak	(cms)=	0.13	0.09	
				TOTALS
PEAK FLOW	(cms)=	0.96	1.64	2.595 (iii)
TIME TO PEAK	(hrs)=	12.00	12.00	12.00
RUNOFF VOLUME	(mm)=	107.06	64.87	75.41
TOTAL RAINFALL	(mm)=	108.06	108.06	108.06
RUNOFF COEFFICIENT	=	0.99	0.60	0.70

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

READ STORM	Filename: C:\Users\jlysecki\AppD
	ata\Local\Temp\
	aad80675-a0b4-4fc2-876a-2640adc73013\35bb3c6a
Ptotal=108.06 mm	Comments: FIFTY YR SCS STORM 12 MIN TIME STEP 24 H

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.20	1.10	6.20	2.20	12.20	22.04	18.20	2.20
0.40	1.10	6.40	2.20	12.40	13.78	18.40	2.20
0.60	1.10	6.60	2.20	12.60	9.92	18.60	2.20
0.80	1.10	6.80	2.20	12.80	9.37	18.80	2.20
1.00	1.10	7.00	2.20	13.00	6.61	19.00	2.20
1.20	1.10	7.20	2.20	13.20	5.51	19.20	1.65
1.40	1.10	7.40	2.20	13.40	5.51	19.40	1.65
1.60	1.10	7.60	2.20	13.60	5.51	19.60	1.65
1.80	1.10	7.80	2.20	13.80	5.51	19.80	1.65
2.00	1.10	8.00	2.20	14.00	5.51	20.00	1.65
2.20	1.10	8.20	3.31	14.20	3.31	20.20	1.65
2.40	1.10	8.40	3.31	14.40	3.31	20.40	1.65
2.60	1.10	8.60	3.31	14.60	3.31	20.60	1.65
2.80	1.10	8.80	3.31	14.80	3.31	20.80	1.65
3.00	1.10	9.00	3.31	15.00	3.31	21.00	1.65
3.20	1.10	9.20	3.31	15.20	3.31	21.20	1.10
3.40	1.10	9.40	3.31	15.40	3.31	21.40	1.10
3.60	1.10	9.60	3.31	15.60	3.31	21.60	1.10
3.80	1.10	9.80	3.31	15.80	3.31	21.80	1.10
4.00	1.10	10.00	3.31	16.00	3.31	22.00	1.10
4.20	2.20	10.20	6.05	16.20	2.20	22.20	1.10
4.40	2.20	10.40	6.05	16.40	2.20	22.40	1.10
4.60	2.20	10.60	6.05	16.60	2.20	22.60	1.10
4.80	2.20	10.80	6.05	16.80	2.20	22.80	1.10
5.00	2.20	11.00	6.05	17.00	2.20	23.00	1.10
5.20	2.20	11.20	8.26	17.20	2.20	23.20	1.10
5.40	2.20	11.40	12.12	17.40	2.20	23.40	1.10
5.60	2.20	11.60	27.55	17.60	2.20	23.60	1.10
5.80	2.20	11.80	60.61	17.80	2.20	23.80	1.10
6.00	2.20	12.00	114.06	18.00	2.20	24.00	1.10

CALIB	
STANDHYD (0257)	Area (ha)= 3.10
ID= 1 DT=12.0 min	Total Imp(%)= 67.90 Dir. Conn.(%)= 42.90

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	2.10	1.00	
Dep. Storage	(mm)=	1.00	1.50	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	143.76	40.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.	(mm/hr)=	114.06	146.57	
over	(min)	12.00	12.00	
Storage Coeff.	(min)=	3.01 (ii)	9.07 (ii)	
Unit Hyd. Tpeak	(min)=	12.00	12.00	
Unit Hyd. peak	(cms)=	0.14	0.10	
				TOTALS
PEAK FLOW	(cms)=	0.42	0.34	0.756 (iii)
TIME TO PEAK	(hrs)=	12.00	12.00	12.00
RUNOFF VOLUME	(mm)=	107.06	67.08	84.23
TOTAL RAINFALL	(mm)=	108.06	108.06	108.06
RUNOFF COEFFICIENT	=	0.99	0.62	0.78

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0258)				
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0228):	12.56	2.595	12.00	75.41
+ ID2= 2 (0257):	3.10	0.756	12.00	84.23
ID = 3 (0258):	15.66	3.350	12.00	77.16

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0243) IN= 2---> OUT= 1 DT= 12.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.1346	0.4241
	0.0096	0.0421	0.1575	0.4697
	0.0159	0.0886	0.1823	0.5165
	0.0203	0.1399	0.2088	0.5647
	0.0228	0.1768	0.2369	0.6142
	0.0250	0.2150	0.2514	0.6394
	0.0628	0.2544	0.2663	0.6650
	0.0835	0.2950	0.2816	0.6910
	0.0991	0.3368	0.2997	0.7172
	0.1144	0.3798	0.3113	0.7439

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0258)	15.660	3.350	12.00	77.16
OUTFLOW: ID= 1 (0243)	15.660	0.291	13.00	77.09

PEAK FLOW REDUCTION [Qout/Qin](%)= 8.68
TIME SHIFT OF PEAK FLOW (min)= 60.00
MAXIMUM STORAGE USED (ha.m.)= 0.7048

ROUTEPIPE(0184) IN= 2---> OUT= 1 DT= 12.0 min		
	PIPE Number	= 1.00
	Diameter (mm)	=1650.00
	Length (m)	= 500.00
	Slope (m/m)	= 0.005
	Manning n	= 0.013

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

DEPTH (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME min
0.09	.216E+02	0.0	0.80	10.40
0.17	.600E+02	0.1	1.25	6.67
0.26	.108E+03	0.3	1.61	5.18
0.35	.164E+03	0.6	1.91	4.36
0.43	.225E+03	1.0	2.18	3.83
0.52	.290E+03	1.4	2.41	3.46
0.61	.358E+03	1.9	2.61	3.19
0.69	.428E+03	2.4	2.79	2.99
0.78	.499E+03	2.9	2.95	2.83
0.87	.570E+03	3.5	3.08	2.70
0.96	.642E+03	4.1	3.20	2.61
1.04	.712E+03	4.7	3.29	2.53
1.13	.780E+03	5.2	3.36	2.48
1.22	.844E+03	5.8	3.41	2.44
1.30	.905E+03	6.2	3.44	2.43
1.39	.961E+03	6.6	3.43	2.43
1.48	.101E+04	6.9	3.40	2.45
1.56	.105E+04	6.9	3.31	2.52
1.65	.107E+04	6.5	3.02	2.76

<---- hydrograph ----> <-pipe / channel->

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 2 (0243)	15.66	0.29	13.00	77.09	0.24	1.48
OUTFLOW: ID= 1 (0184)	15.66	0.29	13.00	77.09	0.24	1.48

READ STORM Ptotal=108.06 mm	Filename: C:\Users\jlysecki\AppData\Local\Temp\aad80675-a0b4-4fc2-876a-2640adc73013\35bb3c6a Comments: FIFTY YR SCS STORM 12 MIN TIME STEP 24 H

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.20	1.10	6.20	2.20	12.20	22.04	18.20	2.20
0.40	1.10	6.40	2.20	12.40	13.78	18.40	2.20
0.60	1.10	6.60	2.20	12.60	9.92	18.60	2.20
0.80	1.10	6.80	2.20	12.80	9.37	18.80	2.20
1.00	1.10	7.00	2.20	13.00	6.61	19.00	2.20
1.20	1.10	7.20	2.20	13.20	5.51	19.20	1.65
1.40	1.10	7.40	2.20	13.40	5.51	19.40	1.65
1.60	1.10	7.60	2.20	13.60	5.51	19.60	1.65
1.80	1.10	7.80	2.20	13.80	5.51	19.80	1.65
2.00	1.10	8.00	2.20	14.00	5.51	20.00	1.65
2.20	1.10	8.20	3.31	14.20	3.31	20.20	1.65
2.40	1.10	8.40	3.31	14.40	3.31	20.40	1.65
2.60	1.10	8.60	3.31	14.60	3.31	20.60	1.65
2.80	1.10	8.80	3.31	14.80	3.31	20.80	1.65
3.00	1.10	9.00	3.31	15.00	3.31	21.00	1.65
3.20	1.10	9.20	3.31	15.20	3.31	21.20	1.10
3.40	1.10	9.40	3.31	15.40	3.31	21.40	1.10
3.60	1.10	9.60	3.31	15.60	3.31	21.60	1.10
3.80	1.10	9.80	3.31	15.80	3.31	21.80	1.10
4.00	1.10	10.00	3.31	16.00	3.31	22.00	1.10
4.20	2.20	10.20	6.05	16.20	2.20	22.20	1.10
4.40	2.20	10.40	6.05	16.40	2.20	22.40	1.10
4.60	2.20	10.60	6.05	16.60	2.20	22.60	1.10
4.80	2.20	10.80	6.05	16.80	2.20	22.80	1.10
5.00	2.20	11.00	6.05	17.00	2.20	23.00	1.10
5.20	2.20	11.20	8.26	17.20	2.20	23.20	1.10
5.40	2.20	11.40	12.12	17.40	2.20	23.40	1.10
5.60	2.20	11.60	27.55	17.60	2.20	23.60	1.10
5.80	2.20	11.80	60.61	17.80	2.20	23.80	1.10
6.00	2.20	12.00	114.06	18.00	2.20	24.00	1.10

CALIB STANDHYD (0229) ID= 1 DT=12.0 min	Area (ha)= 12.13 Total Imp(%)= 54.50 Dir. Conn.(%)= 19.70

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	6.61	5.52	
Dep. Storage	(mm)=	1.00	1.50	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	284.37	40.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.	(mm/hr)=	114.06	145.00	
over	(min)	12.00	12.00	
Storage Coeff.	(min)=	4.54 (ii)	10.62 (ii)	
Unit Hyd. Tpeak	(min)=	12.00	12.00	
Unit Hyd. peak	(cms)=	0.13	0.10	
				TOTALS
PEAK FLOW	(cms)=	0.73	1.76	2.492 (iii)
TIME TO PEAK	(hrs)=	12.00	12.00	12.00
RUNOFF VOLUME	(mm)=	107.06	66.88	74.79
TOTAL RAINFALL	(mm)=	108.06	108.06	108.06
RUNOFF COEFFICIENT	=	0.99	0.62	0.69

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
YOU SHOULD CONSIDER SPLITTING THE AREA.

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0196) 1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0184):	15.66	0.291	13.00	77.09
+ ID2= 2 (0229):	12.13	2.492	12.00	74.79
	==========	==========	==========	==========

```
      ID = 3 (  0196):    27.79   2.602    12.00    76.09

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0256)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                         0.0000     0.0000    |  0.2761      0.3332
                         0.0090     0.0385    |  0.3101      0.3536
                         0.0147     0.0812    |  0.3454      0.3743
                         0.0199     0.1456    |  0.3818      0.3952
                         0.0210     0.1631    |  0.4194      0.4165
                         0.0987     0.2172    |  0.4581      0.4381
                         0.1306     0.2358    |  0.4979      0.4600
                         0.1761     0.2739    |  0.5806      0.5047
                         0.2120     0.2934    |  0.6234      0.5275
                         0.2433     0.3131    |  0.7121      0.5742

                                    AREA      QPEAK      TPEAK       R.V.
                                    (ha)      (cms)      (hrs)       (mm)
   INFLOW : ID= 2 (  0196)        27.790      2.602      12.00      76.09
   OUTFLOW: ID= 1 (  0256)        27.790      0.598      12.80      76.05

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 22.99
                  TIME SHIFT OF PEAK FLOW          (min)= 48.00
                  MAXIMUM  STORAGE   USED        (ha.m.)=  0.5146

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

--------------------
|    READ STORM    |    Filename: C:\Users\jlysecki\AppD
|                  |              ata\Local\Temp\
|                  |              aad80675-a0b4-4fc2-876a-2640adc73013\35bb3c6a
| Ptotal=108.06 mm |    Comments: FIFTY YR SCS STORM 12 MIN TIME STEP 24 H
--------------------
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.20    1.10 |  6.20    2.20 | 12.20   22.04 | 18.20    2.20
               0.40    1.10 |  6.40    2.20 | 12.40   13.78 | 18.40    2.20
               0.60    1.10 |  6.60    2.20 | 12.60    9.92 | 18.60    2.20
               0.80    1.10 |  6.80    2.20 | 12.80    9.37 | 18.80    2.20
               1.00    1.10 |  7.00    2.20 | 13.00    6.61 | 19.00    2.20
               1.20    1.10 |  7.20    2.20 | 13.20    5.51 | 19.20    1.65
               1.40    1.10 |  7.40    2.20 | 13.40    5.51 | 19.40    1.65
               1.60    1.10 |  7.60    2.20 | 13.60    5.51 | 19.60    1.65
               1.80    1.10 |  7.80    2.20 | 13.80    5.51 | 19.80    1.65
               2.00    1.10 |  8.00    2.20 | 14.00    5.51 | 20.00    1.65
               2.20    1.10 |  8.20    3.31 | 14.20    3.31 | 20.20    1.65
               2.40    1.10 |  8.40    3.31 | 14.40    3.31 | 20.40    1.65
               2.60    1.10 |  8.60    3.31 | 14.60    3.31 | 20.60    1.65
               2.80    1.10 |  8.80    3.31 | 14.80    3.31 | 20.80    1.65
               3.00    1.10 |  9.00    3.31 | 15.00    3.31 | 21.00    1.65
               3.20    1.10 |  9.20    3.31 | 15.20    3.31 | 21.20    1.10
               3.40    1.10 |  9.40    3.31 | 15.40    3.31 | 21.40    1.10
               3.60    1.10 |  9.60    3.31 | 15.60    3.31 | 21.60    1.10
               3.80    1.10 |  9.80    3.31 | 15.80    3.31 | 21.80    1.10
               4.00    1.10 | 10.00    3.31 | 16.00    3.31 | 22.00    1.10
               4.20    2.20 | 10.20    6.05 | 16.20    2.20 | 22.20    1.10
               4.40    2.20 | 10.40    6.05 | 16.40    2.20 | 22.40    1.10
               4.60    2.20 | 10.60    6.05 | 16.60    2.20 | 22.60    1.10
               4.80    2.20 | 10.80    6.05 | 16.80    2.20 | 22.80    1.10
               5.00    2.20 | 11.00    6.05 | 17.00    2.20 | 23.00    1.10
               5.20    2.20 | 11.20    8.26 | 17.20    2.20 | 23.20    1.10
               5.40    2.20 | 11.40   12.12 | 17.40    2.20 | 23.40    1.10
               5.60    2.20 | 11.60   27.55 | 17.60    2.20 | 23.60    1.10
               5.80    2.20 | 11.80   60.61 | 17.80    2.20 | 23.80    1.10
               6.00    2.20 | 12.00  114.06 | 18.00    2.20 | 24.00    1.10

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

--------------------
| CALIB            |
| STANDHYD (  0230)|   Area     (ha)=  20.35
|ID= 1 DT=12.0 min |   Total Imp(%)=  53.70   Dir. Conn.(%)=  32.40
--------------------
                                    IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=           10.93          9.42
     Dep. Storage      (mm)=            1.00          1.50
     Average Slope      (%)=            1.00          2.00
     Length             (m)=          368.33         40.00
     Mannings n            =           0.013         0.250

     Max.Eff.Inten.(mm/hr)=          114.06        111.24
               over (min)            12.00         24.00
     Storage Coeff.  (min)=           5.30 (ii)    12.06 (ii)
     Unit Hyd. Tpeak (min)=          12.00         24.00
     Unit Hyd. peak  (cms)=           0.13          0.07
                                                              *TOTALS*
     PEAK FLOW       (cms)=           1.98          1.81        3.416 (iii)
     TIME TO PEAK    (hrs)=          12.00         12.20         12.00
     RUNOFF VOLUME    (mm)=         107.06         61.86         76.51
     TOTAL RAINFALL   (mm)=         108.06        108.06        108.06
     RUNOFF COEFFICIENT   =           0.99          0.57          0.71

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

--------------------
| ADD HYD  (  0224)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0230):    20.35   3.416    12.00    76.51
     + ID2= 2 (  0256):    27.79   0.598    12.80    76.05
       ================================================
       ID = 3 (  0224):    48.14   3.725    12.00    76.24

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0253)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                         0.0000     0.0000    |  0.6390      0.9848
                         0.0270     0.1457    |  0.9700      1.2900
                         0.0430     0.3152    |  1.1040      1.7480
                         0.0530     0.4653    |  3.3100      1.9350
                         0.3280     0.6677    | 11.3140      2.2662

                                    AREA      QPEAK      TPEAK       R.V.
                                    (ha)      (cms)      (hrs)       (mm)
   INFLOW : ID= 2 (  0224)        48.140      3.725      12.00      76.24
   OUTFLOW: ID= 1 (  0253)        48.140      0.761      14.00      76.22

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 20.44
                  TIME SHIFT OF PEAK FLOW          (min)=120.00
                  MAXIMUM  STORAGE   USED        (ha.m.)=  1.0985

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

--------------------
|    READ STORM    |    Filename: C:\Users\jlysecki\AppD
|                  |              ata\Local\Temp\
|                  |              aad80675-a0b4-4fc2-876a-2640adc73013\35bb3c6a
| Ptotal=108.06 mm |    Comments: FIFTY YR SCS STORM 12 MIN TIME STEP 24 H
--------------------
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.20    1.10 |  6.20    2.20 | 12.20   22.04 | 18.20    2.20
               0.40    1.10 |  6.40    2.20 | 12.40   13.78 | 18.40    2.20
               0.60    1.10 |  6.60    2.20 | 12.60    9.92 | 18.60    2.20
```

0.80	1.10	6.80	2.20	12.80	9.37	18.80	2.20
1.00	1.10	7.00	2.20	13.00	6.61	19.00	2.20
1.20	1.10	7.20	2.20	13.20	5.51	19.20	1.65
1.40	1.10	7.40	2.20	13.40	5.51	19.40	1.65
1.60	1.10	7.60	2.20	13.60	5.51	19.60	1.65
1.80	1.10	7.80	2.20	13.80	5.51	19.80	1.65
2.00	1.10	8.00	2.20	14.00	5.51	20.00	1.65
2.20	1.10	8.20	3.31	14.20	3.31	20.20	1.65
2.40	1.10	8.40	3.31	14.40	3.31	20.40	1.65
2.60	1.10	8.60	3.31	14.60	3.31	20.60	1.65
2.80	1.10	8.80	3.31	14.80	3.31	20.80	1.65
3.00	1.10	9.00	3.31	15.00	3.31	21.00	1.65
3.20	1.10	9.20	3.31	15.20	3.31	21.20	1.10
3.40	1.10	9.40	3.31	15.40	3.31	21.40	1.10
3.60	1.10	9.60	3.31	15.60	3.31	21.60	1.10
3.80	1.10	9.80	3.31	15.80	3.31	21.80	1.10
4.00	1.10	10.00	3.31	16.00	3.31	22.00	1.10
4.20	2.20	10.20	6.05	16.20	2.20	22.20	1.10
4.40	2.20	10.40	6.05	16.40	2.20	22.40	1.10
4.60	2.20	10.60	6.05	16.60	2.20	22.60	1.10
4.80	2.20	10.80	6.05	16.80	2.20	22.80	1.10
5.00	2.20	11.00	6.05	17.00	2.20	23.00	1.10
5.20	2.20	11.20	8.26	17.20	2.20	23.20	1.10
5.40	2.20	11.40	12.12	17.40	2.20	23.40	1.10
5.60	2.20	11.60	27.55	17.60	2.20	23.60	1.10
5.80	2.20	11.80	60.61	17.80	2.20	23.80	1.10
6.00	2.20	12.00	114.06	18.00	2.20	24.00	1.10

CALIB					
STANDHYD (0160)	Area (ha)= 1.30				
ID= 1 DT=12.0 min	Total Imp(%)= 50.70	Dir. Conn.(%)= 22.00			

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	0.66	0.64	
Dep. Storage	(mm)=	1.00	1.50	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	93.09	40.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.	(mm/hr)=	114.06	124.62	
over	(min)	12.00	12.00	
Storage Coeff.	(min)=	2.32 (ii)	8.78 (ii)	
Unit Hyd. Tpeak	(min)=	12.00	12.00	
Unit Hyd. peak	(cms)=	0.14	0.11	
				TOTALS
PEAK FLOW	(cms)=	0.09	0.19	0.277 (iii)
TIME TO PEAK	(hrs)=	12.00	12.00	12.00
RUNOFF VOLUME	(mm)=	107.06	64.01	73.48
TOTAL RAINFALL	(mm)=	108.06	108.06	108.06
RUNOFF COEFFICIENT	=	0.99	0.59	0.68

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

DUHYD (0183)				
Inlet Cap.= 0.152				
#of Inlets= 1				
Total(cms)= 0.2	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
TOTAL HYD.(ID= 1):	1.30	0.28	12.00	73.48
MAJOR SYS.(ID= 2):	0.12	0.12	12.00	73.48
MINOR SYS.(ID= 3):	1.18	0.15	12.00	73.48

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

READ STORM	Filename: C:\Users\j1ysecki\AppData\Local\Temp\aad80675-a0b4-4fc2-876a-2640adc73013\35bb3c6a
Ptotal=108.06 mm	Comments: FIFTY YR SCS STORM 12 MIN TIME STEP 24 H

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.20	1.10	6.20	2.20	12.20	22.04	18.20	2.20
0.40	1.10	6.40	2.20	12.40	13.78	18.40	2.20
0.60	1.10	6.60	2.20	12.60	9.92	18.60	2.20
0.80	1.10	6.80	2.20	12.80	9.37	18.80	2.20
1.00	1.10	7.00	2.20	13.00	6.61	19.00	2.20
1.20	1.10	7.20	2.20	13.20	5.51	19.20	1.65
1.40	1.10	7.40	2.20	13.40	5.51	19.40	1.65
1.60	1.10	7.60	2.20	13.60	5.51	19.60	1.65
1.80	1.10	7.80	2.20	13.80	5.51	19.80	1.65
2.00	1.10	8.00	2.20	14.00	5.51	20.00	1.65
2.20	1.10	8.20	3.31	14.20	3.31	20.20	1.65
2.40	1.10	8.40	3.31	14.40	3.31	20.40	1.65
2.60	1.10	8.60	3.31	14.60	3.31	20.60	1.65
2.80	1.10	8.80	3.31	14.80	3.31	20.80	1.65
3.00	1.10	9.00	3.31	15.00	3.31	21.00	1.65
3.20	1.10	9.20	3.31	15.20	3.31	21.20	1.10
3.40	1.10	9.40	3.31	15.40	3.31	21.40	1.10
3.60	1.10	9.60	3.31	15.60	3.31	21.60	1.10
3.80	1.10	9.80	3.31	15.80	3.31	21.80	1.10
4.00	1.10	10.00	3.31	16.00	3.31	22.00	1.10
4.20	2.20	10.20	6.05	16.20	2.20	22.20	1.10
4.40	2.20	10.40	6.05	16.40	2.20	22.40	1.10
4.60	2.20	10.60	6.05	16.60	2.20	22.60	1.10
4.80	2.20	10.80	6.05	16.80	2.20	22.80	1.10
5.00	2.20	11.00	6.05	17.00	2.20	23.00	1.10
5.20	2.20	11.20	8.26	17.20	2.20	23.20	1.10
5.40	2.20	11.40	12.12	17.40	2.20	23.40	1.10
5.60	2.20	11.60	27.55	17.60	2.20	23.60	1.10
5.80	2.20	11.80	60.61	17.80	2.20	23.80	1.10
6.00	2.20	12.00	114.06	18.00	2.20	24.00	1.10

CALIB					
STANDHYD (0193)	Area (ha)= 1.21				
ID= 1 DT=12.0 min	Total Imp(%)= 49.30	Dir. Conn.(%)= 20.10			

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	0.60	0.61	
Dep. Storage	(mm)=	1.00	1.50	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	89.81	40.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.	(mm/hr)=	114.06	123.93	
over	(min)	12.00	12.00	
Storage Coeff.	(min)=	2.27 (ii)	8.75 (ii)	
Unit Hyd. Tpeak	(min)=	12.00	12.00	
Unit Hyd. peak	(cms)=	0.14	0.11	
				TOTALS
PEAK FLOW	(cms)=	0.08	0.18	0.255 (iii)
TIME TO PEAK	(hrs)=	12.00	12.00	12.00
RUNOFF VOLUME	(mm)=	107.06	63.91	72.58
TOTAL RAINFALL	(mm)=	108.06	108.06	108.06
RUNOFF COEFFICIENT	=	0.99	0.59	0.67

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

COLE ENGINEERING

Experience Enhancing Excellence

```
--------------------
| DUHYD    (  0227)|
| Inlet Cap.= 0.120|
| #of Inlets=     1|
| Total(cms)=   0.1|      AREA     QPEAK     TPEAK     R.V.
--------------------      (ha)      (cms)     (hrs)     (mm)
     TOTAL HYD.(ID= 1):   1.21      0.25     12.00    72.58
     ==================================================
     MAJOR SYS.(ID= 2):   0.13      0.13     12.00    72.58
     MINOR SYS.(ID= 3):   1.08      0.12     11.80    72.58

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

```
--------------------
|    READ STORM    |    Filename: C:\Users\jlysecki\AppD
|                  |              ata\Local\Temp\
|                  |              aad80675-a0b4-4fc2-876a-2640adc73013\35bb3c6a
| Ptotal=108.06 mm |    Comments: FIFTY YR SCS STORM 12 MIN TIME STEP 24 H
--------------------
```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.20	1.10	6.20	2.20	12.20	22.04	18.20	2.20
0.40	1.10	6.40	2.20	12.40	13.78	18.40	2.20
0.60	1.10	6.60	2.20	12.60	9.92	18.60	2.20
0.80	1.10	6.80	2.20	12.80	9.37	18.80	2.20
1.00	1.10	7.00	2.20	13.00	6.61	19.00	2.20
1.20	1.10	7.20	2.20	13.20	5.51	19.20	1.65
1.40	1.10	7.40	2.20	13.40	5.51	19.40	1.65
1.60	1.10	7.60	2.20	13.60	5.51	19.60	1.65
1.80	1.10	7.80	2.20	13.80	5.51	19.80	1.65
2.00	1.10	8.00	2.20	14.00	5.51	20.00	1.65
2.20	1.10	8.20	3.31	14.20	3.31	20.20	1.65
2.40	1.10	8.40	3.31	14.40	3.31	20.40	1.65
2.60	1.10	8.60	3.31	14.60	3.31	20.60	1.65
2.80	1.10	8.80	3.31	14.80	3.31	20.80	1.65
3.00	1.10	9.00	3.31	15.00	3.31	21.00	1.65
3.20	1.10	9.20	3.31	15.20	3.31	21.20	1.10
3.40	1.10	9.40	3.31	15.40	3.31	21.40	1.10
3.60	1.10	9.60	3.31	15.60	3.31	21.60	1.10
3.80	1.10	9.80	3.31	15.80	3.31	21.80	1.10
4.00	1.10	10.00	3.31	16.00	3.31	22.00	1.10
4.20	2.20	10.20	6.05	16.20	2.20	22.20	1.10
4.40	2.20	10.40	6.05	16.40	2.20	22.40	1.10
4.60	2.20	10.60	6.05	16.60	2.20	22.60	1.10
4.80	2.20	10.80	6.05	16.80	2.20	22.80	1.10
5.00	2.20	11.00	6.05	17.00	2.20	23.00	1.10
5.20	2.20	11.20	8.26	17.20	2.20	23.20	1.10
5.40	2.20	11.40	12.12	17.40	2.20	23.40	1.10
5.60	2.20	11.60	27.55	17.60	2.20	23.60	1.10
5.80	2.20	11.80	60.61	17.80	2.20	23.80	1.10
6.00	2.20	12.00	114.06	18.00	2.20	24.00	1.10

```
--------------------
| CALIB            |
| STANDHYD (  0206)|   Area     (ha)=  38.60
|ID= 1 DT=12.0 min |   Total Imp(%)=  54.70   Dir. Conn.(%)=  23.20
--------------------
```

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	21.11	17.49
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	507.28	40.00
Mannings n	=	0.013	0.250
Max.Eff.Inten.	(mm/hr)=	114.06	137.20
over	(min)	12.00	24.00
Storage Coeff.	(min)=	6.42 (ii)	12.64 (ii)
Unit Hyd. Tpeak	(min)=	12.00	24.00
Unit Hyd. peak	(cms)=	0.12	0.07
			TOTALS
PEAK FLOW	(cms)=	2.61	4.11	5.872 (iii)
TIME TO PEAK	(hrs)=	12.00	12.20	12.00
RUNOFF VOLUME	(mm)=	107.06	65.83	75.40
TOTAL RAINFALL	(mm)=	108.06	108.06	108.06
RUNOFF COEFFICIENT	=	0.99	0.61	0.70

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

```
--------------------
| ADD HYD  (  0225)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0183):      0.12    0.125    12.00    73.48
     + ID2= 2 (  0206):     38.60    5.872    12.00    75.40
       ================================================
       ID = 3 (  0225):     38.72    5.997    12.00    75.39

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

```
--------------------
| ADD HYD  (  0225)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0225):     38.72    5.997    12.00    75.39
     + ID2= 2 (  0227):      0.13    0.135    12.00    72.58
       ================================================
       ID = 1 (  0225):     38.86    6.132    12.00    75.38

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

```
--------------------
|    READ STORM    |    Filename: C:\Users\jlysecki\AppD
|                  |              ata\Local\Temp\
|                  |              aad80675-a0b4-4fc2-876a-2640adc73013\35bb3c6a
| Ptotal=108.06 mm |    Comments: FIFTY YR SCS STORM 12 MIN TIME STEP 24 H
--------------------
```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.20	1.10	6.20	2.20	12.20	22.04	18.20	2.20
0.40	1.10	6.40	2.20	12.40	13.78	18.40	2.20
0.60	1.10	6.60	2.20	12.60	9.92	18.60	2.20
0.80	1.10	6.80	2.20	12.80	9.37	18.80	2.20
1.00	1.10	7.00	2.20	13.00	6.61	19.00	2.20
1.20	1.10	7.20	2.20	13.20	5.51	19.20	1.65
1.40	1.10	7.40	2.20	13.40	5.51	19.40	1.65
1.60	1.10	7.60	2.20	13.60	5.51	19.60	1.65
1.80	1.10	7.80	2.20	13.80	5.51	19.80	1.65
2.00	1.10	8.00	2.20	14.00	5.51	20.00	1.65
2.20	1.10	8.20	3.31	14.20	3.31	20.20	1.65
2.40	1.10	8.40	3.31	14.40	3.31	20.40	1.65
2.60	1.10	8.60	3.31	14.60	3.31	20.60	1.65
2.80	1.10	8.80	3.31	14.80	3.31	20.80	1.65
3.00	1.10	9.00	3.31	15.00	3.31	21.00	1.65
3.20	1.10	9.20	3.31	15.20	3.31	21.20	1.10
3.40	1.10	9.40	3.31	15.40	3.31	21.40	1.10
3.60	1.10	9.60	3.31	15.60	3.31	21.60	1.10
3.80	1.10	9.80	3.31	15.80	3.31	21.80	1.10
4.00	1.10	10.00	3.31	16.00	3.31	22.00	1.10
4.20	2.20	10.20	6.05	16.20	2.20	22.20	1.10
4.40	2.20	10.40	6.05	16.40	2.20	22.40	1.10
4.60	2.20	10.60	6.05	16.60	2.20	22.60	1.10
4.80	2.20	10.80	6.05	16.80	2.20	22.80	1.10
5.00	2.20	11.00	6.05	17.00	2.20	23.00	1.10
5.20	2.20	11.20	8.26	17.20	2.20	23.20	1.10
5.40	2.20	11.40	12.12	17.40	2.20	23.40	1.10
5.60	2.20	11.60	27.55	17.60	2.20	23.60	1.10

5.80	2.20	11.80	60.61	17.80	2.20	23.80	1.10
6.00	2.20	12.00	114.06	18.00	2.20	24.00	1.10

CALIB			
STANDHYD (0209)	Area (ha)= 5.20		
ID= 1 DT=12.0 min	Total Imp(%)= 31.60	Dir. Conn.(%)= 19.40	

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	1.64	3.56	
Dep. Storage	(mm)=	1.00	1.50	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	186.19	40.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.	(mm/hr)=	114.06	81.35	
over	(min)	12.00	12.00	
Storage Coeff.	(min)=	3.52 (ii)	11.18 (ii)	
Unit Hyd. Tpeak	(min)=	12.00	12.00	
Unit Hyd. peak	(cms)=	0.14	0.09	
				TOTALS
PEAK FLOW	(cms)=	0.31	0.62	0.935 (iii)
TIME TO PEAK	(hrs)=	12.00	12.00	12.00
RUNOFF VOLUME	(mm)=	107.06	56.00	65.91
TOTAL RAINFALL	(mm)=	108.06	108.06	108.06
RUNOFF COEFFICIENT	=	0.99	0.52	0.61

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
YOU SHOULD CONSIDER SPLITTING THE AREA.

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

READ STORM	Filename: C:\Users\jlysecki\AppD
	ata\Local\Temp\
	aad80675-a0b4-4fc2-876a-2640adc73013\35bb3c6a
Ptotal=108.06 mm	Comments: FIFTY YR SCS STORM 12 MIN TIME STEP 24 H

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.20	1.10	6.20	2.20	12.20	22.04	18.20	2.20
0.40	1.10	6.40	2.20	12.40	13.78	18.40	2.20
0.60	1.10	6.60	2.20	12.60	9.92	18.60	2.20
0.80	1.10	6.80	2.20	12.80	9.37	18.80	2.20
1.00	1.10	7.00	2.20	13.00	6.61	19.00	2.20
1.20	1.10	7.20	2.20	13.20	5.51	19.20	1.65
1.40	1.10	7.40	2.20	13.40	5.51	19.40	1.65
1.60	1.10	7.60	2.20	13.60	5.51	19.60	1.65
1.80	1.10	7.80	2.20	13.80	5.51	19.80	1.65
2.00	1.10	8.00	2.20	14.00	5.51	20.00	1.65
2.20	1.10	8.20	3.31	14.20	3.31	20.20	1.65
2.40	1.10	8.40	3.31	14.40	3.31	20.40	1.65
2.60	1.10	8.60	3.31	14.60	3.31	20.60	1.65
2.80	1.10	8.80	3.31	14.80	3.31	20.80	1.65
3.00	1.10	9.00	3.31	15.00	3.31	21.00	1.65
3.20	1.10	9.20	3.31	15.20	3.31	21.20	1.10
3.40	1.10	9.40	3.31	15.40	3.31	21.40	1.10
3.60	1.10	9.60	3.31	15.60	3.31	21.60	1.10
3.80	1.10	9.80	3.31	15.80	3.31	21.80	1.10
4.00	1.10	10.00	3.31	16.00	3.31	22.00	1.10
4.20	2.20	10.20	6.05	16.20	2.20	22.20	1.10
4.40	2.20	10.40	6.05	16.40	2.20	22.40	1.10
4.60	2.20	10.60	6.05	16.60	2.20	22.60	1.10
4.80	2.20	10.80	6.05	16.80	2.20	22.80	1.10
5.00	2.20	11.00	6.05	17.00	2.20	23.00	1.10
5.20	2.20	11.20	8.26	17.20	2.20	23.20	1.10
5.40	2.20	11.40	12.12	17.40	2.20	23.40	1.10
5.60	2.20	11.60	27.55	17.60	2.20	23.60	1.10
5.80	2.20	11.80	60.61	17.80	2.20	23.80	1.10
6.00	2.20	12.00	114.06	18.00	2.20	24.00	1.10

CALIB			
STANDHYD (0252)	Area (ha)= 1.44		
ID= 1 DT=12.0 min	Total Imp(%)= 52.40	Dir. Conn.(%)= 20.10	

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	0.75	0.69	
Dep. Storage	(mm)=	1.00	1.50	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	97.98	40.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.	(mm/hr)=	114.06	135.33	
over	(min)	12.00	12.00	
Storage Coeff.	(min)=	2.39 (ii)	8.65 (ii)	
Unit Hyd. Tpeak	(min)=	12.00	12.00	
Unit Hyd. peak	(cms)=	0.14	0.11	
				TOTALS
PEAK FLOW	(cms)=	0.09	0.22	0.309 (iii)
TIME TO PEAK	(hrs)=	12.00	12.00	12.00
RUNOFF VOLUME	(mm)=	107.06	65.57	73.91
TOTAL RAINFALL	(mm)=	108.06	108.06	108.06
RUNOFF COEFFICIENT	=	0.99	0.61	0.68

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

RESERVOIR(0261)				
IN= 2---> OUT= 1				
DT= 5.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.1470	0.0137
	0.0530	0.0050	0.1700	0.0155
	0.0700	0.0076	0.1900	0.0220
	0.1150	0.0113	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0252)	1.440	0.309	12.00	73.91
OUTFLOW: ID= 1 (0261)	1.440	0.179	12.10	73.89

PEAK FLOW REDUCTION [Qout/Qin](%)= 57.95
TIME SHIFT OF PEAK FLOW (min)= 6.00
MAXIMUM STORAGE USED (ha.m.)= 0.0191

ADD HYD (0251)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0209):		5.20	0.935	12.00	65.91
+ ID2= 2 (0261):		1.44	0.179	12.10	73.89
ID = 3 (0251):		6.64	1.104	12.00	67.64

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0245)				
IN= 2---> OUT= 1				
DT= 12.0 min	OUTFLOW	STORAGE	OUTFLOW	STORAGE

```
--------------------      (cms)      (ha.m.)   |    (cms)      (ha.m.)
                         0.0000      0.0000   |   0.3090      0.2876
                         0.0000      0.0000   |   0.3330      0.3838
                         0.1230      0.1102   |   0.3620      0.5200
                         0.2870      0.1971   |   0.0000      0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0251)      6.640     1.104     12.00      67.64
   OUTFLOW: ID= 1 (  0245)      6.640     0.254     12.60      67.61

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)= 23.00
                    TIME SHIFT OF PEAK FLOW          (min)= 36.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=  0.1801

--------------------------------------------------------------------------------
-------------------
| ROUTEPIPE(  0212)|     PIPE Number     =   1.00
| IN= 2---> OUT= 1 |     Diameter    (mm)=1650.00
| DT= 12.0 min     |     Length       (m)= 850.00
--------------------     Slope       (m/m)=  0.005
                         Manning n        =  0.013

     <----------------- TRAVEL TIME TABLE ------------------->
       DEPTH      VOLUME     FLOW RATE    VELOCITY    TRAV.TIME
        (m)      (cu.m.)       (cms)        (m/s)        min
       0.09     .367E+02        0.0         0.80        17.68
       0.17     .102E+03        0.1         1.25        11.33
       0.26     .184E+03        0.3         1.61         8.81
       0.35     .278E+03        0.6         1.91         7.41
       0.43     .382E+03        1.0         2.18         6.51
       0.52     .492E+03        1.4         2.41         5.88
       0.61     .608E+03        1.9         2.61         5.43
       0.69     .727E+03        2.4         2.79         5.08
       0.78     .848E+03        2.9         2.95         4.81
       0.87     .970E+03        3.5         3.08         4.60
       0.96     .109E+04        4.1         3.20         4.43
       1.04     .121E+04        4.7         3.29         4.31
       1.13     .133E+04        5.2         3.36         4.22
       1.22     .144E+04        5.8         3.41         4.15
       1.30     .154E+04        6.2         3.44         4.12
       1.39     .163E+04        6.6         3.43         4.13
       1.48     .172E+04        6.9         3.40         4.17
       1.56     .178E+04        6.9         3.31         4.28
       1.65     .182E+04        6.5         3.02         4.70
                                <---- hydrograph ---->   <-pipe / channel->
                              AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                              (ha)    (cms)   (hrs)   (mm)       (m)       (m/s)
   INFLOW : ID= 2 (  0245)    6.64     0.25   12.60  67.61      0.22       1.42
   OUTFLOW: ID= 1 (  0212)    6.64     0.25   12.70  67.60      0.22       1.41

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

-------------------
| ADD HYD  (  0211)|
|   1 +  2 =  3    |          AREA     QPEAK     TPEAK      R.V.
-------------------           (ha)     (cms)     (hrs)       (mm)
       ID1= 1 (  0212):      6.64    0.250     12.70      67.60
     + ID2= 2 (  0225):     38.86    6.132     12.00      75.38
       ================================================
       ID = 3 (  0211):     45.50    6.213     12.00      74.25

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
-------------------
| RESERVOIR(  0255)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
-------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                        0.0000      0.0000   |   1.6250      1.2448
                        0.0190      0.1627   |   1.6630      1.2997
                        0.0360      0.4306   |   1.8430      1.5816
                        0.0480      0.7217   |   2.1300      2.1197
                        0.1330      0.7718   |   2.9680      2.2465
                        1.0390      0.9773   |   7.5380      2.5741

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0211)     45.496     6.213     12.00      74.25
   OUTFLOW: ID= 1 (  0255)     45.496     1.781     12.70      74.20

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)= 28.66
                    TIME SHIFT OF PEAK FLOW          (min)= 42.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=  1.4864

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

       V    V   I    SSSSS  U   U    A    L              (v 5.1.2004)
       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)\Visual OTTHYMO 5.1\VO2\voin.dat
  Output  filename: C:\Users\jlysecki\AppData\Local\Civica\VH5\a379672b-db33-4372-b5e0-
ba58a07d1417\a1290ec5-1ca8-4919-9bc2-cd92de285bd3\sce
  Summary filename: C:\Users\jlysecki\AppData\Local\Civica\VH5\a379672b-db33-4372-b5e0-
ba58a07d1417\a1290ec5-1ca8-4919-9bc2-cd92de285bd3\sce


DATE: 01/15/2020                          TIME: 04:10:47

USER:


COMMENTS: _____

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


--------------------
|    READ STORM    |    Filename: C:\Users\jlysecki\AppD
|                  |              ata\Local\Temp\
|                  |              aad80675-a0b4-4fc2-876a-2640adc73013\f5882d70
| Ptotal=112.42 mm |    Comments: SCS TYPE II TWENTY FOUR HOUR, HUNDRED YE
--------------------
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.20    1.27 |  6.20    2.29 | 12.20   21.84 | 18.20    2.29
                0.40    1.27 |  6.40    2.29 | 12.40   13.72 | 18.40    2.29
                0.60    1.27 |  6.60    2.29 | 12.60    9.91 | 18.60    2.29
                0.80    1.27 |  6.80    2.29 | 12.80    9.40 | 18.80    2.29
                1.00    1.27 |  7.00    2.29 | 13.00    6.60 | 19.00    2.29
                1.20    1.27 |  7.20    2.29 | 13.20    5.59 | 19.20    1.78
                1.40    1.27 |  7.40    2.29 | 13.40    5.59 | 19.40    1.78
                1.60    1.27 |  7.60    2.29 | 13.60    5.59 | 19.60    1.78
                1.80    1.27 |  7.80    2.29 | 13.80    5.59 | 19.80    1.78
                2.00    1.27 |  8.00    2.29 | 14.00    5.59 | 20.00    1.78
                2.20    1.27 |  8.20    3.30 | 14.20    3.30 | 20.20    1.78
                2.40    1.27 |  8.40    3.30 | 14.40    3.30 | 20.40    1.78
```

2.60	1.27	8.60	3.30	14.60	3.30	20.60	1.78
2.80	1.27	8.80	3.30	14.80	3.30	20.80	1.78
3.00	1.27	9.00	3.30	15.00	3.30	21.00	1.78
3.20	1.27	9.20	3.30	15.20	3.30	21.20	1.27
3.40	1.27	9.40	3.30	15.40	3.30	21.40	1.27
3.60	1.27	9.60	3.30	15.60	3.30	21.60	1.27
3.80	1.27	9.80	3.30	15.80	3.30	21.80	1.27
4.00	1.27	10.00	3.30	16.00	3.30	22.00	1.27
4.20	2.29	10.20	6.10	16.20	2.29	22.20	1.27
4.40	2.29	10.40	6.10	16.40	2.29	22.40	1.27
4.60	2.29	10.60	6.10	16.60	2.29	22.60	1.27
4.80	2.29	10.80	6.10	16.80	2.29	22.80	1.27
5.00	2.29	11.00	6.10	17.00	2.29	23.00	1.27
5.20	2.29	11.20	8.13	17.20	2.29	23.20	1.27
5.40	2.29	11.40	11.94	17.40	2.29	23.40	1.27
5.60	2.29	11.60	27.43	17.60	2.29	23.60	1.27
5.80	2.29	11.80	59.94	17.80	2.29	23.80	1.27
6.00	2.29	12.00	126.49	18.00	2.29	24.00	1.27

CALIB	
STANDHYD (0228)	Area (ha)= 12.56
ID= 1 DT=12.0 min	Total Imp(%)= 54.10 Dir. Conn.(%)= 25.00

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	6.79	5.77	
Dep. Storage	(mm)=	1.00	1.50	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	289.37	40.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.	(mm/hr)=	126.49	146.45	
over	(min)	12.00	12.00	
Storage Coeff.	(min)=	4.40 (ii)	10.46 (ii)	
Unit Hyd. Tpeak	(min)=	12.00	12.00	
Unit Hyd. peak	(cms)=	0.13	0.10	
				TOTALS
PEAK FLOW	(cms)=	1.06	1.84	2.901 (iii)
TIME TO PEAK	(hrs)=	12.00	12.00	12.00
RUNOFF VOLUME	(mm)=	111.42	68.56	79.27
TOTAL RAINFALL	(mm)=	112.42	112.42	112.42
RUNOFF COEFFICIENT	=	0.99	0.61	0.71

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

READ STORM	Filename: C:\Users\jlysecki\AppData\Local\Temp\aad80675-a0b4-4fc2-876a-2640adc73013\f5882d70
Ptotal=112.42 mm	Comments: SCS TYPE II TWENTY FOUR HOUR, HUNDRED YE

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.20	1.27	6.20	2.29	12.20	21.84	18.20	2.29
0.40	1.27	6.40	2.29	12.40	13.72	18.40	2.29
0.60	1.27	6.60	2.29	12.60	9.91	18.60	2.29
0.80	1.27	6.80	2.29	12.80	9.40	18.80	2.29
1.00	1.27	7.00	2.29	13.00	6.60	19.00	2.29
1.20	1.27	7.20	2.29	13.20	5.59	19.20	1.78
1.40	1.27	7.40	2.29	13.40	5.59	19.40	1.78
1.60	1.27	7.60	2.29	13.60	5.59	19.60	1.78
1.80	1.27	7.80	2.29	13.80	5.59	19.80	1.78
2.00	1.27	8.00	2.29	14.00	5.59	20.00	1.78
2.20	1.27	8.20	3.30	14.20	3.30	20.20	1.78
2.40	1.27	8.40	3.30	14.40	3.30	20.40	1.78
2.60	1.27	8.60	3.30	14.60	3.30	20.60	1.78
2.80	1.27	8.80	3.30	14.80	3.30	20.80	1.78
3.00	1.27	9.00	3.30	15.00	3.30	21.00	1.78
3.20	1.27	9.20	3.30	15.20	3.30	21.20	1.27
3.40	1.27	9.40	3.30	15.40	3.30	21.40	1.27
3.60	1.27	9.60	3.30	15.60	3.30	21.60	1.27
3.80	1.27	9.80	3.30	15.80	3.30	21.80	1.27
4.00	1.27	10.00	3.30	16.00	3.30	22.00	1.27
4.20	2.29	10.20	6.10	16.20	2.29	22.20	1.27
4.40	2.29	10.40	6.10	16.40	2.29	22.40	1.27
4.60	2.29	10.60	6.10	16.60	2.29	22.60	1.27
4.80	2.29	10.80	6.10	16.80	2.29	22.80	1.27
5.00	2.29	11.00	6.10	17.00	2.29	23.00	1.27
5.20	2.29	11.20	8.13	17.20	2.29	23.20	1.27
5.40	2.29	11.40	11.94	17.40	2.29	23.40	1.27
5.60	2.29	11.60	27.43	17.60	2.29	23.60	1.27
5.80	2.29	11.80	59.94	17.80	2.29	23.80	1.27
6.00	2.29	12.00	126.49	18.00	2.29	24.00	1.27

CALIB	
STANDHYD (0257)	Area (ha)= 3.10
ID= 1 DT=12.0 min	Total Imp(%)= 67.90 Dir. Conn.(%)= 42.90

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	2.10	1.00	
Dep. Storage	(mm)=	1.00	1.50	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	143.76	40.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.	(mm/hr)=	126.49	164.51	
over	(min)	12.00	12.00	
Storage Coeff.	(min)=	2.89 (ii)	8.67 (ii)	
Unit Hyd. Tpeak	(min)=	12.00	12.00	
Unit Hyd. peak	(cms)=	0.14	0.11	
				TOTALS
PEAK FLOW	(cms)=	0.46	0.38	0.843 (iii)
TIME TO PEAK	(hrs)=	12.00	12.00	12.00
RUNOFF VOLUME	(mm)=	111.42	70.84	88.25
TOTAL RAINFALL	(mm)=	112.42	112.42	112.42
RUNOFF COEFFICIENT	=	0.99	0.63	0.78

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0258)		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
1 + 2 = 3	ID1= 1 (0228):	12.56	2.901	12.00	79.27
	+ ID2= 2 (0257):	3.10	0.843	12.00	88.25
	ID = 3 (0258):	15.66	3.744	12.00	81.05

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0243)				
IN= 2---> OUT= 1				
DT= 12.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.1346	0.4241
	0.0096	0.0421	0.1575	0.4697
	0.0159	0.0886	0.1823	0.5165
	0.0203	0.1399	0.2088	0.5647
	0.0228	0.1768	0.2369	0.6142

```
                    0.0250     0.2150   |   0.2514      0.6394
                    0.0628     0.2544   |   0.2663      0.6650
                    0.0835     0.2950   |   0.2816      0.6910
                    0.0991     0.3368   |   0.2997      0.7172
                    0.1144     0.3798   |   0.3113      0.7439

                          AREA     QPEAK     TPEAK       R.V.
                          (ha)     (cms)     (hrs)       (mm)
 INFLOW : ID= 2 (  0258)     15.660     3.744     12.00      81.05
 OUTFLOW: ID= 1 (  0243)     15.660     0.309     13.00      80.98

                PEAK   FLOW   REDUCTION [Qout/Qin](%)=  8.24
                TIME SHIFT OF PEAK FLOW          (min)= 60.00
                MAXIMUM  STORAGE   USED       (ha.m.)=  0.7390

--------------------------------------------------------------------------------
--------------------
| ROUTEPIPE(  0184)|     PIPE Number     =   1.00
| IN= 2---> OUT= 1 |     Diameter    (mm)=1650.00
| DT= 12.0 min     |     Length       (m)= 500.00
--------------------     Slope      (m/m)=  0.005
                         Manning n        =  0.013

     <----------------- TRAVEL TIME TABLE ------------------->
       DEPTH      VOLUME     FLOW RATE    VELOCITY    TRAV.TIME
        (m)      (cu.m.)       (cms)        (m/s)        min
       0.09     .216E+02        0.0         0.80        10.40
       0.17     .600E+02        0.1         1.25         6.67
       0.26     .108E+03        0.3         1.61         5.18
       0.35     .164E+03        0.6         1.91         4.36
       0.43     .225E+03        1.0         2.18         3.83
       0.52     .290E+03        1.4         2.41         3.46
       0.61     .358E+03        1.9         2.61         3.19
       0.69     .428E+03        2.4         2.79         2.99
       0.78     .499E+03        2.9         2.95         2.83
       0.87     .570E+03        3.5         3.08         2.70
       0.96     .642E+03        4.1         3.20         2.61
       1.04     .712E+03        4.7         3.29         2.53
       1.13     .780E+03        5.2         3.36         2.48
       1.22     .844E+03        5.8         3.41         2.44
       1.30     .905E+03        6.2         3.44         2.43
       1.39     .961E+03        6.6         3.43         2.43
       1.48     .101E+04        6.9         3.40         2.45
       1.56     .105E+04        6.9         3.31         2.52
       1.65     .107E+04        6.5         3.02         2.76
                              <---- hydrograph ---->   <-pipe / channel->
                            AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                            (ha)    (cms)   (hrs)   (mm)       (m)       (m/s)
 INFLOW : ID= 2 (  0243)   15.66     0.31   13.00  80.98      0.24      1.52
 OUTFLOW: ID= 1 (  0184)   15.66     0.31   13.00  80.98      0.24      1.52

--------------------------------------------------------------------------------
--------------------
|    READ STORM    |    Filename: C:\Users\j1ysecki\AppD
|                  |              ata\Local\Temp\
|                  |              aad80675-a0b4-4fc2-876a-2640adc73013\f5882d70
| Ptotal=112.42 mm |    Comments: SCS TYPE II TWENTY FOUR HOUR, HUNDRED YE
--------------------
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.20    1.27 |  6.20    2.29 | 12.20   21.84 | 18.20    2.29
                0.40    1.27 |  6.40    2.29 | 12.40   13.72 | 18.40    2.29
                0.60    1.27 |  6.60    2.29 | 12.60    9.91 | 18.60    2.29
                0.80    1.27 |  6.80    2.29 | 12.80    9.40 | 18.80    2.29
                1.00    1.27 |  7.00    2.29 | 13.00    6.60 | 19.00    2.29
                1.20    1.27 |  7.20    2.29 | 13.20    5.59 | 19.20    1.78
                1.40    1.27 |  7.40    2.29 | 13.40    5.59 | 19.40    1.78
                1.60    1.27 |  7.60    2.29 | 13.60    5.59 | 19.60    1.78
                1.80    1.27 |  7.80    2.29 | 13.80    5.59 | 19.80    1.78
                2.00    1.27 |  8.00    2.29 | 14.00    5.59 | 20.00    1.78
                2.20    1.27 |  8.20    3.30 | 14.20    3.30 | 20.20    1.78
                2.40    1.27 |  8.40    3.30 | 14.40    3.30 | 20.40    1.78
                2.60    1.27 |  8.60    3.30 | 14.60    3.30 | 20.60    1.78
                2.80    1.27 |  8.80    3.30 | 14.80    3.30 | 20.80    1.78
                3.00    1.27 |  9.00    3.30 | 15.00    3.30 | 21.00    1.78
                3.20    1.27 |  9.20    3.30 | 15.20    3.30 | 21.20    1.27
                3.40    1.27 |  9.40    3.30 | 15.40    3.30 | 21.40    1.27
                3.60    1.27 |  9.60    3.30 | 15.60    3.30 | 21.60    1.27
                3.80    1.27 |  9.80    3.30 | 15.80    3.30 | 21.80    1.27
                4.00    1.27 | 10.00    3.30 | 16.00    3.30 | 22.00    1.27
                4.20    2.29 | 10.20    6.10 | 16.20    2.29 | 22.20    1.27
                4.40    2.29 | 10.40    6.10 | 16.40    2.29 | 22.40    1.27
                4.60    2.29 | 10.60    6.10 | 16.60    2.29 | 22.60    1.27
                4.80    2.29 | 10.80    6.10 | 16.80    2.29 | 22.80    1.27
                5.00    2.29 | 11.00    6.10 | 17.00    2.29 | 23.00    1.27
                5.20    2.29 | 11.20    8.13 | 17.20    2.29 | 23.20    1.27
                5.40    2.29 | 11.40   11.94 | 17.40    2.29 | 23.40    1.27
                5.60    2.29 | 11.60   27.43 | 17.60    2.29 | 23.60    1.27
                5.80    2.29 | 11.80   59.94 | 17.80    2.29 | 23.80    1.27
                6.00    2.29 | 12.00  126.49 | 18.00    2.29 | 24.00    1.27

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0229)|   Area     (ha)=  12.13
|ID= 1 DT=12.0 min |   Total Imp(%)=  54.50   Dir. Conn.(%)=  19.70
--------------------
                                  IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=        6.61          5.52
     Dep. Storage      (mm)=        1.00          1.50
     Average Slope      (%)=        1.00          2.00
     Length             (m)=      284.37         40.00
     Mannings n            =       0.013         0.250

     Max.Eff.Inten.(mm/hr)=      126.49        162.76
               over (min)        12.00         12.00
     Storage Coeff.  (min)=        4.35 (ii)    10.16 (ii)
     Unit Hyd. Tpeak (min)=       12.00         12.00
     Unit Hyd. peak  (cms)=        0.13          0.10
                                                          *TOTALS*
     PEAK FLOW       (cms)=        0.81          1.98       2.788 (iii)
     TIME TO PEAK    (hrs)=       12.00         12.00      12.00
     RUNOFF VOLUME    (mm)=      111.42         70.63      78.67
     TOTAL RAINFALL   (mm)=      112.42        112.42     112.42
     RUNOFF COEFFICIENT   =        0.99          0.63       0.70

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| ADD HYD  (  0196)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0184):    15.66    0.309    13.00    80.98
      + ID2= 2 (  0229):    12.13    2.788    12.00    78.67
        ==========================================================
        ID = 3 (  0196):    27.79    2.906    12.00    79.97

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0256)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW    STORAGE    |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)    |   (cms)     (ha.m.)
                        0.0000     0.0000     |   0.2761     0.3332
                        0.0090     0.0385     |   0.3101     0.3536
                        0.0147     0.0812     |   0.3454     0.3743
                        0.0199     0.1456     |   0.3818     0.3952
```

0.0210	0.1631	0.4194	0.4165
0.0987	0.2172	0.4581	0.4381
0.1306	0.2358	0.4979	0.4600
0.1761	0.2739	0.5806	0.5047
0.2120	0.2934	0.6234	0.5275
0.2433	0.3131	0.7121	0.5742

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0196)	27.790	2.906	12.00	79.97
OUTFLOW: ID= 1 (0256)	27.790	0.645	12.60	79.93

PEAK FLOW REDUCTION [Qout/Qin](%)= 22.19
TIME SHIFT OF PEAK FLOW (min)= 36.00
MAXIMUM STORAGE USED (ha.m.)= 0.5397

READ STORM	Filename: C:\Users\jlysecki\AppData\Local\Temp\aad80675-a0b4-4fc2-876a-2640adc73013\f5882d70
Ptotal=112.42 mm	Comments: SCS TYPE II TWENTY FOUR HOUR, HUNDRED YE

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.20	1.27	6.20	2.29	12.20	21.84	18.20	2.29
0.40	1.27	6.40	2.29	12.40	13.72	18.40	2.29
0.60	1.27	6.60	2.29	12.60	9.91	18.60	2.29
0.80	1.27	6.80	2.29	12.80	9.40	18.80	2.29
1.00	1.27	7.00	2.29	13.00	6.60	19.00	2.29
1.20	1.27	7.20	2.29	13.20	5.59	19.20	1.78
1.40	1.27	7.40	2.29	13.40	5.59	19.40	1.78
1.60	1.27	7.60	2.29	13.60	5.59	19.60	1.78
1.80	1.27	7.80	2.29	13.80	5.59	19.80	1.78
2.00	1.27	8.00	2.29	14.00	5.59	20.00	1.78
2.20	1.27	8.20	3.30	14.20	3.30	20.20	1.78
2.40	1.27	8.40	3.30	14.40	3.30	20.40	1.78
2.60	1.27	8.60	3.30	14.60	3.30	20.60	1.78
2.80	1.27	8.80	3.30	14.80	3.30	20.80	1.78
3.00	1.27	9.00	3.30	15.00	3.30	21.00	1.78
3.20	1.27	9.20	3.30	15.20	3.30	21.20	1.27
3.40	1.27	9.40	3.30	15.40	3.30	21.40	1.27
3.60	1.27	9.60	3.30	15.60	3.30	21.60	1.27
3.80	1.27	9.80	3.30	15.80	3.30	21.80	1.27
4.00	1.27	10.00	3.30	16.00	3.30	22.00	1.27
4.20	2.29	10.20	6.10	16.20	2.29	22.20	1.27
4.40	2.29	10.40	6.10	16.40	2.29	22.40	1.27
4.60	2.29	10.60	6.10	16.60	2.29	22.60	1.27
4.80	2.29	10.80	6.10	16.80	2.29	22.80	1.27
5.00	2.29	11.00	6.10	17.00	2.29	23.00	1.27
5.20	2.29	11.20	8.13	17.20	2.29	23.20	1.27
5.40	2.29	11.40	11.94	17.40	2.29	23.40	1.27
5.60	2.29	11.60	27.43	17.60	2.29	23.60	1.27
5.80	2.29	11.80	59.94	17.80	2.29	23.80	1.27
6.00	2.29	12.00	126.49	18.00	2.29	24.00	1.27

CALIB STANDHYD (0230) ID= 1 DT=12.0 min	Area (ha)= 20.35 Total Imp(%)= 53.70 Dir. Conn.(%)= 32.40

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	10.93	9.42
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	368.33	40.00
Mannings n	=	0.013	0.250
Max.Eff.Inten.(mm/hr)=		126.49	125.11
over (min)		12.00	12.00
Storage Coeff. (min)=		5.08 (ii)	11.54 (ii)
Unit Hyd. Tpeak (min)=		12.00	12.00
Unit Hyd. peak (cms)=		0.13	0.09

		TOTALS
PEAK FLOW	(cms)=	4.663 (iii)
TIME TO PEAK	(hrs)=	12.00
RUNOFF VOLUME	(mm)=	80.35
TOTAL RAINFALL	(mm)=	112.42
RUNOFF COEFFICIENT	=	0.71

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0224) 1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0230):	20.35	4.663	12.00	80.35
+ ID2= 2 (0256):	27.79	0.645	12.60	79.93
ID = 3 (0224):	48.14	5.003	12.00	80.11

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0253)
IN= 2---> OUT= 1
DT= 12.0 min

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.6390	0.9848
0.0270	0.1457	0.9700	1.2900
0.0430	0.3152	1.1040	1.7480
0.0530	0.4653	3.3100	1.9350
0.3280	0.6677	11.3140	2.2662

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0224)	48.140	5.003	12.00	80.11
OUTFLOW: ID= 1 (0253)	48.140	0.807	14.00	80.08

PEAK FLOW REDUCTION [Qout/Qin](%)= 16.14
TIME SHIFT OF PEAK FLOW (min)=120.00
MAXIMUM STORAGE USED (ha.m.)= 1.1405

READ STORM	Filename: C:\Users\jlysecki\AppData\Local\Temp\aad80675-a0b4-4fc2-876a-2640adc73013\f5882d70
Ptotal=112.42 mm	Comments: SCS TYPE II TWENTY FOUR HOUR, HUNDRED YE

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.20	1.27	6.20	2.29	12.20	21.84	18.20	2.29
0.40	1.27	6.40	2.29	12.40	13.72	18.40	2.29
0.60	1.27	6.60	2.29	12.60	9.91	18.60	2.29
0.80	1.27	6.80	2.29	12.80	9.40	18.80	2.29
1.00	1.27	7.00	2.29	13.00	6.60	19.00	2.29
1.20	1.27	7.20	2.29	13.20	5.59	19.20	1.78
1.40	1.27	7.40	2.29	13.40	5.59	19.40	1.78
1.60	1.27	7.60	2.29	13.60	5.59	19.60	1.78
1.80	1.27	7.80	2.29	13.80	5.59	19.80	1.78
2.00	1.27	8.00	2.29	14.00	5.59	20.00	1.78
2.20	1.27	8.20	3.30	14.20	3.30	20.20	1.78
2.40	1.27	8.40	3.30	14.40	3.30	20.40	1.78
2.60	1.27	8.60	3.30	14.60	3.30	20.60	1.78
2.80	1.27	8.80	3.30	14.80	3.30	20.80	1.78
3.00	1.27	9.00	3.30	15.00	3.30	21.00	1.78
3.20	1.27	9.20	3.30	15.20	3.30	21.20	1.27
3.40	1.27	9.40	3.30	15.40	3.30	21.40	1.27

3.60	1.27	9.60	3.30	15.60	3.30	21.60	1.27
3.80	1.27	9.80	3.30	15.80	3.30	21.80	1.27
4.00	1.27	10.00	3.30	16.00	3.30	22.00	1.27
4.20	2.29	10.20	6.10	16.20	2.29	22.20	1.27
4.40	2.29	10.40	6.10	16.40	2.29	22.40	1.27
4.60	2.29	10.60	6.10	16.60	2.29	22.60	1.27
4.80	2.29	10.80	6.10	16.80	2.29	22.80	1.27
5.00	2.29	11.00	6.10	17.00	2.29	23.00	1.27
5.20	2.29	11.20	8.13	17.20	2.29	23.20	1.27
5.40	2.29	11.40	11.94	17.40	2.29	23.40	1.27
5.60	2.29	11.60	27.43	17.60	2.29	23.60	1.27
5.80	2.29	11.80	59.94	17.80	2.29	23.80	1.27
6.00	2.29	12.00	126.49	18.00	2.29	24.00	1.27

CALIB			
STANDHYD (0160)	Area (ha)= 1.30		
ID= 1 DT=12.0 min	Total Imp(%)= 50.70	Dir. Conn.(%)= 22.00	

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	0.66	0.64	
Dep. Storage	(mm)=	1.00	1.50	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	93.09	40.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.	(mm/hr)=	126.49	140.04	
over	(min)	12.00	12.00	
Storage Coeff.	(min)=	2.23 (ii)	8.40 (ii)	
Unit Hyd. Tpeak	(min)=	12.00	12.00	
Unit Hyd. peak	(cms)=	0.14	0.11	
				TOTALS
PEAK FLOW	(cms)=	0.10	0.21	0.310 (iii)
TIME TO PEAK	(hrs)=	12.00	12.00	12.00
RUNOFF VOLUME	(mm)=	111.42	67.68	77.30
TOTAL RAINFALL	(mm)=	112.42	112.42	112.42
RUNOFF COEFFICIENT	=	0.99	0.60	0.69

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

DUHYD (0183)				
Inlet Cap.= 0.152				
#of Inlets= 1				
Total(cms)= 0.2	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
TOTAL HYD.(ID= 1):	1.30	0.31	12.00	77.30
MAJOR SYS.(ID= 2):	0.15	0.16	12.00	77.30
MINOR SYS.(ID= 3):	1.15	0.15	12.00	77.30

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

READ STORM	Filename: C:\Users\jlysecki\AppData\Local\Temp\aad80675-a0b4-4fc2-876a-2640adc73013\f5882d70
Ptotal=112.42 mm	Comments: SCS TYPE II TWENTY FOUR HOUR, HUNDRED YE

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.20	1.27	6.20	2.29	12.20	21.84	18.20	2.29
0.40	1.27	6.40	2.29	12.40	13.72	18.40	2.29
0.60	1.27	6.60	2.29	12.60	9.91	18.60	2.29
0.80	1.27	6.80	2.29	12.80	9.40	18.80	2.29
1.00	1.27	7.00	2.29	13.00	6.60	19.00	2.29
1.20	1.27	7.20	2.29	13.20	5.59	19.20	1.78
1.40	1.27	7.40	2.29	13.40	5.59	19.40	1.78
1.60	1.27	7.60	2.29	13.60	5.59	19.60	1.78
1.80	1.27	7.80	2.29	13.80	5.59	19.80	1.78
2.00	1.27	8.00	2.29	14.00	5.59	20.00	1.78
2.20	1.27	8.20	3.30	14.20	3.30	20.20	1.78
2.40	1.27	8.40	3.30	14.40	3.30	20.40	1.78
2.60	1.27	8.60	3.30	14.60	3.30	20.60	1.78
2.80	1.27	8.80	3.30	14.80	3.30	20.80	1.78
3.00	1.27	9.00	3.30	15.00	3.30	21.00	1.78
3.20	1.27	9.20	3.30	15.20	3.30	21.20	1.27
3.40	1.27	9.40	3.30	15.40	3.30	21.40	1.27
3.60	1.27	9.60	3.30	15.60	3.30	21.60	1.27
3.80	1.27	9.80	3.30	15.80	3.30	21.80	1.27
4.00	1.27	10.00	3.30	16.00	3.30	22.00	1.27
4.20	2.29	10.20	6.10	16.20	2.29	22.20	1.27
4.40	2.29	10.40	6.10	16.40	2.29	22.40	1.27
4.60	2.29	10.60	6.10	16.60	2.29	22.60	1.27
4.80	2.29	10.80	6.10	16.80	2.29	22.80	1.27
5.00	2.29	11.00	6.10	17.00	2.29	23.00	1.27
5.20	2.29	11.20	8.13	17.20	2.29	23.20	1.27
5.40	2.29	11.40	11.94	17.40	2.29	23.40	1.27
5.60	2.29	11.60	27.43	17.60	2.29	23.60	1.27
5.80	2.29	11.80	59.94	17.80	2.29	23.80	1.27
6.00	2.29	12.00	126.49	18.00	2.29	24.00	1.27

CALIB			
STANDHYD (0193)	Area (ha)= 1.21		
ID= 1 DT=12.0 min	Total Imp(%)= 49.30	Dir. Conn.(%)= 20.10	

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	0.60	0.61	
Dep. Storage	(mm)=	1.00	1.50	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	89.81	40.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.	(mm/hr)=	126.49	139.28	
over	(min)	12.00	12.00	
Storage Coeff.	(min)=	2.18 (ii)	8.36 (ii)	
Unit Hyd. Tpeak	(min)=	12.00	12.00	
Unit Hyd. peak	(cms)=	0.14	0.11	
				TOTALS
PEAK FLOW	(cms)=	0.09	0.20	0.285 (iii)
TIME TO PEAK	(hrs)=	12.00	12.00	12.00
RUNOFF VOLUME	(mm)=	111.42	67.57	76.38
TOTAL RAINFALL	(mm)=	112.42	112.42	112.42
RUNOFF COEFFICIENT	=	0.99	0.60	0.68

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

DUHYD (0227)				
Inlet Cap.= 0.120				
#of Inlets= 1				
Total(cms)= 0.1	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
TOTAL HYD.(ID= 1):	1.21	0.29	12.00	76.38
MAJOR SYS.(ID= 2):	0.16	0.17	12.00	76.38
MINOR SYS.(ID= 3):	1.05	0.12	11.80	76.38

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

COLE ENGINEERING

Experience Enhancing Excellence

```
--------------------
|    READ STORM    |    Filename: C:\Users\jlysecki\AppD
|                  |              ata\Local\Temp\
|                  |              aad80675-a0b4-4fc2-876a-2640adc73013\f5882d70
| Ptotal=112.42 mm |    Comments: SCS TYPE II TWENTY FOUR HOUR, HUNDRED YE
--------------------
```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.20	1.27	6.20	2.29	12.20	21.84	18.20	2.29
0.40	1.27	6.40	2.29	12.40	13.72	18.40	2.29
0.60	1.27	6.60	2.29	12.60	9.91	18.60	2.29
0.80	1.27	6.80	2.29	12.80	9.40	18.80	2.29
1.00	1.27	7.00	2.29	13.00	6.60	19.00	2.29
1.20	1.27	7.20	2.29	13.20	5.59	19.20	1.78
1.40	1.27	7.40	2.29	13.40	5.59	19.40	1.78
1.60	1.27	7.60	2.29	13.60	5.59	19.60	1.78
1.80	1.27	7.80	2.29	13.80	5.59	19.80	1.78
2.00	1.27	8.00	2.29	14.00	5.59	20.00	1.78
2.20	1.27	8.20	3.30	14.20	3.30	20.20	1.78
2.40	1.27	8.40	3.30	14.40	3.30	20.40	1.78
2.60	1.27	8.60	3.30	14.60	3.30	20.60	1.78
2.80	1.27	8.80	3.30	14.80	3.30	20.80	1.78
3.00	1.27	9.00	3.30	15.00	3.30	21.00	1.78
3.20	1.27	9.20	3.30	15.20	3.30	21.20	1.27
3.40	1.27	9.40	3.30	15.40	3.30	21.40	1.27
3.60	1.27	9.60	3.30	15.60	3.30	21.60	1.27
3.80	1.27	9.80	3.30	15.80	3.30	21.80	1.27
4.00	1.27	10.00	3.30	16.00	3.30	22.00	1.27
4.20	2.29	10.20	6.10	16.20	2.29	22.20	1.27
4.40	2.29	10.40	6.10	16.40	2.29	22.40	1.27
4.60	2.29	10.60	6.10	16.60	2.29	22.60	1.27
4.80	2.29	10.80	6.10	16.80	2.29	22.80	1.27
5.00	2.29	11.00	6.10	17.00	2.29	23.00	1.27
5.20	2.29	11.20	8.13	17.20	2.29	23.20	1.27
5.40	2.29	11.40	11.94	17.40	2.29	23.40	1.27
5.60	2.29	11.60	27.43	17.60	2.29	23.60	1.27
5.80	2.29	11.80	59.94	17.80	2.29	23.80	1.27
6.00	2.29	12.00	126.49	18.00	2.29	24.00	1.27

```
--------------------
| CALIB            |
| STANDHYD (  0206)|   Area     (ha)=  38.60
|ID= 1 DT=12.0 min |   Total Imp(%)=  54.70   Dir. Conn.(%)=  23.20
--------------------
```

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	21.11	17.49
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	507.28	40.00
Mannings n	=	0.013	0.250
Max.Eff.Inten.	(mm/hr)=	126.49	154.08
over	(min)	12.00	24.00
Storage Coeff.	(min)=	6.16 (ii)	12.10 (ii)
Unit Hyd. Tpeak	(min)=	12.00	24.00
Unit Hyd. peak	(cms)=	0.12	0.07
			TOTALS
PEAK FLOW	(cms)=	2.89	4.55	6.404 (iii)
TIME TO PEAK	(hrs)=	12.00	12.20	12.00
RUNOFF VOLUME	(mm)=	111.42	69.56	79.27
TOTAL RAINFALL	(mm)=	112.42	112.42	112.42
RUNOFF COEFFICIENT	=	0.99	0.62	0.71

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

```
--------------------
| ADD HYD  (  0225)|
|   1 +  2 =  3    |          AREA     QPEAK     TPEAK      R.V.
--------------------          (ha)     (cms)     (hrs)      (mm)
       ID1= 1 (  0183):      0.15     0.158     12.00     77.30
     + ID2= 2 (  0206):     38.60     6.404     12.00     79.27
       ==========================================================
       ID = 3 (  0225):     38.75     6.562     12.00     79.26

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

```
--------------------
| ADD HYD  (  0225)|
|   3 +  2 =  1    |          AREA     QPEAK     TPEAK      R.V.
--------------------          (ha)     (cms)     (hrs)      (mm)
       ID1= 3 (  0225):     38.75     6.562     12.00     79.26
     + ID2= 2 (  0227):      0.16     0.165     12.00     76.38
       ==========================================================
       ID = 1 (  0225):     38.90     6.727     12.00     79.25

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

```
--------------------
|    READ STORM    |    Filename: C:\Users\jlysecki\AppD
|                  |              ata\Local\Temp\
|                  |              aad80675-a0b4-4fc2-876a-2640adc73013\f5882d70
| Ptotal=112.42 mm |    Comments: SCS TYPE II TWENTY FOUR HOUR, HUNDRED YE
--------------------
```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.20	1.27	6.20	2.29	12.20	21.84	18.20	2.29
0.40	1.27	6.40	2.29	12.40	13.72	18.40	2.29
0.60	1.27	6.60	2.29	12.60	9.91	18.60	2.29
0.80	1.27	6.80	2.29	12.80	9.40	18.80	2.29
1.00	1.27	7.00	2.29	13.00	6.60	19.00	2.29
1.20	1.27	7.20	2.29	13.20	5.59	19.20	1.78
1.40	1.27	7.40	2.29	13.40	5.59	19.40	1.78
1.60	1.27	7.60	2.29	13.60	5.59	19.60	1.78
1.80	1.27	7.80	2.29	13.80	5.59	19.80	1.78
2.00	1.27	8.00	2.29	14.00	5.59	20.00	1.78
2.20	1.27	8.20	3.30	14.20	3.30	20.20	1.78
2.40	1.27	8.40	3.30	14.40	3.30	20.40	1.78
2.60	1.27	8.60	3.30	14.60	3.30	20.60	1.78
2.80	1.27	8.80	3.30	14.80	3.30	20.80	1.78
3.00	1.27	9.00	3.30	15.00	3.30	21.00	1.78
3.20	1.27	9.20	3.30	15.20	3.30	21.20	1.27
3.40	1.27	9.40	3.30	15.40	3.30	21.40	1.27
3.60	1.27	9.60	3.30	15.60	3.30	21.60	1.27
3.80	1.27	9.80	3.30	15.80	3.30	21.80	1.27
4.00	1.27	10.00	3.30	16.00	3.30	22.00	1.27
4.20	2.29	10.20	6.10	16.20	2.29	22.20	1.27
4.40	2.29	10.40	6.10	16.40	2.29	22.40	1.27
4.60	2.29	10.60	6.10	16.60	2.29	22.60	1.27
4.80	2.29	10.80	6.10	16.80	2.29	22.80	1.27
5.00	2.29	11.00	6.10	17.00	2.29	23.00	1.27
5.20	2.29	11.20	8.13	17.20	2.29	23.20	1.27
5.40	2.29	11.40	11.94	17.40	2.29	23.40	1.27
5.60	2.29	11.60	27.43	17.60	2.29	23.60	1.27
5.80	2.29	11.80	59.94	17.80	2.29	23.80	1.27
6.00	2.29	12.00	126.49	18.00	2.29	24.00	1.27

```
--------------------
| CALIB            |
| STANDHYD (  0209)|   Area     (ha)=   5.20
|ID= 1 DT=12.0 min |   Total Imp(%)=  31.60   Dir. Conn.(%)=  19.40
--------------------
```

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	1.64	3.56
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00

Length	(m)=	186.19	40.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.	(mm/hr)=	126.49	91.70	
over	(min)	12.00	12.00	
Storage Coeff.	(min)=	3.38 (ii)	10.68 (ii)	
Unit Hyd. Tpeak	(min)=	12.00	12.00	
Unit Hyd. peak	(cms)=	0.14	0.10	
				TOTALS
PEAK FLOW	(cms)=	0.35	0.70	1.050 (iii)
TIME TO PEAK	(hrs)=	12.00	12.00	12.00
RUNOFF VOLUME	(mm)=	111.42	59.40	69.49
TOTAL RAINFALL	(mm)=	112.42	112.42	112.42
RUNOFF COEFFICIENT	=	0.99	0.53	0.62

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
YOU SHOULD CONSIDER SPLITTING THE AREA.

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

READ STORM | Filename: C:\Users\jlysecki\AppD
ata\Local\Temp\
aad80675-a0b4-4fc2-876a-2640adc73013\f5882d70
Ptotal=112.42 mm | Comments: SCS TYPE II TWENTY FOUR HOUR, HUNDRED YE

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.20	1.27	6.20	2.29	12.20	21.84	18.20	2.29
0.40	1.27	6.40	2.29	12.40	13.72	18.40	2.29
0.60	1.27	6.60	2.29	12.60	9.91	18.60	2.29
0.80	1.27	6.80	2.29	12.80	9.40	18.80	2.29
1.00	1.27	7.00	2.29	13.00	6.60	19.00	2.29
1.20	1.27	7.20	2.29	13.20	5.59	19.20	1.78
1.40	1.27	7.40	2.29	13.40	5.59	19.40	1.78
1.60	1.27	7.60	2.29	13.60	5.59	19.60	1.78
1.80	1.27	7.80	2.29	13.80	5.59	19.80	1.78
2.00	1.27	8.00	2.29	14.00	5.59	20.00	1.78
2.20	1.27	8.20	3.30	14.20	3.30	20.20	1.78
2.40	1.27	8.40	3.30	14.40	3.30	20.40	1.78
2.60	1.27	8.60	3.30	14.60	3.30	20.60	1.78
2.80	1.27	8.80	3.30	14.80	3.30	20.80	1.78
3.00	1.27	9.00	3.30	15.00	3.30	21.00	1.78
3.20	1.27	9.20	3.30	15.20	3.30	21.20	1.27
3.40	1.27	9.40	3.30	15.40	3.30	21.40	1.27
3.60	1.27	9.60	3.30	15.60	3.30	21.60	1.27
3.80	1.27	9.80	3.30	15.80	3.30	21.80	1.27
4.00	1.27	10.00	3.30	16.00	3.30	22.00	1.27
4.20	2.29	10.20	6.10	16.20	2.29	22.20	1.27
4.40	2.29	10.40	6.10	16.40	2.29	22.40	1.27
4.60	2.29	10.60	6.10	16.60	2.29	22.60	1.27
4.80	2.29	10.80	6.10	16.80	2.29	22.80	1.27
5.00	2.29	11.00	6.10	17.00	2.29	23.00	1.27
5.20	2.29	11.20	8.13	17.20	2.29	23.20	1.27
5.40	2.29	11.40	11.94	17.40	2.29	23.40	1.27
5.60	2.29	11.60	27.43	17.60	2.29	23.60	1.27
5.80	2.29	11.80	59.94	17.80	2.29	23.80	1.27
6.00	2.29	12.00	126.49	18.00	2.29	24.00	1.27

CALIB
STANDHYD (0252) | Area (ha)= 1.44
ID= 1 DT=12.0 min | Total Imp(%)= 52.40 Dir. Conn.(%)= 20.10

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.75	0.69
Dep. Storage	(mm)=	1.00	1.50

Average Slope	(%)=	1.00	2.00
Length	(m)=	97.98	40.00
Mannings n	=	0.013	0.250
Max.Eff.Inten.	(mm/hr)=	126.49	151.98
over	(min)	12.00	12.00
Storage Coeff.	(min)=	2.30 (ii)	8.27 (ii)
Unit Hyd. Tpeak	(min)=	12.00	12.00
Unit Hyd. peak	(cms)=	0.14	0.11
			TOTALS
PEAK FLOW	(cms)=	0.10	0.24	0.346 (iii)
TIME TO PEAK	(hrs)=	12.00	12.00	12.00
RUNOFF VOLUME	(mm)=	111.42	69.29	77.75
TOTAL RAINFALL	(mm)=	112.42	112.42	112.42
RUNOFF COEFFICIENT	=	0.99	0.62	0.69

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

RESERVOIR(0261)|
IN= 2---> OUT= 1 |
DT= 5.0 min |

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.1470	0.0137
0.0530	0.0050	0.1700	0.0155
0.0700	0.0076	0.1900	0.0220
0.1150	0.0113	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0252)	1.440	0.346	12.00	77.75
OUTFLOW: ID= 1 (0261)	1.440	0.185	12.10	77.74

PEAK FLOW REDUCTION [Qout/Qin](%)= 53.55
TIME SHIFT OF PEAK FLOW (min)= 6.00
MAXIMUM STORAGE USED (ha.m.)= 0.0214

ADD HYD (0251)|
1 + 2 = 3 |

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0209):	5.20	1.050	12.00	69.49
+ ID2= 2 (0261):	1.44	0.185	12.10	77.74
ID = 3 (0251):	6.64	1.223	12.00	71.28

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0245)|
IN= 2---> OUT= 1 |
DT= 12.0 min |

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.3090	0.2876
0.0000	0.0000	0.3330	0.3838
0.1230	0.1102	0.3620	0.5200
0.2870	0.1971	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0251)	6.640	1.223	12.00	71.28
OUTFLOW: ID= 1 (0245)	6.640	0.272	12.50	71.24

PEAK FLOW REDUCTION [Qout/Qin](%)= 22.27
TIME SHIFT OF PEAK FLOW (min)= 30.00
MAXIMUM STORAGE USED (ha.m.)= 0.1898

COLE ENGINEERING

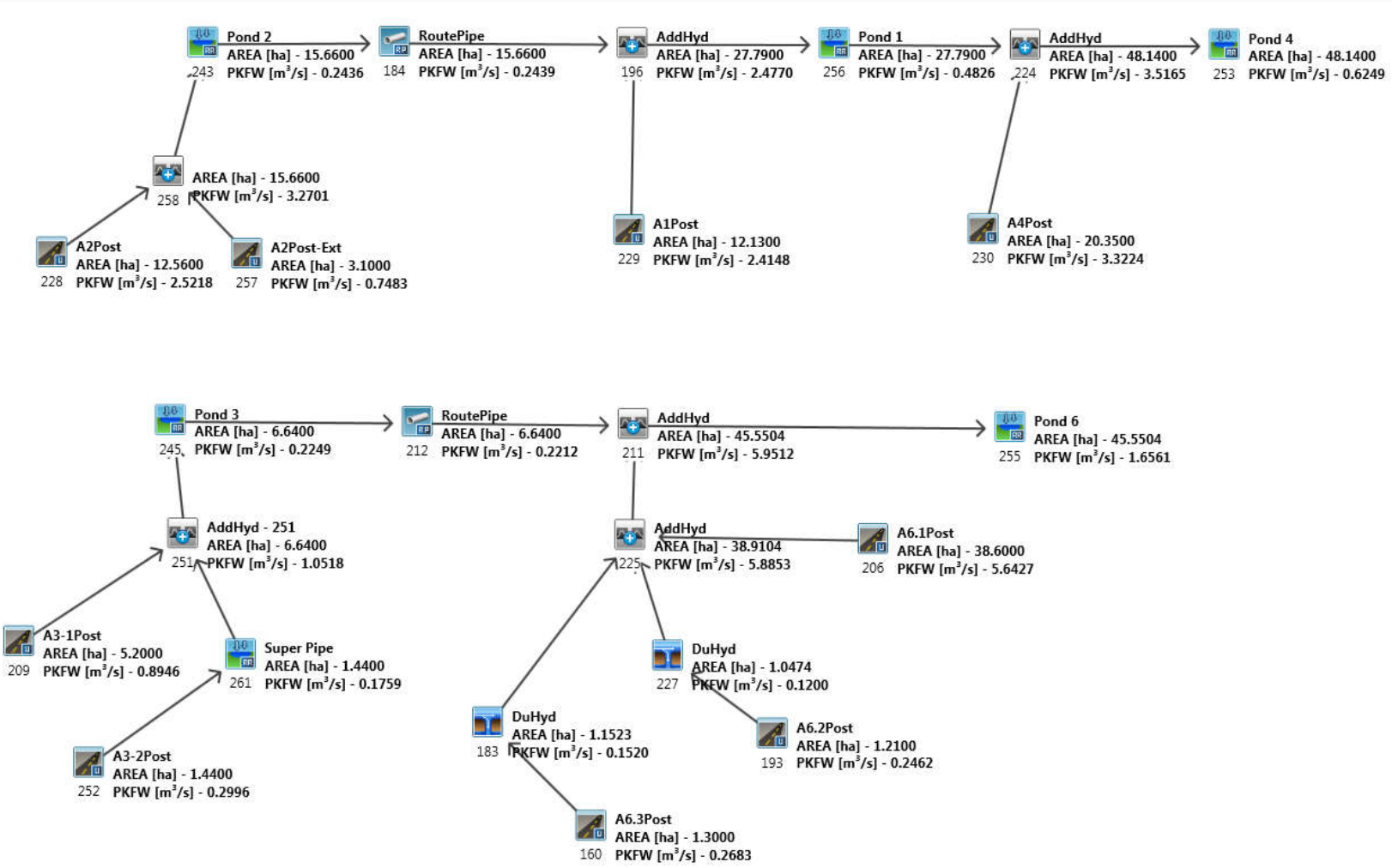
Experience Enhancing Excellence

```
-------------------------------------------------------------------------------
-------------------
| ROUTEPIPE(  0212)|     PIPE Number      =   1.00
| IN= 2---> OUT= 1 |     Diameter    (mm)=1650.00
| DT= 12.0 min     |     Length       (m)= 850.00
-------------------      Slope      (m/m)=  0.005
                         Manning n        =  0.013

     <----------------- TRAVEL TIME TABLE ------------------->
       DEPTH      VOLUME     FLOW RATE    VELOCITY    TRAV.TIME
         (m)      (cu.m.)       (cms)        (m/s)        min
        0.09     .367E+02        0.0         0.80        17.68
        0.17     .102E+03        0.1         1.25        11.33
        0.26     .184E+03        0.3         1.61         8.81
        0.35     .278E+03        0.6         1.91         7.41
        0.43     .382E+03        1.0         2.18         6.51
        0.52     .492E+03        1.4         2.41         5.88
        0.61     .608E+03        1.9         2.61         5.43
        0.69     .727E+03        2.4         2.79         5.08
        0.78     .848E+03        2.9         2.95         4.81
        0.87     .970E+03        3.5         3.08         4.60
        0.96     .109E+04        4.1         3.20         4.43
        1.04     .121E+04        4.7         3.29         4.31
        1.13     .133E+04        5.2         3.36         4.22
        1.22     .144E+04        5.8         3.41         4.15
        1.30     .154E+04        6.2         3.44         4.12
        1.39     .163E+04        6.6         3.43         4.13
        1.48     .172E+04        6.9         3.40         4.17
        1.56     .178E+04        6.9         3.31         4.28
        1.65     .182E+04        6.5         3.02         4.70
                                    <---- hydrograph ---->   <-pipe / channel->
                                  AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                                  (ha)    (cms)   (hrs)   (mm)       (m)       (m/s)
   INFLOW : ID= 2 (  0245)     6.64     0.27   12.50  71.24      0.23      1.45
   OUTFLOW: ID= 1 (  0212)     6.64     0.27   12.70  71.24      0.22      1.44


-------------------------------------------------------------------------------
-------------------
| ADD HYD  (  0211)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0212):     6.64   0.269    12.70    71.24
     + ID2= 2 (  0225):    38.90   6.727    12.00    79.25
       ================================================
       ID = 3 (  0211):    45.54   6.813    12.00    78.08

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
-------------------
| RESERVOIR(  0255)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
-------------------       (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   1.6250      1.2448
                          0.0190     0.1627   |   1.6630      1.2997
                          0.0360     0.4306   |   1.8430      1.5816
                          0.0480     0.7217   |   2.1300      2.1197
                          0.1330     0.7718   |   2.9680      2.2465
                          1.0390     0.9773   |   7.5380      2.5741

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0211)     45.544     6.813     12.00      78.08
   OUTFLOW: ID= 1 (  0255)     45.544     1.839     12.60      78.03

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 27.00
                  TIME SHIFT OF PEAK FLOW         (min)= 36.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  1.5777

-------------------------------------------------------------------------------
FINISH
===============================================================================
```

COLE ENGINEERING
Experience Enhancing Excellence

L09-301 – Marianneville – Glenway Estates (Phase 2)
2, 5, 10, 25, 50 & 100-Year 12 Hour SCS Storm
Proposed Condition Model Output
January 2020

VO5 Model Schematic



COLE ENGINEERING

Experience Enhancing Excellence

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

       V    V   I    SSSSS  U   U    A    L              (v 5.1.2004)
       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)\Visual OTTHYMO 5.1\VO2\voin.dat
  Output  filename: C:\Users\jlysecki\AppData\Local\Civica\VH5\a379672b-db33-4372-b5e0-
ba58a07d1417\011ba78b-d9b3-467c-a7b6-905913564f20\sce
  Summary filename: C:\Users\jlysecki\AppData\Local\Civica\VH5\a379672b-db33-4372-b5e0-
ba58a07d1417\011ba78b-d9b3-467c-a7b6-905913564f20\sce


DATE: 01/15/2020                          TIME: 04:16:44

USER:



COMMENTS: _____________________________________________________

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


--------------------
|    READ STORM    |    Filename: C:\Users\jlysecki\AppD
|                  |              ata\Local\Temp\
|                  |              1e046b6a-70e8-44fb-adb2-28217afe7b2a\a0ec6f58
| Ptotal= 42.00 mm |    Comments: 2 YR 12 HOUR SCS
--------------------
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.25    1.05 |  3.25    1.68 |  6.25    7.56 |  9.25    1.47
                0.50    1.05 |  3.50    1.68 |  6.50    7.56 |  9.50    1.47
                0.75    1.05 |  3.75    1.68 |  6.75    3.36 |  9.75    1.47
                1.00    1.05 |  4.00    1.68 |  7.00    3.36 | 10.00    1.47
                1.25    1.05 |  4.25    2.52 |  7.25    2.52 | 10.25    0.84
                1.50    1.05 |  4.50    2.52 |  7.50    2.52 | 10.50    0.84
                1.75    1.05 |  4.75    3.36 |  7.75    2.52 | 10.75    0.84
                2.00    1.05 |  5.00    3.36 |  8.00    2.52 | 11.00    0.84
                2.25    1.26 |  5.25    5.04 |  8.25    1.47 | 11.25    0.84
                2.50    1.26 |  5.50    5.04 |  8.50    1.47 | 11.50    0.84
                2.75    1.26 |  5.75   20.16 |  8.75    1.47 | 11.75    0.84
                3.00    1.26 |  6.00   55.44 |  9.00    1.47 | 12.00    0.84

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


--------------------
| CALIB            |
| STANDHYD (  0228)|   Area     (ha)=  12.56
|ID= 1 DT=12.0 min |   Total Imp(%)=  54.10   Dir. Conn.(%)=  25.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       6.79          5.77
     Dep. Storage     (mm)=       1.00          1.50
     Average Slope     (%)=       1.00          2.00
     Length            (m)=     289.37         40.00
     Mannings n           =      0.013         0.250

        NOTE:  RAINFALL WAS TRANSFORMED TO  12.0 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
               0.200    1.05 | 3.200    1.68 | 6.200    7.56 |  9.20    1.47
               0.400    1.05 | 3.400    1.68 | 6.400    7.56 |  9.40    1.47
               0.600    1.05 | 3.600    1.68 | 6.600    5.46 |  9.60    1.47
               0.800    1.05 | 3.800    1.68 | 6.800    3.36 |  9.80    1.47
               1.000    1.05 | 4.000    1.68 | 7.000    3.36 | 10.00    1.47
               1.200    1.05 | 4.200    2.52 | 7.200    2.52 | 10.20    0.84
               1.400    1.05 | 4.400    2.52 | 7.400    2.52 | 10.40    0.84
               1.600    1.05 | 4.600    2.94 | 7.600    2.52 | 10.60    0.84
               1.800    1.05 | 4.800    3.36 | 7.800    2.52 | 10.80    0.84
               2.000    1.05 | 5.000    3.36 | 8.000    2.52 | 11.00    0.84
               2.200    1.26 | 5.200    5.04 | 8.200    1.47 | 11.20    0.84
               2.400    1.26 | 5.400    5.04 | 8.400    1.47 | 11.40    0.84
               2.600    1.26 | 5.600   12.60 | 8.600    1.47 | 11.60    0.84
               2.800    1.26 | 5.800   28.98 | 8.800    1.47 | 11.80    0.84
               3.000    1.26 | 6.000   55.44 | 9.000    1.47 | 12.00    0.84

     Max.Eff.Inten.(mm/hr)=      55.44         39.07
               over (min)        12.00         24.00
     Storage Coeff.  (min)=       6.12 (ii)    16.40 (ii)
     Unit Hyd. Tpeak (min)=      12.00         24.00
     Unit Hyd. peak  (cms)=       0.12          0.06
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.45          0.34       0.695 (iii)
     TIME TO PEAK    (hrs)=       6.00          6.20        6.00
     RUNOFF VOLUME    (mm)=      41.00         15.22       21.66
     TOTAL RAINFALL   (mm)=      42.00         42.00       42.00
     RUNOFF COEFFICIENT   =       0.98          0.36        0.52

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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


--------------------
|    READ STORM    |    Filename: C:\Users\jlysecki\AppD
|                  |              ata\Local\Temp\
|                  |              1e046b6a-70e8-44fb-adb2-28217afe7b2a\a0ec6f58
| Ptotal= 42.00 mm |    Comments: 2 YR 12 HOUR SCS
--------------------
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.25    1.05 |  3.25    1.68 |  6.25    7.56 |  9.25    1.47
                0.50    1.05 |  3.50    1.68 |  6.50    7.56 |  9.50    1.47
                0.75    1.05 |  3.75    1.68 |  6.75    3.36 |  9.75    1.47
                1.00    1.05 |  4.00    1.68 |  7.00    3.36 | 10.00    1.47
                1.25    1.05 |  4.25    2.52 |  7.25    2.52 | 10.25    0.84
                1.50    1.05 |  4.50    2.52 |  7.50    2.52 | 10.50    0.84
                1.75    1.05 |  4.75    3.36 |  7.75    2.52 | 10.75    0.84
                2.00    1.05 |  5.00    3.36 |  8.00    2.52 | 11.00    0.84
                2.25    1.26 |  5.25    5.04 |  8.25    1.47 | 11.25    0.84
                2.50    1.26 |  5.50    5.04 |  8.50    1.47 | 11.50    0.84
                2.75    1.26 |  5.75   20.16 |  8.75    1.47 | 11.75    0.84
                3.00    1.26 |  6.00   55.44 |  9.00    1.47 | 12.00    0.84

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


--------------------
| CALIB            |
| STANDHYD (  0257)|   Area     (ha)=   3.10
|ID= 1 DT=12.0 min |   Total Imp(%)=  67.90   Dir. Conn.(%)=  42.90
--------------------
                           IMPERVIOUS    PERVIOUS (i)
```

Surface Area	(ha)=	2.10	1.00
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	143.76	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 12.0 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
0.200	1.05	3.200	1.68	6.200	7.56	9.20	1.47
0.400	1.05	3.400	1.68	6.400	7.56	9.40	1.47
0.600	1.05	3.600	1.68	6.600	5.46	9.60	1.47
0.800	1.05	3.800	1.68	6.800	3.36	9.80	1.47
1.000	1.05	4.000	1.68	7.000	3.36	10.00	1.47
1.200	1.05	4.200	2.52	7.200	2.52	10.20	0.84
1.400	1.05	4.400	2.52	7.400	2.52	10.40	0.84
1.600	1.05	4.600	2.94	7.600	2.52	10.60	0.84
1.800	1.05	4.800	3.36	7.800	2.52	10.80	0.84
2.000	1.05	5.000	3.36	8.000	2.52	11.00	0.84
2.200	1.26	5.200	5.04	8.200	1.47	11.20	0.84
2.400	1.26	5.400	5.04	8.400	1.47	11.40	0.84
2.600	1.26	5.600	12.60	8.600	1.47	11.60	0.84
2.800	1.26	5.800	28.98	8.800	1.47	11.80	0.84
3.000	1.26	6.000	55.44	9.000	1.47	12.00	0.84

Max.Eff.Inten.	(mm/hr)=	55.44	44.98	
over	(min)	12.00	24.00	
Storage Coeff.	(min)=	4.02 (ii)	13.74 (ii)	
Unit Hyd. Tpeak	(min)=	12.00	24.00	
Unit Hyd. peak	(cms)=	0.13	0.06	
				TOTALS
PEAK FLOW	(cms)=	0.20	0.07	0.253 (iii)
TIME TO PEAK	(hrs)=	6.00	6.20	6.00
RUNOFF VOLUME	(mm)=	41.00	16.08	26.77
TOTAL RAINFALL	(mm)=	42.00	42.00	42.00
RUNOFF COEFFICIENT	=	0.98	0.38	0.64

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0258)		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
	ID1= 1 (0228):	12.56	0.695	6.00	21.66
+	ID2= 2 (0257):	3.10	0.253	6.00	26.77
	ID = 3 (0258):	15.66	0.948	6.00	22.67

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0243)				
IN= 2---> OUT= 1				
DT= 12.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.1346	0.4241
	0.0096	0.0421	0.1575	0.4697
	0.0159	0.0886	0.1823	0.5165
	0.0203	0.1399	0.2088	0.5647
	0.0228	0.1768	0.2369	0.6142
	0.0250	0.2150	0.2514	0.6394
	0.0628	0.2544	0.2663	0.6650
	0.0835	0.2950	0.2816	0.6910
	0.0991	0.3368	0.2997	0.7172
	0.1144	0.3798	0.3113	0.7439

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0258)	15.660	0.948	6.00	22.67
OUTFLOW: ID= 1 (0243)	15.660	0.063	8.20	22.60

PEAK FLOW REDUCTION [Qout/Qin](%)= 6.68
TIME SHIFT OF PEAK FLOW (min)=132.00
MAXIMUM STORAGE USED (ha.m.)= 0.2556

ROUTEPIPE(0184)		
IN= 2---> OUT= 1	Pipe Number	= 1.00
DT= 12.0 min	Diameter (mm)	=1650.00
	Length (m)	= 500.00
	Slope (m/m)	= 0.005
	Manning n	= 0.013

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

DEPTH (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME min
0.09	.216E+02	0.0	0.80	10.40
0.17	.600E+02	0.1	1.25	6.67
0.26	.108E+03	0.3	1.61	5.18
0.35	.164E+03	0.6	1.91	4.36
0.43	.225E+03	1.0	2.18	3.83
0.52	.290E+03	1.4	2.41	3.46
0.61	.358E+03	1.9	2.61	3.19
0.69	.428E+03	2.4	2.79	2.99
0.78	.499E+03	2.9	2.95	2.83
0.87	.570E+03	3.5	3.08	2.70
0.96	.642E+03	4.1	3.20	2.61
1.04	.712E+03	4.7	3.29	2.53
1.13	.780E+03	5.2	3.36	2.48
1.22	.844E+03	5.8	3.41	2.44
1.30	.905E+03	6.2	3.44	2.43
1.39	.961E+03	6.6	3.43	2.43
1.48	.101E+04	6.9	3.40	2.45
1.56	.105E+04	6.9	3.31	2.52
1.65	.107E+04	6.5	3.02	2.76

<---- hydrograph ----> <-pipe / channel->

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 2 (0243)	15.66	0.06	8.20	22.60	0.11	0.88
OUTFLOW: ID= 1 (0184)	15.66	0.06	8.40	22.60	0.11	0.88

READ STORM	Filename: C:\Users\jlysecki\AppData\Local\Temp\1e046b6a-70e8-44fb-adb2-28217afe7b2a\a0ec6f58
Ptotal= 42.00 mm	Comments: 2 YR 12 HOUR SCS

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	1.05	3.25	1.68	6.25	7.56	9.25	1.47
0.50	1.05	3.50	1.68	6.50	7.56	9.50	1.47
0.75	1.05	3.75	1.68	6.75	3.36	9.75	1.47
1.00	1.05	4.00	1.68	7.00	3.36	10.00	1.47
1.25	1.05	4.25	2.52	7.25	2.52	10.25	0.84
1.50	1.05	4.50	2.52	7.50	2.52	10.50	0.84
1.75	1.05	4.75	3.36	7.75	2.52	10.75	0.84
2.00	1.05	5.00	3.36	8.00	2.52	11.00	0.84
2.25	1.26	5.25	5.04	8.25	1.47	11.25	0.84
2.50	1.26	5.50	5.04	8.50	1.47	11.50	0.84
2.75	1.26	5.75	20.16	8.75	1.47	11.75	0.84
3.00	1.26	6.00	55.44	9.00	1.47	12.00	0.84

CALIB		
STANDHYD (0229)	Area	(ha)= 12.13

COLE ENGINEERING

Experience Enhancing Excellence

```
|ID= 1 DT=12.0 min |    Total Imp(%)=  54.50   Dir. Conn.(%)=  19.70
--------------------

                              IMPERVIOUS     PERVIOUS (i)
     Surface Area      (ha)=       6.61          5.52
     Dep. Storage      (mm)=       1.00          1.50
     Average Slope      (%)=       1.00          2.00
     Length             (m)=     284.37         40.00
     Mannings n            =      0.013         0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO  12.0 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
    0.200    1.05 | 3.200    1.68 | 6.200    7.56 |  9.20    1.47
    0.400    1.05 | 3.400    1.68 | 6.400    7.56 |  9.40    1.47
    0.600    1.05 | 3.600    1.68 | 6.600    5.46 |  9.60    1.47
    0.800    1.05 | 3.800    1.68 | 6.800    3.36 |  9.80    1.47
    1.000    1.05 | 4.000    1.68 | 7.000    3.36 | 10.00    1.47
    1.200    1.05 | 4.200    2.52 | 7.200    2.52 | 10.20    0.84
    1.400    1.05 | 4.400    2.52 | 7.400    2.52 | 10.40    0.84
    1.600    1.05 | 4.600    2.94 | 7.600    2.52 | 10.60    0.84
    1.800    1.05 | 4.800    3.36 | 7.800    2.52 | 10.80    0.84
    2.000    1.05 | 5.000    3.36 | 8.000    2.52 | 11.00    0.84
    2.200    1.26 | 5.200    5.04 | 8.200    1.47 | 11.20    0.84
    2.400    1.26 | 5.400    5.04 | 8.400    1.47 | 11.40    0.84
    2.600    1.26 | 5.600   12.60 | 8.600    1.47 | 11.60    0.84
    2.800    1.26 | 5.800   28.98 | 8.800    1.47 | 11.80    0.84
    3.000    1.26 | 6.000   55.44 | 9.000    1.47 | 12.00    0.84

     Max.Eff.Inten.(mm/hr)=      55.44         44.40
                   over (min)       12.00         24.00
     Storage Coeff.  (min)=       6.06 (ii)     15.82 (ii)
     Unit Hyd. Tpeak (min)=      12.00         24.00
     Unit Hyd. peak  (cms)=       0.12          0.06
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.34          0.37      0.616 (iii)
     TIME TO PEAK    (hrs)=       6.00          6.20       6.00
     RUNOFF VOLUME    (mm)=      41.00         16.00      20.93
     TOTAL RAINFALL   (mm)=      42.00         42.00      42.00
     RUNOFF COEFFICIENT   =       0.98          0.38       0.50

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  69.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

--------------------
| ADD HYD  (  0196)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0184):    15.66   0.063     8.40     22.60
      + ID2= 2 (  0229):    12.13   0.616     6.00     20.93
        ================================================
        ID = 3 (  0196):    27.79   0.631     6.00     21.87

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0256)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------       (cms)     (ha.m.)   |   (cms)     (ha.m.)
                         0.0000     0.0000    |  0.2761     0.3332
                         0.0090     0.0385    |  0.3101     0.3536
                         0.0147     0.0812    |  0.3454     0.3743
                         0.0199     0.1456    |  0.3818     0.3952
                         0.0210     0.1631    |  0.4194     0.4165
                         0.0987     0.2172    |  0.4581     0.4381
                         0.1306     0.2358    |  0.4979     0.4600
                         0.1761     0.2739    |  0.5806     0.5047
                         0.2120     0.2934    |  0.6234     0.5275
                         0.2433     0.3131    |  0.7121     0.5742

                                  AREA     QPEAK     TPEAK      R.V.
                                  (ha)     (cms)     (hrs)      (mm)
     INFLOW : ID= 2 (  0196)     27.790     0.631      6.00     21.87
     OUTFLOW: ID= 1 (  0256)     27.790     0.091      9.80     21.83

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)= 14.48
                    TIME SHIFT OF PEAK FLOW          (min)=228.00
                    MAXIMUM  STORAGE   USED        (ha.m.)=  0.2121

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

--------------------
|    READ STORM    |    Filename: C:\Users\jlysecki\AppD
|                  |              ata\Local\Temp\
|                  |              1e046b6a-70e8-44fb-adb2-28217afe7b2a\a0ec6f58
| Ptotal= 42.00 mm |    Comments: 2 YR 12 HOUR SCS
--------------------
     TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
      hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
     0.25    1.05 |  3.25    1.68 |  6.25    7.56 |  9.25    1.47
     0.50    1.05 |  3.50    1.68 |  6.50    7.56 |  9.50    1.47
     0.75    1.05 |  3.75    1.68 |  6.75    3.36 |  9.75    1.47
     1.00    1.05 |  4.00    1.68 |  7.00    3.36 | 10.00    1.47
     1.25    1.05 |  4.25    2.52 |  7.25    2.52 | 10.25    0.84
     1.50    1.05 |  4.50    2.52 |  7.50    2.52 | 10.50    0.84
     1.75    1.05 |  4.75    3.36 |  7.75    2.52 | 10.75    0.84
     2.00    1.05 |  5.00    3.36 |  8.00    2.52 | 11.00    0.84
     2.25    1.26 |  5.25    5.04 |  8.25    1.47 | 11.25    0.84
     2.50    1.26 |  5.50    5.04 |  8.50    1.47 | 11.50    0.84
     2.75    1.26 |  5.75   20.16 |  8.75    1.47 | 11.75    0.84
     3.00    1.26 |  6.00   55.44 |  9.00    1.47 | 12.00    0.84

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

--------------------
| CALIB            |
| STANDHYD (  0230)|   Area     (ha)=  20.35
|ID= 1 DT=12.0 min |   Total Imp(%)=  53.70   Dir. Conn.(%)=  32.40
--------------------

                              IMPERVIOUS     PERVIOUS (i)
     Surface Area      (ha)=      10.93          9.42
     Dep. Storage      (mm)=       1.00          1.50
     Average Slope      (%)=       1.00          2.00
     Length             (m)=     368.33         40.00
     Mannings n            =      0.013         0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO  12.0 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
    0.200    1.05 | 3.200    1.68 | 6.200    7.56 |  9.20    1.47
    0.400    1.05 | 3.400    1.68 | 6.400    7.56 |  9.40    1.47
    0.600    1.05 | 3.600    1.68 | 6.600    5.46 |  9.60    1.47
    0.800    1.05 | 3.800    1.68 | 6.800    3.36 |  9.80    1.47
    1.000    1.05 | 4.000    1.68 | 7.000    3.36 | 10.00    1.47
    1.200    1.05 | 4.200    2.52 | 7.200    2.52 | 10.20    0.84
    1.400    1.05 | 4.400    2.52 | 7.400    2.52 | 10.40    0.84
    1.600    1.05 | 4.600    2.94 | 7.600    2.52 | 10.60    0.84
    1.800    1.05 | 4.800    3.36 | 7.800    2.52 | 10.80    0.84
    2.000    1.05 | 5.000    3.36 | 8.000    2.52 | 11.00    0.84
    2.200    1.26 | 5.200    5.04 | 8.200    1.47 | 11.20    0.84
    2.400    1.26 | 5.400    5.04 | 8.400    1.47 | 11.40    0.84
    2.600    1.26 | 5.600   12.60 | 8.600    1.47 | 11.60    0.84
    2.800    1.26 | 5.800   28.98 | 8.800    1.47 | 11.80    0.84
    3.000    1.26 | 6.000   55.44 | 9.000    1.47 | 12.00    0.84

     Max.Eff.Inten.(mm/hr)=      55.44         32.31
```

over (min)		12.00	24.00	
Storage Coeff. (min)=		7.07 (ii)	18.16 (ii)	
Unit Hyd. Tpeak (min)=		12.00	24.00	
Unit Hyd. peak (cms)=		0.12	0.06	
				TOTALS
PEAK FLOW	(cms)=	0.92	0.43	1.231 (iii)
TIME TO PEAK	(hrs)=	6.00	6.20	6.00
RUNOFF VOLUME	(mm)=	41.00	14.09	22.81
TOTAL RAINFALL	(mm)=	42.00	42.00	42.00
RUNOFF COEFFICIENT	=	0.98	0.34	0.54

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0224)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0230):	20.35	1.231	6.00	22.81
+ ID2= 2 (0256):	27.79	0.091	9.80	21.83
ID = 3 (0224):	48.14	1.246	6.00	22.25

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0253)
IN= 2---> OUT= 1
DT= 12.0 min

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.6390	0.9848
0.0270	0.1457	0.9700	1.2900
0.0430	0.3152	1.1040	1.7480
0.0530	0.4653	3.3100	1.9350
0.3280	0.6677	11.3140	2.2662

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0224)	48.140	1.246	6.00	22.25
OUTFLOW: ID= 1 (0253)	48.140	0.094	12.20	22.22

PEAK FLOW REDUCTION [Qout/Qin](%)= 7.52
TIME SHIFT OF PEAK FLOW (min)=372.00
MAXIMUM STORAGE USED (ha.m.)= 0.4953

READ STORM
Ptotal= 42.00 mm
Filename: C:\Users\jlysecki\AppData\Local\Temp\1e046b6a-70e8-44fb-adb2-28217afe7b2a\a0ec6f58
Comments: 2 YR 12 HOUR SCS

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	1.05	3.25	1.68	6.25	7.56	9.25	1.47
0.50	1.05	3.50	1.68	6.50	7.56	9.50	1.47
0.75	1.05	3.75	1.68	6.75	3.36	9.75	1.47
1.00	1.05	4.00	1.68	7.00	3.36	10.00	1.47
1.25	1.05	4.25	2.52	7.25	2.52	10.25	0.84
1.50	1.05	4.50	2.52	7.50	2.52	10.50	0.84
1.75	1.05	4.75	3.36	7.75	2.52	10.75	0.84
2.00	1.05	5.00	3.36	8.00	2.52	11.00	0.84
2.25	1.26	5.25	5.04	8.25	1.47	11.25	0.84
2.50	1.26	5.50	5.04	8.50	1.47	11.50	0.84
2.75	1.26	5.75	20.16	8.75	1.47	11.75	0.84
3.00	1.26	6.00	55.44	9.00	1.47	12.00	0.84

CALIB
STANDHYD (0160)
ID= 1 DT=12.0 min

Area (ha)= 1.30
Total Imp(%)= 50.70 Dir. Conn.(%)= 22.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.66	0.64
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	93.09	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 12.0 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
0.200	1.05	3.200	1.68	6.200	7.56	9.20	1.47
0.400	1.05	3.400	1.68	6.400	7.56	9.40	1.47
0.600	1.05	3.600	1.68	6.600	5.46	9.60	1.47
0.800	1.05	3.800	1.68	6.800	3.36	9.80	1.47
1.000	1.05	4.000	1.68	7.000	3.36	10.00	1.47
1.200	1.05	4.200	2.52	7.200	2.52	10.20	0.84
1.400	1.05	4.400	2.52	7.400	2.52	10.40	0.84
1.600	1.05	4.600	2.94	7.600	2.52	10.60	0.84
1.800	1.05	4.800	3.36	7.800	2.52	10.80	0.84
2.000	1.05	5.000	3.36	8.000	2.52	11.00	0.84
2.200	1.26	5.200	5.04	8.200	1.47	11.20	0.84
2.400	1.26	5.400	5.04	8.400	1.47	11.40	0.84
2.600	1.26	5.600	12.60	8.600	1.47	11.60	0.84
2.800	1.26	5.800	28.98	8.800	1.47	11.80	0.84
3.000	1.26	6.000	55.44	9.000	1.47	12.00	0.84

Max.Eff.Inten.(mm/hr)=		55.44	37.02	
over (min)		12.00	24.00	
Storage Coeff. (min)=		3.10 (ii)	13.60 (ii)	
Unit Hyd. Tpeak (min)=		12.00	24.00	
Unit Hyd. peak (cms)=		0.14	0.06	
				TOTALS
PEAK FLOW	(cms)=	0.04	0.04	0.072 (iii)
TIME TO PEAK	(hrs)=	6.00	6.20	6.00
RUNOFF VOLUME	(mm)=	41.00	14.89	20.63
TOTAL RAINFALL	(mm)=	42.00	42.00	42.00
RUNOFF COEFFICIENT	=	0.98	0.35	0.49

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

DUHYD (0183)
Inlet Cap.= 0.152
#of Inlets= 1
Total(cms)= 0.2

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
TOTAL HYD.(ID= 1):	1.30	0.07	6.00	20.63
MAJOR SYS.(ID= 2):	0.00	0.00	0.00	0.00
MINOR SYS.(ID= 3):	1.30	0.07	6.00	20.63

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

READ STORM
Filename: C:\Users\jlysecki\AppData\Local\Temp\1e046b6a-70e8-44fb-adb2-28217afe7b2a\a0ec6f58

| Ptotal= 42.00 mm | Comments: 2 YR 12 HOUR SCS

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	1.05	3.25	1.68	6.25	7.56	9.25	1.47
0.50	1.05	3.50	1.68	6.50	7.56	9.50	1.47
0.75	1.05	3.75	1.68	6.75	3.36	9.75	1.47
1.00	1.05	4.00	1.68	7.00	3.36	10.00	1.47
1.25	1.05	4.25	2.52	7.25	2.52	10.25	0.84
1.50	1.05	4.50	2.52	7.50	2.52	10.50	0.84
1.75	1.05	4.75	3.36	7.75	2.52	10.75	0.84
2.00	1.05	5.00	3.36	8.00	2.52	11.00	0.84
2.25	1.26	5.25	5.04	8.25	1.47	11.25	0.84
2.50	1.26	5.50	5.04	8.50	1.47	11.50	0.84
2.75	1.26	5.75	20.16	8.75	1.47	11.75	0.84
3.00	1.26	6.00	55.44	9.00	1.47	12.00	0.84

| CALIB | STANDHYD (0193) | ID= 1 DT=12.0 min | Area (ha)= 1.21 | Total Imp(%)= 49.30 | Dir. Conn.(%)= 20.10

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.60	0.61
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	89.81	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 12.0 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
0.200	1.05	3.200	1.68	6.200	7.56	9.20	1.47
0.400	1.05	3.400	1.68	6.400	7.56	9.40	1.47
0.600	1.05	3.600	1.68	6.600	5.46	9.60	1.47
0.800	1.05	3.800	1.68	6.800	3.36	9.80	1.47
1.000	1.05	4.000	1.68	7.000	3.36	10.00	1.47
1.200	1.05	4.200	2.52	7.200	2.52	10.20	0.84
1.400	1.05	4.400	2.52	7.400	2.52	10.40	0.84
1.600	1.05	4.600	2.94	7.600	2.52	10.60	0.84
1.800	1.05	4.800	3.36	7.800	2.52	10.80	0.84
2.000	1.05	5.000	3.36	8.000	2.52	11.00	0.84
2.200	1.26	5.200	5.04	8.200	1.47	11.20	0.84
2.400	1.26	5.400	5.04	8.400	1.47	11.40	0.84
2.600	1.26	5.600	12.60	8.600	1.47	11.60	0.84
2.800	1.26	5.800	28.98	8.800	1.47	11.80	0.84
3.000	1.26	6.000	55.44	9.000	1.47	12.00	0.84

				TOTALS
Max.Eff.Inten.	(mm/hr)=	55.44	36.77	
over	(min)	12.00	24.00	
Storage Coeff.	(min)=	3.03 (ii)	13.56 (ii)	
Unit Hyd. Tpeak	(min)=	12.00	24.00	
Unit Hyd. peak	(cms)=	0.14	0.06	
PEAK FLOW	(cms)=	0.04	0.04	0.064 (iii)
TIME TO PEAK	(hrs)=	6.00	6.20	6.00
RUNOFF VOLUME	(mm)=	41.00	14.85	20.10
TOTAL RAINFALL	(mm)=	42.00	42.00	42.00
RUNOFF COEFFICIENT	=	0.98	0.35	0.48

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

| DUHYD (0227)

| Inlet Cap.= 0.120|
| #of Inlets= 1|
| Total(cms)= 0.1|

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
TOTAL HYD.(ID= 1):	1.21	0.06	6.00	20.10
MAJOR SYS.(ID= 2):	0.00	0.00	0.00	0.00
MINOR SYS.(ID= 3):	1.21	0.06	6.00	20.10

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

| READ STORM | Filename: C:\Users\jlysecki\AppData\Local\Temp\1e046b6a-70e8-44fb-adb2-28217afe7b2a\a0ec6f58
| Ptotal= 42.00 mm | Comments: 2 YR 12 HOUR SCS

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	1.05	3.25	1.68	6.25	7.56	9.25	1.47
0.50	1.05	3.50	1.68	6.50	7.56	9.50	1.47
0.75	1.05	3.75	1.68	6.75	3.36	9.75	1.47
1.00	1.05	4.00	1.68	7.00	3.36	10.00	1.47
1.25	1.05	4.25	2.52	7.25	2.52	10.25	0.84
1.50	1.05	4.50	2.52	7.50	2.52	10.50	0.84
1.75	1.05	4.75	3.36	7.75	2.52	10.75	0.84
2.00	1.05	5.00	3.36	8.00	2.52	11.00	0.84
2.25	1.26	5.25	5.04	8.25	1.47	11.25	0.84
2.50	1.26	5.50	5.04	8.50	1.47	11.50	0.84
2.75	1.26	5.75	20.16	8.75	1.47	11.75	0.84
3.00	1.26	6.00	55.44	9.00	1.47	12.00	0.84

| CALIB | STANDHYD (0206) | ID= 1 DT=12.0 min | Area (ha)= 38.60 | Total Imp(%)= 54.70 | Dir. Conn.(%)= 23.20

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	21.11	17.49
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	507.28	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 12.0 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
0.200	1.05	3.200	1.68	6.200	7.56	9.20	1.47
0.400	1.05	3.400	1.68	6.400	7.56	9.40	1.47
0.600	1.05	3.600	1.68	6.600	5.46	9.60	1.47
0.800	1.05	3.800	1.68	6.800	3.36	9.80	1.47
1.000	1.05	4.000	1.68	7.000	3.36	10.00	1.47
1.200	1.05	4.200	2.52	7.200	2.52	10.20	0.84
1.400	1.05	4.400	2.52	7.400	2.52	10.40	0.84
1.600	1.05	4.600	2.94	7.600	2.52	10.60	0.84
1.800	1.05	4.800	3.36	7.800	2.52	10.80	0.84
2.000	1.05	5.000	3.36	8.000	2.52	11.00	0.84
2.200	1.26	5.200	5.04	8.200	1.47	11.20	0.84
2.400	1.26	5.400	5.04	8.400	1.47	11.40	0.84
2.600	1.26	5.600	12.60	8.600	1.47	11.60	0.84
2.800	1.26	5.800	28.98	8.800	1.47	11.80	0.84
3.000	1.26	6.000	55.44	9.000	1.47	12.00	0.84

				TOTALS
Max.Eff.Inten.	(mm/hr)=	55.44	41.55	
over	(min)	12.00	24.00	
Storage Coeff.	(min)=	8.57 (ii)	18.60 (ii)	
Unit Hyd. Tpeak	(min)=	12.00	24.00	
Unit Hyd. peak	(cms)=	0.11	0.05	

COLE ENGINEERING

Experience Enhancing Excellence

PEAK FLOW	(cms)=	1.19	1.03	1.941 (iii)
TIME TO PEAK	(hrs)=	6.00	6.20	6.00
RUNOFF VOLUME	(mm)=	41.00	15.59	21.49
TOTAL RAINFALL	(mm)=	42.00	42.00	42.00
RUNOFF COEFFICIENT	=	0.98	0.37	0.51

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0225)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
*** W A R N I N G : HYDROGRAPH 0183 <ID= 1> IS DRY.				
*** W A R N I N G : HYDROGRAPH 0225 = HYDROGRAPH 0206				
ID1= 1 (0183):	0.00	0.000	0.00	0.00
+ ID2= 2 (0206):	38.60	1.941	6.00	21.49
ID = 3 (0225):	38.60	1.941	6.00	21.49

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0225)
3 + 2 = 1

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
*** W A R N I N G : HYDROGRAPH 0227 <ID= 2> IS DRY.				
*** W A R N I N G : HYDROGRAPH 0001 = HYDROGRAPH 0003				
ID1= 3 (0225):	38.60	1.941	6.00	21.49
+ ID2= 2 (0227):	0.00	0.000	0.00	0.00
ID = 1 (0225):	38.60	1.941	6.00	21.49

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

READ STORM | Filename: C:\Users\jlysecki\AppData\Local\Temp\1e046b6a-70e8-44fb-adb2-28217afe7b2a\a0ec6f58
Ptotal= 42.00 mm | Comments: 2 YR 12 HOUR SCS

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	1.05	3.25	1.68	6.25	7.56	9.25	1.47
0.50	1.05	3.50	1.68	6.50	7.56	9.50	1.47
0.75	1.05	3.75	1.68	6.75	3.36	9.75	1.47
1.00	1.05	4.00	1.68	7.00	3.36	10.00	1.47
1.25	1.05	4.25	2.52	7.25	2.52	10.25	0.84
1.50	1.05	4.50	2.52	7.50	2.52	10.50	0.84
1.75	1.05	4.75	3.36	7.75	2.52	10.75	0.84
2.00	1.05	5.00	3.36	8.00	2.52	11.00	0.84
2.25	1.26	5.25	5.04	8.25	1.47	11.25	0.84
2.50	1.26	5.50	5.04	8.50	1.47	11.50	0.84
2.75	1.26	5.75	20.16	8.75	1.47	11.75	0.84
3.00	1.26	6.00	55.44	9.00	1.47	12.00	0.84

CALIB
STANDHYD (0209) | Area (ha)= 5.20
ID= 1 DT=12.0 min | Total Imp(%)= 31.60 Dir. Conn.(%)= 19.40

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	1.64	3.56
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	186.19	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 12.0 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
0.200	1.05	3.200	1.68	6.200	7.56	9.20	1.47
0.400	1.05	3.400	1.68	6.400	7.56	9.40	1.47
0.600	1.05	3.600	1.68	6.600	5.46	9.60	1.47
0.800	1.05	3.800	1.68	6.800	3.36	9.80	1.47
1.000	1.05	4.000	1.68	7.000	3.36	10.00	1.47
1.200	1.05	4.200	2.52	7.200	2.52	10.20	0.84
1.400	1.05	4.400	2.52	7.400	2.52	10.40	0.84
1.600	1.05	4.600	2.94	7.600	2.52	10.60	0.84
1.800	1.05	4.800	3.36	7.800	2.52	10.80	0.84
2.000	1.05	5.000	3.36	8.000	2.52	11.00	0.84
2.200	1.26	5.200	5.04	8.200	1.47	11.20	0.84
2.400	1.26	5.400	5.04	8.400	1.47	11.40	0.84
2.600	1.26	5.600	12.60	8.600	1.47	11.60	0.84
2.800	1.26	5.800	28.98	8.800	1.47	11.80	0.84
3.000	1.26	6.000	55.44	9.000	1.47	12.00	0.84

Max.Eff.Inten.	(mm/hr)=	55.44	15.20	
	over (min)	12.00	24.00	
Storage Coeff.	(min)=	4.70 (ii)	19.69 (ii)	
Unit Hyd. Tpeak	(min)=	12.00	24.00	
Unit Hyd. peak	(cms)=	0.13	0.05	
				TOTALS
PEAK FLOW	(cms)=	0.15	0.11	0.227 (iii)
TIME TO PEAK	(hrs)=	6.00	6.20	6.00
RUNOFF VOLUME	(mm)=	41.00	12.06	17.67
TOTAL RAINFALL	(mm)=	42.00	42.00	42.00
RUNOFF COEFFICIENT	=	0.98	0.29	0.42

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
YOU SHOULD CONSIDER SPLITTING THE AREA.

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

READ STORM | Filename: C:\Users\jlysecki\AppData\Local\Temp\1e046b6a-70e8-44fb-adb2-28217afe7b2a\a0ec6f58
Ptotal= 42.00 mm | Comments: 2 YR 12 HOUR SCS

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	1.05	3.25	1.68	6.25	7.56	9.25	1.47
0.50	1.05	3.50	1.68	6.50	7.56	9.50	1.47
0.75	1.05	3.75	1.68	6.75	3.36	9.75	1.47
1.00	1.05	4.00	1.68	7.00	3.36	10.00	1.47
1.25	1.05	4.25	2.52	7.25	2.52	10.25	0.84
1.50	1.05	4.50	2.52	7.50	2.52	10.50	0.84
1.75	1.05	4.75	3.36	7.75	2.52	10.75	0.84
2.00	1.05	5.00	3.36	8.00	2.52	11.00	0.84
2.25	1.26	5.25	5.04	8.25	1.47	11.25	0.84
2.50	1.26	5.50	5.04	8.50	1.47	11.50	0.84
2.75	1.26	5.75	20.16	8.75	1.47	11.75	0.84
3.00	1.26	6.00	55.44	9.00	1.47	12.00	0.84

CALIB

COLE ENGINEERING

Experience Enhancing Excellence

| STANDHYD (0252)| Area (ha)= 1.44
|ID= 1 DT=12.0 min | Total Imp(%)= 52.40 Dir. Conn.(%)= 20.10

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	0.75	0.69
Dep. Storage (mm)=	1.00	1.50
Average Slope (%)=	1.00	2.00
Length (m)=	97.98	40.00
Mannings n =	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 12.0 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
0.200	1.05	3.200	1.68	6.200	7.56	9.20	1.47
0.400	1.05	3.400	1.68	6.400	7.56	9.40	1.47
0.600	1.05	3.600	1.68	6.600	5.46	9.60	1.47
0.800	1.05	3.800	1.68	6.800	3.36	9.80	1.47
1.000	1.05	4.000	1.68	7.000	3.36	10.00	1.47
1.200	1.05	4.200	2.52	7.200	2.52	10.20	0.84
1.400	1.05	4.400	2.52	7.400	2.52	10.40	0.84
1.600	1.05	4.600	2.94	7.600	2.52	10.60	0.84
1.800	1.05	4.800	3.36	7.800	2.52	10.80	0.84
2.000	1.05	5.000	3.36	8.000	2.52	11.00	0.84
2.200	1.26	5.200	5.04	8.200	1.47	11.20	0.84
2.400	1.26	5.400	5.04	8.400	1.47	11.40	0.84
2.600	1.26	5.600	12.60	8.600	1.47	11.60	0.84
2.800	1.26	5.800	28.98	8.800	1.47	11.80	0.84
3.000	1.26	6.000	55.44	9.000	1.47	12.00	0.84

			TOTALS
Max.Eff.Inten.(mm/hr)=	55.44	40.87	
over (min)	12.00	24.00	
Storage Coeff. (min)=	3.20 (ii)	13.29 (ii)	
Unit Hyd. Tpeak (min)=	12.00	24.00	
Unit Hyd. peak (cms)=	0.14	0.06	
PEAK FLOW (cms)=	0.04	0.04	0.078 (iii)
TIME TO PEAK (hrs)=	6.00	6.20	6.00
RUNOFF VOLUME (mm)=	41.00	15.49	20.61
TOTAL RAINFALL (mm)=	42.00	42.00	42.00
RUNOFF COEFFICIENT =	0.98	0.37	0.49

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

RESERVOIR(0261)
IN= 2---> OUT= 1
DT= 5.0 min

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.1470	0.0137
0.0530	0.0050	0.1700	0.0155
0.0700	0.0076	0.1900	0.0220
0.1150	0.0113	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0252)	1.440	0.078	6.00	20.61
OUTFLOW: ID= 1 (0261)	1.440	0.053	6.20	20.60

PEAK FLOW REDUCTION [Qout/Qin](%)= 67.65
TIME SHIFT OF PEAK FLOW (min)= 12.00
MAXIMUM STORAGE USED (ha.m.)= 0.0050

ADD HYD (0251)

1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0209):	5.20	0.227	6.00	17.67
+ ID2= 2 (0261):	1.44	0.053	6.20	20.60
ID = 3 (0251):	6.64	0.267	6.00	18.30

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0245)
IN= 2---> OUT= 1
DT= 12.0 min

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.3090	0.2876
0.0000	0.0000	0.3330	0.3838
0.1230	0.1102	0.3620	0.5200
0.2870	0.1971	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0251)	6.640	0.267	6.00	18.30
OUTFLOW: ID= 1 (0245)	6.640	0.064	6.90	18.27

PEAK FLOW REDUCTION [Qout/Qin](%)= 23.98
TIME SHIFT OF PEAK FLOW (min)= 54.00
MAXIMUM STORAGE USED (ha.m.)= 0.0574

ROUTEPIPE(0212)		
IN= 2---> OUT= 1	Diameter	(mm)=1650.00
DT= 12.0 min	Length	(m)= 850.00
	Slope	(m/m)= 0.005
	Manning n	= 0.013

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

DEPTH (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME min
0.09	.367E+02	0.0	0.80	17.68
0.17	.102E+03	0.1	1.25	11.33
0.26	.184E+03	0.3	1.61	8.81
0.35	.278E+03	0.6	1.91	7.41
0.43	.382E+03	1.0	2.18	6.51
0.52	.492E+03	1.4	2.41	5.88
0.61	.608E+03	1.9	2.61	5.43
0.69	.727E+03	2.4	2.79	5.08
0.78	.848E+03	2.9	2.95	4.81
0.87	.970E+03	3.5	3.08	4.60
0.96	.109E+04	4.1	3.20	4.43
1.04	.121E+04	4.7	3.29	4.31
1.13	.133E+04	5.2	3.36	4.22
1.22	.144E+04	5.8	3.41	4.15
1.30	.154E+04	6.2	3.44	4.12
1.39	.163E+04	6.6	3.43	4.13
1.48	.172E+04	6.9	3.40	4.17
1.56	.178E+04	6.9	3.31	4.28
1.65	.182E+04	6.5	3.02	4.70

	AREA (ha)	QPEAK (cms)	<---- hydrograph ----> TPEAK (hrs)	R.V. (mm)	<-pipe / channel-> MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 2 (0245)	6.64	0.06	6.90	18.27	0.11	0.88
OUTFLOW: ID= 1 (0212)	6.64	0.06	7.20	18.27	0.11	0.88

ADD HYD (0211)	
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0212):	6.64	0.063	7.20	18.27
+ ID2= 2 (0225):	38.60	1.941	6.00	21.49
ID = 3 (0211):	45.24	1.959	6.00	21.01

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0255) IN= 2---> OUT= 1 DT= 12.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	1.6250	1.2448
	0.0190	0.1627	1.6630	1.2997
	0.0360	0.4306	1.8430	1.5816
	0.0480	0.7217	2.1300	2.1197
	0.1330	0.7718	2.9680	2.2465
	1.0390	0.9773	7.5380	2.5741

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0211)	45.240	1.959	6.00	21.01
OUTFLOW: ID= 1 (0255)	45.240	0.112	10.40	20.96

PEAK FLOW REDUCTION [Qout/Qin](%)= 5.71
TIME SHIFT OF PEAK FLOW (min)=264.00
MAXIMUM STORAGE USED (ha.m.)= 0.7594

```
V    V   I    SSSSS  U   U    A    L              (v 5.1.2004)
V    V   I    SS     U   U   A A   L
 V  V    I     SS    U   U  AAAAA  L
 V  V    I      SS   U   U  A   A  L
  VV     I    SSSSS  UUUUU  A   A  LLLLL

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

Developed and Distributed by Civica Infrastructure

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

Input filename: C:\Program Files (x86)\Visual OTTHYMO 5.1\VO2\voin.dat
Output filename: C:\Users\jlysecki\AppData\Local\Civica\VH5\a379672b-db33-4372-b5e0-ba58a07d1417\a17e57a0-2f3f-4e74-93d5-d7b6c229fb85\sce
Summary filename: C:\Users\jlysecki\AppData\Local\Civica\VH5\a379672b-db33-4372-b5e0-ba58a07d1417\a17e57a0-2f3f-4e74-93d5-d7b6c229fb85\sce

DATE: 01/15/2020 TIME: 04:16:44

USER:

COMMENTS: _____

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

READ STORM Ptotal= 54.40 mm	Filename: C:\Users\jlysecki\AppData\Local\Temp\1e046b6a-70e8-44fb-adb2-28217afe7b2a\e04745ee Comments: 5YR 12HR SCS

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	1.36	3.25	2.18	6.25	9.79	9.25	1.90
0.50	1.36	3.50	2.18	6.50	9.79	9.50	1.90
0.75	1.36	3.75	2.18	6.75	4.35	9.75	1.90
1.00	1.36	4.00	2.18	7.00	4.35	10.00	1.90
1.25	1.36	4.25	3.26	7.25	3.26	10.25	1.09
1.50	1.36	4.50	3.26	7.50	3.26	10.50	1.09
1.75	1.36	4.75	4.35	7.75	3.26	10.75	1.09
2.00	1.36	5.00	4.35	8.00	3.26	11.00	1.09
2.25	1.63	5.25	6.53	8.25	1.90	11.25	1.09
2.50	1.63	5.50	6.53	8.50	1.90	11.50	1.09
2.75	1.63	5.75	26.11	8.75	1.90	11.75	1.09
3.00	1.63	6.00	71.81	9.00	1.90	12.00	1.09

CALIB STANDHYD (0228) ID= 1 DT=12.0 min	Area (ha)= 12.56 Total Imp(%)= 54.10 Dir. Conn.(%)= 25.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	6.79	5.77
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	289.37	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 12.0 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
0.200	1.36	3.200	2.18	6.200	9.79	9.20	1.90
0.400	1.36	3.400	2.18	6.400	9.79	9.40	1.90
0.600	1.36	3.600	2.18	6.600	7.07	9.60	1.90
0.800	1.36	3.800	2.18	6.800	4.35	9.80	1.90
1.000	1.36	4.000	2.18	7.000	4.35	10.00	1.90
1.200	1.36	4.200	3.26	7.200	3.26	10.20	1.09
1.400	1.36	4.400	3.26	7.400	3.26	10.40	1.09
1.600	1.36	4.600	3.81	7.600	3.26	10.60	1.09
1.800	1.36	4.800	4.35	7.800	3.26	10.80	1.09
2.000	1.36	5.000	4.35	8.000	3.26	11.00	1.09
2.200	1.63	5.200	6.53	8.200	1.90	11.20	1.09
2.400	1.63	5.400	6.53	8.400	1.90	11.40	1.09
2.600	1.63	5.600	16.32	8.600	1.90	11.60	1.09
2.800	1.63	5.800	37.54	8.800	1.90	11.80	1.09
3.000	1.63	6.000	71.81	9.000	1.90	12.00	1.09

				TOTALS
Max.Eff.Inten.	(mm/hr)=	71.81	59.60	
	over (min)	12.00	24.00	
Storage Coeff.	(min)=	5.52 (ii)	14.20 (ii)	
Unit Hyd. Tpeak	(min)=	12.00	24.00	
Unit Hyd. peak	(cms)=	0.13	0.06	
PEAK FLOW	(cms)=	0.59	0.54	0.998 (iii)
TIME TO PEAK	(hrs)=	6.00	6.20	6.00
RUNOFF VOLUME	(mm)=	53.40	23.19	30.74
TOTAL RAINFALL	(mm)=	54.40	54.40	54.40
RUNOFF COEFFICIENT	=	0.98	0.43	0.57

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

READ STORM	Filename: C:\Users\jlysecki\AppData\Local\Temp\

COLE ENGINEERING

Experience Enhancing Excellence

		1e046b6a-70e8-44fb-adb2-28217afe7b2a\e04745ee
Ptotal= 54.40 mm	Comments: 5YR 12HR SCS	

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	1.36	3.25	2.18	6.25	9.79	9.25	1.90
0.50	1.36	3.50	2.18	6.50	9.79	9.50	1.90
0.75	1.36	3.75	2.18	6.75	4.35	9.75	1.90
1.00	1.36	4.00	2.18	7.00	4.35	10.00	1.90
1.25	1.36	4.25	3.26	7.25	3.26	10.25	1.09
1.50	1.36	4.50	3.26	7.50	3.26	10.50	1.09
1.75	1.36	4.75	4.35	7.75	3.26	10.75	1.09
2.00	1.36	5.00	4.35	8.00	3.26	11.00	1.09
2.25	1.63	5.25	6.53	8.25	1.90	11.25	1.09
2.50	1.63	5.50	6.53	8.50	1.90	11.50	1.09
2.75	1.63	5.75	26.11	8.75	1.90	11.75	1.09
3.00	1.63	6.00	71.81	9.00	1.90	12.00	1.09

CALIB
STANDHYD (0257) | Area (ha)= 3.10
ID= 1 DT=12.0 min | Total Imp(%)= 67.90 Dir. Conn.(%)= 42.90

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	2.10	1.00
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	143.76	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 12.0 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
0.200	1.36	3.200	2.18	6.200	9.79	9.20	1.90
0.400	1.36	3.400	2.18	6.400	9.79	9.40	1.90
0.600	1.36	3.600	2.18	6.600	7.07	9.60	1.90
0.800	1.36	3.800	2.18	6.800	4.35	9.80	1.90
1.000	1.36	4.000	2.18	7.000	4.35	10.00	1.90
1.200	1.36	4.200	3.26	7.200	3.26	10.20	1.09
1.400	1.36	4.400	3.26	7.400	3.26	10.40	1.09
1.600	1.36	4.600	3.81	7.600	3.26	10.60	1.09
1.800	1.36	4.800	4.35	7.800	3.26	10.80	1.09
2.000	1.36	5.000	4.35	8.000	3.26	11.00	1.09
2.200	1.63	5.200	6.53	8.200	1.90	11.20	1.09
2.400	1.63	5.400	6.53	8.400	1.90	11.40	1.09
2.600	1.63	5.600	16.32	8.600	1.90	11.60	1.09
2.800	1.63	5.800	37.54	8.800	1.90	11.80	1.09
3.000	1.63	6.000	71.81	9.000	1.90	12.00	1.09

Max.Eff.Inten.(mm/hr)=		71.81	68.16	
over (min)		12.00	12.00	
Storage Coeff. (min)=		3.63 (ii)	11.85 (ii)	
Unit Hyd. Tpeak (min)=		12.00	12.00	
Unit Hyd. peak (cms)=		0.14	0.09	
				TOTALS
PEAK FLOW	(cms)=	0.26	0.14	0.400 (iii)
TIME TO PEAK	(hrs)=	6.00	6.00	6.00
RUNOFF VOLUME	(mm)=	53.40	24.37	36.82
TOTAL RAINFALL	(mm)=	54.40	54.40	54.40
RUNOFF COEFFICIENT	=	0.98	0.45	0.68

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0258)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0228):	12.56	0.998	6.00	30.74
+ ID2= 2 (0257):	3.10	0.400	6.00	36.82
ID = 3 (0258):	15.66	1.398	6.00	31.95

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0243)
IN= 2---> OUT= 1
DT= 12.0 min

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.1346	0.4241
0.0096	0.0421	0.1575	0.4697
0.0159	0.0886	0.1823	0.5165
0.0203	0.1399	0.2088	0.5647
0.0228	0.1768	0.2369	0.6142
0.0250	0.2150	0.2514	0.6394
0.0628	0.2544	0.2663	0.6650
0.0835	0.2950	0.2816	0.6910
0.0991	0.3368	0.2997	0.7172
0.1144	0.3798	0.3113	0.7439

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0258)	15.660	1.398	6.00	31.95
OUTFLOW: ID= 1 (0243)	15.660	0.102	8.00	31.88

PEAK FLOW REDUCTION [Qout/Qin](%)= 7.27
TIME SHIFT OF PEAK FLOW (min)=120.00
MAXIMUM STORAGE USED (ha.m.)= 0.3443

ROUTEPIPE(0184)
IN= 2---> OUT= 1
DT= 12.0 min

PIPE Number = 1.00
Diameter (mm)=1650.00
Length (m)= 500.00
Slope (m/m)= 0.005
Manning n = 0.013

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

DEPTH (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME min
0.09	.216E+02	0.0	0.80	10.40
0.17	.600E+02	0.1	1.25	6.67
0.26	.108E+03	0.3	1.61	5.18
0.35	.164E+03	0.6	1.91	4.36
0.43	.225E+03	1.0	2.18	3.83
0.52	.290E+03	1.4	2.41	3.46
0.61	.358E+03	1.9	2.61	3.19
0.69	.428E+03	2.4	2.79	2.99
0.78	.499E+03	2.9	2.95	2.83
0.87	.570E+03	3.5	3.08	2.70
0.96	.642E+03	4.1	3.20	2.61
1.04	.712E+03	4.7	3.29	2.53
1.13	.780E+03	5.2	3.36	2.48
1.22	.844E+03	5.8	3.41	2.44
1.30	.905E+03	6.2	3.44	2.43
1.39	.961E+03	6.6	3.43	2.43
1.48	.101E+04	6.9	3.40	2.45
1.56	.105E+04	6.9	3.31	2.52
1.65	.107E+04	6.5	3.02	2.76

	AREA (ha)	<---- hydrograph ----> QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	<-pipe / channel-> MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 2 (0243)	15.66	0.10	8.00	31.88	0.14	1.01
OUTFLOW: ID= 1 (0184)	15.66	0.10	8.00	31.88	0.14	1.01

```
--------------------
|    READ STORM    |    Filename: C:\Users\jlysecki\AppD
|                  |              ata\Local\Temp\
|                  |              1e046b6a-70e8-44fb-adb2-28217afe7b2a\e04745ee
| Ptotal= 54.40 mm |    Comments: 5YR 12HR SCS
--------------------
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.25    1.36 |  3.25    2.18 |  6.25    9.79 |  9.25    1.90
                0.50    1.36 |  3.50    2.18 |  6.50    9.79 |  9.50    1.90
                0.75    1.36 |  3.75    2.18 |  6.75    4.35 |  9.75    1.90
                1.00    1.36 |  4.00    2.18 |  7.00    4.35 | 10.00    1.90
                1.25    1.36 |  4.25    3.26 |  7.25    3.26 | 10.25    1.09
                1.50    1.36 |  4.50    3.26 |  7.50    3.26 | 10.50    1.09
                1.75    1.36 |  4.75    4.35 |  7.75    3.26 | 10.75    1.09
                2.00    1.36 |  5.00    4.35 |  8.00    3.26 | 11.00    1.09
                2.25    1.63 |  5.25    6.53 |  8.25    1.90 | 11.25    1.09
                2.50    1.63 |  5.50    6.53 |  8.50    1.90 | 11.50    1.09
                2.75    1.63 |  5.75   26.11 |  8.75    1.90 | 11.75    1.09
                3.00    1.63 |  6.00   71.81 |  9.00    1.90 | 12.00    1.09

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

--------------------
| CALIB            |
| STANDHYD (  0229)|   Area     (ha)=  12.13
|ID= 1 DT=12.0 min |   Total Imp(%)=  54.50   Dir. Conn.(%)=  19.70
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       6.61          5.52
     Dep. Storage     (mm)=       1.00          1.50
     Average Slope     (%)=       1.00          2.00
     Length            (m)=     284.37         40.00
     Mannings n            =      0.013         0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO  12.0 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
               0.200    1.36 | 3.200    2.18 | 6.200    9.79 |  9.20    1.90
               0.400    1.36 | 3.400    2.18 | 6.400    9.79 |  9.40    1.90
               0.600    1.36 | 3.600    2.18 | 6.600    7.07 |  9.60    1.90
               0.800    1.36 | 3.800    2.18 | 6.800    4.35 |  9.80    1.90
               1.000    1.36 | 4.000    2.18 | 7.000    4.35 | 10.00    1.90
               1.200    1.36 | 4.200    3.26 | 7.200    3.26 | 10.20    1.09
               1.400    1.36 | 4.400    3.26 | 7.400    3.26 | 10.40    1.09
               1.600    1.36 | 4.600    3.81 | 7.600    3.26 | 10.60    1.09
               1.800    1.36 | 4.800    4.35 | 7.800    3.26 | 10.80    1.09
               2.000    1.36 | 5.000    4.35 | 8.000    3.26 | 11.00    1.09
               2.200    1.63 | 5.200    6.53 | 8.200    1.90 | 11.20    1.09
               2.400    1.63 | 5.400    6.53 | 8.400    1.90 | 11.40    1.09
               2.600    1.63 | 5.600   16.32 | 8.600    1.90 | 11.60    1.09
               2.800    1.63 | 5.800   37.54 | 8.800    1.90 | 11.80    1.09
               3.000    1.63 | 6.000   71.81 | 9.000    1.90 | 12.00    1.09

     Max.Eff.Inten.(mm/hr)=      71.81         67.32
                 over (min)       12.00         24.00
     Storage Coeff.  (min)=       5.46 (ii)    13.73 (ii)
     Unit Hyd. Tpeak (min)=      12.00         24.00
     Unit Hyd. peak  (cms)=       0.13          0.06
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.45          0.59      0.900 (iii)
     TIME TO PEAK    (hrs)=       6.00          6.20      6.00
     RUNOFF VOLUME    (mm)=      53.40         24.26     30.00
     TOTAL RAINFALL   (mm)=      54.40         54.40     54.40
     RUNOFF COEFFICIENT   =       0.98          0.45      0.55

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  69.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

--------------------
| ADD HYD  (  0196)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0184):    15.66    0.102     8.00    31.88
      + ID2= 2 (  0229):    12.13    0.900     6.00    30.00
        ================================================
        ID = 3 (  0196):    27.79    0.918     6.00    31.06

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| RESERVOIR(  0256)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                         0.0000     0.0000    |  0.2761     0.3332
                         0.0090     0.0385    |  0.3101     0.3536
                         0.0147     0.0812    |  0.3454     0.3743
                         0.0199     0.1456    |  0.3818     0.3952
                         0.0210     0.1631    |  0.4194     0.4165
                         0.0987     0.2172    |  0.4581     0.4381
                         0.1306     0.2358    |  0.4979     0.4600
                         0.1761     0.2739    |  0.5806     0.5047
                         0.2120     0.2934    |  0.6234     0.5275
                         0.2433     0.3131    |  0.7121     0.5742

                                  AREA     QPEAK     TPEAK      R.V.
                                  (ha)     (cms)     (hrs)      (mm)
   INFLOW : ID= 2 (  0196)      27.790     0.918      6.00     31.06
   OUTFLOW: ID= 1 (  0256)      27.790     0.170      8.20     31.02

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 18.49
                  TIME SHIFT OF PEAK FLOW          (min)=132.00
                  MAXIMUM  STORAGE   USED        (ha.m.)=  0.2686

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

--------------------
|    READ STORM    |    Filename: C:\Users\jlysecki\AppD
|                  |              ata\Local\Temp\
|                  |              1e046b6a-70e8-44fb-adb2-28217afe7b2a\e04745ee
| Ptotal= 54.40 mm |    Comments: 5YR 12HR SCS
--------------------
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.25    1.36 |  3.25    2.18 |  6.25    9.79 |  9.25    1.90
                0.50    1.36 |  3.50    2.18 |  6.50    9.79 |  9.50    1.90
                0.75    1.36 |  3.75    2.18 |  6.75    4.35 |  9.75    1.90
                1.00    1.36 |  4.00    2.18 |  7.00    4.35 | 10.00    1.90
                1.25    1.36 |  4.25    3.26 |  7.25    3.26 | 10.25    1.09
                1.50    1.36 |  4.50    3.26 |  7.50    3.26 | 10.50    1.09
                1.75    1.36 |  4.75    4.35 |  7.75    3.26 | 10.75    1.09
                2.00    1.36 |  5.00    4.35 |  8.00    3.26 | 11.00    1.09
                2.25    1.63 |  5.25    6.53 |  8.25    1.90 | 11.25    1.09
                2.50    1.63 |  5.50    6.53 |  8.50    1.90 | 11.50    1.09
                2.75    1.63 |  5.75   26.11 |  8.75    1.90 | 11.75    1.09
                3.00    1.63 |  6.00   71.81 |  9.00    1.90 | 12.00    1.09

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

--------------------
| CALIB            |
| STANDHYD (  0230)|   Area     (ha)=  20.35
|ID= 1 DT=12.0 min |   Total Imp(%)=  53.70   Dir. Conn.(%)=  32.40
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      10.93          9.42
     Dep. Storage     (mm)=       1.00          1.50
     Average Slope     (%)=       1.00          2.00
```

Length	(m)=	368.33	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 12.0 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
0.200	1.36	3.200	2.18	6.200	9.79	9.20	1.90
0.400	1.36	3.400	2.18	6.400	9.79	9.40	1.90
0.600	1.36	3.600	2.18	6.600	7.07	9.60	1.90
0.800	1.36	3.800	2.18	6.800	4.35	9.80	1.90
1.000	1.36	4.000	2.18	7.000	4.35	10.00	1.90
1.200	1.36	4.200	3.26	7.200	3.26	10.20	1.09
1.400	1.36	4.400	3.26	7.400	3.26	10.40	1.09
1.600	1.36	4.600	3.81	7.600	3.26	10.60	1.09
1.800	1.36	4.800	4.35	7.800	3.26	10.80	1.09
2.000	1.36	5.000	4.35	8.000	3.26	11.00	1.09
2.200	1.63	5.200	6.53	8.200	1.90	11.20	1.09
2.400	1.63	5.400	6.53	8.400	1.90	11.40	1.09
2.600	1.63	5.600	16.32	8.600	1.90	11.60	1.09
2.800	1.63	5.800	37.54	8.800	1.90	11.80	1.09
3.000	1.63	6.000	71.81	9.000	1.90	12.00	1.09

Max.Eff.Inten.(mm/hr)=		71.81	49.72	
over (min)		12.00	24.00	
Storage Coeff. (min)=		6.38 (ii)	15.71 (ii)	
Unit Hyd. Tpeak (min)=		12.00	24.00	
Unit Hyd. peak (cms)=		0.12	0.06	
				TOTALS
PEAK FLOW	(cms)=	1.21	0.71	1.739 (iii)
TIME TO PEAK	(hrs)=	6.00	6.20	6.00
RUNOFF VOLUME	(mm)=	53.40	21.66	31.94
TOTAL RAINFALL	(mm)=	54.40	54.40	54.40
RUNOFF COEFFICIENT	=	0.98	0.40	0.59

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0224)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0230):	20.35	1.739	6.00	31.94
+ ID2= 2 (0256):	27.79	0.170	8.20	31.02
ID = 3 (0224):	48.14	1.756	6.00	31.41

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0253)
IN= 2---> OUT= 1
DT= 12.0 min

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.6390	0.9848
0.0270	0.1457	0.9700	1.2900
0.0430	0.3152	1.1040	1.7480
0.0530	0.4653	3.3100	1.9350
0.3280	0.6677	11.3140	2.2662

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0224)	48.140	1.756	6.00	31.41
OUTFLOW: ID= 1 (0253)	48.140	0.225	10.20	31.38

PEAK FLOW REDUCTION [Qout/Qin](%)= 12.81

TIME SHIFT OF PEAK FLOW (min)=252.00
MAXIMUM STORAGE USED (ha.m.)= 0.5921

READ STORM
Ptotal= 54.40 mm

Filename: C:\Users\jlysecki\AppData\Local\Temp\1e046b6a-70e8-44fb-adb2-28217afe7b2a\e04745ee
Comments: 5YR 12HR SCS

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	1.36	3.25	2.18	6.25	9.79	9.25	1.90
0.50	1.36	3.50	2.18	6.50	9.79	9.50	1.90
0.75	1.36	3.75	2.18	6.75	4.35	9.75	1.90
1.00	1.36	4.00	2.18	7.00	4.35	10.00	1.90
1.25	1.36	4.25	3.26	7.25	3.26	10.25	1.09
1.50	1.36	4.50	3.26	7.50	3.26	10.50	1.09
1.75	1.36	4.75	4.35	7.75	3.26	10.75	1.09
2.00	1.36	5.00	4.35	8.00	3.26	11.00	1.09
2.25	1.63	5.25	6.53	8.25	1.90	11.25	1.09
2.50	1.63	5.50	6.53	8.50	1.90	11.50	1.09
2.75	1.63	5.75	26.11	8.75	1.90	11.75	1.09
3.00	1.63	6.00	71.81	9.00	1.90	12.00	1.09

CALIB
STANDHYD (0160)
ID= 1 DT=12.0 min

Area (ha)= 1.30
Total Imp(%)= 50.70 Dir. Conn.(%)= 22.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.66	0.64
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	93.09	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 12.0 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
0.200	1.36	3.200	2.18	6.200	9.79	9.20	1.90
0.400	1.36	3.400	2.18	6.400	9.79	9.40	1.90
0.600	1.36	3.600	2.18	6.600	7.07	9.60	1.90
0.800	1.36	3.800	2.18	6.800	4.35	9.80	1.90
1.000	1.36	4.000	2.18	7.000	4.35	10.00	1.90
1.200	1.36	4.200	3.26	7.200	3.26	10.20	1.09
1.400	1.36	4.400	3.26	7.400	3.26	10.40	1.09
1.600	1.36	4.600	3.81	7.600	3.26	10.60	1.09
1.800	1.36	4.800	4.35	7.800	3.26	10.80	1.09
2.000	1.36	5.000	4.35	8.000	3.26	11.00	1.09
2.200	1.63	5.200	6.53	8.200	1.90	11.20	1.09
2.400	1.63	5.400	6.53	8.400	1.90	11.40	1.09
2.600	1.63	5.600	16.32	8.600	1.90	11.60	1.09
2.800	1.63	5.800	37.54	8.800	1.90	11.80	1.09
3.000	1.63	6.000	71.81	9.000	1.90	12.00	1.09

Max.Eff.Inten.(mm/hr)=		71.81	56.61	
over (min)		12.00	12.00	
Storage Coeff. (min)=		2.79 (ii)	11.66 (ii)	
Unit Hyd. Tpeak (min)=		12.00	12.00	
Unit Hyd. peak (cms)=		0.14	0.09	
				TOTALS
PEAK FLOW	(cms)=	0.06	0.08	0.132 (iii)
TIME TO PEAK	(hrs)=	6.00	6.00	6.00
RUNOFF VOLUME	(mm)=	53.40	22.75	29.49
TOTAL RAINFALL	(mm)=	54.40	54.40	54.40
RUNOFF COEFFICIENT	=	0.98	0.42	0.54

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

DUHYD (0183)					
Inlet Cap.= 0.152					
#of Inlets= 1					
Total(cms)= 0.2		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
	TOTAL HYD.(ID= 1):	1.30	0.13	6.00	29.49
	MAJOR SYS.(ID= 2):	0.00	0.00	0.00	0.00
	MINOR SYS.(ID= 3):	1.30	0.13	6.00	29.49

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

READ STORM	Filename: C:\Users\jlysecki\AppData\Local\Temp\1e046b6a-70e8-44fb-adb2-28217afe7b2a\e04745ee
Ptotal= 54.40 mm	Comments: 5YR 12HR SCS

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	1.36	3.25	2.18	6.25	9.79	9.25	1.90
0.50	1.36	3.50	2.18	6.50	9.79	9.50	1.90
0.75	1.36	3.75	2.18	6.75	4.35	9.75	1.90
1.00	1.36	4.00	2.18	7.00	4.35	10.00	1.90
1.25	1.36	4.25	3.26	7.25	3.26	10.25	1.09
1.50	1.36	4.50	3.26	7.50	3.26	10.50	1.09
1.75	1.36	4.75	4.35	7.75	3.26	10.75	1.09
2.00	1.36	5.00	4.35	8.00	3.26	11.00	1.09
2.25	1.63	5.25	6.53	8.25	1.90	11.25	1.09
2.50	1.63	5.50	6.53	8.50	1.90	11.50	1.09
2.75	1.63	5.75	26.11	8.75	1.90	11.75	1.09
3.00	1.63	6.00	71.81	9.00	1.90	12.00	1.09

CALIB			
STANDHYD (0193)	Area (ha)= 1.21		
ID= 1 DT=12.0 min	Total Imp(%)= 49.30	Dir. Conn.(%)= 20.10	
		IMPERVIOUS	PERVIOUS (i)
	Surface Area (ha)=	0.60	0.61
	Dep. Storage (mm)=	1.00	1.50
	Average Slope (%)=	1.00	2.00
	Length (m)=	89.81	40.00
	Mannings n =	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 12.0 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
0.200	1.36	3.200	2.18	6.200	9.79	9.20	1.90
0.400	1.36	3.400	2.18	6.400	9.79	9.40	1.90
0.600	1.36	3.600	2.18	6.600	7.07	9.60	1.90
0.800	1.36	3.800	2.18	6.800	4.35	9.80	1.90
1.000	1.36	4.000	2.18	7.000	4.35	10.00	1.90
1.200	1.36	4.200	3.26	7.200	3.26	10.20	1.09
1.400	1.36	4.400	3.26	7.400	3.26	10.40	1.09
1.600	1.36	4.600	3.81	7.600	3.26	10.60	1.09
1.800	1.36	4.800	4.35	7.800	3.26	10.80	1.09
2.000	1.36	5.000	4.35	8.000	3.26	11.00	1.09
2.200	1.63	5.200	6.53	8.200	1.90	11.20	1.09
2.400	1.63	5.400	6.53	8.400	1.90	11.40	1.09
2.600	1.63	5.600	16.32	8.600	1.90	11.60	1.09
2.800	1.63	5.800	37.54	8.800	1.90	11.80	1.09
3.000	1.63	6.000	71.81	9.000	1.90	12.00	1.09

Max.Eff.Inten.(mm/hr)=	71.81	56.25		
over (min)	12.00	12.00		
Storage Coeff. (min)=	2.73 (ii)	11.62 (ii)		
Unit Hyd. Tpeak (min)=	12.00	12.00		
Unit Hyd. peak (cms)=	0.14	0.09		
			TOTALS	
PEAK FLOW (cms)=	0.05	0.07	0.120 (iii)	
TIME TO PEAK (hrs)=	6.00	6.00	6.00	
RUNOFF VOLUME (mm)=	53.40	22.70	28.86	
TOTAL RAINFALL (mm)=	54.40	54.40	54.40	
RUNOFF COEFFICIENT =	0.98	0.42	0.53	

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

DUHYD (0227)					
Inlet Cap.= 0.120					
#of Inlets= 1					
Total(cms)= 0.1		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
	TOTAL HYD.(ID= 1):	1.21	0.12	6.00	28.86
	MAJOR SYS.(ID= 2):	0.00	0.00	0.00	0.00
	MINOR SYS.(ID= 3):	1.21	0.12	6.00	28.86

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

READ STORM	Filename: C:\Users\jlysecki\AppData\Local\Temp\1e046b6a-70e8-44fb-adb2-28217afe7b2a\e04745ee
Ptotal= 54.40 mm	Comments: 5YR 12HR SCS

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	1.36	3.25	2.18	6.25	9.79	9.25	1.90
0.50	1.36	3.50	2.18	6.50	9.79	9.50	1.90
0.75	1.36	3.75	2.18	6.75	4.35	9.75	1.90
1.00	1.36	4.00	2.18	7.00	4.35	10.00	1.90
1.25	1.36	4.25	3.26	7.25	3.26	10.25	1.09
1.50	1.36	4.50	3.26	7.50	3.26	10.50	1.09
1.75	1.36	4.75	4.35	7.75	3.26	10.75	1.09
2.00	1.36	5.00	4.35	8.00	3.26	11.00	1.09
2.25	1.63	5.25	6.53	8.25	1.90	11.25	1.09
2.50	1.63	5.50	6.53	8.50	1.90	11.50	1.09
2.75	1.63	5.75	26.11	8.75	1.90	11.75	1.09
3.00	1.63	6.00	71.81	9.00	1.90	12.00	1.09

CALIB			
STANDHYD (0206)	Area (ha)= 38.60		
ID= 1 DT=12.0 min	Total Imp(%)= 54.70	Dir. Conn.(%)= 23.20	
		IMPERVIOUS	PERVIOUS (i)
	Surface Area (ha)=	21.11	17.49
	Dep. Storage (mm)=	1.00	1.50
	Average Slope (%)=	1.00	2.00
	Length (m)=	507.28	40.00
	Mannings n =	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 12.0 MIN. TIME STEP.

COLE ENGINEERING

Experience Enhancing Excellence

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.200	1.36	3.200	2.18	6.200	9.79	9.20	1.90
0.400	1.36	3.400	2.18	6.400	9.79	9.40	1.90
0.600	1.36	3.600	2.18	6.600	7.07	9.60	1.90
0.800	1.36	3.800	2.18	6.800	4.35	9.80	1.90
1.000	1.36	4.000	2.18	7.000	4.35	10.00	1.90
1.200	1.36	4.200	3.26	7.200	3.26	10.20	1.09
1.400	1.36	4.400	3.26	7.400	3.26	10.40	1.09
1.600	1.36	4.600	3.81	7.600	3.26	10.60	1.09
1.800	1.36	4.800	4.35	7.800	3.26	10.80	1.09
2.000	1.36	5.000	4.35	8.000	3.26	11.00	1.09
2.200	1.63	5.200	6.53	8.200	1.90	11.20	1.09
2.400	1.63	5.400	6.53	8.400	1.90	11.40	1.09
2.600	1.63	5.600	16.32	8.600	1.90	11.60	1.09
2.800	1.63	5.800	37.54	8.800	1.90	11.80	1.09
3.000	1.63	6.000	71.81	9.000	1.90	12.00	1.09

			TOTALS
Max.Eff.Inten.(mm/hr)=	71.81	63.19	
over (min)	12.00	24.00	
Storage Coeff. (min)=	7.73 (ii)	16.21 (ii)	
Unit Hyd. Tpeak (min)=	12.00	24.00	
Unit Hyd. peak (cms)=	0.11	0.06	
PEAK FLOW (cms)=	1.58	1.66	2.823 (iii)
TIME TO PEAK (hrs)=	6.00	6.20	6.00
RUNOFF VOLUME (mm)=	53.40	23.70	30.59
TOTAL RAINFALL (mm)=	54.40	54.40	54.40
RUNOFF COEFFICIENT =	0.98	0.44	0.56

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0225)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
*** W A R N I N G : HYDROGRAPH 0183 <ID= 1> IS DRY.					
*** W A R N I N G : HYDROGRAPH 0225 = HYDROGRAPH 0206					
ID1= 1 (0183):		0.00	0.000	0.00	0.00
+ ID2= 2 (0206):		38.60	2.823	6.00	30.59
ID = 3 (0225):		38.60	2.823	6.00	30.59

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0225)		AREA	QPEAK	TPEAK	R.V.
3 + 2 = 1		(ha)	(cms)	(hrs)	(mm)
*** W A R N I N G : HYDROGRAPH 0227 <ID= 2> IS DRY.					
*** W A R N I N G : HYDROGRAPH 0001 = HYDROGRAPH 0003					
ID1= 3 (0225):		38.60	2.823	6.00	30.59
+ ID2= 2 (0227):		0.00	0.000	0.00	0.00
ID = 1 (0225):		38.60	2.823	6.00	30.59

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

READ STORM	Filename: C:\Users\jlysecki\AppData\Local\Temp\1e046b6a-70e8-44fb-adb2-28217afe7b2a\e04745ee

Ptotal= 54.40 mm	Comments: 5YR 12HR SCS

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	1.36	3.25	2.18	6.25	9.79	9.25	1.90
0.50	1.36	3.50	2.18	6.50	9.79	9.50	1.90
0.75	1.36	3.75	2.18	6.75	4.35	9.75	1.90
1.00	1.36	4.00	2.18	7.00	4.35	10.00	1.90
1.25	1.36	4.25	3.26	7.25	3.26	10.25	1.09
1.50	1.36	4.50	3.26	7.50	3.26	10.50	1.09
1.75	1.36	4.75	4.35	7.75	3.26	10.75	1.09
2.00	1.36	5.00	4.35	8.00	3.26	11.00	1.09
2.25	1.63	5.25	6.53	8.25	1.90	11.25	1.09
2.50	1.63	5.50	6.53	8.50	1.90	11.50	1.09
2.75	1.63	5.75	26.11	8.75	1.90	11.75	1.09
3.00	1.63	6.00	71.81	9.00	1.90	12.00	1.09

CALIB	
STANDHYD (0209)	Area (ha)= 5.20
ID= 1 DT=12.0 min	Total Imp(%)= 31.60 Dir. Conn.(%)= 19.40

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	1.64	3.56
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	186.19	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 12.0 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
0.200	1.36	3.200	2.18	6.200	9.79	9.20	1.90
0.400	1.36	3.400	2.18	6.400	9.79	9.40	1.90
0.600	1.36	3.600	2.18	6.600	7.07	9.60	1.90
0.800	1.36	3.800	2.18	6.800	4.35	9.80	1.90
1.000	1.36	4.000	2.18	7.000	4.35	10.00	1.90
1.200	1.36	4.200	3.26	7.200	3.26	10.20	1.09
1.400	1.36	4.400	3.26	7.400	3.26	10.40	1.09
1.600	1.36	4.600	3.81	7.600	3.26	10.60	1.09
1.800	1.36	4.800	4.35	7.800	3.26	10.80	1.09
2.000	1.36	5.000	4.35	8.000	3.26	11.00	1.09
2.200	1.63	5.200	6.53	8.200	1.90	11.20	1.09
2.400	1.63	5.400	6.53	8.400	1.90	11.40	1.09
2.600	1.63	5.600	16.32	8.600	1.90	11.60	1.09
2.800	1.63	5.800	37.54	8.800	1.90	11.80	1.09
3.000	1.63	6.000	71.81	9.000	1.90	12.00	1.09

			TOTALS
Max.Eff.Inten.(mm/hr)=	71.81	34.84	
over (min)	12.00	24.00	
Storage Coeff. (min)=	4.23 (ii)	15.00 (ii)	
Unit Hyd. Tpeak (min)=	12.00	24.00	
Unit Hyd. peak (cms)=	0.13	0.06	
PEAK FLOW (cms)=	0.20	0.19	0.336 (iii)
TIME TO PEAK (hrs)=	6.00	6.20	6.00
RUNOFF VOLUME (mm)=	53.40	18.82	25.53
TOTAL RAINFALL (mm)=	54.40	54.40	54.40
RUNOFF COEFFICIENT =	0.98	0.35	0.47

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
YOU SHOULD CONSIDER SPLITTING THE AREA.

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

```
-------------------
|    READ STORM    |    Filename: C:\Users\jlysecki\AppD
|                  |              ata\Local\Temp\
|                  |              1e046b6a-70e8-44fb-adb2-28217afe7b2a\e04745ee
| Ptotal= 54.40 mm |    Comments: 5YR 12HR SCS
-------------------
```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	1.36	3.25	2.18	6.25	9.79	9.25	1.90
0.50	1.36	3.50	2.18	6.50	9.79	9.50	1.90
0.75	1.36	3.75	2.18	6.75	4.35	9.75	1.90
1.00	1.36	4.00	2.18	7.00	4.35	10.00	1.90
1.25	1.36	4.25	3.26	7.25	3.26	10.25	1.09
1.50	1.36	4.50	3.26	7.50	3.26	10.50	1.09
1.75	1.36	4.75	4.35	7.75	3.26	10.75	1.09
2.00	1.36	5.00	4.35	8.00	3.26	11.00	1.09
2.25	1.63	5.25	6.53	8.25	1.90	11.25	1.09
2.50	1.63	5.50	6.53	8.50	1.90	11.50	1.09
2.75	1.63	5.75	26.11	8.75	1.90	11.75	1.09
3.00	1.63	6.00	71.81	9.00	1.90	12.00	1.09

```
-------------------
| CALIB            |
| STANDHYD (  0252)|   Area     (ha)=   1.44
|ID= 1 DT=12.0 min |   Total Imp(%)=  52.40   Dir. Conn.(%)=  20.10
-------------------
```

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.75	0.69
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	97.98	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 12.0 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
0.200	1.36	3.200	2.18	6.200	9.79	9.20	1.90
0.400	1.36	3.400	2.18	6.400	9.79	9.40	1.90
0.600	1.36	3.600	2.18	6.600	7.07	9.60	1.90
0.800	1.36	3.800	2.18	6.800	4.35	9.80	1.90
1.000	1.36	4.000	2.18	7.000	4.35	10.00	1.90
1.200	1.36	4.200	3.26	7.200	3.26	10.20	1.09
1.400	1.36	4.400	3.26	7.400	3.26	10.40	1.09
1.600	1.36	4.600	3.81	7.600	3.26	10.60	1.09
1.800	1.36	4.800	4.35	7.800	3.26	10.80	1.09
2.000	1.36	5.000	4.35	8.000	3.26	11.00	1.09
2.200	1.63	5.200	6.53	8.200	1.90	11.20	1.09
2.400	1.63	5.400	6.53	8.400	1.90	11.40	1.09
2.600	1.63	5.600	16.32	8.600	1.90	11.60	1.09
2.800	1.63	5.800	37.54	8.800	1.90	11.80	1.09
3.000	1.63	6.000	71.81	9.000	1.90	12.00	1.09

Max.Eff.Inten.(mm/hr)=		71.81	62.20	
over (min)		12.00	12.00	
Storage Coeff. (min)=		2.88 (ii)	11.41 (ii)	
Unit Hyd. Tpeak (min)=		12.00	12.00	
Unit Hyd. peak (cms)=		0.14	0.09	
				TOTALS
PEAK FLOW	(cms)=	0.06	0.09	0.146 (iii)
TIME TO PEAK	(hrs)=	6.00	6.00	6.00
RUNOFF VOLUME	(mm)=	53.40	23.56	29.56
TOTAL RAINFALL	(mm)=	54.40	54.40	54.40
RUNOFF COEFFICIENT	=	0.98	0.43	0.54

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.

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

```
-------------------
| RESERVOIR(  0261)|
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |
-------------------
```

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.1470	0.0137
0.0530	0.0050	0.1700	0.0155
0.0700	0.0076	0.1900	0.0220
0.1150	0.0113	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0252)	1.440	0.146	6.00	29.56
OUTFLOW: ID= 1 (0261)	1.440	0.084	6.10	29.54

PEAK FLOW REDUCTION [Qout/Qin](%)= 57.48
TIME SHIFT OF PEAK FLOW (min)= 6.00
MAXIMUM STORAGE USED (ha.m.)= 0.0090

```
-------------------
| ADD HYD  (  0251)|
|   1 +  2 =  3    |
-------------------
```

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0209):	5.20	0.336	6.00	25.53
+ ID2= 2 (0261):	1.44	0.084	6.10	29.54
ID = 3 (0251):	6.64	0.403	6.00	26.40

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```
-------------------
| RESERVOIR(  0245)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |
-------------------
```

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.3090	0.2876
0.0000	0.0000	0.3330	0.3838
0.1230	0.1102	0.3620	0.5200
0.2870	0.1971	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0251)	6.640	0.403	6.00	26.40
OUTFLOW: ID= 1 (0245)	6.640	0.095	6.90	26.36

PEAK FLOW REDUCTION [Qout/Qin](%)= 23.49
TIME SHIFT OF PEAK FLOW (min)= 54.00
MAXIMUM STORAGE USED (ha.m.)= 0.0848

```
-------------------
| ROUTEPIPE(  0212)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |
-------------------
```

PIPE Number = 1.00
Diameter (mm)=1650.00
Length (m)= 850.00
Slope (m/m)= 0.005
Manning n = 0.013

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

DEPTH (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME min
0.09	.367E+02	0.0	0.80	17.68
0.17	.102E+03	0.1	1.25	11.33
0.26	.184E+03	0.3	1.61	8.81
0.35	.278E+03	0.6	1.91	7.41
0.43	.382E+03	1.0	2.18	6.51
0.52	.492E+03	1.4	2.41	5.88
0.61	.608E+03	1.9	2.61	5.43
0.69	.727E+03	2.4	2.79	5.08
0.78	.848E+03	2.9	2.95	4.81
0.87	.970E+03	3.5	3.08	4.60

COLE ENGINEERING

Experience Enhancing Excellence

0.96	.109E+04	4.1	3.20	4.43	
1.04	.121E+04	4.7	3.29	4.31	
1.13	.133E+04	5.2	3.36	4.22	
1.22	.144E+04	5.8	3.41	4.15	
1.30	.154E+04	6.2	3.44	4.12	
1.39	.163E+04	6.6	3.43	4.13	
1.48	.172E+04	6.9	3.40	4.17	
1.56	.178E+04	6.9	3.31	4.28	
1.65	.182E+04	6.5	3.02	4.70	

		<---- hydrograph ---->			<-pipe / channel->	
	AREA	QPEAK	TPEAK	R.V.	MAX DEPTH	MAX VEL
	(ha)	(cms)	(hrs)	(mm)	(m)	(m/s)
INFLOW : ID= 2 (0245)	6.64	0.09	6.90	26.36	0.13	0.98
OUTFLOW: ID= 1 (0212)	6.64	0.09	7.10	26.36	0.13	0.98

ADD HYD (0211)				
1 + 2 = 3	AREA	QPEAK	TPEAK	R.V.
	(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0212):	6.64	0.093	7.10	26.36
+ ID2= 2 (0225):	38.60	2.823	6.00	30.59
ID = 3 (0211):	45.24	2.849	6.00	29.97

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0255)				
IN= 2---> OUT= 1				
DT= 12.0 min	OUTFLOW	STORAGE	OUTFLOW	STORAGE
	(cms)	(ha.m.)	(cms)	(ha.m.)
	0.0000	0.0000	1.6250	1.2448
	0.0190	0.1627	1.6630	1.2997
	0.0360	0.4306	1.8430	1.5816
	0.0480	0.7217	2.1300	2.1197
	0.1330	0.7718	2.9680	2.2465
	1.0390	0.9773	7.5380	2.5741

	AREA	QPEAK	TPEAK	R.V.
	(ha)	(cms)	(hrs)	(mm)
INFLOW : ID= 2 (0211)	45.240	2.849	6.00	29.97
OUTFLOW: ID= 1 (0255)	45.240	0.431	7.30	29.92

PEAK FLOW REDUCTION [Qout/Qin](%)= 15.14
TIME SHIFT OF PEAK FLOW (min)= 78.00
MAXIMUM STORAGE USED (ha.m.)= 0.8395

V V I SSSSS U U A L (v 5.1.2004)
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)\Visual OTTHYMO 5.1\VO2\voin.dat
Output filename: C:\Users\jlysecki\AppData\Local\Civica\VH5\a379672b-db33-4372-b5e0-ba58a07d1417\f717abf5-d063-4bb4-8173-ebc63f1e41a9\sce

Summary filename: C:\Users\jlysecki\AppData\Local\Civica\VH5\a379672b-db33-4372-b5e0-ba58a07d1417\f717abf5-d063-4bb4-8173-ebc63f1e41a9\sce

DATE: 01/15/2020 TIME: 04:16:44

USER:

COMMENTS: _____

** SIMULATION : Run 03 **

READ STORM	Filename: C:\Users\jlysecki\AppData\Local\Temp\1e046b6a-70e8-44fb-adb2-28217afe7b2a\c75abbfd
Ptotal= 62.70 mm	Comments: 10YR 12HR SCS

TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.25	1.57	3.25	2.51	6.25	11.29	9.25	2.19
0.50	1.57	3.50	2.51	6.50	11.29	9.50	2.19
0.75	1.57	3.75	2.51	6.75	5.02	9.75	2.19
1.00	1.57	4.00	2.51	7.00	5.02	10.00	2.19
1.25	1.57	4.25	3.76	7.25	3.76	10.25	1.25
1.50	1.57	4.50	3.76	7.50	3.76	10.50	1.25
1.75	1.57	4.75	5.02	7.75	3.76	10.75	1.25
2.00	1.57	5.00	5.02	8.00	3.76	11.00	1.25
2.25	1.88	5.25	7.52	8.25	2.19	11.25	1.25
2.50	1.88	5.50	7.52	8.50	2.19	11.50	1.25
2.75	1.88	5.75	30.10	8.75	2.19	11.75	1.25
3.00	1.88	6.00	82.76	9.00	2.19	12.00	1.25

CALIB		
STANDHYD (0228)	Area (ha)= 12.56	
ID= 1 DT=12.0 min	Total Imp(%)= 54.10	Dir. Conn.(%)= 25.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	6.79	5.77
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	289.37	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 12.0 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
0.200	1.57	3.200	2.51	6.200	11.29	9.20	2.19
0.400	1.57	3.400	2.51	6.400	11.29	9.40	2.19
0.600	1.57	3.600	2.51	6.600	8.15	9.60	2.19
0.800	1.57	3.800	2.51	6.800	5.02	9.80	2.19
1.000	1.57	4.000	2.51	7.000	5.02	10.00	2.19
1.200	1.57	4.200	3.76	7.200	3.76	10.20	1.25
1.400	1.57	4.400	3.76	7.400	3.76	10.40	1.25
1.600	1.57	4.600	4.39	7.600	3.76	10.60	1.25
1.800	1.57	4.800	5.02	7.800	3.76	10.80	1.25
2.000	1.57	5.000	5.02	8.000	3.76	11.00	1.25
2.200	1.88	5.200	7.52	8.200	2.19	11.20	1.25
2.400	1.88	5.400	7.52	8.400	2.19	11.40	1.25
2.600	1.88	5.600	18.81	8.600	2.19	11.60	1.25
2.800	1.88	5.800	43.26	8.800	2.19	11.80	1.25
3.000	1.88	6.000	82.76	9.000	2.19	12.00	1.25

COLE ENGINEERING

Experience Enhancing Excellence

```
     Max.Eff.Inten.(mm/hr)=      82.76        74.49
               over (min)       12.00        24.00
     Storage Coeff.  (min)=       5.21 (ii)   13.15 (ii)
     Unit Hyd. Tpeak (min)=      12.00        24.00
     Unit Hyd. peak  (cms)=       0.13         0.07
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.69         0.70          1.217 (iii)
     TIME TO PEAK    (hrs)=       6.00         6.20          6.00
     RUNOFF VOLUME    (mm)=      61.70        29.00         37.17
     TOTAL RAINFALL   (mm)=      62.70        62.70         62.70
     RUNOFF COEFFICIENT   =       0.98         0.46          0.59

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
```

```
-------------------
|    READ STORM    |    Filename: C:\Users\jlysecki\AppD
|                  |              ata\Local\Temp\
|                  |              1e046b6a-70e8-44fb-adb2-28217afe7b2a\c75abbfd
| Ptotal= 62.70 mm |    Comments: 10YR 12HR SCS
-------------------
```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	1.57	3.25	2.51	6.25	11.29	9.25	2.19
0.50	1.57	3.50	2.51	6.50	11.29	9.50	2.19
0.75	1.57	3.75	2.51	6.75	5.02	9.75	2.19
1.00	1.57	4.00	2.51	7.00	5.02	10.00	2.19
1.25	1.57	4.25	3.76	7.25	3.76	10.25	1.25
1.50	1.57	4.50	3.76	7.50	3.76	10.50	1.25
1.75	1.57	4.75	5.02	7.75	3.76	10.75	1.25
2.00	1.57	5.00	5.02	8.00	3.76	11.00	1.25
2.25	1.88	5.25	7.52	8.25	2.19	11.25	1.25
2.50	1.88	5.50	7.52	8.50	2.19	11.50	1.25
2.75	1.88	5.75	30.10	8.75	2.19	11.75	1.25
3.00	1.88	6.00	82.76	9.00	2.19	12.00	1.25

```
-------------------
| CALIB             |
| STANDHYD (  0257)|   Area     (ha)=   3.10
|ID= 1 DT=12.0 min |   Total Imp(%)=  67.90   Dir. Conn.(%)=  42.90
-------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      2.10         1.00
     Dep. Storage     (mm)=      1.00         1.50
     Average Slope     (%)=      1.00         2.00
     Length            (m)=    143.76        40.00
     Mannings n           =     0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO  12.0 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
0.200	1.57	3.200	2.51	6.200	11.29	9.20	2.19
0.400	1.57	3.400	2.51	6.400	11.29	9.40	2.19
0.600	1.57	3.600	2.51	6.600	8.15	9.60	2.19
0.800	1.57	3.800	2.51	6.800	5.02	9.80	2.19
1.000	1.57	4.000	2.51	7.000	5.02	10.00	2.19
1.200	1.57	4.200	3.76	7.200	3.76	10.20	1.25
1.400	1.57	4.400	3.76	7.400	3.76	10.40	1.25
1.600	1.57	4.600	4.39	7.600	3.76	10.60	1.25
1.800	1.57	4.800	5.02	7.800	3.76	10.80	1.25
2.000	1.57	5.000	5.02	8.000	3.76	11.00	1.25
2.200	1.88	5.200	7.52	8.200	2.19	11.20	1.25
2.400	1.88	5.400	7.52	8.400	2.19	11.40	1.25
2.600	1.88	5.600	18.81	8.600	2.19	11.60	1.25
2.800	1.88	5.800	43.26	8.800	2.19	11.80	1.25
3.000	1.88	6.000	82.76	9.000	2.19	12.00	1.25

```
     Max.Eff.Inten.(mm/hr)=      82.76        84.87
               over (min)       12.00        12.00
     Storage Coeff.  (min)=       3.43 (ii)   10.96 (ii)
     Unit Hyd. Tpeak (min)=      12.00        12.00
     Unit Hyd. peak  (cms)=       0.14         0.09
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.30         0.18          0.481 (iii)
     TIME TO PEAK    (hrs)=       6.00         6.00          6.00
     RUNOFF VOLUME    (mm)=      61.70        30.36         43.81
     TOTAL RAINFALL   (mm)=      62.70        62.70         62.70
     RUNOFF COEFFICIENT   =       0.98         0.48          0.70

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
```

```
-------------------
| ADD HYD  (  0258)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
-------------------           (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0228):     12.56    1.217     6.00    37.17
     + ID2= 2 (  0257):      3.10    0.481     6.00    43.81
       ================================================
       ID = 3 (  0258):     15.66    1.698     6.00    38.49

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

```
-------------------
| RESERVOIR(  0243)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW    STORAGE    |  OUTFLOW    STORAGE
-------------------       (cms)     (ha.m.)    |    (cms)     (ha.m.)
                         0.0000     0.0000     |   0.1346     0.4241
                         0.0096     0.0421     |   0.1575     0.4697
                         0.0159     0.0886     |   0.1823     0.5165
                         0.0203     0.1399     |   0.2088     0.5647
                         0.0228     0.1768     |   0.2369     0.6142
                         0.0250     0.2150     |   0.2514     0.6394
                         0.0628     0.2544     |   0.2663     0.6650
                         0.0835     0.2950     |   0.2816     0.6910
                         0.0991     0.3368     |   0.2997     0.7172
                         0.1144     0.3798     |   0.3113     0.7439

                                    AREA     QPEAK     TPEAK      R.V.
                                    (ha)     (cms)     (hrs)      (mm)
   INFLOW : ID= 2 (  0258)        15.660     1.698      6.00     38.49
   OUTFLOW: ID= 1 (  0243)        15.660     0.129      7.80     38.42

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  7.58
                  TIME SHIFT OF PEAK FLOW          (min)=108.00
                  MAXIMUM  STORAGE   USED        (ha.m.)=  0.4111
```

```
-------------------
| ROUTEPIPE(  0184)|     PIPE Number      =   1.00
| IN= 2---> OUT= 1 |     Diameter     (mm)=1650.00
| DT= 12.0 min     |     Length        (m)= 500.00
-------------------      Slope       (m/m)=  0.005
                         Manning n        =  0.013

     <----------------- TRAVEL TIME TABLE ------------------->
       DEPTH       VOLUME     FLOW RATE     VELOCITY     TRAV.TIME
         (m)       (cu.m.)       (cms)         (m/s)         min
        0.09     .216E+02        0.0          0.80         10.40
        0.17     .600E+02        0.1          1.25          6.67
```

0.26	.108E+03	0.3	1.61	5.18
0.35	.164E+03	0.6	1.91	4.36
0.43	.225E+03	1.0	2.18	3.83
0.52	.290E+03	1.4	2.41	3.46
0.61	.358E+03	1.9	2.61	3.19
0.69	.428E+03	2.4	2.79	2.99
0.78	.499E+03	2.9	2.95	2.83
0.87	.570E+03	3.5	3.08	2.70
0.96	.642E+03	4.1	3.20	2.61
1.04	.712E+03	4.7	3.29	2.53
1.13	.780E+03	5.2	3.36	2.48
1.22	.844E+03	5.8	3.41	2.44
1.30	.905E+03	6.2	3.44	2.43
1.39	.961E+03	6.6	3.43	2.43
1.48	.101E+04	6.9	3.40	2.45
1.56	.105E+04	6.9	3.31	2.52
1.65	.107E+04	6.5	3.02	2.76

	<---- hydrograph ---->			<-pipe / channel->	
	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 2 (0243)	15.66	0.13	7.80	38.42	0.16	1.13
OUTFLOW: ID= 1 (0184)	15.66	0.13	7.80	38.42	0.16	1.13

READ STORM | Filename: C:\Users\jlysecki\AppData\Local\Temp\1e046b6a-70e8-44fb-adb2-28217afe7b2a\c75abbfd
Ptotal= 62.70 mm | Comments: 10YR 12HR SCS

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	1.57	3.25	2.51	6.25	11.29	9.25	2.19
0.50	1.57	3.50	2.51	6.50	11.29	9.50	2.19
0.75	1.57	3.75	2.51	6.75	5.02	9.75	2.19
1.00	1.57	4.00	2.51	7.00	5.02	10.00	2.19
1.25	1.57	4.25	3.76	7.25	3.76	10.25	1.25
1.50	1.57	4.50	3.76	7.50	3.76	10.50	1.25
1.75	1.57	4.75	5.02	7.75	3.76	10.75	1.25
2.00	1.57	5.00	5.02	8.00	3.76	11.00	1.25
2.25	1.88	5.25	7.52	8.25	2.19	11.25	1.25
2.50	1.88	5.50	7.52	8.50	2.19	11.50	1.25
2.75	1.88	5.75	30.10	8.75	2.19	11.75	1.25
3.00	1.88	6.00	82.76	9.00	2.19	12.00	1.25

CALIB | STANDHYD (0229) | ID= 1 DT=12.0 min | Area (ha)= 12.13 | Total Imp(%)= 54.50 | Dir. Conn.(%)= 19.70

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	6.61	5.52
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	284.37	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 12.0 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
0.200	1.57	3.200	2.51	6.200	11.29	9.20	2.19
0.400	1.57	3.400	2.51	6.400	11.29	9.40	2.19
0.600	1.57	3.600	2.51	6.600	8.15	9.60	2.19
0.800	1.57	3.800	2.51	6.800	5.02	9.80	2.19
1.000	1.57	4.000	2.51	7.000	5.02	10.00	2.19
1.200	1.57	4.200	3.76	7.200	3.76	10.20	1.25
1.400	1.57	4.400	3.76	7.400	3.76	10.40	1.25
1.600	1.57	4.600	4.39	7.600	3.76	10.60	1.25
1.800	1.57	4.800	5.02	7.800	3.76	10.80	1.25
2.000	1.57	5.000	5.02	8.000	3.76	11.00	1.25
2.200	1.88	5.200	7.52	8.200	2.19	11.20	1.25
2.400	1.88	5.400	7.52	8.400	2.19	11.40	1.25
2.600	1.88	5.600	18.81	8.600	2.19	11.60	1.25
2.800	1.88	5.800	43.26	8.800	2.19	11.80	1.25
3.000	1.88	6.000	82.76	9.000	2.19	12.00	1.25

Max.Eff.Inten.	(mm/hr)=	82.76	83.85
over	(min)	12.00	24.00
Storage Coeff.	(min)=	5.16 (ii)	12.73 (ii)
Unit Hyd. Tpeak	(min)=	12.00	24.00
Unit Hyd. peak	(cms)=	0.13	0.07
			TOTALS
PEAK FLOW	(cms)=	0.52	0.76	1.106 (iii)
TIME TO PEAK	(hrs)=	6.00	6.20	6.00
RUNOFF VOLUME	(mm)=	61.70	30.24	36.44
TOTAL RAINFALL	(mm)=	62.70	62.70	62.70
RUNOFF COEFFICIENT	=	0.98	0.48	0.58

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20% YOU SHOULD CONSIDER SPLITTING THE AREA.

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0196) | 1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0184):	15.66	0.129	7.80	38.42
+ ID2= 2 (0229):	12.13	1.106	6.00	36.44
ID = 3 (0196):	27.79	1.126	6.00	37.55

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0256) | IN= 2---> OUT= 1 | DT= 12.0 min

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.2761	0.3332
0.0090	0.0385	0.3101	0.3536
0.0147	0.0812	0.3454	0.3743
0.0199	0.1456	0.3818	0.3952
0.0210	0.1631	0.4194	0.4165
0.0987	0.2172	0.4581	0.4381
0.1306	0.2358	0.4979	0.4600
0.1761	0.2739	0.5806	0.5047
0.2120	0.2934	0.6234	0.5275
0.2433	0.3131	0.7121	0.5742

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0196)	27.790	1.126	6.00	37.55
OUTFLOW: ID= 1 (0256)	27.790	0.234	7.40	37.51

PEAK FLOW REDUCTION [Qout/Qin](%)= 20.78
TIME SHIFT OF PEAK FLOW (min)= 84.00
MAXIMUM STORAGE USED (ha.m.)= 0.3073

READ STORM | Filename: C:\Users\jlysecki\AppData\Local\Temp\1e046b6a-70e8-44fb-adb2-28217afe7b2a\c75abbfd
Ptotal= 62.70 mm | Comments: 10YR 12HR SCS

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	1.57	3.25	2.51	6.25	11.29	9.25	2.19
0.50	1.57	3.50	2.51	6.50	11.29	9.50	2.19
0.75	1.57	3.75	2.51	6.75	5.02	9.75	2.19
1.00	1.57	4.00	2.51	7.00	5.02	10.00	2.19
1.25	1.57	4.25	3.76	7.25	3.76	10.25	1.25
1.50	1.57	4.50	3.76	7.50	3.76	10.50	1.25
1.75	1.57	4.75	5.02	7.75	3.76	10.75	1.25
2.00	1.57	5.00	5.02	8.00	3.76	11.00	1.25
2.25	1.88	5.25	7.52	8.25	2.19	11.25	1.25
2.50	1.88	5.50	7.52	8.50	2.19	11.50	1.25
2.75	1.88	5.75	30.10	8.75	2.19	11.75	1.25
3.00	1.88	6.00	82.76	9.00	2.19	12.00	1.25

CALIB
STANDHYD (0230)
ID= 1 DT=12.0 min

Area (ha)= 20.35
Total Imp(%)= 53.70 Dir. Conn.(%)= 32.40

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	10.93	9.42
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	368.33	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 12.0 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
0.200	1.57	3.200	2.51	6.200	11.29	9.20	2.19
0.400	1.57	3.400	2.51	6.400	11.29	9.40	2.19
0.600	1.57	3.600	2.51	6.600	8.15	9.60	2.19
0.800	1.57	3.800	2.51	6.800	5.02	9.80	2.19
1.000	1.57	4.000	2.51	7.000	5.02	10.00	2.19
1.200	1.57	4.200	3.76	7.200	3.76	10.20	1.25
1.400	1.57	4.400	3.76	7.400	3.76	10.40	1.25
1.600	1.57	4.600	4.39	7.600	3.76	10.60	1.25
1.800	1.57	4.800	5.02	7.800	3.76	10.80	1.25
2.000	1.57	5.000	5.02	8.000	3.76	11.00	1.25
2.200	1.88	5.200	7.52	8.200	2.19	11.20	1.25
2.400	1.88	5.400	7.52	8.400	2.19	11.40	1.25
2.600	1.88	5.600	18.81	8.600	2.19	11.60	1.25
2.800	1.88	5.800	43.26	8.800	2.19	11.80	1.25
3.000	1.88	6.000	82.76	9.000	2.19	12.00	1.25

Max.Eff.Inten.(mm/hr)=		82.76	62.45	
over (min)		12.00	24.00	
Storage Coeff. (min)=		6.02 (ii)	14.54 (ii)	
Unit Hyd. Tpeak (min)=		12.00	24.00	
Unit Hyd. peak (cms)=		0.12	0.06	
				TOTALS
PEAK FLOW	(cms)=	1.41	0.92	2.102 (iii)
TIME TO PEAK	(hrs)=	6.00	6.20	6.00
RUNOFF VOLUME	(mm)=	61.70	27.20	38.38
TOTAL RAINFALL	(mm)=	62.70	62.70	62.70
RUNOFF COEFFICIENT	=	0.98	0.43	0.61

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0224)
1 + 2 = 3

		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0230):		20.35	2.102	6.00	38.38
+ ID2= 2 (0256):		27.79	0.234	7.40	37.51
ID = 3 (0224):		48.14	2.122	6.00	37.88

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0253)
IN= 2---> OUT= 1
DT= 12.0 min

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.6390	0.9848
0.0270	0.1457	0.9700	1.2900
0.0430	0.3152	1.1040	1.7480
0.0530	0.4653	3.3100	1.9350
0.3280	0.6677	11.3140	2.2662

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0224)	48.140	2.122	6.00	37.88
OUTFLOW: ID= 1 (0253)	48.140	0.315	8.80	37.85

PEAK FLOW REDUCTION [Qout/Qin](%)= 14.83
TIME SHIFT OF PEAK FLOW (min)=168.00
MAXIMUM STORAGE USED (ha.m.)= 0.6580

READ STORM
Ptotal= 62.70 mm

Filename: C:\Users\jlysecki\AppData\Local\Temp\1e046b6a-70e8-44fb-adb2-28217afe7b2a\c75abbfd
Comments: 10YR 12HR SCS

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	1.57	3.25	2.51	6.25	11.29	9.25	2.19
0.50	1.57	3.50	2.51	6.50	11.29	9.50	2.19
0.75	1.57	3.75	2.51	6.75	5.02	9.75	2.19
1.00	1.57	4.00	2.51	7.00	5.02	10.00	2.19
1.25	1.57	4.25	3.76	7.25	3.76	10.25	1.25
1.50	1.57	4.50	3.76	7.50	3.76	10.50	1.25
1.75	1.57	4.75	5.02	7.75	3.76	10.75	1.25
2.00	1.57	5.00	5.02	8.00	3.76	11.00	1.25
2.25	1.88	5.25	7.52	8.25	2.19	11.25	1.25
2.50	1.88	5.50	7.52	8.50	2.19	11.50	1.25
2.75	1.88	5.75	30.10	8.75	2.19	11.75	1.25
3.00	1.88	6.00	82.76	9.00	2.19	12.00	1.25

CALIB
STANDHYD (0160)
ID= 1 DT=12.0 min

Area (ha)= 1.30
Total Imp(%)= 50.70 Dir. Conn.(%)= 22.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.66	0.64
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	93.09	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 12.0 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
0.200	1.57	3.200	2.51	6.200	11.29	9.20	2.19
0.400	1.57	3.400	2.51	6.400	11.29	9.40	2.19
0.600	1.57	3.600	2.51	6.600	8.15	9.60	2.19
0.800	1.57	3.800	2.51	6.800	5.02	9.80	2.19

1.000	1.57	4.000	2.51	7.000	5.02	10.00	2.19
1.200	1.57	4.200	3.76	7.200	3.76	10.20	1.25
1.400	1.57	4.400	3.76	7.400	3.76	10.40	1.25
1.600	1.57	4.600	4.39	7.600	3.76	10.60	1.25
1.800	1.57	4.800	5.02	7.800	3.76	10.80	1.25
2.000	1.57	5.000	5.02	8.000	3.76	11.00	1.25
2.200	1.88	5.200	7.52	8.200	2.19	11.20	1.25
2.400	1.88	5.400	7.52	8.400	2.19	11.40	1.25
2.600	1.88	5.600	18.81	8.600	2.19	11.60	1.25
2.800	1.88	5.800	43.26	8.800	2.19	11.80	1.25
3.000	1.88	6.000	82.76	9.000	2.19	12.00	1.25

Max.Eff.Inten.(mm/hr)=		82.76	70.85	
over (min)		12.00	12.00	
Storage Coeff. (min)=		2.64 (ii)	10.74 (ii)	
Unit Hyd. Tpeak (min)=		12.00	12.00	
Unit Hyd. peak (cms)=		0.14	0.10	
				TOTALS
PEAK FLOW	(cms)=	0.07	0.10	0.163 (iii)
TIME TO PEAK	(hrs)=	6.00	6.00	6.00
RUNOFF VOLUME	(mm)=	61.70	28.48	35.78
TOTAL RAINFALL	(mm)=	62.70	62.70	62.70
RUNOFF COEFFICIENT	=	0.98	0.45	0.57

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

DUHYD (0183)				
Inlet Cap.= 0.152				
#of Inlets= 1				
Total(cms)= 0.2	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
TOTAL HYD.(ID= 1):	1.30	0.16	6.00	35.78
MAJOR SYS.(ID= 2):	0.02	0.01	6.00	35.78
MINOR SYS.(ID= 3):	1.28	0.15	6.00	35.78

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

READ STORM	Filename: C:\Users\jlysecki\AppData\Local\Temp\1e046b6a-70e8-44fb-adb2-28217afe7b2a\c75abbfd
Ptotal= 62.70 mm	Comments: 10YR 12HR SCS

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	1.57	3.25	2.51	6.25	11.29	9.25	2.19
0.50	1.57	3.50	2.51	6.50	11.29	9.50	2.19
0.75	1.57	3.75	2.51	6.75	5.02	9.75	2.19
1.00	1.57	4.00	2.51	7.00	5.02	10.00	2.19
1.25	1.57	4.25	3.76	7.25	3.76	10.25	1.25
1.50	1.57	4.50	3.76	7.50	3.76	10.50	1.25
1.75	1.57	4.75	5.02	7.75	3.76	10.75	1.25
2.00	1.57	5.00	5.02	8.00	3.76	11.00	1.25
2.25	1.88	5.25	7.52	8.25	2.19	11.25	1.25
2.50	1.88	5.50	7.52	8.50	2.19	11.50	1.25
2.75	1.88	5.75	30.10	8.75	2.19	11.75	1.25
3.00	1.88	6.00	82.76	9.00	2.19	12.00	1.25

CALIB			
STANDHYD (0193)	Area (ha)= 1.21		
ID= 1 DT=12.0 min	Total Imp(%)= 49.30	Dir. Conn.(%)=	20.10

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.60	0.61
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	89.81	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 12.0 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
0.200	1.57	3.200	2.51	6.200	11.29	9.20	2.19
0.400	1.57	3.400	2.51	6.400	11.29	9.40	2.19
0.600	1.57	3.600	2.51	6.600	8.15	9.60	2.19
0.800	1.57	3.800	2.51	6.800	5.02	9.80	2.19
1.000	1.57	4.000	2.51	7.000	5.02	10.00	2.19
1.200	1.57	4.200	3.76	7.200	3.76	10.20	1.25
1.400	1.57	4.400	3.76	7.400	3.76	10.40	1.25
1.600	1.57	4.600	4.39	7.600	3.76	10.60	1.25
1.800	1.57	4.800	5.02	7.800	3.76	10.80	1.25
2.000	1.57	5.000	5.02	8.000	3.76	11.00	1.25
2.200	1.88	5.200	7.52	8.200	2.19	11.20	1.25
2.400	1.88	5.400	7.52	8.400	2.19	11.40	1.25
2.600	1.88	5.600	18.81	8.600	2.19	11.60	1.25
2.800	1.88	5.800	43.26	8.800	2.19	11.80	1.25
3.000	1.88	6.000	82.76	9.000	2.19	12.00	1.25

Max.Eff.Inten.(mm/hr)=		82.76	70.42	
over (min)		12.00	12.00	
Storage Coeff. (min)=		2.58 (ii)	10.70 (ii)	
Unit Hyd. Tpeak (min)=		12.00	12.00	
Unit Hyd. peak (cms)=		0.14	0.10	
				TOTALS
PEAK FLOW	(cms)=	0.06	0.09	0.148 (iii)
TIME TO PEAK	(hrs)=	6.00	6.00	6.00
RUNOFF VOLUME	(mm)=	61.70	28.42	35.10
TOTAL RAINFALL	(mm)=	62.70	62.70	62.70
RUNOFF COEFFICIENT	=	0.98	0.45	0.56

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

DUHYD (0227)				
Inlet Cap.= 0.120				
#of Inlets= 1				
Total(cms)= 0.1	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
TOTAL HYD.(ID= 1):	1.21	0.15	6.00	35.10
MAJOR SYS.(ID= 2):	0.06	0.03	6.00	35.10
MINOR SYS.(ID= 3):	1.15	0.12	6.00	35.10

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

READ STORM	Filename: C:\Users\jlysecki\AppData\Local\Temp\1e046b6a-70e8-44fb-adb2-28217afe7b2a\c75abbfd
Ptotal= 62.70 mm	Comments: 10YR 12HR SCS

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	1.57	3.25	2.51	6.25	11.29	9.25	2.19
0.50	1.57	3.50	2.51	6.50	11.29	9.50	2.19
0.75	1.57	3.75	2.51	6.75	5.02	9.75	2.19

1.00	1.57	4.00	2.51	7.00	5.02	10.00	2.19
1.25	1.57	4.25	3.76	7.25	3.76	10.25	1.25
1.50	1.57	4.50	3.76	7.50	3.76	10.50	1.25
1.75	1.57	4.75	5.02	7.75	3.76	10.75	1.25
2.00	1.57	5.00	5.02	8.00	3.76	11.00	1.25
2.25	1.88	5.25	7.52	8.25	2.19	11.25	1.25
2.50	1.88	5.50	7.52	8.50	2.19	11.50	1.25
2.75	1.88	5.75	30.10	8.75	2.19	11.75	1.25
3.00	1.88	6.00	82.76	9.00	2.19	12.00	1.25

CALIB	
STANDHYD (0206)	Area (ha)= 38.60
ID= 1 DT=12.0 min	Total Imp(%)= 54.70 Dir. Conn.(%)= 23.20

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	21.11	17.49
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	507.28	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 12.0 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
0.200	1.57	3.200	2.51	6.200	11.29	9.20	2.19
0.400	1.57	3.400	2.51	6.400	11.29	9.40	2.19
0.600	1.57	3.600	2.51	6.600	8.15	9.60	2.19
0.800	1.57	3.800	2.51	6.800	5.02	9.80	2.19
1.000	1.57	4.000	2.51	7.000	5.02	10.00	2.19
1.200	1.57	4.200	3.76	7.200	3.76	10.20	1.25
1.400	1.57	4.400	3.76	7.400	3.76	10.40	1.25
1.600	1.57	4.600	4.39	7.600	3.76	10.60	1.25
1.800	1.57	4.800	5.02	7.800	3.76	10.80	1.25
2.000	1.57	5.000	5.02	8.000	3.76	11.00	1.25
2.200	1.88	5.200	7.52	8.200	2.19	11.20	1.25
2.400	1.88	5.400	7.52	8.400	2.19	11.40	1.25
2.600	1.88	5.600	18.81	8.600	2.19	11.60	1.25
2.800	1.88	5.800	43.26	8.800	2.19	11.80	1.25
3.000	1.88	6.000	82.76	9.000	2.19	12.00	1.25

				TOTALS
Max.Eff.Inten.	(mm/hr)=	82.76	78.85	
over	(min)	12.00	24.00	
Storage Coeff.	(min)=	7.30 (ii)	15.06 (ii)	
Unit Hyd. Tpeak	(min)=	12.00	24.00	
Unit Hyd. peak	(cms)=	0.11	0.06	
PEAK FLOW	(cms)=	1.84	2.14	3.463 (iii)
TIME TO PEAK	(hrs)=	6.00	6.20	6.00
RUNOFF VOLUME	(mm)=	61.70	29.59	37.04
TOTAL RAINFALL	(mm)=	62.70	62.70	62.70
RUNOFF COEFFICIENT	=	0.98	0.47	0.59

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0225)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0183):		0.02	0.011	6.00	35.78
+ ID2= 2 (0206):		38.60	3.463	6.00	37.04
ID = 3 (0225):		38.62	3.474	6.00	37.04

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0225)		AREA	QPEAK	TPEAK	R.V.
3 + 2 = 1		(ha)	(cms)	(hrs)	(mm)
ID1= 3 (0225):		38.62	3.474	6.00	37.04
+ ID2= 2 (0227):		0.06	0.028	6.00	35.10
ID = 1 (0225):		38.68	3.502	6.00	37.04

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

READ STORM	Filename: C:\Users\jlysecki\AppData\Local\Temp\1e046b6a-70e8-44fb-adb2-28217afe7b2a\c75abbfd
Ptotal= 62.70 mm	Comments: 10YR 12HR SCS

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	1.57	3.25	2.51	6.25	11.29	9.25	2.19
0.50	1.57	3.50	2.51	6.50	11.29	9.50	2.19
0.75	1.57	3.75	2.51	6.75	5.02	9.75	2.19
1.00	1.57	4.00	2.51	7.00	5.02	10.00	2.19
1.25	1.57	4.25	3.76	7.25	3.76	10.25	1.25
1.50	1.57	4.50	3.76	7.50	3.76	10.50	1.25
1.75	1.57	4.75	5.02	7.75	3.76	10.75	1.25
2.00	1.57	5.00	5.02	8.00	3.76	11.00	1.25
2.25	1.88	5.25	7.52	8.25	2.19	11.25	1.25
2.50	1.88	5.50	7.52	8.50	2.19	11.50	1.25
2.75	1.88	5.75	30.10	8.75	2.19	11.75	1.25
3.00	1.88	6.00	82.76	9.00	2.19	12.00	1.25

CALIB	
STANDHYD (0209)	Area (ha)= 5.20
ID= 1 DT=12.0 min	Total Imp(%)= 31.60 Dir. Conn.(%)= 19.40

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	1.64	3.56
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	186.19	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 12.0 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
0.200	1.57	3.200	2.51	6.200	11.29	9.20	2.19
0.400	1.57	3.400	2.51	6.400	11.29	9.40	2.19
0.600	1.57	3.600	2.51	6.600	8.15	9.60	2.19
0.800	1.57	3.800	2.51	6.800	5.02	9.80	2.19
1.000	1.57	4.000	2.51	7.000	5.02	10.00	2.19
1.200	1.57	4.200	3.76	7.200	3.76	10.20	1.25
1.400	1.57	4.400	3.76	7.400	3.76	10.40	1.25
1.600	1.57	4.600	4.39	7.600	3.76	10.60	1.25
1.800	1.57	4.800	5.02	7.800	3.76	10.80	1.25
2.000	1.57	5.000	5.02	8.000	3.76	11.00	1.25
2.200	1.88	5.200	7.52	8.200	2.19	11.20	1.25
2.400	1.88	5.400	7.52	8.400	2.19	11.40	1.25
2.600	1.88	5.600	18.81	8.600	2.19	11.60	1.25
2.800	1.88	5.800	43.26	8.800	2.19	11.80	1.25
3.000	1.88	6.000	82.76	9.000	2.19	12.00	1.25

Max.Eff.Inten.	(mm/hr)=	82.76	44.16

COLE ENGINEERING

Experience Enhancing Excellence

over (min)	12.00	24.00	
Storage Coeff. (min)=	4.00 (ii)	13.79 (ii)	
Unit Hyd. Tpeak (min)=	12.00	24.00	
Unit Hyd. peak (cms)=	0.13	0.06	
			TOTALS
PEAK FLOW (cms)=	0.23	0.25	0.413 (iii)
TIME TO PEAK (hrs)=	6.00	6.20	6.00
RUNOFF VOLUME (mm)=	61.70	23.84	31.18
TOTAL RAINFALL (mm)=	62.70	62.70	62.70
RUNOFF COEFFICIENT =	0.98	0.38	0.50

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
YOU SHOULD CONSIDER SPLITTING THE AREA.

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

READ STORM | Filename: C:\Users\jlysecki\AppData\Local\Temp\1e046b6a-70e8-44fb-adb2-28217afe7b2a\c75abbfd
Ptotal= 62.70 mm | Comments: 10YR 12HR SCS

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	1.57	3.25	2.51	6.25	11.29	9.25	2.19
0.50	1.57	3.50	2.51	6.50	11.29	9.50	2.19
0.75	1.57	3.75	2.51	6.75	5.02	9.75	2.19
1.00	1.57	4.00	2.51	7.00	5.02	10.00	2.19
1.25	1.57	4.25	3.76	7.25	3.76	10.25	1.25
1.50	1.57	4.50	3.76	7.50	3.76	10.50	1.25
1.75	1.57	4.75	5.02	7.75	3.76	10.75	1.25
2.00	1.57	5.00	5.02	8.00	3.76	11.00	1.25
2.25	1.88	5.25	7.52	8.25	2.19	11.25	1.25
2.50	1.88	5.50	7.52	8.50	2.19	11.50	1.25
2.75	1.88	5.75	30.10	8.75	2.19	11.75	1.25
3.00	1.88	6.00	82.76	9.00	2.19	12.00	1.25

CALIB
STANDHYD (0252) | Area (ha)= 1.44
ID= 1 DT=12.0 min | Total Imp(%)= 52.40 Dir. Conn.(%)= 20.10

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.75	0.69
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	97.98	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 12.0 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
0.200	1.57	3.200	2.51	6.200	11.29	9.20	2.19
0.400	1.57	3.400	2.51	6.400	11.29	9.40	2.19
0.600	1.57	3.600	2.51	6.600	8.15	9.60	2.19
0.800	1.57	3.800	2.51	6.800	5.02	9.80	2.19
1.000	1.57	4.000	2.51	7.000	5.02	10.00	2.19
1.200	1.57	4.200	3.76	7.200	3.76	10.20	1.25
1.400	1.57	4.400	3.76	7.400	3.76	10.40	1.25
1.600	1.57	4.600	4.39	7.600	3.76	10.60	1.25
1.800	1.57	4.800	5.02	7.800	3.76	10.80	1.25
2.000	1.57	5.000	5.02	8.000	3.76	11.00	1.25
2.200	1.88	5.200	7.52	8.200	2.19	11.20	1.25
2.400	1.88	5.400	7.52	8.400	2.19	11.40	1.25
2.600	1.88	5.600	18.81	8.600	2.19	11.60	1.25
2.800	1.88	5.800	43.26	8.800	2.19	11.80	1.25
3.000	1.88	6.000	82.76	9.000	2.19	12.00	1.25

Max.Eff.Inten.(mm/hr)=	82.76	77.65	
over (min)	12.00	12.00	
Storage Coeff. (min)=	2.72 (ii)	10.53 (ii)	
Unit Hyd. Tpeak (min)=	12.00	12.00	
Unit Hyd. peak (cms)=	0.14	0.10	
			TOTALS
PEAK FLOW (cms)=	0.07	0.12	0.181 (iii)
TIME TO PEAK (hrs)=	6.00	6.00	6.00
RUNOFF VOLUME (mm)=	61.70	29.43	35.91
TOTAL RAINFALL (mm)=	62.70	62.70	62.70
RUNOFF COEFFICIENT =	0.98	0.47	0.57

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

RESERVOIR(0261)
IN= 2---> OUT= 1
DT= 5.0 min

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.1470	0.0137
0.0530	0.0050	0.1700	0.0155
0.0700	0.0076	0.1900	0.0220
0.1150	0.0113	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0252)	1.440	0.181	6.00	35.91
OUTFLOW: ID= 1 (0261)	1.440	0.109	6.10	35.90

PEAK FLOW REDUCTION [Qout/Qin](%)= 59.89
TIME SHIFT OF PEAK FLOW (min)= 6.00
MAXIMUM STORAGE USED (ha.m.)= 0.0110

ADD HYD (0251)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0209):	5.20	0.413	6.00	31.18
+ ID2= 2 (0261):	1.44	0.109	6.10	35.90
ID = 3 (0251):	6.64	0.497	6.00	32.20

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0245)
IN= 2---> OUT= 1
DT= 12.0 min

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.3090	0.2876
0.0000	0.0000	0.3330	0.3838
0.1230	0.1102	0.3620	0.5200
0.2870	0.1971	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0251)	6.640	0.497	6.00	32.20
OUTFLOW: ID= 1 (0245)	6.640	0.116	6.80	32.17

PEAK FLOW REDUCTION [Qout/Qin](%)= 23.36
TIME SHIFT OF PEAK FLOW (min)= 48.00
MAXIMUM STORAGE USED (ha.m.)= 0.1042

```
--------------------------------------------------------------------------------
-------------------
| ROUTEPIPE(  0212)|     PIPE Number      =   1.00
| IN= 2---> OUT= 1 |     Diameter    (mm)=1650.00
| DT= 12.0 min     |     Length       (m)= 850.00
-------------------      Slope      (m/m)=  0.005
                         Manning n        =  0.013

     <----------------- TRAVEL TIME TABLE ------------------->
       DEPTH      VOLUME     FLOW RATE     VELOCITY    TRAV.TIME
        (m)      (cu.m.)       (cms)         (m/s)        min
       0.09     .367E+02        0.0          0.80        17.68
       0.17     .102E+03        0.1          1.25        11.33
       0.26     .184E+03        0.3          1.61         8.81
       0.35     .278E+03        0.6          1.91         7.41
       0.43     .382E+03        1.0          2.18         6.51
       0.52     .492E+03        1.4          2.41         5.88
       0.61     .608E+03        1.9          2.61         5.43
       0.69     .727E+03        2.4          2.79         5.08
       0.78     .848E+03        2.9          2.95         4.81
       0.87     .970E+03        3.5          3.08         4.60
       0.96     .109E+04        4.1          3.20         4.43
       1.04     .121E+04        4.7          3.29         4.31
       1.13     .133E+04        5.2          3.36         4.22
       1.22     .144E+04        5.8          3.41         4.15
       1.30     .154E+04        6.2          3.44         4.12
       1.39     .163E+04        6.6          3.43         4.13
       1.48     .172E+04        6.9          3.40         4.17
       1.56     .178E+04        6.9          3.31         4.28
       1.65     .182E+04        6.5          3.02         4.70
                                    <---- hydrograph ---->   <-pipe / channel->
                                AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                                (ha)    (cms)   (hrs)   (mm)       (m)       (m/s)
   INFLOW : ID= 2 (  0245)     6.64     0.12    6.80  32.17      0.15       1.07
   OUTFLOW: ID= 1 (  0212)     6.64     0.11    7.00  32.17      0.15       1.06

--------------------------------------------------------------------------------
-------------------
| ADD HYD  (  0211)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
-------------------           (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0212):      6.64   0.115     7.00    32.17
     + ID2= 2 (  0225):     38.68   3.502     6.00    37.04
       ================================================
       ID = 3 (  0211):     45.32   3.535     6.00    36.32

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
-------------------
| RESERVOIR(  0255)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
-------------------       (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |  1.6250      1.2448
                          0.0190     0.1627   |  1.6630      1.2997
                          0.0360     0.4306   |  1.8430      1.5816
                          0.0480     0.7217   |  2.1300      2.1197
                          0.1330     0.7718   |  2.9680      2.2465
                          1.0390     0.9773   |  7.5380      2.5741

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0211)    45.320     3.535      6.00      36.32
   OUTFLOW: ID= 1 (  0255)    45.320     0.784      6.90      36.28

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 22.17
                  TIME SHIFT OF PEAK FLOW          (min)= 54.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.9197

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

 FINISH
```

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

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

       V    V   I    SSSSS  U   U    A    L              (v 5.1.2004)
       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 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)\Visual OTTHYMO 5.1\VO2\voin.dat
  Output  filename: C:\Users\jlysecki\AppData\Local\Civica\VH5\a379672b-db33-4372-b5e0-
ba58a07d1417\842c1c6e-4b19-4b7c-a464-b87d29a99a29\sce
  Summary filename: C:\Users\jlysecki\AppData\Local\Civica\VH5\a379672b-db33-4372-b5e0-
ba58a07d1417\842c1c6e-4b19-4b7c-a464-b87d29a99a29\sce


DATE: 01/15/2020                          TIME: 04:16:44

USER:


COMMENTS: _____

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


-------------------
|    READ STORM    |    Filename: C:\Users\jlysecki\AppD
|                  |              ata\Local\Temp\
|                  |              1e046b6a-70e8-44fb-adb2-28217afe7b2a\24d7f49a
| Ptotal= 73.10 mm |    Comments: 25YR 12HR SCS
-------------------
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.25    1.83 |  3.25    2.92 |  6.25   13.16 |  9.25    2.56
                0.50    1.83 |  3.50    2.92 |  6.50   13.16 |  9.50    2.56
                0.75    1.83 |  3.75    2.92 |  6.75    5.85 |  9.75    2.56
                1.00    1.83 |  4.00    2.92 |  7.00    5.85 | 10.00    2.56
                1.25    1.83 |  4.25    4.39 |  7.25    4.39 | 10.25    1.46
                1.50    1.83 |  4.50    4.39 |  7.50    4.39 | 10.50    1.46
                1.75    1.83 |  4.75    5.85 |  7.75    4.39 | 10.75    1.46
                2.00    1.83 |  5.00    5.85 |  8.00    4.39 | 11.00    1.46
                2.25    2.19 |  5.25    8.77 |  8.25    2.56 | 11.25    1.46
                2.50    2.19 |  5.50    8.77 |  8.50    2.56 | 11.50    1.46
                2.75    2.19 |  5.75   35.09 |  8.75    2.56 | 11.75    1.46
                3.00    2.19 |  6.00   96.49 |  9.00    2.56 | 12.00    1.46

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

-------------------
| CALIB            |
| STANDHYD (  0228)|   Area     (ha)=  12.56
|ID= 1 DT=12.0 min |   Total Imp(%)=  54.10   Dir. Conn.(%)=  25.00
-------------------

                         IMPERVIOUS    PERVIOUS (i)
```

Surface Area	(ha)=	6.79	5.77
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	289.37	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 12.0 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
0.200	1.83	3.200	2.92	6.200	13.16	9.20	2.56
0.400	1.83	3.400	2.92	6.400	13.16	9.40	2.56
0.600	1.83	3.600	2.92	6.600	9.50	9.60	2.56
0.800	1.83	3.800	2.92	6.800	5.85	9.80	2.56
1.000	1.83	4.000	2.92	7.000	5.85	10.00	2.56
1.200	1.83	4.200	4.39	7.200	4.39	10.20	1.46
1.400	1.83	4.400	4.39	7.400	4.39	10.40	1.46
1.600	1.83	4.600	5.12	7.600	4.39	10.60	1.46
1.800	1.83	4.800	5.85	7.800	4.39	10.80	1.46
2.000	1.83	5.000	5.85	8.000	4.39	11.00	1.46
2.200	2.19	5.200	8.77	8.200	2.56	11.20	1.46
2.400	2.19	5.400	8.77	8.400	2.56	11.40	1.46
2.600	2.19	5.600	21.93	8.600	2.56	11.60	1.46
2.800	2.19	5.800	50.44	8.800	2.56	11.80	1.46
3.000	2.19	6.000	96.49	9.000	2.56	12.00	1.46

Max.Eff.Inten.	(mm/hr)=	96.49	94.13	
over	(min)	12.00	24.00	
Storage Coeff.	(min)=	4.90 (ii)	12.13 (ii)	
Unit Hyd. Tpeak	(min)=	12.00	24.00	
Unit Hyd. peak	(cms)=	0.13	0.07	
				TOTALS
PEAK FLOW	(cms)=	0.80	0.90	1.505 (iii)
TIME TO PEAK	(hrs)=	6.00	6.20	6.00
RUNOFF VOLUME	(mm)=	72.10	36.69	45.54
TOTAL RAINFALL	(mm)=	73.10	73.10	73.10
RUNOFF COEFFICIENT	=	0.99	0.50	0.62

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

READ STORM | Filename: C:\Users\jlysecki\AppData\Local\Temp\1e046b6a-70e8-44fb-adb2-28217afe7b2a\24d7f49a
Ptotal= 73.10 mm | Comments: 25YR 12HR SCS

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	1.83	3.25	2.92	6.25	13.16	9.25	2.56
0.50	1.83	3.50	2.92	6.50	13.16	9.50	2.56
0.75	1.83	3.75	2.92	6.75	5.85	9.75	2.56
1.00	1.83	4.00	2.92	7.00	5.85	10.00	2.56
1.25	1.83	4.25	4.39	7.25	4.39	10.25	1.46
1.50	1.83	4.50	4.39	7.50	4.39	10.50	1.46
1.75	1.83	4.75	5.85	7.75	4.39	10.75	1.46
2.00	1.83	5.00	5.85	8.00	4.39	11.00	1.46
2.25	2.19	5.25	8.77	8.25	2.56	11.25	1.46
2.50	2.19	5.50	8.77	8.50	2.56	11.50	1.46
2.75	2.19	5.75	35.09	8.75	2.56	11.75	1.46
3.00	2.19	6.00	96.49	9.00	2.56	12.00	1.46

CALIB STANDHYD (0257) | Area (ha)= 3.10

ID= 1 DT=12.0 min | Total Imp(%)= 67.90 Dir. Conn.(%)= 42.90

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	2.10	1.00
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	143.76	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 12.0 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
0.200	1.83	3.200	2.92	6.200	13.16	9.20	2.56
0.400	1.83	3.400	2.92	6.400	13.16	9.40	2.56
0.600	1.83	3.600	2.92	6.600	9.50	9.60	2.56
0.800	1.83	3.800	2.92	6.800	5.85	9.80	2.56
1.000	1.83	4.000	2.92	7.000	5.85	10.00	2.56
1.200	1.83	4.200	4.39	7.200	4.39	10.20	1.46
1.400	1.83	4.400	4.39	7.400	4.39	10.40	1.46
1.600	1.83	4.600	5.12	7.600	4.39	10.60	1.46
1.800	1.83	4.800	5.85	7.800	4.39	10.80	1.46
2.000	1.83	5.000	5.85	8.000	4.39	11.00	1.46
2.200	2.19	5.200	8.77	8.200	2.56	11.20	1.46
2.400	2.19	5.400	8.77	8.400	2.56	11.40	1.46
2.600	2.19	5.600	21.93	8.600	2.56	11.60	1.46
2.800	2.19	5.800	50.44	8.800	2.56	11.80	1.46
3.000	2.19	6.000	96.49	9.000	2.56	12.00	1.46

Max.Eff.Inten.	(mm/hr)=	96.49	106.81	
over	(min)	12.00	12.00	
Storage Coeff.	(min)=	3.22 (ii)	10.10 (ii)	
Unit Hyd. Tpeak	(min)=	12.00	12.00	
Unit Hyd. peak	(cms)=	0.14	0.10	
				TOTALS
PEAK FLOW	(cms)=	0.35	0.23	0.587 (iii)
TIME TO PEAK	(hrs)=	6.00	6.00	6.00
RUNOFF VOLUME	(mm)=	72.10	38.27	52.78
TOTAL RAINFALL	(mm)=	73.10	73.10	73.10
RUNOFF COEFFICIENT	=	0.99	0.52	0.72

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0258)

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
1 + 2 = 3				
ID1= 1 (0228):	12.56	1.505	6.00	45.54
+ ID2= 2 (0257):	3.10	0.587	6.00	52.78
ID = 3 (0258):	15.66	2.092	6.00	46.97

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0243)
IN= 2---> OUT= 1
DT= 12.0 min

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.1346	0.4241
0.0096	0.0421	0.1575	0.4697
0.0159	0.0886	0.1823	0.5165
0.0203	0.1399	0.2088	0.5647
0.0228	0.1768	0.2369	0.6142
0.0250	0.2150	0.2514	0.6394

0.0628	0.2544	0.2663	0.6650
0.0835	0.2950	0.2816	0.6910
0.0991	0.3368	0.2997	0.7172
0.1144	0.3798	0.3113	0.7439

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0258)	15.660	2.092	6.00	46.97
OUTFLOW: ID= 1 (0243)	15.660	0.171	7.40	46.90

PEAK FLOW REDUCTION [Qout/Qin](%)= 8.17
TIME SHIFT OF PEAK FLOW (min)= 84.00
MAXIMUM STORAGE USED (ha.m.)= 0.4952

ROUTEPIPE(0184)
IN= 2---> OUT= 1
DT= 12.0 min

PIPE Number = 1.00
Diameter (mm)=1650.00
Length (m)= 500.00
Slope (m/m)= 0.005
Manning n = 0.013

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

DEPTH (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME min
0.09	.216E+02	0.0	0.80	10.40
0.17	.600E+02	0.1	1.25	6.67
0.26	.108E+03	0.3	1.61	5.18
0.35	.164E+03	0.6	1.91	4.36
0.43	.225E+03	1.0	2.18	3.83
0.52	.290E+03	1.4	2.41	3.46
0.61	.358E+03	1.9	2.61	3.19
0.69	.428E+03	2.4	2.79	2.99
0.78	.499E+03	2.9	2.95	2.83
0.87	.570E+03	3.5	3.08	2.70
0.96	.642E+03	4.1	3.20	2.61
1.04	.712E+03	4.7	3.29	2.53
1.13	.780E+03	5.2	3.36	2.48
1.22	.844E+03	5.8	3.41	2.44
1.30	.905E+03	6.2	3.44	2.43
1.39	.961E+03	6.6	3.43	2.43
1.48	.101E+04	6.9	3.40	2.45
1.56	.105E+04	6.9	3.31	2.52
1.65	.107E+04	6.5	3.02	2.76

	<---- hydrograph ----> AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	<-pipe / channel-> MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 2 (0243)	15.66	0.17	7.40	46.90	0.18	1.28
OUTFLOW: ID= 1 (0184)	15.66	0.17	7.40	46.90	0.18	1.28

READ STORM
Ptotal= 73.10 mm

Filename: C:\Users\jlysecki\AppData\Local\Temp\1e046b6a-70e8-44fb-adb2-28217afe7b2a\24d7f49a
Comments: 25YR 12HR SCS

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	1.83	3.25	2.92	6.25	13.16	9.25	2.56
0.50	1.83	3.50	2.92	6.50	13.16	9.50	2.56
0.75	1.83	3.75	2.92	6.75	5.85	9.75	2.56
1.00	1.83	4.00	2.92	7.00	5.85	10.00	2.56
1.25	1.83	4.25	4.39	7.25	4.39	10.25	1.46
1.50	1.83	4.50	4.39	7.50	4.39	10.50	1.46
1.75	1.83	4.75	5.85	7.75	4.39	10.75	1.46
2.00	1.83	5.00	5.85	8.00	4.39	11.00	1.46
2.25	2.19	5.25	8.77	8.25	2.56	11.25	1.46
2.50	2.19	5.50	8.77	8.50	2.56	11.50	1.46
2.75	2.19	5.75	35.09	8.75	2.56	11.75	1.46
3.00	2.19	6.00	96.49	9.00	2.56	12.00	1.46

CALIB
STANDHYD (0229)
ID= 1 DT=12.0 min

Area (ha)= 12.13
Total Imp(%)= 54.50 Dir. Conn.(%)= 19.70

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	6.61	5.52
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	284.37	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 12.0 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
0.200	1.83	3.200	2.92	6.200	13.16	9.20	2.56
0.400	1.83	3.400	2.92	6.400	13.16	9.40	2.56
0.600	1.83	3.600	2.92	6.600	9.50	9.60	2.56
0.800	1.83	3.800	2.92	6.800	5.85	9.80	2.56
1.000	1.83	4.000	2.92	7.000	5.85	10.00	2.56
1.200	1.83	4.200	4.39	7.200	4.39	10.20	1.46
1.400	1.83	4.400	4.39	7.400	4.39	10.40	1.46
1.600	1.83	4.600	5.12	7.600	4.39	10.60	1.46
1.800	1.83	4.800	5.85	7.800	4.39	10.80	1.46
2.000	1.83	5.000	5.85	8.000	4.39	11.00	1.46
2.200	2.19	5.200	8.77	8.200	2.56	11.20	1.46
2.400	2.19	5.400	8.77	8.400	2.56	11.40	1.46
2.600	2.19	5.600	21.93	8.600	2.56	11.60	1.46
2.800	2.19	5.800	50.44	8.800	2.56	11.80	1.46
3.000	2.19	6.000	96.49	9.000	2.56	12.00	1.46

Max.Eff.Inten.(mm/hr)=	96.49	105.58		
over (min)	12.00	12.00		
Storage Coeff. (min)=	4.85 (ii)	11.76 (ii)		
Unit Hyd. Tpeak (min)=	12.00	12.00		
Unit Hyd. peak (cms)=	0.13	0.09		
				TOTALS
PEAK FLOW (cms)=	0.61	1.21		1.826 (iii)
TIME TO PEAK (hrs)=	6.00	6.00		6.00
RUNOFF VOLUME (mm)=	72.10	38.13		44.82
TOTAL RAINFALL (mm)=	73.10	73.10		73.10
RUNOFF COEFFICIENT =	0.99	0.52		0.61

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20% YOU SHOULD CONSIDER SPLITTING THE AREA.

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0196)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0184):	15.66	0.171	7.40	46.90
+ ID2= 2 (0229):	12.13	1.826	6.00	44.82
ID = 3 (0196):	27.79	1.863	6.00	45.99

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0256)
IN= 2---> OUT= 1
DT= 12.0 min

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.2761	0.3332

	0.0090	0.0385	0.3101	0.3536
	0.0147	0.0812	0.3454	0.3743
	0.0199	0.1456	0.3818	0.3952
	0.0210	0.1631	0.4194	0.4165
	0.0987	0.2172	0.4581	0.4381
	0.1306	0.2358	0.4979	0.4600
	0.1761	0.2739	0.5806	0.5047
	0.2120	0.2934	0.6234	0.5275
	0.2433	0.3131	0.7121	0.5742

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0196)	27.790	1.863	6.00	45.99
OUTFLOW: ID= 1 (0256)	27.790	0.322	7.00	45.95

PEAK FLOW REDUCTION [Qout/Qin](%)= 17.26
TIME SHIFT OF PEAK FLOW (min)= 60.00
MAXIMUM STORAGE USED (ha.m.)= 0.3609

READ STORM | Filename: C:\Users\jlysecki\AppData\Local\Temp\1e046b6a-70e8-44fb-adb2-28217afe7b2a\24d7f49a
Ptotal= 73.10 mm | Comments: 25YR 12HR SCS

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	1.83	3.25	2.92	6.25	13.16	9.25	2.56
0.50	1.83	3.50	2.92	6.50	13.16	9.50	2.56
0.75	1.83	3.75	2.92	6.75	5.85	9.75	2.56
1.00	1.83	4.00	2.92	7.00	5.85	10.00	2.56
1.25	1.83	4.25	4.39	7.25	4.39	10.25	1.46
1.50	1.83	4.50	4.39	7.50	4.39	10.50	1.46
1.75	1.83	4.75	5.85	7.75	4.39	10.75	1.46
2.00	1.83	5.00	5.85	8.00	4.39	11.00	1.46
2.25	2.19	5.25	8.77	8.25	2.56	11.25	1.46
2.50	2.19	5.50	8.77	8.50	2.56	11.50	1.46
2.75	2.19	5.75	35.09	8.75	2.56	11.75	1.46
3.00	2.19	6.00	96.49	9.00	2.56	12.00	1.46

CALIB
STANDHYD (0230) | Area (ha)= 20.35
ID= 1 DT=12.0 min | Total Imp(%)= 53.70 Dir. Conn.(%)= 32.40

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	10.93	9.42
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	368.33	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 12.0 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
0.200	1.83	3.200	2.92	6.200	13.16	9.20	2.56
0.400	1.83	3.400	2.92	6.400	13.16	9.40	2.56
0.600	1.83	3.600	2.92	6.600	9.50	9.60	2.56
0.800	1.83	3.800	2.92	6.800	5.85	9.80	2.56
1.000	1.83	4.000	2.92	7.000	5.85	10.00	2.56
1.200	1.83	4.200	4.39	7.200	4.39	10.20	1.46
1.400	1.83	4.400	4.39	7.400	4.39	10.40	1.46
1.600	1.83	4.600	5.12	7.600	4.39	10.60	1.46
1.800	1.83	4.800	5.85	7.800	4.39	10.80	1.46
2.000	1.83	5.000	5.85	8.000	4.39	11.00	1.46
2.200	2.19	5.200	8.77	8.200	2.56	11.20	1.46
2.400	2.19	5.400	8.77	8.400	2.56	11.40	1.46
2.600	2.19	5.600	21.93	8.600	2.56	11.60	1.46
2.800	2.19	5.800	50.44	8.800	2.56	11.80	1.46
3.000	2.19	6.000	96.49	9.000	2.56	12.00	1.46

			TOTALS
Max.Eff.Inten.(mm/hr)=	96.49	79.34	
over (min)	12.00	24.00	
Storage Coeff. (min)=	5.67 (ii)	13.41 (ii)	
Unit Hyd. Tpeak (min)=	12.00	24.00	
Unit Hyd. peak (cms)=	0.12	0.06	
PEAK FLOW (cms)=	1.66	1.20	2.579 (iii)
TIME TO PEAK (hrs)=	6.00	6.20	6.00
RUNOFF VOLUME (mm)=	72.10	34.58	46.73
TOTAL RAINFALL (mm)=	73.10	73.10	73.10
RUNOFF COEFFICIENT =	0.99	0.47	0.64

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0224)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0230):	20.35	2.579	6.00	46.73
+ ID2= 2 (0256):	27.79	0.322	7.00	45.95
ID = 3 (0224):	48.14	2.675	6.00	46.28

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0253)
IN= 2---> OUT= 1
DT= 12.0 min

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.6390	0.9848
0.0270	0.1457	0.9700	1.2900
0.0430	0.3152	1.1040	1.7480
0.0530	0.4653	3.3100	1.9350
0.3280	0.6677	11.3140	2.2662

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0224)	48.140	2.675	6.00	46.28
OUTFLOW: ID= 1 (0253)	48.140	0.432	8.40	46.26

PEAK FLOW REDUCTION [Qout/Qin](%)= 16.15
TIME SHIFT OF PEAK FLOW (min)=144.00
MAXIMUM STORAGE USED (ha.m.)= 0.7736

READ STORM | Filename: C:\Users\jlysecki\AppData\Local\Temp\1e046b6a-70e8-44fb-adb2-28217afe7b2a\24d7f49a
Ptotal= 73.10 mm | Comments: 25YR 12HR SCS

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	1.83	3.25	2.92	6.25	13.16	9.25	2.56
0.50	1.83	3.50	2.92	6.50	13.16	9.50	2.56
0.75	1.83	3.75	2.92	6.75	5.85	9.75	2.56
1.00	1.83	4.00	2.92	7.00	5.85	10.00	2.56
1.25	1.83	4.25	4.39	7.25	4.39	10.25	1.46
1.50	1.83	4.50	4.39	7.50	4.39	10.50	1.46
1.75	1.83	4.75	5.85	7.75	4.39	10.75	1.46
2.00	1.83	5.00	5.85	8.00	4.39	11.00	1.46
2.25	2.19	5.25	8.77	8.25	2.56	11.25	1.46
2.50	2.19	5.50	8.77	8.50	2.56	11.50	1.46

2.75	2.19	5.75	35.09	8.75	2.56	11.75	1.46
3.00	2.19	6.00	96.49	9.00	2.56	12.00	1.46

CALIB			
STANDHYD (0160)	Area (ha)= 1.30		
ID= 1 DT=12.0 min	Total Imp(%)= 50.70	Dir. Conn.(%)= 22.00	

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.66	0.64
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	93.09	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 12.0 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
0.200	1.83	3.200	2.92	6.200	13.16	9.20	2.56
0.400	1.83	3.400	2.92	6.400	13.16	9.40	2.56
0.600	1.83	3.600	2.92	6.600	9.50	9.60	2.56
0.800	1.83	3.800	2.92	6.800	5.85	9.80	2.56
1.000	1.83	4.000	2.92	7.000	5.85	10.00	2.56
1.200	1.83	4.200	4.39	7.200	4.39	10.20	1.46
1.400	1.83	4.400	4.39	7.400	4.39	10.40	1.46
1.600	1.83	4.600	5.12	7.600	4.39	10.60	1.46
1.800	1.83	4.800	5.85	7.800	4.39	10.80	1.46
2.000	1.83	5.000	5.85	8.000	4.39	11.00	1.46
2.200	2.19	5.200	8.77	8.200	2.56	11.20	1.46
2.400	2.19	5.400	8.77	8.400	2.56	11.40	1.46
2.600	2.19	5.600	21.93	8.600	2.56	11.60	1.46
2.800	2.19	5.800	50.44	8.800	2.56	11.80	1.46
3.000	2.19	6.000	96.49	9.000	2.56	12.00	1.46

Max.Eff.Inten.	(mm/hr)=	96.49	89.67	
over	(min)	12.00	12.00	
Storage Coeff.	(min)=	2.48 (ii)	9.85 (ii)	
Unit Hyd. Tpeak	(min)=	12.00	12.00	
Unit Hyd. peak	(cms)=	0.14	0.10	
				TOTALS
PEAK FLOW	(cms)=	0.08	0.13	0.204 (iii)
TIME TO PEAK	(hrs)=	6.00	6.00	6.00
RUNOFF VOLUME	(mm)=	72.10	36.08	44.00
TOTAL RAINFALL	(mm)=	73.10	73.10	73.10
RUNOFF COEFFICIENT	=	0.99	0.49	0.60

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

DUHYD (0183)					
Inlet Cap.= 0.152					
#of Inlets= 1					
Total(cms)= 0.2		AREA	QPEAK	TPEAK	R.V.
		(ha)	(cms)	(hrs)	(mm)
TOTAL HYD.(ID= 1):		1.30	0.20	6.00	44.00
MAJOR SYS.(ID= 2):		0.08	0.05	6.00	44.00
MINOR SYS.(ID= 3):		1.22	0.15	6.00	44.00

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

READ STORM	Filename: C:\Users\jlysecki\AppD
	ata\Local\Temp\
	1e046b6a-70e8-44fb-adb2-28217afe7b2a\24d7f49a
Ptotal= 73.10 mm	Comments: 25YR 12HR SCS

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	1.83	3.25	2.92	6.25	13.16	9.25	2.56
0.50	1.83	3.50	2.92	6.50	13.16	9.50	2.56
0.75	1.83	3.75	2.92	6.75	5.85	9.75	2.56
1.00	1.83	4.00	2.92	7.00	5.85	10.00	2.56
1.25	1.83	4.25	4.39	7.25	4.39	10.25	1.46
1.50	1.83	4.50	4.39	7.50	4.39	10.50	1.46
1.75	1.83	4.75	5.85	7.75	4.39	10.75	1.46
2.00	1.83	5.00	5.85	8.00	4.39	11.00	1.46
2.25	2.19	5.25	8.77	8.25	2.56	11.25	1.46
2.50	2.19	5.50	8.77	8.50	2.56	11.50	1.46
2.75	2.19	5.75	35.09	8.75	2.56	11.75	1.46
3.00	2.19	6.00	96.49	9.00	2.56	12.00	1.46

CALIB			
STANDHYD (0193)	Area (ha)= 1.21		
ID= 1 DT=12.0 min	Total Imp(%)= 49.30	Dir. Conn.(%)= 20.10	

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.60	0.61
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	89.81	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 12.0 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
0.200	1.83	3.200	2.92	6.200	13.16	9.20	2.56
0.400	1.83	3.400	2.92	6.400	13.16	9.40	2.56
0.600	1.83	3.600	2.92	6.600	9.50	9.60	2.56
0.800	1.83	3.800	2.92	6.800	5.85	9.80	2.56
1.000	1.83	4.000	2.92	7.000	5.85	10.00	2.56
1.200	1.83	4.200	4.39	7.200	4.39	10.20	1.46
1.400	1.83	4.400	4.39	7.400	4.39	10.40	1.46
1.600	1.83	4.600	5.12	7.600	4.39	10.60	1.46
1.800	1.83	4.800	5.85	7.800	4.39	10.80	1.46
2.000	1.83	5.000	5.85	8.000	4.39	11.00	1.46
2.200	2.19	5.200	8.77	8.200	2.56	11.20	1.46
2.400	2.19	5.400	8.77	8.400	2.56	11.40	1.46
2.600	2.19	5.600	21.93	8.600	2.56	11.60	1.46
2.800	2.19	5.800	50.44	8.800	2.56	11.80	1.46
3.000	2.19	6.000	96.49	9.000	2.56	12.00	1.46

Max.Eff.Inten.	(mm/hr)=	96.49	89.14	
over	(min)	12.00	12.00	
Storage Coeff.	(min)=	2.43 (ii)	9.82 (ii)	
Unit Hyd. Tpeak	(min)=	12.00	12.00	
Unit Hyd. peak	(cms)=	0.14	0.10	
				TOTALS
PEAK FLOW	(cms)=	0.06	0.12	0.186 (iii)
TIME TO PEAK	(hrs)=	6.00	6.00	6.00
RUNOFF VOLUME	(mm)=	72.10	36.01	43.26
TOTAL RAINFALL	(mm)=	73.10	73.10	73.10
RUNOFF COEFFICIENT	=	0.99	0.49	0.59

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

COLE ENGINEERING

Experience Enhancing Excellence

```
| DUHYD    (  0227)|
| Inlet Cap.= 0.120|
| #of Inlets=    1|
| Total(cms)=  0.1|
```

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
TOTAL HYD.(ID= 1):	1.21	0.19	6.00	43.26
MAJOR SYS.(ID= 2):	0.11	0.07	6.00	43.26
MINOR SYS.(ID= 3):	1.10	0.12	6.00	43.26

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```
|    READ STORM    |    Filename: C:\Users\jlysecki\AppD
|                  |              ata\Local\Temp\
|                  |              1e046b6a-70e8-44fb-adb2-28217afe7b2a\24d7f49a
| Ptotal= 73.10 mm |    Comments: 25YR 12HR SCS
```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	1.83	3.25	2.92	6.25	13.16	9.25	2.56
0.50	1.83	3.50	2.92	6.50	13.16	9.50	2.56
0.75	1.83	3.75	2.92	6.75	5.85	9.75	2.56
1.00	1.83	4.00	2.92	7.00	5.85	10.00	2.56
1.25	1.83	4.25	4.39	7.25	4.39	10.25	1.46
1.50	1.83	4.50	4.39	7.50	4.39	10.50	1.46
1.75	1.83	4.75	5.85	7.75	4.39	10.75	1.46
2.00	1.83	5.00	5.85	8.00	4.39	11.00	1.46
2.25	2.19	5.25	8.77	8.25	2.56	11.25	1.46
2.50	2.19	5.50	8.77	8.50	2.56	11.50	1.46
2.75	2.19	5.75	35.09	8.75	2.56	11.75	1.46
3.00	2.19	6.00	96.49	9.00	2.56	12.00	1.46

```
| CALIB            |
| STANDHYD (  0206)|   Area     (ha)=  38.60
|ID= 1 DT=12.0 min |   Total Imp(%)=  54.70   Dir. Conn.(%)=  23.20
```

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	21.11	17.49
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	507.28	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 12.0 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
0.200	1.83	3.200	2.92	6.200	13.16	9.20	2.56
0.400	1.83	3.400	2.92	6.400	13.16	9.40	2.56
0.600	1.83	3.600	2.92	6.600	9.50	9.60	2.56
0.800	1.83	3.800	2.92	6.800	5.85	9.80	2.56
1.000	1.83	4.000	2.92	7.000	5.85	10.00	2.56
1.200	1.83	4.200	4.39	7.200	4.39	10.20	1.46
1.400	1.83	4.400	4.39	7.400	4.39	10.40	1.46
1.600	1.83	4.600	5.12	7.600	4.39	10.60	1.46
1.800	1.83	4.800	5.85	7.800	4.39	10.80	1.46
2.000	1.83	5.000	5.85	8.000	4.39	11.00	1.46
2.200	2.19	5.200	8.77	8.200	2.56	11.20	1.46
2.400	2.19	5.400	8.77	8.400	2.56	11.40	1.46
2.600	2.19	5.600	21.93	8.600	2.56	11.60	1.46
2.800	2.19	5.800	50.44	8.800	2.56	11.80	1.46
3.000	2.19	6.000	96.49	9.000	2.56	12.00	1.46

Max.Eff.Inten.(mm/hr)=		96.49	99.47
over (min)		12.00	24.00
Storage Coeff. (min)=		6.87 (ii)	13.94 (ii)
Unit Hyd. Tpeak (min)=		12.00	24.00
Unit Hyd. peak (cms)=		0.12	0.06

				TOTALS
PEAK FLOW	(cms)=	2.18	2.77	4.311 (iii)
TIME TO PEAK	(hrs)=	6.00	6.20	6.00
RUNOFF VOLUME	(mm)=	72.10	37.38	45.43
TOTAL RAINFALL	(mm)=	73.10	73.10	73.10
RUNOFF COEFFICIENT	=	0.99	0.51	0.62

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

```
| ADD HYD  (  0225)|
|   1 +  2 =  3    |
```

		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0183):		0.08	0.052	6.00	44.00
+ ID2= 2 (0206):		38.60	4.311	6.00	45.43
ID = 3 (0225):		38.68	4.363	6.00	45.43

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```
| ADD HYD  (  0225)|
|   3 +  2 =  1    |
```

		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 3 (0225):		38.68	4.363	6.00	45.43
+ ID2= 2 (0227):		0.11	0.066	6.00	43.26
ID = 1 (0225):		38.80	4.429	6.00	45.42

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```
|    READ STORM    |    Filename: C:\Users\jlysecki\AppD
|                  |              ata\Local\Temp\
|                  |              1e046b6a-70e8-44fb-adb2-28217afe7b2a\24d7f49a
| Ptotal= 73.10 mm |    Comments: 25YR 12HR SCS
```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	1.83	3.25	2.92	6.25	13.16	9.25	2.56
0.50	1.83	3.50	2.92	6.50	13.16	9.50	2.56
0.75	1.83	3.75	2.92	6.75	5.85	9.75	2.56
1.00	1.83	4.00	2.92	7.00	5.85	10.00	2.56
1.25	1.83	4.25	4.39	7.25	4.39	10.25	1.46
1.50	1.83	4.50	4.39	7.50	4.39	10.50	1.46
1.75	1.83	4.75	5.85	7.75	4.39	10.75	1.46
2.00	1.83	5.00	5.85	8.00	4.39	11.00	1.46
2.25	2.19	5.25	8.77	8.25	2.56	11.25	1.46
2.50	2.19	5.50	8.77	8.50	2.56	11.50	1.46
2.75	2.19	5.75	35.09	8.75	2.56	11.75	1.46
3.00	2.19	6.00	96.49	9.00	2.56	12.00	1.46

```
| CALIB            |
| STANDHYD (  0209)|   Area     (ha)=   5.20
|ID= 1 DT=12.0 min |   Total Imp(%)=  31.60   Dir. Conn.(%)=  19.40
```

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	1.64	3.56
Dep. Storage	(mm)=	1.00	1.50

Average Slope	(%)=	1.00	2.00
Length	(m)=	186.19	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 12.0 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
0.200	1.83	3.200	2.92	6.200	13.16	9.20	2.56
0.400	1.83	3.400	2.92	6.400	13.16	9.40	2.56
0.600	1.83	3.600	2.92	6.600	9.50	9.60	2.56
0.800	1.83	3.800	2.92	6.800	5.85	9.80	2.56
1.000	1.83	4.000	2.92	7.000	5.85	10.00	2.56
1.200	1.83	4.200	4.39	7.200	4.39	10.20	1.46
1.400	1.83	4.400	4.39	7.400	4.39	10.40	1.46
1.600	1.83	4.600	5.12	7.600	4.39	10.60	1.46
1.800	1.83	4.800	5.85	7.800	4.39	10.80	1.46
2.000	1.83	5.000	5.85	8.000	4.39	11.00	1.46
2.200	2.19	5.200	8.77	8.200	2.56	11.20	1.46
2.400	2.19	5.400	8.77	8.400	2.56	11.40	1.46
2.600	2.19	5.600	21.93	8.600	2.56	11.60	1.46
2.800	2.19	5.800	50.44	8.800	2.56	11.80	1.46
3.000	2.19	6.000	96.49	9.000	2.56	12.00	1.46

Max.Eff.Inten.	(mm/hr)=	96.49	56.68	
over	(min)	12.00	24.00	
Storage Coeff.	(min)=	3.76 (ii)	12.62 (ii)	
Unit Hyd. Tpeak	(min)=	12.00	24.00	
Unit Hyd. peak	(cms)=	0.14	0.07	
				TOTALS
PEAK FLOW	(cms)=	0.26	0.33	0.515 (iii)
TIME TO PEAK	(hrs)=	6.00	6.20	6.00
RUNOFF VOLUME	(mm)=	72.10	30.59	38.64
TOTAL RAINFALL	(mm)=	73.10	73.10	73.10
RUNOFF COEFFICIENT	=	0.99	0.42	0.53

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
YOU SHOULD CONSIDER SPLITTING THE AREA.

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

READ STORM	Filename: C:\Users\jlysecki\AppData\Local\Temp\1e046b6a-70e8-44fb-adb2-28217afe7b2a\24d7f49a
Ptotal= 73.10 mm	Comments: 25YR 12HR SCS

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	1.83	3.25	2.92	6.25	13.16	9.25	2.56
0.50	1.83	3.50	2.92	6.50	13.16	9.50	2.56
0.75	1.83	3.75	2.92	6.75	5.85	9.75	2.56
1.00	1.83	4.00	2.92	7.00	5.85	10.00	2.56
1.25	1.83	4.25	4.39	7.25	4.39	10.25	1.46
1.50	1.83	4.50	4.39	7.50	4.39	10.50	1.46
1.75	1.83	4.75	5.85	7.75	4.39	10.75	1.46
2.00	1.83	5.00	5.85	8.00	4.39	11.00	1.46
2.25	2.19	5.25	8.77	8.25	2.56	11.25	1.46
2.50	2.19	5.50	8.77	8.50	2.56	11.50	1.46
2.75	2.19	5.75	35.09	8.75	2.56	11.75	1.46
3.00	2.19	6.00	96.49	9.00	2.56	12.00	1.46

CALIB STANDHYD (0252)	Area (ha)= 1.44	ID= 1 DT=12.0 min	Total Imp(%)= 52.40	Dir. Conn.(%)= 20.10

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.75	0.69
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	97.98	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 12.0 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
0.200	1.83	3.200	2.92	6.200	13.16	9.20	2.56
0.400	1.83	3.400	2.92	6.400	13.16	9.40	2.56
0.600	1.83	3.600	2.92	6.600	9.50	9.60	2.56
0.800	1.83	3.800	2.92	6.800	5.85	9.80	2.56
1.000	1.83	4.000	2.92	7.000	5.85	10.00	2.56
1.200	1.83	4.200	4.39	7.200	4.39	10.20	1.46
1.400	1.83	4.400	4.39	7.400	4.39	10.40	1.46
1.600	1.83	4.600	5.12	7.600	4.39	10.60	1.46
1.800	1.83	4.800	5.85	7.800	4.39	10.80	1.46
2.000	1.83	5.000	5.85	8.000	4.39	11.00	1.46
2.200	2.19	5.200	8.77	8.200	2.56	11.20	1.46
2.400	2.19	5.400	8.77	8.400	2.56	11.40	1.46
2.600	2.19	5.600	21.93	8.600	2.56	11.60	1.46
2.800	2.19	5.800	50.44	8.800	2.56	11.80	1.46
3.000	2.19	6.000	96.49	9.000	2.56	12.00	1.46

Max.Eff.Inten.	(mm/hr)=	96.49	98.00	
over	(min)	12.00	12.00	
Storage Coeff.	(min)=	2.56 (ii)	9.67 (ii)	
Unit Hyd. Tpeak	(min)=	12.00	12.00	
Unit Hyd. peak	(cms)=	0.14	0.10	
				TOTALS
PEAK FLOW	(cms)=	0.08	0.15	0.227 (iii)
TIME TO PEAK	(hrs)=	6.00	6.00	6.00
RUNOFF VOLUME	(mm)=	72.10	37.19	44.20
TOTAL RAINFALL	(mm)=	73.10	73.10	73.10
RUNOFF COEFFICIENT	=	0.99	0.51	0.60

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

RESERVOIR(0261)	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
IN= 2---> OUT= 1				
DT= 5.0 min	0.0000	0.0000	0.1470	0.0137
	0.0530	0.0050	0.1700	0.0155
	0.0700	0.0076	0.1900	0.0220
	0.1150	0.0113	0.0000	0.0000

		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0252)		1.440	0.227	6.00	44.20
OUTFLOW: ID= 1 (0261)		1.440	0.142	6.10	44.19
PEAK FLOW REDUCTION	[Qout/Qin](%)=	62.50			
TIME SHIFT OF PEAK FLOW	(min)=	6.00			
MAXIMUM STORAGE USED	(ha.m.)=	0.0135			

ADD HYD (0251)	1 + 2 = 3	AREA	QPEAK	TPEAK	R.V.

```
--------------------          (ha)     (cms)     (hrs)      (mm)
       ID1= 1 (  0209):      5.20    0.515      6.00     38.64
     + ID2= 2 (  0261):      1.44    0.142      6.10     44.19
       ================================================
       ID = 3 (  0251):      6.64    0.628      6.00     39.84

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0245)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                         0.0000      0.0000   |  0.3090      0.2876
                         0.0000      0.0000   |  0.3330      0.3838
                         0.1230      0.1102   |  0.3620      0.5200
                         0.2870      0.1971   |  0.0000      0.0000

                              AREA     QPEAK     TPEAK       R.V.
                              (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0251)     6.640     0.628      6.00      39.84
   OUTFLOW: ID= 1 (  0245)     6.640     0.157      6.80      39.81

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 24.94
                  TIME SHIFT OF PEAK FLOW          (min)= 48.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.1282

------------------------------------------------------------------------------
--------------------
| ROUTEPIPE(  0212)|     PIPE Number     =   1.00
| IN= 2---> OUT= 1 |     Diameter    (mm)=1650.00
| DT= 12.0 min     |     Length       (m)= 850.00
--------------------     Slope       (m/m)=  0.005
                         Manning n        =  0.013

     <----------------- TRAVEL TIME TABLE ------------------->
       DEPTH      VOLUME     FLOW RATE    VELOCITY    TRAV.TIME
        (m)      (cu.m.)       (cms)        (m/s)        min
       0.09     .367E+02        0.0         0.80        17.68
       0.17     .102E+03        0.1         1.25        11.33
       0.26     .184E+03        0.3         1.61         8.81
       0.35     .278E+03        0.6         1.91         7.41
       0.43     .382E+03        1.0         2.18         6.51
       0.52     .492E+03        1.4         2.41         5.88
       0.61     .608E+03        1.9         2.61         5.43
       0.69     .727E+03        2.4         2.79         5.08
       0.78     .848E+03        2.9         2.95         4.81
       0.87     .970E+03        3.5         3.08         4.60
       0.96     .109E+04        4.1         3.20         4.43
       1.04     .121E+04        4.7         3.29         4.31
       1.13     .133E+04        5.2         3.36         4.22
       1.22     .144E+04        5.8         3.41         4.15
       1.30     .154E+04        6.2         3.44         4.12
       1.39     .163E+04        6.6         3.43         4.13
       1.48     .172E+04        6.9         3.40         4.17
       1.56     .178E+04        6.9         3.31         4.28
       1.65     .182E+04        6.5         3.02         4.70
                                    <---- hydrograph ---->   <-pipe / channel->
                               AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                               (ha)    (cms)   (hrs)   (mm)       (m)       (m/s)
   INFLOW : ID= 2 (  0245)    6.64     0.16    6.80  39.81       0.18       1.26
   OUTFLOW: ID= 1 (  0212)    6.64     0.16    6.90  39.80       0.18       1.26

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

--------------------
| ADD HYD  (  0211)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0212):      6.64    0.155     6.90     39.80
     + ID2= 2 (  0225):     38.80    4.429     6.00     45.42
       ================================================
       ID = 3 (  0211):     45.44    4.470     6.00     44.60

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0255)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                         0.0000      0.0000   |  1.6250      1.2448
                         0.0190      0.1627   |  1.6630      1.2997
                         0.0360      0.4306   |  1.8430      1.5816
                         0.0480      0.7217   |  2.1300      2.1197
                         0.1330      0.7718   |  2.9680      2.2465
                         1.0390      0.9773   |  7.5380      2.5741

                              AREA     QPEAK     TPEAK       R.V.
                              (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0211)    45.436     4.470      6.00      44.60
   OUTFLOW: ID= 1 (  0255)    45.436     1.188      6.70      44.55

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 26.57
                  TIME SHIFT OF PEAK FLOW          (min)= 42.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  1.0465

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

       V    V   I    SSSSS  U   U    A    L              (v 5.1.2004)
       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 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)\Visual OTTHYMO 5.1\VO2\voin.dat
  Output  filename: C:\Users\jlysecki\AppData\Local\Civica\VH5\a379672b-db33-4372-b5e0-
ba58a07d1417\18daa752-8af2-41fe-937b-35d2c4290b48\sce
  Summary filename: C:\Users\jlysecki\AppData\Local\Civica\VH5\a379672b-db33-4372-b5e0-
ba58a07d1417\18daa752-8af2-41fe-937b-35d2c4290b48\sce


DATE: 01/15/2020                          TIME: 04:16:44

USER:


COMMENTS: _____

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


--------------------
|    READ STORM    |    Filename: C:\Users\jlysecki\AppD
|                  |              ata\Local\Temp\
|                  |              1e046b6a-70e8-44fb-adb2-28217afe7b2a\4ca97a92
| Ptotal= 80.80 mm |    Comments: 50YR 12HR SCS
--------------------
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
```

hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.25	2.02	3.25	3.23	6.25	14.54	9.25	2.83
0.50	2.02	3.50	3.23	6.50	14.54	9.50	2.83
0.75	2.02	3.75	3.23	6.75	6.46	9.75	2.83
1.00	2.02	4.00	3.23	7.00	6.46	10.00	2.83
1.25	2.02	4.25	4.85	7.25	4.85	10.25	1.62
1.50	2.02	4.50	4.85	7.50	4.85	10.50	1.62
1.75	2.02	4.75	6.46	7.75	4.85	10.75	1.62
2.00	2.02	5.00	6.46	8.00	4.85	11.00	1.62
2.25	2.42	5.25	9.70	8.25	2.83	11.25	1.62
2.50	2.42	5.50	9.70	8.50	2.83	11.50	1.62
2.75	2.42	5.75	38.78	8.75	2.83	11.75	1.62
3.00	2.42	6.00	106.66	9.00	2.83	12.00	1.62

CALIB
STANDHYD (0228)
ID= 1 DT=12.0 min

Area (ha)= 12.56
Total Imp(%)= 54.10 Dir. Conn.(%)= 25.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	6.79	5.77
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	289.37	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 12.0 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
0.200	2.02	3.200	3.23	6.200	14.54	9.20	2.83
0.400	2.02	3.400	3.23	6.400	14.54	9.40	2.83
0.600	2.02	3.600	3.23	6.600	10.50	9.60	2.83
0.800	2.02	3.800	3.23	6.800	6.46	9.80	2.83
1.000	2.02	4.000	3.23	7.000	6.46	10.00	2.83
1.200	2.02	4.200	4.85	7.200	4.85	10.20	1.62
1.400	2.02	4.400	4.85	7.400	4.85	10.40	1.62
1.600	2.02	4.600	5.66	7.600	4.85	10.60	1.62
1.800	2.02	4.800	6.46	7.800	4.85	10.80	1.62
2.000	2.02	5.000	6.46	8.000	4.85	11.00	1.62
2.200	2.42	5.200	9.70	8.200	2.83	11.20	1.62
2.400	2.42	5.400	9.70	8.400	2.83	11.40	1.62
2.600	2.42	5.600	24.24	8.600	2.83	11.60	1.62
2.800	2.42	5.800	55.75	8.800	2.83	11.80	1.62
3.000	2.42	6.000	106.66	9.000	2.83	12.00	1.62

				TOTALS
Max.Eff.Inten.	(mm/hr)=	106.66	109.23	
over	(min)	12.00	12.00	
Storage Coeff.	(min)=	4.71 (ii)	11.52 (ii)	
Unit Hyd. Tpeak	(min)=	12.00	12.00	
Unit Hyd. peak	(cms)=	0.13	0.09	
PEAK FLOW	(cms)=	0.89	1.32	2.215 (iii)
TIME TO PEAK	(hrs)=	6.00	6.00	6.00
RUNOFF VOLUME	(mm)=	79.80	42.62	51.91
TOTAL RAINFALL	(mm)=	80.80	80.80	80.80
RUNOFF COEFFICIENT	=	0.99	0.53	0.64

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

READ STORM	Filename: C:\Users\jlysecki\AppData\Local\Temp\1e046b6a-70e8-44fb-adb2-28217afe7b2a\4ca97a92

Ptotal= 80.80 mm	Comments: 50YR 12HR SCS

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	2.02	3.25	3.23	6.25	14.54	9.25	2.83
0.50	2.02	3.50	3.23	6.50	14.54	9.50	2.83
0.75	2.02	3.75	3.23	6.75	6.46	9.75	2.83
1.00	2.02	4.00	3.23	7.00	6.46	10.00	2.83
1.25	2.02	4.25	4.85	7.25	4.85	10.25	1.62
1.50	2.02	4.50	4.85	7.50	4.85	10.50	1.62
1.75	2.02	4.75	6.46	7.75	4.85	10.75	1.62
2.00	2.02	5.00	6.46	8.00	4.85	11.00	1.62
2.25	2.42	5.25	9.70	8.25	2.83	11.25	1.62
2.50	2.42	5.50	9.70	8.50	2.83	11.50	1.62
2.75	2.42	5.75	38.78	8.75	2.83	11.75	1.62
3.00	2.42	6.00	106.66	9.00	2.83	12.00	1.62

CALIB
STANDHYD (0257)
ID= 1 DT=12.0 min

Area (ha)= 3.10
Total Imp(%)= 67.90 Dir. Conn.(%)= 42.90

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	2.10	1.00
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	143.76	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 12.0 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
0.200	2.02	3.200	3.23	6.200	14.54	9.20	2.83
0.400	2.02	3.400	3.23	6.400	14.54	9.40	2.83
0.600	2.02	3.600	3.23	6.600	10.50	9.60	2.83
0.800	2.02	3.800	3.23	6.800	6.46	9.80	2.83
1.000	2.02	4.000	3.23	7.000	6.46	10.00	2.83
1.200	2.02	4.200	4.85	7.200	4.85	10.20	1.62
1.400	2.02	4.400	4.85	7.400	4.85	10.40	1.62
1.600	2.02	4.600	5.66	7.600	4.85	10.60	1.62
1.800	2.02	4.800	6.46	7.800	4.85	10.80	1.62
2.000	2.02	5.000	6.46	8.000	4.85	11.00	1.62
2.200	2.42	5.200	9.70	8.200	2.83	11.20	1.62
2.400	2.42	5.400	9.70	8.400	2.83	11.40	1.62
2.600	2.42	5.600	24.24	8.600	2.83	11.60	1.62
2.800	2.42	5.800	55.75	8.800	2.83	11.80	1.62
3.000	2.42	6.000	106.66	9.000	2.83	12.00	1.62

				TOTALS
Max.Eff.Inten.	(mm/hr)=	106.66	123.62	
over	(min)	12.00	12.00	
Storage Coeff.	(min)=	3.10 (ii)	9.58 (ii)	
Unit Hyd. Tpeak	(min)=	12.00	12.00	
Unit Hyd. peak	(cms)=	0.14	0.10	
PEAK FLOW	(cms)=	0.39	0.28	0.667 (iii)
TIME TO PEAK	(hrs)=	6.00	6.00	6.00
RUNOFF VOLUME	(mm)=	79.80	44.36	59.56
TOTAL RAINFALL	(mm)=	80.80	80.80	80.80
RUNOFF COEFFICIENT	=	0.99	0.55	0.74

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

```
| ADD HYD  (  0258)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
-------------------           (ha)     (cms)    (hrs)      (mm)
        ID1= 1 (  0228):    12.56   2.215     6.00     51.91
      + ID2= 2 (  0257):     3.10   0.667     6.00     59.56
        ================================================
        ID = 3 (  0258):    15.66   2.882     6.00     53.43

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
-------------------
| RESERVOIR(  0243)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
-------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                         0.0000     0.0000   |   0.1346     0.4241
                         0.0096     0.0421   |   0.1575     0.4697
                         0.0159     0.0886   |   0.1823     0.5165
                         0.0203     0.1399   |   0.2088     0.5647
                         0.0228     0.1768   |   0.2369     0.6142
                         0.0250     0.2150   |   0.2514     0.6394
                         0.0628     0.2544   |   0.2663     0.6650
                         0.0835     0.2950   |   0.2816     0.6910
                         0.0991     0.3368   |   0.2997     0.7172
                         0.1144     0.3798   |   0.3113     0.7439

                              AREA     QPEAK     TPEAK       R.V.
                              (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0258)     15.660     2.882      6.00      53.43
   OUTFLOW: ID= 1 (  0243)     15.660     0.206      7.20      53.36

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  7.16
                  TIME SHIFT OF PEAK FLOW          (min)= 72.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.5609

--------------------------------------------------------------------------------
-------------------
| ROUTEPIPE(  0184)|     PIPE Number     =   1.00
| IN= 2---> OUT= 1 |     Diameter    (mm)=1650.00
| DT= 12.0 min     |     Length       (m)= 500.00
-------------------      Slope      (m/m)=  0.005
                         Manning n       =  0.013

     <----------------- TRAVEL TIME TABLE ------------------->
       DEPTH      VOLUME     FLOW RATE    VELOCITY    TRAV.TIME
         (m)     (cu.m.)       (cms)        (m/s)        min
        0.09    .216E+02         0.0         0.80        10.40
        0.17    .600E+02         0.1         1.25         6.67
        0.26    .108E+03         0.3         1.61         5.18
        0.35    .164E+03         0.6         1.91         4.36
        0.43    .225E+03         1.0         2.18         3.83
        0.52    .290E+03         1.4         2.41         3.46
        0.61    .358E+03         1.9         2.61         3.19
        0.69    .428E+03         2.4         2.79         2.99
        0.78    .499E+03         2.9         2.95         2.83
        0.87    .570E+03         3.5         3.08         2.70
        0.96    .642E+03         4.1         3.20         2.61
        1.04    .712E+03         4.7         3.29         2.53
        1.13    .780E+03         5.2         3.36         2.48
        1.22    .844E+03         5.8         3.41         2.44
        1.30    .905E+03         6.2         3.44         2.43
        1.39    .961E+03         6.6         3.43         2.43
        1.48    .101E+04         6.9         3.40         2.45
        1.56    .105E+04         6.9         3.31         2.52
        1.65    .107E+04         6.5         3.02         2.76
                                    <---- hydrograph ---->   <-pipe / channel->
                                AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                                (ha)    (cms)   (hrs)   (mm)       (m)       (m/s)
   INFLOW : ID= 2 (  0243)   15.66     0.21    7.20   53.36      0.20       1.33
   OUTFLOW: ID= 1 (  0184)   15.66     0.21    7.20   53.36      0.20       1.33

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

```
|    READ STORM    |    Filename: C:\Users\jlysecki\AppD
|                  |              ata\Local\Temp\
|                  |              1e046b6a-70e8-44fb-adb2-28217afe7b2a\4ca97a92
| Ptotal= 80.80 mm |    Comments: 50YR 12HR SCS
--------------------
```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	2.02	3.25	3.23	6.25	14.54	9.25	2.83
0.50	2.02	3.50	3.23	6.50	14.54	9.50	2.83
0.75	2.02	3.75	3.23	6.75	6.46	9.75	2.83
1.00	2.02	4.00	3.23	7.00	6.46	10.00	2.83
1.25	2.02	4.25	4.85	7.25	4.85	10.25	1.62
1.50	2.02	4.50	4.85	7.50	4.85	10.50	1.62
1.75	2.02	4.75	6.46	7.75	4.85	10.75	1.62
2.00	2.02	5.00	6.46	8.00	4.85	11.00	1.62
2.25	2.42	5.25	9.70	8.25	2.83	11.25	1.62
2.50	2.42	5.50	9.70	8.50	2.83	11.50	1.62
2.75	2.42	5.75	38.78	8.75	2.83	11.75	1.62
3.00	2.42	6.00	106.66	9.00	2.83	12.00	1.62

```
--------------------------------------------------------------------------------
-------------------
| CALIB            |
| STANDHYD (  0229)|   Area     (ha)=  12.13
|ID= 1 DT=12.0 min |   Total Imp(%)=  54.50   Dir. Conn.(%)=  19.70
-------------------

                                IMPERVIOUS     PERVIOUS (i)
     Surface Area     (ha)=        6.61           5.52
     Dep. Storage     (mm)=        1.00           1.50
     Average Slope     (%)=        1.00           2.00
     Length            (m)=      284.37          40.00
     Mannings n           =       0.013          0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO  12.0 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
0.200	2.02	3.200	3.23	6.200	14.54	9.20	2.83
0.400	2.02	3.400	3.23	6.400	14.54	9.40	2.83
0.600	2.02	3.600	3.23	6.600	10.50	9.60	2.83
0.800	2.02	3.800	3.23	6.800	6.46	9.80	2.83
1.000	2.02	4.000	3.23	7.000	6.46	10.00	2.83
1.200	2.02	4.200	4.85	7.200	4.85	10.20	1.62
1.400	2.02	4.400	4.85	7.400	4.85	10.40	1.62
1.600	2.02	4.600	5.66	7.600	4.85	10.60	1.62
1.800	2.02	4.800	6.46	7.800	4.85	10.80	1.62
2.000	2.02	5.000	6.46	8.000	4.85	11.00	1.62
2.200	2.42	5.200	9.70	8.200	2.83	11.20	1.62
2.400	2.42	5.400	9.70	8.400	2.83	11.40	1.62
2.600	2.42	5.600	24.24	8.600	2.83	11.60	1.62
2.800	2.42	5.800	55.75	8.800	2.83	11.80	1.62
3.000	2.42	6.000	106.66	9.000	2.83	12.00	1.62

```
     Max.Eff.Inten.(mm/hr)=     106.66       122.22
                  over (min)       12.00        12.00
     Storage Coeff.  (min)=        4.66 (ii)   11.17 (ii)
     Unit Hyd. Tpeak (min)=       12.00        12.00
     Unit Hyd. peak  (cms)=        0.13         0.09
                                                          *TOTALS*
     PEAK FLOW       (cms)=        0.68         1.44          2.116 (iii)
     TIME TO PEAK    (hrs)=        6.00         6.00          6.00
     RUNOFF VOLUME    (mm)=       79.80        44.20         51.21
     TOTAL RAINFALL   (mm)=       80.80        80.80         80.80
     RUNOFF COEFFICIENT   =        0.99         0.55          0.63

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
             YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
```

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

ADD HYD (0196)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0184):		15.66	0.206	7.20	53.36
+ ID2= 2 (0229):		12.13	2.116	6.00	51.21
ID = 3 (0196):		27.79	2.169	6.00	52.42

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0256)				
IN= 2---> OUT= 1				
DT= 12.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.2761	0.3332
	0.0090	0.0385	0.3101	0.3536
	0.0147	0.0812	0.3454	0.3743
	0.0199	0.1456	0.3818	0.3952
	0.0210	0.1631	0.4194	0.4165
	0.0987	0.2172	0.4581	0.4381
	0.1306	0.2358	0.4979	0.4600
	0.1761	0.2739	0.5806	0.5047
	0.2120	0.2934	0.6234	0.5275
	0.2433	0.3131	0.7121	0.5742

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0196)	27.790	2.169	6.00	52.42
OUTFLOW: ID= 1 (0256)	27.790	0.402	7.00	52.38

PEAK FLOW REDUCTION [Qout/Qin](%)= 18.52
TIME SHIFT OF PEAK FLOW (min)= 60.00
MAXIMUM STORAGE USED (ha.m.)= 0.4066

READ STORM	Filename: C:\Users\jlysecki\AppData\Local\Temp\1e046b6a-70e8-44fb-adb2-28217afe7b2a\4ca97a92
Ptotal= 80.80 mm	Comments: 50YR 12HR SCS

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	2.02	3.25	3.23	6.25	14.54	9.25	2.83
0.50	2.02	3.50	3.23	6.50	14.54	9.50	2.83
0.75	2.02	3.75	3.23	6.75	6.46	9.75	2.83
1.00	2.02	4.00	3.23	7.00	6.46	10.00	2.83
1.25	2.02	4.25	4.85	7.25	4.85	10.25	1.62
1.50	2.02	4.50	4.85	7.50	4.85	10.50	1.62
1.75	2.02	4.75	6.46	7.75	4.85	10.75	1.62
2.00	2.02	5.00	6.46	8.00	4.85	11.00	1.62
2.25	2.42	5.25	9.70	8.25	2.83	11.25	1.62
2.50	2.42	5.50	9.70	8.50	2.83	11.50	1.62
2.75	2.42	5.75	38.78	8.75	2.83	11.75	1.62
3.00	2.42	6.00	106.66	9.00	2.83	12.00	1.62

CALIB		
STANDHYD (0230)	Area (ha)= 20.35	
ID= 1 DT=12.0 min	Total Imp(%)= 53.70	Dir. Conn.(%)= 32.40

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	10.93	9.42
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	368.33	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 12.0 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
0.200	2.02	3.200	3.23	6.200	14.54	9.20	2.83
0.400	2.02	3.400	3.23	6.400	14.54	9.40	2.83
0.600	2.02	3.600	3.23	6.600	10.50	9.60	2.83
0.800	2.02	3.800	3.23	6.800	6.46	9.80	2.83
1.000	2.02	4.000	3.23	7.000	6.46	10.00	2.83
1.200	2.02	4.200	4.85	7.200	4.85	10.20	1.62
1.400	2.02	4.400	4.85	7.400	4.85	10.40	1.62
1.600	2.02	4.600	5.66	7.600	4.85	10.60	1.62
1.800	2.02	4.800	6.46	7.800	4.85	10.80	1.62
2.000	2.02	5.000	6.46	8.000	4.85	11.00	1.62
2.200	2.42	5.200	9.70	8.200	2.83	11.20	1.62
2.400	2.42	5.400	9.70	8.400	2.83	11.40	1.62
2.600	2.42	5.600	24.24	8.600	2.83	11.60	1.62
2.800	2.42	5.800	55.75	8.800	2.83	11.80	1.62
3.000	2.42	6.000	106.66	9.000	2.83	12.00	1.62

				TOTALS
Max.Eff.Inten.(mm/hr)=		106.66	92.39	
over (min)		12.00	24.00	
Storage Coeff. (min)=		5.44 (ii)	12.73 (ii)	
Unit Hyd. Tpeak (min)=		12.00	24.00	
Unit Hyd. peak (cms)=		0.13	0.07	
PEAK FLOW	(cms)=	1.84	1.43	2.946 (iii)
TIME TO PEAK	(hrs)=	6.00	6.20	6.00
RUNOFF VOLUME	(mm)=	79.80	40.29	53.09
TOTAL RAINFALL	(mm)=	80.80	80.80	80.80
RUNOFF COEFFICIENT	=	0.99	0.50	0.66

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0224)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0230):		20.35	2.946	6.00	53.09
+ ID2= 2 (0256):		27.79	0.402	7.00	52.38
ID = 3 (0224):		48.14	3.092	6.00	52.68

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0253)				
IN= 2---> OUT= 1				
DT= 12.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.6390	0.9848
	0.0270	0.1457	0.9700	1.2900
	0.0430	0.3152	1.1040	1.7480
	0.0530	0.4653	3.3100	1.9350
	0.3280	0.6677	11.3140	2.2662

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0224)	48.140	3.092	6.00	52.68
OUTFLOW: ID= 1 (0253)	48.140	0.527	8.20	52.66

PEAK FLOW REDUCTION [Qout/Qin](%)= 17.03
TIME SHIFT OF PEAK FLOW (min)=132.00

MAXIMUM STORAGE USED (ha.m.)= 0.8710

READ STORM	Filename: C:\Users\jlysecki\AppData\Local\Temp\1e046b6a-70e8-44fb-adb2-28217afe7b2a\4ca97a92
Ptotal= 80.80 mm	Comments: 50YR 12HR SCS

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	2.02	3.25	3.23	6.25	14.54	9.25	2.83
0.50	2.02	3.50	3.23	6.50	14.54	9.50	2.83
0.75	2.02	3.75	3.23	6.75	6.46	9.75	2.83
1.00	2.02	4.00	3.23	7.00	6.46	10.00	2.83
1.25	2.02	4.25	4.85	7.25	4.85	10.25	1.62
1.50	2.02	4.50	4.85	7.50	4.85	10.50	1.62
1.75	2.02	4.75	6.46	7.75	4.85	10.75	1.62
2.00	2.02	5.00	6.46	8.00	4.85	11.00	1.62
2.25	2.42	5.25	9.70	8.25	2.83	11.25	1.62
2.50	2.42	5.50	9.70	8.50	2.83	11.50	1.62
2.75	2.42	5.75	38.78	8.75	2.83	11.75	1.62
3.00	2.42	6.00	106.66	9.00	2.83	12.00	1.62

CALIB	
STANDHYD (0160)	Area (ha)= 1.30
ID= 1 DT=12.0 min	Total Imp(%)= 50.70 Dir. Conn.(%)= 22.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.66	0.64
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	93.09	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 12.0 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
0.200	2.02	3.200	3.23	6.200	14.54	9.20	2.83
0.400	2.02	3.400	3.23	6.400	14.54	9.40	2.83
0.600	2.02	3.600	3.23	6.600	10.50	9.60	2.83
0.800	2.02	3.800	3.23	6.800	6.46	9.80	2.83
1.000	2.02	4.000	3.23	7.000	6.46	10.00	2.83
1.200	2.02	4.200	4.85	7.200	4.85	10.20	1.62
1.400	2.02	4.400	4.85	7.400	4.85	10.40	1.62
1.600	2.02	4.600	5.66	7.600	4.85	10.60	1.62
1.800	2.02	4.800	6.46	7.800	4.85	10.80	1.62
2.000	2.02	5.000	6.46	8.000	4.85	11.00	1.62
2.200	2.42	5.200	9.70	8.200	2.83	11.20	1.62
2.400	2.42	5.400	9.70	8.400	2.83	11.40	1.62
2.600	2.42	5.600	24.24	8.600	2.83	11.60	1.62
2.800	2.42	5.800	55.75	8.800	2.83	11.80	1.62
3.000	2.42	6.000	106.66	9.000	2.83	12.00	1.62

				TOTALS
Max.Eff.Inten.(mm/hr)=		106.66	104.16	
over (min)		12.00	12.00	
Storage Coeff. (min)=		2.38 (ii)	9.33 (ii)	
Unit Hyd. Tpeak (min)=		12.00	12.00	
Unit Hyd. peak (cms)=		0.14	0.10	
PEAK FLOW	(cms)=	0.08	0.15	0.236 (iii)
TIME TO PEAK	(hrs)=	6.00	6.00	6.00
RUNOFF VOLUME	(mm)=	79.80	41.96	50.28
TOTAL RAINFALL	(mm)=	80.80	80.80	80.80
RUNOFF COEFFICIENT	=	0.99	0.52	0.62

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

DUHYD (0183)				
Inlet Cap.= 0.152				
#of Inlets= 1				
Total(cms)= 0.2	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
TOTAL HYD.(ID= 1):	1.30	0.24	6.00	50.28
MAJOR SYS.(ID= 2):	0.12	0.08	6.00	50.28
MINOR SYS.(ID= 3):	1.18	0.15	6.00	50.28

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

READ STORM	Filename: C:\Users\jlysecki\AppData\Local\Temp\1e046b6a-70e8-44fb-adb2-28217afe7b2a\4ca97a92
Ptotal= 80.80 mm	Comments: 50YR 12HR SCS

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	2.02	3.25	3.23	6.25	14.54	9.25	2.83
0.50	2.02	3.50	3.23	6.50	14.54	9.50	2.83
0.75	2.02	3.75	3.23	6.75	6.46	9.75	2.83
1.00	2.02	4.00	3.23	7.00	6.46	10.00	2.83
1.25	2.02	4.25	4.85	7.25	4.85	10.25	1.62
1.50	2.02	4.50	4.85	7.50	4.85	10.50	1.62
1.75	2.02	4.75	6.46	7.75	4.85	10.75	1.62
2.00	2.02	5.00	6.46	8.00	4.85	11.00	1.62
2.25	2.42	5.25	9.70	8.25	2.83	11.25	1.62
2.50	2.42	5.50	9.70	8.50	2.83	11.50	1.62
2.75	2.42	5.75	38.78	8.75	2.83	11.75	1.62
3.00	2.42	6.00	106.66	9.00	2.83	12.00	1.62

CALIB	
STANDHYD (0193)	Area (ha)= 1.21
ID= 1 DT=12.0 min	Total Imp(%)= 49.30 Dir. Conn.(%)= 20.10

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.60	0.61
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	89.81	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 12.0 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
0.200	2.02	3.200	3.23	6.200	14.54	9.20	2.83
0.400	2.02	3.400	3.23	6.400	14.54	9.40	2.83
0.600	2.02	3.600	3.23	6.600	10.50	9.60	2.83
0.800	2.02	3.800	3.23	6.800	6.46	9.80	2.83
1.000	2.02	4.000	3.23	7.000	6.46	10.00	2.83
1.200	2.02	4.200	4.85	7.200	4.85	10.20	1.62
1.400	2.02	4.400	4.85	7.400	4.85	10.40	1.62
1.600	2.02	4.600	5.66	7.600	4.85	10.60	1.62
1.800	2.02	4.800	6.46	7.800	4.85	10.80	1.62
2.000	2.02	5.000	6.46	8.000	4.85	11.00	1.62
2.200	2.42	5.200	9.70	8.200	2.83	11.20	1.62
2.400	2.42	5.400	9.70	8.400	2.83	11.40	1.62
2.600	2.42	5.600	24.24	8.600	2.83	11.60	1.62
2.800	2.42	5.800	55.75	8.800	2.83	11.80	1.62

COLE ENGINEERING

Experience Enhancing Excellence

		3.000	2.42	6.000	106.66	9.000	2.83	12.00	1.62

Max.Eff.Inten.(mm/hr)=	106.66	103.56		
over (min)	12.00	12.00		
Storage Coeff. (min)=	2.33 (ii)	9.29 (ii)		
Unit Hyd. Tpeak (min)=	12.00	12.00		
Unit Hyd. peak (cms)=	0.14	0.10		
			TOTALS	
PEAK FLOW (cms)=	0.07	0.14	0.216	(iii)
TIME TO PEAK (hrs)=	6.00	6.00	6.00	
RUNOFF VOLUME (mm)=	79.80	41.87	49.49	
TOTAL RAINFALL (mm)=	80.80	80.80	80.80	
RUNOFF COEFFICIENT =	0.99	0.52	0.61	

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

DUHYD (0227)				
Inlet Cap.= 0.120				
#of Inlets= 1				
Total(cms)= 0.1	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
TOTAL HYD.(ID= 1):	1.21	0.22	6.00	49.49
MAJOR SYS.(ID= 2):	0.14	0.10	6.00	49.49
MINOR SYS.(ID= 3):	1.07	0.12	6.00	49.49

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

READ STORM	Filename: C:\Users\jlysecki\AppData\Local\Temp\1e046b6a-70e8-44fb-adb2-28217afe7b2a\4ca97a92
Ptotal= 80.80 mm	Comments: 50YR 12HR SCS

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	2.02	3.25	3.23	6.25	14.54	9.25	2.83
0.50	2.02	3.50	3.23	6.50	14.54	9.50	2.83
0.75	2.02	3.75	3.23	6.75	6.46	9.75	2.83
1.00	2.02	4.00	3.23	7.00	6.46	10.00	2.83
1.25	2.02	4.25	4.85	7.25	4.85	10.25	1.62
1.50	2.02	4.50	4.85	7.50	4.85	10.50	1.62
1.75	2.02	4.75	6.46	7.75	4.85	10.75	1.62
2.00	2.02	5.00	6.46	8.00	4.85	11.00	1.62
2.25	2.42	5.25	9.70	8.25	2.83	11.25	1.62
2.50	2.42	5.50	9.70	8.50	2.83	11.50	1.62
2.75	2.42	5.75	38.78	8.75	2.83	11.75	1.62
3.00	2.42	6.00	106.66	9.00	2.83	12.00	1.62

CALIB	
STANDHYD (0206)	Area (ha)= 38.60
ID= 1 DT=12.0 min	Total Imp(%)= 54.70 Dir. Conn.(%)= 23.20

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	21.11	17.49
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	507.28	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 12.0 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
0.200	2.02	3.200	3.23	6.200	14.54	9.20	2.83
0.400	2.02	3.400	3.23	6.400	14.54	9.40	2.83
0.600	2.02	3.600	3.23	6.600	10.50	9.60	2.83
0.800	2.02	3.800	3.23	6.800	6.46	9.80	2.83
1.000	2.02	4.000	3.23	7.000	6.46	10.00	2.83
1.200	2.02	4.200	4.85	7.200	4.85	10.20	1.62
1.400	2.02	4.400	4.85	7.400	4.85	10.40	1.62
1.600	2.02	4.600	5.66	7.600	4.85	10.60	1.62
1.800	2.02	4.800	6.46	7.800	4.85	10.80	1.62
2.000	2.02	5.000	6.46	8.000	4.85	11.00	1.62
2.200	2.42	5.200	9.70	8.200	2.83	11.20	1.62
2.400	2.42	5.400	9.70	8.400	2.83	11.40	1.62
2.600	2.42	5.600	24.24	8.600	2.83	11.60	1.62
2.800	2.42	5.800	55.75	8.800	2.83	11.80	1.62
3.000	2.42	6.000	106.66	9.000	2.83	12.00	1.62

Max.Eff.Inten.(mm/hr)=	106.66	115.29		
over (min)	12.00	24.00		
Storage Coeff. (min)=	6.60 (ii)	13.26 (ii)		
Unit Hyd. Tpeak (min)=	12.00	24.00		
Unit Hyd. peak (cms)=	0.12	0.06		
			TOTALS	
PEAK FLOW (cms)=	2.43	3.27	4.967	(iii)
TIME TO PEAK (hrs)=	6.00	6.20	6.00	
RUNOFF VOLUME (mm)=	79.80	43.38	51.83	
TOTAL RAINFALL (mm)=	80.80	80.80	80.80	
RUNOFF COEFFICIENT =	0.99	0.54	0.64	

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0225)				
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0183):	0.12	0.084	6.00	50.28
+ ID2= 2 (0206):	38.60	4.967	6.00	51.83
ID = 3 (0225):	38.72	5.050	6.00	51.82

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0225)				
3 + 2 = 1	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 3 (0225):	38.72	5.050	6.00	51.82
+ ID2= 2 (0227):	0.14	0.096	6.00	49.49
ID = 1 (0225):	38.86	5.146	6.00	51.81

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

READ STORM	Filename: C:\Users\jlysecki\AppData\Local\Temp\1e046b6a-70e8-44fb-adb2-28217afe7b2a\4ca97a92
Ptotal= 80.80 mm	Comments: 50YR 12HR SCS

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	2.02	3.25	3.23	6.25	14.54	9.25	2.83

0.50	2.02	3.50	3.23	6.50	14.54	9.50	2.83
0.75	2.02	3.75	3.23	6.75	6.46	9.75	2.83
1.00	2.02	4.00	3.23	7.00	6.46	10.00	2.83
1.25	2.02	4.25	4.85	7.25	4.85	10.25	1.62
1.50	2.02	4.50	4.85	7.50	4.85	10.50	1.62
1.75	2.02	4.75	6.46	7.75	4.85	10.75	1.62
2.00	2.02	5.00	6.46	8.00	4.85	11.00	1.62
2.25	2.42	5.25	9.70	8.25	2.83	11.25	1.62
2.50	2.42	5.50	9.70	8.50	2.83	11.50	1.62
2.75	2.42	5.75	38.78	8.75	2.83	11.75	1.62
3.00	2.42	6.00	106.66	9.00	2.83	12.00	1.62

CALIB	
STANDHYD (0209)	Area (ha)= 5.20
ID= 1 DT=12.0 min	Total Imp(%)= 31.60 Dir. Conn.(%)= 19.40

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	1.64	3.56
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	186.19	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 12.0 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
0.200	2.02	3.200	3.23	6.200	14.54	9.20	2.83
0.400	2.02	3.400	3.23	6.400	14.54	9.40	2.83
0.600	2.02	3.600	3.23	6.600	10.50	9.60	2.83
0.800	2.02	3.800	3.23	6.800	6.46	9.80	2.83
1.000	2.02	4.000	3.23	7.000	6.46	10.00	2.83
1.200	2.02	4.200	4.85	7.200	4.85	10.20	1.62
1.400	2.02	4.400	4.85	7.400	4.85	10.40	1.62
1.600	2.02	4.600	5.66	7.600	4.85	10.60	1.62
1.800	2.02	4.800	6.46	7.800	4.85	10.80	1.62
2.000	2.02	5.000	6.46	8.000	4.85	11.00	1.62
2.200	2.42	5.200	9.70	8.200	2.83	11.20	1.62
2.400	2.42	5.400	9.70	8.400	2.83	11.40	1.62
2.600	2.42	5.600	24.24	8.600	2.83	11.60	1.62
2.800	2.42	5.800	55.75	8.800	2.83	11.80	1.62
3.000	2.42	6.000	106.66	9.000	2.83	12.00	1.62

				TOTALS
Max.Eff.Inten.	(mm/hr)=	106.66	66.44	
	over (min)	12.00	12.00	
Storage Coeff.	(min)=	3.62 (ii)	11.93 (ii)	
Unit Hyd. Tpeak	(min)=	12.00	12.00	
Unit Hyd. peak	(cms)=	0.14	0.09	
PEAK FLOW	(cms)=	0.29	0.49	0.779 (iii)
TIME TO PEAK	(hrs)=	6.00	6.00	6.00
RUNOFF VOLUME	(mm)=	79.80	35.86	44.38
TOTAL RAINFALL	(mm)=	80.80	80.80	80.80
RUNOFF COEFFICIENT	=	0.99	0.44	0.55

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
YOU SHOULD CONSIDER SPLITTING THE AREA.

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

READ STORM	Filename: C:\Users\jlysecki\AppData\Local\Temp\1e046b6a-70e8-44fb-adb2-28217afe7b2a\4ca97a92

Ptotal= 80.80 mm	Comments: 50YR 12HR SCS

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	2.02	3.25	3.23	6.25	14.54	9.25	2.83
0.50	2.02	3.50	3.23	6.50	14.54	9.50	2.83
0.75	2.02	3.75	3.23	6.75	6.46	9.75	2.83
1.00	2.02	4.00	3.23	7.00	6.46	10.00	2.83
1.25	2.02	4.25	4.85	7.25	4.85	10.25	1.62
1.50	2.02	4.50	4.85	7.50	4.85	10.50	1.62
1.75	2.02	4.75	6.46	7.75	4.85	10.75	1.62
2.00	2.02	5.00	6.46	8.00	4.85	11.00	1.62
2.25	2.42	5.25	9.70	8.25	2.83	11.25	1.62
2.50	2.42	5.50	9.70	8.50	2.83	11.50	1.62
2.75	2.42	5.75	38.78	8.75	2.83	11.75	1.62
3.00	2.42	6.00	106.66	9.00	2.83	12.00	1.62

CALIB	
STANDHYD (0252)	Area (ha)= 1.44
ID= 1 DT=12.0 min	Total Imp(%)= 52.40 Dir. Conn.(%)= 20.10

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.75	0.69
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	97.98	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 12.0 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
0.200	2.02	3.200	3.23	6.200	14.54	9.20	2.83
0.400	2.02	3.400	3.23	6.400	14.54	9.40	2.83
0.600	2.02	3.600	3.23	6.600	10.50	9.60	2.83
0.800	2.02	3.800	3.23	6.800	6.46	9.80	2.83
1.000	2.02	4.000	3.23	7.000	6.46	10.00	2.83
1.200	2.02	4.200	4.85	7.200	4.85	10.20	1.62
1.400	2.02	4.400	4.85	7.400	4.85	10.40	1.62
1.600	2.02	4.600	5.66	7.600	4.85	10.60	1.62
1.800	2.02	4.800	6.46	7.800	4.85	10.80	1.62
2.000	2.02	5.000	6.46	8.000	4.85	11.00	1.62
2.200	2.42	5.200	9.70	8.200	2.83	11.20	1.62
2.400	2.42	5.400	9.70	8.400	2.83	11.40	1.62
2.600	2.42	5.600	24.24	8.600	2.83	11.60	1.62
2.800	2.42	5.800	55.75	8.800	2.83	11.80	1.62
3.000	2.42	6.000	106.66	9.000	2.83	12.00	1.62

				TOTALS
Max.Eff.Inten.	(mm/hr)=	106.66	113.63	
	over (min)	12.00	12.00	
Storage Coeff.	(min)=	2.46 (ii)	9.17 (ii)	
Unit Hyd. Tpeak	(min)=	12.00	12.00	
Unit Hyd. peak	(cms)=	0.14	0.10	
PEAK FLOW	(cms)=	0.09	0.18	0.263 (iii)
TIME TO PEAK	(hrs)=	6.00	6.00	6.00
RUNOFF VOLUME	(mm)=	79.80	43.17	50.53
TOTAL RAINFALL	(mm)=	80.80	80.80	80.80
RUNOFF COEFFICIENT	=	0.99	0.53	0.63

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

RESERVOIR(0261)

COLE ENGINEERING

Experience Enhancing Excellence

```
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                         0.0000     0.0000    |  0.1470      0.0137
                         0.0530     0.0050    |  0.1700      0.0155
                         0.0700     0.0076    |  0.1900      0.0220
                         0.1150     0.0113    |  0.0000      0.0000

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0252)     1.440     0.263      6.00      50.53
   OUTFLOW: ID= 1 (  0261)     1.440     0.166      6.10      50.51

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 63.26
                  TIME SHIFT OF PEAK FLOW          (min)=  6.00
                  MAXIMUM  STORAGE   USED        (ha.m.)=  0.0153

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

--------------------
| ADD HYD  (  0251)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0209):     5.20    0.779     6.00    44.38
     + ID2= 2 (  0261):     1.44    0.166     6.10    50.51
       ==========================================================
       ID = 3 (  0251):     6.64    0.914     6.00    45.71

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0245)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                         0.0000     0.0000    |  0.3090      0.2876
                         0.0000     0.0000    |  0.3330      0.3838
                         0.1230     0.1102    |  0.3620      0.5200
                         0.2870     0.1971    |  0.0000      0.0000

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0251)     6.640     0.914      6.00      45.71
   OUTFLOW: ID= 1 (  0245)     6.640     0.190      6.60      45.68

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 20.84
                  TIME SHIFT OF PEAK FLOW          (min)= 36.00
                  MAXIMUM  STORAGE   USED        (ha.m.)=  0.1462

--------------------------------------------------------------------------------
--------------------
| ROUTEPIPE(  0212)|     PIPE Number      =   1.00
| IN= 2---> OUT= 1 |     Diameter     (mm)=1650.00
| DT= 12.0 min     |     Length        (m)= 850.00
--------------------     Slope       (m/m)=  0.005
                         Manning n         =  0.013

     <------------------ TRAVEL TIME TABLE ---------------------->
       DEPTH      VOLUME     FLOW RATE    VELOCITY    TRAV.TIME
         (m)     (cu.m.)       (cms)        (m/s)         min
        0.09    .367E+02         0.0         0.80         17.68
        0.17    .102E+03         0.1         1.25         11.33
        0.26    .184E+03         0.3         1.61          8.81
        0.35    .278E+03         0.6         1.91          7.41
        0.43    .382E+03         1.0         2.18          6.51
        0.52    .492E+03         1.4         2.41          5.88
        0.61    .608E+03         1.9         2.61          5.43
        0.69    .727E+03         2.4         2.79          5.08
        0.78    .848E+03         2.9         2.95          4.81
        0.87    .970E+03         3.5         3.08          4.60
        0.96    .109E+04         4.1         3.20          4.43
        1.04    .121E+04         4.7         3.29          4.31
        1.13    .133E+04         5.2         3.36          4.22
        1.22    .144E+04         5.8         3.41          4.15
        1.30    .154E+04         6.2         3.44          4.12
        1.39    .163E+04         6.6         3.43          4.13
        1.48    .172E+04         6.9         3.40          4.17
        1.56    .178E+04         6.9         3.31          4.28
        1.65    .182E+04         6.5         3.02          4.70

                                    <---- hydrograph ---->   <-pipe / channel->
                                  AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                                  (ha)    (cms)   (hrs)   (mm)       (m)      (m/s)
   INFLOW : ID= 2 (  0245)     6.64     0.19     6.60   45.68       0.19       1.31
   OUTFLOW: ID= 1 (  0212)     6.64     0.19     6.80   45.67       0.19       1.30

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

--------------------
| ADD HYD  (  0211)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0212):     6.64    0.188     6.80    45.67
     + ID2= 2 (  0225):    38.86    5.146     6.00    51.81
       ==========================================================
       ID = 3 (  0211):    45.50    5.202     6.00    50.92

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0255)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                         0.0000     0.0000    |  1.6250      1.2448
                         0.0190     0.1627    |  1.6630      1.2997
                         0.0360     0.4306    |  1.8430      1.5816
                         0.0480     0.7217    |  2.1300      2.1197
                         0.1330     0.7718    |  2.9680      2.2465
                         1.0390     0.9773    |  7.5380      2.5741

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0211)     45.499     5.202      6.00      50.92
   OUTFLOW: ID= 1 (  0255)     45.499     1.445      6.70      50.87

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 27.78
                  TIME SHIFT OF PEAK FLOW          (min)= 42.00
                  MAXIMUM  STORAGE   USED        (ha.m.)=  1.1632

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

       V    V   I    SSSSS  U   U    A    L              (v 5.1.2004)
       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 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)\Visual OTTHYMO 5.1\VO2\voin.dat
  Output  filename: C:\Users\jlysecki\AppData\Local\Civica\VH5\a379672b-db33-4372-b5e0-
ba58a07d1417\f560892b-bd3d-433c-8150-5cb456d1ea85\sce
  Summary filename: C:\Users\jlysecki\AppData\Local\Civica\VH5\a379672b-db33-4372-b5e0-
ba58a07d1417\f560892b-bd3d-433c-8150-5cb456d1ea85\sce


DATE: 01/15/2020                          TIME: 04:16:44
```

COLE ENGINEERING

Experience Enhancing Excellence

USER:

COMMENTS: _____

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

READ STORM	Filename: C:\Users\jlysecki\AppData\Local\Temp\1e046b6a-70e8-44fb-adb2-28217afe7b2a\67b6f165
Ptotal= 88.50 mm	Comments: 100YR 12HR SCS

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	2.21	3.25	3.54	6.25	15.93	9.25	3.10
0.50	2.21	3.50	3.54	6.50	15.93	9.50	3.10
0.75	2.21	3.75	3.54	6.75	7.08	9.75	3.10
1.00	2.21	4.00	3.54	7.00	7.08	10.00	3.10
1.25	2.21	4.25	5.31	7.25	5.31	10.25	1.77
1.50	2.21	4.50	5.31	7.50	5.31	10.50	1.77
1.75	2.21	4.75	7.08	7.75	5.31	10.75	1.77
2.00	2.21	5.00	7.08	8.00	5.31	11.00	1.77
2.25	2.65	5.25	10.62	8.25	3.10	11.25	1.77
2.50	2.65	5.50	10.62	8.50	3.10	11.50	1.77
2.75	2.65	5.75	42.48	8.75	3.10	11.75	1.77
3.00	2.65	6.00	116.82	9.00	3.10	12.00	1.77

CALIB STANDHYD (0228)	Area (ha)= 12.56
ID= 1 DT=12.0 min	Total Imp(%)= 54.10 Dir. Conn.(%)= 25.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	6.79	5.77
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	289.37	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 12.0 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
0.200	2.21	3.200	3.54	6.200	15.93	9.20	3.10
0.400	2.21	3.400	3.54	6.400	15.93	9.40	3.10
0.600	2.21	3.600	3.54	6.600	11.51	9.60	3.10
0.800	2.21	3.800	3.54	6.800	7.08	9.80	3.10
1.000	2.21	4.000	3.54	7.000	7.08	10.00	3.10
1.200	2.21	4.200	5.31	7.200	5.31	10.20	1.77
1.400	2.21	4.400	5.31	7.400	5.31	10.40	1.77
1.600	2.21	4.600	6.19	7.600	5.31	10.60	1.77
1.800	2.21	4.800	7.08	7.800	5.31	10.80	1.77
2.000	2.21	5.000	7.08	8.000	5.31	11.00	1.77
2.200	2.65	5.200	10.62	8.200	3.10	11.20	1.77
2.400	2.66	5.400	10.62	8.400	3.10	11.40	1.77
2.600	2.66	5.600	26.55	8.600	3.10	11.60	1.77
2.800	2.66	5.800	61.06	8.800	3.10	11.80	1.77
3.000	2.66	6.000	116.82	9.000	3.10	12.00	1.77

Max.Eff.Inten.	(mm/hr)=	116.82	124.71
	over (min)	12.00	12.00
Storage Coeff.	(min)=	4.54 (ii)	11.00 (ii)
Unit Hyd. Tpeak	(min)=	12.00	12.00
Unit Hyd. peak	(cms)=	0.13	0.09

				TOTALS
PEAK FLOW	(cms)=	0.98	1.54	2.522 (iii)
TIME TO PEAK	(hrs)=	6.00	6.00	6.00
RUNOFF VOLUME	(mm)=	87.50	48.73	58.42
TOTAL RAINFALL	(mm)=	88.50	88.50	88.50
RUNOFF COEFFICIENT	=	0.99	0.55	0.66

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

READ STORM	Filename: C:\Users\jlysecki\AppData\Local\Temp\1e046b6a-70e8-44fb-adb2-28217afe7b2a\67b6f165
Ptotal= 88.50 mm	Comments: 100YR 12HR SCS

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	2.21	3.25	3.54	6.25	15.93	9.25	3.10
0.50	2.21	3.50	3.54	6.50	15.93	9.50	3.10
0.75	2.21	3.75	3.54	6.75	7.08	9.75	3.10
1.00	2.21	4.00	3.54	7.00	7.08	10.00	3.10
1.25	2.21	4.25	5.31	7.25	5.31	10.25	1.77
1.50	2.21	4.50	5.31	7.50	5.31	10.50	1.77
1.75	2.21	4.75	7.08	7.75	5.31	10.75	1.77
2.00	2.21	5.00	7.08	8.00	5.31	11.00	1.77
2.25	2.65	5.25	10.62	8.25	3.10	11.25	1.77
2.50	2.65	5.50	10.62	8.50	3.10	11.50	1.77
2.75	2.65	5.75	42.48	8.75	3.10	11.75	1.77
3.00	2.65	6.00	116.82	9.00	3.10	12.00	1.77

CALIB STANDHYD (0257)	Area (ha)= 3.10
ID= 1 DT=12.0 min	Total Imp(%)= 67.90 Dir. Conn.(%)= 42.90

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	2.10	1.00
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	143.76	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 12.0 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
0.200	2.21	3.200	3.54	6.200	15.93	9.20	3.10
0.400	2.21	3.400	3.54	6.400	15.93	9.40	3.10
0.600	2.21	3.600	3.54	6.600	11.51	9.60	3.10
0.800	2.21	3.800	3.54	6.800	7.08	9.80	3.10
1.000	2.21	4.000	3.54	7.000	7.08	10.00	3.10
1.200	2.21	4.200	5.31	7.200	5.31	10.20	1.77
1.400	2.21	4.400	5.31	7.400	5.31	10.40	1.77
1.600	2.21	4.600	6.19	7.600	5.31	10.60	1.77
1.800	2.21	4.800	7.08	7.800	5.31	10.80	1.77
2.000	2.21	5.000	7.08	8.000	5.31	11.00	1.77
2.200	2.65	5.200	10.62	8.200	3.10	11.20	1.77
2.400	2.66	5.400	10.62	8.400	3.10	11.40	1.77
2.600	2.66	5.600	26.55	8.600	3.10	11.60	1.77
2.800	2.66	5.800	61.06	8.800	3.10	11.80	1.77
3.000	2.66	6.000	116.82	9.000	3.10	12.00	1.77

Max.Eff.Inten.	(mm/hr)=	116.82	140.80

over (min)		12.00	12.00	
Storage Coeff. (min)=		2.98 (ii)	9.14 (ii)	
Unit Hyd. Tpeak (min)=		12.00	12.00	
Unit Hyd. peak (cms)=		0.14	0.10	
				TOTALS
PEAK FLOW	(cms)=	0.43	0.32	0.748 (iii)
TIME TO PEAK	(hrs)=	6.00	6.00	6.00
RUNOFF VOLUME	(mm)=	87.50	50.61	66.44
TOTAL RAINFALL	(mm)=	88.50	88.50	88.50
RUNOFF COEFFICIENT	=	0.99	0.57	0.75

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0258)		AREA	QPEAK	TPEAK	R.V.
		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0228):		12.56	2.522	6.00	58.42
+ ID2= 2 (0257):		3.10	0.748	6.00	66.44
ID = 3 (0258):		15.66	3.270	6.00	60.01

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0243)		OUTFLOW	STORAGE	OUTFLOW	STORAGE
IN= 2---> OUT= 1		(cms)	(ha.m.)	(cms)	(ha.m.)
DT= 12.0 min		0.0000	0.0000	0.1346	0.4241
		0.0096	0.0421	0.1575	0.4697
		0.0159	0.0886	0.1823	0.5165
		0.0203	0.1399	0.2088	0.5647
		0.0228	0.1768	0.2369	0.6142
		0.0250	0.2150	0.2514	0.6394
		0.0628	0.2544	0.2663	0.6650
		0.0835	0.2950	0.2816	0.6910
		0.0991	0.3368	0.2997	0.7172
		0.1144	0.3798	0.3113	0.7439

	AREA	QPEAK	TPEAK	R.V.
	(ha)	(cms)	(hrs)	(mm)
INFLOW : ID= 2 (0258)	15.660	3.270	6.00	60.01
OUTFLOW: ID= 1 (0243)	15.660	0.244	7.20	59.94

PEAK FLOW REDUCTION [Qout/Qin](%)= 7.45
TIME SHIFT OF PEAK FLOW (min)= 72.00
MAXIMUM STORAGE USED (ha.m.)= 0.6270

ROUTEPIPE(0184)			
IN= 2---> OUT= 1	Pipe Number	=	1.00
DT= 12.0 min	Diameter	(mm)=	1650.00
	Length	(m)=	500.00
	Slope	(m/m)=	0.005
	Manning n	=	0.013

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

DEPTH (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME min
0.09	.216E+02	0.0	0.80	10.40
0.17	.600E+02	0.1	1.25	6.67
0.26	.108E+03	0.3	1.61	5.18
0.35	.164E+03	0.6	1.91	4.36
0.43	.225E+03	1.0	2.18	3.83
0.52	.290E+03	1.4	2.41	3.46
0.61	.358E+03	1.9	2.61	3.19
0.69	.428E+03	2.4	2.79	2.99
0.78	.499E+03	2.9	2.95	2.83
0.87	.570E+03	3.5	3.08	2.70
0.96	.642E+03	4.1	3.20	2.61
1.04	.712E+03	4.7	3.29	2.53
1.13	.780E+03	5.2	3.36	2.48
1.22	.844E+03	5.8	3.41	2.44
1.30	.905E+03	6.2	3.44	2.43
1.39	.961E+03	6.6	3.43	2.43
1.48	.101E+04	6.9	3.40	2.45
1.56	.105E+04	6.9	3.31	2.52
1.65	.107E+04	6.5	3.02	2.76

<---- hydrograph ----> <-pipe / channel->

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 2 (0243)	15.66	0.24	7.20	59.94	0.21	1.40
OUTFLOW: ID= 1 (0184)	15.66	0.24	7.20	59.93	0.21	1.40

READ STORM	Filename: C:\Users\jlysecki\AppData\Local\Temp\1e046b6a-70e8-44fb-adb2-28217afe7b2a\67b6f165
Ptotal= 88.50 mm	Comments: 100YR 12HR SCS

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	2.21	3.25	3.54	6.25	15.93	9.25	3.10
0.50	2.21	3.50	3.54	6.50	15.93	9.50	3.10
0.75	2.21	3.75	3.54	6.75	7.08	9.75	3.10
1.00	2.21	4.00	3.54	7.00	7.08	10.00	3.10
1.25	2.21	4.25	5.31	7.25	5.31	10.25	1.77
1.50	2.21	4.50	5.31	7.50	5.31	10.50	1.77
1.75	2.21	4.75	7.08	7.75	5.31	10.75	1.77
2.00	2.21	5.00	7.08	8.00	5.31	11.00	1.77
2.25	2.65	5.25	10.62	8.25	3.10	11.25	1.77
2.50	2.65	5.50	10.62	8.50	3.10	11.50	1.77
2.75	2.65	5.75	42.48	8.75	3.10	11.75	1.77
3.00	2.65	6.00	116.82	9.00	3.10	12.00	1.77

CALIB			
STANDHYD (0229)	Area	(ha)=	12.13
ID= 1 DT=12.0 min	Total Imp(%)=	54.50	Dir. Conn.(%)= 19.70

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	6.61	5.52
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	284.37	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 12.0 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
0.200	2.21	3.200	3.54	6.200	15.93	9.20	3.10
0.400	2.21	3.400	3.54	6.400	15.93	9.40	3.10
0.600	2.21	3.600	3.54	6.600	11.51	9.60	3.10
0.800	2.21	3.800	3.54	6.800	7.08	9.80	3.10
1.000	2.21	4.000	3.54	7.000	7.08	10.00	3.10
1.200	2.21	4.200	5.31	7.200	5.31	10.20	1.77
1.400	2.21	4.400	5.31	7.400	5.31	10.40	1.77
1.600	2.21	4.600	6.19	7.600	5.31	10.60	1.77
1.800	2.21	4.800	7.08	7.800	5.31	10.80	1.77
2.000	2.21	5.000	7.08	8.000	5.31	11.00	1.77
2.200	2.65	5.200	10.62	8.200	3.10	11.20	1.77
2.400	2.66	5.400	10.62	8.400	3.10	11.40	1.77
2.600	2.66	5.600	26.55	8.600	3.10	11.60	1.77
2.800	2.66	5.800	61.06	8.800	3.10	11.80	1.77

3.000	2.66	6.000	116.82	9.000	3.10	12.00	1.77

Max.Eff.Inten.(mm/hr)=		116.82	139.23	
over (min)		12.00	12.00	
Storage Coeff. (min)=		4.49 (ii)	10.68 (ii)	
Unit Hyd. Tpeak (min)=		12.00	12.00	
Unit Hyd. peak (cms)=		0.13	0.10	
				TOTALS
PEAK FLOW	(cms)=	0.75	1.67	2.415 (iii)
TIME TO PEAK	(hrs)=	6.00	6.00	6.00
RUNOFF VOLUME	(mm)=	87.50	50.44	57.74
TOTAL RAINFALL	(mm)=	88.50	88.50	88.50
RUNOFF COEFFICIENT	=	0.99	0.57	0.65

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
YOU SHOULD CONSIDER SPLITTING THE AREA.

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0196)

1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0184):	15.66	0.244	7.20	59.93
+ ID2= 2 (0229):	12.13	2.415	6.00	57.74
ID = 3 (0196):	27.79	2.477	6.00	58.98

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0256)
IN= 2---> OUT= 1
DT= 12.0 min

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.2761	0.3332
0.0090	0.0385	0.3101	0.3536
0.0147	0.0812	0.3454	0.3743
0.0199	0.1456	0.3818	0.3952
0.0210	0.1631	0.4194	0.4165
0.0987	0.2172	0.4581	0.4381
0.1306	0.2358	0.4979	0.4600
0.1761	0.2739	0.5806	0.5047
0.2120	0.2934	0.6234	0.5275
0.2433	0.3131	0.7121	0.5742

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0196)	27.790	2.477	6.00	58.98
OUTFLOW: ID= 1 (0256)	27.790	0.483	6.80	58.94

PEAK FLOW REDUCTION [Qout/Qin](%)= 19.48
TIME SHIFT OF PEAK FLOW (min)= 48.00
MAXIMUM STORAGE USED (ha.m.)= 0.4519

READ STORM | Filename: C:\Users\jlysecki\AppData\Local\Temp\1e046b6a-70e8-44fb-adb2-28217afe7b2a\67b6f165
Ptotal= 88.50 mm | Comments: 100YR 12HR SCS

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	2.21	3.25	3.54	6.25	15.93	9.25	3.10
0.50	2.21	3.50	3.54	6.50	15.93	9.50	3.10
0.75	2.21	3.75	3.54	6.75	7.08	9.75	3.10
1.00	2.21	4.00	3.54	7.00	7.08	10.00	3.10
1.25	2.21	4.25	5.31	7.25	5.31	10.25	1.77
1.50	2.21	4.50	5.31	7.50	5.31	10.50	1.77
1.75	2.21	4.75	7.08	7.75	5.31	10.75	1.77
2.00	2.21	5.00	7.08	8.00	5.31	11.00	1.77
2.25	2.65	5.25	10.62	8.25	3.10	11.25	1.77
2.50	2.65	5.50	10.62	8.50	3.10	11.50	1.77
2.75	2.65	5.75	42.48	8.75	3.10	11.75	1.77
3.00	2.65	6.00	116.82	9.00	3.10	12.00	1.77

CALIB
STANDHYD (0230)| Area (ha)= 20.35
ID= 1 DT=12.0 min | Total Imp(%)= 53.70 Dir. Conn.(%)= 32.40

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	10.93	9.42
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	368.33	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 12.0 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
0.200	2.21	3.200	3.54	6.200	15.93	9.20	3.10
0.400	2.21	3.400	3.54	6.400	15.93	9.40	3.10
0.600	2.21	3.600	3.54	6.600	11.51	9.60	3.10
0.800	2.21	3.800	3.54	6.800	7.08	9.80	3.10
1.000	2.21	4.000	3.54	7.000	7.08	10.00	3.10
1.200	2.21	4.200	5.31	7.200	5.31	10.20	1.77
1.400	2.21	4.400	5.31	7.400	5.31	10.40	1.77
1.600	2.21	4.600	6.19	7.600	5.31	10.60	1.77
1.800	2.21	4.800	7.08	7.800	5.31	10.80	1.77
2.000	2.21	5.000	7.08	8.000	5.31	11.00	1.77
2.200	2.65	5.200	10.62	8.200	3.10	11.20	1.77
2.400	2.66	5.400	10.62	8.400	3.10	11.40	1.77
2.600	2.66	5.600	26.55	8.600	3.10	11.60	1.77
2.800	2.66	5.800	61.06	8.800	3.10	11.80	1.77
3.000	2.66	6.000	116.82	9.000	3.10	12.00	1.77

Max.Eff.Inten.(mm/hr)=		116.82	105.82	
over (min)		12.00	24.00	
Storage Coeff. (min)=		5.25 (ii)	12.15 (ii)	
Unit Hyd. Tpeak (min)=		12.00	24.00	
Unit Hyd. peak (cms)=		0.13	0.07	
				TOTALS
PEAK FLOW	(cms)=	2.03	1.66	3.322 (iii)
TIME TO PEAK	(hrs)=	6.00	6.20	6.00
RUNOFF VOLUME	(mm)=	87.50	46.20	59.58
TOTAL RAINFALL	(mm)=	88.50	88.50	88.50
RUNOFF COEFFICIENT	=	0.99	0.52	0.67

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0224)

1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0230):	20.35	3.322	6.00	59.58
+ ID2= 2 (0256):	27.79	0.483	6.80	58.94
ID = 3 (0224):	48.14	3.517	6.00	59.21

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0253)				
IN= 2---> OUT= 1				
DT= 12.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.6390	0.9848
	0.0270	0.1457	0.9700	1.2900
	0.0430	0.3152	1.1040	1.7480
	0.0530	0.4653	3.3100	1.9350
	0.3280	0.6677	11.3140	2.2662

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0224)	48.140	3.517	6.00	59.21
OUTFLOW: ID= 1 (0253)	48.140	0.625	8.20	59.18

PEAK FLOW REDUCTION [Qout/Qin](%)= 17.77
TIME SHIFT OF PEAK FLOW (min)=132.00
MAXIMUM STORAGE USED (ha.m.)= 0.9706

READ STORM	Filename: C:\Users\jlysecki\AppData\Local\Temp\1e046b6a-70e8-44fb-adb2-28217afe7b2a\67b6f165
Ptotal= 88.50 mm	Comments: 100YR 12HR SCS

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	2.21	3.25	3.54	6.25	15.93	9.25	3.10
0.50	2.21	3.50	3.54	6.50	15.93	9.50	3.10
0.75	2.21	3.75	3.54	6.75	7.08	9.75	3.10
1.00	2.21	4.00	3.54	7.00	7.08	10.00	3.10
1.25	2.21	4.25	5.31	7.25	5.31	10.25	1.77
1.50	2.21	4.50	5.31	7.50	5.31	10.50	1.77
1.75	2.21	4.75	7.08	7.75	5.31	10.75	1.77
2.00	2.21	5.00	7.08	8.00	5.31	11.00	1.77
2.25	2.65	5.25	10.62	8.25	3.10	11.25	1.77
2.50	2.65	5.50	10.62	8.50	3.10	11.50	1.77
2.75	2.65	5.75	42.48	8.75	3.10	11.75	1.77
3.00	2.65	6.00	116.82	9.00	3.10	12.00	1.77

CALIB	
STANDHYD (0160)	Area (ha)= 1.30
ID= 1 DT=12.0 min	Total Imp(%)= 50.70 Dir. Conn.(%)= 22.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.66	0.64
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	93.09	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 12.0 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
0.200	2.21	3.200	3.54	6.200	15.93	9.20	3.10
0.400	2.21	3.400	3.54	6.400	15.93	9.40	3.10
0.600	2.21	3.600	3.54	6.600	11.51	9.60	3.10
0.800	2.21	3.800	3.54	6.800	7.08	9.80	3.10
1.000	2.21	4.000	3.54	7.000	7.08	10.00	3.10
1.200	2.21	4.200	5.31	7.200	5.31	10.20	1.77
1.400	2.21	4.400	5.31	7.400	5.31	10.40	1.77
1.600	2.21	4.600	6.19	7.600	5.31	10.60	1.77
1.800	2.21	4.800	7.08	7.800	5.31	10.80	1.77
2.000	2.21	5.000	7.08	8.000	5.31	11.00	1.77
2.200	2.65	5.200	10.62	8.200	3.10	11.20	1.77
2.400	2.66	5.400	10.62	8.400	3.10	11.40	1.77
2.600	2.66	5.600	26.55	8.600	3.10	11.60	1.77
2.800	2.66	5.800	61.06	8.800	3.10	11.80	1.77
3.000	2.66	6.000	116.82	9.000	3.10	12.00	1.77

			TOTALS
Max.Eff.Inten.(mm/hr)=	116.82	119.03	
over (min)	12.00	12.00	
Storage Coeff. (min)=	2.30 (ii)	8.88 (ii)	
Unit Hyd. Tpeak (min)=	12.00	12.00	
Unit Hyd. peak (cms)=	0.14	0.10	
PEAK FLOW (cms)=	0.09	0.18	0.268 (iii)
TIME TO PEAK (hrs)=	6.00	6.00	6.00
RUNOFF VOLUME (mm)=	87.50	48.00	56.69
TOTAL RAINFALL (mm)=	88.50	88.50	88.50
RUNOFF COEFFICIENT =	0.99	0.54	0.64

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

DUHYD (0183)				
Inlet Cap.= 0.152				
#of Inlets= 1				
Total(cms)= 0.2	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
TOTAL HYD.(ID= 1):	1.30	0.27	6.00	56.69
MAJOR SYS.(ID= 2):	0.15	0.12	6.00	56.69
MINOR SYS.(ID= 3):	1.15	0.15	6.00	56.69

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

READ STORM	Filename: C:\Users\jlysecki\AppData\Local\Temp\1e046b6a-70e8-44fb-adb2-28217afe7b2a\67b6f165
Ptotal= 88.50 mm	Comments: 100YR 12HR SCS

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	2.21	3.25	3.54	6.25	15.93	9.25	3.10
0.50	2.21	3.50	3.54	6.50	15.93	9.50	3.10
0.75	2.21	3.75	3.54	6.75	7.08	9.75	3.10
1.00	2.21	4.00	3.54	7.00	7.08	10.00	3.10
1.25	2.21	4.25	5.31	7.25	5.31	10.25	1.77
1.50	2.21	4.50	5.31	7.50	5.31	10.50	1.77
1.75	2.21	4.75	7.08	7.75	5.31	10.75	1.77
2.00	2.21	5.00	7.08	8.00	5.31	11.00	1.77
2.25	2.65	5.25	10.62	8.25	3.10	11.25	1.77
2.50	2.65	5.50	10.62	8.50	3.10	11.50	1.77
2.75	2.65	5.75	42.48	8.75	3.10	11.75	1.77
3.00	2.65	6.00	116.82	9.00	3.10	12.00	1.77

CALIB	
STANDHYD (0193)	Area (ha)= 1.21
ID= 1 DT=12.0 min	Total Imp(%)= 49.30 Dir. Conn.(%)= 20.10

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.60	0.61
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	89.81	40.00

Mannings n = 0.013 0.250

NOTE: RAINFALL WAS TRANSFORMED TO 12.0 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
0.200	2.21	3.200	3.54	6.200	15.93	9.20	3.10
0.400	2.21	3.400	3.54	6.400	15.93	9.40	3.10
0.600	2.21	3.600	3.54	6.600	11.51	9.60	3.10
0.800	2.21	3.800	3.54	6.800	7.08	9.80	3.10
1.000	2.21	4.000	3.54	7.000	7.08	10.00	3.10
1.200	2.21	4.200	5.31	7.200	5.31	10.20	1.77
1.400	2.21	4.400	5.31	7.400	5.31	10.40	1.77
1.600	2.21	4.600	6.19	7.600	5.31	10.60	1.77
1.800	2.21	4.800	7.08	7.800	5.31	10.80	1.77
2.000	2.21	5.000	7.08	8.000	5.31	11.00	1.77
2.200	2.65	5.200	10.62	8.200	3.10	11.20	1.77
2.400	2.66	5.400	10.62	8.400	3.10	11.40	1.77
2.600	2.66	5.600	26.55	8.600	3.10	11.60	1.77
2.800	2.66	5.800	61.06	8.800	3.10	11.80	1.77
3.000	2.66	6.000	116.82	9.000	3.10	12.00	1.77

				TOTALS
Max.Eff.Inten.(mm/hr)=		116.82	118.35	
over (min)		12.00	12.00	
Storage Coeff. (min)=		2.25 (ii)	8.85 (ii)	
Unit Hyd. Tpeak (min)=		12.00	12.00	
Unit Hyd. peak (cms)=		0.14	0.11	
PEAK FLOW	(cms)=	0.08	0.17	0.246 (iii)
TIME TO PEAK	(hrs)=	6.00	6.00	6.00
RUNOFF VOLUME	(mm)=	87.50	47.92	55.87
TOTAL RAINFALL	(mm)=	88.50	88.50	88.50
RUNOFF COEFFICIENT	=	0.99	0.54	0.63

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

DUHYD (0227)
Inlet Cap.= 0.120
#of Inlets= 1
Total(cms)= 0.1

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
TOTAL HYD.(ID= 1):	1.21	0.25	6.00	55.87
MAJOR SYS.(ID= 2):	0.16	0.13	6.00	55.87
MINOR SYS.(ID= 3):	1.05	0.12	6.00	55.87

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

READ STORM | Filename: C:\Users\jlysecki\AppData\Local\Temp\1e046b6a-70e8-44fb-adb2-28217afe7b2a\67b6f165
Ptotal= 88.50 mm | Comments: 100YR 12HR SCS

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	2.21	3.25	3.54	6.25	15.93	9.25	3.10
0.50	2.21	3.50	3.54	6.50	15.93	9.50	3.10
0.75	2.21	3.75	3.54	6.75	7.08	9.75	3.10
1.00	2.21	4.00	3.54	7.00	7.08	10.00	3.10
1.25	2.21	4.25	5.31	7.25	5.31	10.25	1.77
1.50	2.21	4.50	5.31	7.50	5.31	10.50	1.77
1.75	2.21	4.75	7.08	7.75	5.31	10.75	1.77
2.00	2.21	5.00	7.08	8.00	5.31	11.00	1.77
2.25	2.65	5.25	10.62	8.25	3.10	11.25	1.77
2.50	2.65	5.50	10.62	8.50	3.10	11.50	1.77
2.75	2.65	5.75	42.48	8.75	3.10	11.75	1.77
3.00	2.65	6.00	116.82	9.00	3.10	12.00	1.77

CALIB
STANDHYD (0206) | Area (ha)= 38.60
ID= 1 DT=12.0 min | Total Imp(%)= 54.70 Dir. Conn.(%)= 23.20

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	21.11	17.49
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	507.28	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 12.0 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
0.200	2.21	3.200	3.54	6.200	15.93	9.20	3.10
0.400	2.21	3.400	3.54	6.400	15.93	9.40	3.10
0.600	2.21	3.600	3.54	6.600	11.51	9.60	3.10
0.800	2.21	3.800	3.54	6.800	7.08	9.80	3.10
1.000	2.21	4.000	3.54	7.000	7.08	10.00	3.10
1.200	2.21	4.200	5.31	7.200	5.31	10.20	1.77
1.400	2.21	4.400	5.31	7.400	5.31	10.40	1.77
1.600	2.21	4.600	6.19	7.600	5.31	10.60	1.77
1.800	2.21	4.800	7.08	7.800	5.31	10.80	1.77
2.000	2.21	5.000	7.08	8.000	5.31	11.00	1.77
2.200	2.65	5.200	10.62	8.200	3.10	11.20	1.77
2.400	2.66	5.400	10.62	8.400	3.10	11.40	1.77
2.600	2.66	5.600	26.55	8.600	3.10	11.60	1.77
2.800	2.66	5.800	61.06	8.800	3.10	11.80	1.77
3.000	2.66	6.000	116.82	9.000	3.10	12.00	1.77

				TOTALS
Max.Eff.Inten.(mm/hr)=		116.82	131.49	
over (min)		12.00	24.00	
Storage Coeff. (min)=		6.36 (ii)	12.69 (ii)	
Unit Hyd. Tpeak (min)=		12.00	24.00	
Unit Hyd. peak (cms)=		0.12	0.07	
PEAK FLOW	(cms)=	2.67	3.79	5.643 (iii)
TIME TO PEAK	(hrs)=	6.00	6.20	6.00
RUNOFF VOLUME	(mm)=	87.50	49.55	58.35
TOTAL RAINFALL	(mm)=	88.50	88.50	88.50
RUNOFF COEFFICIENT	=	0.99	0.56	0.66

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0225)
1 + 2 = 3

		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0183):		0.15	0.116	6.00	56.69
+ ID2= 2 (0206):		38.60	5.643	6.00	58.35
ID = 3 (0225):		38.75	5.759	6.00	58.35

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

COLE ENGINEERING

Experience Enhancing Excellence

```
--------------------
| ADD HYD  (  0225)|
|   3 +  2 =  1    |          AREA     QPEAK     TPEAK      R.V.
--------------------           (ha)     (cms)     (hrs)      (mm)
       ID1= 3 (  0225):     38.75    5.759      6.00     58.35
     + ID2= 2 (  0227):      0.16    0.126      6.00     55.87
       ==============================================
       ID = 1 (  0225):     38.91    5.885      6.00     58.34

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
|    READ STORM    |    Filename: C:\Users\jlysecki\AppD
|                  |              ata\Local\Temp\
|                  |              1e046b6a-70e8-44fb-adb2-28217afe7b2a\67b6f165
| Ptotal= 88.50 mm |    Comments: 100YR 12HR SCS
--------------------
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.25    2.21 |  3.25    3.54 |   6.25   15.93 |  9.25    3.10
                0.50    2.21 |  3.50    3.54 |   6.50   15.93 |  9.50    3.10
                0.75    2.21 |  3.75    3.54 |   6.75    7.08 |  9.75    3.10
                1.00    2.21 |  4.00    3.54 |   7.00    7.08 | 10.00    3.10
                1.25    2.21 |  4.25    5.31 |   7.25    5.31 | 10.25    1.77
                1.50    2.21 |  4.50    5.31 |   7.50    5.31 | 10.50    1.77
                1.75    2.21 |  4.75    7.08 |   7.75    5.31 | 10.75    1.77
                2.00    2.21 |  5.00    7.08 |   8.00    5.31 | 11.00    1.77
                2.25    2.65 |  5.25   10.62 |   8.25    3.10 | 11.25    1.77
                2.50    2.65 |  5.50   10.62 |   8.50    3.10 | 11.50    1.77
                2.75    2.65 |  5.75   42.48 |   8.75    3.10 | 11.75    1.77
                3.00    2.65 |  6.00  116.82 |   9.00    3.10 | 12.00    1.77

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

--------------------
| CALIB            |
| STANDHYD (  0209)|   Area     (ha)=   5.20
|ID= 1 DT=12.0 min |   Total Imp(%)=  31.60   Dir. Conn.(%)=  19.40
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.64         3.56
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     186.19        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO  12.0 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
               0.200    2.21 | 3.200    3.54 | 6.200   15.93 |  9.20    3.10
               0.400    2.21 | 3.400    3.54 | 6.400   15.93 |  9.40    3.10
               0.600    2.21 | 3.600    3.54 | 6.600   11.51 |  9.60    3.10
               0.800    2.21 | 3.800    3.54 | 6.800    7.08 |  9.80    3.10
               1.000    2.21 | 4.000    3.54 | 7.000    7.08 | 10.00    3.10
               1.200    2.21 | 4.200    5.31 | 7.200    5.31 | 10.20    1.77
               1.400    2.21 | 4.400    5.31 | 7.400    5.31 | 10.40    1.77
               1.600    2.21 | 4.600    6.19 | 7.600    5.31 | 10.60    1.77
               1.800    2.21 | 4.800    7.08 | 7.800    5.31 | 10.80    1.77
               2.000    2.21 | 5.000    7.08 | 8.000    5.31 | 11.00    1.77
               2.200    2.65 | 5.200   10.62 | 8.200    3.10 | 11.20    1.77
               2.400    2.66 | 5.400   10.62 | 8.400    3.10 | 11.40    1.77
               2.600    2.66 | 5.600   26.55 | 8.600    3.10 | 11.60    1.77
               2.800    2.66 | 5.800   61.06 | 8.800    3.10 | 11.80    1.77
               3.000    2.66 | 6.000  116.82 | 9.000    3.10 | 12.00    1.77

     Max.Eff.Inten.(mm/hr)=     116.82        76.56
                over (min)        12.00        12.00
     Storage Coeff.  (min)=       3.49 (ii)   11.34 (ii)
     Unit Hyd. Tpeak (min)=      12.00        12.00
     Unit Hyd. peak  (cms)=       0.14         0.09
                                                    *TOTALS*
     PEAK FLOW       (cms)=       0.32         0.57          0.895 (iii)
     TIME TO PEAK    (hrs)=       6.00         6.00           6.00
     RUNOFF VOLUME    (mm)=      87.50        41.34          50.29
     TOTAL RAINFALL   (mm)=      88.50        88.50          88.50
     RUNOFF COEFFICIENT   =       0.99         0.47           0.57

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

--------------------
|    READ STORM    |    Filename: C:\Users\jlysecki\AppD
|                  |              ata\Local\Temp\
|                  |              1e046b6a-70e8-44fb-adb2-28217afe7b2a\67b6f165
| Ptotal= 88.50 mm |    Comments: 100YR 12HR SCS
--------------------
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.25    2.21 |  3.25    3.54 |   6.25   15.93 |  9.25    3.10
                0.50    2.21 |  3.50    3.54 |   6.50   15.93 |  9.50    3.10
                0.75    2.21 |  3.75    3.54 |   6.75    7.08 |  9.75    3.10
                1.00    2.21 |  4.00    3.54 |   7.00    7.08 | 10.00    3.10
                1.25    2.21 |  4.25    5.31 |   7.25    5.31 | 10.25    1.77
                1.50    2.21 |  4.50    5.31 |   7.50    5.31 | 10.50    1.77
                1.75    2.21 |  4.75    7.08 |   7.75    5.31 | 10.75    1.77
                2.00    2.21 |  5.00    7.08 |   8.00    5.31 | 11.00    1.77
                2.25    2.65 |  5.25   10.62 |   8.25    3.10 | 11.25    1.77
                2.50    2.65 |  5.50   10.62 |   8.50    3.10 | 11.50    1.77
                2.75    2.65 |  5.75   42.48 |   8.75    3.10 | 11.75    1.77
                3.00    2.65 |  6.00  116.82 |   9.00    3.10 | 12.00    1.77

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

--------------------
| CALIB            |
| STANDHYD (  0252)|   Area     (ha)=   1.44
|ID= 1 DT=12.0 min |   Total Imp(%)=  52.40   Dir. Conn.(%)=  20.10
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.75         0.69
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      97.98        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO  12.0 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
               0.200    2.21 | 3.200    3.54 | 6.200   15.93 |  9.20    3.10
               0.400    2.21 | 3.400    3.54 | 6.400   15.93 |  9.40    3.10
               0.600    2.21 | 3.600    3.54 | 6.600   11.51 |  9.60    3.10
               0.800    2.21 | 3.800    3.54 | 6.800    7.08 |  9.80    3.10
               1.000    2.21 | 4.000    3.54 | 7.000    7.08 | 10.00    3.10
               1.200    2.21 | 4.200    5.31 | 7.200    5.31 | 10.20    1.77
               1.400    2.21 | 4.400    5.31 | 7.400    5.31 | 10.40    1.77
               1.600    2.21 | 4.600    6.19 | 7.600    5.31 | 10.60    1.77
               1.800    2.21 | 4.800    7.08 | 7.800    5.31 | 10.80    1.77
               2.000    2.21 | 5.000    7.08 | 8.000    5.31 | 11.00    1.77
               2.200    2.65 | 5.200   10.62 | 8.200    3.10 | 11.20    1.77
               2.400    2.66 | 5.400   10.62 | 8.400    3.10 | 11.40    1.77
               2.600    2.66 | 5.600   26.55 | 8.600    3.10 | 11.60    1.77
               2.800    2.66 | 5.800   61.06 | 8.800    3.10 | 11.80    1.77
               3.000    2.66 | 6.000  116.82 | 9.000    3.10 | 12.00    1.77

     Max.Eff.Inten.(mm/hr)=     116.82       129.63
```

COLE ENGINEERING

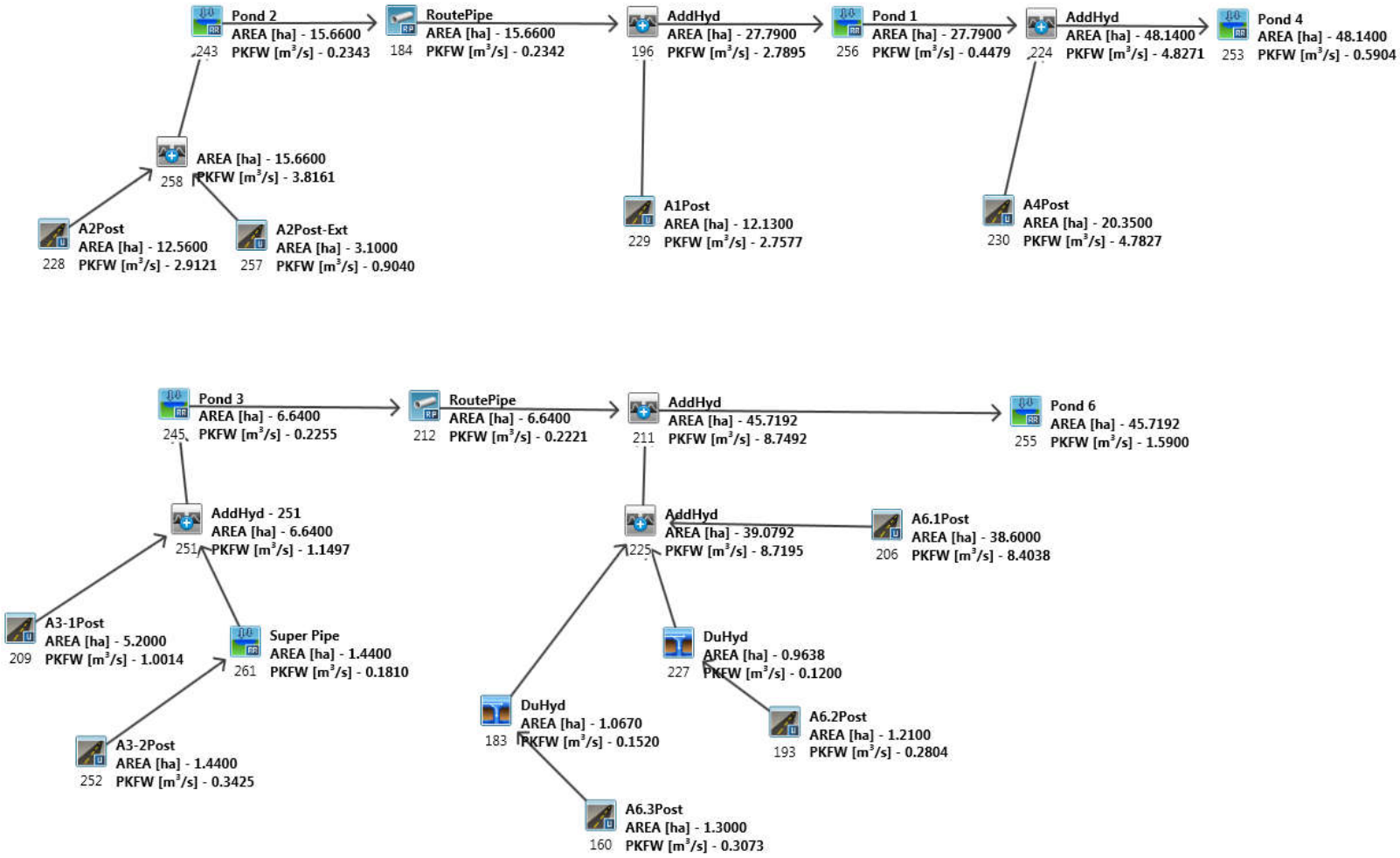
Experience Enhancing Excellence

```
                over (min)       12.00        12.00
     Storage Coeff.  (min)=       2.37 (ii)    8.73 (ii)
     Unit Hyd. Tpeak (min)=      12.00        12.00
     Unit Hyd. peak  (cms)=       0.14         0.11
                                                  *TOTALS*
     PEAK FLOW       (cms)=       0.09         0.21          0.300 (iii)
     TIME TO PEAK    (hrs)=       6.00         6.00          6.00
     RUNOFF VOLUME    (mm)=      87.50        49.33         57.00
     TOTAL RAINFALL   (mm)=      88.50        88.50         88.50
     RUNOFF COEFFICIENT   =       0.99         0.56          0.64

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
-------------------
| RESERVOIR(  0261)|
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
-------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                         0.0000     0.0000   |   0.1470     0.0137
                         0.0530     0.0050   |   0.1700     0.0155
                         0.0700     0.0076   |   0.1900     0.0220
                         0.1150     0.0113   |   0.0000     0.0000

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0252)     1.440     0.300      6.00      57.00
   OUTFLOW: ID= 1 (  0261)     1.440     0.176      6.10      56.98

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 58.72
                  TIME SHIFT OF PEAK FLOW          (min)=  6.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0178

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

-------------------
| ADD HYD  (  0251)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)     (cms)    (hrs)     (mm)
       ID1= 1 (  0209):     5.20   0.895     6.00    50.29
     + ID2= 2 (  0261):     1.44   0.176     6.10    56.98
       ================================================
       ID = 3 (  0251):     6.64   1.052     6.00    51.74

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
-------------------
| RESERVOIR(  0245)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
-------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                         0.0000     0.0000   |   0.3090     0.2876
                         0.0000     0.0000   |   0.3330     0.3838
                         0.1230     0.1102   |   0.3620     0.5200
                         0.2870     0.1971   |   0.0000     0.0000

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0251)     6.640     1.052      6.00      51.74
   OUTFLOW: ID= 1 (  0245)     6.640     0.225      6.60      51.71

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 21.38
                  TIME SHIFT OF PEAK FLOW          (min)= 36.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.1642

--------------------------------------------------------------------------------
-------------------
| ROUTEPIPE(  0212)|     PIPE Number     =   1.00
| IN= 2---> OUT= 1 |     Diameter    (mm)=1650.00
| DT= 12.0 min     |     Length       (m)= 850.00
-------------------      Slope       (m/m)=  0.005
                         Manning n        =  0.013

     <----------------- TRAVEL TIME TABLE ------------------->
       DEPTH      VOLUME     FLOW RATE     VELOCITY    TRAV.TIME
         (m)      (cu.m.)       (cms)        (m/s)        min
        0.09     .367E+02        0.0         0.80        17.68
        0.17     .102E+03        0.1         1.25        11.33
        0.26     .184E+03        0.3         1.61         8.81
        0.35     .278E+03        0.6         1.91         7.41
        0.43     .382E+03        1.0         2.18         6.51
        0.52     .492E+03        1.4         2.41         5.88
        0.61     .608E+03        1.9         2.61         5.43
        0.69     .727E+03        2.4         2.79         5.08
        0.78     .848E+03        2.9         2.95         4.81
        0.87     .970E+03        3.5         3.08         4.60
        0.96     .109E+04        4.1         3.20         4.43
        1.04     .121E+04        4.7         3.29         4.31
        1.13     .133E+04        5.2         3.36         4.22
        1.22     .144E+04        5.8         3.41         4.15
        1.30     .154E+04        6.2         3.44         4.12
        1.39     .163E+04        6.6         3.43         4.13
        1.48     .172E+04        6.9         3.40         4.17
        1.56     .178E+04        6.9         3.31         4.28
        1.65     .182E+04        6.5         3.02         4.70

                                     <---- hydrograph ---->   <-pipe / channel->
                                AREA    QPEAK    TPEAK   R.V.   MAX DEPTH  MAX VEL
                                (ha)    (cms)    (hrs)   (mm)       (m)      (m/s)
   INFLOW : ID= 2 (  0245)     6.64     0.22     6.60  51.71      0.21      1.36
   OUTFLOW: ID= 1 (  0212)     6.64     0.22     6.80  51.70      0.20      1.36

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

-------------------
| ADD HYD  (  0211)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)     (cms)    (hrs)     (mm)
       ID1= 1 (  0212):     6.64   0.221     6.80    51.70
     + ID2= 2 (  0225):    38.91   5.885     6.00    58.34
       ================================================
       ID = 3 (  0211):    45.55   5.951     6.00    57.37

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
-------------------
| RESERVOIR(  0255)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
-------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                         0.0000     0.0000   |   1.6250     1.2448
                         0.0190     0.1627   |   1.6630     1.2997
                         0.0360     0.4306   |   1.8430     1.5816
                         0.0480     0.7217   |   2.1300     2.1197
                         0.1330     0.7718   |   2.9680     2.2465
                         1.0390     0.9773   |   7.5380     2.5741

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0211)     45.550     5.951      6.00      57.37
   OUTFLOW: ID= 1 (  0255)     45.550     1.656      6.70      57.32

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 27.83
                  TIME SHIFT OF PEAK FLOW          (min)= 42.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  1.2910

--------------------------------------------------------------------------------
FINISH
================================================================================
```

COLE ENGINEERING
Experience Enhancing Excellence

L09-301 – Marianneville – Glenway Estates (Phase 2)
2, 5, 10, 25, 50 & 100-Year 4 Hour Chicago Storm
Proposed Condition Model Output
January 2020

VO5 Model Schematic



COLE ENGINEERING

Experience Enhancing Excellence

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

       V    V   I    SSSSS  U   U    A    L              (v 5.1.2004)
       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 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)\Visual OTTHYMO 5.1\VO2\voin.dat
  Output  filename: C:\Users\jlysecki\AppData\Local\Civica\VH5\a379672b-db33-4372-b5e0-
ba58a07d1417\e2e9470f-ad62-4647-870d-6b54f876d832\sce
  Summary filename: C:\Users\jlysecki\AppData\Local\Civica\VH5\a379672b-db33-4372-b5e0-
ba58a07d1417\e2e9470f-ad62-4647-870d-6b54f876d832\sce


DATE: 01/15/2020                          TIME: 04:24:46

USER:


COMMENTS: _____________________________________________________


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

--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 648.000
| Ptotal= 34.82 mm |                          B=   4.000
--------------------                          C=   0.784
                       used in:   INTENSITY =  A / (t + B)^C

                       Duration of storm  =  4.00 hrs
                       Storm time step    = 10.00 min
                       Time to peak ratio =  0.33

                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.17    2.27 |  1.17   17.18 |'  2.17    5.25 |  3.17    2.69
                0.33    2.60 |  1.33   81.85 |'  2.33    4.49 |  3.33    2.50
                0.50    3.04 |  1.50   22.51 |'  2.50    3.93 |  3.50    2.34
                0.67    3.72 |  1.67   11.87 |'  2.67    3.51 |  3.67    2.21
                0.83    4.86 |  1.83    8.23 |'  2.83    3.18 |  3.83    2.08
                1.00    7.30 |  2.00    6.38 |'  3.00    2.91 |  4.00    1.98


------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0228)|   Area     (ha)=  12.56
|ID= 1 DT=12.0 min |   Total Imp(%)=  54.10   Dir. Conn.(%)=  25.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      6.79          5.77
     Dep. Storage     (mm)=      1.00          1.50
     Average Slope     (%)=      1.00          2.00
     Length            (m)=    289.37         40.00
     Mannings n           =     0.013         0.250

      NOTE:  RAINFALL WAS TRANSFORMED TO  12.0 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
               0.200    2.33 | 1.200   27.96 | 2.200    5.12 |  3.20    2.66
               0.400    2.75 | 1.400   62.07 | 2.400    4.30 |  3.40    2.45
               0.600    3.38 | 1.600   17.19 | 2.600    3.72 |  3.60    2.28
               0.800    4.48 | 1.800    9.44 | 2.800    3.29 |  3.80    2.12
               1.000    6.89 | 2.000    6.69 | 3.000    2.96 |  4.00    1.99

     Max.Eff.Inten.(mm/hr)=      62.07         32.07
               over (min)        12.00         24.00
     Storage Coeff.  (min)=       5.85 (ii)    16.97 (ii)
     Unit Hyd. Tpeak (min)=      12.00         24.00
     Unit Hyd. peak  (cms)=       0.12          0.06
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.50          0.27      0.650 (iii)
     TIME TO PEAK    (hrs)=       1.40          1.60       1.40
     RUNOFF VOLUME    (mm)=      33.82         11.08      16.76
     TOTAL RAINFALL   (mm)=      34.82         34.82      34.82
     RUNOFF COEFFICIENT   =       0.97          0.32       0.48

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------
--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 648.000
| Ptotal= 34.82 mm |                          B=   4.000
--------------------                          C=   0.784
                       used in:   INTENSITY =  A / (t + B)^C

                       Duration of storm  =  4.00 hrs
                       Storm time step    = 10.00 min
                       Time to peak ratio =  0.33

                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.17    2.27 |  1.17   17.18 |'  2.17    5.25 |  3.17    2.69
                0.33    2.60 |  1.33   81.85 |'  2.33    4.49 |  3.33    2.50
                0.50    3.04 |  1.50   22.51 |'  2.50    3.93 |  3.50    2.34
                0.67    3.72 |  1.67   11.87 |'  2.67    3.51 |  3.67    2.21
                0.83    4.86 |  1.83    8.23 |'  2.83    3.18 |  3.83    2.08
                1.00    7.30 |  2.00    6.38 |'  3.00    2.91 |  4.00    1.98


------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0257)|   Area     (ha)=   3.10
|ID= 1 DT=12.0 min |   Total Imp(%)=  67.90   Dir. Conn.(%)=  42.90
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      2.10          1.00
     Dep. Storage     (mm)=      1.00          1.50
     Average Slope     (%)=      1.00          2.00
     Length            (m)=    143.76         40.00
     Mannings n           =     0.013         0.250

      NOTE:  RAINFALL WAS TRANSFORMED TO  12.0 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
               0.200    2.33 | 1.200   27.96 | 2.200    5.12 |  3.20    2.66
               0.400    2.75 | 1.400   62.07 | 2.400    4.30 |  3.40    2.45
               0.600    3.38 | 1.600   17.19 | 2.600    3.72 |  3.60    2.28
               0.800    4.48 | 1.800    9.44 | 2.800    3.29 |  3.80    2.12
```

	1.000	6.89	2.000	6.69	3.000	2.96	4.00	1.99

Max.Eff.Inten.(mm/hr)=	62.07	37.28		
over (min)	12.00	24.00		
Storage Coeff. (min)=	3.84 (ii)	14.32 (ii)		
Unit Hyd. Tpeak (min)=	12.00	24.00		
Unit Hyd. peak (cms)=	0.14	0.06		
			TOTALS	
PEAK FLOW (cms)=	0.22	0.06	0.257 (iii)	
TIME TO PEAK (hrs)=	1.40	1.60	1.40	
RUNOFF VOLUME (mm)=	33.82	11.76	21.22	
TOTAL RAINFALL (mm)=	34.82	34.82	34.82	
RUNOFF COEFFICIENT =	0.97	0.34	0.61	

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0258)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
	ID1= 1 (0228):	12.56	0.650	1.40	16.76
+	ID2= 2 (0257):	3.10	0.257	1.40	21.22
	ID = 3 (0258):	15.66	0.907	1.40	17.64

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0243)					
IN= 2---> OUT= 1					
DT= 12.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.1346	0.4241
	0.0096	0.0421	0.1575	0.4697
	0.0159	0.0886	0.1823	0.5165
	0.0203	0.1399	0.2088	0.5647
	0.0228	0.1768	0.2369	0.6142
	0.0250	0.2150	0.2514	0.6394
	0.0628	0.2544	0.2663	0.6650
	0.0835	0.2950	0.2816	0.6910
	0.0991	0.3368	0.2997	0.7172
	0.1144	0.3798	0.3113	0.7439

		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (	0258)	15.660	0.907	1.40	17.64
OUTFLOW: ID= 1 (	0243)	15.660	0.048	4.00	17.57

PEAK FLOW REDUCTION [Qout/Qin](%)= 5.30
TIME SHIFT OF PEAK FLOW (min)=156.00
MAXIMUM STORAGE USED (ha.m.)= 0.2396

ROUTEPIPE(0184)		
IN= 2---> OUT= 1	Pipe Number	= 1.00
DT= 12.0 min	Diameter	(mm)=1650.00
	Length	(m)= 500.00
	Slope	(m/m)= 0.005
	Manning n	= 0.013

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

DEPTH (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME min
0.09	.216E+02	0.0	0.80	10.40
0.17	.600E+02	0.1	1.25	6.67
0.26	.108E+03	0.3	1.61	5.18
0.35	.164E+03	0.6	1.91	4.36
0.43	.225E+03	1.0	2.18	3.83
0.52	.290E+03	1.4	2.41	3.46
0.61	.358E+03	1.9	2.61	3.19
0.69	.428E+03	2.4	2.79	2.99
0.78	.499E+03	2.9	2.95	2.83
0.87	.570E+03	3.5	3.08	2.70
0.96	.642E+03	4.1	3.20	2.61
1.04	.712E+03	4.7	3.29	2.53
1.13	.780E+03	5.2	3.36	2.48
1.22	.844E+03	5.8	3.41	2.44
1.30	.905E+03	6.2	3.44	2.43
1.39	.961E+03	6.6	3.43	2.43
1.48	.101E+04	6.9	3.40	2.45
1.56	.105E+04	6.9	3.31	2.52
1.65	.107E+04	6.5	3.02	2.76

<---- hydrograph ----> <-pipe / channel->

		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 2 (	0243)	15.66	0.05	4.00	17.57	0.10	0.84
OUTFLOW: ID= 1 (	0184)	15.66	0.05	4.20	17.57	0.10	0.84

CHICAGO STORM	IDF curve parameters: A= 648.000
Ptotal= 34.82 mm	B= 4.000
	C= 0.784

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

Duration of storm = 4.00 hrs
Storm time step = 10.00 min
Time to peak ratio = 0.33

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.17	2.27	1.17	17.18	2.17	5.25	3.17	2.69
0.33	2.60	1.33	81.85	2.33	4.49	3.33	2.50
0.50	3.04	1.50	22.51	2.50	3.93	3.50	2.34
0.67	3.72	1.67	11.87	2.67	3.51	3.67	2.21
0.83	4.86	1.83	8.23	2.83	3.18	3.83	2.08
1.00	7.30	2.00	6.38	3.00	2.91	4.00	1.98

CALIB		
STANDHYD (0229)	Area (ha)=	12.13
ID= 1 DT=12.0 min	Total Imp(%)=	54.50 Dir. Conn.(%)= 19.70

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	6.61	5.52
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	284.37	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 12.0 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
0.200	2.33	1.200	27.96	2.200	5.12	3.20	2.66
0.400	2.75	1.400	62.07	2.400	4.30	3.40	2.45
0.600	3.38	1.600	17.19	2.600	3.72	3.60	2.28
0.800	4.48	1.800	9.44	2.800	3.29	3.80	2.12
1.000	6.89	2.000	6.69	3.000	2.96	4.00	1.99

Max.Eff.Inten.(mm/hr)=	62.07	36.77		
over (min)	12.00	24.00		
Storage Coeff. (min)=	5.79 (ii)	16.32 (ii)		
Unit Hyd. Tpeak (min)=	12.00	24.00		
Unit Hyd. peak (cms)=	0.12	0.06		
			TOTALS	
PEAK FLOW (cms)=	0.38	0.30	0.551 (iii)	
TIME TO PEAK (hrs)=	1.40	1.60	1.40	

RUNOFF VOLUME (mm)=	33.82	11.70	16.05
TOTAL RAINFALL (mm)=	34.82	34.82	34.82
RUNOFF COEFFICIENT =	0.97	0.34	0.46

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
YOU SHOULD CONSIDER SPLITTING THE AREA.

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0196)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0184):	15.66	0.048	4.20	17.57
+ ID2= 2 (0229):	12.13	0.551	1.40	16.05
ID = 3 (0196):	27.79	0.558	1.40	16.91

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0256)
IN= 2---> OUT= 1
DT= 12.0 min

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.2761	0.3332
0.0090	0.0385	0.3101	0.3536
0.0147	0.0812	0.3454	0.3743
0.0199	0.1456	0.3818	0.3952
0.0210	0.1631	0.4194	0.4165
0.0987	0.2172	0.4581	0.4381
0.1306	0.2358	0.4979	0.4600
0.1761	0.2739	0.5806	0.5047
0.2120	0.2934	0.6234	0.5275
0.2433	0.3131	0.7121	0.5742

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0196)	27.790	0.558	1.40	16.91
OUTFLOW: ID= 1 (0256)	27.790	0.062	4.40	16.87

PEAK FLOW REDUCTION [Qout/Qin](%)= 11.03
TIME SHIFT OF PEAK FLOW (min)=180.00
MAXIMUM STORAGE USED (ha.m.)= 0.1914

CHICAGO STORM
Ptotal= 34.82 mm

IDF curve parameters: A= 648.000
B= 4.000
C= 0.784
used in: INTENSITY = A / (t + B)^C

Duration of storm = 4.00 hrs
Storm time step = 10.00 min
Time to peak ratio = 0.33

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.17	2.27	1.17	17.18	2.17	5.25	3.17	2.69
0.33	2.60	1.33	81.85	2.33	4.49	3.33	2.50
0.50	3.04	1.50	22.51	2.50	3.93	3.50	2.34
0.67	3.72	1.67	11.87	2.67	3.51	3.67	2.21
0.83	4.86	1.83	8.23	2.83	3.18	3.83	2.08
1.00	7.30	2.00	6.38	3.00	2.91	4.00	1.98

CALIB
STANDHYD (0230)
ID= 1 DT=12.0 min

Area (ha)= 20.35
Total Imp(%)= 53.70 Dir. Conn.(%)= 32.40

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	10.93	9.42
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	368.33	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 12.0 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
0.200	2.33	1.200	27.96	2.200	5.12	3.20	2.66
0.400	2.75	1.400	62.07	2.400	4.30	3.40	2.45
0.600	3.38	1.600	17.19	2.600	3.72	3.60	2.28
0.800	4.48	1.800	9.44	2.800	3.29	3.80	2.12
1.000	6.89	2.000	6.69	3.000	2.96	4.00	1.99

				TOTALS
Max.Eff.Inten.(mm/hr)=	62.07	18.10		
over (min)	12.00	24.00		
Storage Coeff. (min)=	6.76 (ii)	20.74 (ii)		
Unit Hyd. Tpeak (min)=	12.00	24.00		
Unit Hyd. peak (cms)=	0.12	0.05		
PEAK FLOW (cms)=	1.02	0.32		1.197 (iii)
TIME TO PEAK (hrs)=	1.40	1.60		1.40
RUNOFF VOLUME (mm)=	33.82	10.20		17.85
TOTAL RAINFALL (mm)=	34.82	34.82		34.82
RUNOFF COEFFICIENT =	0.97	0.29		0.51

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0224)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0230):	20.35	1.197	1.40	17.85
+ ID2= 2 (0256):	27.79	0.062	4.40	16.87
ID = 3 (0224):	48.14	1.206	1.40	17.28

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0253)
IN= 2---> OUT= 1
DT= 12.0 min

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.6390	0.9848
0.0270	0.1457	0.9700	1.2900
0.0430	0.3152	1.1040	1.7480
0.0530	0.4653	3.3100	1.9350
0.3280	0.6677	11.3140	2.2662

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0224)	48.140	1.206	1.40	17.28
OUTFLOW: ID= 1 (0253)	48.140	0.046	6.20	17.26

PEAK FLOW REDUCTION [Qout/Qin](%)= 3.82
TIME SHIFT OF PEAK FLOW (min)=288.00
MAXIMUM STORAGE USED (ha.m.)= 0.3619

CHICAGO STORM	Ptotal= 34.82 mm

IDF curve parameters: A= 648.000
B= 4.000
C= 0.784
used in: INTENSITY = A / (t + B)^C

Duration of storm = 4.00 hrs
Storm time step = 10.00 min
Time to peak ratio = 0.33

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.17	2.27	1.17	17.18	2.17	5.25	3.17	2.69
0.33	2.60	1.33	81.85	2.33	4.49	3.33	2.50
0.50	3.04	1.50	22.51	2.50	3.93	3.50	2.34
0.67	3.72	1.67	11.87	2.67	3.51	3.67	2.21
0.83	4.86	1.83	8.23	2.83	3.18	3.83	2.08
1.00	7.30	2.00	6.38	3.00	2.91	4.00	1.98

CALIB	STANDHYD (0160)	ID= 1 DT=12.0 min

Area (ha)= 1.30
Total Imp(%)= 50.70 Dir. Conn.(%)= 22.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.66	0.64
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	93.09	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 12.0 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
0.200	2.33	1.200	27.96	2.200	5.12	3.20	2.66
0.400	2.75	1.400	62.07	2.400	4.30	3.40	2.45
0.600	3.38	1.600	17.19	2.600	3.72	3.60	2.28
0.800	4.48	1.800	9.44	2.800	3.29	3.80	2.12
1.000	6.89	2.000	6.69	3.000	2.96	4.00	1.99

				TOTALS
Max.Eff.Inten.(mm/hr)=		62.07	30.27	
over (min)		12.00	24.00	
Storage Coeff.	(min)=	2.96 (ii)	14.34 (ii)	
Unit Hyd. Tpeak	(min)=	12.00	24.00	
Unit Hyd. peak	(cms)=	0.14	0.06	
PEAK FLOW	(cms)=	0.05	0.03	0.066 (iii)
TIME TO PEAK	(hrs)=	1.40	1.60	1.40
RUNOFF VOLUME	(mm)=	33.82	10.82	15.87
TOTAL RAINFALL	(mm)=	34.82	34.82	34.82
RUNOFF COEFFICIENT	=	0.97	0.31	0.46

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

DUHYD	(0183)	Inlet Cap.= 0.152	#of Inlets= 1	Total(cms)= 0.2

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
TOTAL HYD.(ID= 1):	1.30	0.07	1.40	15.87

MAJOR SYS.(ID= 2):	0.00	0.00	0.00	0.00
MINOR SYS.(ID= 3):	1.30	0.07	1.40	15.87

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CHICAGO STORM	Ptotal= 34.82 mm

IDF curve parameters: A= 648.000
B= 4.000
C= 0.784
used in: INTENSITY = A / (t + B)^C

Duration of storm = 4.00 hrs
Storm time step = 10.00 min
Time to peak ratio = 0.33

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.17	2.27	1.17	17.18	2.17	5.25	3.17	2.69
0.33	2.60	1.33	81.85	2.33	4.49	3.33	2.50
0.50	3.04	1.50	22.51	2.50	3.93	3.50	2.34
0.67	3.72	1.67	11.87	2.67	3.51	3.67	2.21
0.83	4.86	1.83	8.23	2.83	3.18	3.83	2.08
1.00	7.30	2.00	6.38	3.00	2.91	4.00	1.98

CALIB	STANDHYD (0193)	ID= 1 DT=12.0 min

Area (ha)= 1.21
Total Imp(%)= 49.30 Dir. Conn.(%)= 20.10

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.60	0.61
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	89.81	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 12.0 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
0.200	2.33	1.200	27.96	2.200	5.12	3.20	2.66
0.400	2.75	1.400	62.07	2.400	4.30	3.40	2.45
0.600	3.38	1.600	17.19	2.600	3.72	3.60	2.28
0.800	4.48	1.800	9.44	2.800	3.29	3.80	2.12
1.000	6.89	2.000	6.69	3.000	2.96	4.00	1.99

				TOTALS
Max.Eff.Inten.(mm/hr)=		62.07	30.06	
over (min)		12.00	24.00	
Storage Coeff.	(min)=	2.90 (ii)	14.31 (ii)	
Unit Hyd. Tpeak	(min)=	12.00	24.00	
Unit Hyd. peak	(cms)=	0.14	0.06	
PEAK FLOW	(cms)=	0.04	0.03	0.058 (iii)
TIME TO PEAK	(hrs)=	1.40	1.60	1.40
RUNOFF VOLUME	(mm)=	33.82	10.79	15.41
TOTAL RAINFALL	(mm)=	34.82	34.82	34.82
RUNOFF COEFFICIENT	=	0.97	0.31	0.44

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

DUHYD	(0227)	Inlet Cap.= 0.120	#of Inlets= 1

Total(cms)= 0.1|	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
TOTAL HYD.(ID= 1):		1.21	0.06	1.40	15.41
MAJOR SYS.(ID= 2):		0.00	0.00	0.00	0.00
MINOR SYS.(ID= 3):		1.21	0.06	1.40	15.41

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CHICAGO STORM	Ptotal= 34.82 mm

IDF curve parameters: A= 648.000
B= 4.000
C= 0.784
used in: INTENSITY = A / (t + B)^C

Duration of storm = 4.00 hrs
Storm time step = 10.00 min
Time to peak ratio = 0.33

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.17	2.27	1.17	17.18	2.17	5.25	3.17	2.69
0.33	2.60	1.33	81.85	2.33	4.49	3.33	2.50
0.50	3.04	1.50	22.51	2.50	3.93	3.50	2.34
0.67	3.72	1.67	11.87	2.67	3.51	3.67	2.21
0.83	4.86	1.83	8.23	2.83	3.18	3.83	2.08
1.00	7.30	2.00	6.38	3.00	2.91	4.00	1.98

CALIB	STANDHYD (0206)	ID= 1 DT=12.0 min

Area (ha)= 38.60
Total Imp(%)= 54.70 Dir. Conn.(%)= 23.20

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	21.11	17.49
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	507.28	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 12.0 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
0.200	2.33	1.200	27.96	2.200	5.12	3.20	2.66
0.400	2.75	1.400	62.07	2.400	4.30	3.40	2.45
0.600	3.38	1.600	17.19	2.600	3.72	3.60	2.28
0.800	4.48	1.800	9.44	2.800	3.29	3.80	2.12
1.000	6.89	2.000	6.69	3.000	2.96	4.00	1.99

				TOTALS
Max.Eff.Inten.(mm/hr)=		62.07	34.25	
over (min)		12.00	24.00	
Storage Coeff. (min)=		8.19 (ii)	19.03 (ii)	
Unit Hyd. Tpeak (min)=		12.00	24.00	
Unit Hyd. peak (cms)=		0.11	0.05	
PEAK FLOW	(cms)=	1.32	0.83	1.777 (iii)
TIME TO PEAK	(hrs)=	1.40	1.60	1.40
RUNOFF VOLUME	(mm)=	33.82	11.37	16.58
TOTAL RAINFALL	(mm)=	34.82	34.82	34.82
RUNOFF COEFFICIENT	=	0.97	0.33	0.48

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0225)	1 + 2 = 3		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
*** W A R N I N G : HYDROGRAPH 0183 <ID= 1> IS DRY.						
*** W A R N I N G : HYDROGRAPH 0225 = HYDROGRAPH 0206						
	ID1= 1 (0183):		0.00	0.000	0.00	0.00
	+ ID2= 2 (0206):		38.60	1.777	1.40	16.58
	ID = 3 (0225):		38.60	1.777	1.40	16.58

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0225)	3 + 2 = 1		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
*** W A R N I N G : HYDROGRAPH 0227 <ID= 2> IS DRY.						
*** W A R N I N G : HYDROGRAPH 0001 = HYDROGRAPH 0003						
	ID1= 3 (0225):		38.60	1.777	1.40	16.58
	+ ID2= 2 (0227):		0.00	0.000	0.00	0.00
	ID = 1 (0225):		38.60	1.777	1.40	16.58

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CHICAGO STORM	Ptotal= 34.82 mm

IDF curve parameters: A= 648.000
B= 4.000
C= 0.784
used in: INTENSITY = A / (t + B)^C

Duration of storm = 4.00 hrs
Storm time step = 10.00 min
Time to peak ratio = 0.33

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.17	2.27	1.17	17.18	2.17	5.25	3.17	2.69
0.33	2.60	1.33	81.85	2.33	4.49	3.33	2.50
0.50	3.04	1.50	22.51	2.50	3.93	3.50	2.34
0.67	3.72	1.67	11.87	2.67	3.51	3.67	2.21
0.83	4.86	1.83	8.23	2.83	3.18	3.83	2.08
1.00	7.30	2.00	6.38	3.00	2.91	4.00	1.98

CALIB	STANDHYD (0209)	ID= 1 DT=12.0 min

Area (ha)= 5.20
Total Imp(%)= 31.60 Dir. Conn.(%)= 19.40

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	1.64	3.56
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	186.19	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 12.0 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
0.200	2.33	1.200	27.96	2.200	5.12	3.20	2.66
0.400	2.75	1.400	62.07	2.400	4.30	3.40	2.45
0.600	3.38	1.600	17.19	2.600	3.72	3.60	2.28
0.800	4.48	1.800	9.44	2.800	3.29	3.80	2.12
1.000	6.89	2.000	6.69	3.000	2.96	4.00	1.99

Max.Eff.Inten.(mm/hr)=	62.07	12.26	

```
                over (min)       12.00        24.00
     Storage Coeff.  (min)=       4.49 (ii)   20.83 (ii)
     Unit Hyd. Tpeak (min)=      12.00        24.00
     Unit Hyd. peak  (cms)=       0.13         0.05
                                                *TOTALS*
     PEAK FLOW       (cms)=       0.17         0.08          0.211 (iii)
     TIME TO PEAK    (hrs)=       1.40         1.60           1.40
     RUNOFF VOLUME    (mm)=      33.82         8.63          13.51
     TOTAL RAINFALL   (mm)=      34.82        34.82          34.82
     RUNOFF COEFFICIENT   =       0.97         0.25           0.39

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 648.000
| Ptotal= 34.82 mm |                          B=   4.000
--------------------                          C=   0.784
                       used in:   INTENSITY =  A / (t + B)^C

                       Duration of storm  =  4.00 hrs
                       Storm time step    = 10.00 min
                       Time to peak ratio =  0.33

                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.17    2.27 |  1.17   17.18 |  2.17    5.25 |  3.17    2.69
                0.33    2.60 |  1.33   81.85 |  2.33    4.49 |  3.33    2.50
                0.50    3.04 |  1.50   22.51 |  2.50    3.93 |  3.50    2.34
                0.67    3.72 |  1.67   11.87 |  2.67    3.51 |  3.67    2.21
                0.83    4.86 |  1.83    8.23 |  2.83    3.18 |  3.83    2.08
                1.00    7.30 |  2.00    6.38 |  3.00    2.91 |  4.00    1.98


--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0252)|   Area     (ha)=   1.44
|ID= 1 DT=12.0 min |   Total Imp(%)=  52.40   Dir. Conn.(%)=  20.10
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.75         0.69
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      97.98        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO  12.0 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
               0.200    2.33 | 1.200   27.96 | 2.200    5.12 |  3.20    2.66
               0.400    2.75 | 1.400   62.07 | 2.400    4.30 |  3.40    2.45
               0.600    3.38 | 1.600   17.19 | 2.600    3.72 |  3.60    2.28
               0.800    4.48 | 1.800    9.44 | 2.800    3.29 |  3.80    2.12
               1.000    6.89 | 2.000    6.69 | 3.000    2.96 |  4.00    1.99

     Max.Eff.Inten.(mm/hr)=      62.07        33.65
                over (min)       12.00        24.00
     Storage Coeff.  (min)=       3.05 (ii)   13.97 (ii)
     Unit Hyd. Tpeak (min)=      12.00        24.00
     Unit Hyd. peak  (cms)=       0.14         0.06
                                                *TOTALS*
     PEAK FLOW       (cms)=       0.05         0.04          0.070 (iii)
     TIME TO PEAK    (hrs)=       1.40         1.60           1.40
     RUNOFF VOLUME    (mm)=      33.82        11.29          15.81
     TOTAL RAINFALL   (mm)=      34.82        34.82          34.82
     RUNOFF COEFFICIENT   =       0.97         0.32           0.45

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0261)|
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.1470     0.0137
                          0.0530     0.0050   |   0.1700     0.0155
                          0.0700     0.0076   |   0.1900     0.0220
                          0.1150     0.0113   |   0.0000     0.0000

                                  AREA     QPEAK     TPEAK       R.V.
                                  (ha)     (cms)     (hrs)       (mm)
     INFLOW : ID= 2 (  0252)      1.440     0.070     1.40       15.81
     OUTFLOW: ID= 1 (  0261)      1.440     0.047     1.70       15.80

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)= 67.11
                    TIME SHIFT OF PEAK FLOW         (min)= 18.00
                    MAXIMUM  STORAGE   USED        (ha.m.)=  0.0045

--------------------------------------------------------------------------------
--------------------
| ADD HYD  (  0251)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0209):     5.20    0.211     1.40    13.51
      + ID2= 2 (  0261):     1.44    0.047     1.70    15.80
        ================================================
        ID = 3 (  0251):     6.64    0.243     1.40    14.01

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0245)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.3090     0.2876
                          0.0000     0.0000   |   0.3330     0.3838
                          0.1230     0.1102   |   0.3620     0.5200
                          0.2870     0.1971   |   0.0000     0.0000

                                  AREA     QPEAK     TPEAK       R.V.
                                  (ha)     (cms)     (hrs)       (mm)
     INFLOW : ID= 2 (  0251)      6.640     0.243     1.40       14.01
     OUTFLOW: ID= 1 (  0245)      6.640     0.057     2.60       13.97

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)= 23.31
                    TIME SHIFT OF PEAK FLOW         (min)= 72.00
                    MAXIMUM  STORAGE   USED        (ha.m.)=  0.0508

--------------------------------------------------------------------------------
--------------------
| ROUTEPIPE(  0212)|     PIPE Number      =   1.00
| IN= 2---> OUT= 1 |     Diameter     (mm)=1650.00
| DT= 12.0 min     |     Length        (m)= 850.00
--------------------     Slope       (m/m)=  0.005
                         Manning n         =  0.013

      <----------------- TRAVEL TIME TABLE ------------------->
        DEPTH      VOLUME    FLOW RATE    VELOCITY    TRAV.TIME
          (m)     (cu.m.)       (cms)        (m/s)         min
         0.09    .367E+02         0.0         0.80       17.68
```

COLE ENGINEERING

Experience Enhancing Excellence

0.17	.102E+03	0.1	1.25	11.33
0.26	.184E+03	0.3	1.61	8.81
0.35	.278E+03	0.6	1.91	7.41
0.43	.382E+03	1.0	2.18	6.51
0.52	.492E+03	1.4	2.41	5.88
0.61	.608E+03	1.9	2.61	5.43
0.69	.727E+03	2.4	2.79	5.08
0.78	.848E+03	2.9	2.95	4.81
0.87	.970E+03	3.5	3.08	4.60
0.96	.109E+04	4.1	3.20	4.43
1.04	.121E+04	4.7	3.29	4.31
1.13	.133E+04	5.2	3.36	4.22
1.22	.144E+04	5.8	3.41	4.15
1.30	.154E+04	6.2	3.44	4.12
1.39	.163E+04	6.6	3.43	4.13
1.48	.172E+04	6.9	3.40	4.17
1.56	.178E+04	6.9	3.31	4.28
1.65	.182E+04	6.5	3.02	4.70

		<---- hydrograph ---->			<-pipe / channel->	
		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 2 (| 0245)	6.64	0.06	2.60	13.97	0.10	0.86
OUTFLOW: ID= 1 (| 0212)	6.64	0.06	2.90	13.97	0.10	0.86

ADD HYD (0211)		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
1 + 2 = 3	ID1= 1 (0212):	6.64	0.056	2.90	13.97
	+ ID2= 2 (0225):	38.60	1.777	1.40	16.58
	ID = 3 (0211):	45.24	1.785	1.40	16.20

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0255)				
IN= 2---> OUT= 1				
DT= 12.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	1.6250	1.2448
	0.0190	0.1627	1.6630	1.2997
	0.0360	0.4306	1.8430	1.5816
	0.0480	0.7217	2.1300	2.1197
	0.1330	0.7718	2.9680	2.2465
	1.0390	0.9773	7.5380	2.5741

		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (	0211)	45.240	1.785	1.40	16.20
OUTFLOW: ID= 1 (	0255)	45.240	0.045	5.00	16.15

PEAK FLOW REDUCTION [Qout/Qin](%)= 2.51
TIME SHIFT OF PEAK FLOW (min)=216.00
MAXIMUM STORAGE USED (ha.m.)= 0.6456

```
      V    V   I    SSSSS  U   U    A    L              (v 5.1.2004)
      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
```


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

Input filename: C:\Program Files (x86)\Visual OTTHYMO 5.1\VO2\voin.dat
Output filename: C:\Users\jlysecki\AppData\Local\Civica\VH5\a379672b-db33-4372-b5e0-ba58a07d1417\8cad8bda-20c7-4db8-a355-00d6545f11a2\sce
Summary filename: C:\Users\jlysecki\AppData\Local\Civica\VH5\a379672b-db33-4372-b5e0-ba58a07d1417\8cad8bda-20c7-4db8-a355-00d6545f11a2\sce

DATE: 01/15/2020 TIME: 04:24:46

USER:

COMMENTS: _____

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

CHICAGO STORM	Ptotal= 46.27 mm

IDF curve parameters: A= 930.000
B= 4.000
C= 0.798
used in: INTENSITY = A / (t + B)^C

Duration of storm = 4.00 hrs
Storm time step = 10.00 min
Time to peak ratio = 0.33

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.17	2.85	1.17	22.78	2.17	6.72	3.17	3.39
0.33	3.26	1.33	113.21	2.33	5.72	3.33	3.14
0.50	3.84	1.50	30.05	2.50	4.99	3.50	2.94
0.67	4.72	1.67	15.54	2.67	4.45	3.67	2.76
0.83	6.21	1.83	10.66	2.83	4.02	3.83	2.61
1.00	9.42	2.00	8.20	3.00	3.67	4.00	2.47

CALIB	STANDHYD (0228)	ID= 1 DT=12.0 min

Area (ha)= 12.56
Total Imp(%)= 54.10 Dir. Conn.(%)= 25.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	6.79	5.77
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	289.37	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 12.0 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
0.200	2.92	1.200	37.85	2.200	6.55	3.20	3.35
0.400	3.45	1.400	85.49	2.400	5.48	3.40	3.08
0.600	4.28	1.600	22.80	2.600	4.72	3.60	2.85
0.800	5.71	1.800	12.29	2.800	4.16	3.80	2.66
1.000	8.88	2.000	8.61	3.000	3.73	4.00	2.49

Max.Eff.Inten.(mm/hr)=		85.49	54.98
over (min)		12.00	24.00
Storage Coeff. (min)=		5.15 (ii)	14.11 (ii)

COLE ENGINEERING

Experience Enhancing Excellence

```
     Unit Hyd. Tpeak (min)=      12.00        24.00
     Unit Hyd. peak  (cms)=       0.13         0.06
                                                    *TOTALS*
     PEAK FLOW       (cms)=       0.70         0.50          0.988 (iii)
     TIME TO PEAK    (hrs)=       1.40         1.60           1.40
     RUNOFF VOLUME    (mm)=      45.27        17.85          24.71
     TOTAL RAINFALL   (mm)=      46.27        46.27          46.27
     RUNOFF COEFFICIENT   =       0.98         0.39           0.53

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 930.000
| Ptotal= 46.27 mm |                          B=   4.000
--------------------                          C=   0.798
                       used in:   INTENSITY =  A / (t + B)^C

                       Duration of storm  =  4.00 hrs
                       Storm time step    = 10.00 min
                       Time to peak ratio =  0.33

                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.17    2.85 |  1.17   22.78 |'  2.17    6.72 |  3.17    3.39
                0.33    3.26 |  1.33  113.21 |'  2.33    5.72 |  3.33    3.14
                0.50    3.84 |  1.50   30.05 |'  2.50    4.99 |  3.50    2.94
                0.67    4.72 |  1.67   15.54 |'  2.67    4.45 |  3.67    2.76
                0.83    6.21 |  1.83   10.66 |'  2.83    4.02 |  3.83    2.61
                1.00    9.42 |  2.00    8.20 |'  3.00    3.67 |  4.00    2.47


--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0257)|   Area     (ha)=   3.10
|ID= 1 DT=12.0 min |   Total Imp(%)=  67.90   Dir. Conn.(%)=  42.90
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.10         1.00
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     143.76        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO  12.0 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
                0.200    2.92 | 1.200   37.85 | 2.200    6.55 |  3.20    3.35
                0.400    3.45 | 1.400   85.49 | 2.400    5.48 |  3.40    3.08
                0.600    4.28 | 1.600   22.80 | 2.600    4.72 |  3.60    2.85
                0.800    5.71 | 1.800   12.29 | 2.800    4.16 |  3.80    2.66
                1.000    8.88 | 2.000    8.61 | 3.000    3.73 |  4.00    2.49

     Max.Eff.Inten.(mm/hr)=      85.49        63.46
               over (min)        12.00        12.00
     Storage Coeff.  (min)=       3.38 (ii)   11.85 (ii)
     Unit Hyd. Tpeak (min)=      12.00        12.00
     Unit Hyd. peak  (cms)=       0.14         0.09
                                                    *TOTALS*
     PEAK FLOW       (cms)=       0.31         0.12          0.432 (iii)
     TIME TO PEAK    (hrs)=       1.40         1.40           1.40
     RUNOFF VOLUME    (mm)=      45.27        18.83          30.17
     TOTAL RAINFALL   (mm)=      46.27        46.27          46.27
     RUNOFF COEFFICIENT   =       0.98         0.41           0.65

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

```
       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| ADD HYD  (  0258)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0228):    12.56    0.988     1.40    24.71
      + ID2= 2 (  0257):     3.10    0.432     1.40    30.17
        ================================================
        ID = 3 (  0258):    15.66    1.419     1.40    25.79

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0243)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                         0.0000     0.0000    |   0.1346     0.4241
                         0.0096     0.0421    |   0.1575     0.4697
                         0.0159     0.0886    |   0.1823     0.5165
                         0.0203     0.1399    |   0.2088     0.5647
                         0.0228     0.1768    |   0.2369     0.6142
                         0.0250     0.2150    |   0.2514     0.6394
                         0.0628     0.2544    |   0.2663     0.6650
                         0.0835     0.2950    |   0.2816     0.6910
                         0.0991     0.3368    |   0.2997     0.7172
                         0.1144     0.3798    |   0.3113     0.7439

                                    AREA     QPEAK     TPEAK       R.V.
                                    (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0258)        15.660     1.419      1.40      25.79
   OUTFLOW: ID= 1 (  0243)        15.660     0.094      3.80      25.72

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  6.60
                  TIME SHIFT OF PEAK FLOW          (min)=144.00
                  MAXIMUM  STORAGE   USED        (ha.m.)=  0.3222

--------------------------------------------------------------------------------
--------------------
| ROUTEPIPE(  0184)|     PIPE Number      =   1.00
| IN= 2---> OUT= 1 |     Diameter     (mm)=1650.00
| DT= 12.0 min     |     Length        (m)= 500.00
--------------------     Slope       (m/m)=  0.005
                         Manning n         =  0.013

     <----------------- TRAVEL TIME TABLE ------------------->
       DEPTH      VOLUME     FLOW RATE     VELOCITY    TRAV.TIME
         (m)     (cu.m.)       (cms)         (m/s)        min
        0.09    .216E+02        0.0          0.80        10.40
        0.17    .600E+02        0.1          1.25         6.67
        0.26    .108E+03        0.3          1.61         5.18
        0.35    .164E+03        0.6          1.91         4.36
        0.43    .225E+03        1.0          2.18         3.83
        0.52    .290E+03        1.4          2.41         3.46
        0.61    .358E+03        1.9          2.61         3.19
        0.69    .428E+03        2.4          2.79         2.99
        0.78    .499E+03        2.9          2.95         2.83
        0.87    .570E+03        3.5          3.08         2.70
        0.96    .642E+03        4.1          3.20         2.61
        1.04    .712E+03        4.7          3.29         2.53
        1.13    .780E+03        5.2          3.36         2.48
        1.22    .844E+03        5.8          3.41         2.44
        1.30    .905E+03        6.2          3.44         2.43
        1.39    .961E+03        6.6          3.43         2.43
        1.48    .101E+04        6.9          3.40         2.45
        1.56    .105E+04        6.9          3.31         2.52
        1.65    .107E+04        6.5          3.02         2.76
```

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 2 (0243)	15.66	0.09	3.80	25.72	0.13	0.98
OUTFLOW: ID= 1 (0184)	15.66	0.09	3.80	25.72	0.13	0.98

CHICAGO STORM
Ptotal= 46.27 mm

IDF curve parameters: A= 930.000
B= 4.000
C= 0.798
used in: INTENSITY = A / (t + B)^C

Duration of storm = 4.00 hrs
Storm time step = 10.00 min
Time to peak ratio = 0.33

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.17	2.85	1.17	22.78	2.17	6.72	3.17	3.39
0.33	3.26	1.33	113.21	2.33	5.72	3.33	3.14
0.50	3.84	1.50	30.05	2.50	4.99	3.50	2.94
0.67	4.72	1.67	15.54	2.67	4.45	3.67	2.76
0.83	6.21	1.83	10.66	2.83	4.02	3.83	2.61
1.00	9.42	2.00	8.20	3.00	3.67	4.00	2.47

CALIB
STANDHYD (0229)
ID= 1 DT=12.0 min

Area (ha)= 12.13
Total Imp(%)= 54.50 Dir. Conn.(%)= 19.70

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	6.61	5.52
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	284.37	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 12.0 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
0.200	2.92	1.200	37.85	2.200	6.55	3.20	3.35
0.400	3.45	1.400	85.49	2.400	5.48	3.40	3.08
0.600	4.28	1.600	22.80	2.600	4.72	3.60	2.85
0.800	5.71	1.800	12.29	2.800	4.16	3.80	2.66
1.000	8.88	2.000	8.61	3.000	3.73	4.00	2.49

				TOTALS
Max.Eff.Inten.(mm/hr)=		85.49	62.63	
over (min)		12.00	24.00	
Storage Coeff. (min)=		5.09 (ii)	13.60 (ii)	
Unit Hyd. Tpeak (min)=		12.00	24.00	
Unit Hyd. peak (cms)=		0.13	0.06	
PEAK FLOW	(cms)=	0.54	0.55	0.854 (iii)
TIME TO PEAK	(hrs)=	1.40	1.60	1.40
RUNOFF VOLUME	(mm)=	45.27	18.74	23.96
TOTAL RAINFALL	(mm)=	46.27	46.27	46.27
RUNOFF COEFFICIENT	=	0.98	0.41	0.52

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
YOU SHOULD CONSIDER SPLITTING THE AREA.

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0196)
1 + 2 = 3

		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0184):		15.66	0.094	3.80	25.72
+ ID2= 2 (0229):		12.13	0.854	1.40	23.96
ID = 3 (0196):		27.79	0.865	1.40	24.95

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0256)
IN= 2---> OUT= 1
DT= 12.0 min

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.2761	0.3332
0.0090	0.0385	0.3101	0.3536
0.0147	0.0812	0.3454	0.3743
0.0199	0.1456	0.3818	0.3952
0.0210	0.1631	0.4194	0.4165
0.0987	0.2172	0.4581	0.4381
0.1306	0.2358	0.4979	0.4600
0.1761	0.2739	0.5806	0.5047
0.2120	0.2934	0.6234	0.5275
0.2433	0.3131	0.7121	0.5742

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0196)	27.790	0.865	1.40	24.95
OUTFLOW: ID= 1 (0256)	27.790	0.151	4.00	24.91

PEAK FLOW REDUCTION [Qout/Qin](%)= 17.50
TIME SHIFT OF PEAK FLOW (min)=156.00
MAXIMUM STORAGE USED (ha.m.)= 0.2534

CHICAGO STORM
Ptotal= 46.27 mm

IDF curve parameters: A= 930.000
B= 4.000
C= 0.798
used in: INTENSITY = A / (t + B)^C

Duration of storm = 4.00 hrs
Storm time step = 10.00 min
Time to peak ratio = 0.33

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.17	2.85	1.17	22.78	2.17	6.72	3.17	3.39
0.33	3.26	1.33	113.21	2.33	5.72	3.33	3.14
0.50	3.84	1.50	30.05	2.50	4.99	3.50	2.94
0.67	4.72	1.67	15.54	2.67	4.45	3.67	2.76
0.83	6.21	1.83	10.66	2.83	4.02	3.83	2.61
1.00	9.42	2.00	8.20	3.00	3.67	4.00	2.47

CALIB
STANDHYD (0230)
ID= 1 DT=12.0 min

Area (ha)= 20.35
Total Imp(%)= 53.70 Dir. Conn.(%)= 32.40

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	10.93	9.42
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	368.33	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 12.0 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
0.200	2.92	1.200	37.85	2.200	6.55	3.20	3.35
0.400	3.45	1.400	85.49	2.400	5.48	3.40	3.08
0.600	4.28	1.600	22.80	2.600	4.72	3.60	2.85
0.800	5.71	1.800	12.29	2.800	4.16	3.80	2.66
1.000	8.88	2.000	8.61	3.000	3.73	4.00	2.49

Max.Eff.Inten.(mm/hr)=		85.49	45.31	
over (min)		12.00	24.00	
Storage Coeff. (min)=		5.95 (ii)	15.63 (ii)	
Unit Hyd. Tpeak (min)=		12.00	24.00	
Unit Hyd. peak (cms)=		0.12	0.06	
				TOTALS
PEAK FLOW	(cms)=	1.44	0.64	1.802 (iii)
TIME TO PEAK	(hrs)=	1.40	1.60	1.40
RUNOFF VOLUME	(mm)=	45.27	16.59	25.88
TOTAL RAINFALL	(mm)=	46.27	46.27	46.27
RUNOFF COEFFICIENT	=	0.98	0.36	0.56

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0224)

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0230):	20.35	1.802	1.40	25.88
+ ID2= 2 (0256):	27.79	0.151	4.00	24.91
ID = 3 (0224):	48.14	1.814	1.40	25.32

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0253)
IN= 2---> OUT= 1
DT= 12.0 min

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.6390	0.9848
0.0270	0.1457	0.9700	1.2900
0.0430	0.3152	1.1040	1.7480
0.0530	0.4653	3.3100	1.9350
0.3280	0.6677	11.3140	2.2662

		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (	0224)	48.140	1.814	1.40	25.32
OUTFLOW: ID= 1 (	0253)	48.140	0.166	4.40	25.29

PEAK FLOW REDUCTION [Qout/Qin](%)= 9.18
TIME SHIFT OF PEAK FLOW (min)=180.00
MAXIMUM STORAGE USED (ha.m.)= 0.5490

CHICAGO STORM
Ptotal= 46.27 mm

IDF curve parameters: A= 930.000
B= 4.000
C= 0.798
used in: INTENSITY = A / (t + B)^C

Duration of storm = 4.00 hrs
Storm time step = 10.00 min
Time to peak ratio = 0.33

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.17	2.85	1.17	22.78	2.17	6.72	3.17	3.39
0.33	3.26	1.33	113.21	2.33	5.72	3.33	3.14
0.50	3.84	1.50	30.05	2.50	4.99	3.50	2.94
0.67	4.72	1.67	15.54	2.67	4.45	3.67	2.76
0.83	6.21	1.83	10.66	2.83	4.02	3.83	2.61
1.00	9.42	2.00	8.20	3.00	3.67	4.00	2.47

CALIB
STANDHYD (0160) Area (ha)= 1.30
ID= 1 DT=12.0 min Total Imp(%)= 50.70 Dir. Conn.(%)= 22.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.66	0.64
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	93.09	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 12.0 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
0.200	2.92	1.200	37.85	2.200	6.55	3.20	3.35
0.400	3.45	1.400	85.49	2.400	5.48	3.40	3.08
0.600	4.28	1.600	22.80	2.600	4.72	3.60	2.85
0.800	5.71	1.800	12.29	2.800	4.16	3.80	2.66
1.000	8.88	2.000	8.61	3.000	3.73	4.00	2.49

Max.Eff.Inten.(mm/hr)=		85.49	52.03	
over (min)		12.00	12.00	
Storage Coeff. (min)=		2.61 (ii)	11.77 (ii)	
Unit Hyd. Tpeak (min)=		12.00	12.00	
Unit Hyd. peak (cms)=		0.14	0.09	
				TOTALS
PEAK FLOW	(cms)=	0.07	0.06	0.132 (iii)
TIME TO PEAK	(hrs)=	1.40	1.40	1.40
RUNOFF VOLUME	(mm)=	45.27	17.49	23.59
TOTAL RAINFALL	(mm)=	46.27	46.27	46.27
RUNOFF COEFFICIENT	=	0.98	0.38	0.51

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

DUHYD (0183)
Inlet Cap.= 0.152
#of Inlets= 1
Total(cms)= 0.2

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
TOTAL HYD.(ID= 1):	1.30	0.13	1.40	23.59
MAJOR SYS.(ID= 2):	0.00	0.00	0.00	0.00
MINOR SYS.(ID= 3):	1.30	0.13	1.40	23.59

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CHICAGO STORM
Ptotal= 46.27 mm

IDF curve parameters: A= 930.000
B= 4.000
C= 0.798
used in: INTENSITY = A / (t + B)^C

Duration of storm = 4.00 hrs
Storm time step = 10.00 min
Time to peak ratio = 0.33

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.17	2.85	1.17	22.78	2.17	6.72	3.17	3.39
0.33	3.26	1.33	113.21	2.33	5.72	3.33	3.14
0.50	3.84	1.50	30.05	2.50	4.99	3.50	2.94
0.67	4.72	1.67	15.54	2.67	4.45	3.67	2.76
0.83	6.21	1.83	10.66	2.83	4.02	3.83	2.61
1.00	9.42	2.00	8.20	3.00	3.67	4.00	2.47

CALIB
STANDHYD (0193)
ID= 1 DT=12.0 min

Area (ha)= 1.21
Total Imp(%)= 49.30 Dir. Conn.(%)= 20.10

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.60	0.61
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	89.81	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 12.0 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
0.200	2.92	1.200	37.85	2.200	6.55	3.20	3.35
0.400	3.45	1.400	85.49	2.400	5.48	3.40	3.08
0.600	4.28	1.600	22.80	2.600	4.72	3.60	2.85
0.800	5.71	1.800	12.29	2.800	4.16	3.80	2.66
1.000	8.88	2.000	8.61	3.000	3.73	4.00	2.49

Max.Eff.Inten.(mm/hr)=		85.49	51.68	
over (min)		12.00	12.00	
Storage Coeff. (min)=		2.55 (ii)	11.74 (ii)	
Unit Hyd. Tpeak (min)=		12.00	12.00	
Unit Hyd. peak (cms)=		0.14	0.09	
				TOTALS
PEAK FLOW	(cms)=	0.06	0.06	0.118 (iii)
TIME TO PEAK	(hrs)=	1.40	1.40	1.40
RUNOFF VOLUME	(mm)=	45.27	17.44	23.03
TOTAL RAINFALL	(mm)=	46.27	46.27	46.27
RUNOFF COEFFICIENT	=	0.98	0.38	0.50

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

DUHYD (0227)
Inlet Cap.= 0.120
#of Inlets= 1
Total(cms)= 0.1

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
TOTAL HYD.(ID= 1):	1.21	0.12	1.40	23.03
MAJOR SYS.(ID= 2):	0.00	0.00	0.00	0.00
MINOR SYS.(ID= 3):	1.21	0.12	1.40	23.03

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CHICAGO STORM
Ptotal= 46.27 mm

IDF curve parameters: A= 930.000
B= 4.000
C= 0.798
used in: INTENSITY = A / (t + B)^C

Duration of storm = 4.00 hrs
Storm time step = 10.00 min
Time to peak ratio = 0.33

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.17	2.85	1.17	22.78	2.17	6.72	3.17	3.39
0.33	3.26	1.33	113.21	2.33	5.72	3.33	3.14
0.50	3.84	1.50	30.05	2.50	4.99	3.50	2.94
0.67	4.72	1.67	15.54	2.67	4.45	3.67	2.76
0.83	6.21	1.83	10.66	2.83	4.02	3.83	2.61
1.00	9.42	2.00	8.20	3.00	3.67	4.00	2.47

CALIB
STANDHYD (0206)
ID= 1 DT=12.0 min

Area (ha)= 38.60
Total Imp(%)= 54.70 Dir. Conn.(%)= 23.20

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	21.11	17.49
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	507.28	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 12.0 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
0.200	2.92	1.200	37.85	2.200	6.55	3.20	3.35
0.400	3.45	1.400	85.49	2.400	5.48	3.40	3.08
0.600	4.28	1.600	22.80	2.600	4.72	3.60	2.85
0.800	5.71	1.800	12.29	2.800	4.16	3.80	2.66
1.000	8.88	2.000	8.61	3.000	3.73	4.00	2.49

Max.Eff.Inten.(mm/hr)=		85.49	58.53	
over (min)		12.00	24.00	
Storage Coeff. (min)=		7.21 (ii)	15.95 (ii)	
Unit Hyd. Tpeak (min)=		12.00	24.00	
Unit Hyd. peak (cms)=		0.11	0.06	
				TOTALS
PEAK FLOW	(cms)=	1.88	1.53	2.744 (iii)
TIME TO PEAK	(hrs)=	1.40	1.60	1.40
RUNOFF VOLUME	(mm)=	45.27	18.28	24.54
TOTAL RAINFALL	(mm)=	46.27	46.27	46.27
RUNOFF COEFFICIENT	=	0.98	0.40	0.53

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0225)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
*** W A R N I N G : HYDROGRAPH 0183 <ID= 1> IS DRY.				
*** W A R N I N G : HYDROGRAPH 0225 = HYDROGRAPH 0206				
ID1= 1 (0183):	0.00	0.000	0.00	0.00
+ ID2= 2 (0206):	38.60	2.744	1.40	24.54
ID = 3 (0225):	38.60	2.744	1.40	24.54

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```
-------------------
| ADD HYD  (  0225)|
|   3 +  2 =  1    |          AREA     QPEAK     TPEAK      R.V.
-------------------           (ha)     (cms)     (hrs)      (mm)
*** W A R N I N G :  HYDROGRAPH   0227 <ID= 2> IS DRY.
*** W A R N I N G :  HYDROGRAPH   0001 = HYDROGRAPH 0003
       ID1= 3 (  0225):    38.60   2.744     1.40    24.54
     + ID2= 2 (  0227):     0.00   0.000     0.00     0.00
       ================================================
       ID = 1 (  0225):    38.60   2.744     1.40    24.54

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

```
-------------------
| CHICAGO STORM    |    IDF curve parameters: A= 930.000
| Ptotal= 46.27 mm |                          B=   4.000
-------------------                          C=   0.798
                       used in:   INTENSITY =  A / (t + B)^C

                       Duration of storm  =  4.00 hrs
                       Storm time step    = 10.00 min
                       Time to peak ratio =  0.33

               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.17    2.85 |  1.17   22.78 |  2.17    6.72 |  3.17    3.39
               0.33    3.26 |  1.33  113.21 |  2.33    5.72 |  3.33    3.14
               0.50    3.84 |  1.50   30.05 |  2.50    4.99 |  3.50    2.94
               0.67    4.72 |  1.67   15.54 |  2.67    4.45 |  3.67    2.76
               0.83    6.21 |  1.83   10.66 |  2.83    4.02 |  3.83    2.61
               1.00    9.42 |  2.00    8.20 |  3.00    3.67 |  4.00    2.47
```

```
-------------------
| CALIB            |
| STANDHYD (  0209)|   Area    (ha)=   5.20
|ID= 1 DT=12.0 min |   Total Imp(%)=  31.60   Dir. Conn.(%)=  19.40
-------------------

                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      1.64         3.56
     Dep. Storage     (mm)=      1.00         1.50
     Average Slope     (%)=      1.00         2.00
     Length            (m)=    186.19        40.00
     Mannings n           =     0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO  12.0 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
              0.200    2.92 | 1.200   37.85 | 2.200    6.55 |  3.20    3.35
              0.400    3.45 | 1.400   85.49 | 2.400    5.48 |  3.40    3.08
              0.600    4.28 | 1.600   22.80 | 2.600    4.72 |  3.60    2.85
              0.800    5.71 | 1.800   12.29 | 2.800    4.16 |  3.80    2.66
              1.000    8.88 | 2.000    8.61 | 3.000    3.73 |  4.00    2.49

     Max.Eff.Inten.(mm/hr)=     85.49        31.04
               over (min)       12.00        24.00
     Storage Coeff.  (min)=      3.95 (ii)   15.22 (ii)
     Unit Hyd. Tpeak (min)=     12.00        24.00
     Unit Hyd. peak  (cms)=      0.13         0.06
                                                    *TOTALS*
     PEAK FLOW       (cms)=      0.23         0.17     0.326 (iii)
     TIME TO PEAK    (hrs)=      1.40         1.60     1.40
     RUNOFF VOLUME    (mm)=     45.27        14.27    20.28
     TOTAL RAINFALL   (mm)=     46.27        46.27    46.27
     RUNOFF COEFFICIENT   =      0.98         0.31     0.44

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.
```

```
       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
```

```
-------------------
| CHICAGO STORM    |    IDF curve parameters: A= 930.000
| Ptotal= 46.27 mm |                          B=   4.000
-------------------                          C=   0.798
                       used in:   INTENSITY =  A / (t + B)^C

                       Duration of storm  =  4.00 hrs
                       Storm time step    = 10.00 min
                       Time to peak ratio =  0.33

               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.17    2.85 |  1.17   22.78 |  2.17    6.72 |  3.17    3.39
               0.33    3.26 |  1.33  113.21 |  2.33    5.72 |  3.33    3.14
               0.50    3.84 |  1.50   30.05 |  2.50    4.99 |  3.50    2.94
               0.67    4.72 |  1.67   15.54 |  2.67    4.45 |  3.67    2.76
               0.83    6.21 |  1.83   10.66 |  2.83    4.02 |  3.83    2.61
               1.00    9.42 |  2.00    8.20 |  3.00    3.67 |  4.00    2.47
```

```
-------------------
| CALIB            |
| STANDHYD (  0252)|   Area    (ha)=   1.44
|ID= 1 DT=12.0 min |   Total Imp(%)=  52.40   Dir. Conn.(%)=  20.10
-------------------

                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      0.75         0.69
     Dep. Storage     (mm)=      1.00         1.50
     Average Slope     (%)=      1.00         2.00
     Length            (m)=     97.98        40.00
     Mannings n           =     0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO  12.0 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
              0.200    2.92 | 1.200   37.85 | 2.200    6.55 |  3.20    3.35
              0.400    3.45 | 1.400   85.49 | 2.400    5.48 |  3.40    3.08
              0.600    4.28 | 1.600   22.80 | 2.600    4.72 |  3.60    2.85
              0.800    5.71 | 1.800   12.29 | 2.800    4.16 |  3.80    2.66
              1.000    8.88 | 2.000    8.61 | 3.000    3.73 |  4.00    2.49

     Max.Eff.Inten.(mm/hr)=     85.49        57.55
               over (min)       12.00        12.00
     Storage Coeff.  (min)=      2.69 (ii)   11.49 (ii)
     Unit Hyd. Tpeak (min)=     12.00        12.00
     Unit Hyd. peak  (cms)=      0.14         0.09
                                                    *TOTALS*
     PEAK FLOW       (cms)=      0.07         0.08     0.145 (iii)
     TIME TO PEAK    (hrs)=      1.40         1.40     1.40
     RUNOFF VOLUME    (mm)=     45.27        18.16    23.60
     TOTAL RAINFALL   (mm)=     46.27        46.27    46.27
     RUNOFF COEFFICIENT   =      0.98         0.39     0.51

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
```

```
-------------------
| RESERVOIR(  0261)|
| IN= 2---> OUT= 1 |
```

COLE ENGINEERING

Experience Enhancing Excellence

DT= 5.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.1470	0.0137
	0.0530	0.0050	0.1700	0.0155
	0.0700	0.0076	0.1900	0.0220
	0.1150	0.0113	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0252)	1.440	0.145	1.40	23.60
OUTFLOW: ID= 1 (0261)	1.440	0.081	1.60	23.59

PEAK FLOW REDUCTION [Qout/Qin](%)= 55.62
TIME SHIFT OF PEAK FLOW (min)= 12.00
MAXIMUM STORAGE USED (ha.m.)= 0.0086

ADD HYD (0251)	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
1 + 2 = 3				
ID1= 1 (0209):	5.20	0.326	1.40	20.28
+ ID2= 2 (0261):	1.44	0.081	1.60	23.59
ID = 3 (0251):	6.64	0.385	1.40	21.00

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0245)				
IN= 2---> OUT= 1				
DT= 12.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.3090	0.2876
	0.0000	0.0000	0.3330	0.3838
	0.1230	0.1102	0.3620	0.5200
	0.2870	0.1971	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0251)	6.640	0.385	1.40	21.00
OUTFLOW: ID= 1 (0245)	6.640	0.088	2.40	20.97

PEAK FLOW REDUCTION [Qout/Qin](%)= 22.85
TIME SHIFT OF PEAK FLOW (min)= 60.00
MAXIMUM STORAGE USED (ha.m.)= 0.0790

ROUTEPIPE(0212)	
IN= 2---> OUT= 1	Pipe Number = 1.00
DT= 12.0 min	Diameter (mm)=1650.00
	Length (m)= 850.00
	Slope (m/m)= 0.005
	Manning n = 0.013

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

DEPTH (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME min
0.09	.367E+02	0.0	0.80	17.68
0.17	.102E+03	0.1	1.25	11.33
0.26	.184E+03	0.3	1.61	8.81
0.35	.278E+03	0.6	1.91	7.41
0.43	.382E+03	1.0	2.18	6.51
0.52	.492E+03	1.4	2.41	5.88
0.61	.608E+03	1.9	2.61	5.43
0.69	.727E+03	2.4	2.79	5.08
0.78	.848E+03	2.9	2.95	4.81
0.87	.970E+03	3.5	3.08	4.60
0.96	.109E+04	4.1	3.20	4.43
1.04	.121E+04	4.7	3.29	4.31
1.13	.133E+04	5.2	3.36	4.22
1.22	.144E+04	5.8	3.41	4.15
1.30	.154E+04	6.2	3.44	4.12
1.39	.163E+04	6.6	3.43	4.13
1.48	.172E+04	6.9	3.40	4.17
1.56	.178E+04	6.9	3.31	4.28
1.65	.182E+04	6.5	3.02	4.70

<---- hydrograph ----> <-pipe / channel->

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 2 (0245)	6.64	0.09	2.40	20.97	0.13	0.96
OUTFLOW: ID= 1 (0212)	6.64	0.09	2.70	20.96	0.13	0.96

ADD HYD (0211)	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
1 + 2 = 3				
ID1= 1 (0212):	6.64	0.087	2.70	20.96
+ ID2= 2 (0225):	38.60	2.744	1.40	24.54
ID = 3 (0211):	45.24	2.756	1.40	24.01

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0255)				
IN= 2---> OUT= 1				
DT= 12.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	1.6250	1.2448
	0.0190	0.1627	1.6630	1.2997
	0.0360	0.4306	1.8430	1.5816
	0.0480	0.7217	2.1300	2.1197
	0.1330	0.7718	2.9680	2.2465
	1.0390	0.9773	7.5380	2.5741

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0211)	45.240	2.756	1.40	24.01
OUTFLOW: ID= 1 (0255)	45.240	0.337	3.50	23.96

PEAK FLOW REDUCTION [Qout/Qin](%)= 12.23
TIME SHIFT OF PEAK FLOW (min)=126.00
MAXIMUM STORAGE USED (ha.m.)= 0.8181

V V I SSSSS U U A L (v 5.1.2004)
V V I SS U U A A L
V V I SS U U AAAAA L
V V I SS U U A A L
VV I SSSSS UUUUU A A LLLLL

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

Developed and Distributed by Civica Infrastructure

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

Input filename: C:\Program Files (x86)\Visual OTTHYMO 5.1\VO2\voin.dat
Output filename: C:\Users\jlysecki\AppData\Local\Civica\VH5\a379672b-db33-4372-b5e0-ba58a07d1417\e165703e-1ac0-4b57-b745-296f739edb1c\sce
Summary filename: C:\Users\jlysecki\AppData\Local\Civica\VH5\a379672b-db33-4372-b5e0-ba58a07d1417\e165703e-1ac0-4b57-b745-296f739edb1c\sce

DATE: 01/15/2020 TIME: 04:24:46

USER:

COMMENTS: _____

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

CHICAGO STORM	IDF curve parameters: A=1021.000
Ptotal= 54.13 mm	B= 3.000
	C= 0.787

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

Duration of storm = 4.00 hrs
Storm time step = 10.00 min
Time to peak ratio = 0.33

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.17	3.43	1.17	25.32	2.17	7.85	3.17	4.06
0.33	3.92	1.33	135.63	2.33	6.73	3.33	3.78
0.50	4.59	1.50	33.17	2.50	5.91	3.50	3.54
0.67	5.59	1.67	17.50	2.67	5.29	3.67	3.33
0.83	7.28	1.83	12.21	2.83	4.79	3.83	3.15
1.00	10.84	2.00	9.50	3.00	4.39	4.00	2.99

CALIB	
STANDHYD (0228)	Area (ha)= 12.56
ID= 1 DT=12.0 min	Total Imp(%)= 54.10 Dir. Conn.(%)= 25.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	6.79	5.77
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	289.37	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 12.0 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
0.200	3.52	1.200	43.70	2.200	7.66	3.20	4.02
0.400	4.14	1.400	101.48	2.400	6.45	3.40	3.70
0.600	5.09	1.600	25.33	2.600	5.60	3.60	3.44
0.800	6.72	1.800	13.97	2.800	4.96	3.80	3.21
1.000	10.25	2.000	9.95	3.000	4.46	4.00	3.02

Max.Eff.Inten.(mm/hr)=		101.48	72.71	
over (min)		12.00	24.00	
Storage Coeff. (min)=		4.80 (ii)	12.82 (ii)	
Unit Hyd. Tpeak (min)=		12.00	24.00	
Unit Hyd. peak (cms)=		0.13	0.07	
				TOTALS
PEAK FLOW	(cms)=	0.84	0.68	1.237 (iii)
TIME TO PEAK	(hrs)=	1.40	1.60	1.40
RUNOFF VOLUME	(mm)=	53.13	23.01	30.54
TOTAL RAINFALL	(mm)=	54.13	54.13	54.13
RUNOFF COEFFICIENT	=	0.98	0.43	0.56

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CHICAGO STORM	IDF curve parameters: A=1021.000
Ptotal= 54.13 mm	B= 3.000
	C= 0.787

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

Duration of storm = 4.00 hrs
Storm time step = 10.00 min
Time to peak ratio = 0.33

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.17	3.43	1.17	25.32	2.17	7.85	3.17	4.06
0.33	3.92	1.33	135.63	2.33	6.73	3.33	3.78
0.50	4.59	1.50	33.17	2.50	5.91	3.50	3.54
0.67	5.59	1.67	17.50	2.67	5.29	3.67	3.33
0.83	7.28	1.83	12.21	2.83	4.79	3.83	3.15
1.00	10.84	2.00	9.50	3.00	4.39	4.00	2.99

CALIB	
STANDHYD (0257)	Area (ha)= 3.10
ID= 1 DT=12.0 min	Total Imp(%)= 67.90 Dir. Conn.(%)= 42.90

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	2.10	1.00
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	143.76	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 12.0 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
0.200	3.52	1.200	43.70	2.200	7.66	3.20	4.02
0.400	4.14	1.400	101.48	2.400	6.45	3.40	3.70
0.600	5.09	1.600	25.33	2.600	5.60	3.60	3.44
0.800	6.72	1.800	13.97	2.800	4.96	3.80	3.21
1.000	10.25	2.000	9.95	3.000	4.46	4.00	3.02

Max.Eff.Inten.(mm/hr)=		101.48	83.60	
over (min)		12.00	12.00	
Storage Coeff. (min)=		3.16 (ii)	10.74 (ii)	
Unit Hyd. Tpeak (min)=		12.00	12.00	
Unit Hyd. peak (cms)=		0.14	0.10	
				TOTALS
PEAK FLOW	(cms)=	0.37	0.17	0.537 (iii)
TIME TO PEAK	(hrs)=	1.40	1.40	1.40
RUNOFF VOLUME	(mm)=	53.13	24.18	36.60
TOTAL RAINFALL	(mm)=	54.13	54.13	54.13
RUNOFF COEFFICIENT	=	0.98	0.45	0.68

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0258)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0228):		12.56	1.237	1.40	30.54
+ ID2= 2 (0257):		3.10	0.537	1.40	36.60

```
      ================================================
      ID = 3 (  0258):    15.66   1.774     1.40    31.74

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
-------------------
| RESERVOIR(  0243)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
-------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                         0.0000     0.0000   |   0.1346     0.4241
                         0.0096     0.0421   |   0.1575     0.4697
                         0.0159     0.0886   |   0.1823     0.5165
                         0.0203     0.1399   |   0.2088     0.5647
                         0.0228     0.1768   |   0.2369     0.6142
                         0.0250     0.2150   |   0.2514     0.6394
                         0.0628     0.2544   |   0.2663     0.6650
                         0.0835     0.2950   |   0.2816     0.6910
                         0.0991     0.3368   |   0.2997     0.7172
                         0.1144     0.3798   |   0.3113     0.7439

                              AREA     QPEAK     TPEAK       R.V.
                              (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0258)    15.660     1.774     1.40      31.74
   OUTFLOW: ID= 1 (  0243)    15.660     0.119     3.60      31.67

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  6.73
                  TIME SHIFT OF PEAK FLOW          (min)=132.00
                  MAXIMUM  STORAGE   USED        (ha.m.)=  0.3908

--------------------------------------------------------------------------------
-------------------
| ROUTEPIPE(  0184)|     PIPE Number     =   1.00
| IN= 2---> OUT= 1 |     Diameter    (mm)=1650.00
| DT= 12.0 min     |     Length       (m)= 500.00
-------------------      Slope      (m/m)=  0.005
                         Manning n        =  0.013

     <----------------- TRAVEL TIME TABLE ------------------->
       DEPTH      VOLUME     FLOW RATE    VELOCITY    TRAV.TIME
        (m)     (cu.m.)       (cms)        (m/s)        min
       0.09    .216E+02        0.0         0.80        10.40
       0.17    .600E+02        0.1         1.25         6.67
       0.26    .108E+03        0.3         1.61         5.18
       0.35    .164E+03        0.6         1.91         4.36
       0.43    .225E+03        1.0         2.18         3.83
       0.52    .290E+03        1.4         2.41         3.46
       0.61    .358E+03        1.9         2.61         3.19
       0.69    .428E+03        2.4         2.79         2.99
       0.78    .499E+03        2.9         2.95         2.83
       0.87    .570E+03        3.5         3.08         2.70
       0.96    .642E+03        4.1         3.20         2.61
       1.04    .712E+03        4.7         3.29         2.53
       1.13    .780E+03        5.2         3.36         2.48
       1.22    .844E+03        5.8         3.41         2.44
       1.30    .905E+03        6.2         3.44         2.43
       1.39    .961E+03        6.6         3.43         2.43
       1.48    .101E+04        6.9         3.40         2.45
       1.56    .105E+04        6.9         3.31         2.52
       1.65    .107E+04        6.5         3.02         2.76
                                    <---- hydrograph ---->   <-pipe / channel->
                               AREA    QPEAK    TPEAK   R.V.   MAX DEPTH  MAX VEL
                               (ha)    (cms)    (hrs)   (mm)       (m)      (m/s)
   INFLOW : ID= 2 (  0243)   15.66     0.12     3.60  31.67      0.15      1.09
   OUTFLOW: ID= 1 (  0184)   15.66     0.12     3.80  31.67      0.15      1.09


--------------------------------------------------------------------------------
-------------------
| CHICAGO STORM    |     IDF curve parameters: A=1021.000
| Ptotal= 54.13 mm |                           B=   3.000
-------------------                           C=   0.787
                         used in:   INTENSITY =  A / (t + B)^C

                         Duration of storm  =  4.00 hrs
                         Storm time step    = 10.00 min
                         Time to peak ratio =  0.33

      TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
       hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
      0.17    3.43 |  1.17   25.32 |'  2.17    7.85 |  3.17    4.06
      0.33    3.92 |  1.33  135.63 |'  2.33    6.73 |  3.33    3.78
      0.50    4.59 |  1.50   33.17 |'  2.50    5.91 |  3.50    3.54
      0.67    5.59 |  1.67   17.50 |'  2.67    5.29 |  3.67    3.33
      0.83    7.28 |  1.83   12.21 |'  2.83    4.79 |  3.83    3.15
      1.00   10.84 |  2.00    9.50 |'  3.00    4.39 |  4.00    2.99

--------------------------------------------------------------------------------
-------------------
| CALIB            |
| STANDHYD (  0229)|   Area     (ha)=  12.13
|ID= 1 DT=12.0 min |   Total Imp(%)=  54.50   Dir. Conn.(%)=  19.70
-------------------
                                IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        6.61          5.52
     Dep. Storage     (mm)=        1.00          1.50
     Average Slope     (%)=        1.00          2.00
     Length            (m)=      284.37         40.00
     Mannings n           =       0.013         0.250

        NOTE:  RAINFALL WAS TRANSFORMED TO  12.0 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
     0.200    3.52 | 1.200   43.70 | 2.200    7.66 |  3.20    4.02
     0.400    4.14 | 1.400  101.48 | 2.400    6.45 |  3.40    3.70
     0.600    5.09 | 1.600   25.33 | 2.600    5.60 |  3.60    3.44
     0.800    6.72 | 1.800   13.97 | 2.800    4.96 |  3.80    3.21
     1.000   10.25 | 2.000    9.95 | 3.000    4.46 |  4.00    3.02

     Max.Eff.Inten.(mm/hr)=     101.48        82.53
                 over (min)        12.00        24.00
     Storage Coeff.  (min)=        4.75 (ii)   12.38 (ii)
     Unit Hyd. Tpeak (min)=       12.00        24.00
     Unit Hyd. peak  (cms)=        0.13         0.07
                                                          *TOTALS*
     PEAK FLOW       (cms)=        0.64         0.75          1.080 (iii)
     TIME TO PEAK    (hrs)=        1.40         1.60          1.40
     RUNOFF VOLUME    (mm)=       53.13        24.07         29.80
     TOTAL RAINFALL   (mm)=       54.13        54.13         54.13
     RUNOFF COEFFICIENT   =        0.98         0.44          0.55

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
             YOU SHOULD CONSIDER SPLITTING THE AREA.

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  69.0    Ia = Dep. Storage   (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

-------------------
| ADD HYD  (  0196)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
-------------------           (ha)     (cms)    (hrs)     (mm)
        ID1= 1 (  0184):    15.66   0.119     3.80     31.67
      + ID2= 2 (  0229):    12.13   1.080     1.40     29.80
        ================================================
        ID = 3 (  0196):    27.79   1.093     1.40     30.85

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
-------------------
| RESERVOIR(  0256)|
```

IN= 2---> OUT= 1
DT= 12.0 min

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.2761	0.3332
0.0090	0.0385	0.3101	0.3536
0.0147	0.0812	0.3454	0.3743
0.0199	0.1456	0.3818	0.3952
0.0210	0.1631	0.4194	0.4165
0.0987	0.2172	0.4581	0.4381
0.1306	0.2358	0.4979	0.4600
0.1761	0.2739	0.5806	0.5047
0.2120	0.2934	0.6234	0.5275
0.2433	0.3131	0.7121	0.5742

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0196)	27.790	1.093	1.40	30.85
OUTFLOW: ID= 1 (0256)	27.790	0.211	3.60	30.81

PEAK FLOW REDUCTION [Qout/Qin](%)= 19.31
TIME SHIFT OF PEAK FLOW (min)=132.00
MAXIMUM STORAGE USED (ha.m.)= 0.2929

CHICAGO STORM
Ptotal= 54.13 mm

IDF curve parameters: A=1021.000
B= 3.000
C= 0.787
used in: INTENSITY = A / (t + B)^C

Duration of storm = 4.00 hrs
Storm time step = 10.00 min
Time to peak ratio = 0.33

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.17	3.43	1.17	25.32	2.17	7.85	3.17	4.06
0.33	3.92	1.33	135.63	2.33	6.73	3.33	3.78
0.50	4.59	1.50	33.17	2.50	5.91	3.50	3.54
0.67	5.59	1.67	17.50	2.67	5.29	3.67	3.33
0.83	7.28	1.83	12.21	2.83	4.79	3.83	3.15
1.00	10.84	2.00	9.50	3.00	4.39	4.00	2.99

CALIB
STANDHYD (0230)
ID= 1 DT=12.0 min

Area (ha)= 20.35
Total Imp(%)= 53.70 Dir. Conn.(%)= 32.40

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	10.93	9.42
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	368.33	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 12.0 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
0.200	3.52	1.200	43.70	2.200	7.66	3.20	4.02
0.400	4.14	1.400	101.48	2.400	6.45	3.40	3.70
0.600	5.09	1.600	25.33	2.600	5.60	3.60	3.44
0.800	6.72	1.800	13.97	2.800	4.96	3.80	3.21
1.000	10.25	2.000	9.95	3.000	4.46	4.00	3.02

				TOTALS
Max.Eff.Inten.(mm/hr)=		101.48	60.23	
over (min)		12.00	24.00	
Storage Coeff. (min)=		5.55 (ii)	14.20 (ii)	
Unit Hyd. Tpeak (min)=		12.00	24.00	
Unit Hyd. peak (cms)=		0.13	0.06	
PEAK FLOW	(cms)=	1.73	0.88	2.234 (iii)
TIME TO PEAK	(hrs)=	1.40	1.60	1.40
RUNOFF VOLUME	(mm)=	53.13	21.49	31.74
TOTAL RAINFALL	(mm)=	54.13	54.13	54.13
RUNOFF COEFFICIENT	=	0.98	0.40	0.59

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0224)
1 + 2 = 3

		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0230):		20.35	2.234	1.40	31.74
+ ID2= 2 (0256):		27.79	0.211	3.60	30.81
ID = 3 (0224):		48.14	2.248	1.40	31.21

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0253)
IN= 2---> OUT= 1
DT= 12.0 min

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.6390	0.9848
0.0270	0.1457	0.9700	1.2900
0.0430	0.3152	1.1040	1.7480
0.0530	0.4653	3.3100	1.9350
0.3280	0.6677	11.3140	2.2662

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0224)	48.140	2.248	1.40	31.21
OUTFLOW: ID= 1 (0253)	48.140	0.281	4.20	31.18

PEAK FLOW REDUCTION [Qout/Qin](%)= 12.49
TIME SHIFT OF PEAK FLOW (min)=168.00
MAXIMUM STORAGE USED (ha.m.)= 0.6332

CHICAGO STORM
Ptotal= 54.13 mm

IDF curve parameters: A=1021.000
B= 3.000
C= 0.787
used in: INTENSITY = A / (t + B)^C

Duration of storm = 4.00 hrs
Storm time step = 10.00 min
Time to peak ratio = 0.33

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.17	3.43	1.17	25.32	2.17	7.85	3.17	4.06
0.33	3.92	1.33	135.63	2.33	6.73	3.33	3.78
0.50	4.59	1.50	33.17	2.50	5.91	3.50	3.54
0.67	5.59	1.67	17.50	2.67	5.29	3.67	3.33
0.83	7.28	1.83	12.21	2.83	4.79	3.83	3.15
1.00	10.84	2.00	9.50	3.00	4.39	4.00	2.99

CALIB
STANDHYD (0160)
ID= 1 DT=12.0 min

Area (ha)= 1.30
Total Imp(%)= 50.70 Dir. Conn.(%)= 22.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.66	0.64

Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	93.09	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 12.0 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
0.200	3.52	1.200	43.70	2.200	7.66	3.20	4.02
0.400	4.14	1.400	101.48	2.400	6.45	3.40	3.70
0.600	5.09	1.600	25.33	2.600	5.60	3.60	3.44
0.800	6.72	1.800	13.97	2.800	4.96	3.80	3.21
1.000	10.25	2.000	9.95	3.000	4.46	4.00	3.02

Max.Eff.Inten.(mm/hr)=		101.48	68.92	
over (min)		12.00	12.00	
Storage Coeff. (min)=		2.43 (ii)	10.62 (ii)	
Unit Hyd. Tpeak (min)=		12.00	12.00	
Unit Hyd. peak (cms)=		0.14	0.10	
				TOTALS
PEAK FLOW	(cms)=	0.08	0.09	0.169 (iii)
TIME TO PEAK	(hrs)=	1.40	1.40	1.40
RUNOFF VOLUME	(mm)=	53.13	22.57	29.29
TOTAL RAINFALL	(mm)=	54.13	54.13	54.13
RUNOFF COEFFICIENT	=	0.98	0.42	0.54

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

DUHYD (0183)				
Inlet Cap.= 0.152				
#of Inlets= 1				
Total(cms)= 0.2	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
TOTAL HYD.(ID= 1):	1.30	0.17	1.40	29.29
MAJOR SYS.(ID= 2):	0.04	0.02	1.40	29.29
MINOR SYS.(ID= 3):	1.26	0.15	1.40	29.29

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CHICAGO STORM	IDF curve parameters: A=1021.000
Ptotal= 54.13 mm	B= 3.000
	C= 0.787

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

Duration of storm = 4.00 hrs
Storm time step = 10.00 min
Time to peak ratio = 0.33

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.17	3.43	1.17	25.32	2.17	7.85	3.17	4.06
0.33	3.92	1.33	135.63	2.33	6.73	3.33	3.78
0.50	4.59	1.50	33.17	2.50	5.91	3.50	3.54
0.67	5.59	1.67	17.50	2.67	5.29	3.67	3.33
0.83	7.28	1.83	12.21	2.83	4.79	3.83	3.15
1.00	10.84	2.00	9.50	3.00	4.39	4.00	2.99

CALIB		
STANDHYD (0193)	Area	(ha)= 1.21

ID= 1 DT=12.0 min | Total Imp(%)= 49.30 Dir. Conn.(%)= 20.10

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.60	0.61
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	89.81	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 12.0 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
0.200	3.52	1.200	43.70	2.200	7.66	3.20	4.02
0.400	4.14	1.400	101.48	2.400	6.45	3.40	3.70
0.600	5.09	1.600	25.33	2.600	5.60	3.60	3.44
0.800	6.72	1.800	13.97	2.800	4.96	3.80	3.21
1.000	10.25	2.000	9.95	3.000	4.46	4.00	3.02

Max.Eff.Inten.(mm/hr)=		101.48	68.47	
over (min)		12.00	12.00	
Storage Coeff. (min)=		2.38 (ii)	10.59 (ii)	
Unit Hyd. Tpeak (min)=		12.00	12.00	
Unit Hyd. peak (cms)=		0.14	0.10	
				TOTALS
PEAK FLOW	(cms)=	0.07	0.08	0.153 (iii)
TIME TO PEAK	(hrs)=	1.40	1.40	1.40
RUNOFF VOLUME	(mm)=	53.13	22.52	28.67
TOTAL RAINFALL	(mm)=	54.13	54.13	54.13
RUNOFF COEFFICIENT	=	0.98	0.42	0.53

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

DUHYD (0227)				
Inlet Cap.= 0.120				
#of Inlets= 1				
Total(cms)= 0.1	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
TOTAL HYD.(ID= 1):	1.21	0.15	1.40	28.67
MAJOR SYS.(ID= 2):	0.08	0.03	1.40	28.67
MINOR SYS.(ID= 3):	1.13	0.12	1.40	28.67

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CHICAGO STORM	IDF curve parameters: A=1021.000
Ptotal= 54.13 mm	B= 3.000
	C= 0.787

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

Duration of storm = 4.00 hrs
Storm time step = 10.00 min
Time to peak ratio = 0.33

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.17	3.43	1.17	25.32	2.17	7.85	3.17	4.06
0.33	3.92	1.33	135.63	2.33	6.73	3.33	3.78
0.50	4.59	1.50	33.17	2.50	5.91	3.50	3.54
0.67	5.59	1.67	17.50	2.67	5.29	3.67	3.33
0.83	7.28	1.83	12.21	2.83	4.79	3.83	3.15
1.00	10.84	2.00	9.50	3.00	4.39	4.00	2.99

```
--------------------------------------------------------------------------------
-------------------
| CALIB             |
| STANDHYD (  0206)|   Area     (ha)=  38.60
|ID= 1 DT=12.0 min |   Total Imp(%)=  54.70   Dir. Conn.(%)=  23.20
-------------------

                        IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      21.11        17.49
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     507.28        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO  12.0 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
              0.200    3.52 | 1.200   43.70 | 2.200    7.66 |  3.20    4.02
              0.400    4.14 | 1.400  101.48 | 2.400    6.45 |  3.40    3.70
              0.600    5.09 | 1.600   25.33 | 2.600    5.60 |  3.60    3.44
              0.800    6.72 | 1.800   13.97 | 2.800    4.96 |  3.80    3.21
              1.000   10.25 | 2.000    9.95 | 3.000    4.46 |  4.00    3.02

     Max.Eff.Inten.(mm/hr)=     101.48        77.27
               over (min)       12.00        24.00
     Storage Coeff.  (min)=      6.73 (ii)   14.55 (ii)
     Unit Hyd. Tpeak (min)=     12.00        24.00
     Unit Hyd. peak  (cms)=      0.12         0.06
                                                    *TOTALS*
     PEAK FLOW       (cms)=      2.26         2.08          3.463 (iii)
     TIME TO PEAK    (hrs)=      1.40         1.60           1.40
     RUNOFF VOLUME    (mm)=     53.13        23.52          30.39
     TOTAL RAINFALL   (mm)=     54.13        54.13          54.13
     RUNOFF COEFFICIENT   =      0.98         0.43           0.56

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

-------------------
| ADD HYD  (  0225)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
-------------------           (ha)     (cms)    (hrs)     (mm)
       ID1= 1 (  0183):      0.04   0.017     1.40    29.29
     + ID2= 2 (  0206):     38.60   3.463     1.40    30.39
       ================================================
       ID = 3 (  0225):     38.64   3.480     1.40    30.39

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

-------------------
| ADD HYD  (  0225)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
-------------------           (ha)     (cms)    (hrs)     (mm)
       ID1= 3 (  0225):     38.64   3.480     1.40    30.39
     + ID2= 2 (  0227):      0.08   0.033     1.40    28.67
       ================================================
       ID = 1 (  0225):     38.73   3.513     1.40    30.39

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
-------------------
| CHICAGO STORM    |    IDF curve parameters: A=1021.000
| Ptotal= 54.13 mm |                          B=   3.000
-------------------                          C=   0.787
                          used in:   INTENSITY =  A / (t + B)^C

                          Duration of storm  =  4.00 hrs
                          Storm time step    = 10.00 min
                          Time to peak ratio =  0.33

               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
              0.17     3.43 |  1.17   25.32 |  2.17    7.85 |  3.17    4.06
              0.33     3.92 |  1.33  135.63 |  2.33    6.73 |  3.33    3.78
              0.50     4.59 |  1.50   33.17 |  2.50    5.91 |  3.50    3.54
              0.67     5.59 |  1.67   17.50 |  2.67    5.29 |  3.67    3.33
              0.83     7.28 |  1.83   12.21 |  2.83    4.79 |  3.83    3.15
              1.00    10.84 |  2.00    9.50 |  3.00    4.39 |  4.00    2.99

--------------------------------------------------------------------------------
-------------------
| CALIB             |
| STANDHYD (  0209)|   Area     (ha)=   5.20
|ID= 1 DT=12.0 min |   Total Imp(%)=  31.60   Dir. Conn.(%)=  19.40
-------------------

                        IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.64         3.56
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     186.19        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO  12.0 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
              0.200    3.52 | 1.200   43.70 | 2.200    7.66 |  3.20    4.02
              0.400    4.14 | 1.400  101.48 | 2.400    6.45 |  3.40    3.70
              0.600    5.09 | 1.600   25.33 | 2.600    5.60 |  3.60    3.44
              0.800    6.72 | 1.800   13.97 | 2.800    4.96 |  3.80    3.21
              1.000   10.25 | 2.000    9.95 | 3.000    4.46 |  4.00    3.02

     Max.Eff.Inten.(mm/hr)=     101.48        41.66
               over (min)       12.00        24.00
     Storage Coeff.  (min)=      3.69 (ii)   13.71 (ii)
     Unit Hyd. Tpeak (min)=     12.00        24.00
     Unit Hyd. peak  (cms)=      0.14         0.06
                                                    *TOTALS*
     PEAK FLOW       (cms)=      0.28         0.23          0.410 (iii)
     TIME TO PEAK    (hrs)=      1.40         1.60           1.40
     RUNOFF VOLUME    (mm)=     53.13        18.67          25.35
     TOTAL RAINFALL   (mm)=     54.13        54.13          54.13
     RUNOFF COEFFICIENT   =      0.98         0.34           0.47

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
-------------------
| CHICAGO STORM    |    IDF curve parameters: A=1021.000
| Ptotal= 54.13 mm |                          B=   3.000
-------------------                          C=   0.787
                          used in:   INTENSITY =  A / (t + B)^C

                          Duration of storm  =  4.00 hrs
                          Storm time step    = 10.00 min
                          Time to peak ratio =  0.33

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

0.17	3.43	1.17	25.32	2.17	7.85	3.17	4.06
0.33	3.92	1.33	135.63	2.33	6.73	3.33	3.78
0.50	4.59	1.50	33.17	2.50	5.91	3.50	3.54
0.67	5.59	1.67	17.50	2.67	5.29	3.67	3.33
0.83	7.28	1.83	12.21	2.83	4.79	3.83	3.15
1.00	10.84	2.00	9.50	3.00	4.39	4.00	2.99

CALIB			
STANDHYD (0252)	Area (ha)= 1.44		
ID= 1 DT=12.0 min	Total Imp(%)= 52.40	Dir. Conn.(%)= 20.10	

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.75	0.69
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	97.98	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 12.0 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
0.200	3.52	1.200	43.70	2.200	7.66	3.20	4.02
0.400	4.14	1.400	101.48	2.400	6.45	3.40	3.70
0.600	5.09	1.600	25.33	2.600	5.60	3.60	3.44
0.800	6.72	1.800	13.97	2.800	4.96	3.80	3.21
1.000	10.25	2.000	9.95	3.000	4.46	4.00	3.02

Max.Eff.Inten.(mm/hr)=		101.48	76.01	
over (min)		12.00	12.00	
Storage Coeff. (min)=		2.51 (ii)	10.38 (ii)	
Unit Hyd. Tpeak (min)=		12.00	12.00	
Unit Hyd. peak (cms)=		0.14	0.10	
				TOTALS
PEAK FLOW	(cms)=	0.08	0.11	0.187 (iii)
TIME TO PEAK	(hrs)=	1.40	1.40	1.40
RUNOFF VOLUME	(mm)=	53.13	23.38	29.36
TOTAL RAINFALL	(mm)=	54.13	54.13	54.13
RUNOFF COEFFICIENT	=	0.98	0.43	0.54

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

RESERVOIR(0261)				
IN= 2---> OUT= 1				
DT= 5.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.1470	0.0137
	0.0530	0.0050	0.1700	0.0155
	0.0700	0.0076	0.1900	0.0220
	0.1150	0.0113	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0252)	1.440	0.187	1.40	29.36
OUTFLOW: ID= 1 (0261)	1.440	0.107	1.60	29.34

PEAK FLOW REDUCTION [Qout/Qin](%)= 56.85
TIME SHIFT OF PEAK FLOW (min)= 12.00
MAXIMUM STORAGE USED (ha.m.)= 0.0110

ADD HYD (0251)				
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0209):	5.20	0.410	1.40	25.35
+ ID2= 2 (0261):	1.44	0.107	1.60	29.34
ID = 3 (0251):	6.64	0.481	1.40	26.22

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0245)				
IN= 2---> OUT= 1				
DT= 12.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.3090	0.2876
	0.0000	0.0000	0.3330	0.3838
	0.1230	0.1102	0.3620	0.5200
	0.2870	0.1971	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0251)	6.640	0.481	1.40	26.22
OUTFLOW: ID= 1 (0245)	6.640	0.110	2.40	26.18

PEAK FLOW REDUCTION [Qout/Qin](%)= 22.87
TIME SHIFT OF PEAK FLOW (min)= 60.00
MAXIMUM STORAGE USED (ha.m.)= 0.0986

ROUTEPIPE(0212)		
IN= 2---> OUT= 1	Pipe Number	= 1.00
DT= 12.0 min	Diameter	(mm)=1650.00
	Length	(m)= 850.00
	Slope	(m/m)= 0.005
	Manning n	= 0.013

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

DEPTH (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME min
0.09	.367E+02	0.0	0.80	17.68
0.17	.102E+03	0.1	1.25	11.33
0.26	.184E+03	0.3	1.61	8.81
0.35	.278E+03	0.6	1.91	7.41
0.43	.382E+03	1.0	2.18	6.51
0.52	.492E+03	1.4	2.41	5.88
0.61	.608E+03	1.9	2.61	5.43
0.69	.727E+03	2.4	2.79	5.08
0.78	.848E+03	2.9	2.95	4.81
0.87	.970E+03	3.5	3.08	4.60
0.96	.109E+04	4.1	3.20	4.43
1.04	.121E+04	4.7	3.29	4.31
1.13	.133E+04	5.2	3.36	4.22
1.22	.144E+04	5.8	3.41	4.15
1.30	.154E+04	6.2	3.44	4.12
1.39	.163E+04	6.6	3.43	4.13
1.48	.172E+04	6.9	3.40	4.17
1.56	.178E+04	6.9	3.31	4.28
1.65	.182E+04	6.5	3.02	4.70

	AREA (ha)	<---- hydrograph ----> QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	<-pipe / channel-> MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 2 (0245)	6.64	0.11	2.40	26.18	0.14	1.05
OUTFLOW: ID= 1 (0212)	6.64	0.11	2.60	26.18	0.14	1.04

ADD HYD (0211)				
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0212):	6.64	0.109	2.60	26.18
+ ID2= 2 (0225):	38.73	3.513	1.40	30.39

```
       ID = 3 (  0211):    45.37   3.528     1.40    29.77

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0255)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                         0.0000     0.0000   |  1.6250      1.2448
                         0.0190     0.1627   |  1.6630      1.2997
                         0.0360     0.4306   |  1.8430      1.5816
                         0.0480     0.7217   |  2.1300      2.1197
                         0.1330     0.7718   |  2.9680      2.2465
                         1.0390     0.9773   |  7.5380      2.5741

                              AREA     QPEAK     TPEAK       R.V.
                              (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0211)    45.366     3.528     1.40      29.77
   OUTFLOW: ID= 1 (  0255)    45.366     0.617     2.70      29.72

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 17.49
                  TIME SHIFT OF PEAK FLOW          (min)= 78.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.8817

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

       V    V   I    SSSSS  U   U    A    L              (v 5.1.2004)
       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 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)\Visual OTTHYMO 5.1\VO2\voin.dat
  Output  filename: C:\Users\jlysecki\AppData\Local\Civica\VH5\a379672b-db33-4372-b5e0-
ba58a07d1417\cf5a1b9c-cf99-433b-8e4b-1868969d8b74\sce
  Summary filename: C:\Users\jlysecki\AppData\Local\Civica\VH5\a379672b-db33-4372-b5e0-
ba58a07d1417\cf5a1b9c-cf99-433b-8e4b-1868969d8b74\sce


DATE: 01/15/2020                          TIME: 04:24:46

USER:


COMMENTS: _____________________________________________________


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

--------------------
| CHICAGO STORM    |    IDF curve parameters: A=1100.000
| Ptotal= 62.15 mm |                          B=   2.000
--------------------                          C=   0.776
                       used in:   INTENSITY =  A / (t + B)^C
                                  Duration of storm  =  4.00 hrs
                                  Storm time step    = 10.00 min
                                  Time to peak ratio =  0.33

                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.17    4.06 |  1.17   27.34 |'  2.17    9.00 |  3.17    4.78
                0.33    4.62 |  1.33  159.94 |'  2.33    7.77 |  3.33    4.46
                0.50    5.38 |  1.50   35.45 |'  2.50    6.86 |  3.50    4.19
                0.67    6.51 |  1.67   19.27 |'  2.67    6.16 |  3.67    3.95
                0.83    8.38 |  1.83   13.70 |'  2.83    5.61 |  3.83    3.74
                1.00   12.24 |  2.00   10.80 |'  3.00    5.16 |  4.00    3.55


--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0228)|   Area     (ha)=  12.56
|ID= 1 DT=12.0 min |   Total Imp(%)=  54.10   Dir. Conn.(%)=  25.00
--------------------

                                    IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=           6.79          5.77
     Dep. Storage     (mm)=           1.00          1.50
     Average Slope     (%)=           1.00          2.00
     Length            (m)=         289.37         40.00
     Mannings n           =          0.013         0.250

        NOTE:  RAINFALL WAS TRANSFORMED TO  12.0 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
               0.200    4.16 | 1.200   49.44 | 2.200    8.80 |  3.20    4.73
               0.400    4.87 | 1.400  118.44 | 2.400    7.47 |  3.40    4.37
               0.600    5.94 | 1.600   27.36 | 2.600    6.51 |  3.60    4.07
               0.800    7.75 | 1.800   15.56 | 2.800    5.80 |  3.80    3.81
               1.000   11.60 | 2.000   11.29 | 3.000    5.23 |  4.00    3.59

     Max.Eff.Inten.(mm/hr)=     118.44         92.78
                over (min)        12.00         12.00
     Storage Coeff.  (min)=       4.52 (ii)    11.79 (ii)
     Unit Hyd. Tpeak (min)=      12.00         12.00
     Unit Hyd. peak  (cms)=       0.13          0.09
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.99          1.03          2.016 (iii)
     TIME TO PEAK    (hrs)=       1.40          1.40          1.40
     RUNOFF VOLUME    (mm)=      61.15         28.61         36.74
     TOTAL RAINFALL   (mm)=      62.15         62.15         62.15
     RUNOFF COEFFICIENT   =       0.98          0.46          0.59

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CHICAGO STORM    |    IDF curve parameters: A=1100.000
| Ptotal= 62.15 mm |                          B=   2.000
--------------------                          C=   0.776
                       used in:   INTENSITY =  A / (t + B)^C

                                  Duration of storm  =  4.00 hrs
                                  Storm time step    = 10.00 min
                                  Time to peak ratio =  0.33

                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.17    4.06 |  1.17   27.34 |'  2.17    9.00 |  3.17    4.78
                0.33    4.62 |  1.33  159.94 |'  2.33    7.77 |  3.33    4.46
                0.50    5.38 |  1.50   35.45 |'  2.50    6.86 |  3.50    4.19
                0.67    6.51 |  1.67   19.27 |'  2.67    6.16 |  3.67    3.95
```

0.83	8.38	1.83	13.70	2.83	5.61	3.83	3.74
1.00	12.24	2.00	10.80	3.00	5.16	4.00	3.55

CALIB			
STANDHYD (0257)	Area (ha)= 3.10		
ID= 1 DT=12.0 min	Total Imp(%)= 67.90	Dir. Conn.(%)= 42.90	

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	2.10	1.00
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	143.76	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 12.0 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
0.200	4.16	1.200	49.44	2.200	8.80	3.20	4.73
0.400	4.87	1.400	118.44	2.400	7.47	3.40	4.37
0.600	5.94	1.600	27.36	2.600	6.51	3.60	4.07
0.800	7.75	1.800	15.56	2.800	5.80	3.80	3.81
1.000	11.60	2.000	11.29	3.000	5.23	4.00	3.59

				TOTALS
Max.Eff.Inten.(mm/hr)=		118.44	106.30	
over (min)		12.00	12.00	
Storage Coeff. (min)=		2.97 (ii)	9.86 (ii)	
Unit Hyd. Tpeak (min)=		12.00	12.00	
Unit Hyd. peak (cms)=		0.14	0.10	
PEAK FLOW	(cms)=	0.43	0.22	0.654 (iii)
TIME TO PEAK	(hrs)=	1.40	1.40	1.40
RUNOFF VOLUME	(mm)=	61.15	29.96	43.34
TOTAL RAINFALL	(mm)=	62.15	62.15	62.15
RUNOFF COEFFICIENT	=	0.98	0.48	0.70

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0258)					
1 + 2 = 3		AREA	QPEAK	TPEAK	R.V.
		(ha)	(cms)	(hrs)	(mm)
	ID1= 1 (0228):	12.56	2.016	1.40	36.74
	+ ID2= 2 (0257):	3.10	0.654	1.40	43.34
	ID = 3 (0258):	15.66	2.670	1.40	38.05

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0243)				
IN= 2---> OUT= 1				
DT= 12.0 min	OUTFLOW	STORAGE	OUTFLOW	STORAGE
	(cms)	(ha.m.)	(cms)	(ha.m.)
	0.0000	0.0000	0.1346	0.4241
	0.0096	0.0421	0.1575	0.4697
	0.0159	0.0886	0.1823	0.5165
	0.0203	0.1399	0.2088	0.5647
	0.0228	0.1768	0.2369	0.6142
	0.0250	0.2150	0.2514	0.6394
	0.0628	0.2544	0.2663	0.6650
	0.0835	0.2950	0.2816	0.6910
	0.0991	0.3368	0.2997	0.7172
	0.1144	0.3798	0.3113	0.7439

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0258)	15.660	2.670	1.40	38.05
OUTFLOW: ID= 1 (0243)	15.660	0.153	3.40	37.98

PEAK FLOW REDUCTION [Qout/Qin](%)= 5.74
TIME SHIFT OF PEAK FLOW (min)=120.00
MAXIMUM STORAGE USED (ha.m.)= 0.4611

ROUTEPIPE(0184)	PIPE Number = 1.00
IN= 2---> OUT= 1	Diameter (mm)=1650.00
DT= 12.0 min	Length (m)= 500.00
	Slope (m/m)= 0.005
	Manning n = 0.013

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

DEPTH (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME min
0.09	.216E+02	0.0	0.80	10.40
0.17	.600E+02	0.1	1.25	6.67
0.26	.108E+03	0.3	1.61	5.18
0.35	.164E+03	0.6	1.91	4.36
0.43	.225E+03	1.0	2.18	3.83
0.52	.290E+03	1.4	2.41	3.46
0.61	.358E+03	1.9	2.61	3.19
0.69	.428E+03	2.4	2.79	2.99
0.78	.499E+03	2.9	2.95	2.83
0.87	.570E+03	3.5	3.08	2.70
0.96	.642E+03	4.1	3.20	2.61
1.04	.712E+03	4.7	3.29	2.53
1.13	.780E+03	5.2	3.36	2.48
1.22	.844E+03	5.8	3.41	2.44
1.30	.905E+03	6.2	3.44	2.43
1.39	.961E+03	6.6	3.43	2.43
1.48	.101E+04	6.9	3.40	2.45
1.56	.105E+04	6.9	3.31	2.52
1.65	.107E+04	6.5	3.02	2.76

<---- hydrograph ----> <-pipe / channel->

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 2 (0243)	15.66	0.15	3.40	37.98	0.18	1.25
OUTFLOW: ID= 1 (0184)	15.66	0.15	3.60	37.98	0.18	1.25

CHICAGO STORM	IDF curve parameters: A=1100.000
Ptotal= 62.15 mm	B= 2.000
	C= 0.776
	used in: INTENSITY = A / (t + B)^C
	Duration of storm = 4.00 hrs
	Storm time step = 10.00 min
	Time to peak ratio = 0.33

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.17	4.06	1.17	27.34	2.17	9.00	3.17	4.78
0.33	4.62	1.33	159.94	2.33	7.77	3.33	4.46
0.50	5.38	1.50	35.45	2.50	6.86	3.50	4.19
0.67	6.51	1.67	19.27	2.67	6.16	3.67	3.95
0.83	8.38	1.83	13.70	2.83	5.61	3.83	3.74
1.00	12.24	2.00	10.80	3.00	5.16	4.00	3.55

CALIB			
STANDHYD (0229)	Area (ha)= 12.13		
ID= 1 DT=12.0 min	Total Imp(%)= 54.50	Dir. Conn.(%)= 19.70	

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	6.61	5.52
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	284.37	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 12.0 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
0.200	4.16	1.200	49.44	2.200	8.80	3.20	4.73
0.400	4.87	1.400	118.44	2.400	7.47	3.40	4.37
0.600	5.94	1.600	27.36	2.600	6.51	3.60	4.07
0.800	7.75	1.800	15.56	2.800	5.80	3.80	3.81
1.000	11.60	2.000	11.29	3.000	5.23	4.00	3.59

				TOTALS
Max.Eff.Inten.(mm/hr)=		118.44	104.97	
over (min)		12.00	12.00	
Storage Coeff. (min)=		4.47 (ii)	11.39 (ii)	
Unit Hyd. Tpeak (min)=		12.00	12.00	
Unit Hyd. peak (cms)=		0.13	0.09	
PEAK FLOW	(cms)=	0.75	1.13	1.886 (iii)
TIME TO PEAK	(hrs)=	1.40	1.40	1.40
RUNOFF VOLUME	(mm)=	61.15	29.84	36.00
TOTAL RAINFALL	(mm)=	62.15	62.15	62.15
RUNOFF COEFFICIENT	=	0.98	0.48	0.58

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
YOU SHOULD CONSIDER SPLITTING THE AREA.

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0196)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0184):		15.66	0.153	3.60	37.98
+ ID2= 2 (0229):		12.13	1.886	1.40	36.00
ID = 3 (0196):		27.79	1.901	1.40	37.12

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0256)				
IN= 2---> OUT= 1				
DT= 12.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.2761	0.3332
	0.0090	0.0385	0.3101	0.3536
	0.0147	0.0812	0.3454	0.3743
	0.0199	0.1456	0.3818	0.3952
	0.0210	0.1631	0.4194	0.4165
	0.0987	0.2172	0.4581	0.4381
	0.1306	0.2358	0.4979	0.4600
	0.1761	0.2739	0.5806	0.5047
	0.2120	0.2934	0.6234	0.5275
	0.2433	0.3131	0.7121	0.5742

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0196)	27.790	1.901	1.40	37.12
OUTFLOW: ID= 1 (0256)	27.790	0.278	3.20	37.08

PEAK FLOW REDUCTION [Qout/Qin](%)= 14.61
TIME SHIFT OF PEAK FLOW (min)=108.00
MAXIMUM STORAGE USED (ha.m.)= 0.3343

CHICAGO STORM	IDF curve parameters: A=1100.000
Ptotal= 62.15 mm	B= 2.000
	C= 0.776
	used in: INTENSITY = A / (t + B)^C
	Duration of storm = 4.00 hrs
	Storm time step = 10.00 min
	Time to peak ratio = 0.33

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.17	4.06	1.17	27.34	2.17	9.00	3.17	4.78
0.33	4.62	1.33	159.94	2.33	7.77	3.33	4.46
0.50	5.38	1.50	35.45	2.50	6.86	3.50	4.19
0.67	6.51	1.67	19.27	2.67	6.16	3.67	3.95
0.83	8.38	1.83	13.70	2.83	5.61	3.83	3.74
1.00	12.24	2.00	10.80	3.00	5.16	4.00	3.55

CALIB		
STANDHYD (0230)	Area (ha)=	20.35
ID= 1 DT=12.0 min	Total Imp(%)=	53.70 Dir. Conn.(%)= 32.40

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	10.93	9.42
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	368.33	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 12.0 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
0.200	4.16	1.200	49.44	2.200	8.80	3.20	4.73
0.400	4.87	1.400	118.44	2.400	7.47	3.40	4.37
0.600	5.94	1.600	27.36	2.600	6.51	3.60	4.07
0.800	7.75	1.800	15.56	2.800	5.80	3.80	3.81
1.000	11.60	2.000	11.29	3.000	5.23	4.00	3.59

				TOTALS
Max.Eff.Inten.(mm/hr)=		118.44	77.22	
over (min)		12.00	24.00	
Storage Coeff. (min)=		5.22 (ii)	13.05 (ii)	
Unit Hyd. Tpeak (min)=		12.00	24.00	
Unit Hyd. peak (cms)=		0.13	0.07	
PEAK FLOW	(cms)=	2.04	1.16	2.710 (iii)
TIME TO PEAK	(hrs)=	1.40	1.60	1.40
RUNOFF VOLUME	(mm)=	61.15	26.83	37.95
TOTAL RAINFALL	(mm)=	62.15	62.15	62.15
RUNOFF COEFFICIENT	=	0.98	0.43	0.61

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0224)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)

```
      ID1= 1 (  0230):    20.35   2.710     1.40    37.95
    + ID2= 2 (  0256):    27.79   0.278     3.20    37.08
      ================================================
      ID = 3 (  0224):    48.14   2.728     1.40    37.45

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
------------------
| RESERVOIR(  0253)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
------------------      (cms)      (ha.m.)   |   (cms)      (ha.m.)
                        0.0000      0.0000   |   0.6390      0.9848
                        0.0270      0.1457   |   0.9700      1.2900
                        0.0430      0.3152   |   1.1040      1.7480
                        0.0530      0.4653   |   3.3100      1.9350
                        0.3280      0.6677   |  11.3140      2.2662

                              AREA     QPEAK     TPEAK       R.V.
                              (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0224)    48.140     2.728     1.40      37.45
   OUTFLOW: ID= 1 (  0253)    48.140     0.386     4.20      37.42

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 14.15
                  TIME SHIFT OF PEAK FLOW          (min)=168.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.7282

--------------------------------------------------------------------------------
------------------
| CHICAGO STORM    |    IDF curve parameters: A=1100.000
| Ptotal= 62.15 mm |                          B=   2.000
------------------                          C=   0.776
                       used in:   INTENSITY =  A / (t + B)^C

                       Duration of storm  =  4.00 hrs
                       Storm time step    = 10.00 min
                       Time to peak ratio =  0.33

                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.17    4.06 |  1.17   27.34 |'  2.17    9.00 |  3.17    4.78
                0.33    4.62 |  1.33  159.94 |'  2.33    7.77 |  3.33    4.46
                0.50    5.38 |  1.50   35.45 |'  2.50    6.86 |  3.50    4.19
                0.67    6.51 |  1.67   19.27 |'  2.67    6.16 |  3.67    3.95
                0.83    8.38 |  1.83   13.70 |'  2.83    5.61 |  3.83    3.74
                1.00   12.24 |  2.00   10.80 |'  3.00    5.16 |  4.00    3.55


--------------------------------------------------------------------------------
------------------
| CALIB            |
| STANDHYD (  0160)|   Area     (ha)=   1.30
|ID= 1 DT=12.0 min |   Total Imp(%)=  50.70   Dir. Conn.(%)=  22.00
------------------

                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.66          0.64
     Dep. Storage     (mm)=       1.00          1.50
     Average Slope     (%)=       1.00          2.00
     Length            (m)=      93.09         40.00
     Mannings n             =    0.013         0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO  12.0 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
               0.200    4.16 | 1.200   49.44 | 2.200    8.80 |  3.20    4.73
               0.400    4.87 | 1.400  118.44 | 2.400    7.47 |  3.40    4.37
               0.600    5.94 | 1.600   27.36 | 2.600    6.51 |  3.60    4.07
               0.800    7.75 | 1.800   15.56 | 2.800    5.80 |  3.80    3.81
               1.000   11.60 | 2.000   11.29 | 3.000    5.23 |  4.00    3.59

    Max.Eff.Inten.(mm/hr)=     118.44        88.07
               over (min)       12.00        12.00
```

```
     Storage Coeff.  (min)=       2.29 (ii)     9.71 (ii)
     Unit Hyd. Tpeak (min)=      12.00         12.00
     Unit Hyd. peak  (cms)=       0.14          0.10
                                                    *TOTALS*
     PEAK FLOW       (cms)=       0.09          0.12          0.212 (iii)
     TIME TO PEAK    (hrs)=       1.40          1.40           1.40
     RUNOFF VOLUME    (mm)=      61.15         28.10          35.37
     TOTAL RAINFALL   (mm)=      62.15         62.15          62.15
     RUNOFF COEFFICIENT   =       0.98          0.45           0.57

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
------------------
| DUHYD    (  0183)|
| Inlet Cap.= 0.152|
| #of Inlets=     1|
| Total(cms)=  0.2|      AREA     QPEAK     TPEAK     R.V.
------------------       (ha)     (cms)     (hrs)     (mm)
     TOTAL HYD.(ID= 1):   1.30      0.21      1.40    35.37
     ================================================
     MAJOR SYS.(ID= 2):   0.12      0.06      1.40    35.37
     MINOR SYS.(ID= 3):   1.18      0.15      1.40    35.37

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
------------------
| CHICAGO STORM    |    IDF curve parameters: A=1100.000
| Ptotal= 62.15 mm |                          B=   2.000
------------------                          C=   0.776
                       used in:   INTENSITY =  A / (t + B)^C

                       Duration of storm  =  4.00 hrs
                       Storm time step    = 10.00 min
                       Time to peak ratio =  0.33

                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.17    4.06 |  1.17   27.34 |'  2.17    9.00 |  3.17    4.78
                0.33    4.62 |  1.33  159.94 |'  2.33    7.77 |  3.33    4.46
                0.50    5.38 |  1.50   35.45 |'  2.50    6.86 |  3.50    4.19
                0.67    6.51 |  1.67   19.27 |'  2.67    6.16 |  3.67    3.95
                0.83    8.38 |  1.83   13.70 |'  2.83    5.61 |  3.83    3.74
                1.00   12.24 |  2.00   10.80 |'  3.00    5.16 |  4.00    3.55


--------------------------------------------------------------------------------
------------------
| CALIB            |
| STANDHYD (  0193)|   Area     (ha)=   1.21
|ID= 1 DT=12.0 min |   Total Imp(%)=  49.30   Dir. Conn.(%)=  20.10
------------------

                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.60          0.61
     Dep. Storage     (mm)=       1.00          1.50
     Average Slope     (%)=       1.00          2.00
     Length            (m)=      89.81         40.00
     Mannings n             =    0.013         0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO  12.0 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
               0.200    4.16 | 1.200   49.44 | 2.200    8.80 |  3.20    4.73
               0.400    4.87 | 1.400  118.44 | 2.400    7.47 |  3.40    4.37
               0.600    5.94 | 1.600   27.36 | 2.600    6.51 |  3.60    4.07
               0.800    7.75 | 1.800   15.56 | 2.800    5.80 |  3.80    3.81
```

```
             1.000   11.60 | 2.000   11.29 | 3.000    5.23 |  4.00    3.59

     Max.Eff.Inten.(mm/hr)=     118.44        87.50
               over (min)       12.00        12.00
     Storage Coeff.  (min)=      2.24 (ii)    9.68 (ii)
     Unit Hyd. Tpeak (min)=     12.00        12.00
     Unit Hyd. peak  (cms)=      0.14         0.10
                                                        *TOTALS*
     PEAK FLOW       (cms)=      0.08         0.11          0.193 (iii)
     TIME TO PEAK    (hrs)=      1.40         1.40          1.40
     RUNOFF VOLUME    (mm)=     61.15        28.03         34.69
     TOTAL RAINFALL   (mm)=     62.15        62.15         62.15
     RUNOFF COEFFICIENT   =      0.98         0.45          0.56

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
-------------------
| DUHYD    (  0227)|
| Inlet Cap.= 0.120|
| #of Inlets=     1|
| Total(cms)=   0.1|      AREA     QPEAK     TPEAK    R.V.
-------------------      (ha)      (cms)     (hrs)    (mm)
     TOTAL HYD.(ID= 1):   1.21      0.19      1.40    34.69
     ================================================
     MAJOR SYS.(ID= 2):   0.15      0.07      1.40    34.69
     MINOR SYS.(ID= 3):   1.06      0.12      1.40    34.69

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
-------------------
| CHICAGO STORM    |    IDF curve parameters: A=1100.000
| Ptotal= 62.15 mm |                          B=   2.000
-------------------                          C=   0.776
                       used in:   INTENSITY =  A / (t + B)^C

                       Duration of storm  =  4.00 hrs
                       Storm time step    = 10.00 min
                       Time to peak ratio =  0.33

                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.17    4.06 |  1.17   27.34 |  2.17    9.00 |  3.17    4.78
                0.33    4.62 |  1.33  159.94 |  2.33    7.77 |  3.33    4.46
                0.50    5.38 |  1.50   35.45 |  2.50    6.86 |  3.50    4.19
                0.67    6.51 |  1.67   19.27 |  2.67    6.16 |  3.67    3.95
                0.83    8.38 |  1.83   13.70 |  2.83    5.61 |  3.83    3.74
                1.00   12.24 |  2.00   10.80 |  3.00    5.16 |  4.00    3.55


--------------------------------------------------------------------------------
-------------------
| CALIB            |
| STANDHYD (  0206)|   Area     (ha)=  38.60
|ID= 1 DT=12.0 min |   Total Imp(%)=  54.70   Dir. Conn.(%)=  23.20
-------------------

                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=     21.11         17.49
     Dep. Storage     (mm)=      1.00          1.50
     Average Slope     (%)=      1.00          2.00
     Length            (m)=    507.28         40.00
     Mannings n           =     0.013         0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO  12.0 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
                0.200    4.16 | 1.200   49.44 | 2.200    8.80 |  3.20    4.73
                0.400    4.87 | 1.400  118.44 | 2.400    7.47 |  3.40    4.37
                0.600    5.94 | 1.600   27.36 | 2.600    6.51 |  3.60    4.07
                0.800    7.75 | 1.800   15.56 | 2.800    5.80 |  3.80    3.81
                1.000   11.60 | 2.000   11.29 | 3.000    5.23 |  4.00    3.59

     Max.Eff.Inten.(mm/hr)=     118.44        98.45
               over (min)       12.00        24.00
     Storage Coeff.  (min)=      6.33 (ii)   13.43 (ii)
     Unit Hyd. Tpeak (min)=     12.00        24.00
     Unit Hyd. peak  (cms)=      0.12         0.06
                                                        *TOTALS*
     PEAK FLOW       (cms)=      2.67         2.71          4.262 (iii)
     TIME TO PEAK    (hrs)=      1.40         1.60          1.40
     RUNOFF VOLUME    (mm)=     61.15        29.20         36.61
     TOTAL RAINFALL   (mm)=     62.15        62.15         62.15
     RUNOFF COEFFICIENT   =      0.98         0.47          0.59

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

-------------------
| ADD HYD  (  0225)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------        (ha)     (cms)    (hrs)     (mm)
       ID1= 1 (  0183):     0.12    0.060     1.40    35.37
     + ID2= 2 (  0206):    38.60    4.262     1.40    36.61
       ================================================
       ID = 3 (  0225):    38.72    4.323     1.40    36.61

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

-------------------
| ADD HYD  (  0225)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
-------------------        (ha)     (cms)    (hrs)     (mm)
       ID1= 3 (  0225):    38.72    4.323     1.40    36.61
     + ID2= 2 (  0227):     0.15    0.073     1.40    34.69
       ================================================
       ID = 1 (  0225):    38.87    4.395     1.40    36.60

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
-------------------
| CHICAGO STORM    |    IDF curve parameters: A=1100.000
| Ptotal= 62.15 mm |                          B=   2.000
-------------------                          C=   0.776
                       used in:   INTENSITY =  A / (t + B)^C

                       Duration of storm  =  4.00 hrs
                       Storm time step    = 10.00 min
                       Time to peak ratio =  0.33

                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.17    4.06 |  1.17   27.34 |  2.17    9.00 |  3.17    4.78
                0.33    4.62 |  1.33  159.94 |  2.33    7.77 |  3.33    4.46
                0.50    5.38 |  1.50   35.45 |  2.50    6.86 |  3.50    4.19
                0.67    6.51 |  1.67   19.27 |  2.67    6.16 |  3.67    3.95
                0.83    8.38 |  1.83   13.70 |  2.83    5.61 |  3.83    3.74
                1.00   12.24 |  2.00   10.80 |  3.00    5.16 |  4.00    3.55


--------------------------------------------------------------------------------
-------------------
| CALIB            |
```

```
| STANDHYD (  0209)|   Area     (ha)=   5.20
|ID= 1 DT=12.0 min |   Total Imp(%)=  31.60   Dir. Conn.(%)=  19.40
-------------------

                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.64         3.56
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     186.19        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO  12.0 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
              0.200    4.16 | 1.200   49.44 | 2.200    8.80 |  3.20    4.73
              0.400    4.87 | 1.400  118.44 | 2.400    7.47 |  3.40    4.37
              0.600    5.94 | 1.600   27.36 | 2.600    6.51 |  3.60    4.07
              0.800    7.75 | 1.800   15.56 | 2.800    5.80 |  3.80    3.81
              1.000   11.60 | 2.000   11.29 | 3.000    5.23 |  4.00    3.59

     Max.Eff.Inten.(mm/hr)=     118.44        53.89
               over (min)       12.00        24.00
     Storage Coeff.  (min)=      3.47 (ii)   12.50 (ii)
     Unit Hyd. Tpeak (min)=     12.00        24.00
     Unit Hyd. peak  (cms)=      0.14         0.07
                                                    *TOTALS*
     PEAK FLOW       (cms)=      0.33         0.31      0.504 (iii)
     TIME TO PEAK    (hrs)=      1.40         1.60       1.40
     RUNOFF VOLUME    (mm)=     61.15        23.50      30.80
     TOTAL RAINFALL   (mm)=     62.15        62.15      62.15
     RUNOFF COEFFICIENT   =      0.98         0.38       0.50

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
-------------------
| CHICAGO STORM    |    IDF curve parameters: A=1100.000
| Ptotal= 62.15 mm |                          B=   2.000
-------------------                          C=   0.776
                        used in:   INTENSITY =  A / (t + B)^C

                        Duration of storm  =  4.00 hrs
                        Storm time step    = 10.00 min
                        Time to peak ratio =  0.33

               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
              0.17    4.06 |  1.17   27.34 |  2.17    9.00 |  3.17    4.78
              0.33    4.62 |  1.33  159.94 |  2.33    7.77 |  3.33    4.46
              0.50    5.38 |  1.50   35.45 |  2.50    6.86 |  3.50    4.19
              0.67    6.51 |  1.67   19.27 |  2.67    6.16 |  3.67    3.95
              0.83    8.38 |  1.83   13.70 |  2.83    5.61 |  3.83    3.74
              1.00   12.24 |  2.00   10.80 |  3.00    5.16 |  4.00    3.55


--------------------------------------------------------------------------------
-------------------
| CALIB            |
| STANDHYD (  0252)|   Area     (ha)=   1.44
|ID= 1 DT=12.0 min |   Total Imp(%)=  52.40   Dir. Conn.(%)=  20.10
-------------------

                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.75         0.69
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      97.98        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO  12.0 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
              0.200    4.16 | 1.200   49.44 | 2.200    8.80 |  3.20    4.73
              0.400    4.87 | 1.400  118.44 | 2.400    7.47 |  3.40    4.37
              0.600    5.94 | 1.600   27.36 | 2.600    6.51 |  3.60    4.07
              0.800    7.75 | 1.800   15.56 | 2.800    5.80 |  3.80    3.81
              1.000   11.60 | 2.000   11.29 | 3.000    5.23 |  4.00    3.59

     Max.Eff.Inten.(mm/hr)=     118.44        96.89
               over (min)       12.00        12.00
     Storage Coeff.  (min)=      2.36 (ii)    9.51 (ii)
     Unit Hyd. Tpeak (min)=     12.00        12.00
     Unit Hyd. peak  (cms)=      0.14         0.10
                                                    *TOTALS*
     PEAK FLOW       (cms)=      0.09         0.14      0.236 (iii)
     TIME TO PEAK    (hrs)=      1.40         1.40       1.40
     RUNOFF VOLUME    (mm)=     61.15        29.04      35.49
     TOTAL RAINFALL   (mm)=     62.15        62.15      62.15
     RUNOFF COEFFICIENT   =      0.98         0.47       0.57

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
-------------------
| RESERVOIR(  0261)|
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
-------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                        0.0000     0.0000    |   0.1470     0.0137
                        0.0530     0.0050    |   0.1700     0.0155
                        0.0700     0.0076    |   0.1900     0.0220
                        0.1150     0.0113    |   0.0000     0.0000

                                  AREA     QPEAK     TPEAK       R.V.
                                  (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0252)      1.440     0.236      1.40       35.49
   OUTFLOW: ID= 1 (  0261)      1.440     0.134      1.60       35.48

                 PEAK   FLOW   REDUCTION [Qout/Qin](%)= 56.81
                 TIME SHIFT OF PEAK FLOW          (min)= 12.00
                 MAXIMUM  STORAGE   USED        (ha.m.)=  0.0133

--------------------------------------------------------------------------------
-------------------
| ADD HYD  (  0251)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
-------------------           (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0209):      5.20    0.504     1.40    30.80
     + ID2= 2 (  0261):      1.44    0.134     1.60    35.48
       ================================================
       ID = 3 (  0251):      6.64    0.597     1.40    31.82

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
-------------------
| RESERVOIR(  0245)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
-------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                        0.0000     0.0000    |   0.3090     0.2876
                        0.0000     0.0000    |   0.3330     0.3838
                        0.1230     0.1102    |   0.3620     0.5200
```

```
                        0.2870     0.1971   |   0.0000      0.0000

                                  AREA     QPEAK     TPEAK       R.V.
                                  (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0251)       6.640     0.597      1.40      31.82
   OUTFLOW: ID= 1 (  0245)       6.640     0.139      2.40      31.78

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)= 23.31
                    TIME SHIFT OF PEAK FLOW          (min)= 60.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=  0.1189

--------------------------------------------------------------------------------
------------------
| ROUTEPIPE(  0212)|     PIPE Number     =   1.00
| IN= 2---> OUT= 1 |     Diameter    (mm)=1650.00
| DT= 12.0 min     |     Length       (m)= 850.00
-------------------      Slope      (m/m)=  0.005
                         Manning n        =  0.013

     <----------------- TRAVEL TIME TABLE ---------------------->
       DEPTH      VOLUME     FLOW RATE    VELOCITY    TRAV.TIME
        (m)      (cu.m.)       (cms)        (m/s)        min
       0.09     .367E+02        0.0         0.80        17.68
       0.17     .102E+03        0.1         1.25        11.33
       0.26     .184E+03        0.3         1.61         8.81
       0.35     .278E+03        0.6         1.91         7.41
       0.43     .382E+03        1.0         2.18         6.51
       0.52     .492E+03        1.4         2.41         5.88
       0.61     .608E+03        1.9         2.61         5.43
       0.69     .727E+03        2.4         2.79         5.08
       0.78     .848E+03        2.9         2.95         4.81
       0.87     .970E+03        3.5         3.08         4.60
       0.96     .109E+04        4.1         3.20         4.43
       1.04     .121E+04        4.7         3.29         4.31
       1.13     .133E+04        5.2         3.36         4.22
       1.22     .144E+04        5.8         3.41         4.15
       1.30     .154E+04        6.2         3.44         4.12
       1.39     .163E+04        6.6         3.43         4.13
       1.48     .172E+04        6.9         3.40         4.17
       1.56     .178E+04        6.9         3.31         4.28
       1.65     .182E+04        6.5         3.02         4.70
                                <---- hydrograph ---->   <-pipe / channel->
                               AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                               (ha)    (cms)   (hrs)   (mm)       (m)       (m/s)
   INFLOW : ID= 2 (  0245)    6.64     0.14    2.40  31.78      0.17       1.19
   OUTFLOW: ID= 1 (  0212)    6.64     0.14    2.50  31.78      0.16       1.18

--------------------------------------------------------------------------------
------------------
| ADD HYD  (  0211)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0212):      6.64   0.139     2.50    31.78
     + ID2= 2 (  0225):     38.87   4.395     1.40    36.60
       ========================================================
       ID = 3 (  0211):     45.51   4.413     1.40    35.90

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
------------------
| RESERVOIR(  0255)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
-------------------       (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |  1.6250      1.2448
                          0.0190     0.1627   |  1.6630      1.2997
                          0.0360     0.4306   |  1.8430      1.5816
                          0.0480     0.7217   |  2.1300      2.1197
                          0.1330     0.7718   |  2.9680      2.2465
                          1.0390     0.9773   |  7.5380      2.5741

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0211)     45.513     4.413      1.40      35.90
   OUTFLOW: ID= 1 (  0255)     45.513     0.970      2.40      35.85

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)= 21.98
                    TIME SHIFT OF PEAK FLOW          (min)= 60.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=  0.9621

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

      V    V   I    SSSSS  U   U    A    L              (v 5.1.2004)
      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 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)\Visual OTTHYMO 5.1\VO2\voin.dat
  Output  filename: C:\Users\jlysecki\AppData\Local\Civica\VH5\a379672b-db33-4372-b5e0-
ba58a07d1417\a63492c5-812d-40f6-a5e8-8b717b7a1390\sce
  Summary filename: C:\Users\jlysecki\AppData\Local\Civica\VH5\a379672b-db33-4372-b5e0-
ba58a07d1417\a63492c5-812d-40f6-a5e8-8b717b7a1390\sce


DATE: 01/15/2020                          TIME: 04:24:46

USER:


COMMENTS: _____

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

-------------------
| CHICAGO STORM    |    IDF curve parameters: A=1488.000
| Ptotal= 72.26 mm |                          B=   3.000
-------------------                           C=   0.803
                         used in:   INTENSITY =  A / (t + B)^C

                         Duration of storm  =  4.00 hrs
                         Storm time step    = 10.00 min
                         Time to peak ratio =  0.33

                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.17    4.27 |  1.17   33.54 |  2.17    9.99 |  3.17    5.08
                0.33    4.89 |  1.33  189.72 |  2.33    8.52 |  3.33    4.72
                0.50    5.75 |  1.50   44.29 |  2.50    7.46 |  3.50    4.41
                0.67    7.05 |  1.67   22.84 |  2.67    6.65 |  3.67    4.15
                0.83    9.24 |  1.83   15.74 |  2.83    6.02 |  3.83    3.91
                1.00   13.94 |  2.00   12.16 |  3.00    5.50 |  4.00    3.71


--------------------------------------------------------------------------------
------------------
| CALIB            |
| STANDHYD (  0228)|   Area     (ha)=  12.56
|ID= 1 DT=12.0 min |   Total Imp(%)=  54.10   Dir. Conn.(%)=  25.00
```

COLE ENGINEERING

Experience Enhancing Excellence

```
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       6.79         5.77
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     289.37        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO  12.0 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
              0.200    4.38 | 1.200   59.57 | 2.200    9.74 |  3.20    5.02
              0.400    5.18 | 1.400  141.24 | 2.400    8.17 |  3.40    4.62
              0.600    6.40 | 1.600   33.57 | 2.600    7.05 |  3.60    4.28
              0.800    8.51 | 1.800   18.11 | 2.800    6.23 |  3.80    3.99
              1.000   13.16 | 2.000   12.76 | 3.000    5.59 |  4.00    3.74

     Max.Eff.Inten.(mm/hr)=     141.24       121.53
               over (min)       12.00        12.00
     Storage Coeff.  (min)=      4.21 (ii)   10.74 (ii)
     Unit Hyd. Tpeak (min)=     12.00        12.00
     Unit Hyd. peak  (cms)=      0.13         0.10
                                                    *TOTALS*
     PEAK FLOW       (cms)=      1.19         1.41      2.598 (iii)
     TIME TO PEAK    (hrs)=      1.40         1.40       1.40
     RUNOFF VOLUME    (mm)=     71.26        36.05      44.85
     TOTAL RAINFALL   (mm)=     72.26        72.26      72.26
     RUNOFF COEFFICIENT   =      0.99         0.50       0.62

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  69.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CHICAGO STORM    |    IDF curve parameters: A=1488.000
| Ptotal= 72.26 mm |                          B=   3.000
--------------------                          C=   0.803
                       used in:   INTENSITY =  A / (t + B)^C

                       Duration of storm  =  4.00 hrs
                       Storm time step    = 10.00 min
                       Time to peak ratio =  0.33

               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.17    4.27 |  1.17   33.54 |  2.17    9.99 |  3.17    5.08
               0.33    4.89 |  1.33  189.72 |  2.33    8.52 |  3.33    4.72
               0.50    5.75 |  1.50   44.29 |  2.50    7.46 |  3.50    4.41
               0.67    7.05 |  1.67   22.84 |  2.67    6.65 |  3.67    4.15
               0.83    9.24 |  1.83   15.74 |  2.83    6.02 |  3.83    3.91
               1.00   13.94 |  2.00   12.16 |  3.00    5.50 |  4.00    3.71


--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0257)|   Area     (ha)=   3.10
|ID= 1 DT=12.0 min |   Total Imp(%)=  67.90   Dir. Conn.(%)=  42.90
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.10         1.00
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     143.76        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO  12.0 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
              0.200    4.38 | 1.200   59.57 | 2.200    9.74 |  3.20    5.02
              0.400    5.18 | 1.400  141.24 | 2.400    8.17 |  3.40    4.62
              0.600    6.40 | 1.600   33.57 | 2.600    7.05 |  3.60    4.28
              0.800    8.51 | 1.800   18.11 | 2.800    6.23 |  3.80    3.99
              1.000   13.16 | 2.000   12.76 | 3.000    5.59 |  4.00    3.74

     Max.Eff.Inten.(mm/hr)=     141.24       138.66
               over (min)       12.00        12.00
     Storage Coeff.  (min)=      2.77 (ii)    8.96 (ii)
     Unit Hyd. Tpeak (min)=     12.00        12.00
     Unit Hyd. peak  (cms)=      0.14         0.10
                                                    *TOTALS*
     PEAK FLOW       (cms)=      0.52         0.30      0.818 (iii)
     TIME TO PEAK    (hrs)=      1.40         1.40       1.40
     RUNOFF VOLUME    (mm)=     71.26        37.62      52.05
     TOTAL RAINFALL   (mm)=     72.26        72.26      72.26
     RUNOFF COEFFICIENT   =      0.99         0.52       0.72

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  69.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

--------------------
| ADD HYD  (  0258)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0228):    12.56   2.598     1.40    44.85
      + ID2= 2 (  0257):     3.10   0.818     1.40    52.05
        ================================================
        ID = 3 (  0258):    15.66   3.416     1.40    46.28

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0243)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |  0.1346      0.4241
                          0.0096     0.0421   |  0.1575      0.4697
                          0.0159     0.0886   |  0.1823      0.5165
                          0.0203     0.1399   |  0.2088      0.5647
                          0.0228     0.1768   |  0.2369      0.6142
                          0.0250     0.2150   |  0.2514      0.6394
                          0.0628     0.2544   |  0.2663      0.6650
                          0.0835     0.2950   |  0.2816      0.6910
                          0.0991     0.3368   |  0.2997      0.7172
                          0.1144     0.3798   |  0.3113      0.7439

                                    AREA     QPEAK     TPEAK       R.V.
                                    (ha)     (cms)     (hrs)       (mm)
     INFLOW : ID= 2 (  0258)      15.660     3.416      1.40       46.28
     OUTFLOW: ID= 1 (  0243)      15.660     0.203      3.00       46.21

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  5.94
                  TIME SHIFT OF PEAK FLOW          (min)= 96.00
                  MAXIMUM  STORAGE   USED        (ha.m.)=  0.5544

--------------------------------------------------------------------------------
--------------------
| ROUTEPIPE(  0184)|     PIPE Number      =   1.00
| IN= 2---> OUT= 1 |     Diameter     (mm)=1650.00
| DT= 12.0 min     |     Length        (m)= 500.00
--------------------     Slope       (m/m)=  0.005
                         Manning n        =  0.013
```

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

DEPTH (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME min
0.09	.216E+02	0.0	0.80	10.40
0.17	.600E+02	0.1	1.25	6.67
0.26	.108E+03	0.3	1.61	5.18
0.35	.164E+03	0.6	1.91	4.36
0.43	.225E+03	1.0	2.18	3.83
0.52	.290E+03	1.4	2.41	3.46
0.61	.358E+03	1.9	2.61	3.19
0.69	.428E+03	2.4	2.79	2.99
0.78	.499E+03	2.9	2.95	2.83
0.87	.570E+03	3.5	3.08	2.70
0.96	.642E+03	4.1	3.20	2.61
1.04	.712E+03	4.7	3.29	2.53
1.13	.780E+03	5.2	3.36	2.48
1.22	.844E+03	5.8	3.41	2.44
1.30	.905E+03	6.2	3.44	2.43
1.39	.961E+03	6.6	3.43	2.43
1.48	.101E+04	6.9	3.40	2.45
1.56	.105E+04	6.9	3.31	2.52
1.65	.107E+04	6.5	3.02	2.76

	<---- hydrograph ----> AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	<-pipe / channel-> MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 2 (0243)	15.66	0.20	3.00	46.21	0.20	1.33
OUTFLOW: ID= 1 (0184)	15.66	0.20	3.20	46.20	0.20	1.33

CHICAGO STORM	Ptotal= 72.26 mm

IDF curve parameters: A=1488.000
B= 3.000
C= 0.803
used in: INTENSITY = A / (t + B)^C

Duration of storm = 4.00 hrs
Storm time step = 10.00 min
Time to peak ratio = 0.33

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.17	4.27	1.17	33.54	2.17	9.99	3.17	5.08
0.33	4.89	1.33	189.72	2.33	8.52	3.33	4.72
0.50	5.75	1.50	44.29	2.50	7.46	3.50	4.41
0.67	7.05	1.67	22.84	2.67	6.65	3.67	4.15
0.83	9.24	1.83	15.74	2.83	6.02	3.83	3.91
1.00	13.94	2.00	12.16	3.00	5.50	4.00	3.71

CALIB	STANDHYD (0229)	ID= 1 DT=12.0 min

Area (ha)= 12.13
Total Imp(%)= 54.50 Dir. Conn.(%)= 19.70

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	6.61	5.52
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	284.37	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 12.0 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
0.200	4.38	1.200	59.57	2.200	9.74	3.20	5.02
0.400	5.18	1.400	141.24	2.400	8.17	3.40	4.62
0.600	6.40	1.600	33.57	2.600	7.05	3.60	4.28
0.800	8.51	1.800	18.11	2.800	6.23	3.80	3.99
1.000	13.16	2.000	12.76	3.000	5.59	4.00	3.74

				TOTALS
Max.Eff.Inten.(mm/hr)=	141.24	136.99		
over (min)	12.00	12.00		
Storage Coeff. (min)=	4.17 (ii)	10.39 (ii)		
Unit Hyd. Tpeak (min)=	12.00	12.00		
Unit Hyd. peak (cms)=	0.13	0.10		
PEAK FLOW (cms)=	0.91	1.55		2.452 (iii)
TIME TO PEAK (hrs)=	1.40	1.40		1.40
RUNOFF VOLUME (mm)=	71.26	37.47		44.13
TOTAL RAINFALL (mm)=	72.26	72.26		72.26
RUNOFF COEFFICIENT =	0.99	0.52		0.61

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
YOU SHOULD CONSIDER SPLITTING THE AREA.

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0196)	1 + 2 = 3		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
		ID1= 1 (0184):	15.66	0.203	3.20	46.20
		+ ID2= 2 (0229):	12.13	2.452	1.40	44.13
		ID = 3 (0196):	27.79	2.474	1.40	45.30

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0256)	IN= 2---> OUT= 1	DT= 12.0 min

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.2761	0.3332
0.0090	0.0385	0.3101	0.3536
0.0147	0.0812	0.3454	0.3743
0.0199	0.1456	0.3818	0.3952
0.0210	0.1631	0.4194	0.4165
0.0987	0.2172	0.4581	0.4381
0.1306	0.2358	0.4979	0.4600
0.1761	0.2739	0.5806	0.5047
0.2120	0.2934	0.6234	0.5275
0.2433	0.3131	0.7121	0.5742

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0196)	27.790	2.474	1.40	45.30
OUTFLOW: ID= 1 (0256)	27.790	0.381	2.80	45.26

PEAK FLOW REDUCTION [Qout/Qin](%)= 15.40
TIME SHIFT OF PEAK FLOW (min)= 84.00
MAXIMUM STORAGE USED (ha.m.)= 0.3947

CHICAGO STORM	Ptotal= 72.26 mm

IDF curve parameters: A=1488.000
B= 3.000
C= 0.803
used in: INTENSITY = A / (t + B)^C

Duration of storm = 4.00 hrs
Storm time step = 10.00 min
Time to peak ratio = 0.33

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.17	4.27	1.17	33.54	2.17	9.99	3.17	5.08
0.33	4.89	1.33	189.72	2.33	8.52	3.33	4.72

0.50	5.75	1.50	44.29	2.50	7.46	3.50	4.41
0.67	7.05	1.67	22.84	2.67	6.65	3.67	4.15
0.83	9.24	1.83	15.74	2.83	6.02	3.83	3.91
1.00	13.94	2.00	12.16	3.00	5.50	4.00	3.71

CALIB	
STANDHYD (0230)	Area (ha)= 20.35
ID= 1 DT=12.0 min	Total Imp(%)= 53.70 Dir. Conn.(%)= 32.40

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	10.93	9.42
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	368.33	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 12.0 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
0.200	4.38	1.200	59.57	2.200	9.74	3.20	5.02
0.400	5.18	1.400	141.24	2.400	8.17	3.40	4.62
0.600	6.40	1.600	33.57	2.600	7.05	3.60	4.28
0.800	8.51	1.800	18.11	2.800	6.23	3.80	3.99
1.000	13.16	2.000	12.76	3.000	5.59	4.00	3.74

				TOTALS
Max.Eff.Inten.(mm/hr)=		141.24	101.71	
over (min)		12.00	12.00	
Storage Coeff. (min)=		4.87 (ii)	11.88 (ii)	
Unit Hyd. Tpeak (min)=		12.00	12.00	
Unit Hyd. peak (cms)=		0.13	0.09	
PEAK FLOW	(cms)=	2.45	1.83	4.286 (iii)
TIME TO PEAK	(hrs)=	1.40	1.40	1.40
RUNOFF VOLUME	(mm)=	71.26	33.96	46.05
TOTAL RAINFALL	(mm)=	72.26	72.26	72.26
RUNOFF COEFFICIENT	=	0.99	0.47	0.64

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0224)		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
1 + 2 = 3	ID1= 1 (0230):	20.35	4.286	1.40	46.05
	+ ID2= 2 (0256):	27.79	0.381	2.80	45.26
	ID = 3 (0224):	48.14	4.307	1.40	45.59

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0253)	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
IN= 2---> OUT= 1	0.0000	0.0000	0.6390	0.9848
DT= 12.0 min	0.0270	0.1457	0.9700	1.2900
	0.0430	0.3152	1.1040	1.7480
	0.0530	0.4653	3.3100	1.9350
	0.3280	0.6677	11.3140	2.2662

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0224)	48.140	4.307	1.40	45.59
OUTFLOW: ID= 1 (0253)	48.140	0.512	4.00	45.56

PEAK FLOW REDUCTION [Qout/Qin](%)= 11.90
TIME SHIFT OF PEAK FLOW (min)=156.00
MAXIMUM STORAGE USED (ha.m.)= 0.8564

CHICAGO STORM	IDF curve parameters: A=1488.000
Ptotal= 72.26 mm	B= 3.000
	C= 0.803

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

Duration of storm = 4.00 hrs
Storm time step = 10.00 min
Time to peak ratio = 0.33

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.17	4.27	1.17	33.54	2.17	9.99	3.17	5.08
0.33	4.89	1.33	189.72	2.33	8.52	3.33	4.72
0.50	5.75	1.50	44.29	2.50	7.46	3.50	4.41
0.67	7.05	1.67	22.84	2.67	6.65	3.67	4.15
0.83	9.24	1.83	15.74	2.83	6.02	3.83	3.91
1.00	13.94	2.00	12.16	3.00	5.50	4.00	3.71

CALIB	
STANDHYD (0160)	Area (ha)= 1.30
ID= 1 DT=12.0 min	Total Imp(%)= 50.70 Dir. Conn.(%)= 22.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.66	0.64
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	93.09	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 12.0 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
0.200	4.38	1.200	59.57	2.200	9.74	3.20	5.02
0.400	5.18	1.400	141.24	2.400	8.17	3.40	4.62
0.600	6.40	1.600	33.57	2.600	7.05	3.60	4.28
0.800	8.51	1.800	18.11	2.800	6.23	3.80	3.99
1.000	13.16	2.000	12.76	3.000	5.59	4.00	3.74

				TOTALS
Max.Eff.Inten.(mm/hr)=		141.24	115.54	
over (min)		12.00	12.00	
Storage Coeff. (min)=		2.13 (ii)	8.79 (ii)	
Unit Hyd. Tpeak (min)=		12.00	12.00	
Unit Hyd. peak (cms)=		0.14	0.11	
PEAK FLOW	(cms)=	0.11	0.16	0.274 (iii)
TIME TO PEAK	(hrs)=	1.40	1.40	1.40
RUNOFF VOLUME	(mm)=	71.26	35.45	43.33
TOTAL RAINFALL	(mm)=	72.26	72.26	72.26
RUNOFF COEFFICIENT	=	0.99	0.49	0.60

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

```
--------------------
| DUHYD    (  0183)|
| Inlet Cap.= 0.152|
| #of Inlets=     1|
| Total(cms)=   0.2|      AREA     QPEAK     TPEAK     R.V.
--------------------      (ha)      (cms)     (hrs)     (mm)
     TOTAL HYD.(ID= 1):   1.30       0.27      1.40    43.33
     ====================================================
     MAJOR SYS.(ID= 2):   0.20       0.12      1.40    43.33
     MINOR SYS.(ID= 3):   1.10       0.15      1.40    43.33

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| CHICAGO STORM    |    IDF curve parameters: A=1488.000
| Ptotal= 72.26 mm |                          B=   3.000
--------------------                          C=   0.803
                       used in:   INTENSITY =  A / (t + B)^C

                       Duration of storm  =  4.00 hrs
                       Storm time step    = 10.00 min
                       Time to peak ratio =  0.33

                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.17    4.27 |  1.17   33.54 |  2.17    9.99 |  3.17    5.08
                0.33    4.89 |  1.33  189.72 |  2.33    8.52 |  3.33    4.72
                0.50    5.75 |  1.50   44.29 |  2.50    7.46 |  3.50    4.41
                0.67    7.05 |  1.67   22.84 |  2.67    6.65 |  3.67    4.15
                0.83    9.24 |  1.83   15.74 |  2.83    6.02 |  3.83    3.91
                1.00   13.94 |  2.00   12.16 |  3.00    5.50 |  4.00    3.71


--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0193)|   Area     (ha)=   1.21
|ID= 1 DT=12.0 min |   Total Imp(%)=  49.30   Dir. Conn.(%)=  20.10
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.60          0.61
     Dep. Storage     (mm)=       1.00          1.50
     Average Slope     (%)=       1.00          2.00
     Length            (m)=      89.81         40.00
     Mannings n           =      0.013         0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO  12.0 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
               0.200    4.38 | 1.200   59.57 | 2.200    9.74 |  3.20    5.02
               0.400    5.18 | 1.400  141.24 | 2.400    8.17 |  3.40    4.62
               0.600    6.40 | 1.600   33.57 | 2.600    7.05 |  3.60    4.28
               0.800    8.51 | 1.800   18.11 | 2.800    6.23 |  3.80    3.99
               1.000   13.16 | 2.000   12.76 | 3.000    5.59 |  4.00    3.74

     Max.Eff.Inten.(mm/hr)=     141.24       114.82
               over (min)       12.00        12.00
     Storage Coeff.  (min)=      2.09 (ii)    8.76 (ii)
     Unit Hyd. Tpeak (min)=     12.00        12.00
     Unit Hyd. peak  (cms)=      0.14         0.11
                                                      *TOTALS*
     PEAK FLOW       (cms)=      0.10         0.15       0.250 (iii)
     TIME TO PEAK    (hrs)=      1.40         1.40        1.40
     RUNOFF VOLUME    (mm)=     71.26        35.38       42.59
     TOTAL RAINFALL   (mm)=     72.26        72.26       72.26
     RUNOFF COEFFICIENT   =      0.99         0.49        0.59

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| DUHYD    (  0227)|
| Inlet Cap.= 0.120|
| #of Inlets=     1|
| Total(cms)=   0.1|      AREA     QPEAK     TPEAK     R.V.
--------------------      (ha)      (cms)     (hrs)     (mm)
     TOTAL HYD.(ID= 1):   1.21       0.25      1.40    42.59
     ====================================================
     MAJOR SYS.(ID= 2):   0.22       0.13      1.40    42.59
     MINOR SYS.(ID= 3):   0.99       0.12      1.40    42.59

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| CHICAGO STORM    |    IDF curve parameters: A=1488.000
| Ptotal= 72.26 mm |                          B=   3.000
--------------------                          C=   0.803
                       used in:   INTENSITY =  A / (t + B)^C

                       Duration of storm  =  4.00 hrs
                       Storm time step    = 10.00 min
                       Time to peak ratio =  0.33

                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.17    4.27 |  1.17   33.54 |  2.17    9.99 |  3.17    5.08
                0.33    4.89 |  1.33  189.72 |  2.33    8.52 |  3.33    4.72
                0.50    5.75 |  1.50   44.29 |  2.50    7.46 |  3.50    4.41
                0.67    7.05 |  1.67   22.84 |  2.67    6.65 |  3.67    4.15
                0.83    9.24 |  1.83   15.74 |  2.83    6.02 |  3.83    3.91
                1.00   13.94 |  2.00   12.16 |  3.00    5.50 |  4.00    3.71


--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0206)|   Area     (ha)=  38.60
|ID= 1 DT=12.0 min |   Total Imp(%)=  54.70   Dir. Conn.(%)=  23.20
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      21.11         17.49
     Dep. Storage     (mm)=       1.00          1.50
     Average Slope     (%)=       1.00          2.00
     Length            (m)=     507.28         40.00
     Mannings n           =      0.013         0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO  12.0 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
               0.200    4.38 | 1.200   59.57 | 2.200    9.74 |  3.20    5.02
               0.400    5.18 | 1.400  141.24 | 2.400    8.17 |  3.40    4.62
               0.600    6.40 | 1.600   33.57 | 2.600    7.05 |  3.60    4.28
               0.800    8.51 | 1.800   18.11 | 2.800    6.23 |  3.80    3.99
               1.000   13.16 | 2.000   12.76 | 3.000    5.59 |  4.00    3.74

     Max.Eff.Inten.(mm/hr)=     141.24       128.73
               over (min)       12.00        24.00
     Storage Coeff.  (min)=      5.90 (ii)   12.27 (ii)
     Unit Hyd. Tpeak (min)=     12.00        24.00
     Unit Hyd. peak  (cms)=      0.12         0.07
                                                      *TOTALS*
     PEAK FLOW       (cms)=      3.23         3.68       5.415 (iii)
     TIME TO PEAK    (hrs)=      1.40         1.60        1.40
     RUNOFF VOLUME    (mm)=     71.26        36.73       44.74
     TOTAL RAINFALL   (mm)=     72.26        72.26       72.26
     RUNOFF COEFFICIENT   =      0.99         0.51        0.62

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0225)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
	ID1= 1 (0183):	0.20	0.122	1.40	43.33
	+ ID2= 2 (0206):	38.60	5.415	1.40	44.74
	ID = 3 (0225):	38.80	5.537	1.40	44.73

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0225)		AREA	QPEAK	TPEAK	R.V.
3 + 2 = 1		(ha)	(cms)	(hrs)	(mm)
	ID1= 3 (0225):	38.80	5.537	1.40	44.73
	+ ID2= 2 (0227):	0.22	0.130	1.40	42.59
	ID = 1 (0225):	39.02	5.667	1.40	44.72

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CHICAGO STORM	IDF curve parameters: A=1488.000
Ptotal= 72.26 mm	B= 3.000
	C= 0.803

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

Duration of storm = 4.00 hrs
Storm time step = 10.00 min
Time to peak ratio = 0.33

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.17	4.27	1.17	33.54	2.17	9.99	3.17	5.08
0.33	4.89	1.33	189.72	2.33	8.52	3.33	4.72
0.50	5.75	1.50	44.29	2.50	7.46	3.50	4.41
0.67	7.05	1.67	22.84	2.67	6.65	3.67	4.15
0.83	9.24	1.83	15.74	2.83	6.02	3.83	3.91
1.00	13.94	2.00	12.16	3.00	5.50	4.00	3.71

CALIB	
STANDHYD (0209)	Area (ha)= 5.20
ID= 1 DT=12.0 min	Total Imp(%)= 31.60 Dir. Conn.(%)= 19.40

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	1.64	3.56
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	186.19	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 12.0 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
0.200	4.38	1.200	59.57	2.200	9.74	3.20	5.02
0.400	5.18	1.400	141.24	2.400	8.17	3.40	4.62
0.600	6.40	1.600	33.57	2.600	7.05	3.60	4.28
0.800	8.51	1.800	18.11	2.800	6.23	3.80	3.99
1.000	13.16	2.000	12.76	3.000	5.59	4.00	3.74

Max.Eff.Inten.	(mm/hr)=	141.24	71.69
	over (min)	12.00	12.00
Storage Coeff.	(min)=	3.23 (ii)	11.29 (ii)
Unit Hyd. Tpeak	(min)=	12.00	12.00
Unit Hyd. peak	(cms)=	0.14	0.09

		TOTALS
PEAK FLOW	(cms)=	0.888 (iii)
TIME TO PEAK	(hrs)=	1.40
RUNOFF VOLUME	(mm)=	38.02
TOTAL RAINFALL	(mm)=	72.26
RUNOFF COEFFICIENT	=	0.53

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
YOU SHOULD CONSIDER SPLITTING THE AREA.

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CHICAGO STORM	IDF curve parameters: A=1488.000
Ptotal= 72.26 mm	B= 3.000
	C= 0.803

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

Duration of storm = 4.00 hrs
Storm time step = 10.00 min
Time to peak ratio = 0.33

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.17	4.27	1.17	33.54	2.17	9.99	3.17	5.08
0.33	4.89	1.33	189.72	2.33	8.52	3.33	4.72
0.50	5.75	1.50	44.29	2.50	7.46	3.50	4.41
0.67	7.05	1.67	22.84	2.67	6.65	3.67	4.15
0.83	9.24	1.83	15.74	2.83	6.02	3.83	3.91
1.00	13.94	2.00	12.16	3.00	5.50	4.00	3.71

CALIB	
STANDHYD (0252)	Area (ha)= 1.44
ID= 1 DT=12.0 min	Total Imp(%)= 52.40 Dir. Conn.(%)= 20.10

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.75	0.69
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	97.98	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 12.0 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
0.200	4.38	1.200	59.57	2.200	9.74	3.20	5.02
0.400	5.18	1.400	141.24	2.400	8.17	3.40	4.62
0.600	6.40	1.600	33.57	2.600	7.05	3.60	4.28
0.800	8.51	1.800	18.11	2.800	6.23	3.80	3.99
1.000	13.16	2.000	12.76	3.000	5.59	4.00	3.74

Max.Eff.Inten.	(mm/hr)=	141.24	126.75
	over (min)	12.00	12.00
Storage Coeff.	(min)=	2.20 (ii)	8.62 (ii)
Unit Hyd. Tpeak	(min)=	12.00	12.00
Unit Hyd. peak	(cms)=	0.14	0.11

```
                                                    *TOTALS*
     PEAK FLOW       (cms)=       0.11          0.19          0.305 (iii)
     TIME TO PEAK    (hrs)=       1.40          1.40           1.40
     RUNOFF VOLUME    (mm)=      71.26         36.55          43.52
     TOTAL RAINFALL   (mm)=      72.26         72.26          72.26
     RUNOFF COEFFICIENT   =       0.99          0.51           0.60

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  69.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
-------------------
| RESERVOIR(  0261)|
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
-------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                         0.0000     0.0000   |   0.1470     0.0137
                         0.0530     0.0050   |   0.1700     0.0155
                         0.0700     0.0076   |   0.1900     0.0220
                         0.1150     0.0113   |   0.0000     0.0000

                              AREA     QPEAK     TPEAK       R.V.
                              (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0252)    1.440     0.305      1.40      43.52
   OUTFLOW: ID= 1 (  0261)    1.440     0.172      1.60      43.51

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 56.50
                  TIME SHIFT OF PEAK FLOW          (min)= 12.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0170

--------------------------------------------------------------------------------
-------------------
| ADD HYD  (  0251)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0209):     5.20   0.888     1.40     38.02
     + ID2= 2 (  0261):     1.44   0.172     1.60     43.51
       ================================================
       ID = 3 (  0251):     6.64   1.015     1.40     39.21

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
-------------------
| RESERVOIR(  0245)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
-------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                         0.0000     0.0000   |   0.3090     0.2876
                         0.0000     0.0000   |   0.3330     0.3838
                         0.1230     0.1102   |   0.3620     0.5200
                         0.2870     0.1971   |   0.0000     0.0000

                              AREA     QPEAK     TPEAK       R.V.
                              (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0251)    6.640     1.015      1.40      39.21
   OUTFLOW: ID= 1 (  0245)    6.640     0.193      2.20      39.18

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 19.00
                  TIME SHIFT OF PEAK FLOW          (min)= 48.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.1475

--------------------------------------------------------------------------------
-------------------
| ROUTEPIPE(  0212)|     PIPE Number     =   1.00
| IN= 2---> OUT= 1 |     Diameter    (mm)=1650.00
| DT= 12.0 min     |     Length       (m)= 850.00
-------------------      Slope      (m/m)=  0.005
                         Manning n        =  0.013

<---------- TRAVEL TIME TABLE ---------->
  DEPTH      VOLUME     FLOW RATE     VELOCITY     TRAV.TIME
    (m)      (cu.m.)       (cms)        (m/s)         min
   0.09     .367E+02        0.0         0.80         17.68
   0.17     .102E+03        0.1         1.25         11.33
   0.26     .184E+03        0.3         1.61          8.81
   0.35     .278E+03        0.6         1.91          7.41
   0.43     .382E+03        1.0         2.18          6.51
   0.52     .492E+03        1.4         2.41          5.88
   0.61     .608E+03        1.9         2.61          5.43
   0.69     .727E+03        2.4         2.79          5.08
   0.78     .848E+03        2.9         2.95          4.81
   0.87     .970E+03        3.5         3.08          4.60
   0.96     .109E+04        4.1         3.20          4.43
   1.04     .121E+04        4.7         3.29          4.31
   1.13     .133E+04        5.2         3.36          4.22
   1.22     .144E+04        5.8         3.41          4.15
   1.30     .154E+04        6.2         3.44          4.12
   1.39     .163E+04        6.6         3.43          4.13
   1.48     .172E+04        6.9         3.40          4.17
   1.56     .178E+04        6.9         3.31          4.28
   1.65     .182E+04        6.5         3.02          4.70
                          <---- hydrograph ---->   <-pipe / channel->
                          AREA     QPEAK    TPEAK    R.V.   MAX DEPTH  MAX VEL
                          (ha)     (cms)    (hrs)    (mm)       (m)       (m/s)
 INFLOW : ID= 2 (  0245)    6.64      0.19     2.20  39.18       0.19      1.31
 OUTFLOW: ID= 1 (  0212)    6.64      0.19     2.30  39.17       0.19      1.31

--------------------------------------------------------------------------------
-------------------
| ADD HYD  (  0211)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0212):     6.64   0.190     2.30     39.17
     + ID2= 2 (  0225):    39.02   5.667     1.40     44.72
       ================================================
       ID = 3 (  0211):    45.66   5.693     1.40     43.92

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
-------------------
| RESERVOIR(  0255)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
-------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                         0.0000     0.0000   |   1.6250     1.2448
                         0.0190     0.1627   |   1.6630     1.2997
                         0.0360     0.4306   |   1.8430     1.5816
                         0.0480     0.7217   |   2.1300     2.1197
                         0.1330     0.7718   |   2.9680     2.2465
                         1.0390     0.9773   |   7.5380     2.5741

                              AREA     QPEAK     TPEAK       R.V.
                              (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0211)   45.662     5.693      1.40      43.92
   OUTFLOW: ID= 1 (  0255)   45.662     1.361      2.20      43.87

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 23.91
                  TIME SHIFT OF PEAK FLOW          (min)= 48.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  1.1255

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

      V    V   I    SSSSS  U   U    A    L              (v 5.1.2004)
      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
```

COLE ENGINEERING

Experience Enhancing Excellence

```
       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)\Visual OTTHYMO 5.1\VO2\voin.dat
  Output  filename: C:\Users\jlysecki\AppData\Local\Civica\VH5\a379672b-db33-4372-b5e0-
ba58a07d1417\1eb4770d-cd43-4445-b7c9-d4e170933dc0\sce
  Summary filename: C:\Users\jlysecki\AppData\Local\Civica\VH5\a379672b-db33-4372-b5e0-
ba58a07d1417\1eb4770d-cd43-4445-b7c9-d4e170933dc0\sce

DATE: 01/15/2020                          TIME: 04:24:46

USER:


COMMENTS: _____________________________________________________

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

--------------------
| CHICAGO STORM    |    IDF curve parameters: A=1770.000
| Ptotal= 78.03 mm |                          B=   4.000
--------------------                          C=   0.820
                       used in:   INTENSITY =  A / (t + B)^C

                       Duration of storm  =  4.00 hrs
                       Storm time step    = 10.00 min
                       Time to peak ratio =  0.33

                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.17    4.34 |  1.17   38.21 |  2.17   10.60 |  3.17    5.19
                0.33    5.00 |  1.33  203.31 |  2.33    8.96 |  3.33    4.81
                0.50    5.92 |  1.50   50.96 |  2.50    7.78 |  3.50    4.48
                0.67    7.33 |  1.67   25.51 |  2.67    6.90 |  3.67    4.20
                0.83    9.77 |  1.83   17.18 |  2.83    6.21 |  3.83    3.96
                1.00   15.10 |  2.00   13.06 |  3.00    5.65 |  4.00    3.74


--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0228)|   Area     (ha)=  12.56
|ID= 1 DT=12.0 min |   Total Imp(%)=  54.10   Dir. Conn.(%)=  25.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       6.79         5.77
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     289.37        40.00
     Mannings n           =      0.013        0.250

        NOTE:  RAINFALL WAS TRANSFORMED TO  12.0 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
               0.200    4.45 | 1.200   65.72 | 2.200   10.32 |  3.20    5.13
               0.400    5.30 | 1.400  152.52 | 2.400    8.56 |  3.40    4.70
               0.600    6.63 | 1.600   38.23 | 2.600    7.34 |  3.60    4.34
               0.800    8.95 | 1.800   19.96 | 2.800    6.44 |  3.80    4.04
               1.000   14.21 | 2.000   13.75 | 3.000    5.74 |  4.00    3.78

     Max.Eff.Inten.(mm/hr)=     152.52       137.09
               over (min)       12.00        12.00
     Storage Coeff.  (min)=      4.08 (ii)   10.30 (ii)
     Unit Hyd. Tpeak (min)=     12.00        12.00
     Unit Hyd. peak  (cms)=      0.13         0.10
                                                    *TOTALS*
     PEAK FLOW       (cms)=      1.29         1.62      2.912 (iii)
     TIME TO PEAK    (hrs)=      1.40         1.40       1.40
     RUNOFF VOLUME    (mm)=     77.03        40.46      49.60
     TOTAL RAINFALL   (mm)=     78.03        78.03      78.03
     RUNOFF COEFFICIENT   =      0.99         0.52       0.64

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

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN*  =  69.0    Ia = Dep. Storage   (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CHICAGO STORM    |    IDF curve parameters: A=1770.000
| Ptotal= 78.03 mm |                          B=   4.000
--------------------                          C=   0.820
                       used in:   INTENSITY =  A / (t + B)^C

                       Duration of storm  =  4.00 hrs
                       Storm time step    = 10.00 min
                       Time to peak ratio =  0.33

                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.17    4.34 |  1.17   38.21 |  2.17   10.60 |  3.17    5.19
                0.33    5.00 |  1.33  203.31 |  2.33    8.96 |  3.33    4.81
                0.50    5.92 |  1.50   50.96 |  2.50    7.78 |  3.50    4.48
                0.67    7.33 |  1.67   25.51 |  2.67    6.90 |  3.67    4.20
                0.83    9.77 |  1.83   17.18 |  2.83    6.21 |  3.83    3.96
                1.00   15.10 |  2.00   13.06 |  3.00    5.65 |  4.00    3.74


--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0257)|   Area     (ha)=   3.10
|ID= 1 DT=12.0 min |   Total Imp(%)=  67.90   Dir. Conn.(%)=  42.90
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.10         1.00
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     143.76        40.00
     Mannings n           =      0.013        0.250

        NOTE:  RAINFALL WAS TRANSFORMED TO  12.0 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
               0.200    4.45 | 1.200   65.72 | 2.200   10.32 |  3.20    5.13
               0.400    5.30 | 1.400  152.52 | 2.400    8.56 |  3.40    4.70
               0.600    6.63 | 1.600   38.23 | 2.600    7.34 |  3.60    4.34
               0.800    8.95 | 1.800   19.96 | 2.800    6.44 |  3.80    4.04
               1.000   14.21 | 2.000   13.75 | 3.000    5.74 |  4.00    3.78

     Max.Eff.Inten.(mm/hr)=     152.52       156.09
               over (min)       12.00        12.00
     Storage Coeff.  (min)=      2.68 (ii)    8.59 (ii)
     Unit Hyd. Tpeak (min)=     12.00        12.00
     Unit Hyd. peak  (cms)=      0.14         0.11
                                                    *TOTALS*
     PEAK FLOW       (cms)=      0.56         0.34      0.904 (iii)
     TIME TO PEAK    (hrs)=      1.40         1.40       1.40
     RUNOFF VOLUME    (mm)=     77.03        42.15      57.11
```

COLE ENGINEERING

Experience Enhancing Excellence

```
     TOTAL RAINFALL    (mm)=      78.03        78.03          78.03
     RUNOFF COEFFICIENT   =       0.99         0.54           0.73

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

-------------------
| ADD HYD  (  0258)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
-------------------           (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0228):    12.56    2.912     1.40    49.60
     + ID2= 2 (  0257):     3.10    0.904     1.40    57.11
       ================================================
       ID = 3 (  0258):    15.66    3.816     1.40    51.09

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

-------------------
| RESERVOIR(  0243)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
-------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                        0.0000     0.0000    |  0.1346      0.4241
                        0.0096     0.0421    |  0.1575      0.4697
                        0.0159     0.0886    |  0.1823      0.5165
                        0.0203     0.1399    |  0.2088      0.5647
                        0.0228     0.1768    |  0.2369      0.6142
                        0.0250     0.2150    |  0.2514      0.6394
                        0.0628     0.2544    |  0.2663      0.6650
                        0.0835     0.2950    |  0.2816      0.6910
                        0.0991     0.3368    |  0.2997      0.7172
                        0.1144     0.3798    |  0.3113      0.7439

                              AREA     QPEAK     TPEAK       R.V.
                              (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0258)   15.660     3.816      1.40      51.09
   OUTFLOW: ID= 1 (  0243)   15.660     0.234      2.80      51.02

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  6.14
                  TIME SHIFT OF PEAK FLOW          (min)= 84.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.6099

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

-------------------
| ROUTEPIPE(  0184)|     PIPE Number     =   1.00
| IN= 2---> OUT= 1 |     Diameter    (mm)=1650.00
| DT= 12.0 min     |     Length       (m)= 500.00
-------------------     Slope      (m/m)=  0.005
                        Manning n        =  0.013

     <----------------- TRAVEL TIME TABLE ------------------->
       DEPTH      VOLUME     FLOW RATE    VELOCITY    TRAV.TIME
         (m)     (cu.m.)       (cms)        (m/s)        min
        0.09    .216E+02         0.0         0.80        10.40
        0.17    .600E+02         0.1         1.25         6.67
        0.26    .108E+03         0.3         1.61         5.18
        0.35    .164E+03         0.6         1.91         4.36
        0.43    .225E+03         1.0         2.18         3.83
        0.52    .290E+03         1.4         2.41         3.46
        0.61    .358E+03         1.9         2.61         3.19
        0.69    .428E+03         2.4         2.79         2.99
        0.78    .499E+03         2.9         2.95         2.83
        0.87    .570E+03         3.5         3.08         2.70
        0.96    .642E+03         4.1         3.20         2.61
        1.04    .712E+03         4.7         3.29         2.53
        1.13    .780E+03         5.2         3.36         2.48
        1.22    .844E+03         5.8         3.41         2.44
        1.30    .905E+03         6.2         3.44         2.43
        1.39    .961E+03         6.6         3.43         2.43
        1.48    .101E+04         6.9         3.40         2.45
        1.56    .105E+04         6.9         3.31         2.52
        1.65    .107E+04         6.5         3.02         2.76

                                <---- hydrograph ---->   <-pipe / channel->
                                AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                                (ha)    (cms)   (hrs)   (mm)       (m)      (m/s)
   INFLOW : ID= 2 (  0243)    15.66     0.23    2.80   51.02      0.21      1.38
   OUTFLOW: ID= 1 (  0184)    15.66     0.23    3.00   51.02      0.21      1.38

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

-------------------
| CHICAGO STORM    |    IDF curve parameters: A=1770.000
| Ptotal= 78.03 mm |                          B=   4.000
-------------------                          C=   0.820
                        used in:   INTENSITY =  A / (t + B)^C

                        Duration of storm  =  4.00 hrs
                        Storm time step    = 10.00 min
                        Time to peak ratio =  0.33

      TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
       hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
      0.17    4.34 |  1.17   38.21 |'  2.17   10.60 |  3.17    5.19
      0.33    5.00 |  1.33  203.31 |'  2.33    8.96 |  3.33    4.81
      0.50    5.92 |  1.50   50.96 |'  2.50    7.78 |  3.50    4.48
      0.67    7.33 |  1.67   25.51 |'  2.67    6.90 |  3.67    4.20
      0.83    9.77 |  1.83   17.18 |'  2.83    6.21 |  3.83    3.96
      1.00   15.10 |  2.00   13.06 |'  3.00    5.65 |  4.00    3.74

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

-------------------
| CALIB            |
| STANDHYD (  0229)|   Area     (ha)=  12.13
|ID= 1 DT=12.0 min |   Total Imp(%)=  54.50   Dir. Conn.(%)=  19.70
-------------------

                                IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       6.61          5.52
     Dep. Storage     (mm)=       1.00          1.50
     Average Slope     (%)=       1.00          2.00
     Length            (m)=     284.37         40.00
     Mannings n           =      0.013         0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO  12.0 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
     0.200    4.45 | 1.200   65.72 | 2.200   10.32 |  3.20    5.13
     0.400    5.30 | 1.400  152.52 | 2.400    8.56 |  3.40    4.70
     0.600    6.63 | 1.600   38.23 | 2.600    7.34 |  3.60    4.34
     0.800    8.95 | 1.800   19.96 | 2.800    6.44 |  3.80    4.04
     1.000   14.21 | 2.000   13.75 | 3.000    5.74 |  4.00    3.78

     Max.Eff.Inten.(mm/hr)=     152.52       154.23
               over (min)         12.00        12.00
     Storage Coeff.  (min)=       4.04 (ii)    9.97 (ii)
     Unit Hyd. Tpeak (min)=      12.00        12.00
     Unit Hyd. peak  (cms)=       0.13         0.10

                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.98         1.78      2.758 (iii)
     TIME TO PEAK    (hrs)=       1.40         1.40       1.40
     RUNOFF VOLUME    (mm)=      77.03        41.99      48.89
     TOTAL RAINFALL   (mm)=      78.03        78.03      78.03
     RUNOFF COEFFICIENT   =       0.99         0.54       0.63

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
```

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

ADD HYD (0196)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
	ID1= 1 (0184):	15.66	0.234	3.00	51.02
	+ ID2= 2 (0229):	12.13	2.758	1.40	48.89
	ID = 3 (0196):	27.79	2.790	1.40	50.09

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0256)				
IN= 2---> OUT= 1				
DT= 12.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.2761	0.3332
	0.0090	0.0385	0.3101	0.3536
	0.0147	0.0812	0.3454	0.3743
	0.0199	0.1456	0.3818	0.3952
	0.0210	0.1631	0.4194	0.4165
	0.0987	0.2172	0.4581	0.4381
	0.1306	0.2358	0.4979	0.4600
	0.1761	0.2739	0.5806	0.5047
	0.2120	0.2934	0.6234	0.5275
	0.2433	0.3131	0.7121	0.5742

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0196)	27.790	2.790	1.40	50.09
OUTFLOW: ID= 1 (0256)	27.790	0.448	2.60	50.05

PEAK FLOW REDUCTION [Qout/Qin](%)= 16.06
TIME SHIFT OF PEAK FLOW (min)= 72.00
MAXIMUM STORAGE USED (ha.m.)= 0.4325

CHICAGO STORM	IDF curve parameters: A=1770.000
Ptotal= 78.03 mm	B= 4.000
	C= 0.820

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

Duration of storm = 4.00 hrs
Storm time step = 10.00 min
Time to peak ratio = 0.33

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.17	4.34	1.17	38.21	2.17	10.60	3.17	5.19
0.33	5.00	1.33	203.31	2.33	8.96	3.33	4.81
0.50	5.92	1.50	50.96	2.50	7.78	3.50	4.48
0.67	7.33	1.67	25.51	2.67	6.90	3.67	4.20
0.83	9.77	1.83	17.18	2.83	6.21	3.83	3.96
1.00	15.10	2.00	13.06	3.00	5.65	4.00	3.74

CALIB		
STANDHYD (0230)	Area (ha)= 20.35	
ID= 1 DT=12.0 min	Total Imp(%)= 53.70	Dir. Conn.(%)= 32.40

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	10.93	9.42
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	368.33	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 12.0 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
0.200	4.45	1.200	65.72	2.200	10.32	3.20	5.13
0.400	5.30	1.400	152.52	2.400	8.56	3.40	4.70
0.600	6.63	1.600	38.23	2.600	7.34	3.60	4.34
0.800	8.95	1.800	19.96	2.800	6.44	3.80	4.04
1.000	14.21	2.000	13.75	3.000	5.74	4.00	3.78

Max.Eff.Inten.(mm/hr)=		152.52	115.03	
over (min)		12.00	12.00	
Storage Coeff. (min)=		4.72 (ii)	11.39 (ii)	
Unit Hyd. Tpeak (min)=		12.00	12.00	
Unit Hyd. peak (cms)=		0.13	0.09	
				TOTALS
PEAK FLOW	(cms)=	2.66	2.12	4.783 (iii)
TIME TO PEAK	(hrs)=	1.40	1.40	1.40
RUNOFF VOLUME	(mm)=	77.03	38.21	50.79
TOTAL RAINFALL	(mm)=	78.03	78.03	78.03
RUNOFF COEFFICIENT	=	0.99	0.49	0.65

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0224)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
	ID1= 1 (0230):	20.35	4.783	1.40	50.79
	+ ID2= 2 (0256):	27.79	0.448	2.60	50.05
	ID = 3 (0224):	48.14	4.827	1.40	50.36

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0253)				
IN= 2---> OUT= 1				
DT= 12.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.6390	0.9848
	0.0270	0.1457	0.9700	1.2900
	0.0430	0.3152	1.1040	1.7480
	0.0530	0.4653	3.3100	1.9350
	0.3280	0.6677	11.3140	2.2662

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0224)	48.140	4.827	1.40	50.36
OUTFLOW: ID= 1 (0253)	48.140	0.590	4.00	50.34

PEAK FLOW REDUCTION [Qout/Qin](%)= 12.23
TIME SHIFT OF PEAK FLOW (min)=156.00
MAXIMUM STORAGE USED (ha.m.)= 0.9355

CHICAGO STORM	IDF curve parameters: A=1770.000
Ptotal= 78.03 mm	B= 4.000
	C= 0.820

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

Duration of storm = 4.00 hrs
Storm time step = 10.00 min
Time to peak ratio = 0.33

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.17	4.34	1.17	38.21	2.17	10.60	3.17	5.19
0.33	5.00	1.33	203.31	2.33	8.96	3.33	4.81
0.50	5.92	1.50	50.96	2.50	7.78	3.50	4.48
0.67	7.33	1.67	25.51	2.67	6.90	3.67	4.20
0.83	9.77	1.83	17.18	2.83	6.21	3.83	3.96
1.00	15.10	2.00	13.06	3.00	5.65	4.00	3.74

CALIB	
STANDHYD (0160)	Area (ha)= 1.30
ID= 1 DT=12.0 min	Total Imp(%)= 50.70 Dir. Conn.(%)= 22.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.66	0.64
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	93.09	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 12.0 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
0.200	4.45	1.200	65.72	2.200	10.32	3.20	5.13
0.400	5.30	1.400	152.52	2.400	8.56	3.40	4.70
0.600	6.63	1.600	38.23	2.600	7.34	3.60	4.34
0.800	8.95	1.800	19.96	2.800	6.44	3.80	4.04
1.000	14.21	2.000	13.75	3.000	5.74	4.00	3.78

Max.Eff.Inten.(mm/hr)=		152.52	130.42	
over (min)		12.00	12.00	
Storage Coeff. (min)=		2.07 (ii)	8.41 (ii)	
Unit Hyd. Tpeak (min)=		12.00	12.00	
Unit Hyd. peak (cms)=		0.14	0.11	
				TOTALS
PEAK FLOW	(cms)=	0.12	0.19	0.307 (iii)
TIME TO PEAK	(hrs)=	1.40	1.40	1.40
RUNOFF VOLUME	(mm)=	77.03	39.82	48.00
TOTAL RAINFALL	(mm)=	78.03	78.03	78.03
RUNOFF COEFFICIENT	=	0.99	0.51	0.62

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

DUHYD (0183)	
Inlet Cap.= 0.152	
#of Inlets= 1	
Total(cms)= 0.2	

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
TOTAL HYD.(ID= 1):	1.30	0.31	1.40	48.00
MAJOR SYS.(ID= 2):	0.23	0.16	1.40	48.00
MINOR SYS.(ID= 3):	1.07	0.15	1.40	48.00

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CHICAGO STORM	IDF curve parameters: A=1770.000
Ptotal= 78.03 mm	B= 4.000
	C= 0.820

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

Duration of storm = 4.00 hrs
Storm time step = 10.00 min
Time to peak ratio = 0.33

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.17	4.34	1.17	38.21	2.17	10.60	3.17	5.19
0.33	5.00	1.33	203.31	2.33	8.96	3.33	4.81
0.50	5.92	1.50	50.96	2.50	7.78	3.50	4.48
0.67	7.33	1.67	25.51	2.67	6.90	3.67	4.20
0.83	9.77	1.83	17.18	2.83	6.21	3.83	3.96
1.00	15.10	2.00	13.06	3.00	5.65	4.00	3.74

CALIB	
STANDHYD (0193)	Area (ha)= 1.21
ID= 1 DT=12.0 min	Total Imp(%)= 49.30 Dir. Conn.(%)= 20.10

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.60	0.61
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	89.81	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 12.0 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
0.200	4.45	1.200	65.72	2.200	10.32	3.20	5.13
0.400	5.30	1.400	152.52	2.400	8.56	3.40	4.70
0.600	6.63	1.600	38.23	2.600	7.34	3.60	4.34
0.800	8.95	1.800	19.96	2.800	6.44	3.80	4.04
1.000	14.21	2.000	13.75	3.000	5.74	4.00	3.78

Max.Eff.Inten.(mm/hr)=		152.52	129.62	
over (min)		12.00	12.00	
Storage Coeff. (min)=		2.02 (ii)	8.38 (ii)	
Unit Hyd. Tpeak (min)=		12.00	12.00	
Unit Hyd. peak (cms)=		0.14	0.11	
				TOTALS
PEAK FLOW	(cms)=	0.10	0.18	0.280 (iii)
TIME TO PEAK	(hrs)=	1.40	1.40	1.40
RUNOFF VOLUME	(mm)=	77.03	39.74	47.23
TOTAL RAINFALL	(mm)=	78.03	78.03	78.03
RUNOFF COEFFICIENT	=	0.99	0.51	0.61

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

DUHYD (0227)	
Inlet Cap.= 0.120	
#of Inlets= 1	
Total(cms)= 0.1	

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
TOTAL HYD.(ID= 1):	1.21	0.28	1.40	47.23
MAJOR SYS.(ID= 2):	0.25	0.16	1.40	47.23
MINOR SYS.(ID= 3):	0.96	0.12	1.40	47.23

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

COLE ENGINEERING

Experience Enhancing Excellence

```
| CHICAGO STORM    |    IDF curve parameters: A=1770.000
| Ptotal= 78.03 mm |                          B=   4.000
--------------------                          C=   0.820
                       used in:   INTENSITY =  A / (t + B)^C

                       Duration of storm  =  4.00 hrs
                       Storm time step    = 10.00 min
                       Time to peak ratio =  0.33

                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.17    4.34 |  1.17   38.21 |  2.17   10.60 |  3.17    5.19
                0.33    5.00 |  1.33  203.31 |  2.33    8.96 |  3.33    4.81
                0.50    5.92 |  1.50   50.96 |  2.50    7.78 |  3.50    4.48
                0.67    7.33 |  1.67   25.51 |  2.67    6.90 |  3.67    4.20
                0.83    9.77 |  1.83   17.18 |  2.83    6.21 |  3.83    3.96
                1.00   15.10 |  2.00   13.06 |  3.00    5.65 |  4.00    3.74

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0206)|   Area    (ha)=  38.60
|ID= 1 DT=12.0 min |   Total Imp(%)=  54.70   Dir. Conn.(%)=  23.20
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      21.11         17.49
     Dep. Storage     (mm)=       1.00          1.50
     Average Slope     (%)=       1.00          2.00
     Length            (m)=     507.28         40.00
     Mannings n           =      0.013         0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO  12.0 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
               0.200    4.45 | 1.200   65.72 | 2.200   10.32 |  3.20    5.13
               0.400    5.30 | 1.400  152.52 | 2.400    8.56 |  3.40    4.70
               0.600    6.63 | 1.600   38.23 | 2.600    7.34 |  3.60    4.34
               0.800    8.95 | 1.800   19.96 | 2.800    6.44 |  3.80    4.04
               1.000   14.21 | 2.000   13.75 | 3.000    5.74 |  4.00    3.78

     Max.Eff.Inten.(mm/hr)=     152.52       145.07
                 over (min)       12.00        12.00
     Storage Coeff.  (min)=       5.72 (ii)   11.80 (ii)
     Unit Hyd. Tpeak (min)=      12.00        12.00
     Unit Hyd. peak  (cms)=       0.12         0.09
                                                      *TOTALS*
     PEAK FLOW       (cms)=       3.51         4.89          8.404 (iii)
     TIME TO PEAK    (hrs)=       1.40         1.40           1.40
     RUNOFF VOLUME    (mm)=      77.03        41.20          49.51
     TOTAL RAINFALL   (mm)=      78.03        78.03          78.03
     RUNOFF COEFFICIENT   =       0.99         0.53           0.63

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| ADD HYD  (  0225)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0183):     0.23    0.155     1.40    48.00
      + ID2= 2 (  0206):    38.60    8.404     1.40    49.51
        ================================================
        ID = 3 (  0225):    38.83    8.559     1.40    49.50

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

```
--------------------------------------------------------------------------------
--------------------
| ADD HYD  (  0225)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0225):    38.83    8.559     1.40    49.50
      + ID2= 2 (  0227):     0.25    0.160     1.40    47.23
        ================================================
        ID = 1 (  0225):    39.08    8.720     1.40    49.49

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| CHICAGO STORM    |    IDF curve parameters: A=1770.000
| Ptotal= 78.03 mm |                          B=   4.000
--------------------                          C=   0.820
                       used in:   INTENSITY =  A / (t + B)^C

                       Duration of storm  =  4.00 hrs
                       Storm time step    = 10.00 min
                       Time to peak ratio =  0.33

                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.17    4.34 |  1.17   38.21 |  2.17   10.60 |  3.17    5.19
                0.33    5.00 |  1.33  203.31 |  2.33    8.96 |  3.33    4.81
                0.50    5.92 |  1.50   50.96 |  2.50    7.78 |  3.50    4.48
                0.67    7.33 |  1.67   25.51 |  2.67    6.90 |  3.67    4.20
                0.83    9.77 |  1.83   17.18 |  2.83    6.21 |  3.83    3.96
                1.00   15.10 |  2.00   13.06 |  3.00    5.65 |  4.00    3.74

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0209)|   Area    (ha)=   5.20
|ID= 1 DT=12.0 min |   Total Imp(%)=  31.60   Dir. Conn.(%)=  19.40
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.64          3.56
     Dep. Storage     (mm)=       1.00          1.50
     Average Slope     (%)=       1.00          2.00
     Length            (m)=     186.19         40.00
     Mannings n           =      0.013         0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO  12.0 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
               0.200    4.45 | 1.200   65.72 | 2.200   10.32 |  3.20    5.13
               0.400    5.30 | 1.400  152.52 | 2.400    8.56 |  3.40    4.70
               0.600    6.63 | 1.600   38.23 | 2.600    7.34 |  3.60    4.34
               0.800    8.95 | 1.800   19.96 | 2.800    6.44 |  3.80    4.04
               1.000   14.21 | 2.000   13.75 | 3.000    5.74 |  4.00    3.78

     Max.Eff.Inten.(mm/hr)=     152.52        81.49
                 over (min)       12.00        12.00
     Storage Coeff.  (min)=       3.13 (ii)   10.79 (ii)
     Unit Hyd. Tpeak (min)=      12.00        12.00
     Unit Hyd. peak  (cms)=       0.14         0.10
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.42         0.58          1.001 (iii)
     TIME TO PEAK    (hrs)=       1.40         1.40           1.40
     RUNOFF VOLUME    (mm)=      77.03        33.94          42.29
     TOTAL RAINFALL   (mm)=      78.03        78.03          78.03
     RUNOFF COEFFICIENT   =       0.99         0.43           0.54

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.
```

```
      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN*  =  69.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CHICAGO STORM    |    IDF curve parameters: A=1770.000
| Ptotal= 78.03 mm |                          B=   4.000
--------------------                          C=   0.820
                       used in:   INTENSITY =  A / (t + B)^C

                       Duration of storm  =  4.00 hrs
                       Storm time step    = 10.00 min
                       Time to peak ratio =  0.33

                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.17    4.34 |  1.17   38.21 |  2.17   10.60 |  3.17    5.19
                0.33    5.00 |  1.33  203.31 |  2.33    8.96 |  3.33    4.81
                0.50    5.92 |  1.50   50.96 |  2.50    7.78 |  3.50    4.48
                0.67    7.33 |  1.67   25.51 |  2.67    6.90 |  3.67    4.20
                0.83    9.77 |  1.83   17.18 |  2.83    6.21 |  3.83    3.96
                1.00   15.10 |  2.00   13.06 |  3.00    5.65 |  4.00    3.74


--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0252)|   Area    (ha)=   1.44
|ID= 1 DT=12.0 min |   Total Imp(%)=  52.40   Dir. Conn.(%)=  20.10
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.75         0.69
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      97.98        40.00
     Mannings n           =      0.013        0.250

        NOTE:  RAINFALL WAS TRANSFORMED TO  12.0 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
               0.200    4.45 | 1.200   65.72 | 2.200   10.32 |  3.20    5.13
               0.400    5.30 | 1.400  152.52 | 2.400    8.56 |  3.40    4.70
               0.600    6.63 | 1.600   38.23 | 2.600    7.34 |  3.60    4.34
               0.800    8.95 | 1.800   19.96 | 2.800    6.44 |  3.80    4.04
               1.000   14.21 | 2.000   13.75 | 3.000    5.74 |  4.00    3.78

    Max.Eff.Inten.(mm/hr)=     152.52       142.88
              over (min)       12.00        12.00
    Storage Coeff.  (min)=      2.13 (ii)    8.25 (ii)
    Unit Hyd. Tpeak (min)=     12.00        12.00
    Unit Hyd. peak  (cms)=      0.14         0.11
                                                      *TOTALS*
    PEAK FLOW       (cms)=      0.12         0.22          0.343 (iii)
    TIME TO PEAK    (hrs)=      1.40         1.40           1.40
    RUNOFF VOLUME    (mm)=     77.03        41.00          48.24
    TOTAL RAINFALL   (mm)=     78.03        78.03          78.03
    RUNOFF COEFFICIENT   =      0.99         0.53           0.62

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

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN*  =  69.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0261)|
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |  0.1470      0.0137
                          0.0530     0.0050   |  0.1700      0.0155
                          0.0700     0.0076   |  0.1900      0.0220
                          0.1150     0.0113   |  0.0000      0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0252)      1.440     0.343      1.40      48.24
   OUTFLOW: ID= 1 (  0261)      1.440     0.181      1.60      48.23

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 52.83
                  TIME SHIFT OF PEAK FLOW          (min)= 12.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0197

--------------------------------------------------------------------------------
--------------------
| ADD HYD  (  0251)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0209):     5.20    1.001     1.40    42.29
     + ID2= 2 (  0261):     1.44    0.181     1.60    48.23
       ================================================
       ID = 3 (  0251):     6.64    1.150     1.40    43.58

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0245)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |  0.3090      0.2876
                          0.0000     0.0000   |  0.3330      0.3838
                          0.1230     0.1102   |  0.3620      0.5200
                          0.2870     0.1971   |  0.0000      0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0251)      6.640     1.150      1.40      43.58
   OUTFLOW: ID= 1 (  0245)      6.640     0.225      2.10      43.55

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 19.61
                  TIME SHIFT OF PEAK FLOW          (min)= 42.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.1646

--------------------------------------------------------------------------------
--------------------
| ROUTEPIPE(  0212)|     PIPE Number     =   1.00
| IN= 2---> OUT= 1 |     Diameter    (mm)=1650.00
| DT= 12.0 min     |     Length       (m)= 850.00
--------------------     Slope      (m/m)=  0.005
                         Manning n        =  0.013

     <----------------- TRAVEL TIME TABLE ---------------------->
       DEPTH      VOLUME    FLOW RATE    VELOCITY    TRAV.TIME
         (m)     (cu.m.)       (cms)        (m/s)         min
        0.09   .367E+02          0.0         0.80       17.68
        0.17   .102E+03          0.1         1.25       11.33
        0.26   .184E+03          0.3         1.61        8.81
        0.35   .278E+03          0.6         1.91        7.41
        0.43   .382E+03          1.0         2.18        6.51
        0.52   .492E+03          1.4         2.41        5.88
        0.61   .608E+03          1.9         2.61        5.43
        0.69   .727E+03          2.4         2.79        5.08
        0.78   .848E+03          2.9         2.95        4.81
        0.87   .970E+03          3.5         3.08        4.60
        0.96   .109E+04          4.1         3.20        4.43
        1.04   .121E+04          4.7         3.29        4.31
        1.13   .133E+04          5.2         3.36        4.22
        1.22   .144E+04          5.8         3.41        4.15
        1.30   .154E+04          6.2         3.44        4.12
        1.39   .163E+04          6.6         3.43        4.13
```

```
      1.48     .172E+04       6.9          3.40         4.17
      1.56     .178E+04       6.9          3.31         4.28
      1.65     .182E+04       6.5          3.02         4.70
                                  <---- hydrograph ---->   <-pipe / channel->
                               AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                               (ha)    (cms)   (hrs)   (mm)       (m)      (m/s)
   INFLOW : ID= 2 (  0245)    6.64     0.23    2.10  43.55      0.21      1.37
   OUTFLOW: ID= 1 (  0212)    6.64     0.22    2.30  43.54      0.20      1.36


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

--------------------
| ADD HYD  (  0211)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)      (mm)
        ID1= 1 (  0212):     6.64   0.222     2.30     43.54
      + ID2= 2 (  0225):    39.08   8.720     1.40     49.49
        ================================================
        ID = 3 (  0211):    45.72   8.749     1.40     48.62

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0255)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   1.6250     1.2448
                          0.0190     0.1627   |   1.6630     1.2997
                          0.0360     0.4306   |   1.8430     1.5816
                          0.0480     0.7217   |   2.1300     2.1197
                          0.1330     0.7718   |   2.9680     2.2465
                          1.0390     0.9773   |   7.5380     2.5741

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0211)    45.719     8.749     1.40      48.62
   OUTFLOW: ID= 1 (  0255)    45.719     1.590     2.10      48.58

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 18.17
                  TIME SHIFT OF PEAK FLOW         (min)= 42.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  1.2292

--------------------------------------------------------------------------------
FINISH
================================================================================
```

APPENDIX C.5
Emergency Spillway Calculations

COLE ENGINEERING

Emergency Spillway Sizing:
Proposed Pond 1

Marianneville - Glenway Estates (Phase 2)
File No. L09-301
Date: January 2020

$Q_{Spillway}$ =	2.906	m^3/s
Weir Invert =	275.55	m
Weir Length =	30	m
Side Slopes =	10	:1
Max Weir Height =	0.25	m

Rectangular Broad Crested Weir

$$Q=CLH^{1.5}$$

assuming:	H =	0.150	m
	L =	30	m
	C =	1.65	
	Q =	2.88	m^3/s
	Area =	4.50	m^2

V Notch Weir

$$Q=C(\tan F/2)H^{2.5}$$

assuming:	H =	0.150	m
	Side Slope =	10	:1
	C =	1.65	
	Q =	0.14	m^3/s
	Area =	0.23	m^2

Note:

L = H x SS =	*1.50*	*m*
F/2 = arctan (L/H)=	*84.29*	*deg*
tan (F/2) = tan 84.29 =	*10*	*m*

Total Weir Flow =	***3.019***	***m^3/s***
Velocity =	0.64	m/s

Culvert Designer/Analyzer Report
Pond 1 Spillway

Analysis Component			
Storm Event	Design	Discharge	2.9060 m³/s

Peak Discharge Method: User-Specified			
Design Discharge	2.9060 m³/s	Check Discharge	0.0000 m³/s

Tailwater properties: Trapezoidal Channel

Tailwater conditions for Design Storm.			
Discharge	2.9060 m³/s	Bottom Elevation	275.55 m
Depth	0.07 m	Velocity	1.44 m/s

Name	Description	Discharge	HW Elev.	Velocity
Weir	Roadway	2.9060 m³/s	275.70 m	N/A

Culvert Designer/Analyzer Report
Pond 1 Spillway

Component:Weir

Hydraulic Component(s): Roadway					
Discharge	2.9060	m³/s	Allowable HW Elevation	275.70	m
Roadway Width	4.00	m	Overtopping Coefficient	1.65	SI
Low Point	275.55	m	Headwater Elevation	275.70	m
Discharge Coefficient (Cr)	2.98		Submergence Factor (Kt)	1.00	
Tailwater Elevation	275.62	m			

Sta (m)	Elev. (m)
0.00	275.80
2.50	275.55
32.50	275.55
35.00	275.80

APPENDIX C.6
Water Quality Calculations

COLE ENGINEERING

Quality Pond Sizing:
Proposed Pond 1

Marianneville - Glenway Estates (Phase 2)
File No. L09-301
Date: April 2018

Quality Pond Sizing

	Drainage Area			
$A_{to\text{-}pond}$ =	12.13	ha	Percent Impervious	54.5%
$V_{permanent\ pool}$ =	1804	m^3	Percent Pervious	45.5%
$V_{extended\ detention}$ =	485	m^3		

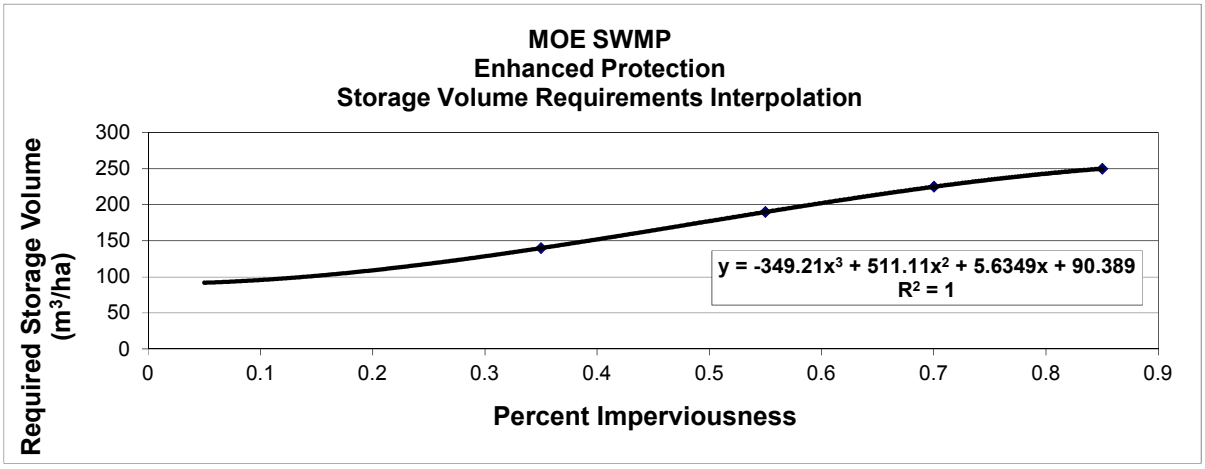
Storage Volume:	V =	189	m^3 / ha
Extended Detention:	V =	40	m^3 / ha
Permanent Pool:	V =	149	m^3 / ha

therefore, provide extended detention storage of 485 m^3
and permanent pool volume of 1804 m^3

MOE 2003 SWMP Manual: Water Quality Storage Requirements based on Receiving Waters *

PROTECTION LEVEL	SWMP Type	STORAGE VOLUME (m^3 / ha) FOR IMPERVIOUS LEVEL				
		35%	55%	54.5%	70%	85%
Enhanced	Wet Pond	140	190	**189**	225	250
Normal	Wet Pond	90	110		130	150
Basic	Wet Pond	60	75		85	95

* Table 3.2 from the MOE SWMP Planning & Design Manual, 2004, pg 3-10



COLE ENGINEERING

Quality Pond Sizing:
Proposed Pond 2

Marianneville - Glenway Estates (Phase 2)
File No. L09-301
Date: April 2018

Quality Pond Sizing

	Drainage Area			
$A_{to\text{-}pond}$ =	15.66	ha	Percent Impervious	56.8%
$V_{permanent\ pool}$ =	2419	m^3	Percent Pervious	43.2%
$V_{extended\ detention}$ =	626	m^3		

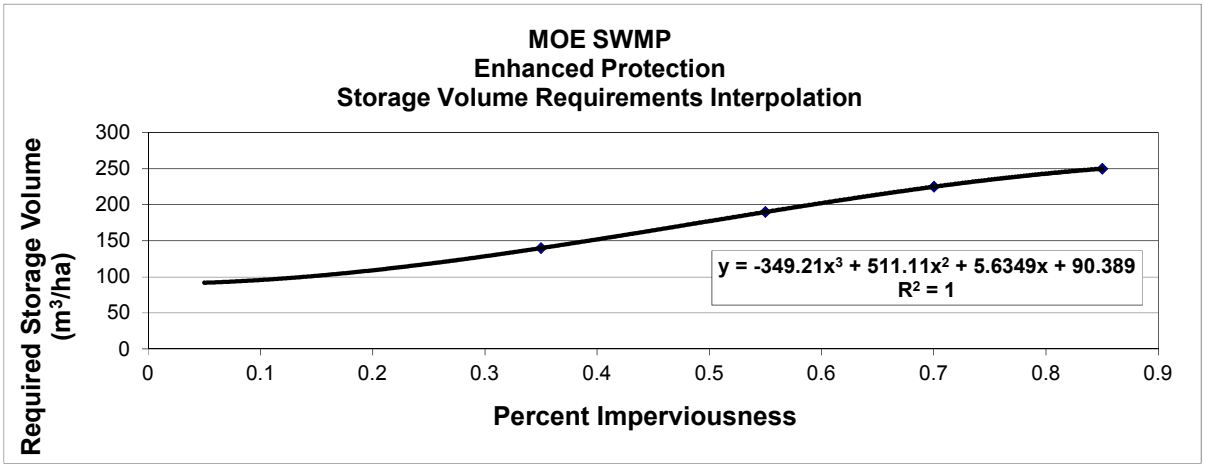
Storage Volume: V = 194 m^3 / ha
Extended Detention: V = 40 m^3 / ha
Permanent Pool: V = 154 m^3 / ha

therefore, provide extended detention storage of 626 m^3
and permanent pool volume of 2419 m^3

MOE 2003 SWMP Manual: Water Quality Storage Requirements based on Receiving Waters *

PROTECTION LEVEL	SWMP Type	STORAGE VOLUME (m^3 / ha) FOR IMPERVIOUS LEVEL				
		35%	55%	56.8%	70%	85%
Enhanced	Wet Pond	140	190	**194**	225	250
Normal	Wet Pond	90	110		130	150
Basic	Wet Pond	60	75		85	95

* Table 3.2 from the MOE SWMP Planning & Design Manual, 2004, pg 3-10



COLE ENGINEERING

Quality Pond Sizing:
Existing Pond 6

Marianneville - Glenway Estates (Phase 2)
File No. L09-301
Date: April 2018

Quality Pond Sizing

	Drainage Area			
$A_{to\text{-}pond}$ =	47.51	ha	Percent Impervious	51.9%
$V_{permanent\ pool}$ =	6750	m^3	Percent Pervious	48.1%
$V_{extended\ detention}$ =	1900	m^3		

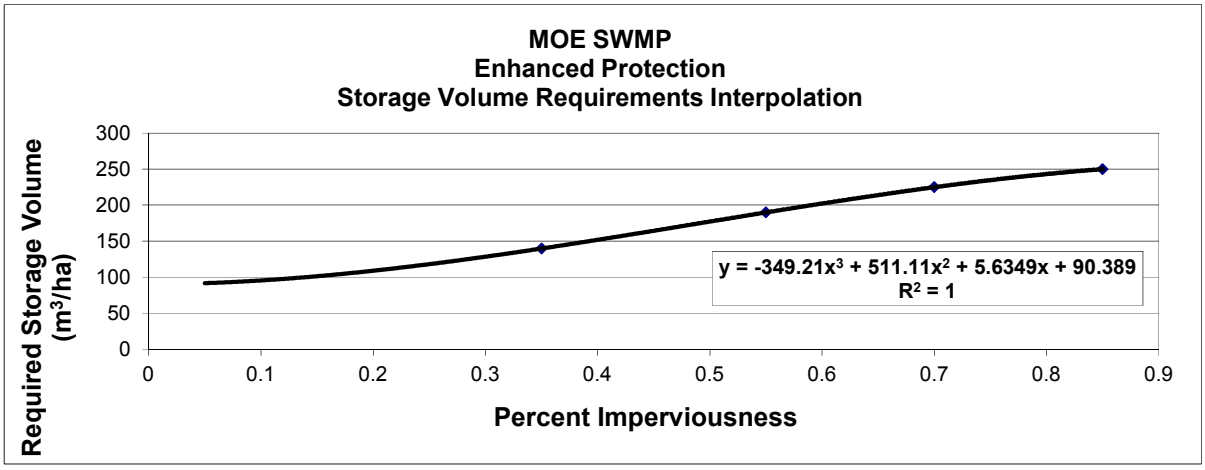
Storage Volume:	V =	182	m^3 / ha
Extended Detention:	V =	40	m^3 / ha
Permanent Pool:	V =	142	m^3 / ha

therefore, provide extended detention storage of 1900 m^3
and permanent pool volume of 6750 m^3

MOE 2003 SWMP Manual: Water Quality Storage Requirements based on Receiving Waters *

PROTECTION LEVEL	SWMP Type	STORAGE VOLUME (m^3 / ha) FOR IMPERVIOUS LEVEL				
		35%	55%	51.9%	70%	85%
Enhanced	Wet Pond	140	190	**182**	225	250
Normal	Wet Pond	90	110		130	150
Basic	Wet Pond	60	75		85	95

* Table 3.2 from the MOE SWMP Planning & Design Manual, 2004, pg 3-10



COLE ENGINEERING

Forebay Sizing
Pond 1 Forebay

Marianneville - Glenway Estates (Phase 2)
File No.: L09-301
Date: January 2020

Forebay Sizing

Settling Calculations

Proposed Forebay Length	**46.8 m**	
Proposed Forebay Width	**24.3 m**	

$$Dist = \sqrt{\frac{rQ_P}{V_S}}$$

Eq. 4.5 MOE SWM Planning and Design Manual, 2003

Water Quality Design Flow Rate from Pond (Q_p)	0.018 m^3/s	(25 mm, 4 Hour Chicago)
Length to Width Ratio of Forebay (r)	1.9 :1	
Settling Velocity (V_s)	0.0003 m/s	
Minimum Forebay Length for Settling	**10.9 m**	
Settling Velocity Achieved in 46.8m x 24.3m Forebay	**0.00002 m/s**	

The 46.8 m long forebay exceeds the minimum 10.9 m settling length and achieves a settling velocity of 0.00002 m/s, which is less than the maximum settling velocity of 0.0003 m/s in a proposed forebay.

Dispersion Length Calculations

$$Dist = \frac{8Q}{dV_F}$$

Eq. 4.6 MOE SWM Planning and Design Manual, 2003

Inlet Flowrate (Q)	0.911 m^3/s	<-- 5 year inflow from VO model
Permanent Pool Depth in Forebay	1.5 m	
Desired velocity of fluid jet in forebay (V_f)	0.5 m/s	
Minimum Dispersion Length	**9.7 m**	
Minimum Bottom Width	**1.2 m**	

The proposed forebay meets all minimum size requirements for achieving desired velocities.

Achieved velocity of 5 yr inlet flow in forebay	**0.10 m/s**

The proposed forebay has a 5 year inlet velocity of 0.1 m/s, therefore it is less than the desired maximum velocity of 0.5 m/s in a proposed forebay.

COLE ENGINEERING

Forebay Sizing
Pond 2 Forebay

Marianneville - Glenway Estates (Phase 2)
File No.: L09-301
Date: January 2020

Forebay Sizing

Settling Calculations

Proposed Forebay Length	**44.4 m**	
Proposed Forebay Width	**22.8 m**	

$$Dist = \sqrt{\frac{rQ_P}{V_S}}$$

Eq. 4.5 MOE SWM Planning and Design Manual, 2003

Water Quality Design Flow Rate from Pond (Q_p)	0.021 m^3/s	(25 mm, 4 Hour Chicago)
Length to Width Ratio of Forebay (r)	2.0 :1	
Settling Velocity (V_s)	0.0003 m/s	
Minimum Forebay Length for Settling	**11.8 m**	
Settling Velocity Achieved in 44.4m x 22.8m Forebay	**0.00002 m/s**	

The 44.4 m long forebay exceeds the minimum 11.8 m settling length and achieves a settling velocity of 0.00002 m/s, which is less than the maximum settling velocity of 0.0003 m/s in a proposed forebay.

Dispersion Length Calculations

$$Dist = \frac{8Q}{dV_F}$$

Eq. 4.6 MOE SWM Planning and Design Manual, 2003

Inlet Flowrate (Q)	1.380 m^3/s	<-- 5 year inflow from VO model
Permanent Pool Depth in Forebay	1.5 m	
Desired velocity of fluid jet in forebay (V_f)	0.5 m/s	
Minimum Dispersion Length	**14.7 m**	
Minimum Bottom Width	**1.8 m**	

The proposed forebay meets all minimum size requirements for achieving desired velocities.

Achieved velocity of 5 yr inlet flow in forebay	0.17 m/s	

The proposed forebay has a 5 year inlet velocity of 0.17 m/s, therefore it is less than the desired maximum velocity of 0.5 m/s in a proposed forebay.

Ontario

MINISTRY OF THE ENVIRONMENT

Database Version: V 1.5 Release Update
Update Date: 16-Jan-12

Project DEVELOPMENT Summary

DEVELOPMENT: Glenway West - West Holland
Subwatershed: West Holland

Pre-Development Landuse	Area (ha)	P coeff (kg/ha)	Pload (kg/yr)
Low Intensity Development	10.84	0.13	1.41
Sod Farm / Golf Course	16.43	0.24	3.94

Total Pre-Developed Area (ha): **27.2700**

Total Pre-Developed Phosphorus Load (kg/yr): **5.35**

POST-DEVELOPMENT EXPORT

Post-Development Landuse	Area (ha)	P coeff (kg/ha)	Best Management Practice applied with Reduction Potential		Pload (kg/yr)
High Intensity - Residential	2.56	1.32	Wet Detention Ponds	63%	1.25
Low Intensity Development	23.33	0.13	Wet Detention Ponds	63%	1.12
Sod Farm / Golf Course	1.89	0.24	Wet Detention Ponds	63%	0.17

PostDeveloped Area Altered: **27.78**

Total PreDeveloped Area: **27.27**

Unaffected Area: **-1**

Post-Development Area exceeds Pre-Developed Area

Pre-Developed Phosphorus EXPORT: **5.35**

Post-Developed EXPORT (without BMP): **6.87**

Post-Developed EXPORT (with BMP): **2.54**

Total Phosphorus Reduction Potential: **2.8** (kg/year)

DEVELOPMENT: Glenway West - West Holland
Subwatershed: West Holland

CONSTRUCTION EXPORT

Total Pre-Developed Phosphorus Load (kg/yr):	**5**
Construction Phase Total Load (kg) :	to be determined
Construction Phase Ammortized Annual Load Over 8 years (kg/yr) :	to be determined
Post Development Total Load (kg/yr) :	**3**

Total Load (kg/yr): Post Development + Construction

Conclusion: **Net Reduction in Load**

Ontario

MINISTRY OF THE ENVIRONMENT

Database Version: V 1.5 Release Update
Update Date: 16-Jan-12

Project DEVELOPMENT Summary

DEVELOPMENT: Glenway West - East Holland
Subwatershed: East Holland

Pre-Development Landuse	Area (ha)	P coeff (kg/ha)	Pload (kg/yr)
Sod Farm / Golf Course	1.2	0.24	0.29

Total Pre-Developed Area (ha): **1.20000**

Total Pre-Developed Phosphorus Load (kg/yr): **0.29**

POST-DEVELOPMENT EXPORT

Post-Development Landuse	Area (ha)	P coeff (kg/ha)	Best Management Practice applied with Reduction Potential		Pload (kg/yr)
Low Intensity Development	0.83	0.13	Wet Detention Ponds	63%	0.04
Sod Farm / Golf Course	0.37	0.24	Wet Detention Ponds	63%	0.03

PostDeveloped Area Altered:	**1.20**	Pre-Developed Phosphorus EXPORT:	**0.29**
Total PreDeveloped Area:	**1.20**	Post-Developed EXPORT (without BMP):	**0.20**
Unaffected Area:	**0**	Post-Developed EXPORT (with BMP):	**0.07**
		Total Phosphorus Reduction Potential:	**0.2** (kg/year)

CONSTRUCTION EXPORT

Total Pre-Developed Phosphorus Load (kg/yr):	**0**
Construction Phase Total Load (kg) :	to be determined
Construction Phase Ammortized Annual Load Over 8 years (kg/yr) :	to be determined
Post Development Total Load (kg/yr) :	**0**

Total Load (kg/yr): Post Development + Construction

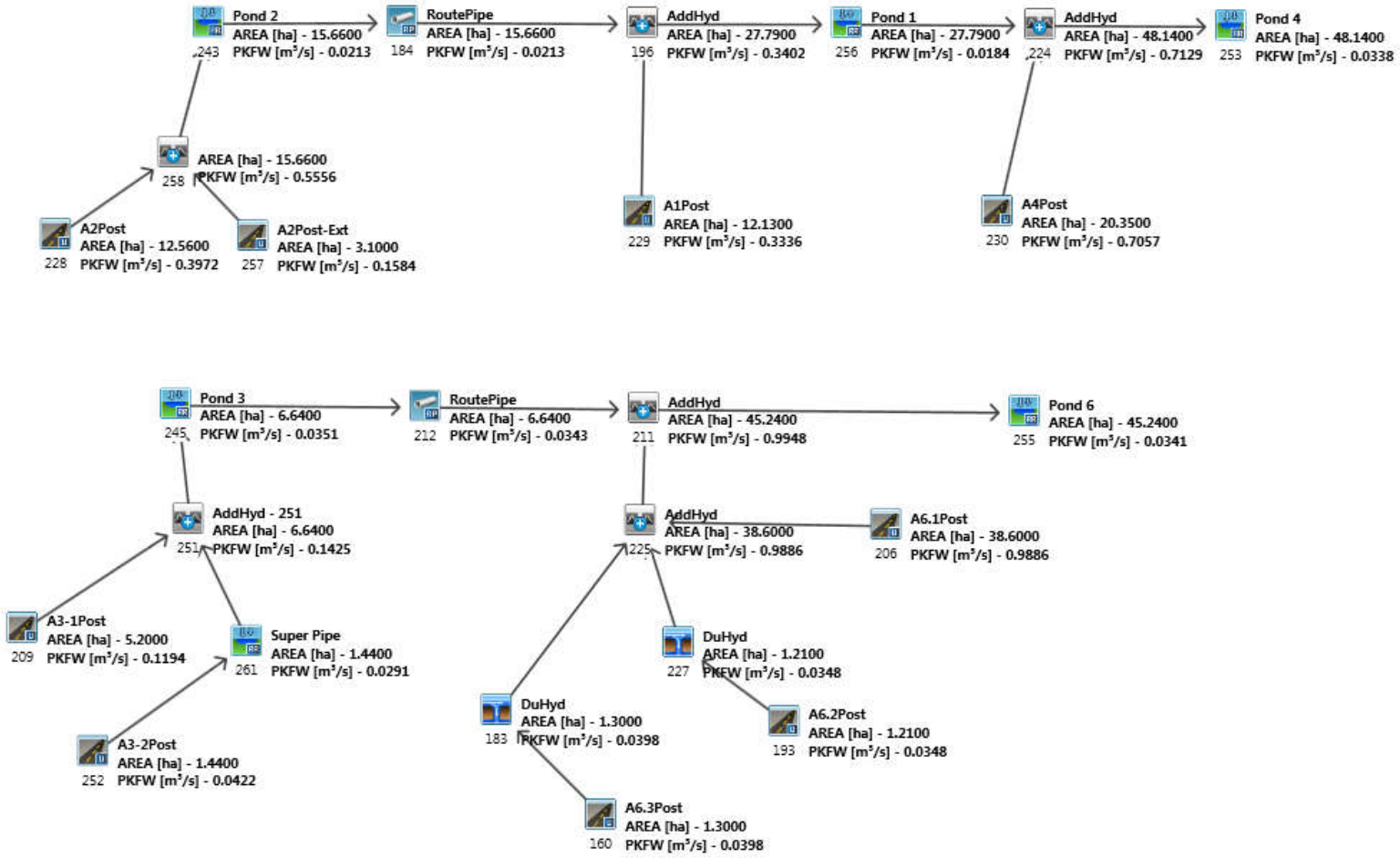
Conclusion: **Net Reduction in Load**

APPENDIX C.7
Extended Detention Calculations

COLE ENGINEERING
Experience Enhancing Excellence

L09-301 – Marianneville – Glenway Estates (Phase 2)
25mm Chicago Storm for Extended Detention
Proposed Condition Model Output
January 2020

VO5 Model Schematic



COLE ENGINEERING

Experience Enhancing Excellence

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

       V    V   I    SSSSS  U   U    A    L              (v 5.1.2004)
       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)\Visual OTTHYMO 5.1\VO2\voin.dat
  Output  filename: C:\Users\jlysecki\AppData\Local\Civica\VH5\a379672b-db33-4372-b5e0-
ba58a07d1417\cf3233ce-3024-4dfa-a115-7407a6ebdbb1\sce
  Summary filename: C:\Users\jlysecki\AppData\Local\Civica\VH5\a379672b-db33-4372-b5e0-
ba58a07d1417\cf3233ce-3024-4dfa-a115-7407a6ebdbb1\sce


DATE: 01/15/2020                          TIME: 04:10:47

USER:



COMMENTS: _____________________________________________________


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


-------------------
|    READ STORM    |    Filename: C:\Users\jlysecki\AppD
|                  |              ata\Local\Temp\
|                  |              aad80675-a0b4-4fc2-876a-2640adc73013\b8992344
| Ptotal= 25.00 mm |    Comments: 25mm4hr
-------------------
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.17    1.36 |  1.17    5.12 |'  2.17    4.33 |  3.17    1.93
                0.33    1.51 |  1.33   12.32 |'  2.33    3.61 |  3.33    1.78
                0.50    1.78 |  1.50   61.47 |'  2.50    3.02 |  3.50    1.66
                0.67    2.08 |  1.67   16.19 |'  2.67    2.71 |  3.67    1.51
                0.83    2.56 |  1.83    8.38 |'  2.83    2.40 |  3.83    1.51
                1.00    3.29 |  2.00    5.69 |'  3.00    2.25 |  4.00    1.51

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

-------------------
| CALIB            |
| STANDHYD (  0228)|   Area     (ha)=  12.56
|ID= 1 DT=12.0 min |   Total Imp(%)=  54.10   Dir. Conn.(%)=  25.00
-------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      6.79          5.77
     Dep. Storage     (mm)=      1.00          1.50
     Average Slope     (%)=      1.00          2.00
     Length            (m)=    289.37         40.00
     Mannings n           =     0.013         0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO  12.0 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
               0.200    1.38 | 1.200    6.32 | 2.200    4.21 |  3.20    1.91
               0.400    1.60 | 1.400   28.70 | 2.400    3.41 |  3.40    1.74
               0.600    1.93 | 1.600   38.83 | 2.600    2.87 |  3.60    1.59
               0.800    2.40 | 1.800   10.98 | 2.800    2.50 |  3.80    1.51
               1.000    3.17 | 2.000    6.14 | 3.000    2.28 |  4.00    1.51

     Max.Eff.Inten.(mm/hr)=      38.83         11.78
               over (min)        12.00         24.00
     Storage Coeff.  (min)=       7.06 (ii)    23.66 (ii)
     Unit Hyd. Tpeak (min)=      12.00         24.00
     Unit Hyd. peak  (cms)=       0.12          0.05
                                                    *TOTALS*
     PEAK FLOW       (cms)=       0.32          0.13          0.397 (iii)
     TIME TO PEAK    (hrs)=       1.60          1.80          1.60
     RUNOFF VOLUME    (mm)=      23.99          6.17         10.63
     TOTAL RAINFALL   (mm)=      24.99         24.99         24.99
     RUNOFF COEFFICIENT   =       0.96          0.25          0.43

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

-------------------
|    READ STORM    |    Filename: C:\Users\jlysecki\AppD
|                  |              ata\Local\Temp\
|                  |              aad80675-a0b4-4fc2-876a-2640adc73013\b8992344
| Ptotal= 25.00 mm |    Comments: 25mm4hr
-------------------
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.17    1.36 |  1.17    5.12 |'  2.17    4.33 |  3.17    1.93
                0.33    1.51 |  1.33   12.32 |'  2.33    3.61 |  3.33    1.78
                0.50    1.78 |  1.50   61.47 |'  2.50    3.02 |  3.50    1.66
                0.67    2.08 |  1.67   16.19 |'  2.67    2.71 |  3.67    1.51
                0.83    2.56 |  1.83    8.38 |'  2.83    2.40 |  3.83    1.51
                1.00    3.29 |  2.00    5.69 |'  3.00    2.25 |  4.00    1.51

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

-------------------
| CALIB            |
| STANDHYD (  0257)|   Area     (ha)=   3.10
|ID= 1 DT=12.0 min |   Total Imp(%)=  67.90   Dir. Conn.(%)=  42.90
-------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      2.10          1.00
     Dep. Storage     (mm)=      1.00          1.50
     Average Slope     (%)=      1.00          2.00
     Length            (m)=    143.76         40.00
     Mannings n           =     0.013         0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO  12.0 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
               0.200    1.38 | 1.200    6.32 | 2.200    4.21 |  3.20    1.91
               0.400    1.60 | 1.400   28.70 | 2.400    3.41 |  3.40    1.74
               0.600    1.93 | 1.600   38.83 | 2.600    2.87 |  3.60    1.59
               0.800    2.40 | 1.800   10.98 | 2.800    2.50 |  3.80    1.51
               1.000    3.17 | 2.000    6.14 | 3.000    2.28 |  4.00    1.51

     Max.Eff.Inten.(mm/hr)=      38.83         13.82
               over (min)        12.00         24.00
     Storage Coeff.  (min)=       4.64 (ii)    20.21 (ii)
     Unit Hyd. Tpeak (min)=      12.00         24.00
```

```
     Unit Hyd. peak  (cms)=       0.13         0.05
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.14         0.03          0.158 (iii)
     TIME TO PEAK    (hrs)=       1.60         1.80          1.60
     RUNOFF VOLUME    (mm)=      23.99         6.61         14.06
     TOTAL RAINFALL   (mm)=      24.99        24.99         24.99
     RUNOFF COEFFICIENT   =       0.96         0.26          0.56

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  69.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

-------------------
| ADD HYD  (  0258)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
-------------------           (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0228):     12.56    0.397     1.60    10.63
      + ID2= 2 (  0257):      3.10    0.158     1.60    14.06
        ==================================================
        ID = 3 (  0258):     15.66    0.556     1.60    11.31

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
-------------------
| RESERVOIR(  0243)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
-------------------       (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |  0.1346      0.4241
                          0.0096     0.0421   |  0.1575      0.4697
                          0.0159     0.0886   |  0.1823      0.5165
                          0.0203     0.1399   |  0.2088      0.5647
                          0.0228     0.1768   |  0.2369      0.6142
                          0.0250     0.2150   |  0.2514      0.6394
                          0.0628     0.2544   |  0.2663      0.6650
                          0.0835     0.2950   |  0.2816      0.6910
                          0.0991     0.3368   |  0.2997      0.7172
                          0.1144     0.3798   |  0.3113      0.7439

                              AREA     QPEAK     TPEAK       R.V.
                              (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0258)   15.660     0.556     1.60       11.31
   OUTFLOW: ID= 1 (  0243)   15.660     0.021     4.20       11.24

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  3.84
                  TIME SHIFT OF PEAK FLOW        (min)=156.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.1552

--------------------------------------------------------------------------------
-------------------
| ROUTEPIPE(  0184)|     PIPE Number     =   1.00
| IN= 2---> OUT= 1 |     Diameter    (mm)=1650.00
| DT= 12.0 min     |     Length       (m)= 500.00
-------------------      Slope       (m/m)=  0.005
                         Manning n        =  0.013

     <----------------- TRAVEL TIME TABLE ------------------->
       DEPTH      VOLUME     FLOW RATE    VELOCITY    TRAV.TIME
        (m)      (cu.m.)       (cms)        (m/s)        min
       0.09     .216E+02        0.0         0.80        10.40
       0.17     .600E+02        0.1         1.25         6.67
       0.26     .108E+03        0.3         1.61         5.18
       0.35     .164E+03        0.6         1.91         4.36
       0.43     .225E+03        1.0         2.18         3.83
       0.52     .290E+03        1.4         2.41         3.46
       0.61     .358E+03        1.9         2.61         3.19
       0.69     .428E+03        2.4         2.79         2.99
       0.78     .499E+03        2.9         2.95         2.83
       0.87     .570E+03        3.5         3.08         2.70
       0.96     .642E+03        4.1         3.20         2.61
       1.04     .712E+03        4.7         3.29         2.53
       1.13     .780E+03        5.2         3.36         2.48
       1.22     .844E+03        5.8         3.41         2.44
       1.30     .905E+03        6.2         3.44         2.43
       1.39     .961E+03        6.6         3.43         2.43
       1.48     .101E+04        6.9         3.40         2.45
       1.56     .105E+04        6.9         3.31         2.52
       1.65     .107E+04        6.5         3.02         2.76

                                    <---- hydrograph ---->   <-pipe / channel->
                                AREA    QPEAK    TPEAK   R.V.   MAX DEPTH  MAX VEL
                                (ha)    (cms)    (hrs)   (mm)     (m)       (m/s)
  INFLOW : ID= 2 (  0243)     15.66     0.02     4.20   11.24     0.05       0.80
  OUTFLOW: ID= 1 (  0184)     15.66     0.02     4.40   11.24     0.05       0.80

--------------------------------------------------------------------------------
-------------------
|    READ STORM    |    Filename: C:\Users\jlysecki\AppD
|                  |              ata\Local\Temp\
|                  |              aad80675-a0b4-4fc2-876a-2640adc73013\b8992344
| Ptotal= 25.00 mm |    Comments: 25mm4hr
-------------------
              TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
               hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
              0.17    1.36 |  1.17    5.12 |  2.17    4.33 |  3.17    1.93
              0.33    1.51 |  1.33   12.32 |  2.33    3.61 |  3.33    1.78
              0.50    1.78 |  1.50   61.47 |  2.50    3.02 |  3.50    1.66
              0.67    2.08 |  1.67   16.19 |  2.67    2.71 |  3.67    1.51
              0.83    2.56 |  1.83    8.38 |  2.83    2.40 |  3.83    1.51
              1.00    3.29 |  2.00    5.69 |  3.00    2.25 |  4.00    1.51

--------------------------------------------------------------------------------
-------------------
| CALIB            |
| STANDHYD (  0229)|   Area     (ha)=  12.13
|ID= 1 DT=12.0 min |   Total Imp(%)=  54.50   Dir. Conn.(%)=  19.70
-------------------
                                IMPERVIOUS     PERVIOUS (i)
     Surface Area     (ha)=        6.61           5.52
     Dep. Storage     (mm)=        1.00           1.50
     Average Slope     (%)=        1.00           2.00
     Length            (m)=      284.37          40.00
     Mannings n           =       0.013          0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO  12.0 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
             0.200    1.38 | 1.200    6.32 | 2.200    4.21 |  3.20    1.91
             0.400    1.60 | 1.400   28.70 | 2.400    3.41 |  3.40    1.74
             0.600    1.93 | 1.600   38.83 | 2.600    2.87 |  3.60    1.59
             0.800    2.40 | 1.800   10.98 | 2.800    2.50 |  3.80    1.51
             1.000    3.17 | 2.000    6.14 | 3.000    2.28 |  4.00    1.51

     Max.Eff.Inten.(mm/hr)=      38.83         13.62
               over (min)        12.00         24.00
     Storage Coeff.  (min)=       6.98 (ii)    22.65 (ii)
     Unit Hyd. Tpeak (min)=      12.00         24.00
     Unit Hyd. peak  (cms)=       0.12          0.05
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.24          0.15          0.334 (iii)
     TIME TO PEAK    (hrs)=       1.60          1.80          1.60
     RUNOFF VOLUME    (mm)=      23.99          6.56         10.00
     TOTAL RAINFALL   (mm)=      24.99         24.99         24.99
     RUNOFF COEFFICIENT   =       0.96          0.26          0.40

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
```

```
         CN*  =  69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
```

ADD HYD (0196)				
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0184):	15.66	0.021	4.40	11.24
+ ID2= 2 (0229):	12.13	0.334	1.60	10.00
ID = 3 (0196):	27.79	0.340	1.60	10.70

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0256)				
IN= 2---> OUT= 1				
DT= 12.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.2761	0.3332
	0.0090	0.0385	0.3101	0.3536
	0.0147	0.0812	0.3454	0.3743
	0.0199	0.1456	0.3818	0.3952
	0.0210	0.1631	0.4194	0.4165
	0.0987	0.2172	0.4581	0.4381
	0.1306	0.2358	0.4979	0.4600
	0.1761	0.2739	0.5806	0.5047
	0.2120	0.2934	0.6234	0.5275
	0.2433	0.3131	0.7121	0.5742

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0196)	27.790	0.340	1.60	10.70
OUTFLOW: ID= 1 (0256)	27.790	0.018	9.80	10.66

PEAK FLOW REDUCTION [Qout/Qin](%)= 5.42
TIME SHIFT OF PEAK FLOW (min)=492.00
MAXIMUM STORAGE USED (ha.m.)= 0.1275

READ STORM	Filename: C:\Users\jlysecki\AppD ata\Local\Temp\ aad80675-a0b4-4fc2-876a-2640adc73013\b8992344
Ptotal= 25.00 mm	Comments: 25mm4hr

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.17	1.36	1.17	5.12	2.17	4.33	3.17	1.93
0.33	1.51	1.33	12.32	2.33	3.61	3.33	1.78
0.50	1.78	1.50	61.47	2.50	3.02	3.50	1.66
0.67	2.08	1.67	16.19	2.67	2.71	3.67	1.51
0.83	2.56	1.83	8.38	2.83	2.40	3.83	1.51
1.00	3.29	2.00	5.69	3.00	2.25	4.00	1.51

CALIB		
STANDHYD (0230)	Area (ha)= 20.35	
ID= 1 DT=12.0 min	Total Imp(%)= 53.70	Dir. Conn.(%)= 32.40

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	10.93	9.42
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	368.33	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 12.0 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
0.200	1.38	1.200	6.32	2.200	4.21	3.20	1.91
0.400	1.60	1.400	28.70	2.400	3.41	3.40	1.74
0.600	1.93	1.600	38.83	2.600	2.87	3.60	1.59
0.800	2.40	1.800	10.98	2.800	2.50	3.80	1.51
1.000	3.17	2.000	6.14	3.000	2.28	4.00	1.51

Max.Eff.Inten.(mm/hr)=		38.83	9.58	
over (min)		12.00	36.00	
Storage Coeff. (min)=		8.15 (ii)	26.19 (ii)	
Unit Hyd. Tpeak (min)=		12.00	36.00	
Unit Hyd. peak (cms)=		0.11	0.04	
				TOTALS
PEAK FLOW	(cms)=	0.65	0.15	0.706 (iii)
TIME TO PEAK	(hrs)=	1.60	2.00	1.60
RUNOFF VOLUME	(mm)=	23.99	5.62	11.58
TOTAL RAINFALL	(mm)=	24.99	24.99	24.99
RUNOFF COEFFICIENT	=	0.96	0.23	0.46

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

```
       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
```

ADD HYD (0224)				
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0230):	20.35	0.706	1.60	11.58
+ ID2= 2 (0256):	27.79	0.018	9.80	10.66
ID = 3 (0224):	48.14	0.713	1.60	11.05

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0253)				
IN= 2---> OUT= 1				
DT= 12.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.6390	0.9848
	0.0270	0.1457	0.9700	1.2900
	0.0430	0.3152	1.1040	1.7480
	0.0530	0.4653	3.3100	1.9350
	0.3280	0.6677	11.3140	2.2662

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0224)	48.140	0.713	1.60	11.05
OUTFLOW: ID= 1 (0253)	48.140	0.034	4.60	11.02

PEAK FLOW REDUCTION [Qout/Qin](%)= 4.74
TIME SHIFT OF PEAK FLOW (min)=180.00
MAXIMUM STORAGE USED (ha.m.)= 0.2178

READ STORM	Filename: C:\Users\jlysecki\AppD ata\Local\Temp\ aad80675-a0b4-4fc2-876a-2640adc73013\b8992344
Ptotal= 25.00 mm	Comments: 25mm4hr

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.17	1.36	1.17	5.12	2.17	4.33	3.17	1.93

0.33	1.51	1.33	12.32	2.33	3.61	3.33	1.78
0.50	1.78	1.50	61.47	2.50	3.02	3.50	1.66
0.67	2.08	1.67	16.19	2.67	2.71	3.67	1.51
0.83	2.56	1.83	8.38	2.83	2.40	3.83	1.51
1.00	3.29	2.00	5.69	3.00	2.25	4.00	1.51

CALIB
STANDHYD (0160)
ID= 1 DT=12.0 min

Area (ha)= 1.30
Total Imp(%)= 50.70 Dir. Conn.(%)= 22.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.66	0.64
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	93.09	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 12.0 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
0.200	1.38	1.200	6.32	2.200	4.21	3.20	1.91
0.400	1.60	1.400	28.70	2.400	3.41	3.40	1.74
0.600	1.93	1.600	38.83	2.600	2.87	3.60	1.59
0.800	2.40	1.800	10.98	2.800	2.50	3.80	1.51
1.000	3.17	2.000	6.14	3.000	2.28	4.00	1.51

				TOTALS
Max.Eff.Inten.(mm/hr)=		38.83	11.11	
over (min)		12.00	24.00	
Storage Coeff. (min)=		3.57 (ii)	20.57 (ii)	
Unit Hyd. Tpeak (min)=		12.00	24.00	
Unit Hyd. peak (cms)=		0.14	0.05	
PEAK FLOW	(cms)=	0.03	0.01	0.040 (iii)
TIME TO PEAK	(hrs)=	1.60	1.80	1.60
RUNOFF VOLUME	(mm)=	23.99	6.01	9.96
TOTAL RAINFALL	(mm)=	24.99	24.99	24.99
RUNOFF COEFFICIENT	=	0.96	0.24	0.40

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

DUHYD (0183)
Inlet Cap.= 0.152
#of Inlets= 1
Total(cms)= 0.2

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
TOTAL HYD.(ID= 1):	1.30	0.04	1.60	9.96
MAJOR SYS.(ID= 2):	0.00	0.00	0.00	0.00
MINOR SYS.(ID= 3):	1.30	0.04	1.60	9.96

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

READ STORM	Filename: C:\Users\jlysecki\AppData\Local\Temp\aad80675-a0b4-4fc2-876a-2640adc73013\b8992344
Ptotal= 25.00 mm	Comments: 25mm4hr

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr

0.17	1.36	1.17	5.12	2.17	4.33	3.17	1.93
0.33	1.51	1.33	12.32	2.33	3.61	3.33	1.78
0.50	1.78	1.50	61.47	2.50	3.02	3.50	1.66
0.67	2.08	1.67	16.19	2.67	2.71	3.67	1.51
0.83	2.56	1.83	8.38	2.83	2.40	3.83	1.51
1.00	3.29	2.00	5.69	3.00	2.25	4.00	1.51

CALIB
STANDHYD (0193)
ID= 1 DT=12.0 min

Area (ha)= 1.21
Total Imp(%)= 49.30 Dir. Conn.(%)= 20.10

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.60	0.61
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	89.81	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 12.0 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
0.200	1.38	1.200	6.32	2.200	4.21	3.20	1.91
0.400	1.60	1.400	28.70	2.400	3.41	3.40	1.74
0.600	1.93	1.600	38.83	2.600	2.87	3.60	1.59
0.800	2.40	1.800	10.98	2.800	2.50	3.80	1.51
1.000	3.17	2.000	6.14	3.000	2.28	4.00	1.51

				TOTALS
Max.Eff.Inten.(mm/hr)=		38.83	11.03	
over (min)		12.00	24.00	
Storage Coeff. (min)=		3.50 (ii)	20.54 (ii)	
Unit Hyd. Tpeak (min)=		12.00	24.00	
Unit Hyd. peak (cms)=		0.14	0.05	
PEAK FLOW	(cms)=	0.03	0.01	0.035 (iii)
TIME TO PEAK	(hrs)=	1.60	1.80	1.60
RUNOFF VOLUME	(mm)=	23.99	5.99	9.60
TOTAL RAINFALL	(mm)=	24.99	24.99	24.99
RUNOFF COEFFICIENT	=	0.96	0.24	0.38

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

DUHYD (0227)
Inlet Cap.= 0.120
#of Inlets= 1
Total(cms)= 0.1

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
TOTAL HYD.(ID= 1):	1.21	0.03	1.60	9.60
MAJOR SYS.(ID= 2):	0.00	0.00	0.00	0.00
MINOR SYS.(ID= 3):	1.21	0.03	1.60	9.60

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

READ STORM	Filename: C:\Users\jlysecki\AppData\Local\Temp\aad80675-a0b4-4fc2-876a-2640adc73013\b8992344
Ptotal= 25.00 mm	Comments: 25mm4hr

TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN

hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.17	1.36	1.17	5.12	2.17	4.33	3.17	1.93
0.33	1.51	1.33	12.32	2.33	3.61	3.33	1.78
0.50	1.78	1.50	61.47	2.50	3.02	3.50	1.66
0.67	2.08	1.67	16.19	2.67	2.71	3.67	1.51
0.83	2.56	1.83	8.38	2.83	2.40	3.83	1.51
1.00	3.29	2.00	5.69	3.00	2.25	4.00	1.51

CALIB	
STANDHYD (0206)	Area (ha)= 38.60
ID= 1 DT=12.0 min	Total Imp(%)= 54.70 Dir. Conn.(%)= 23.20

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	21.11	17.49
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	507.28	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 12.0 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
0.200	1.38	1.200	6.32	2.200	4.21	3.20	1.91
0.400	1.60	1.400	28.70	2.400	3.41	3.40	1.74
0.600	1.93	1.600	38.83	2.600	2.87	3.60	1.59
0.800	2.40	1.800	10.98	2.800	2.50	3.80	1.51
1.000	3.17	2.000	6.14	3.000	2.28	4.00	1.51

				TOTALS
Max.Eff.Inten.(mm/hr)=		38.83	12.63	
over (min)		12.00	36.00	
Storage Coeff. (min)=		9.88 (ii)	26.03 (ii)	
Unit Hyd. Tpeak (min)=		12.00	36.00	
Unit Hyd. peak (cms)=		0.10	0.04	
PEAK FLOW	(cms)=	0.84	0.38	0.989 (iii)
TIME TO PEAK	(hrs)=	1.60	2.00	1.60
RUNOFF VOLUME	(mm)=	23.99	6.36	10.45
TOTAL RAINFALL	(mm)=	24.99	24.99	24.99
RUNOFF COEFFICIENT	=	0.96	0.25	0.42

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0225)					
1 + 2 = 3		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
*** W A R N I N G : HYDROGRAPH 0183 <ID= 1> IS DRY.					
*** W A R N I N G : HYDROGRAPH 0225 = HYDROGRAPH 0206					
ID1= 1 (0183):		0.00	0.000	0.00	0.00
+ ID2= 2 (0206):		38.60	0.989	1.60	10.45
ID = 3 (0225):		38.60	0.989	1.60	10.45

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0225)					
3 + 2 = 1		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
*** W A R N I N G : HYDROGRAPH 0227 <ID= 2> IS DRY.					
*** W A R N I N G : HYDROGRAPH 0001 = HYDROGRAPH 0003					
ID1= 3 (0225):		38.60	0.989	1.60	10.45
+ ID2= 2 (0227):		0.00	0.000	0.00	0.00
ID = 1 (0225):		38.60	0.989	1.60	10.45

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

READ STORM	Filename: C:\Users\jlysecki\AppData\Local\Temp\aad80675-a0b4-4fc2-876a-2640adc73013\b8992344
Ptotal= 25.00 mm	Comments: 25mm4hr

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.17	1.36	1.17	5.12	2.17	4.33	3.17	1.93
0.33	1.51	1.33	12.32	2.33	3.61	3.33	1.78
0.50	1.78	1.50	61.47	2.50	3.02	3.50	1.66
0.67	2.08	1.67	16.19	2.67	2.71	3.67	1.51
0.83	2.56	1.83	8.38	2.83	2.40	3.83	1.51
1.00	3.29	2.00	5.69	3.00	2.25	4.00	1.51

CALIB	
STANDHYD (0209)	Area (ha)= 5.20
ID= 1 DT=12.0 min	Total Imp(%)= 31.60 Dir. Conn.(%)= 19.40

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	1.64	3.56
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	186.19	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 12.0 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
0.200	1.38	1.200	6.32	2.200	4.21	3.20	1.91
0.400	1.60	1.400	28.70	2.400	3.41	3.40	1.74
0.600	1.93	1.600	38.83	2.600	2.87	3.60	1.59
0.800	2.40	1.800	10.98	2.800	2.50	3.80	1.51
1.000	3.17	2.000	6.14	3.000	2.28	4.00	1.51

				TOTALS
Max.Eff.Inten.(mm/hr)=		38.83	6.41	
over (min)		12.00	36.00	
Storage Coeff. (min)=		5.42 (ii)	26.60 (ii)	
Unit Hyd. Tpeak (min)=		12.00	36.00	
Unit Hyd. peak (cms)=		0.13	0.04	
PEAK FLOW	(cms)=	0.10	0.04	0.119 (iii)
TIME TO PEAK	(hrs)=	1.60	2.00	1.60
RUNOFF VOLUME	(mm)=	23.99	4.67	8.41
TOTAL RAINFALL	(mm)=	24.99	24.99	24.99
RUNOFF COEFFICIENT	=	0.96	0.19	0.34

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
YOU SHOULD CONSIDER SPLITTING THE AREA.

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 69.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

COLE ENGINEERING

Experience Enhancing Excellence

```
|    READ STORM    |    Filename: C:\Users\jlysecki\AppD
|                  |              ata\Local\Temp\
|                  |              aad80675-a0b4-4fc2-876a-2640adc73013\b8992344
| Ptotal= 25.00 mm |    Comments: 25mm4hr
--------------------
```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.17	1.36	1.17	5.12	2.17	4.33	3.17	1.93
0.33	1.51	1.33	12.32	2.33	3.61	3.33	1.78
0.50	1.78	1.50	61.47	2.50	3.02	3.50	1.66
0.67	2.08	1.67	16.19	2.67	2.71	3.67	1.51
0.83	2.56	1.83	8.38	2.83	2.40	3.83	1.51
1.00	3.29	2.00	5.69	3.00	2.25	4.00	1.51

```
--------------------
| CALIB            |
| STANDHYD (  0252)|   Area    (ha)=   1.44
|ID= 1 DT=12.0 min |   Total Imp(%)=  52.40   Dir. Conn.(%)=  20.10
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.75         0.69
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      97.98        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO  12.0 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
0.200	1.38	1.200	6.32	2.200	4.21	3.20	1.91
0.400	1.60	1.400	28.70	2.400	3.41	3.40	1.74
0.600	1.93	1.600	38.83	2.600	2.87	3.60	1.59
0.800	2.40	1.800	10.98	2.800	2.50	3.80	1.51
1.000	3.17	2.000	6.14	3.000	2.28	4.00	1.51

```
     Max.Eff.Inten.(mm/hr)=      38.83        12.39
               over (min)        12.00        24.00
     Storage Coeff.  (min)=       3.68 (ii)   19.96 (ii)
     Unit Hyd. Tpeak (min)=      12.00        24.00
     Unit Hyd. peak  (cms)=       0.14         0.05
                                                    *TOTALS*
     PEAK FLOW       (cms)=       0.03         0.02          0.042 (iii)
     TIME TO PEAK    (hrs)=       1.60         1.80          1.60
     RUNOFF VOLUME    (mm)=      23.99         6.31          9.85
     TOTAL RAINFALL   (mm)=      24.99        24.99         24.99
     RUNOFF COEFFICIENT   =       0.96         0.25          0.39

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  69.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
```

```
--------------------
| RESERVOIR(  0261)|
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                         0.0000      0.0000   |  0.1470      0.0137
                         0.0530      0.0050   |  0.1700      0.0155
                         0.0700      0.0076   |  0.1900      0.0220
                         0.1150      0.0113   |  0.0000      0.0000

                              AREA     QPEAK     TPEAK       R.V.
                              (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0252)    1.440     0.042     1.60        9.85
   OUTFLOW: ID= 1 (  0261)    1.440     0.029     1.80        9.84

                         PEAK   FLOW   REDUCTION [Qout/Qin](%)= 68.91
                         TIME SHIFT OF PEAK FLOW         (min)= 12.00
                         MAXIMUM  STORAGE   USED        (ha.m.)=  0.0028
```

```
--------------------
| ADD HYD  (  0251)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0209):      5.20    0.119     1.60     8.41
     + ID2= 2 (  0261):      1.44    0.029     1.80     9.84
       ================================================
       ID = 3 (  0251):      6.64    0.143     1.60     8.72

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

```
--------------------
| RESERVOIR(  0245)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                         0.0000      0.0000   |  0.3090      0.2876
                         0.0000      0.0000   |  0.3330      0.3838
                         0.1230      0.1102   |  0.3620      0.5200
                         0.2870      0.1971   |  0.0000      0.0000

                              AREA     QPEAK     TPEAK       R.V.
                              (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0251)    6.640     0.143      1.60        8.72
   OUTFLOW: ID= 1 (  0245)    6.640     0.035      2.80        8.69

                         PEAK   FLOW   REDUCTION [Qout/Qin](%)= 24.63
                         TIME SHIFT OF PEAK FLOW         (min)= 72.00
                         MAXIMUM  STORAGE   USED        (ha.m.)=  0.0315
```

```
--------------------
| ROUTEPIPE(  0212)|     PIPE Number      =   1.00
| IN= 2---> OUT= 1 |     Diameter     (mm)=1650.00
| DT= 12.0 min     |     Length        (m)= 850.00
--------------------     Slope       (m/m)=  0.005
                         Manning n        =  0.013

     <----------------- TRAVEL TIME TABLE ------------------->
       DEPTH      VOLUME     FLOW RATE     VELOCITY    TRAV.TIME
         (m)     (cu.m.)       (cms)         (m/s)         min
        0.09    .367E+02        0.0          0.80         17.68
        0.17    .102E+03        0.1          1.25         11.33
        0.26    .184E+03        0.3          1.61          8.81
        0.35    .278E+03        0.6          1.91          7.41
        0.43    .382E+03        1.0          2.18          6.51
        0.52    .492E+03        1.4          2.41          5.88
        0.61    .608E+03        1.9          2.61          5.43
        0.69    .727E+03        2.4          2.79          5.08
        0.78    .848E+03        2.9          2.95          4.81
        0.87    .970E+03        3.5          3.08          4.60
        0.96    .109E+04        4.1          3.20          4.43
        1.04    .121E+04        4.7          3.29          4.31
        1.13    .133E+04        5.2          3.36          4.22
        1.22    .144E+04        5.8          3.41          4.15
        1.30    .154E+04        6.2          3.44          4.12
        1.39    .163E+04        6.6          3.43          4.13
        1.48    .172E+04        6.9          3.40          4.17
        1.56    .178E+04        6.9          3.31          4.28
        1.65    .182E+04        6.5          3.02          4.70
                                    <---- hydrograph ---->   <-pipe / channel->
                              AREA    QPEAK    TPEAK   R.V.   MAX DEPTH  MAX VEL
                              (ha)    (cms)    (hrs)   (mm)       (m)      (m/s)
   INFLOW : ID= 2 (  0245)    6.64     0.04     2.80   8.69       0.09      0.80
   OUTFLOW: ID= 1 (  0212)    6.64     0.03     3.20   8.69       0.09      0.80
```

COLE ENGINEERING

Experience Enhancing Excellence

```
--------------------
| ADD HYD  (  0211)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)     (cms)    (hrs)     (mm)
        ID1= 1 (  0212):      6.64   0.034     3.20      8.69
      + ID2= 2 (  0225):     38.60   0.989     1.60     10.45
        ==========================================================
        ID = 3 (  0211):     45.24   0.995     1.60     10.19

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0255)|
| IN= 2---> OUT= 1 |
| DT= 12.0 min     |     OUTFLOW    STORAGE    |  OUTFLOW    STORAGE
--------------------       (cms)     (ha.m.)    |   (cms)     (ha.m.)
                           0.0000     0.0000    |   1.6250      1.2448
                           0.0190     0.1627    |   1.6630      1.2997
                           0.0360     0.4306    |   1.8430      1.5816
                           0.0480     0.7217    |   2.1300      2.1197
                           0.1330     0.7718    |   2.9680      2.2465
                           1.0390     0.9773    |   7.5380      2.5741

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0211)     45.240     0.995      1.60      10.19
   OUTFLOW: ID= 1 (  0255)     45.240     0.034      5.10      10.14

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  3.42
                  TIME SHIFT OF PEAK FLOW         (min)=210.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.4001

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

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

COLE ENGINEERING

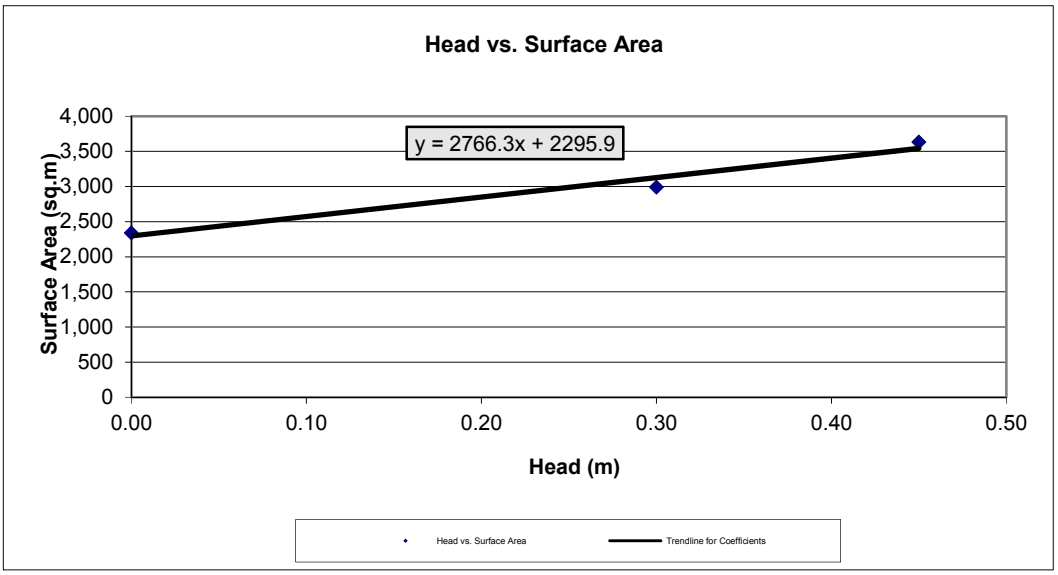
Extended Detention Sheet
SWM Pond 1

Marianneville - Glenway Estates (Phase 2)
File No. L09-301
Date: January 2020

MOE Detention Time Calculation:

Active Storage:

	Elevation (m)	Head (m)	Surface Area (m^2)	Cumulative Storage (m^3)
Permanent Pool	274.00	0.00	2,342	0
	274.30	0.30	2,989	812
Ext. Det. Elevation	**274.45**	**0.45**	**3,632**	**1,286**



y=mx+b

m= 2766.3
b= 2295.9

A_o= 0.011 m^2 Diameter= 0.120 m

t= $((0.66*C_1*h^{1.5})+(2*C_2*h^{0.5}))/2.75A_o$ *Equation 4.11, MOE SWM Planning and Design Manual*

t= $((0.66*(m)*h^{1.5})+(2*(b)*h^{0.5}))/2.75A_o$

h= 0.390 m

t= 92644.50909 s

Ext. Det. = **25.7 hr**

COLE ENGINEERING

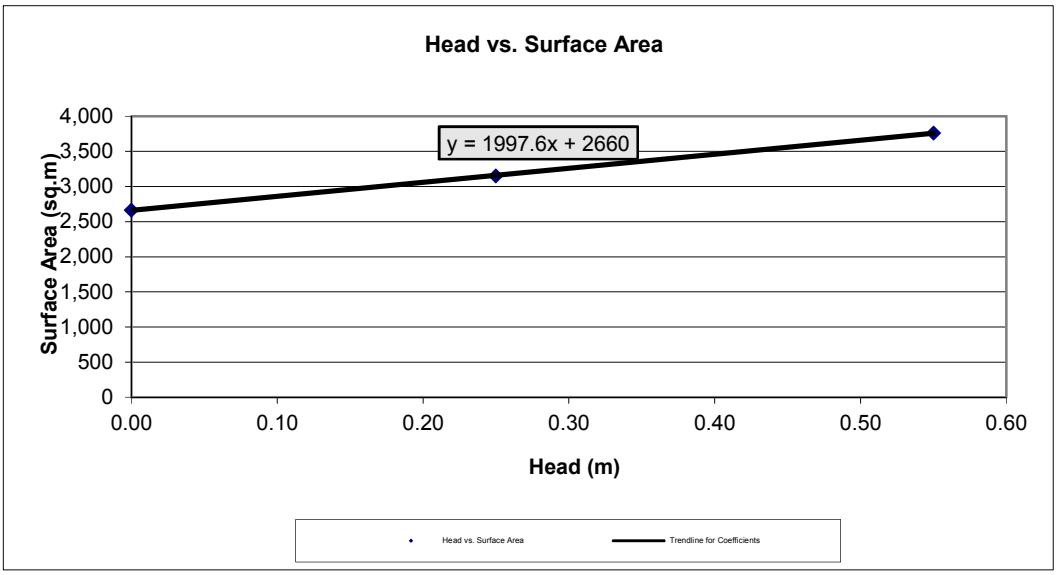
Extended Detention Sheet
SWM Pond 2

Marianneville - Glenway Estates (Phase 2)
File No. L09-301
Date: January 2020

MOE Detention Time Calculation:

Active Storage:

	Elevation (m)	Head (m)	Surface Area (m^2)	Cumulative Storage (m^3)
Permanent Pool	280.00	0.00	2,664	0
	280.25	0.25	3,152	726
Ext. Det. Elevation	**280.55**	**0.55**	**3,762**	**1,768**



y=mx+b

m= 1997.6
b= 2660

A_o= 0.012 m^2 Diameter= 0.125 m

t= $((0.66*C_1*h^{1.5})+(2*C_2*h^{0.5}))/2.75A_o$ *Equation 4.11, MOE SWM Planning and Design Manual*

t= $((0.66*(m)*h^{1.5})+(2*(b)*h^{0.5}))/2.75A_o$

h= 0.488 m

t= 110515.5483 s

Ext. Det. = **30.7 hr**

APPENDIX C.8
Water Balance Calculations

TABLE 1
CLIMATIC WATER BUDGET: CLIMATE NORMAL 1981-2010 (KING SMOKE TREE ID#6154142)
Potential Evapotranspiration

Month	Mean Temperature (°C)	Heat Index	Potential Evapotranspiration (mm)	Daylight Correction Value	Adusted PET (mm)	Total Precipitation (mm)	Surplus (mm)	Deficit (mm)
January	-7.37	0.0	0.0	0.80	0.0	51.65	51.7	0.0
February	-6.10	0.0	0.0	0.81	0.0	45.97	46.0	0.0
March	-1.54	0.0	0.0	1.03	0.0	51.18	51.2	0.0
April	5.96	1.3	27.2	1.13	30.6	64.90	34.3	0.0
May	12.50	4.0	60.3	1.28	76.9	87.10	10.2	0.0
June	17.68	6.8	87.5	1.29	113.3	84.83	0.0	28.4
July	20.47	8.4	102.4	1.31	134.2	86.39	0.0	47.8
August	19.58	7.9	97.6	1.21	118.0	88.38	0.0	29.6
September	15.30	5.4	74.9	1.05	78.5	84.19	5.7	0.0
October	8.62	2.3	40.4	0.94	38.1	72.93	34.8	0.0
November	2.17	0.3	9.2	0.80	7.3	84.57	77.2	0.0
December	-3.71	0.0	0.0	0.77	0.0	55.49	55.5	0.0
TOTALS		**36.4**			**597.0**	**857.58**	**366.5**	**105.9**
				TOTAL WATER SURPLUS	**260.6**	mm		

Latitude 44.0

TABLE 2
WATER BUDGET - PRE-DEVELOPMENT
WATER BALANCE / WATER BUDGET ASSESSMENT

Catchment Designation	Site						
	A1Pre	A2Pre	A2-Ext	A3-2Pre			Total
Area (m²)	102300	139400	25289	12700			279689
Pervious Area (m²)	71508	73185	25289	11430			181412
Impervious Area (m²)	30792	66215	0	1270			98277
Phase 1 Rooftop Area (m²)	2120	0	0	0			2120
Infiltration Factors							
Topography Infiltration Factor	0.1	0.1	0.1	0.1			
Soil Infiltration Factor	0.1	0.1	0.1	0.1			
Land Cover Infiltration Factor	0.075	0.05	0.1	0.1			
MOE Infiltration Factor	0.275	0.25	0.3	0.3			
Run-Off Coefficient	0.725	0.75	0.7	0.7			
Runoff from Impervious Surfaces*	0.8	0.8	0.8	0.8			
Inputs (per Unit Area)							
Precipitation (mm/yr)	858	858	858	858			858
Run-On (mm/yr)	0	0	0	0			0
Other Inputs (mm/yr)	0	0	0	0			0
Total Inputs (mm/yr)	**858**	**858**	**858**	**858**			**858**
Outputs (per Unit Area)							
Precipitation Surplus (mm/yr)	389	463	261	303			410
Net Surplus (mm/yr)	389	463	261	303			410
Evapotranspiration (mm/yr)	469	395	597	554			447
Infiltration (mm/yr)	50	34	78	70			46
Rooftop Infiltration (mm/yr)**	4	0	0	0			2
Total Infiltration (mm/yr)	55	34	78	70			47
Runoff Pervious Areas	132	103	182	164			123
Runoff Impervious Areas	202	326	0	69			239
Total Runoff (mm/yr)	334	428	182	233			363
Total Outputs (mm/yr)	**858**	**858**	**858**	**858**			**858**
Difference (Inputs - Outputs)	0	0	0	0			0
Inputs (Volumes)							
Precipitation (m³/yr)	87730	119547	21687	10891			239856
Run-On (m³/yr)	0	0	0	0			0
Other Inputs (m³/yr)	0	0	0	0			0
Total Inputs (m³/yr)	**87730**	**119547**	**21687**	**10891**			**239856**
Outputs (Volumes)							
Precipitation Surplus (m³/yr)	39761	64500	6590	3850			114701
Net Surplus (m³/yr)	39761	64500	6590	3850			114701
Evapotranspiration (m³/yr)	47970	55047	15097	7041			125155
Infiltration (m³/yr)	5125	4768	1977	894			12763
Rooftop Infiltration (m³/yr)	455	0	0	0			455
Total Infiltration (m³/yr)	5579	4768	1977	894			13218
Runoff Pervious Areas	13510	14304	4613	2085			34513
Runoff Impervious Areas	20671	45428	0	871			66970
Total Runoff (m³/yr)	34181	59732	4613	2956			101483
Total Outputs (m³/yr)	**87730**	**119547**	**21687**	**10891**			**239856**
Difference (Inputs - Outputs)	0	0	0	0			0

*Evaporation from impervious areas was assumed to be: 20% of precipitation
**Assume disconnected rooftops allow 25% of rooftop runoff to infiltrate

TABLE 3
WATER BUDGET - POST-DEVELOPMENT
WATER BALANCE / WATER BUDGET ASSESSMENT

Catchment Designation	Site					
	A1Post	A2 Post	A2-Ext Post	A3-2Post		Total
Area (m²)	121300	125600	30958	12000		289858
Pervious Area (m²)	55192	57650	9937.518	5712		128491
Impervious Area (m²)	66109	67950	21020.482	6288		161367
Phase 1 Rooftop Area (m²)	2120	0	0	0		2120
Phase 2 Rooftop Area (m²)	21019	2386	9640	3240		36286
Infiltration Factors						
Topography Infiltration Factor	0.1	0.1	0.1	0.1		
Soil Infiltration Factor	0.1	0.1	0.1	0.1		
Land Cover Infiltration Factor	0.025	0.025	0.025	0.025		
MOE Infiltration Factor	0.225	0.225	0.225	0.225		
Run-Off Coefficient	0.775	0.775	0.775	0.775		
Runoff from Impervious Surfaces*	0.8	0.8	0.8	0.8		
Inputs (per Unit Area)						
Precipitation (mm/yr)	858	858	858	858		858
Run-On (mm/yr)	0	0	0	0		0
Other Inputs (mm/yr)	0	0	0	0		0
Total Inputs (mm/yr)	**858**	**858**	**858**	**858**		**858**
Outputs (per Unit Area)						
Precipitation Surplus (mm/yr)	492	491	549	484		497
Net Surplus (mm/yr)	492	491	549	484		497
Evapotranspiration (mm/yr)	365	367	308	374		360
Infiltration (mm/yr)	27	27	19	28		26
Rooftop Infiltration (mm/yr)	3.75	0.00	0.00	0		2
Total Infiltration (mm/yr)	30	27	19	28		28
Runoff Pervious Areas	92	93	65	96		90
Runoff Impervious Areas	370	371	466	359		380
Total Runoff (mm/yr)	462	464	531	456		470
Total Outputs (mm/yr)	**858**	**858**	**858**	**858**		**858**
Difference (Inputs - Outputs)	0	0	0	0		0
Inputs (Volumes)						
Precipitation (m³/yr)	104024	107712	26549	10291		248576
Run-On (m³/yr)	0	0	0	0		0
Other Inputs (m³/yr)	0	0	0	0		0
Total Inputs (m³/yr)	**104024**	**107712**	**26549**	**10291**		**248576**
Outputs (Volumes)						
Precipitation Surplus (m³/yr)	59738	61642	17011	5803		144193
Net Surplus (m³/yr)	59738	61642	17011	5803		144193
Evapotranspiration (m³/yr)	44287	46070	9538	4488		104383
Infiltration (m³/yr)	3236	3380	583	335		7534
Rooftop Infiltration (m³/yr)	455	0	0	0		455
Total Infiltration (m³/yr)	3691	3380	583	335		7989
Runoff Pervious Areas	11147	11644	2007	1154		25951
Runoff Impervious Areas	44900	46618	14421	4314		110253
Total Runoff (m³/yr)	56047	58261	16428	5468		136204
Total Outputs (m³/yr)	**104024**	**107712**	**26549**	**10291**		**248576**
Difference (Inputs - Outputs)	0	0	0	0		0

*Evaporation from impervious areas was assumed to be: 20% of precipitation

TABLE 4
WATER BUDGET - POST-DEVELOPMENT WITH MITIGATION
WATER BALANCE / WATER BUDGET ASSESSMENT

Catchment Designation	Site					
	A1Post	A2 Post	A2-Ext Post	A3-2Post		Total
Area (m²)	121300	125600	30958	12000		289858
Pervious Area (m²)	55192	57650	9938	5712		128491
Impervious Area (m²)	66109	67950	21020	6288		161367
Phase 1 Rooftop Area (m²)	2120	0	0	0		2120
Phase 2 Rooftop Area (m²)	21019	2386	9640	3240		36286
Infiltration Factors						
Topography Infiltration Factor	0.1	0.1	0.1	0.1		
Soil Infiltration Factor	0.2	0.2	0.2	0.2		
Land Cover Infiltration Factor	0.025	0.025	0.025	0.025		
MOE Infiltration Factor	0.325	0.325	0.325	0.325		
Run-Off Coefficient	0.675	0.675	0.675	0.675		
Runoff from Impervious Surfaces*	0.8	0.8	0.8	0.8		
Inputs (per Unit Area)						
Precipitation (mm/yr)	858	858	858	858		858
Run-On (mm/yr)	0	0	0	0		0
Other Inputs (mm/yr)	0	0	0	0		0
Total Inputs (mm/yr)	**858**	**858**	**858**	**858**		**858**
Outputs (per Unit Area)						
Precipitation Surplus (mm/yr)	492	491	549	484		497
Net Surplus (mm/yr)	492	491	549	484		497
Evapotranspiration (mm/yr)	365	367	308	374		360
Infiltration (mm/yr)	39	39	27	40		38
Rooftop Infiltration (mm/yr)	41	4	67	58		28
Total Infiltration (mm/yr)	79	43	94	98		66
Runoff Pervious Areas	80	81	56	84		78
Runoff Impervious Areas	333	367	399	302		354
Total Runoff (mm/yr)	413	448	456	385		432
Total Outputs (mm/yr)	**858**	**858**	**858**	**858**		**858**
Difference (Inputs - Outputs)	0	0	0	0		0
Inputs (Volumes)						
Precipitation (m³/yr)	104024	107712	26549	10291		248576
Run-On (m³/yr)	0	0	0	0		0
Other Inputs (m³/yr)	0	0	0	0		0
Total Inputs (m³/yr)	**104024**	**107712**	**26549**	**10291**		**248576**
Outputs (Volumes)						
Precipitation Surplus (m³/yr)	59738	61642	17011	5803		144193
Net Surplus (m³/yr)	59738	61642	17011	5803		144193
Evapotranspiration (m³/yr)	44287	46070	9538	4488		104383
Infiltration (m³/yr)	4675	4883	842	484		10883
Rooftop Infiltration (m³/yr)	4961	512	2067	695		8234
Total Infiltration (m³/yr)	9635	5394	2909	1178		19117
Runoff Pervious Areas	9709	10141	1748	1005		22603
Runoff Impervious Areas	40394	46106	12355	3619		102474
Total Runoff (m³/yr)	50102	56247	14103	4624		125076
Total Outputs (m³/yr)	**104024**	**107712**	**26549**	**10291**		**248576**
Difference (Inputs - Outputs)	0	0	0	0		0

*Evaporation from impervious areas was assumed to be: 20% of precipitation
**Assume disconnected rooftops allow 25% of rooftop runoff to infiltrate
Areas with medium to high density residential rooftops were multiplied by the MOE Infiltration Factor as an extra factor of safety
Mitigation measures include disconnecting new proposed rooftops and addition of topsoil

TABLE 5
WATER BUDGET SUMMARY
WATER BALANCE / WATER BUDGET ASSESSMENT

Characteristic	Site				
	Pre-Development	Post-Development	Change (Pre- to Post-)	Post-Development with Mitigation	Change (Pre- to Post- with Mitigation)
Inputs (Volumes)					
Precipitation (m³/yr)	239856	248576	3.6%	248576	3.6%
Run-On (m³/yr)	0	0	0.0%	0	0.0%
Other Inputs (m³/yr)	0	0	0.0%	0	0.0%
Total Inputs (m³/yr)	**239856**	**248576**	**3.6%**	**248576**	**3.6%**
Outputs (Volumes)					
Precipitation Surplus (m³/yr)	114701	144193	25.7%	144193	25.7%
Net Surplus (m³/yr)	114701	144193	25.7%	144193	25.7%
Evapotranspiration (m³/yr)	125155	104383	-16.6%	104383	-16.6%
Infiltration (m³/yr)	12763	7534	-41.0%	10883	-14.7%
Rooftop Infiltration (m³/yr)	455	455	0.0%	8234	1711.3%
Total Infiltration (m³/yr)	13218	7989	-39.6%	19117	44.6%
Runoff Pervious Areas	34513	25951	-24.8%	22603	-34.5%
Runoff Impervious Areas	66970	110253	64.6%	102474	53.0%
Total Runoff (m³/yr)	101483	136204	34.2%	125076	23.2%
Total Outputs (m³/yr)	**239856**	**248576**	**3.6%**	**248576**	**3.6%**

APPENDIX D
Statement of Limiting Conditions and Assumptions

Statement of Limiting Conditions and Assumptions

1. This Report/Study (the "Work") has been prepared at the request of, and for the exclusive use of, the Owner, and its affiliates (the "Intended Users"). No one other than the Intended Users has the right to use and rely on the Work without first obtaining the written authorization of Cole Engineering Group Ltd. (Cole Engineering) and its Owner.

2. Cole Engineering expressly excludes liability to any party except the Intended Users for any use of, and/or reliance upon, the Work.

3. Cole Engineering notes that the following assumptions were made in completing the Work:

   a) the land use description(s) supplied to us are correct;
   b) the surveys and data supplied to Cole Engineering by the Owner are accurate;
   c) market timing, approval delivery and secondary source information is within the control of Parties other than Cole Engineering; and
   d) there are no encroachments, leases, covenants, binding agreements, restrictions, pledges, charges, liens or special assessments outstanding, or encumbrances which would significantly affect the use or servicing.

   Investigations have not been carried out to verify these assumptions. Cole Engineering deems the sources of data and statistical information contained herein to be reliable, but we extend no guarantee of accuracy in these respects.

4. Cole Engineering accepts no responsibility for legal interpretations, questions of survey, opinion of title, hidden or inconspicuous conditions of the property, toxic wastes or contaminated materials, soil or sub-soil conditions, environmental, engineering or other factual and technical matters disclosed by the Owner, the Client, or any public agency, which by their nature, may change the outcome of the Work. Such factors, beyond the scope of this Work, could affect the findings, conclusions and opinions rendered in the Work. We have made disclosure of related potential problems that have come to our attention. Responsibility for diligence with respect to all matters of fact reported herein rests with the Intended Users.

5. Cole Engineering practices engineering in the general areas of infrastructure and transportation. It is not qualified to and is not providing legal or planning advice in this Work.

6. The legal description of the property and the area of the site were based upon surveys and data supplied to us by the Owner. The plans, photographs, and sketches contained in this report are included solely to aide in visualizing the location of the property, the configuration and boundaries of the site, and the relative position of the improvements on the said lands.

7. We have made investigations from secondary sources as documented in the Work, but we have not checked for compliance with by-laws, codes, agency and governmental regulations, etc., unless specifically noted in the Work.

8. Because conditions, including capacity, allocation, economic, social, and political factors change rapidly and, on occasion, without notice or warning, the findings of the Work expressed herein, are as of the date of the Work and cannot necessarily be relied upon as of any other date without subsequent advice from Cole Engineering.

9. The value of proposed improvements should be applied only with regard to the purpose and function of the Work, as outlined in the body of this Work. Any cost estimates set out in the Work are based on construction averages and subject to change.

10. Neither possession of the Work, nor a copy of it, carries the right of publication. All copyright in the Work is reserved to Cole Engineering. The Work shall not be disclosed, produced or reproduced, quoted from, or referred to, in whole or in part, or published in any manner, without the express written consent of Cole Engineering and the Owner.

11. The Work is only valid if it bears the professional engineer's seal and original signature of the author, and if considered in its entirety. Responsibility for unauthorized alteration to the Work is denied.