CANDEVCON EAST LIMITED
CONSULTING ENGINEERS & PLANNERS

Frisque Lands

3225 5th Concession Road, City of Pickering, Region of Durham

Functional Servicing and Stormwater Management Report

869547 Ontario Inc.

Project #E21007

July 2023

Table of Contents

Tables

Table of Contents Continued

1.0 Introduction and Background

***CANDEVCON EAST* Limited** has been retained by 869547 Ontario Inc. to provide a functional servicing and grading design and a stormwater management (SWM) strategy for the proposed residential development in the City of Pickering. The subject site is located between Balsam Road to the west and Audley Road to the east, north of the unopened road allowance for 5th Concession Road. The location of the site, which has a total area of 17.9 hectares (ha), is shown on **Figure 1**. The proposed development will consist of thirteen (13) low density single family residential estate lots with approximately 7.5 ha proposed for development and the remaining 10.4 ha being dedicated as open space.

The following documents were reviewed in preparation of this FSSR:

- Frisque Lands Geomorphic Assessment, Beacon Environmental, 2023.
- Frisque Lands Environmental Impact Study, Beacon Environmental, 2023
- Sewage System Lot Analysis, Drawings SP-1, SP-2, SP-3, SP-4 and SP-5, Gunnell Engineering Ltd., 2023
- Carruthers Creek Flood Management & Analysis Municipal Class EA, Hydrology Update Report, Carruthers Creek Watershed, Cole Engineering, October 2011.
- Geotechnical Investigation, Slope Stability Analysis and Geotechnical Setback Study, Part of Lots 3 and 4, Concession 5, City of Pickering, Ontario, GeoPro Consulting Limited, January 2023.
- Water Balance Assessment, Frisque Lands, 3225 Fifth Concession Road, Pickering, Ontario, R.J. Burnside & Associates Limited, February 2023.
- Stormwater Management Criteria, Version 1.0, Toronto and Region Conservation Authority, August 2012.
- Design Criteria, Section C, Stormwater Management and Storm Drainage, City of Pickering, January 2014
- Stormwater Management Planning and Design Manual (SWMP Manual) prepared by the Ministry of Environment, March 2003

SUBJECT LANDS

FRISQUE LANDS

THE CORPORATION OF THE CITY OF PICKERING

KEY PLAN

CANDEVCON EAST LIMITED
CONSULTING ENGINEERS & PLANNERS
1600 STELLAR DRIVE, SUITE 402 WHITBY, ONTARIO L1N 9B2
TEL. (289) 315-3680 FAX (905) 794-0611

Drawn By: J.R.	Checked By: M.F.	Proj. No. E21007
Designed By: J.R.	Checked By:	DWG. No. FIG.1
Scale: 1:2000	Date: June 22, 2023	

FILE: E21007-FIGURES.dwg

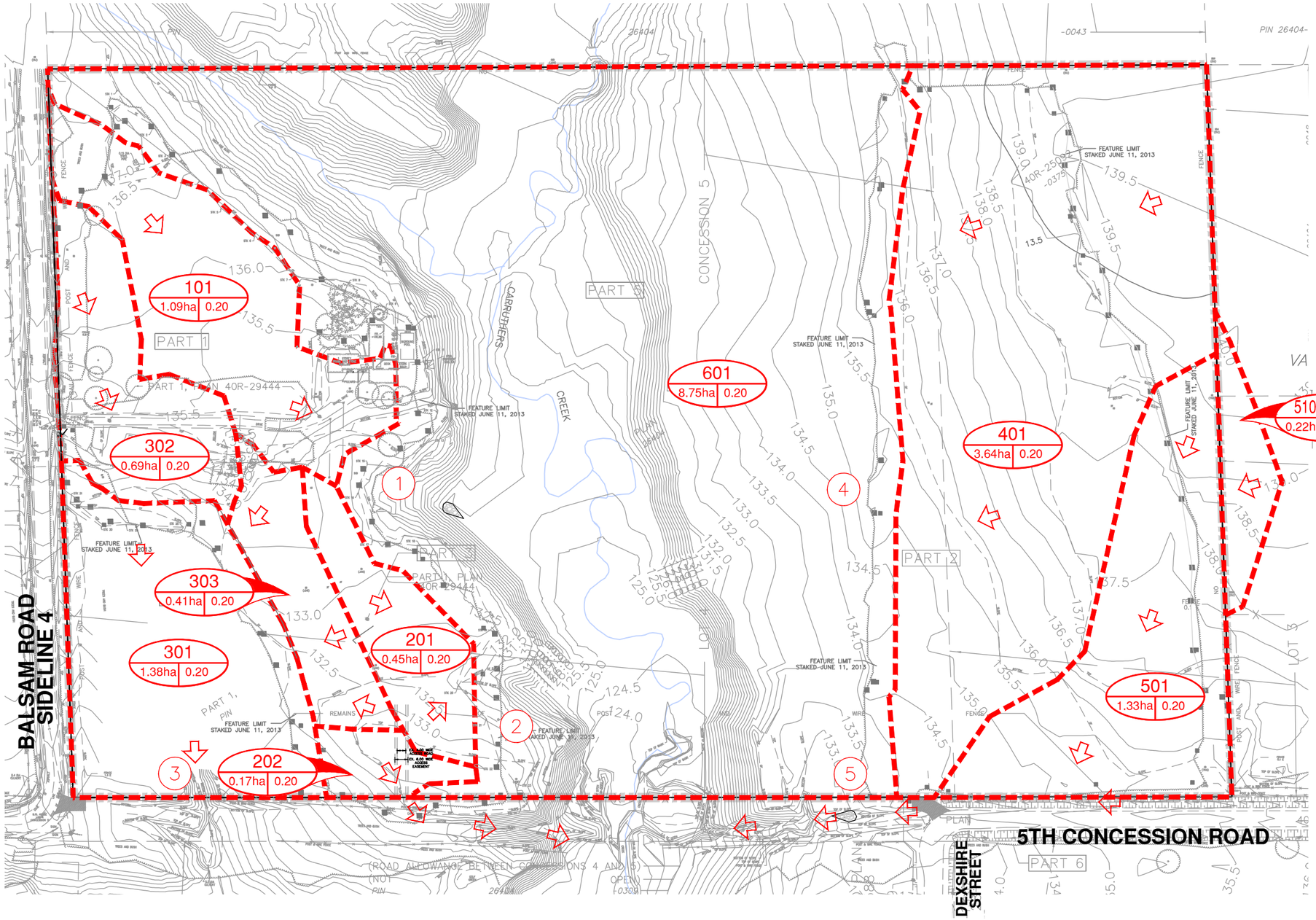
2.0 Site Topography and Grading

2.1 Existing Conditions

The existing site consists of agricultural land where the residential lots are being proposed, with forested area surrounding the agricultural lands and Carruthers Creek through approximately the centre of the property, flowing towards the south. Based on the topographical survey prepared by J.D. Barnes Limited (March 2012), the majority of the property slopes towards Carruthers Creek. The existing topographic conditions are illustrated on **Figure 2.**

2.2 Proposed Conditions

The proposed 13 lot subdivision will include 6.5m paved condominium roads, private driveways and residences. Preliminary centre line road grades and site grades at key points within the proposed development are provided on the Functional Grading Plan, **Drawing FSGP**. These target elevations provide guidance for detailed design to ensure the overall grading and major drainage function.



LEGEND

- EXISTING CONTOUR
- SITE BOUNDARY
- EXISTING DRAINAGE BOUNDARY
- EXISTING STORM SEWER
- FLOW DIRECTION
- AREA ID
- DRAINAGE AREA IN HECTARES
- RUNOFF COEFFICIENT
- OUTLET ID

FRISQUE LANDS

THE CORPORATION OF THE CITY OF PICKERING

PRE-DEVELOPMENT DRAINAGE CONDITIONS

CANDEVCON EAST LIMITED
CONSULTING ENGINEERS & PLANNERS
1600 STELLAR DRIVE, SUITE 402 WHITBY, ONTARIO L1N 9B2
TEL. (289) 315-3680 FAX (905) 794-0611

Drawn By: J.R.	Checked By: M.F.	Proj. No. E21007	
Designed By: J.R.	Checked By:	DWG. No. FIG.2	
Scale: 1:2000	Date: June 22, 2023		

FILE: E21007-FIGURES.dwg

3.0 Storm Drainage

3.1 Existing Conditions

As noted in Section 2.1, under existing conditions the site generally drains towards Carruthers Creek located approximately through the centre of the site. The existing conditions drainage areas have been discretised into five (5) separate outlets as shown on **Figure 2** and described below in **Table 1**. Existing conditions drainage areas have been delineated based on the future development conditions so that a comparison of pre and post development peak flows can be made. To be conservative in establishing pre-development peak flow targets, all drainage areas have been assumed to have a Runoff Coefficient of 0.20 representing 0% impervious surfaces.

Table 1: Existing Conditions Drainage Areas

Outlet ID	Drainage Area ID	Description	Drainage Area (ha)
1	101	West Side of Creek - Agricultural Lands, Existing House, Driveway	1.09
2	201	West Side of Creek - Agricultural Lands	0.45
	202[1]	West Side of Creek - Agricultural Lands	0.17
3	301	West Side of Creek - Woodlot	1.38
	302	West Side of Creek - Agricultural Lands, Driveway	0.69
	303	West Side of Creek - Agricultural Lands	0.41
4	401	East Side of Creek – Agricultural Lands	3.64
5	501	East Side of Creek – Agricultural Lands	1.33
	510 (EXT)	External East Side of Creek – Woodlot	0.22
-	601	Carruthers Creek Natural Heritage System	8.75
Total Site and External Area			18.13

[1]Drainage from Area 202 drains south to a small swale and then easterly towards the main branch of Carruthers Creek, joining with the flows from Area 201 downstream of the southern property limit.

3.2 Proposed Conditions

3.2.1 Minor System

The minor system for the proposed development will be designed to comply with the City of Pickering's Design Guidelines (2020). Separate storm sewers are proposed for the east and west group of residential lots and each will outlet to Carruthers Creek as shown on **Figure 3**. The storm sewers have been designed to convey flows from the front of the lots including approximately half of the roof areas, the driveways and the roads (Areas 102,103, and 501 on **Figure 3**).

Rear roof leaders will be directed to splash pads with flows being conveyed overland as sheet flow towards Carruthers Creek (Drainage Areas 101, 201 and 401) draining to

Outlets 1, 2 and 4, respectively. The roof leaders in Area 302 will also be disconnected to splash pads with flows being conveyed overland through the woodlot to Outlet 3, a small tributary to Carruthers Creek.

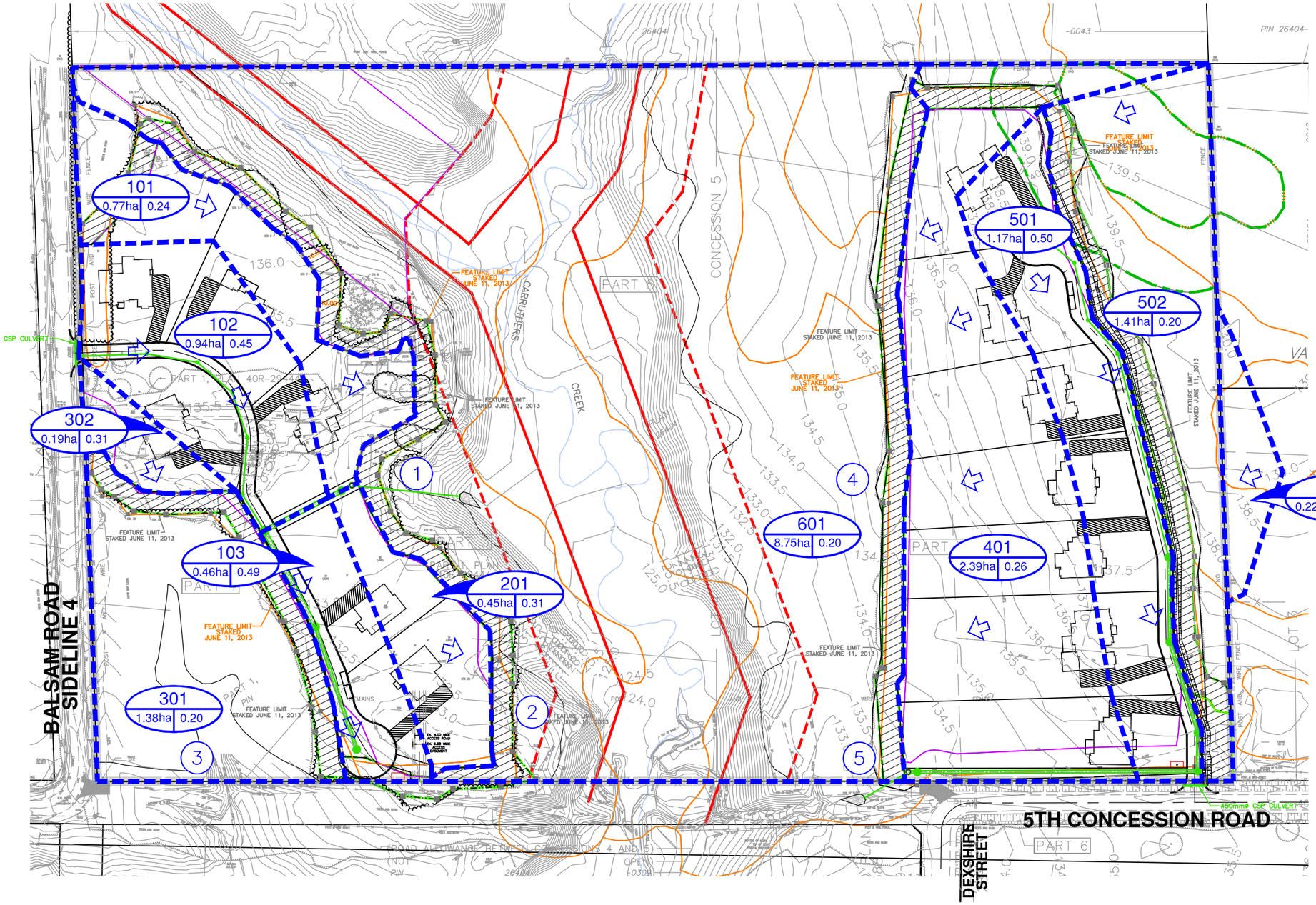
The outlet headwall locations were determined as part of the Frisque Lands Geomorphic Assessment completed by Beacon Environmental Limited (July 2023). The routing and preliminary sizing of the storm sewer to service the development are shown on the Functional Servicing Plan (**Drawing FSGP**).

Minor system flows from the external area, Area 510 (EXT) on **Figure 3**, and Area 502 will be conveyed by a drainage swale flowing southerly parallel to the road, where the flows will then be conveyed under the road via culvert, draining westerly discharging to Carruthers Creek at Outlet 5. These flows are considered clean and will not be captured by the storm system. Refer to **Appendix A** for the culvert and swale conveyance calculations.

Table 2: Proposed Conditions Drainage Areas

Outlet ID	Drainage Area ID	Description	Drainage Area (ha)	Percent[2] Impervious (%)
1	101	West Side of Creek – Lots 1, 2 & 3 rear roof and yards	0.77	5
	102	West Side of Creek – Lots 1, 2, 3 & 6 front roof and yards, and laneway	0.94	35
	103	West Side of Creek – Lots 4 & 5 front roof and yards, and laneway	0.46	41
2	201	West Side of Creek – Lots 4 & 5 rear roof and yards, and laneway/turning circle	0.45	16
3	301	West Side of Creek – Woodlot	1.38	0
	302	West Side of Creek - Lot 6 rear roof and yard	0.19	16
4	401	East Side of Creek – Lots 7-13 rear roof and yards	2.39	9
5	501	East Side of Creek – Agricultural Lands	1.17	43
	502	East Side of Creek – Open Space including existing woodlot	1.41	0
	510 (EXT)	External East Side of Creek – Woodlot	0.22	0
-	601	Carruthers Creek Natural Heritage System	8.75	0
Total Site and External Area			18.13	7

[1]Drainage from Area 202 drains south to a small swale and then easterly towards the main branch of Carruthers Creek, joining with the flows from Area 201 downstream of the southern property limit.
[2]See **Appendix A** for imperviousness calculations



LEGEND

- EXISTING CONTOUR
- SITE BOUNDARY
- PROPOSED DRAINAGE BOUNDARY
- EXISTING STORM SEWER
- PROPOSED STORM SEWER
- MAJOR SYSTEM FLOW DIRECTION
- MINOR SYSTEM FLOW DIRECTION

201 — AREA ID
0.95ha | 0.45 — DRAINAGE AREA IN HECTARES | RUNOFF COEFFICIENT

1 — OUTLET ID

FRISQUE LANDS

THE CORPORATION OF THE CITY OF PICKERING

POST-DEVELOPMENT DRAINAGE CONDITIONS

CANDEVCON EAST LIMITED
CONSULTING ENGINEERS & PLANNERS
1600 STELLAR DRIVE, SUITE 402 WHITBY, ONTARIO L1N 9B2
TEL. (289) 315-3680 FAX (905) 794-0611

Drawn By: J.R.	Checked By: M.F.	Proj. No. E21007	
Designed By: J.R.	Checked By:	DWG. No. FIG.3	
Scale: 1:2000	Date: June 22, 2023		

FILE: E21007-FIGURES.dwg

3.2.2 Major System

Major system flows from Areas 102, 103 and 501 will be captured and detained on-site. Portions of the storm sewer system will be over-sized to store and release the major system flows (100-year peak flow) to the Carruthers Creek Unit Target Flows. Refer to Section 4.0 for functional details of the stormwater management strategy. Capture calculations will be provided during detailed design.

Major system flows from the external area, Area 510 (EXT) on **Figure 3**, and Area 502 will be conveyed via the drainage swale as described above in Section 3.2.1. Refer to **Appendix A** for the culvert and swale conveyance calculations. For the remaining drainage areas, major system flows will generally flow overland to Carruthers Creek or the small tributary at Outlet 3. Refer to **Figure 3** and **Drawing FSGP** for overland flow routes.

Should the storm sewer become 100% blocked or an event in excess of the 100 year storm occurs, the major system flows will pond and spill towards Carruthers Creek via the overland flow route as depicted on the Functional Grading Plan, **Drawing FSGP**.

4.0 Stormwater Management

4.1 Existing Conditions

The site is not currently connected to any Municipal Infrastructure and there is no existing storm sewer or stormwater management facilities in the surrounding vicinity.

4.2 Design Criteria

The criteria for SWM for the subject site are as follows:

Quantity Control	Control post development flows to pre-development levels for all storm events for the 2 through 100-year return period events using the unit flow relationships for Carruthers Creek using the 24 hour AES design storms. Refer to **Appendix B** for the unit flow relationships.
Quality Control	An "Enhanced" level of protection for the minor system drainage as per Ministry of Environment guidelines is required (minimum 80% total suspended solids removal) by TRCA guidelines.
Erosion Control	- As per correspondence from Stephanie Dore at TRCA (August 25, 2022), a fluvial geomorphic erosion threshold analysis is required to determine if the site requires greater than 5mm on-site retention (refer to **Appendix B**). As per the Pre-Consultation Meeting Summary (Appendix B), the City of Pickering requires a minimum retention/infiltration of the first 5mm of runoff from impervious surfaces.
Water Balance	Complete a water balance assessment. At a minimum, TRCA requires a 5mm retention above the initial abstraction for runoff from all impervious surfaces.

4.3 Proposed Conditions

4.3.1 Quantity Control

As outlined in Section 4.2, post development flows are required to be controlled to pre development levels for all storm events, up to the 100 year storm event in accordance with the Carruthers Creek unit rates. The hydrologic model for Carruthers Creek was obtained from TRCA and three scenarios created to analyse the pre, post and post controlled conditions for the site. As a portion of the site, Areas 301 and 302 on **Figure 3**, drain to the small tributary which ultimately joins the main branch south of 5th Concession Road, the model has been extended downstream to the confluence of the

tributary with the main branch at Node 3101. Refer to **Appendix C1**, Figure No. FUT for the location of the flow node and the watershed catchments.

For the pre-development scenario, Catchments 179 and 180 were discretized to represent the site drainage as illustrated on **Figure 2**. As per the Hydrology Update Report (Cole Engineering, October 2011) the Airport Equation was utilized to calculate the time to peak for the discretized catchments. All catchments were modelled as rural pervious drainage areas maintaining the Curve Number from the parent catchment. Refer to **Appendix C1** for the model schematic, time to peak calculations and a summary of the model parameters. The model was simulated utilizing the 24 hour AES storm event for the 2 through 100 year storm events.

The post development scenario was set up in the same manner by discretizing Catchments 179 and 180 to represent the future site drainage as shown on **Figure 3**. Catchments with an imperviousness greater than 20% were modelled as urban with Initial Abstraction and Curve Numbers consistent with the watershed hydrologic model. Refer to **Appendix C2** for the model schematic, time to peak calculations for the remaining rural catchments and a summary of the model parameters.

A comparison was then made between the pre and post development (uncontrolled) scenarios for each Outlet and at Node 3101. The results are summarized in **Table 3** below for the 100 year storm event. Refer to **Appendices C1** and **C2** for the hydrologic models and **Appendix C3** for a summary for all storm events.

Table 3: 100 Year Storm Event Peak Flow Comparison[1] (m^3/s)

Outlet ID[2]	Pre-Development	Post Development Uncontrolled
Outlet 1	0.028	0.076
Outlet 2	0.017	0.013
Outlet 3	0.067	0.043
Outlet 4	0.099	0.065
Outlet 5	0.042	0.089
Node 3101[3]	6.011	6.025

[1]Refer to the Digital Modelling Files for the 2 through 50-year storm events.
[2]Refer to **Figure 3** for the Outlet locations.
[3]Refer to **Appendix C1, Figure No. FUT** for the Node location.

As shown in **Table 3**, there are decreases in peak flow during the 100 year storm event for Outlets 2, 3 and 4. There are minor increases in peak flow at Outlets 1 and 5 resulting from the increase in impervious area to both outlets which then results in a minor increase in peak flows at Node 3101. As such, stormwater management is required for each of these outlets to control post development flows to pre-development levels in accordance with the Carruthers Creek unit rates, and to also ensure that the downstream nodal flow is less than pre-development.

The third scenario represents post development with stormwater management controls to meet the quantity control criterion outlined in Section 4.2 for Outlets 1 and 5. The post development uncontrolled scenario was copied and route Reservoir commands utilized to represent the storage required. The model was iterated to determine the required storage to meet the 5 year, 25 year and 100 year quantity control targets as per Table 8-4 of the Hydrology Update Report for Carruthers Creek Watershed (Cole Engineering, October 2011) presented here in **Appendix C3**. The model was then run for the remaining storm events. It was determined that during a 100 year storm event, Outlet 1 and Outlet 5 will require approximately 332m^3 and 301m^3 respectively, with the required storage provided underground in the form of oversized storm pipes for both outlets.

Refer to **Appendix C3** for the model schematic, results and storage calculations. Refer to **Drawing FSP** for the location of the storage and **Table 4** below for a summary of the release rates, storage required and storage provided. Detailed orifice sizing and updated modelling will be provided during detailed design.

Table 4: Stormwater Management Summary

Outlet ID[1]	Storm Event (Year)	Carruthers Creek Unit Flow Target[2] (m^3/s)	Post Development Controlled Release Rate[3] (m^3/s)	Storage Required[3] (m^3)
1	2	-	0.006	160
	5	0.008	0.008	221
	10	-	0.012	250
	25	0.017	0.017	291
	50	-	0.027	312
	100	0.036	0.036	332
5	2	-	0.005	146
	5	0.007	0.007	200
	10	-	0.010	227
	25	0.014	0.014	264
	50		0.022	283
	100	0.030	0.030	301

[1]Refer to **Figure 3** for Outlet location.
[2]Refer to **Appendix B** and **Appendix C3**.
[3]Refer to **Appendix C3**.

Based on providing SWM controls for the developable area contributing to Outlets 1 and 5 in accordance with the Quantity Control Targets as per Table 8-4 of the Hydrology Update Report, Carruthers Creek Watershed (Cole Engineering, October 2011), the total flow downstream of Concession Road 5 at Node 3101 was reviewed and compared to pre-development and post development uncontrolled flows. Refer to **Table 5** for a summary of the peak flows for the 2 through 100 year storm events at Node 3101.

Table 5: Peak Flow Comparison at Node 3101[1]

Storm Event (Year)	Pre-Development[1] (m^3/s)	Post Development Uncontrolled[3] (m^3/s)	Post Development Controlled[4] (m^3/s)
2	1.750	1.755	1.761
5	2.732	2.739	2.748
10	3.459	3.468	3.477
25	4.439	4.450	4.459
50	5.208	5.221	5.230
100	6.011	6.025	6.034

[1]Refer to **Appendix C1, Figure No. FUT** for the Node location.
[2]Refer to **Appendix C1** for the 100 year results and the Digital Modelling Files for the 2-50 year storm events results
[3]Refer to **Appendix C2** for the 100 year results and the Digital Modelling Files for the 2-50 year storm events results.
[4]Refer to **Appendix C3** for the 100 year results and the Digital Modelling Files for the 2-50 year storm events results.

As shown in **Table 5** above, the total peak flows at Node 3101 increase with SWM controls for the 2 through 100 year storm events. This is due to the timing of the peak flows under post development conditions noting that the unit flow rates are less than pre-development flows. The increases are minor, only 0.4% from pre-development, and as such impacts at the downstream node are not anticipated. No further SWM quantity controls are provided.

4.3.2 Quality Control

As noted above, an "Enhanced" level of protection as presented in Tabe 3.2 of the MOE Stormwater Management Planning and Design Manual (SWMP Manual, March 2003) is required for the proposed development.

Quality treatment will be provided by Low Impact Development (LID) technologies as part of a treatment train approach along with an oil/grit separator (OGS) incorporated into the minor storm sewer system. Based on drainage areas of 1.40ha (Areas 102 and 103 on **Figure 3**) and 1.17ha (Area 501 on **Figure 3**) with an average imperviousness of 37% and 43%, respectively, Stormceptor models EF8 and EF6 (or approved equivalent) will provide 63% and 60% TSS removal for the site's drainage area prior to discharging Carruthers Creek. Refer to **Appendix D** for OGS sizing report. Refer to Section 4.3.5 for information on the proposed LID measures

It is understood that the TRCA only considers 50% TSS removal from standard oil/grit separators and as such LID measures are proposed to provide additional treatment as part of a "treatment train' approach. The performance of the LID measures, as outlined below in Section 4.3.3, in series with the oil/grit separators have been analyzed resulting in a TSS removal rate of 90%, thus meeting the required enhanced treatment level. Should through detailed engineering design, the LIDs outlined below not be

feasible or desired, the alternative would be to install a filtration type OGS such as a Jellyfish to achieve the 80% TSS removal. Refer to **Appendix E** for supporting calculations.

4.3.3 Erosion Control

As requested by TRCA, a geomorphic assessment has been completed by Beacon Environmental Limited to confirm the erosion control criteria of 5mm retention. In order to complete the analysis a continuous simulation hydrologic model was required to be able to assess the potential for erosion under existing and future development conditions. The Visual Otthymo event based hydrologic model prepared as outlined above in Section 4.3.1, was utilized and run using a continuous set of rainfall data for Balsam station provided by TRCA. The pre-, post and post controlled continuous simulation results were then provided to Beacon Environmental for analysis. Refer to **Appendix F** for the model schematic and the digital modelling files for the results.

The geomorphic assessment has concluded that 5mm of retention is sufficient to mitigate potential erosion impacts under future development conditions. Refer to the Frisque Lands Geomorphic Assessment (Beacon Environmental Limited, July 2023) for the geomorphic assessment and results of the erosion modelling. Refer to Section 4.3.5 for information on the proposed LID measures required to mitigate the potential erosion impacts by providing 5mm of retention.

4.3.4 Water Balance

LID measures present an opportunity to reduce runoff and promote infiltration at the source. Incorporating controls that do not require maintenance can be an effective method in the treatment train approach to stormwater management and will help achieve the required 5mm of stormwater retention to meet the water balance criterion. Refer to Section 4.3.5 for preliminary details on the proposed LID measures.

A Water Balance Assessment was completed by R.J. Burnside & Associates Limited (February 2023) which concluded that development related impacts to groundwater from reduction in infiltration could be mitigated by disconnected rear roof leaders to splash pads, allowing the flows to infiltrate over the rear yard. Based on achieving the criterion for erosion control, the strategy has changed to include soakaway pits for the rear roof leaders. As this LID measures is more effective at infiltrating water, the Water Balance calculations have not been updated at this time.

4.3.5 Low Impact Development Measures

LID measures have been considered in order to provide a treatment train approach to SWM providing the necessary quality and erosion controls, in addition to water balance benefits. These LID measures described below include lot level and end-of-pipe controls, as illustrated on **Figure 4**. This will include disconnected roof leaders to

increased depth of amended topsoil, soakaway pits and/or infiltration swales, and, end-of-pipe infiltration galleries and/or bioretention areas, as follows.

Disconnected Roof Leaders to Topsoil Amendments - It is proposed that all front roof leaders be disconnected to splash pads to increase the potential for at source infiltration across the front yard. The roof flows along with the runoff from the driveways will be conveyed overland across the yard towards the proposed road. Increasing the typical topsoil depth of 0.15m to 0.45m across the lawn and providing amendments in accordance with TRCA specifications will minimize local runoff while promoting increased infiltration. Soil amendments will be scarified as per Preserving and Restoring Healthy Soils: Best Practices for Urban Construction, June 2012. As per TRCA requirements, the retention volume in the soils has been assumed to be 50% or 2.5mm.

https://sustainabletechnologies.ca/home/urban-runoff-green-infrastructure/healthy-soils/preserving-and-restoring-healthy-soil-best-practices-for-urban-construction/

Soakaway Pits/Infiltration Swales– It is proposed to infiltration clean water from rear roof areas in soakaway pits to promote the infiltration of clean flows at the source. Based on the functional design presented herein, soakaway pits have been assumed for each lot; however, at detailed design when there are house siting designs, the feasibility and design of the soakaway pits can be re-evaluated. Alternatively, rear yard roof drains can be directed to the surface via splash pads and then collected at the rear yard in a swale. The infiltration gallery can then be installed along the rear lot line under the swale. All flows from the roof areas and rear yards that are captured in the swale can then be infiltrated. Major system flows would continue to sheet drain overland directly to Carruthers Creek. Each soakaway pit will be sized to retain 5mm of runoff from the roof area directed to it.

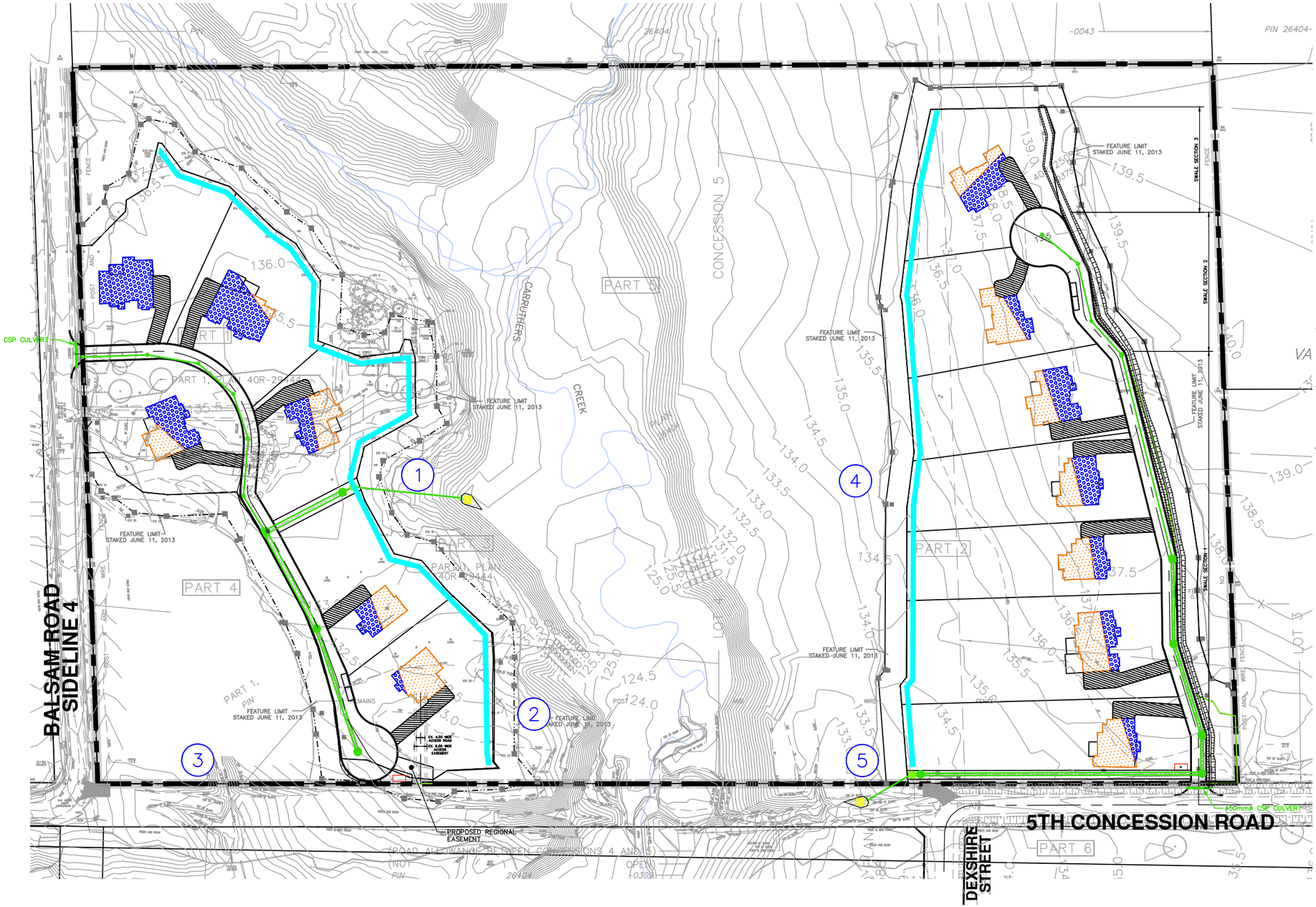
Infiltration/Bioretention at Storm Outfalls – This LID measure will provide the opportunity for the total flow from the site impervious areas to infiltrate or be detained in a sub-surface infiltration gallery or a surface bioretention area located at each of the two storm outfalls. Each infiltration gallery or bioretention area will be designed with 5mm of detention storage to meet the water balance and erosion control criteria. Infiltration testing and depth to groundwater will need to be assessed at each outfall as part of the detailed design. Preliminary sizing of an infiltration gallery for each outlet has been undertaken as part of this FSSR. Refer to **Appendix E** for sizing.

Permeable Pavement – There are opportunities to construct the driveways with permeable pavement to encourage infiltration and retention of stormwater at the source. The bedding material of the permeable pavement would be designed to retain the first 5mm of runoff from the impervious surface. This will be a decision of the individual homeowners and thus hasn't been included in the calculations.

Raingardens – Where possible runoff from front roof downspouts can be directed into raingardens but this will also be at the discretion of the homeowner. This will reduce

runoff by increasing evaporation, transpiration and infiltration. This will be a decision of the individual homeowners and thus hasn't been included in the calculations.

Rain Barrels – Again, at the discretion of the individual homeowner, rainwater can be collected for each downspout and then be utilized for watering gardens and landscaped areas.



LEGEND

- EXISTING CONTOUR
- SITE BOUNDARY
- PROPOSED STORM SEWER
- (1) OUTLET ID
- OIL/GRIT SEPARATOR
- POTENTIAL INFILTRATION SWALE LOCATION SHOULD SOAKAWAY PITS NOT BE FEASIBLE
- INFILTRATION TRENCH OR BIORETENTION AREA
- SWALE — SWALE SECTION
- ROOF AREA TO SOAKAWAY PIT

AREA: 2750m2

- ROOF AREA TO SOIL AMENDMENTS

AREA: 2890m2

- DRIVEWAY AREA TO SOIL AMENDMENTS

AREA: 2770m2

FRISQUE LANDS

THE CORPORATION OF THE CITY OF PICKERING

LOW IMPACT DEVELOPMENT (LID) MEASURE LOCATION PLAN

CANDEVCON EAST LIMITED
CONSULTING ENGINEERS & PLANNERS
1600 STELLAR DRIVE, SUITE 402 WHITBY, ONTARIO L1N 9B2
TEL. (289) 315-3680 FAX (905) 794-0611

Drawn By: J.R.	Checked By: A.K.	Proj. No. E21007	
Designed By: J.R.	Checked By:	DWG. No. FIG.4	
Scale: 1:2000	Date: July 11, 2023		

FILE: E21007-FIGURES.dwg

5.0 Watermain Distribution System

5.1 Existing Conditions

The existing watermain system located adjacent to the subject site is illustrated on **Drawing FSGP** and comprises a 400mm diameter HDPE DR-11 watermain on 5th Concession Road with no existing connections to the subject site.

5.2 Proposed Conditions

The water distribution network for the development will consist of watermains located within the roadway and through the lots adjacent the existing watermain. The meter room and water pumping station for the east lots will be located on the southeast corner of the property, on the west side of the private road (Block 21), providing fire protection and domestic water supply to the east residential lots. The meter room and pumping station for the west lots will be adjacent to Lot 5 (Block 20), near the cul-de-sac, providing fire protection and domestic water supply to the west residential lots. The watermains will connect into the existing 400mm diameter watermain connection off of 5th Concession Road.

The routing and preliminary sizing of the watermain to service the development is shown on the Functional Servicing Plan (**Drawing FSGP**) in the rear pocket.

6.0 Sanitary Drainage System

6.1 Existing Conditions

There is no existing sanitary infrastructure or outfall to service the proposed development.

6.2 Proposed Conditions

Septic systems will be constructed within the private lots to service the proposed residential units for this development. Septic systems are to be designed and constructed in accordance to the Ontario Building Code, Region of Durham requirements and all related standards and specifications.

Preliminary details on the septic bed design as shown in the Sewage System Lot Analysis, Drawings SP-1, SP-2, SP-3, SP-4 and SP-5, prepared by Gunnell Engineering Ltd. (2023). All of the sewage system layouts are conventional sewage systems (i.e. Filter Beds) that have been sized using a daily design sewage flow of 3,000 L/day and include both a primary and reserve areas, all in accordance with the Durham Region Health Department Lot Sizing Policy (document, dated Oct. 2010).

7.0 Conclusions

The servicing and stormwater management for the Frisque residential estate lot subdivision can be accomplished by the following:

- The storm sewer system will be designed to convey the 5 year post-development flows from the proposed development to two (2) proposed outlets to Carruthers Creek.
- Major system flows from the private road and front half of the roofs and front yards will be captured and detained in accordance with the Carruthers Creek Flood Management & Analysis Municipal Class EA.
- Quantity control will be provided in oversized storm sewers ensuring that 2 through 100 year post development peak flows are controlled to pre-development levels in accordance with the Carruthers Creek unit flow targets for both storm outfalls.
- Oil/grit separators are proposed at each outlet from the site to provide an "Enhanced" protection level in combination with LID measures, as required for quality control.
- A treatment train of LID measures are proposed to minimize runoff by maximizing on-site infiltration and retention of stormwater. This measures include disconnected roof leaders to increased depth of amended topsoil, soakaway pits and/or infiltration swales, and, end-of-pipe infiltration galleries and/or bioretention areas
- The watermain distribution system for the proposed development will consist of watermains located within the private roads and connecting into the existing 400mm diameter watermain on 5th Concession Road.

Report prepared by:

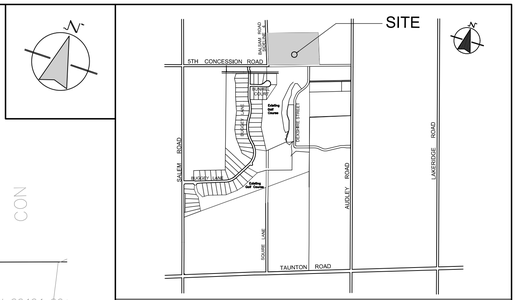
***CANDEVCON EAST* LIMITED**

Ryan Brockie, P.Eng.
Water Resources Engineer

Andrea Keeping, P.Eng.
Sr. Project Manager, Water Resources

RB/AK/jp

cc: 869547 Ontario Inc., Attn: Mr. Paul Bigioni
Blackthorn Development Corp., Attn: Mr. Maurizio Rogato
Beacon Environmental, Attn: Ms. Kristi Quinn, Ms. Shelley Gorenc
R.J. Burnside & Associates Limited, Attn: Ms. Angela Mason, Mr. Travis Mikel



KEY PLAN
N.T.S.

NOTES:

1. MEASUREMENTS IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE SPECIFIED.
2. SEWAGE SERVICE FOR ALL LOTS TO BE VIA. PRIVATE SEPTIC SYSTEMS.
3. SUMP PUMPS ARE TO BE UTILIZED FOR ALL LOTS AND ARE TO DISCHARGE TO SURFACE GRADE, INCL. SPLASH PADS.

LEGEND

- EX. UTILITY POLE
- EX. HYDRANT
- EX. WATER VALVE
- EX. TREE
- EX. CONTOUR
- PROPOSED FINISHED GRADE
- EXISTING GROUND GRADE
- PROP. 3:1 SLOPE
- FD — FRONT DRAINING LOT
- SD — SPLIT DRAINING LOT
- BS — BACK SPLIT LOT
- WO — WALK OUT LOT
- EX. WATERMAIN
- PROP. WATERMAIN
- PROP. STORM SEWER
- PROP. BUILDING ENVELOPE
- PROP. SEPTIC BED/SYSTEM
- OVERLAND FLOW DIRECTION
- MEANDER BELT WIDTH
- MEANDER BELT WIDTH +30m SETBACK
- LIMIT OF VEGETATION
- LIMIT OF VEGETATION +10m SETBACK
- LIMIT OF WETLAND
- LIMIT OF WETLAND +30m SETBACK
- LIMIT OF STAKED FEATURE 10m SETBACK

REVISIONS

No.	BY	DATE	DESCRIPTION	APPROVED

THE CORPORATION OF THE CITY OF PICKERING
DEPARTMENT OF ENGINEERING SERVICES

FRISQUE LANDS

FUNCTIONAL GRADING & SERVICING PLAN

CANDEVCON EAST LIMITED
CONSULTING ENGINEERS & PLANNERS
1600 STELLAR DRIVE, SUITE 402 — WHITBY, ONTARIO L1N 9B2
TEL. (289) 315-3680 — FAX (905) 794-0611

LICENSED PROFESSIONAL ENGINEER — M. A. FAVIT — PROVINCE OF ONTARIO

SCALE :	1:1000	PROJECT No.	E21007
DRAWN BY :	J.R.		
DESIGNED BY :	A.K.	DRAWING No.	FSGP
CHECKED BY :	M.F.		
REVISION DATE:	June 23, 2023		

FILE: E21007-FSGP.dwg

Appendix A

Minor and Major System Calculations

Project Name	E21007	Prepared By: JR
Project No.	Frisque Lands	Checked By: AK
Subject	Drainage Areas	

Area ID[1]	Description	Drainage Area (ha)	Total Percent Impervious[2] (%)	Runoff Coefficient[2]	A x R
101	Pervious Area	0.73	0%	0.20	0.15
	Impervious Area	0.04	100%	0.90	0.04
	Total	**0.77**	**5%**	**0.24**	**0.18**
102	Pervious Area	0.61	0%	0.20	0.12
	Impervious Area	0.33	100%	0.90	0.30
	Total	**0.94**	**35%**	**0.45**	**0.42**
103	Pervious Area	0.27	0%	0.20	0.05
	Impervious Area	0.19	100%	0.90	0.17
	Total	**0.46**	**41%**	**0.49**	**0.23**
201	Pervious Area	0.38	0%	0.20	0.08
	Impervious Area	0.07	100%	0.90	0.06
	Total	**0.45**	**16%**	**0.31**	**0.14**
301	Pervious Area	1.38	0%	0.20	0.28
	Impervious Area	0.00	100%	0.90	0.00
	Total	**1.38**	**0%**	**0.20**	**0.28**
302	Pervious Area	0.16	0%	0.20	0.03
	Impervious Area	0.03	100%	0.90	0.03
	Total	**0.19**	**16%**	**0.31**	**0.06**
401	Pervious Area	2.18	0%	0.20	0.44
	Impervious Area	0.21	100%	0.90	0.19
	Total	**2.39**	**9%**	**0.26**	**0.63**
501	Pervious Area	0.67	0%	0.20	0.13
	Impervious Area	0.50	100%	0.90	0.45
	Total	**1.17**	**43%**	**0.50**	**0.58**
502	Pervious Area	1.41	0%	0.20	0.28
	Impervious Area	0.00	100%	0.90	0.00
	Total	**1.41**	**0%**	**0.20**	**0.28**
601	Pervious Area	8.75	0%	0.20	1.75
	Impervious Area	0.00	100%	0.90	0.00
	Total	**8.75**	**0%**	**0.20**	**1.75**
Total Site Area (Not Including External)		**17.91**	**8%**	**0.25**	**4.54**
510 (EXT)	Pervious Area	0.22	0%	0.20	0.04
	Impervious Area	0.00	100%	0.90	0.00
	Total	**0.22**	**0%**	**0.20**	**0.04**
Total Site Area (Including External)		**18.13**	**8%**	**0.25**	**4.59**

Project Name	Frisque Lands	**Prepared By**	JR
Project No.	E21007	**Checked By**	AK
Subject	Overland Flow and Swale Sizing - Swale Section 1		

Location: Swale East Side of Block 19

Drainage Area (A) =	1.55	ha
Runoff Coeff (R) =	0.20	
Tc =	15.00	min

Portion of Drainage Areas 502. Refer to FIG.4 for swale sections.

Flow (Q) = 2.778 AIR

Total Overland Flow to Swale

100 Year Intensity =	148.54	mm/hr	City of Pickering IDF
100 Year Flow =	0.128	m^3/s	

Overland Flow (Q_{100}) =	0.128	m^3/s

Swale Capacity

Mannings' Equation			**Trapezoidal Channel**		
Flow Depth (m) =	0.50				
Side Slope Ratio (H:V) =	3.0	/**1**	Top width	3.8	
Bed Width (m)=	0.80				
Area (m^2)=	1.150		Hyd. Rad, 'R'	0.2902371	m
Wetted Perimeter (m)=	3.962	m			
Slope (%) =	0.6%		Friction Slope Sf	0.0001	m/m
Manning 'n' =	0.030	(Grass)			
Swale Capacity, Q =	**0.130**	m^3/sec	Velocity	0.113	m/s

Project Name	Frisque Lands	**Prepared By**	AK
Project No.	E21007	**Checked By**	DB
Subject	Overland Flow and Swale Sizing - Swale Section 2		

Location: Swale East Side of Block 19

Drainage Area (A) =	0.75	ha
Runoff Coeff (R) =	0.20	
Tc =	15.00	min

Portion of Drainage Areas 502. Refer to FIG.4 for swale sections.

Flow (Q) = 2.778 AIR

Total Overland Flow to Swale

100 Year Intensity =	148.54	mm/hr	City of Pickering IDF
100 Year Flow =	0.062	m^3/s	

Overland Flow (Q_{100}) =	0.062	m^3/s

Swale Capacity

Mannings' Equation			**Trapezoidal Channel**		
Flow Depth (m) =	0.23				
Side Slope Ratio (H:V) =	3.0	/**1**	Top width	3.88	
Bed Width (m)=	2.50				
Area (m^2)=	0.734		Hyd. Rad, 'R'	0.1855285	m
Wetted Perimeter (m)=	3.955	m			
Slope (%) =	0.6%		Friction Slope Sf	0.0001	m/m
Manning 'n' =	0.030	(Grass)			
Swale Capacity, Q =	**0.062**	m^3/sec	Velocity	0.084	m/s

Project Name	Frisque Lands	**Prepared By**	JR
Project No.	E21007	**Checked By**	AK
Subject	Overland Flow and Swale Sizing - Swale Section 3		

Location: Swale East Side of Block 19

Drainage Area (A) =	0.50	ha
Runoff Coeff (R) =	0.20	
Tc =	15.00	min

Portion of Drainage Areas 502. Refer to FIG.4 for swale sections.

Flow (Q) = 2.778 AIR

Total Overland Flow to Swale

100 Year Intensity =	148.54	mm/hr	City of Pickering IDF
100 Year Flow =	0.041	m^3/s	

Overland Flow (Q_{100}) =	0.041	m^3/s

Swale Capacity

Mannings' Equation			**Trapezoidal Channel**		
Flow Depth (m) =	0.20				
Side Slope Ratio (H:V) =	3.0	/**1**	Top width	3.7	
Bed Width (m)=	2.50				
Area (m^2)=	0.620		Hyd. Rad, 'R'	0.1646785	m
Wetted Perimeter (m)=	3.765	m			
Slope (%) =	0.5%		Friction Slope Sf	0.0001	m/m
Manning 'n' =	0.030	(Grass)			
Swale Capacity, Q =	**0.044**	m^3/sec	Velocity	0.071	m/s

Appendix B

SWM Criteria

City of PICKERING

Minutes/Meeting Summary

Pre-consultation Meeting
November 2, 2020

Subject: 3225 Fifth Concession Road

Applicants: 869547 Ontario Inc.

Agents: Maurizio Rogato – Blackthorn Development Corp.

Distribution: Lino Trombino, Region of Durham Planning Department
Peter Castellan, Region of Durham Works Department
Stephanie Worron, Toronto and Region Conservation Authority

Nilesh Surti, Manager, Development Review & Urban Design
Dean Jacobs, Manager, Policy & Geomatics
Carl Kolbe, Manager, Building Services & Deputy CBO
Paal Helgesen, Manager, Development Services
Deepak Bhatt, Senior Planner, Sustainability
Felix Chau, Planner I

Note: **Due to the COVID-19 protocols, all comments below were collected through email.**

Item/ Ref #	**Details & Discussion & Conclusion** (summary of discussion)	**Action Items/Status** (include deadline as appropriate)
1.	**Proposal**	
	• A proposed Draft Plan of Subdivision consisting of 22 lots for detached dwellings fronting onto two new public road terminating in a cul-de-sacs with access off of Fifth Concession • The proposed lots will range between 0.62 of a hectare to 1.627 hectares.	
2.	**Type of Application**	
	• Zoning By-law Amendment • Draft Plan of Subdivision	

Item/ Ref #	Details & Discussion & Conclusion (summary of discussion)	Action Items/Status (include deadline as appropriate)
3.	**Discussion**	

Lori Reviere-Doersam, Region of Durham (Planning)	• Section 5.2.1 of the Greenbelt Plan provides that an Official Plan Amendment approved prior to December 16, 2004 can shelter subsequent applications without the requirement for Greenbelt Plan conformity for the subsequent applications. Related local approvals can move forward if they are related to the previously obtained approval.
	
	• The Regional Official Plan designates the subject lands as a Country Residential Subdivision – Number 33 (CRS), permitting a maximum of 23 units.
	
	• Country Residential Subdivisions must be individually serviced with drilled wells and private sewage disposal as per MECP and Regional standards.
	
	  • Policy 9B.2.19 of the ROP:
	  ▪ not exceed the maximum number of residential units permitted (23);
	  ▪ be designed to be unobtrusive and blend into the Region's landscape;
	  ▪ not detract from the surrounding natural environment or require significant alterations of the existing topography, waterways or vegetation;
	  ▪ not have an adverse cumulative impact on the environment;
	  ▪ contain a range of lot sizes generally from 0.6 to 1 hectare;
	  ▪ be serviced with an internal road system, having a minimum of two access points without direct access onto a Provincial highway or a Type 'A' Arterial Road;
	  ▪ be in conformity with the Provincial Minimum Distance Separation formulae;
	  ▪ not have a negative impact on key natural heritage or hydrologic features (KNHHF); and
	  ▪ be in conformity with the provisions of the area municipal official plan
	  ▪ approval for a CRS must be in accordance with Policy 9B.2.11 and 9B.2.12 of the ROP.	

Item/ Ref #	Details & Discussion & Conclusion (summary of discussion)	Action Items/Status (include deadline as appropriate)
	• Policy 9B.2.11 and 9B.2.12 ▪ a recent hydrogeological report ▪ lot servicing plan ▪ results of a soil sampling program report ▪ an existing and final grading plan, indicating elevations and lot drainage patterns ▪ required studies can not be more than 3 years old prior to registration ▪ a monitoring program which identifies the amount of development permitted in each phase, as defined by the Region of Durham ▪ the plan of subdivision shall be developed in stages to allow monitoring ▪ further stages of development shall not be permitted if the monitoring results show that soil or groundwater contaminants cannot be mitigated ROPA 175 introduced Policy 5.4.8 to the ROP. This policy allows for a municipal water/sanitary sewer connection outside of the urban area boundary, where, amongst other scenarios, lot creation is permitted by the policies of the plan, subject to conforming to the Region's lot sizing policies. For a property to be considered under this policy, it shall directly abut a municipal watermain or sanitary sewer service within a public right-of-way or easement and the connection shall be technically feasible, to the satisfaction of the Region. This policy allows only for a "connection" of municipal services where the properties are abutting and not an "extension". **Required Studies for Resubmission:** • **Hydrogeological Study** – to address the adequacy of the water supply, in terms of water quantity and quality and suitability of the site to accommodate potential private sewage systems and compliance with pertinent provincial and regional policies (this study will be subject to peer review).	

Item/ Ref #	Details & Discussion & Conclusion (summary of discussion)	Action Items/Status (include deadline as appropriate)
	• **Environmental Impact Study** – to address the identification of KNHHF, appropriate buffers, mitigation measures and endangered species (may require contact with MNRF). There is a concern with the current lot layout which shows lots inside the floodplain. The ROP does not permit development and site alteration in a floodplain. Development and site alteration is also not permitted in the vegetation protection zone of a KNHF/KHF. This could impact the lot layout and number of lots permitted. The study should be scoped with the Conservation Authority. • **Archaeology Study** – as identified by Regional mapping the site is an area of high archaeological potential. • **Minimum Distance Separation Calculation** – to address any livestock facilities within 1,000 metres of the site. • **Phase One Environmental Site Assessment** – to address potential site contamination. This is required for all development applications circulated to the Region of Durham. ESA must be consistent with Provincial regulations. The findings of the ESA may warrant either a Phase Two ESA and/or a Record of Site Condition filed with the MECP. The Regional Reliance Letter and Certificate of Insurance (attached) would also be required. • **Noise Study** – to address potential noise impacts in proximity to an Arterial Road (Fifth Concession Road is a Type "B" Arterial Road). Regional Fee of $500.00 for Recirculation/Review of Plans/Studies is required.	
Pete Castellan, Region of Durham (Works)	Regional Works has reviewed the proposal for a plan of subdivision at 3225 Fifth Concession Road and we offer the following comments.	

Item/ Ref #	Details & Discussion & Conclusion (summary of discussion)	Action Items/Status (include deadline as appropriate)
	The development proposal is outside the urban boundary, as such the future residential lots will be serviced by private well and private waste disposal. Regional Works has no objection to this development proposal.	
Lesley Kennedy, Region of Durham (Health)	This subdivision will have to be serviced by both private water and private sewage system. This will require that the proposal adhere to all requirements in the Region of Durham Drilled Well and Lot Sizing Policies (see attached). The applicant has proposed that a number of lots may be able to connect to municipal services. This is not reflected in our comments but if this is confirmed by the Works Department as a possibility, I can provide updated comments. The Health Department will require the following information at the time of application: 1. A hydro-geological report and/or a geo-technical report. The study should consider the quality and quantity of drinking water on the proposed site and on adjacent groundwater conditions. This will require a current study of proposed and adjacent wells to determine quality and quantity. The Ministry of the Environment's Technical Guidelines (D-5-5) must be applied to assess water supplies through the use of individual private wells in order to establish that a sufficient quantity and quality of drinking water is present. The Ministry of the Environment's Technical Guidelines (D-5-4) is to be applied to determine the impact of the proposed sewage systems on the immediate and adjacent groundwater supplies (bacterial and chemical quality), which will determine the maximum number of lots. 2. Positive and supporting comments regarding the above-noted studies from the Region's Peer Reviewer. The peer reviews will be conducted at the applicant's expense.	

Item/ Ref #	Details & Discussion & Conclusion (summary of discussion)	Action Items/Status (include deadline as appropriate)
	3. A site plan that demonstrates each lot can adhere to the lot sizing requirements outlined in the Lot Sizing Policy. This plan must show the structure footprint, well location, driveway location, the prime and reserve sewage system areas and all required clearance distances. Fees Plan of Subdivision application - $392.00 per lot creation. Examine Initial Peer Review Fee - $270.00 Examine follow up Peer Review reports - $116.00 *Fees increase on April 1st, 2021.	
Stephanie Worron, Toronto and Region Conservation Authority	The subject site is partially within the TRCA Regulated Area of the Carruthers Creek watershed. The site is regulated with respect to the Carruthers Creek valley corridor which runs through the middle of the site and contains the following natural hazards/features: top of bank/erosion hazard, regulatory storm floodplain, wetland complex, meanderbelt, and dripline of contiguous vegetation. The site is also within the Protected Countryside designation of the Greenbelt Plan and as such a Natural heritage Evaluation would be required to identify the natural heritage and hydrologic features on the site. TRCA Mapping was recently updated in 2019, and is now showing a large wetland on the east portion of the site in what appears to be a previously cleared area. We would ask that any Natural Heritage Evaluation which is performed on the site include an analysis of this area. A TRCA Permit will be required prior to development taking place on the site. Based on a review of the Draft Plan of Subdivision provided as part of the October 7th circulation, TRCA staff would not be supportive of the current lot configuration as the lots are extending entirely within the valley corridor and the associated natural hazards/features. We would recommend that the landowner engage with TRCA staff to work through the Concept Development Application process to identify the development limits on the site and scope any required technical documents/studies.	

Item/ Ref #	Details & Discussion & Conclusion (summary of discussion)	Action Items/Status (include deadline as appropriate)
	TRCA Living City Policies: The limits of development are guided by the TRCA's Living City Policies (LCP) and are defined for new development as a minimum of 10 meters inland for any new development from the greater of the following: 1. Physical top of bank of the valley feature; 2. Predicted long-term-stable-top-of-slope (LTSTOS) where geotechnical concerns exist (must be confirmed through an appropriate geotechnical slope stability analysis); 3. Limits of flooding on the property during a Regional Storm Event; and/or 4. Limits of vegetation (dripline) which is contiguous with the natural system. For any Planning Act Applications, TRCA staff would require the following for review: 1. Planning Rationale 2. Natural Heritage Evaluation 3. Hydrogeology Study 4. Functional Servicing, Stormwater Management Report and associated drawings 5. Fluvial Geomorphic Slope Stability Study 6. Site Grading Plan 7. Erosion and Sediment Control Plans The applicant should also comply with the TRCA's SWM guidelines, link provided → https://drive.google.com/file/d/0BxjqkzmOuaaRa3ZxS25wUWF6Q1k/view **Please note, that once the development limits have been determined, TRCA Policies request conveyance of the feature plus buffer into public ownership for the long term preservation.	

Item/ Ref #	Details & Discussion & Conclusion (summary of discussion)	Action Items/Status (include deadline as appropriate)
Paal Helgesen, Manager, Development Services Engineering Services, City of Pickering	**Water Resources** Based on our maps, approximately 70% of the site area is regulated by TRCA and CLOCA. The City's criteria require the following: • Quantity control - control post development flows to pre-development/existing levels for all storm events up to the 100-year return period. • Quality control - Enhanced level of protection (80% TSS removal). • Erosion control - minimum 5mm on-site retention/infiltration. • FSSR is required **Development Services** • Environmental Impact Statement • Functional Grading Plan (FSSR) • Functional Servicing Plan (FSSR) • Geotechnical Report • Tree Inventory/Preservation Plan • Road Widening of 5th Concession Rd may be required along the north side. There are currently no Municipal Services (storm sewer) available. A watermain was extended from Sideline 4 through the unopened road allowance to the east side of Carruthers Creek to facilitate an estate subdivision south of the Fifth Concession Road. Also, Fifth Concession Road was extended west from Audley Road to provide access to the subdivision. There may be an opportunity to provide access to the lands, included as part of this Draft Plan, from Fifth Concession Rd. Cost sharing for the construction of this road and the watermain, may be required. Applicant is advised to contact Greg Gibson, Development Engineering Coordinator, at the Town of Ajax for further details. Fifth Concession Rd on the west side of Carruthers Creek will need to be extended easterly to provide access to the lands north of the unopened road allowance.	

Item/ Ref #	Details & Discussion & Conclusion (summary of discussion)	Action Items/Status (include deadline as appropriate)
	Transportation • A Traffic Impact Study will be required. Applicant is asked to contact Nadeem Zahoor, Transportation Engineer, Engineering Services Department regarding the Terms of Reference for the Study.	
Nadeem Zahoor, Transportation Engineer, City of Pickering	• A Transportation Impact Study (TIS) is required for the proposal to look at the impact to the existing road network. The TIS should be as per the Durham Region TIS Guidelines. • As per the Official Plan, the Concession Road 5 will be a future Arterial B roadway. A road right of way of 36 meters is required at this location. • The roadway design (including the proposed cul-de-sacs) should be as per the City of Pickering design Guidelines. • Further comments will be provided once the detailed plan and the TIS will be received by the City.	
Carl Kolbe – Manager, Building Services & Deputy CBO Building Services, City of Pickering	From Building Services – we would like to 'meet' with the designers ahead of time to head off any potential OBC issues.	
City Development, Policy, City of Pickering	Please see attached memo.	

Item/ Ref #	Details & Discussion & Conclusion (summary of discussion)	Action Items/Status (include deadline as appropriate)
Deepak Bhatt – Senior Planner, Sustainability City Development, Sustainability, City of Pickering	Pre-consultation comments on the development application are as follows: • A Sustainability Development Guideline Report and a Checklist is required and it can be combined with the Planning Justification Report. • The proposed development must satisfy the "Required" elements and achieve a Level 1 rating with at least 19 points. • To assist in preparing the report details the Sustainable Development Guideline reports are available on the City's website at the following link: https://www.pickering.ca/en/living/sustainabledevelopment.aspx • As the project is at pre-consultation and conceptual planning stage, we suggest the applicant include sustainable elements in the design to minimize energy consumption, greenhouse gas emissions and water consumption.	
Nilesh Surti – Manager, Development Review & Urban Design Felix Chau – Planer I City Development, Planning & Design, City of Pickering	• A Zoning By-law Amendment will be required to facilitate the compliance of the proposed development • A Draft Plan of Subdivision is required • A Planning Rationale Report is required • A concept site plan in colour at 150 dpi in JPEG format will be required • A concept site plan indicating the location of the proposed dwellings and services will be required • A Draft By-law is required	
4.	**Technical Reports Required**	
	Please see attached Technical Report Check List	

Item/ Ref #	Details & Discussion & Conclusion (summary of discussion)	Action Items/Status (include deadline as appropriate)
5.	**Fees Requirement**	
	For the proposed development the following fees are required: City of Pickering: Note: fees are subject to change effecting March 1, 2021 City Development: • Zoning By-law Amendment (Major) – $15,785.00 o Plus Fee per Residential Unit ▪ First 25 units (1-25) - $400.00 ▪ Next 75 units (26-100) - $300.00 ▪ Next 100 units (101-200) - $200.00 ▪ Next 800 units (201-1,000) - $100.00 • Draft Plan of Subdivision - $30,750.00 o Plus Fee per Residential Unit ▪ First 25 units (1-25) - $500.00 ▪ Next 75 units (26-100) - $400.00 ▪ Next 100 units (101-200) - $300.00 ▪ Next 800 units (201-1,000) - $200.00 o Plus Fee per Non-Residential Hectare of Land Area - $160.00 o Plus Fee per Development Block Hectare of Land Area - $100.00 External Agencies: Region of Durham Planning & Economic Development Department: • Please contact the Region of Durham to confirm all applicable fees Toronto and Region Conservation Authority: • Please contact the TRCA to confirm all applicable fees	

Copy: Paul Bigioni, 869547 Ontario Inc.
Maurizio Rogato, Blackthorn Development Corp.
Lino Trombino – Region of Durham
Lori Riviere- Doersam – Region of Durham
Peter Castellan – Region of Durham
Lesley Kennedy – Region of Durham
Stephanie Worron – Toronto and Region Conservation Authority

Nilesh Surti – Manager, Development Review & Urban Design
Dean Jacobs – Manager, Policy & Geomatics
Paal Helgesen – Manager, Development Services
Carl Kolbe – Manager, Building Services & Deputy CBO
Nadeem Zahoor – Transportation Engineer
Felix Chau – Planner I

Materials and Studies Required for 3225 Fifth Concession Road
(list appears in Section 16.5A of the Pickering Official Plan (POP))

Plans/Studies/Reports	POP Reference	Required (✓) Not Applicable (N/A)	Comments
Planning Rationale Report	16.5A(i)	✓	
Transportation Study	16.5A(ii)	✓	Report to be signed and stamped by a P.Eng
Shadow Study	16.5A(iii)		
Wind Study	16.5A(iv)		
Heritage Conservation Compliance Statement	16.5A(v)		
Archaeological Assessment	16.5A(vi)	✓	
Functional Servicing Study/ Site Servicing Study	16.5A(vii)	✓	Report to be signed and stamped by a P.Eng
Drainage and Stormwater Management Study	16.5A(viii)	✓	Can be included in the Functional Servicing Study. Report to be signed and stamped by a P.Eng
Flood Plain Impact Engineering Study	16.5A(ix)		
Agricultural Report	16.5A(x)		
Site Suitability Study	16.5A(xi)		
Environmental Report	16.5A(xii)		
Natural Heritage Evaluation	16.5A(xiii)	✓	Environmental Impact Study addressing Key Natural Heritage Feature, buffer and mitigation measures
Hydrological Evaluation	16.5A(xiv)	✓	Report to be signed and stamped by a P.Eng
Hydrogeology and Water Budget Study	16.5A(xv)	✓	Report to be signed and stamped by a P.Eng
Watershed/Sub-watershed Study	16.5A(xvi)		
Aggregate Extraction Impact Study	16.5A(xvii)	✓	
Aggregate Extraction Assessment Study	16.5A(xviii)	✓	
Assessment of Lands within 500 metres of Known Waste Disposal Site	16.5A(xix)		
Phase I Environmental Site Assessment	16.5A(xx)	✓	
Phase II Environmental Site Assessment			
Record of Site Condition			

Plans/Studies/Reports	POP Reference	Required (✓) Not Applicable (N/A)	Comments
Contamination Management Plan (High Aquifer Vulnerability Area)	16.5A(xxi)		
Contamination Management Plan (near Wellhead protection Area)	16.5A(xxii)		
Waste Disposal Community Impact Study	16.5A(xxiii)		
Noise Study	16.5A(xxiv)	✓	
Vibration Study	16.5A(xxv)		
Dust/Odour Control Study	16.5A(xxvi)		
Lighting Study	16.5A(xxvii)		
Retail Impact Study	16.5A(xxviii)		
Sustainable Development Report	16.5A(xxix)	✓	Can be combined with the Planning Rationale Report
Rental Housing Conversion Study	16.5A(xxx)		
Urban Design Brief	16.5A(xxxi)		
Financial Impact Study	16.5A(xxxii)		
Architectural Design Study	16.5A(xxxiii)		
Railway Corridor Safety Study	16.5A(xxxiv)		
Groundwater Impact Study	16.5A(xxxv)		
Water Management Plan	16.5A(xxxvi)		
Other Reports (such as): • Parking Standard Analysis/Justification			
• Construction Management			
• Implementation / Phasing Report			
• Tree/Vegetation Inventory Report		✓	
• Geotechnical Report		✓	Report to be signed and stamped by a P.Eng
• Minimum Distance Separation Calculation		✓	
• Fluvial Geomorphic Slope Stability Study		✓	
• Site Grading Plan		✓	Can be included in the Functional Servicing Report
• Erosion and Sediment Control Plans		✓	
• Coloured Plan		✓	

Plans/Studies/Reports	POP Reference	Required (✓) Not Applicable (N/A)	Comments
• Draft By-law		✓	
Digital copies of all studies and drawings		✓	

October 29, 2020

3225 Fifth Concession Road
Part of Lots 3 and 4, Concession 5
Proponent: Blackthorn Development Corp.
Pre-submission Consultation
Preliminary Policy Comments

1. Proposal and Context

The subject property is located on the north side of an unopened road allowance for Fifth Concession Road, on the east side of Sideline 4 (east of Salem Road) and to the west of Audley Road.

According to the applicant, the subject lands are vacant and approximately 17.91 hectares in size. (*Note: The area of the property is shown as 8.216 ha on Geocortex which differs from what the applicant has identified).

- To the south is the City of Pickering municipal boundary with the Town of Ajax and estate residential development and the Deer Creek Golf Club;
- To the east are rural residential properties;
- To the north is Holiday Gardens, a wedding and event venue; and
- To the west is a rural residential property fronting onto Fifth Concession Road.

The proposal is to develop an estate plan of subdivision consisting of 22 lots that was originally submitted in 1987 with a subsequent Regional Official Plan Amendment approved on September 9th, 1997. The Draft Plan of Subdivision was recommended by the Region, subject to site-specific requirements, but the Region never issued Draft Plan Approval. The proponent is seeking to reactivate the previously submitted applications to develop the property as proposed.

2. Durham Regional Official Plan (May 26, 2020 Consolidation)

The Durham Regional Official Plan (DROP) identifies the property as being within the Greenbelt Boundary and designates the subject site as a Country Residential Subdivision (number 33) within the Rural System. In accordance with Schedule E, Table 'E2', Country Residential Subdivisions, the maximum number of residential units permitted is 23.

Policies within the DROP require that Country Residential Subdivisions be individually serviced with drilled wells and private sewage disposal systems (Policy 9B.2.18) and that once a Country Residential Subdivision has been registered, no severance for an additional lot shall be granted (Policy 9B.2.21). Detailed requirements, in addition to Planning Act requirements, addressing such things as: a hydrogeological report, to address existing conditions and the potential impact of the proposed subdivision on the available water, as well as the potential impact of

proposed private sewage disposal systems on the groundwater supply; a lot servicing plan, indicating the proposed location of all structures, including drilled wells and the subsurface sewage disposal system envelopes; a report of the results of a soil sampling program that adequately represents the geology of the subdivision; and an existing and final grading plan, indicating elevations and lot drainage patterns, are enumerated in Policy 9B.2.11.

Also, conditions of draft approval attached to any Country Residential Subdivision shall contain provisions that: all studies submitted to justify the application be reconfirmed prior to registration, and that such studies are not more than 3 years old; a monitoring program which identifies the amount of development to be permitted in each stage, as defined by the Region, shall be in place to determine the cumulative effect of the various stages of development on adjacent wells and the soil and groundwater conditions; the plan of subdivision shall be developed in stages to allow monitoring; and further stages of development shall not be permitted if the monitoring results show that soil or groundwater contaminants cannot be mitigated and/or in the case of an existing municipal water supply, the capacity has been reached (Policy 9B.2.12).

3. Pickering Official Plan (Edition 8)

3.1 Permitted Use

The subject property is designated "Rural Settlements – Country Residential" in the Pickering Official Plan (POP) which establishes different types of Rural Settlements based on development and growth characteristics. In particular, the Country Residential designation is defined as large lot residential subdivisions located mainly on an internal road which does not exceed the maximum approved number of residential lots and no new country residential settlements will be permitted (see Table 10 in the POP).

Further, Schedule IV – 7: Settlement 7: Birchwood Estates, identifies two distinct areas of "Country Residential" separated by an area of "Open Space System-Natural Areas". The Open Space System – Natural Areas designation in the POP generally limits permissible uses to conservation, environmental protection, restoration, education, passive recreation, and similar uses, subject to the provisions of the Regional Official Plan related to non-agricultural uses, and provided that development or site alteration may only be permitted in key natural heritage and/or key hydrologic features for limited purposes.

The Birchwood Estates Settlement Policies (Policy 13.9) in the POP direct that the existing dwelling on the subject lands be recognized, that development is undertaken in a manner that respects environmental features such as Carruthers Creek and its tributaries; and that the country residential environment of the settlement is maintained once developed.

The proposed 22 estate residential lots, ranging in size from 0.617 ha. up to 1.627 ha., on two separate internal cul-de-sacs with access from the unopened road allowance for Fifth Concession, east of Sideline 4, meets the POP requirements established for permitted uses.

3.2 Transportation System

The subject site proposes access to two internal cul-de-sacs from an unopened road allowance of Fifth Concession Road east of Sideline 4. Fifth Concession Road is identified as a Type B Arterial Road on Schedule II - Transportation System to the POP.

The subject property is within the Durham Transit Rural On Demand area. There is no regularly scheduled transit service adjacent to the subject property.

Is there an opportunity for facilitating and/or implementing passive recreation (i.e. a walking trail) within the proposed natural areas (POP 4.7)?

3.3 Natural Heritage System

3.3.1 The Natural Heritage System

It is an important goal of the City of Pickering to protect, conserve and enhance the City's natural heritage features and functions, as well as ensure the protection of people and property from environmental hazards.

The entire subject property is within the "Natural Heritage System" overlay (Schedule III A) of the Pickering Official Plan. Lands with the highest concentration of the most sensitive and/or key natural heritage and key hydrologic features and functions, are identified on Schedules III B, III C and III D. Policies contained in Chapter 10 of the POP relate to the Natural Heritage System.

In accordance with POP 16.8 (a), submission of an Environmental Report is required as part of this development application. The contents of the Environmental Report are established in POP 16.10.

3.3.1.1 Significant Woodlands

A large portion of the subject site is identified as being within the Significant Woodlands overlay of Schedule III B. Table 18 (POP Chapter 16) identifies a minimum area of influence within 120 metres of any part of the feature. In addition, a vegetation protection zone of 10 metres from the dripline of the woodlands is required, subject to the Environmental Report.

A vegetation protection zone is defined as a buffer area adjacent to a key natural heritage feature or a key hydrologic feature that is intended to protect the feature and its ecological function from adjacent land use impacts.

The Environmental Report must address Significant Woodlands.

3.3.1.2 Shorelines, Significant Valley Lands and Stream Corridors

Two branches of the Carruther's Creek join together and essentially bisect the subject property such that a significant portion of the subject property is identified as being within the Shorelines, Significant Valley Lands and Stream Corridors overlay of Schedule III C.

The Pickering Official Plan establishes policies associated with Shorelines, Significant Valley Lands and Stream Corridors (POP 10.7, 10.12 and 10.22) and in particular that development and site alteration is to be directed away from these areas.

In addition, Table 18 (POP Chapter 16) identifies a minimum area of influence within 120 metres of stable top of bank, and a required vegetation protection zone for all lands within 30 metres of stable top of bank for significant valley lands, subject to the Environmental Report.

Table 18 (POP Chapter 16) identifies a minimum area of influence within 120 metres of any part of the feature and a required vegetation protection zone for all lands within 30 metres of the limits of the floodplain or hazard lands as defined by the relevant Conservation Authority, subject to Section 16.10 if a hydrogeological evaluation is required.

The Environmental Report must address Shorelines, Significant Valley Lands and Stream Corridors.

3.3.1.3 Highly Vulnerable Aquifers

A large portion of the subject site is within an area identified as Highly Vulnerable Aquifers (HVA) (see Schedule III D to the POP). A Contaminant Management Plan is required in support of an application if there are proposed uses on a site that are listed as high risk to groundwater in the DROP (POP 16.14 (b)). The proposed residential use does not appear to qualify as a "high risk" to groundwater. The Regional Municipality of Durham will need to confirm that the proposed residential use is not identified as a high risk land use and as such a Contamination Management Plan would not be required.

*Note: the information contained in this section takes into consideration the recent Council-adopted policies of Official Plan Amendment 36 for Drinking Water Source Protection.

3.3.1.4 Significant Groundwater Recharge Areas

The western portion of the subject site is identified as being within the Significant Groundwater Recharge Area (SGRA) overlay of Schedule III D. In accordance with POP 10.13 (b), *the preparation of a hydrogeology and water budget/balance study, including a mitigation strategy to ensure no loss of water recharge quantity or quality, is required.*

In addition, through the Office of the Risk Management Official at the Region of Durham, a determination must be made as to whether or not the application of road salt within the proposed development would be a moderate or low drinking water threat, and subsequently, whether or not a salt management plan as part of a complete development application would be required (POP 10.13 (g)).

*Note: the information contained in this section takes into consideration the recent Council-adopted policies of Official Plan Amendment 36 for Drinking Water Source Protection.

3.3.1.5 Aggregate Resources

It is noted that a significant portion of the western half of the subject property is within an area identified as Areas of High Potential Mineral Aggregate Resources. As such, any development application within or adjacent to these areas must be accompanied by a study that assesses the potential aggregate reserves on the site and the impact of the proposal on the ability of lands within the area of high potential to be utilized for extraction purposes. In order for development to be permitted the required study must demonstrate that:

(i) the extraction of the resource would not be feasible; or
(ii) the proposed land uses would serve a greater long-term public benefit; and
(iii) issues of public health, public safety and environmental impact are addressed.

In addition, the POP policies require, where appropriate, that the recommendations of the required studies be implemented (POP 10.10).

A study that assesses the potential aggregate reserves on the site, and the impact of the proposal on the ability of lands within the Area of High Potential Mineral Aggregate Resources to be utilized for extraction purposes, is required.

3.4 High Quality Built and Natural Environments and Detailed Design Considerations

The proponent is encouraged to review Chapters 9 and 14 of the Pickering Official Plan which sets out a strategy for addressing community design that focuses on the creation of high quality built and natural environments that evoke a desirable image and sense of place for the City.

4.0 Summary of Comments

The following points identify the key Pickering Official Plan policy requirements for the proposal as outlined in the letter from Blackthorn Development Corporation to the City of Pickering, dated August 27, 2020, including the copy of Draft Plan of Subdivision 18T-87096:

1. The Pickering Official Plan permits the proposed use of 22 estate residential lots;
2. Is there an opportunity for facilitating and/or implementing passive recreation (i.e. a walking trail) within the proposed natural areas? (POP 4.7)
3. In accordance with POP 16.8 (a), submission of an Environmental Report is required as part of this development application. The contents of the Environmental Report are established in POP 16.10. The Environmental Report must address:
    - Significant Woodlands;
    - Shorelines, Significant Valley Lands and Stream Corridors;
    - Highly Vulnerable Aquifers and Significant Groundwater Recharge Areas through the preparation of a hydrogeology and water budget/balance study, including a mitigation strategy to ensure no loss of water recharge quantity or quality, as part of, or independently from, the Environmental Report.
4. A salt management plan may be required depending upon a determination by the Office of the Risk Management Official at the Region of Durham. The contents of same will be determined in conjunction with the Risk Management Official (POP 10.13 (g)).
5. A study that assesses the potential aggregate reserves on the site, and the impact of the proposal on the ability of lands within the Area of High Potential Mineral Aggregate Resources to be utilized for extraction purposes, is required (POP 10.10).

If you wish to discuss the above comments or require clarification, please contact me at extension 2196.

M. Kish

Maurizio Rogato

From: Stephanie Dore <Stephanie.Worron@trca.ca>
Sent: August 25, 2022 2:18 PM
To: Maurizio Rogato
Subject: TRCA Preliminary Comments: 3225 5th Concession Road, Pickering

Good Afternoon Maurizio,

Thank you for your patience while we circulated the July 28th documents to our technical staff for review. I just left you a voicemail to touch base regarding this review, however I have also prepared them for you below:

We understand that you are seeking advice on whether the TRCA would be supportive of using the buffer area from the furthest inland hazard or feature on the subject site to be included within the overall land area that will be assessed for the attenuation calculations associated with the septic systems here. As long as the proposed septic systems, leaching beds, tanks, etc. and the reserve bed areas are located outside of the feature plus buffer, we have no issues with this area being utilized in these calculations. We would also recommend that the private systems conform to *Table 8.2.1.5* found in *Section 8* of the OBC which requires sewage systems to be located a minimum of 3 meters from any property line.

I also wanted to provide the following comments that I received from our technical staff in response to the documents that were provided for review. These should be helpful in informing any forthcoming Planning Act Application submissions with the municipality.

Hydrogeology Comments:

1. With respect to water balance, TRCA requires a 5 mm retention target. Please note that the water level information provided was collected December 2021 and may not reflect the seasonal highs. TRCA requires a 1 m separation from the base of the proposed LID and the seasonally high static water level. In addition, please note that we do not consider septic effluent as contributing to the recharge deficit.
2. With respect to servicing, please utilize anti-seepage collars and trench plugs where open cut excavation occurs below the groundwater table.

Water Resources Comments:

3. Please provide a fluvial geomorphology erosion threshold analysis for review as per Appendix B4 of the TRCA SWM Criteria (2012; link here: https://sustainabletechnologies.ca/app/uploads/2013/01/SWM-Criteria-2012.pdf) to determine if the site requires greater than 5mm on-site retention as per the TRCA. Please provide this retention within the stormwater management approach.
4. Please provide a stormwater management report for review and comment to ensure that the following TRCA SWM Criteria (2012; link here: https://sustainabletechnologies.ca/app/uploads/2013/01/SWM-Criteria-2012.pdf) is met as follows:

    a. Water Quantity: please control post-development peak flows to pre-development levels for all storms up to and including the 100 year storm (i.e., 2, 5, 10, 25, 50, and 100 year storms) using the unit flow relationships that have been established for the entire watershed (see Appendix A) using the 24hour AES design storms. Match proposed Regional peak flows to existing conditions.
    b. Water Quality: please provide 80% Total Suspended Solids (TSS) removal. Please note that TRCA credits 50% TSS removal for an OGS sized for 80% TSS removal for 90% of the annual rainfall. However, an OGS in combination with 5mm on-site retention via a treatment train approach is credited 80% TSS removal.
    c. Minimum 5mm on-site retention: please provide a minimum 5mm on-site retention above the initial abstraction for all impervious surfaces. Please note that pre-treatment is required prior to infiltration.

5. Please provide a wetland risk evaluation as per the TRCA Wetland Water Balance Risk Evaluation (2017; link here: https://trca.ca/app/uploads/2017/12/WetlandWaterBalanceRiskEvaluation_Nov2017.pdf) for wetlands within and/or immediately downstream of the property limits to determine the requirements for the feature based water balance. If the wetland is medium or high risk, please use the Wetland Water Balance Modelling Guidance Document (August 2020; link here: https://sustainabletechnologies.ca/app/uploads/2021/10/TRCA-Wetland-Modelling-Guidance-Document-August_2020-Final_.pdf) and the Wetland Water Balance Monitoring Protocol (September 2016; link here: https://sustainabletechnologies.ca/app/uploads/2017/02/TRCA-Wetland-Water-Balance-Monitoring-Protocol.pdf) for guidance and procedures on how to provide mitigation measures and monitoring for a medium and/or high risk wetland.

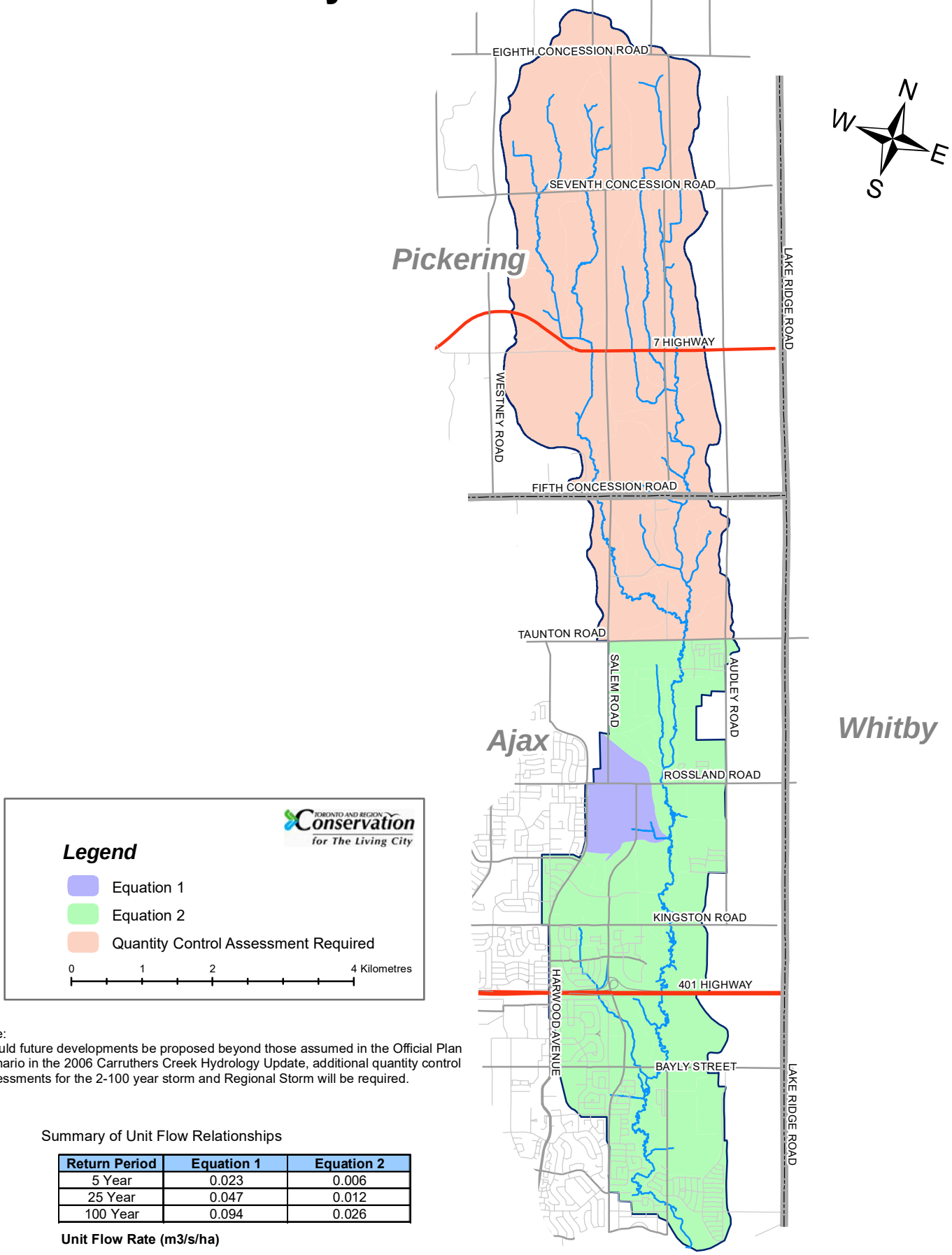
I would also like to note that once we have completed a comprehensive review of all documents which will be submitted to the municipality in the future, we will then be able to provide our position on the proposed lot configuration. If you have any questions, please let me know.

Kind Regards,

Stephanie Dore, RPP, MCIP
Senior Planner
Development Planning and Permits | Development and Engineering Services

T: (437) 880-2469
E: stephanie.dore@trca.ca
A: 101 Exchange Avenue, Vaughan, ON, L4K 5R6 | trca.ca

Carruthers Creek Stormwater Management Quantity Control Release Rates



Note:
Should future developments be proposed beyond those assumed in the Official Plan scenario in the 2006 Carruthers Creek Hydrology Update, additional quantity control assessments for the 2-100 year storm and Regional Storm will be required.

Summary of Unit Flow Relationships

Return Period	Equation 1	Equation 2
5 Year	0.023	0.006
25 Year	0.047	0.012
100 Year	0.094	0.026

Unit Flow Rate (m3/s/ha)

Project Name	Frisque Lands	Prepared By	AK
Project No.	E21007	Checked By	RB
Subject	Quantity Control Target Release Rates and Storage Requirements		

Quantity Control Targets as per Table 8-4 of the Hydrology Update Report, Carruthers Creek Watershed (Cole Engineering, October 2011)

Storm Event	Unitary Discharge	Unitary Storage Volume
	$m^3/s/ha$	$m^3/$ imp.ha
5-year	0.006	500
25-year	0.012	650
100-year	0.026	800

Outlet ID		**1**	**5**
Drainage Area ID		**102 & 103**	**501**
Area (ha)		1.40	1.17
Imperviousness (%)		37%	43%
5-year	Target Release Rate (m^3/s)	0.008	0.007
	Required Storage (m^3)	260	250
25-year	Target Release Rate (m^3/s)	0.017	0.014
	Required Storage (m^3)	338	325
100-year	Target Release Rate (m^3/s)	0.036	0.030
	Required Storage (m^3)	416	400

Appendix C

Event Based Hydrologic Modelling

Appendix C1

Pre-Development Conditions

N

Legend

- SWM Ponds
- Proposed SWM Ponds
- Nodes
- Carruthers Creek
- Roads
- Subcatchment

Land Use

- AGR
- CEM
- COM
- ESTR
- GC
- HDR
- HWY
- IND
- INS
- LDR
- MDR
- NATURAL AREAS
- OW
- REC
- RWY
- UOS

Node 3101

CONCESSION RD. 8
CONCESSION RD. 7
BALSAM RD.
KINSALE RD.
WESTNEY RD. N.
HIGHWAY 7
AUDLEY RD. N.
CONCESSION RD. 5
TAUNTON RD. E.
SALEM RD.
ROSSLAND RD. E.
KINGSTON RD. E. HIGHWAY 2
HIGHWAY 401
BAY ST. E.
PICKERING BEACH RD.-S.T.
SHOAL POINT RD.S.
AUDLEY RD. S.

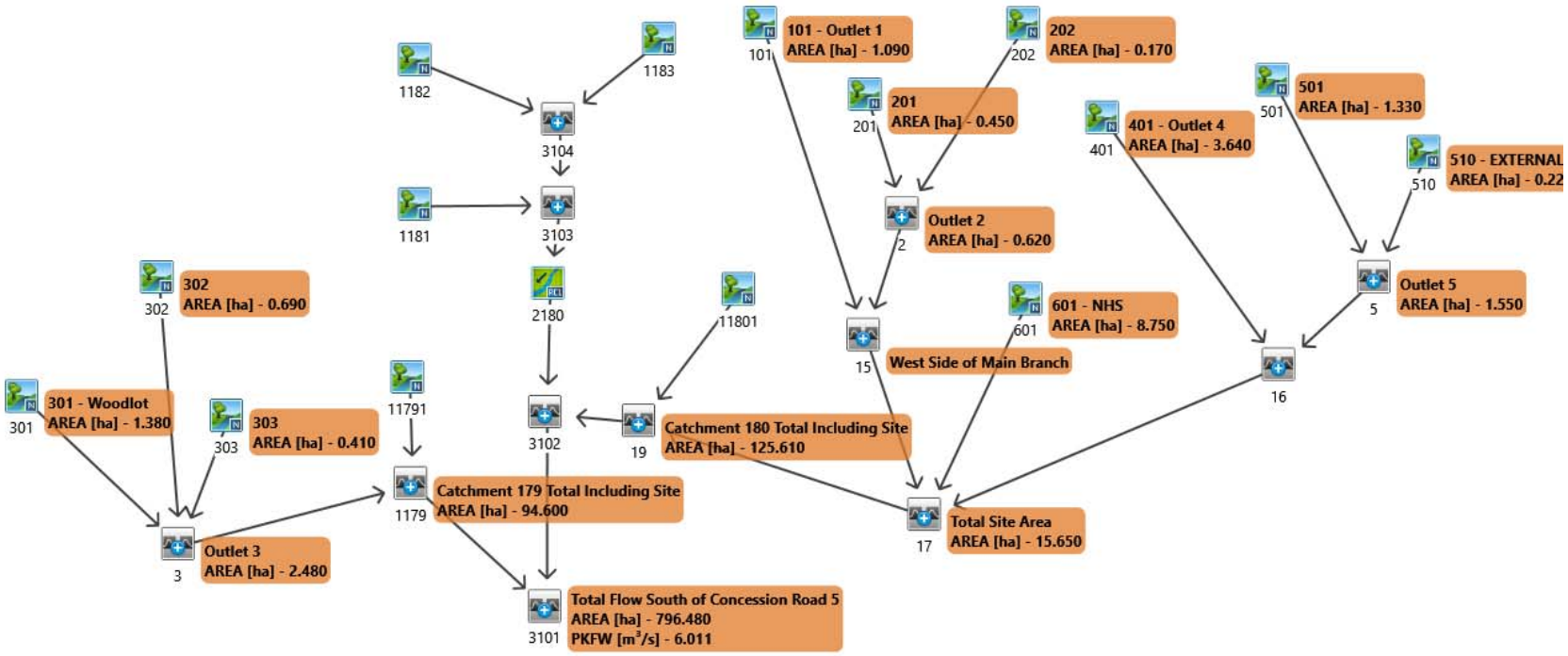
APPROVED OFFICIAL PLAN FUTURE CONDITION MAP
CARRUTHER CREEK FLOOD MANAGEMENT AND ANALYSIS
MUNICIPAL CLASS ENVIRONMENTAL ASSESSMENT
TOWN OF AJAX

COLE ENGINEERING
Experience Enhancing Excellence

Town of Ajax By the Lake

DATE: OCTOBER 2011	PROJECT No: W10-288
SCALE: 1:25 000	FIGURE No: FUT

Visual Otthymo Model Schematic – Pre-Development Conditions



Project Name:	Frisque Lands	Prepared By:	AK
Project No.:	E21007	Reviewed By:	RB
Subject:	Time to Peak Calculations Pre-Development		

Airport Equation [1] **Time of Concentration (min) =** $\frac{3.26*(1.1-C)*L^{0.5}}{S_w^{0.33}}$

Runoff Coefficient 0.20

Drainage Area ID	Area (ha)	Length (m)	Slope (%)	Time of Concentration (min)	Time of Concentration (hrs)	Time to Peak (hr)
101	1.09	260	1.7%	39.48	0.66	0.44
201	0.45	160	1.6%	32.03	0.53	0.36
202	0.17	135	4.1%	21.44	0.36	0.24
301	1.38	110	1.4%	27.78	0.46	0.31
302	0.69	150	1.3%	32.68	0.54	0.36
303	0.41	40	5.0%	10.91	0.18	0.12
401	3.64	150	2.7%	26.00	0.43	0.29
501	1.33	170	2.6%	27.74	0.46	0.31
510 (EXT)	0.22	25	2.0%	11.67	0.19	0.13
601	8.75	450	2.8%	44.43	0.74	0.50

CANDEVCON EAST LIMITED
CONSULTING ENGINEERS & PLANNERS

Project Name:	Frisque Lands					**Prepared By:**	AK
Project No.:	E21007					**Checked By:**	RB
Subject:	Pre-Development Visual Otthymo Model Parameters					**Date:**	26-May-23
NHYD	Name	Outlet	Area	Cn	Ia	N	Tp
1181	NasHyd - 1181	3103	118.7	74.6	4.4	3	4.55
1183	NasHyd - 1183	3104	176.21	76.1	3.9	3	5.98
1182	NasHyd - 1182	3104	281.36	76.1	4.3	3	9.88
11801	Catchment 180 less Site Area	19	109.96	61.4	4.4	3	3.8
101	101 - Outlet 1	15	1.09	61.4	4.4	3	0.44
302	302	3	0.69	61.4	4.4	3	0.36
301	301 - Woodlot	3	1.38	61.4	4.4	3	0.31
303	303	3	0.41	61.4	4.4	3	0.31
201	201	2	0.45	61.4	4.4	3	0.36
202	202	2	0.17	61.4	4.4	3	0.12
11791	Catchment 1179 less Site Area	1179	92.12	54.6	4.6	3	4.68
601	601 - NHS	17	8.75	61.4	4.4	3	0.5
401	401 - Outlet 4	16	3.64	61.4	4.4	3	0.29
501	501	5	1.33	61.4	4.4	3	0.31
510	510 - EXTERNAL	5	0.22	61.4	4.4	3	0.13

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

       V    V   I    SSSSS  U   U    A    L             (v 6.2.2011)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
Developed and Distributed by Smart City Water Inc
Copyright 2007 - 2021 Smart City Water Inc
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 6.2\VO2\voin.dat
  Output  filename: C:\Users\akeeping\AppData\Local\Civica\VH5\3bf9ac1f-e66b-45e5-875b-87a83afa1a0b\c3445eab-5
  Summary filename: C:\Users\akeeping\AppData\Local\Civica\VH5\3bf9ac1f-e66b-45e5-875b-87a83afa1a0b\c3445eab-5


DATE: 07-10-2023                          TIME: 10:25:34

USER:



COMMENTS: _____________________________________________________________


-----------------------------------------------------------------------------------------------------------------
  ***********************************************
  ** SIMULATION : 100yr24_AES                  **
  ***********************************************


--------------------
|    READ STORM    |    Filename: C:\Users\akeeping\AppD
|                  |              ata\Local\Temp\
|                  |              97070632-33ae-46c0-90f1-c8fe188129ff\0130180c
| Ptotal= 95.92 mm |    Comments: 100y24_AES
--------------------
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'    hrs   mm/hr |   hrs   mm/hr
                0.00    0.00 |  6.25    8.15 | 12.50    3.36 | 18.75    0.48
                0.25    0.48 |  6.50    8.15 | 12.75    3.36 | 19.00    0.48
                0.50    0.48 |  6.75    8.15 | 13.00    3.36 | 19.25    0.48
                0.75    0.48 |  7.00    8.15 | 13.25    3.36 | 19.50    0.48
                1.00    0.48 |  7.25    8.15 | 13.50    3.36 | 19.75    0.48
                1.25    0.48 |  7.50    8.15 | 13.75    3.36 | 20.00    0.48
                1.50    0.48 |  7.75    8.15 | 14.00    3.36 | 20.25    0.48
                1.75    0.48 |  8.00    8.15 | 14.25    1.92 | 20.50    0.48
                2.00    0.48 |  8.25   22.06 | 14.50    1.92 | 20.75    0.48
                2.25    0.48 |  8.50   22.06 | 14.75    1.92 | 21.00    0.48
                2.50    0.48 |  8.75   22.06 | 15.00    1.92 | 21.25    0.48
                2.75    0.48 |  9.00   22.06 | 15.25    1.92 | 21.50    0.48
                3.00    0.48 |  9.25   22.06 | 15.50    1.92 | 21.75    0.48
                3.25    0.48 |  9.50   22.06 | 15.75    1.92 | 22.00    0.48
                3.50    0.48 |  9.75   22.06 | 16.00    1.92 | 22.25    0.48
                3.75    0.48 | 10.00   22.06 | 16.25    0.96 | 22.50    0.48
                4.00    0.48 | 10.25    6.23 | 16.50    0.96 | 22.75    0.48
                4.25    2.88 | 10.50    6.23 | 16.75    0.96 | 23.00    0.48
                4.50    2.88 | 10.75    6.23 | 17.00    0.96 | 23.25    0.48
                4.75    2.88 | 11.00    6.23 | 17.25    0.96 | 23.50    0.48
                5.00    2.88 | 11.25    6.23 | 17.50    0.96 | 23.75    0.48
                5.25    2.88 | 11.50    6.23 | 17.75    0.96 | 24.00    0.48
                5.50    2.88 | 11.75    6.23 | 18.00    0.96 |
                5.75    2.88 | 12.00    6.23 | 18.25    0.48 |
                6.00    2.88 | 12.25    3.36 | 18.50    0.48 |

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

--------------------
| CALIB            |
| NASHYD   (  1181)|   Area    (ha)= 118.70   Curve Number   (CN)= 74.6
|ID= 1 DT= 5.0 min |   Ia      (mm)=   4.40   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   4.55

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	6.167	2.88	12.250	6.23	18.33	0.48
0.167	0.00	6.250	2.88	12.333	3.36	18.42	0.48
0.250	0.00	6.333	8.15	12.417	3.36	18.50	0.48
0.333	0.48	6.417	8.15	12.500	3.36	18.58	0.48
0.417	0.48	6.500	8.15	12.583	3.36	18.67	0.48
0.500	0.48	6.583	8.15	12.667	3.36	18.75	0.48
0.583	0.48	6.667	8.15	12.750	3.36	18.83	0.48
0.667	0.48	6.750	8.15	12.833	3.36	18.92	0.48
0.750	0.48	6.833	8.15	12.917	3.36	19.00	0.48
0.833	0.48	6.917	8.15	13.000	3.36	19.08	0.48
0.917	0.48	7.000	8.15	13.083	3.36	19.17	0.48
1.000	0.48	7.083	8.15	13.167	3.36	19.25	0.48
1.083	0.48	7.167	8.15	13.250	3.36	19.33	0.48
1.167	0.48	7.250	8.15	13.333	3.36	19.42	0.48
1.250	0.48	7.333	8.15	13.417	3.36	19.50	0.48
1.333	0.48	7.417	8.15	13.500	3.36	19.58	0.48
1.417	0.48	7.500	8.15	13.583	3.36	19.67	0.48
1.500	0.48	7.583	8.15	13.667	3.36	19.75	0.48
1.583	0.48	7.667	8.15	13.750	3.36	19.83	0.48
1.667	0.48	7.750	8.15	13.833	3.36	19.92	0.48
1.750	0.48	7.833	8.15	13.917	3.36	20.00	0.48
1.833	0.48	7.917	8.15	14.000	3.36	20.08	0.48
1.917	0.48	8.000	8.15	14.083	3.36	20.17	0.48
2.000	0.48	8.083	8.15	14.167	3.36	20.25	0.48
2.083	0.48	8.167	8.15	14.250	3.36	20.33	0.48
2.167	0.48	8.250	8.15	14.333	1.92	20.42	0.48
2.250	0.48	8.333	22.06	14.417	1.92	20.50	0.48
2.333	0.48	8.417	22.06	14.500	1.92	20.58	0.48
2.417	0.48	8.500	22.06	14.583	1.92	20.67	0.48
2.500	0.48	8.583	22.06	14.667	1.92	20.75	0.48
2.583	0.48	8.667	22.06	14.750	1.92	20.83	0.48
2.667	0.48	8.750	22.06	14.833	1.92	20.92	0.48
2.750	0.48	8.833	22.06	14.917	1.92	21.00	0.48
2.833	0.48	8.917	22.06	15.000	1.92	21.08	0.48
2.917	0.48	9.000	22.06	15.083	1.92	21.17	0.48
3.000	0.48	9.083	22.06	15.167	1.92	21.25	0.48
3.083	0.48	9.167	22.06	15.250	1.92	21.33	0.48
3.167	0.48	9.250	22.06	15.333	1.92	21.42	0.48
3.250	0.48	9.333	22.06	15.417	1.92	21.50	0.48
3.333	0.48	9.417	22.06	15.500	1.92	21.58	0.48
3.417	0.48	9.500	22.06	15.583	1.92	21.67	0.48
3.500	0.48	9.583	22.06	15.667	1.92	21.75	0.48
3.583	0.48	9.667	22.06	15.750	1.92	21.83	0.48
3.667	0.48	9.750	22.06	15.833	1.92	21.92	0.48
3.750	0.48	9.833	22.06	15.917	1.92	22.00	0.48
3.833	0.48	9.917	22.06	16.000	1.92	22.08	0.48
3.917	0.48	10.000	22.06	16.083	1.92	22.17	0.48
4.000	0.48	10.083	22.06	16.167	1.92	22.25	0.48
4.083	0.48	10.167	22.06	16.250	1.92	22.33	0.48
4.167	0.48	10.250	22.06	16.333	0.96	22.42	0.48
4.250	0.48	10.333	6.23	16.417	0.96	22.50	0.48
4.333	2.88	10.417	6.23	16.500	0.96	22.58	0.48
4.417	2.88	10.500	6.23	16.583	0.96	22.67	0.48
4.500	2.88	10.583	6.23	16.667	0.96	22.75	0.48
4.583	2.88	10.667	6.23	16.750	0.96	22.83	0.48
4.667	2.88	10.750	6.23	16.833	0.96	22.92	0.48
4.750	2.88	10.833	6.23	16.917	0.96	23.00	0.48
4.833	2.88	10.917	6.23	17.000	0.96	23.08	0.48
4.917	2.88	11.000	6.23	17.083	0.96	23.17	0.48
5.000	2.88	11.083	6.23	17.167	0.96	23.25	0.48
5.083	2.88	11.167	6.23	17.250	0.96	23.33	0.48
5.167	2.88	11.250	6.23	17.333	0.96	23.42	0.48
5.250	2.88	11.333	6.23	17.417	0.96	23.50	0.48
5.333	2.88	11.417	6.23	17.500	0.96	23.58	0.48
5.417	2.88	11.500	6.23	17.583	0.96	23.67	0.48
5.500	2.88	11.583	6.23	17.667	0.96	23.75	0.48
5.583	2.88	11.667	6.23	17.750	0.96	23.83	0.48
5.667	2.88	11.750	6.23	17.833	0.96	23.92	0.48
5.750	2.88	11.833	6.23	17.917	0.96	24.00	0.48
5.833	2.88	11.917	6.23	18.000	0.96	24.08	0.48
5.917	2.88	12.000	6.23	18.083	0.96	24.17	0.48
6.000	2.88	12.083	6.23	18.167	0.96	24.25	0.48
6.083	2.88	12.167	6.23	18.250	0.96		

Unit Hyd Qpeak (cms)= 0.996

PEAK FLOW (cms)= 1.388 (i)
TIME TO PEAK (hrs)= 15.167
RUNOFF VOLUME (mm)= 47.055
TOTAL RAINFALL (mm)= 95.920

RUNOFF COEFFICIENT = 0.491

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

CALIB	
NASHYD (1183)	Area (ha)= 176.21 Curve Number (CN)= 76.1
ID= 1 DT= 5.0 min	Ia (mm)= 3.90 # of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 5.98

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	6.167	2.88	12.250	6.23	18.33	0.48
0.167	0.00	6.250	2.88	12.333	3.36	18.42	0.48
0.250	0.00	6.333	8.15	12.417	3.36	18.50	0.48
0.333	0.48	6.417	8.15	12.500	3.36	18.58	0.48
0.417	0.48	6.500	8.15	12.583	3.36	18.67	0.48
0.500	0.48	6.583	8.15	12.667	3.36	18.75	0.48
0.583	0.48	6.667	8.15	12.750	3.36	18.83	0.48
0.667	0.48	6.750	8.15	12.833	3.36	18.92	0.48
0.750	0.48	6.833	8.15	12.917	3.36	19.00	0.48
0.833	0.48	6.917	8.15	13.000	3.36	19.08	0.48
0.917	0.48	7.000	8.15	13.083	3.36	19.17	0.48
1.000	0.48	7.083	8.15	13.167	3.36	19.25	0.48
1.083	0.48	7.167	8.15	13.250	3.36	19.33	0.48
1.167	0.48	7.250	8.15	13.333	3.36	19.42	0.48
1.250	0.48	7.333	8.15	13.417	3.36	19.50	0.48
1.333	0.48	7.417	8.15	13.500	3.36	19.58	0.48
1.417	0.48	7.500	8.15	13.583	3.36	19.67	0.48
1.500	0.48	7.583	8.15	13.667	3.36	19.75	0.48
1.583	0.48	7.667	8.15	13.750	3.36	19.83	0.48
1.667	0.48	7.750	8.15	13.833	3.36	19.92	0.48
1.750	0.48	7.833	8.15	13.917	3.36	20.00	0.48
1.833	0.48	7.917	8.15	14.000	3.36	20.08	0.48
1.917	0.48	8.000	8.15	14.083	3.36	20.17	0.48
2.000	0.48	8.083	8.15	14.167	3.36	20.25	0.48
2.083	0.48	8.167	8.15	14.250	3.36	20.33	0.48
2.167	0.48	8.250	8.15	14.333	1.92	20.42	0.48
2.250	0.48	8.333	22.06	14.417	1.92	20.50	0.48
2.333	0.48	8.417	22.06	14.500	1.92	20.58	0.48
2.417	0.48	8.500	22.06	14.583	1.92	20.67	0.48
2.500	0.48	8.583	22.06	14.667	1.92	20.75	0.48
2.583	0.48	8.667	22.06	14.750	1.92	20.83	0.48
2.667	0.48	8.750	22.06	14.833	1.92	20.92	0.48
2.750	0.48	8.833	22.06	14.917	1.92	21.00	0.48
2.833	0.48	8.917	22.06	15.000	1.92	21.08	0.48
2.917	0.48	9.000	22.06	15.083	1.92	21.17	0.48
3.000	0.48	9.083	22.06	15.167	1.92	21.25	0.48
3.083	0.48	9.167	22.06	15.250	1.92	21.33	0.48
3.167	0.48	9.250	22.06	15.333	1.92	21.42	0.48
3.250	0.48	9.333	22.06	15.417	1.92	21.50	0.48
3.333	0.48	9.417	22.06	15.500	1.92	21.58	0.48
3.417	0.48	9.500	22.06	15.583	1.92	21.67	0.48
3.500	0.48	9.583	22.06	15.667	1.92	21.75	0.48
3.583	0.48	9.667	22.06	15.750	1.92	21.83	0.48
3.667	0.48	9.750	22.06	15.833	1.92	21.92	0.48
3.750	0.48	9.833	22.06	15.917	1.92	22.00	0.48
3.833	0.48	9.917	22.06	16.000	1.92	22.08	0.48
3.917	0.48	10.000	22.06	16.083	1.92	22.17	0.48
4.000	0.48	10.083	22.06	16.167	1.92	22.25	0.48
4.083	0.48	10.167	22.06	16.250	1.92	22.33	0.48
4.167	0.48	10.250	22.06	16.333	0.96	22.42	0.48
4.250	0.48	10.333	6.23	16.417	0.96	22.50	0.48
4.333	2.88	10.417	6.23	16.500	0.96	22.58	0.48
4.417	2.88	10.500	6.23	16.583	0.96	22.67	0.48
4.500	2.88	10.583	6.23	16.667	0.96	22.75	0.48
4.583	2.88	10.667	6.23	16.750	0.96	22.83	0.48
4.667	2.88	10.750	6.23	16.833	0.96	22.92	0.48
4.750	2.88	10.833	6.23	16.917	0.96	23.00	0.48
4.833	2.88	10.917	6.23	17.000	0.96	23.08	0.48
4.917	2.88	11.000	6.23	17.083	0.96	23.17	0.48
5.000	2.88	11.083	6.23	17.167	0.96	23.25	0.48
5.083	2.88	11.167	6.23	17.250	0.96	23.33	0.48
5.167	2.88	11.250	6.23	17.333	0.96	23.42	0.48
5.250	2.88	11.333	6.23	17.417	0.96	23.50	0.48
5.333	2.88	11.417	6.23	17.500	0.96	23.58	0.48
5.417	2.88	11.500	6.23	17.583	0.96	23.67	0.48
5.500	2.88	11.583	6.23	17.667	0.96	23.75	0.48
5.583	2.88	11.667	6.23	17.750	0.96	23.83	0.48

5.667	2.88	11.750	6.23	17.833	0.96	23.92	0.48
5.750	2.88	11.833	6.23	17.917	0.96	24.00	0.48
5.833	2.88	11.917	6.23	18.000	0.96	24.08	0.48
5.917	2.88	12.000	6.23	18.083	0.96	24.17	0.48
6.000	2.88	12.083	6.23	18.167	0.96	24.25	0.48
6.083	2.88	12.167	6.23	18.250	0.96		

Unit Hyd Qpeak (cms)= 1.125

PEAK FLOW (cms)= 1.773 (i)
TIME TO PEAK (hrs)= 16.833
RUNOFF VOLUME (mm)= 49.290
TOTAL RAINFALL (mm)= 95.920
RUNOFF COEFFICIENT = 0.514

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

CALIB			
NASHYD (1182)	Area (ha)= 281.36	Curve Number (CN)= 76.1	
ID= 1 DT= 5.0 min	Ia (mm)= 4.30	# of Linear Res.(N)= 3.00	
	U.H. Tp(hrs)= 9.88		

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	6.167	2.88	12.250	6.23	18.33	0.48
0.167	0.00	6.250	2.88	12.333	3.36	18.42	0.48
0.250	0.00	6.333	8.15	12.417	3.36	18.50	0.48
0.333	0.48	6.417	8.15	12.500	3.36	18.58	0.48
0.417	0.48	6.500	8.15	12.583	3.36	18.67	0.48
0.500	0.48	6.583	8.15	12.667	3.36	18.75	0.48
0.583	0.48	6.667	8.15	12.750	3.36	18.83	0.48
0.667	0.48	6.750	8.15	12.833	3.36	18.92	0.48
0.750	0.48	6.833	8.15	12.917	3.36	19.00	0.48
0.833	0.48	6.917	8.15	13.000	3.36	19.08	0.48
0.917	0.48	7.000	8.15	13.083	3.36	19.17	0.48
1.000	0.48	7.083	8.15	13.167	3.36	19.25	0.48
1.083	0.48	7.167	8.15	13.250	3.36	19.33	0.48
1.167	0.48	7.250	8.15	13.333	3.36	19.42	0.48
1.250	0.48	7.333	8.15	13.417	3.36	19.50	0.48
1.333	0.48	7.417	8.15	13.500	3.36	19.58	0.48
1.417	0.48	7.500	8.15	13.583	3.36	19.67	0.48
1.500	0.48	7.583	8.15	13.667	3.36	19.75	0.48
1.583	0.48	7.667	8.15	13.750	3.36	19.83	0.48
1.667	0.48	7.750	8.15	13.833	3.36	19.92	0.48
1.750	0.48	7.833	8.15	13.917	3.36	20.00	0.48
1.833	0.48	7.917	8.15	14.000	3.36	20.08	0.48
1.917	0.48	8.000	8.15	14.083	3.36	20.17	0.48
2.000	0.48	8.083	8.15	14.167	3.36	20.25	0.48
2.083	0.48	8.167	8.15	14.250	3.36	20.33	0.48
2.167	0.48	8.250	8.15	14.333	1.92	20.42	0.48
2.250	0.48	8.333	22.06	14.417	1.92	20.50	0.48
2.333	0.48	8.417	22.06	14.500	1.92	20.58	0.48
2.417	0.48	8.500	22.06	14.583	1.92	20.67	0.48
2.500	0.48	8.583	22.06	14.667	1.92	20.75	0.48
2.583	0.48	8.667	22.06	14.750	1.92	20.83	0.48
2.667	0.48	8.750	22.06	14.833	1.92	20.92	0.48
2.750	0.48	8.833	22.06	14.917	1.92	21.00	0.48
2.833	0.48	8.917	22.06	15.000	1.92	21.08	0.48
2.917	0.48	9.000	22.06	15.083	1.92	21.17	0.48
3.000	0.48	9.083	22.06	15.167	1.92	21.25	0.48
3.083	0.48	9.167	22.06	15.250	1.92	21.33	0.48
3.167	0.48	9.250	22.06	15.333	1.92	21.42	0.48
3.250	0.48	9.333	22.06	15.417	1.92	21.50	0.48
3.333	0.48	9.417	22.06	15.500	1.92	21.58	0.48
3.417	0.48	9.500	22.06	15.583	1.92	21.67	0.48
3.500	0.48	9.583	22.06	15.667	1.92	21.75	0.48
3.583	0.48	9.667	22.06	15.750	1.92	21.83	0.48
3.667	0.48	9.750	22.06	15.833	1.92	21.92	0.48
3.750	0.48	9.833	22.06	15.917	1.92	22.00	0.48
3.833	0.48	9.917	22.06	16.000	1.92	22.08	0.48
3.917	0.48	10.000	22.06	16.083	1.92	22.17	0.48
4.000	0.48	10.083	22.06	16.167	1.92	22.25	0.48
4.083	0.48	10.167	22.06	16.250	1.92	22.33	0.48
4.167	0.48	10.250	22.06	16.333	0.96	22.42	0.48
4.250	0.48	10.333	6.23	16.417	0.96	22.50	0.48
4.333	2.88	10.417	6.23	16.500	0.96	22.58	0.48
4.417	2.88	10.500	6.23	16.583	0.96	22.67	0.48
4.500	2.88	10.583	6.23	16.667	0.96	22.75	0.48

4.583	2.88	10.667	6.23	16.750	0.96	22.83	0.48
4.667	2.88	10.750	6.23	16.833	0.96	22.92	0.48
4.750	2.88	10.833	6.23	16.917	0.96	23.00	0.48
4.833	2.88	10.917	6.23	17.000	0.96	23.08	0.48
4.917	2.88	11.000	6.23	17.083	0.96	23.17	0.48
5.000	2.88	11.083	6.23	17.167	0.96	23.25	0.48
5.083	2.88	11.167	6.23	17.250	0.96	23.33	0.48
5.167	2.88	11.250	6.23	17.333	0.96	23.42	0.48
5.250	2.88	11.333	6.23	17.417	0.96	23.50	0.48
5.333	2.88	11.417	6.23	17.500	0.96	23.58	0.48
5.417	2.88	11.500	6.23	17.583	0.96	23.67	0.48
5.500	2.88	11.583	6.23	17.667	0.96	23.75	0.48
5.583	2.88	11.667	6.23	17.750	0.96	23.83	0.48
5.667	2.88	11.750	6.23	17.833	0.96	23.92	0.48
5.750	2.88	11.833	6.23	17.917	0.96	24.00	0.48
5.833	2.88	11.917	6.23	18.000	0.96	24.08	0.48
5.917	2.88	12.000	6.23	18.083	0.96	24.17	0.48
6.000	2.88	12.083	6.23	18.167	0.96	24.25	0.48
6.083	2.88	12.167	6.23	18.250	0.96		

Unit Hyd Qpeak (cms)= 1.088

PEAK FLOW (cms)= 1.883 (i)
TIME TO PEAK (hrs)= 21.083
RUNOFF VOLUME (mm)= 48.974
TOTAL RAINFALL (mm)= 95.920
RUNOFF COEFFICIENT = 0.511

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

ADD HYD (3104)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (1182):		281.36	1.883	21.08	48.97
+ ID2= 2 (1183):		176.21	1.773	16.83	49.29
ID = 3 (3104):		457.57	3.461	18.58	49.10

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (3103)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (1181):		118.70	1.388	15.17	47.05
+ ID2= 2 (3104):		457.57	3.461	18.58	49.10
ID = 3 (3103):		576.27	4.642	17.33	48.68

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ROUTE CHN(2180)		
IN= 2---> OUT= 1	Routing time step (min)'=	5.00

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

Distance	Elevation	Manning	
0.00	138.00	0.0500	
55.00	131.00	0.0500	
95.00	130.00	0.0500	
150.00	129.00	0.0300	Main Channel
160.00	130.00	0.0300 /0.0500	Main Channel
175.00	133.00	0.0500	
350.00	140.00	0.0500	

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

DEPTH (m)	ELEV (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME (min)
0.47	129.47	.138E+05	6.2	0.84	37.35
0.95	129.95	.551E+05	39.1	1.34	23.53
1.42	130.42	.121E+06	119.1	1.87	16.89
1.89	130.89	.205E+06	248.2	2.28	13.79
2.37	131.37	.305E+06	448.4	2.78	11.34
2.84	131.84	.410E+06	706.0	3.25	9.69
3.32	132.32	.521E+06	1013.8	3.67	8.57
3.79	132.79	.638E+06	1370.8	4.06	7.75
4.26	133.26	.761E+06	1767.1	4.39	7.18
4.74	133.74	.897E+06	2217.5	4.67	6.74
5.21	134.21	.105E+07	2730.9	4.93	6.39
5.68	134.68	.121E+07	3309.3	5.16	6.10

6.16	135.16	.139E+07	3955.8	5.38	5.85
6.63	135.63	.158E+07	4674.0	5.59	5.64
7.11	136.11	.179E+07	5467.2	5.78	5.45
7.58	136.58	.201E+07	6338.9	5.97	5.28
8.05	137.05	.224E+07	7292.2	6.15	5.12
8.53	137.53	.249E+07	8330.6	6.33	4.98
9.00	138.00	.275E+07	9457.1	6.50	4.85

		<---- hydrograph ---->			<-pipe / channel->	
	AREA	QPEAK	TPEAK	R.V.	MAX DEPTH	MAX VEL
	(ha)	(cms)	(hrs)	(mm)	(m)	(m/s)
INFLOW : ID= 2 (3103)	576.27	4.64	17.33	48.68	0.36	0.84
OUTFLOW: ID= 1 (2180)	576.27	4.61	18.00	48.68	0.36	0.84

CALIB		
NASHYD (11801)	Area (ha)= 109.96	Curve Number (CN)= 61.4
ID= 1 DT= 5.0 min	Ia (mm)= 4.40	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 3.80	

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	6.167	2.88	12.250	6.23	18.33	0.48
0.167	0.00	6.250	2.88	12.333	3.36	18.42	0.48
0.250	0.00	6.333	8.15	12.417	3.36	18.50	0.48
0.333	0.48	6.417	8.15	12.500	3.36	18.58	0.48
0.417	0.48	6.500	8.15	12.583	3.36	18.67	0.48
0.500	0.48	6.583	8.15	12.667	3.36	18.75	0.48
0.583	0.48	6.667	8.15	12.750	3.36	18.83	0.48
0.667	0.48	6.750	8.15	12.833	3.36	18.92	0.48
0.750	0.48	6.833	8.15	12.917	3.36	19.00	0.48
0.833	0.48	6.917	8.15	13.000	3.36	19.08	0.48
0.917	0.48	7.000	8.15	13.083	3.36	19.17	0.48
1.000	0.48	7.083	8.15	13.167	3.36	19.25	0.48
1.083	0.48	7.167	8.15	13.250	3.36	19.33	0.48
1.167	0.48	7.250	8.15	13.333	3.36	19.42	0.48
1.250	0.48	7.333	8.15	13.417	3.36	19.50	0.48
1.333	0.48	7.417	8.15	13.500	3.36	19.58	0.48
1.417	0.48	7.500	8.15	13.583	3.36	19.67	0.48
1.500	0.48	7.583	8.15	13.667	3.36	19.75	0.48
1.583	0.48	7.667	8.15	13.750	3.36	19.83	0.48
1.667	0.48	7.750	8.15	13.833	3.36	19.92	0.48
1.750	0.48	7.833	8.15	13.917	3.36	20.00	0.48
1.833	0.48	7.917	8.15	14.000	3.36	20.08	0.48
1.917	0.48	8.000	8.15	14.083	3.36	20.17	0.48
2.000	0.48	8.083	8.15	14.167	3.36	20.25	0.48
2.083	0.48	8.167	8.15	14.250	3.36	20.33	0.48
2.167	0.48	8.250	8.15	14.333	1.92	20.42	0.48
2.250	0.48	8.333	22.06	14.417	1.92	20.50	0.48
2.333	0.48	8.417	22.06	14.500	1.92	20.58	0.48
2.417	0.48	8.500	22.06	14.583	1.92	20.67	0.48
2.500	0.48	8.583	22.06	14.667	1.92	20.75	0.48
2.583	0.48	8.667	22.06	14.750	1.92	20.83	0.48
2.667	0.48	8.750	22.06	14.833	1.92	20.92	0.48
2.750	0.48	8.833	22.06	14.917	1.92	21.00	0.48
2.833	0.48	8.917	22.06	15.000	1.92	21.08	0.48
2.917	0.48	9.000	22.06	15.083	1.92	21.17	0.48
3.000	0.48	9.083	22.06	15.167	1.92	21.25	0.48
3.083	0.48	9.167	22.06	15.250	1.92	21.33	0.48
3.167	0.48	9.250	22.06	15.333	1.92	21.42	0.48
3.250	0.48	9.333	22.06	15.417	1.92	21.50	0.48
3.333	0.48	9.417	22.06	15.500	1.92	21.58	0.48
3.417	0.48	9.500	22.06	15.583	1.92	21.67	0.48
3.500	0.48	9.583	22.06	15.667	1.92	21.75	0.48
3.583	0.48	9.667	22.06	15.750	1.92	21.83	0.48
3.667	0.48	9.750	22.06	15.833	1.92	21.92	0.48
3.750	0.48	9.833	22.06	15.917	1.92	22.00	0.48
3.833	0.48	9.917	22.06	16.000	1.92	22.08	0.48
3.917	0.48	10.000	22.06	16.083	1.92	22.17	0.48
4.000	0.48	10.083	22.06	16.167	1.92	22.25	0.48
4.083	0.48	10.167	22.06	16.250	1.92	22.33	0.48
4.167	0.48	10.250	22.06	16.333	0.96	22.42	0.48
4.250	0.48	10.333	6.23	16.417	0.96	22.50	0.48
4.333	2.88	10.417	6.23	16.500	0.96	22.58	0.48
4.417	2.88	10.500	6.23	16.583	0.96	22.67	0.48
4.500	2.88	10.583	6.23	16.667	0.96	22.75	0.48
4.583	2.88	10.667	6.23	16.750	0.96	22.83	0.48

4.667	2.88	10.750	6.23	16.833	0.96	22.92	0.48
4.750	2.88	10.833	6.23	16.917	0.96	23.00	0.48
4.833	2.88	10.917	6.23	17.000	0.96	23.08	0.48
4.917	2.88	11.000	6.23	17.083	0.96	23.17	0.48
5.000	2.88	11.083	6.23	17.167	0.96	23.25	0.48
5.083	2.88	11.167	6.23	17.250	0.96	23.33	0.48
5.167	2.88	11.250	6.23	17.333	0.96	23.42	0.48
5.250	2.88	11.333	6.23	17.417	0.96	23.50	0.48
5.333	2.88	11.417	6.23	17.500	0.96	23.58	0.48
5.417	2.88	11.500	6.23	17.583	0.96	23.67	0.48
5.500	2.88	11.583	6.23	17.667	0.96	23.75	0.48
5.583	2.88	11.667	6.23	17.750	0.96	23.83	0.48
5.667	2.88	11.750	6.23	17.833	0.96	23.92	0.48
5.750	2.88	11.833	6.23	17.917	0.96	24.00	0.48
5.833	2.88	11.917	6.23	18.000	0.96	24.08	0.48
5.917	2.88	12.000	6.23	18.083	0.96	24.17	0.48
6.000	2.88	12.083	6.23	18.167	0.96	24.25	0.48
6.083	2.88	12.167	6.23	18.250	0.96		

Unit Hyd Qpeak (cms)= 1.105

PEAK FLOW (cms)= 1.015 (i)
TIME TO PEAK (hrs)= 14.417
RUNOFF VOLUME (mm)= 33.343
TOTAL RAINFALL (mm)= 95.920
RUNOFF COEFFICIENT = 0.348

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

CALIB NASHYD (0101)	Area (ha)= 1.09	Curve Number (CN)= 61.4
ID= 1 DT= 5.0 min	Ia (mm)= 4.40	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 0.44	

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	6.167	2.88	12.250	6.23	18.33	0.48
0.167	0.00	6.250	2.88	12.333	3.36	18.42	0.48
0.250	0.00	6.333	8.15	12.417	3.36	18.50	0.48
0.333	0.48	6.417	8.15	12.500	3.36	18.58	0.48
0.417	0.48	6.500	8.15	12.583	3.36	18.67	0.48
0.500	0.48	6.583	8.15	12.667	3.36	18.75	0.48
0.583	0.48	6.667	8.15	12.750	3.36	18.83	0.48
0.667	0.48	6.750	8.15	12.833	3.36	18.92	0.48
0.750	0.48	6.833	8.15	12.917	3.36	19.00	0.48
0.833	0.48	6.917	8.15	13.000	3.36	19.08	0.48
0.917	0.48	7.000	8.15	13.083	3.36	19.17	0.48
1.000	0.48	7.083	8.15	13.167	3.36	19.25	0.48
1.083	0.48	7.167	8.15	13.250	3.36	19.33	0.48
1.167	0.48	7.250	8.15	13.333	3.36	19.42	0.48
1.250	0.48	7.333	8.15	13.417	3.36	19.50	0.48
1.333	0.48	7.417	8.15	13.500	3.36	19.58	0.48
1.417	0.48	7.500	8.15	13.583	3.36	19.67	0.48
1.500	0.48	7.583	8.15	13.667	3.36	19.75	0.48
1.583	0.48	7.667	8.15	13.750	3.36	19.83	0.48
1.667	0.48	7.750	8.15	13.833	3.36	19.92	0.48
1.750	0.48	7.833	8.15	13.917	3.36	20.00	0.48
1.833	0.48	7.917	8.15	14.000	3.36	20.08	0.48
1.917	0.48	8.000	8.15	14.083	3.36	20.17	0.48
2.000	0.48	8.083	8.15	14.167	3.36	20.25	0.48
2.083	0.48	8.167	8.15	14.250	3.36	20.33	0.48
2.167	0.48	8.250	8.15	14.333	1.92	20.42	0.48
2.250	0.48	8.333	22.06	14.417	1.92	20.50	0.48
2.333	0.48	8.417	22.06	14.500	1.92	20.58	0.48
2.417	0.48	8.500	22.06	14.583	1.92	20.67	0.48
2.500	0.48	8.583	22.06	14.667	1.92	20.75	0.48
2.583	0.48	8.667	22.06	14.750	1.92	20.83	0.48
2.667	0.48	8.750	22.06	14.833	1.92	20.92	0.48
2.750	0.48	8.833	22.06	14.917	1.92	21.00	0.48
2.833	0.48	8.917	22.06	15.000	1.92	21.08	0.48
2.917	0.48	9.000	22.06	15.083	1.92	21.17	0.48
3.000	0.48	9.083	22.06	15.167	1.92	21.25	0.48
3.083	0.48	9.167	22.06	15.250	1.92	21.33	0.48
3.167	0.48	9.250	22.06	15.333	1.92	21.42	0.48
3.250	0.48	9.333	22.06	15.417	1.92	21.50	0.48
3.333	0.48	9.417	22.06	15.500	1.92	21.58	0.48
3.417	0.48	9.500	22.06	15.583	1.92	21.67	0.48
3.500	0.48	9.583	22.06	15.667	1.92	21.75	0.48

3.583	0.48	9.667	22.06	15.750	1.92	21.83	0.48
3.667	0.48	9.750	22.06	15.833	1.92	21.92	0.48
3.750	0.48	9.833	22.06	15.917	1.92	22.00	0.48
3.833	0.48	9.917	22.06	16.000	1.92	22.08	0.48
3.917	0.48	10.000	22.06	16.083	1.92	22.17	0.48
4.000	0.48	10.083	22.06	16.167	1.92	22.25	0.48
4.083	0.48	10.167	22.06	16.250	1.92	22.33	0.48
4.167	0.48	10.250	22.06	16.333	0.96	22.42	0.48
4.250	0.48	10.333	6.23	16.417	0.96	22.50	0.48
4.333	2.88	10.417	6.23	16.500	0.96	22.58	0.48
4.417	2.88	10.500	6.23	16.583	0.96	22.67	0.48
4.500	2.88	10.583	6.23	16.667	0.96	22.75	0.48
4.583	2.88	10.667	6.23	16.750	0.96	22.83	0.48
4.667	2.88	10.750	6.23	16.833	0.96	22.92	0.48
4.750	2.88	10.833	6.23	16.917	0.96	23.00	0.48
4.833	2.88	10.917	6.23	17.000	0.96	23.08	0.48
4.917	2.88	11.000	6.23	17.083	0.96	23.17	0.48
5.000	2.88	11.083	6.23	17.167	0.96	23.25	0.48
5.083	2.88	11.167	6.23	17.250	0.96	23.33	0.48
5.167	2.88	11.250	6.23	17.333	0.96	23.42	0.48
5.250	2.88	11.333	6.23	17.417	0.96	23.50	0.48
5.333	2.88	11.417	6.23	17.500	0.96	23.58	0.48
5.417	2.88	11.500	6.23	17.583	0.96	23.67	0.48
5.500	2.88	11.583	6.23	17.667	0.96	23.75	0.48
5.583	2.88	11.667	6.23	17.750	0.96	23.83	0.48
5.667	2.88	11.750	6.23	17.833	0.96	23.92	0.48
5.750	2.88	11.833	6.23	17.917	0.96	24.00	0.48
5.833	2.88	11.917	6.23	18.000	0.96	24.08	0.48
5.917	2.88	12.000	6.23	18.083	0.96	24.17	0.48
6.000	2.88	12.083	6.23	18.167	0.96	24.25	0.48
6.083	2.88	12.167	6.23	18.250	0.96		

Unit Hyd Qpeak (cms)= 0.095

PEAK FLOW (cms)= 0.028 (i)
TIME TO PEAK (hrs)= 10.333
RUNOFF VOLUME (mm)= 33.340
TOTAL RAINFALL (mm)= 95.920
RUNOFF COEFFICIENT = 0.348

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

CALIB NASHYD (0201)	Area (ha)= 0.45	Curve Number (CN)= 61.4
ID= 1 DT= 5.0 min	Ia (mm)= 4.40	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 0.36	

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	6.167	2.88	12.250	6.23	18.33	0.48
0.167	0.00	6.250	2.88	12.333	3.36	18.42	0.48
0.250	0.00	6.333	8.15	12.417	3.36	18.50	0.48
0.333	0.48	6.417	8.15	12.500	3.36	18.58	0.48
0.417	0.48	6.500	8.15	12.583	3.36	18.67	0.48
0.500	0.48	6.583	8.15	12.667	3.36	18.75	0.48
0.583	0.48	6.667	8.15	12.750	3.36	18.83	0.48
0.667	0.48	6.750	8.15	12.833	3.36	18.92	0.48
0.750	0.48	6.833	8.15	12.917	3.36	19.00	0.48
0.833	0.48	6.917	8.15	13.000	3.36	19.08	0.48
0.917	0.48	7.000	8.15	13.083	3.36	19.17	0.48
1.000	0.48	7.083	8.15	13.167	3.36	19.25	0.48
1.083	0.48	7.167	8.15	13.250	3.36	19.33	0.48
1.167	0.48	7.250	8.15	13.333	3.36	19.42	0.48
1.250	0.48	7.333	8.15	13.417	3.36	19.50	0.48
1.333	0.48	7.417	8.15	13.500	3.36	19.58	0.48
1.417	0.48	7.500	8.15	13.583	3.36	19.67	0.48
1.500	0.48	7.583	8.15	13.667	3.36	19.75	0.48
1.583	0.48	7.667	8.15	13.750	3.36	19.83	0.48
1.667	0.48	7.750	8.15	13.833	3.36	19.92	0.48
1.750	0.48	7.833	8.15	13.917	3.36	20.00	0.48
1.833	0.48	7.917	8.15	14.000	3.36	20.08	0.48
1.917	0.48	8.000	8.15	14.083	3.36	20.17	0.48
2.000	0.48	8.083	8.15	14.167	3.36	20.25	0.48
2.083	0.48	8.167	8.15	14.250	3.36	20.33	0.48
2.167	0.48	8.250	8.15	14.333	1.92	20.42	0.48
2.250	0.48	8.333	22.06	14.417	1.92	20.50	0.48
2.333	0.48	8.417	22.06	14.500	1.92	20.58	0.48
2.417	0.48	8.500	22.06	14.583	1.92	20.67	0.48

2.500	0.48	8.583	22.06	14.667	1.92	20.75	0.48
2.583	0.48	8.667	22.06	14.750	1.92	20.83	0.48
2.667	0.48	8.750	22.06	14.833	1.92	20.92	0.48
2.750	0.48	8.833	22.06	14.917	1.92	21.00	0.48
2.833	0.48	8.917	22.06	15.000	1.92	21.08	0.48
2.917	0.48	9.000	22.06	15.083	1.92	21.17	0.48
3.000	0.48	9.083	22.06	15.167	1.92	21.25	0.48
3.083	0.48	9.167	22.06	15.250	1.92	21.33	0.48
3.167	0.48	9.250	22.06	15.333	1.92	21.42	0.48
3.250	0.48	9.333	22.06	15.417	1.92	21.50	0.48
3.333	0.48	9.417	22.06	15.500	1.92	21.58	0.48
3.417	0.48	9.500	22.06	15.583	1.92	21.67	0.48
3.500	0.48	9.583	22.06	15.667	1.92	21.75	0.48
3.583	0.48	9.667	22.06	15.750	1.92	21.83	0.48
3.667	0.48	9.750	22.06	15.833	1.92	21.92	0.48
3.750	0.48	9.833	22.06	15.917	1.92	22.00	0.48
3.833	0.48	9.917	22.06	16.000	1.92	22.08	0.48
3.917	0.48	10.000	22.06	16.083	1.92	22.17	0.48
4.000	0.48	10.083	22.06	16.167	1.92	22.25	0.48
4.083	0.48	10.167	22.06	16.250	1.92	22.33	0.48
4.167	0.48	10.250	22.06	16.333	0.96	22.42	0.48
4.250	0.48	10.333	6.23	16.417	0.96	22.50	0.48
4.333	2.88	10.417	6.23	16.500	0.96	22.58	0.48
4.417	2.88	10.500	6.23	16.583	0.96	22.67	0.48
4.500	2.88	10.583	6.23	16.667	0.96	22.75	0.48
4.583	2.88	10.667	6.23	16.750	0.96	22.83	0.48
4.667	2.88	10.750	6.23	16.833	0.96	22.92	0.48
4.750	2.88	10.833	6.23	16.917	0.96	23.00	0.48
4.833	2.88	10.917	6.23	17.000	0.96	23.08	0.48
4.917	2.88	11.000	6.23	17.083	0.96	23.17	0.48
5.000	2.88	11.083	6.23	17.167	0.96	23.25	0.48
5.083	2.88	11.167	6.23	17.250	0.96	23.33	0.48
5.167	2.88	11.250	6.23	17.333	0.96	23.42	0.48
5.250	2.88	11.333	6.23	17.417	0.96	23.50	0.48
5.333	2.88	11.417	6.23	17.500	0.96	23.58	0.48
5.417	2.88	11.500	6.23	17.583	0.96	23.67	0.48
5.500	2.88	11.583	6.23	17.667	0.96	23.75	0.48
5.583	2.88	11.667	6.23	17.750	0.96	23.83	0.48
5.667	2.88	11.750	6.23	17.833	0.96	23.92	0.48
5.750	2.88	11.833	6.23	17.917	0.96	24.00	0.48
5.833	2.88	11.917	6.23	18.000	0.96	24.08	0.48
5.917	2.88	12.000	6.23	18.083	0.96	24.17	0.48
6.000	2.88	12.083	6.23	18.167	0.96	24.25	0.48
6.083	2.88	12.167	6.23	18.250	0.96		

Unit Hyd Qpeak (cms)= 0.048

PEAK FLOW (cms)= 0.012 (i)
TIME TO PEAK (hrs)= 10.250
RUNOFF VOLUME (mm)= 33.335
TOTAL RAINFALL (mm)= 95.920
RUNOFF COEFFICIENT = 0.348

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

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

Area (ha)= 0.17 Curve Number (CN)= 61.4
Ia (mm)= 4.40 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.12

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	6.167	2.88	12.250	6.23	18.33	0.48
0.167	0.00	6.250	2.88	12.333	3.36	18.42	0.48
0.250	0.00	6.333	8.15	12.417	3.36	18.50	0.48
0.333	0.48	6.417	8.15	12.500	3.36	18.58	0.48
0.417	0.48	6.500	8.15	12.583	3.36	18.67	0.48
0.500	0.48	6.583	8.15	12.667	3.36	18.75	0.48
0.583	0.48	6.667	8.15	12.750	3.36	18.83	0.48
0.667	0.48	6.750	8.15	12.833	3.36	18.92	0.48
0.750	0.48	6.833	8.15	12.917	3.36	19.00	0.48
0.833	0.48	6.917	8.15	13.000	3.36	19.08	0.48
0.917	0.48	7.000	8.15	13.083	3.36	19.17	0.48
1.000	0.48	7.083	8.15	13.167	3.36	19.25	0.48
1.083	0.48	7.167	8.15	13.250	3.36	19.33	0.48
1.167	0.48	7.250	8.15	13.333	3.36	19.42	0.48
1.250	0.48	7.333	8.15	13.417	3.36	19.50	0.48
1.333	0.48	7.417	8.15	13.500	3.36	19.58	0.48

1.417	0.48	7.500	8.15	13.583	3.36	19.67	0.48
1.500	0.48	7.583	8.15	13.667	3.36	19.75	0.48
1.583	0.48	7.667	8.15	13.750	3.36	19.83	0.48
1.667	0.48	7.750	8.15	13.833	3.36	19.92	0.48
1.750	0.48	7.833	8.15	13.917	3.36	20.00	0.48
1.833	0.48	7.917	8.15	14.000	3.36	20.08	0.48
1.917	0.48	8.000	8.15	14.083	3.36	20.17	0.48
2.000	0.48	8.083	8.15	14.167	3.36	20.25	0.48
2.083	0.48	8.167	8.15	14.250	3.36	20.33	0.48
2.167	0.48	8.250	8.15	14.333	1.92	20.42	0.48
2.250	0.48	8.333	22.06	14.417	1.92	20.50	0.48
2.333	0.48	8.417	22.06	14.500	1.92	20.58	0.48
2.417	0.48	8.500	22.06	14.583	1.92	20.67	0.48
2.500	0.48	8.583	22.06	14.667	1.92	20.75	0.48
2.583	0.48	8.667	22.06	14.750	1.92	20.83	0.48
2.667	0.48	8.750	22.06	14.833	1.92	20.92	0.48
2.750	0.48	8.833	22.06	14.917	1.92	21.00	0.48
2.833	0.48	8.917	22.06	15.000	1.92	21.08	0.48
2.917	0.48	9.000	22.06	15.083	1.92	21.17	0.48
3.000	0.48	9.083	22.06	15.167	1.92	21.25	0.48
3.083	0.48	9.167	22.06	15.250	1.92	21.33	0.48
3.167	0.48	9.250	22.06	15.333	1.92	21.42	0.48
3.250	0.48	9.333	22.06	15.417	1.92	21.50	0.48
3.333	0.48	9.417	22.06	15.500	1.92	21.58	0.48
3.417	0.48	9.500	22.06	15.583	1.92	21.67	0.48
3.500	0.48	9.583	22.06	15.667	1.92	21.75	0.48
3.583	0.48	9.667	22.06	15.750	1.92	21.83	0.48
3.667	0.48	9.750	22.06	15.833	1.92	21.92	0.48
3.750	0.48	9.833	22.06	15.917	1.92	22.00	0.48
3.833	0.48	9.917	22.06	16.000	1.92	22.08	0.48
3.917	0.48	10.000	22.06	16.083	1.92	22.17	0.48
4.000	0.48	10.083	22.06	16.167	1.92	22.25	0.48
4.083	0.48	10.167	22.06	16.250	1.92	22.33	0.48
4.167	0.48	10.250	22.06	16.333	0.96	22.42	0.48
4.250	0.48	10.333	6.23	16.417	0.96	22.50	0.48
4.333	2.88	10.417	6.23	16.500	0.96	22.58	0.48
4.417	2.88	10.500	6.23	16.583	0.96	22.67	0.48
4.500	2.88	10.583	6.23	16.667	0.96	22.75	0.48
4.583	2.88	10.667	6.23	16.750	0.96	22.83	0.48
4.667	2.88	10.750	6.23	16.833	0.96	22.92	0.48
4.750	2.88	10.833	6.23	16.917	0.96	23.00	0.48
4.833	2.88	10.917	6.23	17.000	0.96	23.08	0.48
4.917	2.88	11.000	6.23	17.083	0.96	23.17	0.48
5.000	2.88	11.083	6.23	17.167	0.96	23.25	0.48
5.083	2.88	11.167	6.23	17.250	0.96	23.33	0.48
5.167	2.88	11.250	6.23	17.333	0.96	23.42	0.48
5.250	2.88	11.333	6.23	17.417	0.96	23.50	0.48
5.333	2.88	11.417	6.23	17.500	0.96	23.58	0.48
5.417	2.88	11.500	6.23	17.583	0.96	23.67	0.48
5.500	2.88	11.583	6.23	17.667	0.96	23.75	0.48
5.583	2.88	11.667	6.23	17.750	0.96	23.83	0.48
5.667	2.88	11.750	6.23	17.833	0.96	23.92	0.48
5.750	2.88	11.833	6.23	17.917	0.96	24.00	0.48
5.833	2.88	11.917	6.23	18.000	0.96	24.08	0.48
5.917	2.88	12.000	6.23	18.083	0.96	24.17	0.48
6.000	2.88	12.083	6.23	18.167	0.96	24.25	0.48
6.083	2.88	12.167	6.23	18.250	0.96		

Unit Hyd Qpeak (cms)= 0.054

PEAK FLOW (cms)= 0.005 (i)
TIME TO PEAK (hrs)= 10.250
RUNOFF VOLUME (mm)= 32.896
TOTAL RAINFALL (mm)= 95.920
RUNOFF COEFFICIENT = 0.343

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

ADD HYD (0002)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0201):		0.45	0.012	10.25	33.34
+ ID2= 2 (0202):		0.17	0.005	10.25	32.90
ID = 3 (0002):		0.62	0.017	10.25	33.21

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0015)

1 + 2 = 3		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
	ID1= 1 (0101):	1.09	0.028	10.33	33.34
+	ID2= 2 (0002):	0.62	0.017	10.25	33.21
	ID = 3 (0015):	1.71	0.045	10.25	33.29

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB NASHYD (0601)	Area (ha)= 8.75	Curve Number (CN)= 61.4
ID= 1 DT= 5.0 min	Ia (mm)= 4.40	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 0.50	

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	6.167	2.88	12.250	6.23	18.33	0.48
0.167	0.00	6.250	2.88	12.333	3.36	18.42	0.48
0.250	0.00	6.333	8.15	12.417	3.36	18.50	0.48
0.333	0.48	6.417	8.15	12.500	3.36	18.58	0.48
0.417	0.48	6.500	8.15	12.583	3.36	18.67	0.48
0.500	0.48	6.583	8.15	12.667	3.36	18.75	0.48
0.583	0.48	6.667	8.15	12.750	3.36	18.83	0.48
0.667	0.48	6.750	8.15	12.833	3.36	18.92	0.48
0.750	0.48	6.833	8.15	12.917	3.36	19.00	0.48
0.833	0.48	6.917	8.15	13.000	3.36	19.08	0.48
0.917	0.48	7.000	8.15	13.083	3.36	19.17	0.48
1.000	0.48	7.083	8.15	13.167	3.36	19.25	0.48
1.083	0.48	7.167	8.15	13.250	3.36	19.33	0.48
1.167	0.48	7.250	8.15	13.333	3.36	19.42	0.48
1.250	0.48	7.333	8.15	13.417	3.36	19.50	0.48
1.333	0.48	7.417	8.15	13.500	3.36	19.58	0.48
1.417	0.48	7.500	8.15	13.583	3.36	19.67	0.48
1.500	0.48	7.583	8.15	13.667	3.36	19.75	0.48
1.583	0.48	7.667	8.15	13.750	3.36	19.83	0.48
1.667	0.48	7.750	8.15	13.833	3.36	19.92	0.48
1.750	0.48	7.833	8.15	13.917	3.36	20.00	0.48
1.833	0.48	7.917	8.15	14.000	3.36	20.08	0.48
1.917	0.48	8.000	8.15	14.083	3.36	20.17	0.48
2.000	0.48	8.083	8.15	14.167	3.36	20.25	0.48
2.083	0.48	8.167	8.15	14.250	3.36	20.33	0.48
2.167	0.48	8.250	8.15	14.333	1.92	20.42	0.48
2.250	0.48	8.333	22.06	14.417	1.92	20.50	0.48
2.333	0.48	8.417	22.06	14.500	1.92	20.58	0.48
2.417	0.48	8.500	22.06	14.583	1.92	20.67	0.48
2.500	0.48	8.583	22.06	14.667	1.92	20.75	0.48
2.583	0.48	8.667	22.06	14.750	1.92	20.83	0.48
2.667	0.48	8.750	22.06	14.833	1.92	20.92	0.48
2.750	0.48	8.833	22.06	14.917	1.92	21.00	0.48
2.833	0.48	8.917	22.06	15.000	1.92	21.08	0.48
2.917	0.48	9.000	22.06	15.083	1.92	21.17	0.48
3.000	0.48	9.083	22.06	15.167	1.92	21.25	0.48
3.083	0.48	9.167	22.06	15.250	1.92	21.33	0.48
3.167	0.48	9.250	22.06	15.333	1.92	21.42	0.48
3.250	0.48	9.333	22.06	15.417	1.92	21.50	0.48
3.333	0.48	9.417	22.06	15.500	1.92	21.58	0.48
3.417	0.48	9.500	22.06	15.583	1.92	21.67	0.48
3.500	0.48	9.583	22.06	15.667	1.92	21.75	0.48
3.583	0.48	9.667	22.06	15.750	1.92	21.83	0.48
3.667	0.48	9.750	22.06	15.833	1.92	21.92	0.48
3.750	0.48	9.833	22.06	15.917	1.92	22.00	0.48
3.833	0.48	9.917	22.06	16.000	1.92	22.08	0.48
3.917	0.48	10.000	22.06	16.083	1.92	22.17	0.48
4.000	0.48	10.083	22.06	16.167	1.92	22.25	0.48
4.083	0.48	10.167	22.06	16.250	1.92	22.33	0.48
4.167	0.48	10.250	22.06	16.333	0.96	22.42	0.48
4.250	0.48	10.333	6.23	16.417	0.96	22.50	0.48
4.333	2.88	10.417	6.23	16.500	0.96	22.58	0.48
4.417	2.88	10.500	6.23	16.583	0.96	22.67	0.48
4.500	2.88	10.583	6.23	16.667	0.96	22.75	0.48
4.583	2.88	10.667	6.23	16.750	0.96	22.83	0.48
4.667	2.88	10.750	6.23	16.833	0.96	22.92	0.48
4.750	2.88	10.833	6.23	16.917	0.96	23.00	0.48
4.833	2.88	10.917	6.23	17.000	0.96	23.08	0.48
4.917	2.88	11.000	6.23	17.083	0.96	23.17	0.48
5.000	2.88	11.083	6.23	17.167	0.96	23.25	0.48
5.083	2.88	11.167	6.23	17.250	0.96	23.33	0.48
5.167	2.88	11.250	6.23	17.333	0.96	23.42	0.48
5.250	2.88	11.333	6.23	17.417	0.96	23.50	0.48

5.333	2.88	11.417	6.23	17.500	0.96	23.58	0.48
5.417	2.88	11.500	6.23	17.583	0.96	23.67	0.48
5.500	2.88	11.583	6.23	17.667	0.96	23.75	0.48
5.583	2.88	11.667	6.23	17.750	0.96	23.83	0.48
5.667	2.88	11.750	6.23	17.833	0.96	23.92	0.48
5.750	2.88	11.833	6.23	17.917	0.96	24.00	0.48
5.833	2.88	11.917	6.23	18.000	0.96	24.08	0.48
5.917	2.88	12.000	6.23	18.083	0.96	24.17	0.48
6.000	2.88	12.083	6.23	18.167	0.96	24.25	0.48
6.083	2.88	12.167	6.23	18.250	0.96		

Unit Hyd Qpeak (cms)= 0.668

PEAK FLOW (cms)= 0.220 (i)
TIME TO PEAK (hrs)= 10.333
RUNOFF VOLUME (mm)= 33.342
TOTAL RAINFALL (mm)= 95.920
RUNOFF COEFFICIENT = 0.348

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

CALIB NASHYD (0401) ID= 1 DT= 5.0 min	Area (ha)= 3.64 Curve Number (CN)= 61.4 Ia (mm)= 4.40 # of Linear Res.(N)= 3.00 U.H. Tp(hrs)= 0.29

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	6.167	2.88	12.250	6.23	18.33	0.48
0.167	0.00	6.250	2.88	12.333	3.36	18.42	0.48
0.250	0.00	6.333	8.15	12.417	3.36	18.50	0.48
0.333	0.48	6.417	8.15	12.500	3.36	18.58	0.48
0.417	0.48	6.500	8.15	12.583	3.36	18.67	0.48
0.500	0.48	6.583	8.15	12.667	3.36	18.75	0.48
0.583	0.48	6.667	8.15	12.750	3.36	18.83	0.48
0.667	0.48	6.750	8.15	12.833	3.36	18.92	0.48
0.750	0.48	6.833	8.15	12.917	3.36	19.00	0.48
0.833	0.48	6.917	8.15	13.000	3.36	19.08	0.48
0.917	0.48	7.000	8.15	13.083	3.36	19.17	0.48
1.000	0.48	7.083	8.15	13.167	3.36	19.25	0.48
1.083	0.48	7.167	8.15	13.250	3.36	19.33	0.48
1.167	0.48	7.250	8.15	13.333	3.36	19.42	0.48
1.250	0.48	7.333	8.15	13.417	3.36	19.50	0.48
1.333	0.48	7.417	8.15	13.500	3.36	19.58	0.48
1.417	0.48	7.500	8.15	13.583	3.36	19.67	0.48
1.500	0.48	7.583	8.15	13.667	3.36	19.75	0.48
1.583	0.48	7.667	8.15	13.750	3.36	19.83	0.48
1.667	0.48	7.750	8.15	13.833	3.36	19.92	0.48
1.750	0.48	7.833	8.15	13.917	3.36	20.00	0.48
1.833	0.48	7.917	8.15	14.000	3.36	20.08	0.48
1.917	0.48	8.000	8.15	14.083	3.36	20.17	0.48
2.000	0.48	8.083	8.15	14.167	3.36	20.25	0.48
2.083	0.48	8.167	8.15	14.250	3.36	20.33	0.48
2.167	0.48	8.250	8.15	14.333	1.92	20.42	0.48
2.250	0.48	8.333	22.06	14.417	1.92	20.50	0.48
2.333	0.48	8.417	22.06	14.500	1.92	20.58	0.48
2.417	0.48	8.500	22.06	14.583	1.92	20.67	0.48
2.500	0.48	8.583	22.06	14.667	1.92	20.75	0.48
2.583	0.48	8.667	22.06	14.750	1.92	20.83	0.48
2.667	0.48	8.750	22.06	14.833	1.92	20.92	0.48
2.750	0.48	8.833	22.06	14.917	1.92	21.00	0.48
2.833	0.48	8.917	22.06	15.000	1.92	21.08	0.48
2.917	0.48	9.000	22.06	15.083	1.92	21.17	0.48
3.000	0.48	9.083	22.06	15.167	1.92	21.25	0.48
3.083	0.48	9.167	22.06	15.250	1.92	21.33	0.48
3.167	0.48	9.250	22.06	15.333	1.92	21.42	0.48
3.250	0.48	9.333	22.06	15.417	1.92	21.50	0.48
3.333	0.48	9.417	22.06	15.500	1.92	21.58	0.48
3.417	0.48	9.500	22.06	15.583	1.92	21.67	0.48
3.500	0.48	9.583	22.06	15.667	1.92	21.75	0.48
3.583	0.48	9.667	22.06	15.750	1.92	21.83	0.48
3.667	0.48	9.750	22.06	15.833	1.92	21.92	0.48
3.750	0.48	9.833	22.06	15.917	1.92	22.00	0.48
3.833	0.48	9.917	22.06	16.000	1.92	22.08	0.48
3.917	0.48	10.000	22.06	16.083	1.92	22.17	0.48
4.000	0.48	10.083	22.06	16.167	1.92	22.25	0.48
4.083	0.48	10.167	22.06	16.250	1.92	22.33	0.48
4.167	0.48	10.250	22.06	16.333	0.96	22.42	0.48

4.250	0.48	10.333	6.23	16.417	0.96	22.50	0.48
4.333	2.88	10.417	6.23	16.500	0.96	22.58	0.48
4.417	2.88	10.500	6.23	16.583	0.96	22.67	0.48
4.500	2.88	10.583	6.23	16.667	0.96	22.75	0.48
4.583	2.88	10.667	6.23	16.750	0.96	22.83	0.48
4.667	2.88	10.750	6.23	16.833	0.96	22.92	0.48
4.750	2.88	10.833	6.23	16.917	0.96	23.00	0.48
4.833	2.88	10.917	6.23	17.000	0.96	23.08	0.48
4.917	2.88	11.000	6.23	17.083	0.96	23.17	0.48
5.000	2.88	11.083	6.23	17.167	0.96	23.25	0.48
5.083	2.88	11.167	6.23	17.250	0.96	23.33	0.48
5.167	2.88	11.250	6.23	17.333	0.96	23.42	0.48
5.250	2.88	11.333	6.23	17.417	0.96	23.50	0.48
5.333	2.88	11.417	6.23	17.500	0.96	23.58	0.48
5.417	2.88	11.500	6.23	17.583	0.96	23.67	0.48
5.500	2.88	11.583	6.23	17.667	0.96	23.75	0.48
5.583	2.88	11.667	6.23	17.750	0.96	23.83	0.48
5.667	2.88	11.750	6.23	17.833	0.96	23.92	0.48
5.750	2.88	11.833	6.23	17.917	0.96	24.00	0.48
5.833	2.88	11.917	6.23	18.000	0.96	24.08	0.48
5.917	2.88	12.000	6.23	18.083	0.96	24.17	0.48
6.000	2.88	12.083	6.23	18.167	0.96	24.25	0.48
6.083	2.88	12.167	6.23	18.250	0.96		

Unit Hyd Qpeak (cms)= 0.479

PEAK FLOW (cms)= 0.099 (i)
TIME TO PEAK (hrs)= 10.250
RUNOFF VOLUME (mm)= 33.329
TOTAL RAINFALL (mm)= 95.920
RUNOFF COEFFICIENT = 0.347

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

CALIB			
NASHYD (0501)	Area (ha)= 1.33	Curve Number (CN)= 61.4	
ID= 1 DT= 5.0 min	Ia (mm)= 4.40	# of Linear Res.(N)= 3.00	
	U.H. Tp(hrs)= 0.31		

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	6.167	2.88	12.250	6.23	18.33	0.48
0.167	0.00	6.250	2.88	12.333	3.36	18.42	0.48
0.250	0.00	6.333	8.15	12.417	3.36	18.50	0.48
0.333	0.48	6.417	8.15	12.500	3.36	18.58	0.48
0.417	0.48	6.500	8.15	12.583	3.36	18.67	0.48
0.500	0.48	6.583	8.15	12.667	3.36	18.75	0.48
0.583	0.48	6.667	8.15	12.750	3.36	18.83	0.48
0.667	0.48	6.750	8.15	12.833	3.36	18.92	0.48
0.750	0.48	6.833	8.15	12.917	3.36	19.00	0.48
0.833	0.48	6.917	8.15	13.000	3.36	19.08	0.48
0.917	0.48	7.000	8.15	13.083	3.36	19.17	0.48
1.000	0.48	7.083	8.15	13.167	3.36	19.25	0.48
1.083	0.48	7.167	8.15	13.250	3.36	19.33	0.48
1.167	0.48	7.250	8.15	13.333	3.36	19.42	0.48
1.250	0.48	7.333	8.15	13.417	3.36	19.50	0.48
1.333	0.48	7.417	8.15	13.500	3.36	19.58	0.48
1.417	0.48	7.500	8.15	13.583	3.36	19.67	0.48
1.500	0.48	7.583	8.15	13.667	3.36	19.75	0.48
1.583	0.48	7.667	8.15	13.750	3.36	19.83	0.48
1.667	0.48	7.750	8.15	13.833	3.36	19.92	0.48
1.750	0.48	7.833	8.15	13.917	3.36	20.00	0.48
1.833	0.48	7.917	8.15	14.000	3.36	20.08	0.48
1.917	0.48	8.000	8.15	14.083	3.36	20.17	0.48
2.000	0.48	8.083	8.15	14.167	3.36	20.25	0.48
2.083	0.48	8.167	8.15	14.250	3.36	20.33	0.48
2.167	0.48	8.250	8.15	14.333	1.92	20.42	0.48
2.250	0.48	8.333	22.06	14.417	1.92	20.50	0.48
2.333	0.48	8.417	22.06	14.500	1.92	20.58	0.48
2.417	0.48	8.500	22.06	14.583	1.92	20.67	0.48
2.500	0.48	8.583	22.06	14.667	1.92	20.75	0.48
2.583	0.48	8.667	22.06	14.750	1.92	20.83	0.48
2.667	0.48	8.750	22.06	14.833	1.92	20.92	0.48
2.750	0.48	8.833	22.06	14.917	1.92	21.00	0.48
2.833	0.48	8.917	22.06	15.000	1.92	21.08	0.48
2.917	0.48	9.000	22.06	15.083	1.92	21.17	0.48
3.000	0.48	9.083	22.06	15.167	1.92	21.25	0.48
3.083	0.48	9.167	22.06	15.250	1.92	21.33	0.48

3.167	0.48	9.250	22.06	15.333	1.92	21.42	0.48
3.250	0.48	9.333	22.06	15.417	1.92	21.50	0.48
3.333	0.48	9.417	22.06	15.500	1.92	21.58	0.48
3.417	0.48	9.500	22.06	15.583	1.92	21.67	0.48
3.500	0.48	9.583	22.06	15.667	1.92	21.75	0.48
3.583	0.48	9.667	22.06	15.750	1.92	21.83	0.48
3.667	0.48	9.750	22.06	15.833	1.92	21.92	0.48
3.750	0.48	9.833	22.06	15.917	1.92	22.00	0.48
3.833	0.48	9.917	22.06	16.000	1.92	22.08	0.48
3.917	0.48	10.000	22.06	16.083	1.92	22.17	0.48
4.000	0.48	10.083	22.06	16.167	1.92	22.25	0.48
4.083	0.48	10.167	22.06	16.250	1.92	22.33	0.48
4.167	0.48	10.250	22.06	16.333	0.96	22.42	0.48
4.250	0.48	10.333	6.23	16.417	0.96	22.50	0.48
4.333	2.88	10.417	6.23	16.500	0.96	22.58	0.48
4.417	2.88	10.500	6.23	16.583	0.96	22.67	0.48
4.500	2.88	10.583	6.23	16.667	0.96	22.75	0.48
4.583	2.88	10.667	6.23	16.750	0.96	22.83	0.48
4.667	2.88	10.750	6.23	16.833	0.96	22.92	0.48
4.750	2.88	10.833	6.23	16.917	0.96	23.00	0.48
4.833	2.88	10.917	6.23	17.000	0.96	23.08	0.48
4.917	2.88	11.000	6.23	17.083	0.96	23.17	0.48
5.000	2.88	11.083	6.23	17.167	0.96	23.25	0.48
5.083	2.88	11.167	6.23	17.250	0.96	23.33	0.48
5.167	2.88	11.250	6.23	17.333	0.96	23.42	0.48
5.250	2.88	11.333	6.23	17.417	0.96	23.50	0.48
5.333	2.88	11.417	6.23	17.500	0.96	23.58	0.48
5.417	2.88	11.500	6.23	17.583	0.96	23.67	0.48
5.500	2.88	11.583	6.23	17.667	0.96	23.75	0.48
5.583	2.88	11.667	6.23	17.750	0.96	23.83	0.48
5.667	2.88	11.750	6.23	17.833	0.96	23.92	0.48
5.750	2.88	11.833	6.23	17.917	0.96	24.00	0.48
5.833	2.88	11.917	6.23	18.000	0.96	24.08	0.48
5.917	2.88	12.000	6.23	18.083	0.96	24.17	0.48
6.000	2.88	12.083	6.23	18.167	0.96	24.25	0.48
6.083	2.88	12.167	6.23	18.250	0.96		

Unit Hyd Qpeak (cms)= 0.164

PEAK FLOW (cms)= 0.036 (i)
TIME TO PEAK (hrs)= 10.250
RUNOFF VOLUME (mm)= 33.332
TOTAL RAINFALL (mm)= 95.920
RUNOFF COEFFICIENT = 0.347

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

CALIB NASHYD (0510) ID= 1 DT= 5.0 min	Area (ha)= 0.22	Curve Number (CN)= 61.4
	Ia (mm)= 4.40	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 0.13	

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	6.167	2.88	12.250	6.23	18.33	0.48
0.167	0.00	6.250	2.88	12.333	3.36	18.42	0.48
0.250	0.00	6.333	8.15	12.417	3.36	18.50	0.48
0.333	0.48	6.417	8.15	12.500	3.36	18.58	0.48
0.417	0.48	6.500	8.15	12.583	3.36	18.67	0.48
0.500	0.48	6.583	8.15	12.667	3.36	18.75	0.48
0.583	0.48	6.667	8.15	12.750	3.36	18.83	0.48
0.667	0.48	6.750	8.15	12.833	3.36	18.92	0.48
0.750	0.48	6.833	8.15	12.917	3.36	19.00	0.48
0.833	0.48	6.917	8.15	13.000	3.36	19.08	0.48
0.917	0.48	7.000	8.15	13.083	3.36	19.17	0.48
1.000	0.48	7.083	8.15	13.167	3.36	19.25	0.48
1.083	0.48	7.167	8.15	13.250	3.36	19.33	0.48
1.167	0.48	7.250	8.15	13.333	3.36	19.42	0.48
1.250	0.48	7.333	8.15	13.417	3.36	19.50	0.48
1.333	0.48	7.417	8.15	13.500	3.36	19.58	0.48
1.417	0.48	7.500	8.15	13.583	3.36	19.67	0.48
1.500	0.48	7.583	8.15	13.667	3.36	19.75	0.48
1.583	0.48	7.667	8.15	13.750	3.36	19.83	0.48
1.667	0.48	7.750	8.15	13.833	3.36	19.92	0.48
1.750	0.48	7.833	8.15	13.917	3.36	20.00	0.48
1.833	0.48	7.917	8.15	14.000	3.36	20.08	0.48
1.917	0.48	8.000	8.15	14.083	3.36	20.17	0.48
2.000	0.48	8.083	8.15	14.167	3.36	20.25	0.48

2.083	0.48	8.167	8.15	14.250	3.36	20.33	0.48
2.167	0.48	8.250	8.15	14.333	1.92	20.42	0.48
2.250	0.48	8.333	22.06	14.417	1.92	20.50	0.48
2.333	0.48	8.417	22.06	14.500	1.92	20.58	0.48
2.417	0.48	8.500	22.06	14.583	1.92	20.67	0.48
2.500	0.48	8.583	22.06	14.667	1.92	20.75	0.48
2.583	0.48	8.667	22.06	14.750	1.92	20.83	0.48
2.667	0.48	8.750	22.06	14.833	1.92	20.92	0.48
2.750	0.48	8.833	22.06	14.917	1.92	21.00	0.48
2.833	0.48	8.917	22.06	15.000	1.92	21.08	0.48
2.917	0.48	9.000	22.06	15.083	1.92	21.17	0.48
3.000	0.48	9.083	22.06	15.167	1.92	21.25	0.48
3.083	0.48	9.167	22.06	15.250	1.92	21.33	0.48
3.167	0.48	9.250	22.06	15.333	1.92	21.42	0.48
3.250	0.48	9.333	22.06	15.417	1.92	21.50	0.48
3.333	0.48	9.417	22.06	15.500	1.92	21.58	0.48
3.417	0.48	9.500	22.06	15.583	1.92	21.67	0.48
3.500	0.48	9.583	22.06	15.667	1.92	21.75	0.48
3.583	0.48	9.667	22.06	15.750	1.92	21.83	0.48
3.667	0.48	9.750	22.06	15.833	1.92	21.92	0.48
3.750	0.48	9.833	22.06	15.917	1.92	22.00	0.48
3.833	0.48	9.917	22.06	16.000	1.92	22.08	0.48
3.917	0.48	10.000	22.06	16.083	1.92	22.17	0.48
4.000	0.48	10.083	22.06	16.167	1.92	22.25	0.48
4.083	0.48	10.167	22.06	16.250	1.92	22.33	0.48
4.167	0.48	10.250	22.06	16.333	0.96	22.42	0.48
4.250	0.48	10.333	6.23	16.417	0.96	22.50	0.48
4.333	2.88	10.417	6.23	16.500	0.96	22.58	0.48
4.417	2.88	10.500	6.23	16.583	0.96	22.67	0.48
4.500	2.88	10.583	6.23	16.667	0.96	22.75	0.48
4.583	2.88	10.667	6.23	16.750	0.96	22.83	0.48
4.667	2.88	10.750	6.23	16.833	0.96	22.92	0.48
4.750	2.88	10.833	6.23	16.917	0.96	23.00	0.48
4.833	2.88	10.917	6.23	17.000	0.96	23.08	0.48
4.917	2.88	11.000	6.23	17.083	0.96	23.17	0.48
5.000	2.88	11.083	6.23	17.167	0.96	23.25	0.48
5.083	2.88	11.167	6.23	17.250	0.96	23.33	0.48
5.167	2.88	11.250	6.23	17.333	0.96	23.42	0.48
5.250	2.88	11.333	6.23	17.417	0.96	23.50	0.48
5.333	2.88	11.417	6.23	17.500	0.96	23.58	0.48
5.417	2.88	11.500	6.23	17.583	0.96	23.67	0.48
5.500	2.88	11.583	6.23	17.667	0.96	23.75	0.48
5.583	2.88	11.667	6.23	17.750	0.96	23.83	0.48
5.667	2.88	11.750	6.23	17.833	0.96	23.92	0.48
5.750	2.88	11.833	6.23	17.917	0.96	24.00	0.48
5.833	2.88	11.917	6.23	18.000	0.96	24.08	0.48
5.917	2.88	12.000	6.23	18.083	0.96	24.17	0.48
6.000	2.88	12.083	6.23	18.167	0.96	24.25	0.48
6.083	2.88	12.167	6.23	18.250	0.96		

Unit Hyd Qpeak (cms)= 0.065

PEAK FLOW (cms)= 0.006 (i)
TIME TO PEAK (hrs)= 10.250
RUNOFF VOLUME (mm)= 33.012
TOTAL RAINFALL (mm)= 95.920
RUNOFF COEFFICIENT = 0.344

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

ADD HYD (0005) | 1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0501):	1.33	0.036	10.25	33.33
+ ID2= 2 (0510):	0.22	0.006	10.25	33.01
ID = 3 (0005):	1.55	0.042	10.25	33.29

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0016) | 1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0401):	3.64	0.099	10.25	33.33
+ ID2= 2 (0005):	1.55	0.042	10.25	33.29
ID = 3 (0016):	5.19	0.142	10.25	33.32

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```
--------------------
| ADD HYD  (  0017)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0015):     1.71   0.045    10.25    33.29
     + ID2= 2 (  0016):     5.19   0.142    10.25    33.32
       ================================================
       ID = 3 (  0017):     6.90   0.186    10.25    33.31

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

--------------------
| ADD HYD  (  0017)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0017):     6.90   0.186    10.25    33.31
     + ID2= 2 (  0601):     8.75   0.220    10.33    33.34
       ================================================
       ID = 1 (  0017):    15.65   0.403    10.25    33.33

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

--------------------
| ADD HYD  (  0019)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 ( 11801):   109.96   1.015    14.42    33.34
     + ID2= 2 (  0017):    15.65   0.403    10.25    33.33
       ================================================
       ID = 3 (  0019):   125.61   1.096    14.25    33.34

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

--------------------
| ADD HYD  (  3102)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0019):   125.61   1.096    14.25    33.34
     + ID2= 2 (  2180):   576.27   4.614    18.00    48.68
       ================================================
       ID = 3 (  3102):   701.88   5.425    17.17    45.93

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0302)|   Area    (ha)=   0.69   Curve Number   (CN)= 61.4
|ID= 1 DT= 5.0 min |   Ia      (mm)=   4.40   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.36

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


                        ---- TRANSFORMED HYETOGRAPH ----
  TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
   hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
 0.083    0.00 | 6.167    2.88 |12.250    6.23 | 18.33    0.48
 0.167    0.00 | 6.250    2.88 |12.333    3.36 | 18.42    0.48
 0.250    0.00 | 6.333    8.15 |12.417    3.36 | 18.50    0.48
 0.333    0.48 | 6.417    8.15 |12.500    3.36 | 18.58    0.48
 0.417    0.48 | 6.500    8.15 |12.583    3.36 | 18.67    0.48
 0.500    0.48 | 6.583    8.15 |12.667    3.36 | 18.75    0.48
 0.583    0.48 | 6.667    8.15 |12.750    3.36 | 18.83    0.48
 0.667    0.48 | 6.750    8.15 |12.833    3.36 | 18.92    0.48
 0.750    0.48 | 6.833    8.15 |12.917    3.36 | 19.00    0.48
 0.833    0.48 | 6.917    8.15 |13.000    3.36 | 19.08    0.48
 0.917    0.48 | 7.000    8.15 |13.083    3.36 | 19.17    0.48
 1.000    0.48 | 7.083    8.15 |13.167    3.36 | 19.25    0.48
 1.083    0.48 | 7.167    8.15 |13.250    3.36 | 19.33    0.48
 1.167    0.48 | 7.250    8.15 |13.333    3.36 | 19.42    0.48
 1.250    0.48 | 7.333    8.15 |13.417    3.36 | 19.50    0.48
 1.333    0.48 | 7.417    8.15 |13.500    3.36 | 19.58    0.48
 1.417    0.48 | 7.500    8.15 |13.583    3.36 | 19.67    0.48
 1.500    0.48 | 7.583    8.15 |13.667    3.36 | 19.75    0.48
 1.583    0.48 | 7.667    8.15 |13.750    3.36 | 19.83    0.48
 1.667    0.48 | 7.750    8.15 |13.833    3.36 | 19.92    0.48
 1.750    0.48 | 7.833    8.15 |13.917    3.36 | 20.00    0.48
 1.833    0.48 | 7.917    8.15 |14.000    3.36 | 20.08    0.48
 1.917    0.48 | 8.000    8.15 |14.083    3.36 | 20.17    0.48
```

2.000	0.48	8.083	8.15	14.167	3.36	20.25	0.48
2.083	0.48	8.167	8.15	14.250	3.36	20.33	0.48
2.167	0.48	8.250	8.15	14.333	1.92	20.42	0.48
2.250	0.48	8.333	22.06	14.417	1.92	20.50	0.48
2.333	0.48	8.417	22.06	14.500	1.92	20.58	0.48
2.417	0.48	8.500	22.06	14.583	1.92	20.67	0.48
2.500	0.48	8.583	22.06	14.667	1.92	20.75	0.48
2.583	0.48	8.667	22.06	14.750	1.92	20.83	0.48
2.667	0.48	8.750	22.06	14.833	1.92	20.92	0.48
2.750	0.48	8.833	22.06	14.917	1.92	21.00	0.48
2.833	0.48	8.917	22.06	15.000	1.92	21.08	0.48
2.917	0.48	9.000	22.06	15.083	1.92	21.17	0.48
3.000	0.48	9.083	22.06	15.167	1.92	21.25	0.48
3.083	0.48	9.167	22.06	15.250	1.92	21.33	0.48
3.167	0.48	9.250	22.06	15.333	1.92	21.42	0.48
3.250	0.48	9.333	22.06	15.417	1.92	21.50	0.48
3.333	0.48	9.417	22.06	15.500	1.92	21.58	0.48
3.417	0.48	9.500	22.06	15.583	1.92	21.67	0.48
3.500	0.48	9.583	22.06	15.667	1.92	21.75	0.48
3.583	0.48	9.667	22.06	15.750	1.92	21.83	0.48
3.667	0.48	9.750	22.06	15.833	1.92	21.92	0.48
3.750	0.48	9.833	22.06	15.917	1.92	22.00	0.48
3.833	0.48	9.917	22.06	16.000	1.92	22.08	0.48
3.917	0.48	10.000	22.06	16.083	1.92	22.17	0.48
4.000	0.48	10.083	22.06	16.167	1.92	22.25	0.48
4.083	0.48	10.167	22.06	16.250	1.92	22.33	0.48
4.167	0.48	10.250	22.06	16.333	0.96	22.42	0.48
4.250	0.48	10.333	6.23	16.417	0.96	22.50	0.48
4.333	2.88	10.417	6.23	16.500	0.96	22.58	0.48
4.417	2.88	10.500	6.23	16.583	0.96	22.67	0.48
4.500	2.88	10.583	6.23	16.667	0.96	22.75	0.48
4.583	2.88	10.667	6.23	16.750	0.96	22.83	0.48
4.667	2.88	10.750	6.23	16.833	0.96	22.92	0.48
4.750	2.88	10.833	6.23	16.917	0.96	23.00	0.48
4.833	2.88	10.917	6.23	17.000	0.96	23.08	0.48
4.917	2.88	11.000	6.23	17.083	0.96	23.17	0.48
5.000	2.88	11.083	6.23	17.167	0.96	23.25	0.48
5.083	2.88	11.167	6.23	17.250	0.96	23.33	0.48
5.167	2.88	11.250	6.23	17.333	0.96	23.42	0.48
5.250	2.88	11.333	6.23	17.417	0.96	23.50	0.48
5.333	2.88	11.417	6.23	17.500	0.96	23.58	0.48
5.417	2.88	11.500	6.23	17.583	0.96	23.67	0.48
5.500	2.88	11.583	6.23	17.667	0.96	23.75	0.48
5.583	2.88	11.667	6.23	17.750	0.96	23.83	0.48
5.667	2.88	11.750	6.23	17.833	0.96	23.92	0.48
5.750	2.88	11.833	6.23	17.917	0.96	24.00	0.48
5.833	2.88	11.917	6.23	18.000	0.96	24.08	0.48
5.917	2.88	12.000	6.23	18.083	0.96	24.17	0.48
6.000	2.88	12.083	6.23	18.167	0.96	24.25	0.48
6.083	2.88	12.167	6.23	18.250	0.96		

Unit Hyd Qpeak (cms)= 0.073

PEAK FLOW (cms)= 0.018 (i)
TIME TO PEAK (hrs)= 10.250
RUNOFF VOLUME (mm)= 33.336
TOTAL RAINFALL (mm)= 95.920
RUNOFF COEFFICIENT = 0.348

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

CALIB					
NASHYD (0301)	Area (ha)=	1.38	Curve Number (CN)=	61.4	
ID= 1 DT= 5.0 min	Ia (mm)=	4.40	# of Linear Res.(N)=	3.00	
	U.H. Tp(hrs)=	0.31			

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	6.167	2.88	12.250	6.23	18.33	0.48
0.167	0.00	6.250	2.88	12.333	3.36	18.42	0.48
0.250	0.00	6.333	8.15	12.417	3.36	18.50	0.48
0.333	0.48	6.417	8.15	12.500	3.36	18.58	0.48
0.417	0.48	6.500	8.15	12.583	3.36	18.67	0.48
0.500	0.48	6.583	8.15	12.667	3.36	18.75	0.48
0.583	0.48	6.667	8.15	12.750	3.36	18.83	0.48
0.667	0.48	6.750	8.15	12.833	3.36	18.92	0.48
0.750	0.48	6.833	8.15	12.917	3.36	19.00	0.48
0.833	0.48	6.917	8.15	13.000	3.36	19.08	0.48

0.917	0.48	7.000	8.15	13.083	3.36	19.17	0.48
1.000	0.48	7.083	8.15	13.167	3.36	19.25	0.48
1.083	0.48	7.167	8.15	13.250	3.36	19.33	0.48
1.167	0.48	7.250	8.15	13.333	3.36	19.42	0.48
1.250	0.48	7.333	8.15	13.417	3.36	19.50	0.48
1.333	0.48	7.417	8.15	13.500	3.36	19.58	0.48
1.417	0.48	7.500	8.15	13.583	3.36	19.67	0.48
1.500	0.48	7.583	8.15	13.667	3.36	19.75	0.48
1.583	0.48	7.667	8.15	13.750	3.36	19.83	0.48
1.667	0.48	7.750	8.15	13.833	3.36	19.92	0.48
1.750	0.48	7.833	8.15	13.917	3.36	20.00	0.48
1.833	0.48	7.917	8.15	14.000	3.36	20.08	0.48
1.917	0.48	8.000	8.15	14.083	3.36	20.17	0.48
2.000	0.48	8.083	8.15	14.167	3.36	20.25	0.48
2.083	0.48	8.167	8.15	14.250	3.36	20.33	0.48
2.167	0.48	8.250	8.15	14.333	1.92	20.42	0.48
2.250	0.48	8.333	22.06	14.417	1.92	20.50	0.48
2.333	0.48	8.417	22.06	14.500	1.92	20.58	0.48
2.417	0.48	8.500	22.06	14.583	1.92	20.67	0.48
2.500	0.48	8.583	22.06	14.667	1.92	20.75	0.48
2.583	0.48	8.667	22.06	14.750	1.92	20.83	0.48
2.667	0.48	8.750	22.06	14.833	1.92	20.92	0.48
2.750	0.48	8.833	22.06	14.917	1.92	21.00	0.48
2.833	0.48	8.917	22.06	15.000	1.92	21.08	0.48
2.917	0.48	9.000	22.06	15.083	1.92	21.17	0.48
3.000	0.48	9.083	22.06	15.167	1.92	21.25	0.48
3.083	0.48	9.167	22.06	15.250	1.92	21.33	0.48
3.167	0.48	9.250	22.06	15.333	1.92	21.42	0.48
3.250	0.48	9.333	22.06	15.417	1.92	21.50	0.48
3.333	0.48	9.417	22.06	15.500	1.92	21.58	0.48
3.417	0.48	9.500	22.06	15.583	1.92	21.67	0.48
3.500	0.48	9.583	22.06	15.667	1.92	21.75	0.48
3.583	0.48	9.667	22.06	15.750	1.92	21.83	0.48
3.667	0.48	9.750	22.06	15.833	1.92	21.92	0.48
3.750	0.48	9.833	22.06	15.917	1.92	22.00	0.48
3.833	0.48	9.917	22.06	16.000	1.92	22.08	0.48
3.917	0.48	10.000	22.06	16.083	1.92	22.17	0.48
4.000	0.48	10.083	22.06	16.167	1.92	22.25	0.48
4.083	0.48	10.167	22.06	16.250	1.92	22.33	0.48
4.167	0.48	10.250	22.06	16.333	0.96	22.42	0.48
4.250	0.48	10.333	6.23	16.417	0.96	22.50	0.48
4.333	2.88	10.417	6.23	16.500	0.96	22.58	0.48
4.417	2.88	10.500	6.23	16.583	0.96	22.67	0.48
4.500	2.88	10.583	6.23	16.667	0.96	22.75	0.48
4.583	2.88	10.667	6.23	16.750	0.96	22.83	0.48
4.667	2.88	10.750	6.23	16.833	0.96	22.92	0.48
4.750	2.88	10.833	6.23	16.917	0.96	23.00	0.48
4.833	2.88	10.917	6.23	17.000	0.96	23.08	0.48
4.917	2.88	11.000	6.23	17.083	0.96	23.17	0.48
5.000	2.88	11.083	6.23	17.167	0.96	23.25	0.48
5.083	2.88	11.167	6.23	17.250	0.96	23.33	0.48
5.167	2.88	11.250	6.23	17.333	0.96	23.42	0.48
5.250	2.88	11.333	6.23	17.417	0.96	23.50	0.48
5.333	2.88	11.417	6.23	17.500	0.96	23.58	0.48
5.417	2.88	11.500	6.23	17.583	0.96	23.67	0.48
5.500	2.88	11.583	6.23	17.667	0.96	23.75	0.48
5.583	2.88	11.667	6.23	17.750	0.96	23.83	0.48
5.667	2.88	11.750	6.23	17.833	0.96	23.92	0.48
5.750	2.88	11.833	6.23	17.917	0.96	24.00	0.48
5.833	2.88	11.917	6.23	18.000	0.96	24.08	0.48
5.917	2.88	12.000	6.23	18.083	0.96	24.17	0.48
6.000	2.88	12.083	6.23	18.167	0.96	24.25	0.48
6.083	2.88	12.167	6.23	18.250	0.96		

Unit Hyd Qpeak (cms)= 0.170

PEAK FLOW (cms)= 0.037 (i)
TIME TO PEAK (hrs)= 10.250
RUNOFF VOLUME (mm)= 33.332
TOTAL RAINFALL (mm)= 95.920
RUNOFF COEFFICIENT = 0.347

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

CALIB					
NASHYD (0303)	Area (ha)=	0.41	Curve Number (CN)=	61.4
ID= 1 DT= 5.0 min	Ia (mm)=	4.40	# of Linear Res.(N)=	3.00
	U.H. Tp(hrs)=	0.31		

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	6.167	2.88	12.250	6.23	18.33	0.48
0.167	0.00	6.250	2.88	12.333	3.36	18.42	0.48
0.250	0.00	6.333	8.15	12.417	3.36	18.50	0.48
0.333	0.48	6.417	8.15	12.500	3.36	18.58	0.48
0.417	0.48	6.500	8.15	12.583	3.36	18.67	0.48
0.500	0.48	6.583	8.15	12.667	3.36	18.75	0.48
0.583	0.48	6.667	8.15	12.750	3.36	18.83	0.48
0.667	0.48	6.750	8.15	12.833	3.36	18.92	0.48
0.750	0.48	6.833	8.15	12.917	3.36	19.00	0.48
0.833	0.48	6.917	8.15	13.000	3.36	19.08	0.48
0.917	0.48	7.000	8.15	13.083	3.36	19.17	0.48
1.000	0.48	7.083	8.15	13.167	3.36	19.25	0.48
1.083	0.48	7.167	8.15	13.250	3.36	19.33	0.48
1.167	0.48	7.250	8.15	13.333	3.36	19.42	0.48
1.250	0.48	7.333	8.15	13.417	3.36	19.50	0.48
1.333	0.48	7.417	8.15	13.500	3.36	19.58	0.48
1.417	0.48	7.500	8.15	13.583	3.36	19.67	0.48
1.500	0.48	7.583	8.15	13.667	3.36	19.75	0.48
1.583	0.48	7.667	8.15	13.750	3.36	19.83	0.48
1.667	0.48	7.750	8.15	13.833	3.36	19.92	0.48
1.750	0.48	7.833	8.15	13.917	3.36	20.00	0.48
1.833	0.48	7.917	8.15	14.000	3.36	20.08	0.48
1.917	0.48	8.000	8.15	14.083	3.36	20.17	0.48
2.000	0.48	8.083	8.15	14.167	3.36	20.25	0.48
2.083	0.48	8.167	8.15	14.250	3.36	20.33	0.48
2.167	0.48	8.250	8.15	14.333	1.92	20.42	0.48
2.250	0.48	8.333	22.06	14.417	1.92	20.50	0.48
2.333	0.48	8.417	22.06	14.500	1.92	20.58	0.48
2.417	0.48	8.500	22.06	14.583	1.92	20.67	0.48
2.500	0.48	8.583	22.06	14.667	1.92	20.75	0.48
2.583	0.48	8.667	22.06	14.750	1.92	20.83	0.48
2.667	0.48	8.750	22.06	14.833	1.92	20.92	0.48
2.750	0.48	8.833	22.06	14.917	1.92	21.00	0.48
2.833	0.48	8.917	22.06	15.000	1.92	21.08	0.48
2.917	0.48	9.000	22.06	15.083	1.92	21.17	0.48
3.000	0.48	9.083	22.06	15.167	1.92	21.25	0.48
3.083	0.48	9.167	22.06	15.250	1.92	21.33	0.48
3.167	0.48	9.250	22.06	15.333	1.92	21.42	0.48
3.250	0.48	9.333	22.06	15.417	1.92	21.50	0.48
3.333	0.48	9.417	22.06	15.500	1.92	21.58	0.48
3.417	0.48	9.500	22.06	15.583	1.92	21.67	0.48
3.500	0.48	9.583	22.06	15.667	1.92	21.75	0.48
3.583	0.48	9.667	22.06	15.750	1.92	21.83	0.48
3.667	0.48	9.750	22.06	15.833	1.92	21.92	0.48
3.750	0.48	9.833	22.06	15.917	1.92	22.00	0.48
3.833	0.48	9.917	22.06	16.000	1.92	22.08	0.48
3.917	0.48	10.000	22.06	16.083	1.92	22.17	0.48
4.000	0.48	10.083	22.06	16.167	1.92	22.25	0.48
4.083	0.48	10.167	22.06	16.250	1.92	22.33	0.48
4.167	0.48	10.250	22.06	16.333	0.96	22.42	0.48
4.250	0.48	10.333	6.23	16.417	0.96	22.50	0.48
4.333	2.88	10.417	6.23	16.500	0.96	22.58	0.48
4.417	2.88	10.500	6.23	16.583	0.96	22.67	0.48
4.500	2.88	10.583	6.23	16.667	0.96	22.75	0.48
4.583	2.88	10.667	6.23	16.750	0.96	22.83	0.48
4.667	2.88	10.750	6.23	16.833	0.96	22.92	0.48
4.750	2.88	10.833	6.23	16.917	0.96	23.00	0.48
4.833	2.88	10.917	6.23	17.000	0.96	23.08	0.48
4.917	2.88	11.000	6.23	17.083	0.96	23.17	0.48
5.000	2.88	11.083	6.23	17.167	0.96	23.25	0.48
5.083	2.88	11.167	6.23	17.250	0.96	23.33	0.48
5.167	2.88	11.250	6.23	17.333	0.96	23.42	0.48
5.250	2.88	11.333	6.23	17.417	0.96	23.50	0.48
5.333	2.88	11.417	6.23	17.500	0.96	23.58	0.48
5.417	2.88	11.500	6.23	17.583	0.96	23.67	0.48
5.500	2.88	11.583	6.23	17.667	0.96	23.75	0.48
5.583	2.88	11.667	6.23	17.750	0.96	23.83	0.48
5.667	2.88	11.750	6.23	17.833	0.96	23.92	0.48
5.750	2.88	11.833	6.23	17.917	0.96	24.00	0.48
5.833	2.88	11.917	6.23	18.000	0.96	24.08	0.48
5.917	2.88	12.000	6.23	18.083	0.96	24.17	0.48
6.000	2.88	12.083	6.23	18.167	0.96	24.25	0.48
6.083	2.88	12.167	6.23	18.250	0.96		

Unit Hyd Qpeak (cms)= 0.051

PEAK FLOW (cms)= 0.011 (i)
TIME TO PEAK (hrs)= 10.250
RUNOFF VOLUME (mm)= 33.330
TOTAL RAINFALL (mm)= 95.920
RUNOFF COEFFICIENT = 0.347

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

ADD HYD (0003)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
	ID1= 1 (0301):	1.38	0.037	10.25	33.33
	+ ID2= 2 (0302):	0.69	0.018	10.25	33.34
	ID = 3 (0003):	2.07	0.056	10.25	33.33

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0003)		AREA	QPEAK	TPEAK	R.V.
3 + 2 = 1		(ha)	(cms)	(hrs)	(mm)
	ID1= 3 (0003):	2.07	0.056	10.25	33.33
	+ ID2= 2 (0303):	0.41	0.011	10.25	33.33
	ID = 1 (0003):	2.48	0.067	10.25	33.33

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB NASHYD (11791) ID= 1 DT= 5.0 min			
Area (ha)= 92.12	Curve Number (CN)= 54.6		
Ia (mm)= 4.60	# of Linear Res.(N)= 3.00		
U.H. Tp(hrs)= 4.68			

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	6.167	2.88	12.250	6.23	18.33	0.48
0.167	0.00	6.250	2.88	12.333	3.36	18.42	0.48
0.250	0.00	6.333	8.15	12.417	3.36	18.50	0.48
0.333	0.48	6.417	8.15	12.500	3.36	18.58	0.48
0.417	0.48	6.500	8.15	12.583	3.36	18.67	0.48
0.500	0.48	6.583	8.15	12.667	3.36	18.75	0.48
0.583	0.48	6.667	8.15	12.750	3.36	18.83	0.48
0.667	0.48	6.750	8.15	12.833	3.36	18.92	0.48
0.750	0.48	6.833	8.15	12.917	3.36	19.00	0.48
0.833	0.48	6.917	8.15	13.000	3.36	19.08	0.48
0.917	0.48	7.000	8.15	13.083	3.36	19.17	0.48
1.000	0.48	7.083	8.15	13.167	3.36	19.25	0.48
1.083	0.48	7.167	8.15	13.250	3.36	19.33	0.48
1.167	0.48	7.250	8.15	13.333	3.36	19.42	0.48
1.250	0.48	7.333	8.15	13.417	3.36	19.50	0.48
1.333	0.48	7.417	8.15	13.500	3.36	19.58	0.48
1.417	0.48	7.500	8.15	13.583	3.36	19.67	0.48
1.500	0.48	7.583	8.15	13.667	3.36	19.75	0.48
1.583	0.48	7.667	8.15	13.750	3.36	19.83	0.48
1.667	0.48	7.750	8.15	13.833	3.36	19.92	0.48
1.750	0.48	7.833	8.15	13.917	3.36	20.00	0.48
1.833	0.48	7.917	8.15	14.000	3.36	20.08	0.48
1.917	0.48	8.000	8.15	14.083	3.36	20.17	0.48
2.000	0.48	8.083	8.15	14.167	3.36	20.25	0.48
2.083	0.48	8.167	8.15	14.250	3.36	20.33	0.48
2.167	0.48	8.250	8.15	14.333	1.92	20.42	0.48
2.250	0.48	8.333	22.06	14.417	1.92	20.50	0.48
2.333	0.48	8.417	22.06	14.500	1.92	20.58	0.48
2.417	0.48	8.500	22.06	14.583	1.92	20.67	0.48
2.500	0.48	8.583	22.06	14.667	1.92	20.75	0.48
2.583	0.48	8.667	22.06	14.750	1.92	20.83	0.48
2.667	0.48	8.750	22.06	14.833	1.92	20.92	0.48
2.750	0.48	8.833	22.06	14.917	1.92	21.00	0.48
2.833	0.48	8.917	22.06	15.000	1.92	21.08	0.48
2.917	0.48	9.000	22.06	15.083	1.92	21.17	0.48
3.000	0.48	9.083	22.06	15.167	1.92	21.25	0.48
3.083	0.48	9.167	22.06	15.250	1.92	21.33	0.48
3.167	0.48	9.250	22.06	15.333	1.92	21.42	0.48
3.250	0.48	9.333	22.06	15.417	1.92	21.50	0.48
3.333	0.48	9.417	22.06	15.500	1.92	21.58	0.48
3.417	0.48	9.500	22.06	15.583	1.92	21.67	0.48
3.500	0.48	9.583	22.06	15.667	1.92	21.75	0.48
3.583	0.48	9.667	22.06	15.750	1.92	21.83	0.48
3.667	0.48	9.750	22.06	15.833	1.92	21.92	0.48

3.750	0.48	9.833	22.06	15.917	1.92	22.00	0.48
3.833	0.48	9.917	22.06	16.000	1.92	22.08	0.48
3.917	0.48	10.000	22.06	16.083	1.92	22.17	0.48
4.000	0.48	10.083	22.06	16.167	1.92	22.25	0.48
4.083	0.48	10.167	22.06	16.250	1.92	22.33	0.48
4.167	0.48	10.250	22.06	16.333	0.96	22.42	0.48
4.250	0.48	10.333	6.23	16.417	0.96	22.50	0.48
4.333	2.88	10.417	6.23	16.500	0.96	22.58	0.48
4.417	2.88	10.500	6.23	16.583	0.96	22.67	0.48
4.500	2.88	10.583	6.23	16.667	0.96	22.75	0.48
4.583	2.88	10.667	6.23	16.750	0.96	22.83	0.48
4.667	2.88	10.750	6.23	16.833	0.96	22.92	0.48
4.750	2.88	10.833	6.23	16.917	0.96	23.00	0.48
4.833	2.88	10.917	6.23	17.000	0.96	23.08	0.48
4.917	2.88	11.000	6.23	17.083	0.96	23.17	0.48
5.000	2.88	11.083	6.23	17.167	0.96	23.25	0.48
5.083	2.88	11.167	6.23	17.250	0.96	23.33	0.48
5.167	2.88	11.250	6.23	17.333	0.96	23.42	0.48
5.250	2.88	11.333	6.23	17.417	0.96	23.50	0.48
5.333	2.88	11.417	6.23	17.500	0.96	23.58	0.48
5.417	2.88	11.500	6.23	17.583	0.96	23.67	0.48
5.500	2.88	11.583	6.23	17.667	0.96	23.75	0.48
5.583	2.88	11.667	6.23	17.750	0.96	23.83	0.48
5.667	2.88	11.750	6.23	17.833	0.96	23.92	0.48
5.750	2.88	11.833	6.23	17.917	0.96	24.00	0.48
5.833	2.88	11.917	6.23	18.000	0.96	24.08	0.48
5.917	2.88	12.000	6.23	18.083	0.96	24.17	0.48
6.000	2.88	12.083	6.23	18.167	0.96	24.25	0.48
6.083	2.88	12.167	6.23	18.250	0.96		

Unit Hyd Qpeak (cms)= 0.752

PEAK FLOW (cms)= 0.608 (i)
TIME TO PEAK (hrs)= 15.583
RUNOFF VOLUME (mm)= 27.566
TOTAL RAINFALL (mm)= 95.920
RUNOFF COEFFICIENT = 0.287

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

ADD HYD (1179)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (11791):	92.12	0.608	15.58	27.57
+ ID2= 2 (0003):	2.48	0.067	10.25	33.33
ID = 3 (1179):	94.60	0.616	15.58	27.72

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (3101)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (1179):	94.60	0.616	15.58	27.72
+ ID2= 2 (3102):	701.88	5.425	17.17	45.93
ID = 3 (3101):	796.48	6.011	16.92	43.77

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

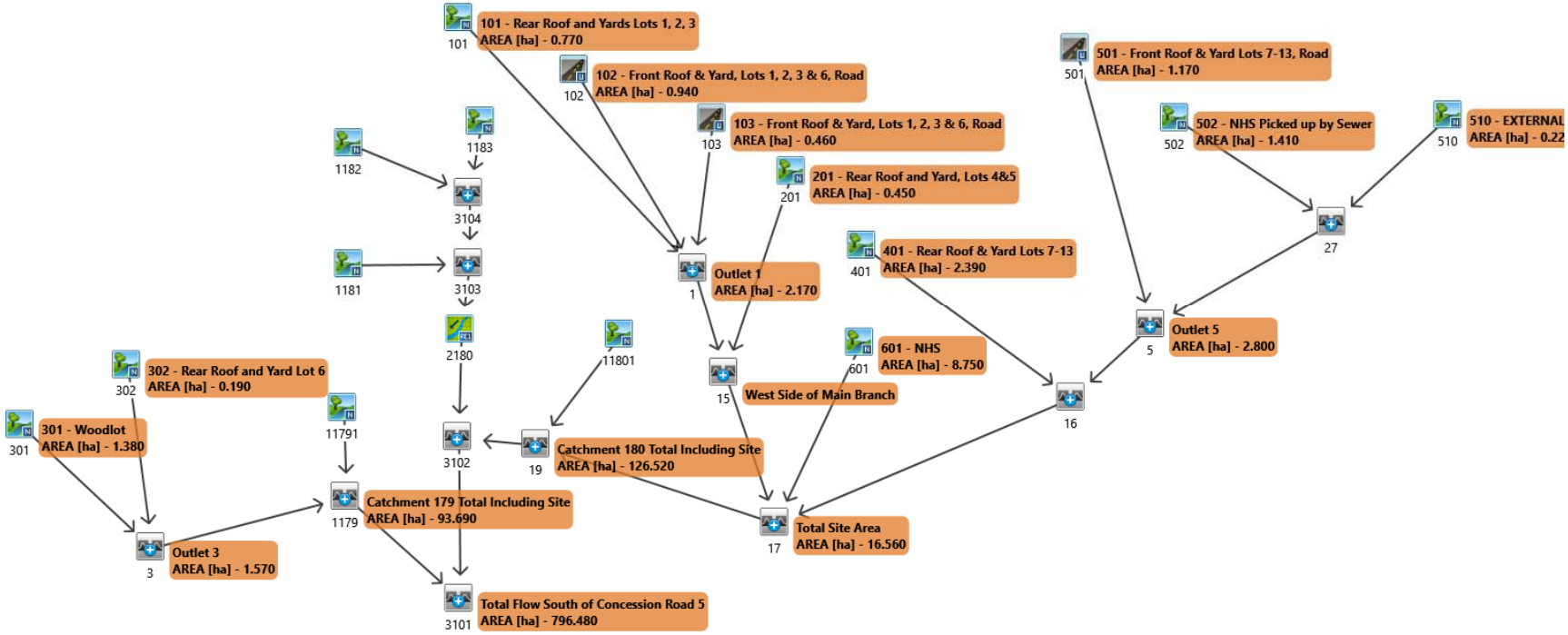
FINISH

==========

Appendix C2

Post Development Uncontrolled Conditions

Visual Otthymo Model Schematic – Post-Development Uncontrolled Conditions



Project Name:	Frisque Lands	**Prepared By:** AK
Project No.:	E21007	**Checked By:** RB
Subject:	Post-Development Visual Otthymo Model Parameters (Uncontrolled and Controlled)	

Rural - Nashyd Commands

NHYD	Name	Outlet	Area	Cn	Ia	N	Tp
1181	NasHyd - 1181	3103	118.7	74.6	4.4	3	4.55
1183	NasHyd - 1183	3104	176.21	76.1	3.9	3	5.98
1182	NasHyd - 1182	3104	281.36	76.1	4.3	3	9.88
11801	Catchment 180 less Site Area	19	109.96	61.4	4.4	3	3.8
101	101 - Rear Roof and Yards Lots 1, 2, 3	1	0.77	61.4	4.4	3	0.17
301	301 - Woodlot	3	1.38	61.4	4.4	3	0.31
201	201 - Rear Roof and Yard, Lots 4&5	15	0.45	61.4	4.4	3	0.17
11791	Catchment 1179 less Site Area	1179	92.12	54.6	4.6	3	4.68
601	601 - NHS	17	8.75	61.4	4.4	3	1.44
401	401 - Rear Roof & Yard Lots 7-13	16	2.39	61.4	4.4	3	0.29
502	502 - NHS Picked up by Sewer	27	1.41	61.4	4.4	3	0.45
510	510 - EXTERNAL	27	0.22	61.4	4.4	3	0.13
302	302 - Rear Roof and Yard Lot 6	3	0.19	61.4	4.4	3	0.17

Urban - Standhyd Commands

NHYD	Name	Area	Timp	Ximp	Slpp	Lgp	Mnp	Scp	Dpsi	Slpi	Lgi	Mni
102	102 - Front Roof & Yard, Lots 1, 2, 3 & 6, Road	0.94	0.35	0.28	2	40	0.25	0	1	1	79.16	0.013
103	103 - Front Roof & Yard, Lots 1, 2, 3 & 6, Road	0.46	0.41	0.33	2	40	0.25	0	1	1	55.38	0.013
501	501 - Front Roof & Yard Lots 7-13, Road	1.17	0.43	0.34	2	40	0.25	0	1	1	88.32	0.013

Project Name	E21007	Prepared By: JR
Project No.	Frisque Lands	Checked By: AK
Subject	Drainage Areas	

Area ID[1]	Description	Drainage Area (ha)	Total Percent Impervious[2] (%)	Runoff Coefficient[2]	A x R
101	Pervious Area	0.73	0%	0.20	0.15
	Impervious Area	0.04	100%	0.90	0.04
	Total	**0.77**	**5%**	**0.24**	**0.18**
102	Pervious Area	0.61	0%	0.20	0.12
	Impervious Area	0.33	100%	0.90	0.30
	Total	**0.94**	**35%**	**0.45**	**0.42**
103	Pervious Area	0.27	0%	0.20	0.05
	Impervious Area	0.19	100%	0.90	0.17
	Total	**0.46**	**41%**	**0.49**	**0.23**
201	Pervious Area	0.38	0%	0.20	0.08
	Impervious Area	0.07	100%	0.90	0.06
	Total	**0.45**	**16%**	**0.31**	**0.14**
301	Pervious Area	1.38	0%	0.20	0.28
	Impervious Area	0.00	100%	0.90	0.00
	Total	**1.38**	**0%**	**0.20**	**0.28**
302	Pervious Area	0.16	0%	0.20	0.03
	Impervious Area	0.03	100%	0.90	0.03
	Total	**0.19**	**16%**	**0.31**	**0.06**
401	Pervious Area	2.18	0%	0.20	0.44
	Impervious Area	0.21	100%	0.90	0.19
	Total	**2.39**	**9%**	**0.26**	**0.63**
501	Pervious Area	0.67	0%	0.20	0.13
	Impervious Area	0.50	100%	0.90	0.45
	Total	**1.17**	**43%**	**0.50**	**0.58**
502	Pervious Area	1.41	0%	0.20	0.28
	Impervious Area	0.00	100%	0.90	0.00
	Total	**1.41**	**0%**	**0.20**	**0.28**
601	Pervious Area	8.75	0%	0.20	1.75
	Impervious Area	0.00	100%	0.90	0.00
	Total	**8.75**	**0%**	**0.20**	**1.75**
Total Site Area (Not Including External)		**17.91**	**8%**	**0.25**	**4.54**
510 (EXT)	Pervious Area	0.22	0%	0.20	0.04
	Impervious Area	0.00	100%	0.90	0.00
	Total	**0.22**	**0%**	**0.20**	**0.04**
Total Site Area (Including External)		**18.13**	**8%**	**0.25**	**4.59**

Project Name:	Frisque Lands	Prepared By:	AK
Project No.:	E21007	Reviewed By:	RB
Subject:	Time to Peak Calculations Post-Development		

Airport Equation [1] **Time of Concentration (min) =** $\frac{3.26*(1.1-C)*L^{0.5}}{S_w^{0.33}}$

Runoff Coefficient 0.20

Drainage Area ID	Area (ha)	Length (m)	Slope (%)	Time of Concentration (min)	Time of Concentration (hrs)	Time to Peak (hr)
101	**1.09**	**40**	**2.0%**	**15.00**	**0.25**	**0.17**
201	**0.45**	**50**	**2.0%**	**15.00**	**0.25**	**0.17**
301	*1.38*	*110*	*1.4%*	*27.78*	*0.46*	*0.31*
302	**0.20**	**40**	**2.0%**	**15.00**	**0.25**	**0.17**
401	3.64	150	2.7%	26.00	0.43	0.29
502	**1.33**	**250**	**3.0%**	**32.28**	**0.54**	**0.36**
510 (EXT)	*0.22*	*25*	*2.0%*	*11.67*	*0.19*	*0.13*
601	*8.75*	*450*	*2.8%*	*44.43*	*0.74*	*0.50*

```
       V    V   I    SSSSS  U   U    A    L              (v 6.2.2011)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

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


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

Input filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
Output filename: C:\Users\akeeping\AppData\Local\Civica\VH5\3bf9ac1f-e66b-45e5-875b-87a83afa1a0b\dc845c16-8
Summary filename: C:\Users\akeeping\AppData\Local\Civica\VH5\3bf9ac1f-e66b-45e5-875b-87a83afa1a0b\dc845c16-8

DATE: 07-10-2023 TIME: 10:27:20

USER:

COMMENTS: _____

****
** SIMULATION : 100yr24_AES **
****

READ STORM	Filename: C:\Users\akeeping\AppD ata\Local\Temp\ 5b1c6c82-3246-4cdd-b192-e597c3a96126\0130180c
Ptotal= 95.92 mm	Comments: 100y24_AES

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	0.00	6.25	8.15	12.50	3.36	18.75	0.48
0.25	0.48	6.50	8.15	12.75	3.36	19.00	0.48
0.50	0.48	6.75	8.15	13.00	3.36	19.25	0.48
0.75	0.48	7.00	8.15	13.25	3.36	19.50	0.48
1.00	0.48	7.25	8.15	13.50	3.36	19.75	0.48
1.25	0.48	7.50	8.15	13.75	3.36	20.00	0.48
1.50	0.48	7.75	8.15	14.00	3.36	20.25	0.48
1.75	0.48	8.00	8.15	14.25	1.92	20.50	0.48
2.00	0.48	8.25	22.06	14.50	1.92	20.75	0.48
2.25	0.48	8.50	22.06	14.75	1.92	21.00	0.48
2.50	0.48	8.75	22.06	15.00	1.92	21.25	0.48
2.75	0.48	9.00	22.06	15.25	1.92	21.50	0.48
3.00	0.48	9.25	22.06	15.50	1.92	21.75	0.48
3.25	0.48	9.50	22.06	15.75	1.92	22.00	0.48
3.50	0.48	9.75	22.06	16.00	1.92	22.25	0.48
3.75	0.48	10.00	22.06	16.25	0.96	22.50	0.48
4.00	0.48	10.25	6.23	16.50	0.96	22.75	0.48
4.25	2.88	10.50	6.23	16.75	0.96	23.00	0.48
4.50	2.88	10.75	6.23	17.00	0.96	23.25	0.48
4.75	2.88	11.00	6.23	17.25	0.96	23.50	0.48
5.00	2.88	11.25	6.23	17.50	0.96	23.75	0.48
5.25	2.88	11.50	6.23	17.75	0.96	24.00	0.48
5.50	2.88	11.75	6.23	18.00	0.96		
5.75	2.88	12.00	6.23	18.25	0.48		
6.00	2.88	12.25	3.36	18.50	0.48		

CALIB NASHYD (1181) ID= 1 DT= 5.0 min	Area (ha)= 118.70 Curve Number (CN)= 74.6 Ia (mm)= 4.40 # of Linear Res.(N)= 3.00 U.H. Tp(hrs)= 4.55

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	6.167	2.88	12.250	6.23	18.33	0.48
0.167	0.00	6.250	2.88	12.333	3.36	18.42	0.48
0.250	0.00	6.333	8.15	12.417	3.36	18.50	0.48
0.333	0.48	6.417	8.15	12.500	3.36	18.58	0.48
0.417	0.48	6.500	8.15	12.583	3.36	18.67	0.48
0.500	0.48	6.583	8.15	12.667	3.36	18.75	0.48
0.583	0.48	6.667	8.15	12.750	3.36	18.83	0.48
0.667	0.48	6.750	8.15	12.833	3.36	18.92	0.48
0.750	0.48	6.833	8.15	12.917	3.36	19.00	0.48
0.833	0.48	6.917	8.15	13.000	3.36	19.08	0.48
0.917	0.48	7.000	8.15	13.083	3.36	19.17	0.48
1.000	0.48	7.083	8.15	13.167	3.36	19.25	0.48
1.083	0.48	7.167	8.15	13.250	3.36	19.33	0.48
1.167	0.48	7.250	8.15	13.333	3.36	19.42	0.48
1.250	0.48	7.333	8.15	13.417	3.36	19.50	0.48
1.333	0.48	7.417	8.15	13.500	3.36	19.58	0.48
1.417	0.48	7.500	8.15	13.583	3.36	19.67	0.48
1.500	0.48	7.583	8.15	13.667	3.36	19.75	0.48
1.583	0.48	7.667	8.15	13.750	3.36	19.83	0.48
1.667	0.48	7.750	8.15	13.833	3.36	19.92	0.48
1.750	0.48	7.833	8.15	13.917	3.36	20.00	0.48
1.833	0.48	7.917	8.15	14.000	3.36	20.08	0.48
1.917	0.48	8.000	8.15	14.083	3.36	20.17	0.48
2.000	0.48	8.083	8.15	14.167	3.36	20.25	0.48
2.083	0.48	8.167	8.15	14.250	3.36	20.33	0.48
2.167	0.48	8.250	8.15	14.333	1.92	20.42	0.48
2.250	0.48	8.333	22.06	14.417	1.92	20.50	0.48
2.333	0.48	8.417	22.06	14.500	1.92	20.58	0.48
2.417	0.48	8.500	22.06	14.583	1.92	20.67	0.48
2.500	0.48	8.583	22.06	14.667	1.92	20.75	0.48
2.583	0.48	8.667	22.06	14.750	1.92	20.83	0.48
2.667	0.48	8.750	22.06	14.833	1.92	20.92	0.48
2.750	0.48	8.833	22.06	14.917	1.92	21.00	0.48
2.833	0.48	8.917	22.06	15.000	1.92	21.08	0.48
2.917	0.48	9.000	22.06	15.083	1.92	21.17	0.48
3.000	0.48	9.083	22.06	15.167	1.92	21.25	0.48
3.083	0.48	9.167	22.06	15.250	1.92	21.33	0.48
3.167	0.48	9.250	22.06	15.333	1.92	21.42	0.48
3.250	0.48	9.333	22.06	15.417	1.92	21.50	0.48
3.333	0.48	9.417	22.06	15.500	1.92	21.58	0.48
3.417	0.48	9.500	22.06	15.583	1.92	21.67	0.48
3.500	0.48	9.583	22.06	15.667	1.92	21.75	0.48
3.583	0.48	9.667	22.06	15.750	1.92	21.83	0.48
3.667	0.48	9.750	22.06	15.833	1.92	21.92	0.48
3.750	0.48	9.833	22.06	15.917	1.92	22.00	0.48
3.833	0.48	9.917	22.06	16.000	1.92	22.08	0.48
3.917	0.48	10.000	22.06	16.083	1.92	22.17	0.48
4.000	0.48	10.083	22.06	16.167	1.92	22.25	0.48
4.083	0.48	10.167	22.06	16.250	1.92	22.33	0.48
4.167	0.48	10.250	22.06	16.333	0.96	22.42	0.48
4.250	0.48	10.333	6.23	16.417	0.96	22.50	0.48
4.333	2.88	10.417	6.23	16.500	0.96	22.58	0.48
4.417	2.88	10.500	6.23	16.583	0.96	22.67	0.48
4.500	2.88	10.583	6.23	16.667	0.96	22.75	0.48
4.583	2.88	10.667	6.23	16.750	0.96	22.83	0.48
4.667	2.88	10.750	6.23	16.833	0.96	22.92	0.48
4.750	2.88	10.833	6.23	16.917	0.96	23.00	0.48
4.833	2.88	10.917	6.23	17.000	0.96	23.08	0.48
4.917	2.88	11.000	6.23	17.083	0.96	23.17	0.48
5.000	2.88	11.083	6.23	17.167	0.96	23.25	0.48
5.083	2.88	11.167	6.23	17.250	0.96	23.33	0.48
5.167	2.88	11.250	6.23	17.333	0.96	23.42	0.48
5.250	2.88	11.333	6.23	17.417	0.96	23.50	0.48
5.333	2.88	11.417	6.23	17.500	0.96	23.58	0.48
5.417	2.88	11.500	6.23	17.583	0.96	23.67	0.48
5.500	2.88	11.583	6.23	17.667	0.96	23.75	0.48
5.583	2.88	11.667	6.23	17.750	0.96	23.83	0.48
5.667	2.88	11.750	6.23	17.833	0.96	23.92	0.48
5.750	2.88	11.833	6.23	17.917	0.96	24.00	0.48
5.833	2.88	11.917	6.23	18.000	0.96	24.08	0.48
5.917	2.88	12.000	6.23	18.083	0.96	24.17	0.48
6.000	2.88	12.083	6.23	18.167	0.96	24.25	0.48
6.083	2.88	12.167	6.23	18.250	0.96		

Unit Hyd Qpeak (cms)= 0.996

PEAK FLOW (cms)= 1.388 (i)
TIME TO PEAK (hrs)= 15.167
RUNOFF VOLUME (mm)= 47.055
TOTAL RAINFALL (mm)= 95.920

RUNOFF COEFFICIENT = 0.491

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

CALIB	
NASHYD (1183)	Area (ha)= 176.21 Curve Number (CN)= 76.1
ID= 1 DT= 5.0 min	Ia (mm)= 3.90 # of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 5.98

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	6.167	2.88	12.250	6.23	18.33	0.48
0.167	0.00	6.250	2.88	12.333	3.36	18.42	0.48
0.250	0.00	6.333	8.15	12.417	3.36	18.50	0.48
0.333	0.48	6.417	8.15	12.500	3.36	18.58	0.48
0.417	0.48	6.500	8.15	12.583	3.36	18.67	0.48
0.500	0.48	6.583	8.15	12.667	3.36	18.75	0.48
0.583	0.48	6.667	8.15	12.750	3.36	18.83	0.48
0.667	0.48	6.750	8.15	12.833	3.36	18.92	0.48
0.750	0.48	6.833	8.15	12.917	3.36	19.00	0.48
0.833	0.48	6.917	8.15	13.000	3.36	19.08	0.48
0.917	0.48	7.000	8.15	13.083	3.36	19.17	0.48
1.000	0.48	7.083	8.15	13.167	3.36	19.25	0.48
1.083	0.48	7.167	8.15	13.250	3.36	19.33	0.48
1.167	0.48	7.250	8.15	13.333	3.36	19.42	0.48
1.250	0.48	7.333	8.15	13.417	3.36	19.50	0.48
1.333	0.48	7.417	8.15	13.500	3.36	19.58	0.48
1.417	0.48	7.500	8.15	13.583	3.36	19.67	0.48
1.500	0.48	7.583	8.15	13.667	3.36	19.75	0.48
1.583	0.48	7.667	8.15	13.750	3.36	19.83	0.48
1.667	0.48	7.750	8.15	13.833	3.36	19.92	0.48
1.750	0.48	7.833	8.15	13.917	3.36	20.00	0.48
1.833	0.48	7.917	8.15	14.000	3.36	20.08	0.48
1.917	0.48	8.000	8.15	14.083	3.36	20.17	0.48
2.000	0.48	8.083	8.15	14.167	3.36	20.25	0.48
2.083	0.48	8.167	8.15	14.250	3.36	20.33	0.48
2.167	0.48	8.250	8.15	14.333	1.92	20.42	0.48
2.250	0.48	8.333	22.06	14.417	1.92	20.50	0.48
2.333	0.48	8.417	22.06	14.500	1.92	20.58	0.48
2.417	0.48	8.500	22.06	14.583	1.92	20.67	0.48
2.500	0.48	8.583	22.06	14.667	1.92	20.75	0.48
2.583	0.48	8.667	22.06	14.750	1.92	20.83	0.48
2.667	0.48	8.750	22.06	14.833	1.92	20.92	0.48
2.750	0.48	8.833	22.06	14.917	1.92	21.00	0.48
2.833	0.48	8.917	22.06	15.000	1.92	21.08	0.48
2.917	0.48	9.000	22.06	15.083	1.92	21.17	0.48
3.000	0.48	9.083	22.06	15.167	1.92	21.25	0.48
3.083	0.48	9.167	22.06	15.250	1.92	21.33	0.48
3.167	0.48	9.250	22.06	15.333	1.92	21.42	0.48
3.250	0.48	9.333	22.06	15.417	1.92	21.50	0.48
3.333	0.48	9.417	22.06	15.500	1.92	21.58	0.48
3.417	0.48	9.500	22.06	15.583	1.92	21.67	0.48
3.500	0.48	9.583	22.06	15.667	1.92	21.75	0.48
3.583	0.48	9.667	22.06	15.750	1.92	21.83	0.48
3.667	0.48	9.750	22.06	15.833	1.92	21.92	0.48
3.750	0.48	9.833	22.06	15.917	1.92	22.00	0.48
3.833	0.48	9.917	22.06	16.000	1.92	22.08	0.48
3.917	0.48	10.000	22.06	16.083	1.92	22.17	0.48
4.000	0.48	10.083	22.06	16.167	1.92	22.25	0.48
4.083	0.48	10.167	22.06	16.250	1.92	22.33	0.48
4.167	0.48	10.250	22.06	16.333	0.96	22.42	0.48
4.250	0.48	10.333	6.23	16.417	0.96	22.50	0.48
4.333	2.88	10.417	6.23	16.500	0.96	22.58	0.48
4.417	2.88	10.500	6.23	16.583	0.96	22.67	0.48
4.500	2.88	10.583	6.23	16.667	0.96	22.75	0.48
4.583	2.88	10.667	6.23	16.750	0.96	22.83	0.48
4.667	2.88	10.750	6.23	16.833	0.96	22.92	0.48
4.750	2.88	10.833	6.23	16.917	0.96	23.00	0.48
4.833	2.88	10.917	6.23	17.000	0.96	23.08	0.48
4.917	2.88	11.000	6.23	17.083	0.96	23.17	0.48
5.000	2.88	11.083	6.23	17.167	0.96	23.25	0.48
5.083	2.88	11.167	6.23	17.250	0.96	23.33	0.48
5.167	2.88	11.250	6.23	17.333	0.96	23.42	0.48
5.250	2.88	11.333	6.23	17.417	0.96	23.50	0.48
5.333	2.88	11.417	6.23	17.500	0.96	23.58	0.48
5.417	2.88	11.500	6.23	17.583	0.96	23.67	0.48
5.500	2.88	11.583	6.23	17.667	0.96	23.75	0.48
5.583	2.88	11.667	6.23	17.750	0.96	23.83	0.48

5.667	2.88	11.750	6.23	17.833	0.96	23.92	0.48
5.750	2.88	11.833	6.23	17.917	0.96	24.00	0.48
5.833	2.88	11.917	6.23	18.000	0.96	24.08	0.48
5.917	2.88	12.000	6.23	18.083	0.96	24.17	0.48
6.000	2.88	12.083	6.23	18.167	0.96	24.25	0.48
6.083	2.88	12.167	6.23	18.250	0.96		

Unit Hyd Qpeak (cms)= 1.125

PEAK FLOW (cms)= 1.773 (i)
TIME TO PEAK (hrs)= 16.833
RUNOFF VOLUME (mm)= 49.290
TOTAL RAINFALL (mm)= 95.920
RUNOFF COEFFICIENT = 0.514

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

CALIB			
NASHYD (1182)	Area (ha)= 281.36	Curve Number (CN)= 76.1	
ID= 1 DT= 5.0 min	Ia (mm)= 4.30	# of Linear Res.(N)= 3.00	
	U.H. Tp(hrs)= 9.88		

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	6.167	2.88	12.250	6.23	18.33	0.48
0.167	0.00	6.250	2.88	12.333	3.36	18.42	0.48
0.250	0.00	6.333	8.15	12.417	3.36	18.50	0.48
0.333	0.48	6.417	8.15	12.500	3.36	18.58	0.48
0.417	0.48	6.500	8.15	12.583	3.36	18.67	0.48
0.500	0.48	6.583	8.15	12.667	3.36	18.75	0.48
0.583	0.48	6.667	8.15	12.750	3.36	18.83	0.48
0.667	0.48	6.750	8.15	12.833	3.36	18.92	0.48
0.750	0.48	6.833	8.15	12.917	3.36	19.00	0.48
0.833	0.48	6.917	8.15	13.000	3.36	19.08	0.48
0.917	0.48	7.000	8.15	13.083	3.36	19.17	0.48
1.000	0.48	7.083	8.15	13.167	3.36	19.25	0.48
1.083	0.48	7.167	8.15	13.250	3.36	19.33	0.48
1.167	0.48	7.250	8.15	13.333	3.36	19.42	0.48
1.250	0.48	7.333	8.15	13.417	3.36	19.50	0.48
1.333	0.48	7.417	8.15	13.500	3.36	19.58	0.48
1.417	0.48	7.500	8.15	13.583	3.36	19.67	0.48
1.500	0.48	7.583	8.15	13.667	3.36	19.75	0.48
1.583	0.48	7.667	8.15	13.750	3.36	19.83	0.48
1.667	0.48	7.750	8.15	13.833	3.36	19.92	0.48
1.750	0.48	7.833	8.15	13.917	3.36	20.00	0.48
1.833	0.48	7.917	8.15	14.000	3.36	20.08	0.48
1.917	0.48	8.000	8.15	14.083	3.36	20.17	0.48
2.000	0.48	8.083	8.15	14.167	3.36	20.25	0.48
2.083	0.48	8.167	8.15	14.250	3.36	20.33	0.48
2.167	0.48	8.250	8.15	14.333	1.92	20.42	0.48
2.250	0.48	8.333	22.06	14.417	1.92	20.50	0.48
2.333	0.48	8.417	22.06	14.500	1.92	20.58	0.48
2.417	0.48	8.500	22.06	14.583	1.92	20.67	0.48
2.500	0.48	8.583	22.06	14.667	1.92	20.75	0.48
2.583	0.48	8.667	22.06	14.750	1.92	20.83	0.48
2.667	0.48	8.750	22.06	14.833	1.92	20.92	0.48
2.750	0.48	8.833	22.06	14.917	1.92	21.00	0.48
2.833	0.48	8.917	22.06	15.000	1.92	21.08	0.48
2.917	0.48	9.000	22.06	15.083	1.92	21.17	0.48
3.000	0.48	9.083	22.06	15.167	1.92	21.25	0.48
3.083	0.48	9.167	22.06	15.250	1.92	21.33	0.48
3.167	0.48	9.250	22.06	15.333	1.92	21.42	0.48
3.250	0.48	9.333	22.06	15.417	1.92	21.50	0.48
3.333	0.48	9.417	22.06	15.500	1.92	21.58	0.48
3.417	0.48	9.500	22.06	15.583	1.92	21.67	0.48
3.500	0.48	9.583	22.06	15.667	1.92	21.75	0.48
3.583	0.48	9.667	22.06	15.750	1.92	21.83	0.48
3.667	0.48	9.750	22.06	15.833	1.92	21.92	0.48
3.750	0.48	9.833	22.06	15.917	1.92	22.00	0.48
3.833	0.48	9.917	22.06	16.000	1.92	22.08	0.48
3.917	0.48	10.000	22.06	16.083	1.92	22.17	0.48
4.000	0.48	10.083	22.06	16.167	1.92	22.25	0.48
4.083	0.48	10.167	22.06	16.250	1.92	22.33	0.48
4.167	0.48	10.250	22.06	16.333	0.96	22.42	0.48
4.250	0.48	10.333	6.23	16.417	0.96	22.50	0.48
4.333	2.88	10.417	6.23	16.500	0.96	22.58	0.48
4.417	2.88	10.500	6.23	16.583	0.96	22.67	0.48
4.500	2.88	10.583	6.23	16.667	0.96	22.75	0.48

4.583	2.88	10.667	6.23	16.750	0.96	22.83	0.48
4.667	2.88	10.750	6.23	16.833	0.96	22.92	0.48
4.750	2.88	10.833	6.23	16.917	0.96	23.00	0.48
4.833	2.88	10.917	6.23	17.000	0.96	23.08	0.48
4.917	2.88	11.000	6.23	17.083	0.96	23.17	0.48
5.000	2.88	11.083	6.23	17.167	0.96	23.25	0.48
5.083	2.88	11.167	6.23	17.250	0.96	23.33	0.48
5.167	2.88	11.250	6.23	17.333	0.96	23.42	0.48
5.250	2.88	11.333	6.23	17.417	0.96	23.50	0.48
5.333	2.88	11.417	6.23	17.500	0.96	23.58	0.48
5.417	2.88	11.500	6.23	17.583	0.96	23.67	0.48
5.500	2.88	11.583	6.23	17.667	0.96	23.75	0.48
5.583	2.88	11.667	6.23	17.750	0.96	23.83	0.48
5.667	2.88	11.750	6.23	17.833	0.96	23.92	0.48
5.750	2.88	11.833	6.23	17.917	0.96	24.00	0.48
5.833	2.88	11.917	6.23	18.000	0.96	24.08	0.48
5.917	2.88	12.000	6.23	18.083	0.96	24.17	0.48
6.000	2.88	12.083	6.23	18.167	0.96	24.25	0.48
6.083	2.88	12.167	6.23	18.250	0.96		

Unit Hyd Qpeak (cms)= 1.088

PEAK FLOW (cms)= 1.883 (i)
TIME TO PEAK (hrs)= 21.083
RUNOFF VOLUME (mm)= 48.974
TOTAL RAINFALL (mm)= 95.920
RUNOFF COEFFICIENT = 0.511

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

ADD HYD (3104)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (1182):		281.36	1.883	21.08	48.97
+ ID2= 2 (1183):		176.21	1.773	16.83	49.29
ID = 3 (3104):		457.57	3.461	18.58	49.10

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (3103)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (1181):		118.70	1.388	15.17	47.05
+ ID2= 2 (3104):		457.57	3.461	18.58	49.10
ID = 3 (3103):		576.27	4.642	17.33	48.68

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ROUTE CHN(2180)		
IN= 2---> OUT= 1	Routing time step (min)'=	5.00

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

Distance	Elevation	Manning	
0.00	138.00	0.0500	
55.00	131.00	0.0500	
95.00	130.00	0.0500	
150.00	129.00	0.0300	Main Channel
160.00	130.00	0.0300 /0.0500	Main Channel
175.00	133.00	0.0500	
350.00	140.00	0.0500	

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

DEPTH (m)	ELEV (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME (min)
0.47	129.47	.138E+05	6.2	0.84	37.35
0.95	129.95	.551E+05	39.1	1.34	23.53
1.42	130.42	.121E+06	119.1	1.87	16.89
1.89	130.89	.205E+06	248.2	2.28	13.79
2.37	131.37	.305E+06	448.4	2.78	11.34
2.84	131.84	.410E+06	706.0	3.25	9.69
3.32	132.32	.521E+06	1013.8	3.67	8.57
3.79	132.79	.638E+06	1370.8	4.06	7.75
4.26	133.26	.761E+06	1767.1	4.39	7.18
4.74	133.74	.897E+06	2217.5	4.67	6.74
5.21	134.21	.105E+07	2730.9	4.93	6.39
5.68	134.68	.121E+07	3309.3	5.16	6.10

6.16	135.16	.139E+07	3955.8	5.38	5.85
6.63	135.63	.158E+07	4674.0	5.59	5.64
7.11	136.11	.179E+07	5467.2	5.78	5.45
7.58	136.58	.201E+07	6338.9	5.97	5.28
8.05	137.05	.224E+07	7292.2	6.15	5.12
8.53	137.53	.249E+07	8330.6	6.33	4.98
9.00	138.00	.275E+07	9457.1	6.50	4.85

		<---- hydrograph ---->			<-pipe / channel->	
	AREA	QPEAK	TPEAK	R.V.	MAX DEPTH	MAX VEL
	(ha)	(cms)	(hrs)	(mm)	(m)	(m/s)
INFLOW : ID= 2 (3103)	576.27	4.64	17.33	48.68	0.36	0.84
OUTFLOW: ID= 1 (2180)	576.27	4.61	18.00	48.68	0.36	0.84

CALIB		
NASHYD (11801)	Area (ha)= 109.96	Curve Number (CN)= 61.4
ID= 1 DT= 5.0 min	Ia (mm)= 4.40	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 3.80	

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	6.167	2.88	12.250	6.23	18.33	0.48
0.167	0.00	6.250	2.88	12.333	3.36	18.42	0.48
0.250	0.00	6.333	8.15	12.417	3.36	18.50	0.48
0.333	0.48	6.417	8.15	12.500	3.36	18.58	0.48
0.417	0.48	6.500	8.15	12.583	3.36	18.67	0.48
0.500	0.48	6.583	8.15	12.667	3.36	18.75	0.48
0.583	0.48	6.667	8.15	12.750	3.36	18.83	0.48
0.667	0.48	6.750	8.15	12.833	3.36	18.92	0.48
0.750	0.48	6.833	8.15	12.917	3.36	19.00	0.48
0.833	0.48	6.917	8.15	13.000	3.36	19.08	0.48
0.917	0.48	7.000	8.15	13.083	3.36	19.17	0.48
1.000	0.48	7.083	8.15	13.167	3.36	19.25	0.48
1.083	0.48	7.167	8.15	13.250	3.36	19.33	0.48
1.167	0.48	7.250	8.15	13.333	3.36	19.42	0.48
1.250	0.48	7.333	8.15	13.417	3.36	19.50	0.48
1.333	0.48	7.417	8.15	13.500	3.36	19.58	0.48
1.417	0.48	7.500	8.15	13.583	3.36	19.67	0.48
1.500	0.48	7.583	8.15	13.667	3.36	19.75	0.48
1.583	0.48	7.667	8.15	13.750	3.36	19.83	0.48
1.667	0.48	7.750	8.15	13.833	3.36	19.92	0.48
1.750	0.48	7.833	8.15	13.917	3.36	20.00	0.48
1.833	0.48	7.917	8.15	14.000	3.36	20.08	0.48
1.917	0.48	8.000	8.15	14.083	3.36	20.17	0.48
2.000	0.48	8.083	8.15	14.167	3.36	20.25	0.48
2.083	0.48	8.167	8.15	14.250	3.36	20.33	0.48
2.167	0.48	8.250	8.15	14.333	1.92	20.42	0.48
2.250	0.48	8.333	22.06	14.417	1.92	20.50	0.48
2.333	0.48	8.417	22.06	14.500	1.92	20.58	0.48
2.417	0.48	8.500	22.06	14.583	1.92	20.67	0.48
2.500	0.48	8.583	22.06	14.667	1.92	20.75	0.48
2.583	0.48	8.667	22.06	14.750	1.92	20.83	0.48
2.667	0.48	8.750	22.06	14.833	1.92	20.92	0.48
2.750	0.48	8.833	22.06	14.917	1.92	21.00	0.48
2.833	0.48	8.917	22.06	15.000	1.92	21.08	0.48
2.917	0.48	9.000	22.06	15.083	1.92	21.17	0.48
3.000	0.48	9.083	22.06	15.167	1.92	21.25	0.48
3.083	0.48	9.167	22.06	15.250	1.92	21.33	0.48
3.167	0.48	9.250	22.06	15.333	1.92	21.42	0.48
3.250	0.48	9.333	22.06	15.417	1.92	21.50	0.48
3.333	0.48	9.417	22.06	15.500	1.92	21.58	0.48
3.417	0.48	9.500	22.06	15.583	1.92	21.67	0.48
3.500	0.48	9.583	22.06	15.667	1.92	21.75	0.48
3.583	0.48	9.667	22.06	15.750	1.92	21.83	0.48
3.667	0.48	9.750	22.06	15.833	1.92	21.92	0.48
3.750	0.48	9.833	22.06	15.917	1.92	22.00	0.48
3.833	0.48	9.917	22.06	16.000	1.92	22.08	0.48
3.917	0.48	10.000	22.06	16.083	1.92	22.17	0.48
4.000	0.48	10.083	22.06	16.167	1.92	22.25	0.48
4.083	0.48	10.167	22.06	16.250	1.92	22.33	0.48
4.167	0.48	10.250	22.06	16.333	0.96	22.42	0.48
4.250	0.48	10.333	6.23	16.417	0.96	22.50	0.48
4.333	2.88	10.417	6.23	16.500	0.96	22.58	0.48
4.417	2.88	10.500	6.23	16.583	0.96	22.67	0.48
4.500	2.88	10.583	6.23	16.667	0.96	22.75	0.48
4.583	2.88	10.667	6.23	16.750	0.96	22.83	0.48

4.667	2.88	10.750	6.23	16.833	0.96	22.92	0.48
4.750	2.88	10.833	6.23	16.917	0.96	23.00	0.48
4.833	2.88	10.917	6.23	17.000	0.96	23.08	0.48
4.917	2.88	11.000	6.23	17.083	0.96	23.17	0.48
5.000	2.88	11.083	6.23	17.167	0.96	23.25	0.48
5.083	2.88	11.167	6.23	17.250	0.96	23.33	0.48
5.167	2.88	11.250	6.23	17.333	0.96	23.42	0.48
5.250	2.88	11.333	6.23	17.417	0.96	23.50	0.48
5.333	2.88	11.417	6.23	17.500	0.96	23.58	0.48
5.417	2.88	11.500	6.23	17.583	0.96	23.67	0.48
5.500	2.88	11.583	6.23	17.667	0.96	23.75	0.48
5.583	2.88	11.667	6.23	17.750	0.96	23.83	0.48
5.667	2.88	11.750	6.23	17.833	0.96	23.92	0.48
5.750	2.88	11.833	6.23	17.917	0.96	24.00	0.48
5.833	2.88	11.917	6.23	18.000	0.96	24.08	0.48
5.917	2.88	12.000	6.23	18.083	0.96	24.17	0.48
6.000	2.88	12.083	6.23	18.167	0.96	24.25	0.48
6.083	2.88	12.167	6.23	18.250	0.96		

Unit Hyd Qpeak (cms)= 1.105

PEAK FLOW (cms)= 1.015 (i)
TIME TO PEAK (hrs)= 14.417
RUNOFF VOLUME (mm)= 33.343
TOTAL RAINFALL (mm)= 95.920
RUNOFF COEFFICIENT = 0.348

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

CALIB NASHYD (0101) ID= 1 DT= 5.0 min	Area (ha)= 0.77	Curve Number (CN)= 61.4
	Ia (mm)= 4.40	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 0.17	

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	6.167	2.88	12.250	6.23	18.33	0.48
0.167	0.00	6.250	2.88	12.333	3.36	18.42	0.48
0.250	0.00	6.333	8.15	12.417	3.36	18.50	0.48
0.333	0.48	6.417	8.15	12.500	3.36	18.58	0.48
0.417	0.48	6.500	8.15	12.583	3.36	18.67	0.48
0.500	0.48	6.583	8.15	12.667	3.36	18.75	0.48
0.583	0.48	6.667	8.15	12.750	3.36	18.83	0.48
0.667	0.48	6.750	8.15	12.833	3.36	18.92	0.48
0.750	0.48	6.833	8.15	12.917	3.36	19.00	0.48
0.833	0.48	6.917	8.15	13.000	3.36	19.08	0.48
0.917	0.48	7.000	8.15	13.083	3.36	19.17	0.48
1.000	0.48	7.083	8.15	13.167	3.36	19.25	0.48
1.083	0.48	7.167	8.15	13.250	3.36	19.33	0.48
1.167	0.48	7.250	8.15	13.333	3.36	19.42	0.48
1.250	0.48	7.333	8.15	13.417	3.36	19.50	0.48
1.333	0.48	7.417	8.15	13.500	3.36	19.58	0.48
1.417	0.48	7.500	8.15	13.583	3.36	19.67	0.48
1.500	0.48	7.583	8.15	13.667	3.36	19.75	0.48
1.583	0.48	7.667	8.15	13.750	3.36	19.83	0.48
1.667	0.48	7.750	8.15	13.833	3.36	19.92	0.48
1.750	0.48	7.833	8.15	13.917	3.36	20.00	0.48
1.833	0.48	7.917	8.15	14.000	3.36	20.08	0.48
1.917	0.48	8.000	8.15	14.083	3.36	20.17	0.48
2.000	0.48	8.083	8.15	14.167	3.36	20.25	0.48
2.083	0.48	8.167	8.15	14.250	3.36	20.33	0.48
2.167	0.48	8.250	8.15	14.333	1.92	20.42	0.48
2.250	0.48	8.333	22.06	14.417	1.92	20.50	0.48
2.333	0.48	8.417	22.06	14.500	1.92	20.58	0.48
2.417	0.48	8.500	22.06	14.583	1.92	20.67	0.48
2.500	0.48	8.583	22.06	14.667	1.92	20.75	0.48
2.583	0.48	8.667	22.06	14.750	1.92	20.83	0.48
2.667	0.48	8.750	22.06	14.833	1.92	20.92	0.48
2.750	0.48	8.833	22.06	14.917	1.92	21.00	0.48
2.833	0.48	8.917	22.06	15.000	1.92	21.08	0.48
2.917	0.48	9.000	22.06	15.083	1.92	21.17	0.48
3.000	0.48	9.083	22.06	15.167	1.92	21.25	0.48
3.083	0.48	9.167	22.06	15.250	1.92	21.33	0.48
3.167	0.48	9.250	22.06	15.333	1.92	21.42	0.48
3.250	0.48	9.333	22.06	15.417	1.92	21.50	0.48
3.333	0.48	9.417	22.06	15.500	1.92	21.58	0.48
3.417	0.48	9.500	22.06	15.583	1.92	21.67	0.48
3.500	0.48	9.583	22.06	15.667	1.92	21.75	0.48

3.583	0.48	9.667	22.06	15.750	1.92	21.83	0.48
3.667	0.48	9.750	22.06	15.833	1.92	21.92	0.48
3.750	0.48	9.833	22.06	15.917	1.92	22.00	0.48
3.833	0.48	9.917	22.06	16.000	1.92	22.08	0.48
3.917	0.48	10.000	22.06	16.083	1.92	22.17	0.48
4.000	0.48	10.083	22.06	16.167	1.92	22.25	0.48
4.083	0.48	10.167	22.06	16.250	1.92	22.33	0.48
4.167	0.48	10.250	22.06	16.333	0.96	22.42	0.48
4.250	0.48	10.333	6.23	16.417	0.96	22.50	0.48
4.333	2.88	10.417	6.23	16.500	0.96	22.58	0.48
4.417	2.88	10.500	6.23	16.583	0.96	22.67	0.48
4.500	2.88	10.583	6.23	16.667	0.96	22.75	0.48
4.583	2.88	10.667	6.23	16.750	0.96	22.83	0.48
4.667	2.88	10.750	6.23	16.833	0.96	22.92	0.48
4.750	2.88	10.833	6.23	16.917	0.96	23.00	0.48
4.833	2.88	10.917	6.23	17.000	0.96	23.08	0.48
4.917	2.88	11.000	6.23	17.083	0.96	23.17	0.48
5.000	2.88	11.083	6.23	17.167	0.96	23.25	0.48
5.083	2.88	11.167	6.23	17.250	0.96	23.33	0.48
5.167	2.88	11.250	6.23	17.333	0.96	23.42	0.48
5.250	2.88	11.333	6.23	17.417	0.96	23.50	0.48
5.333	2.88	11.417	6.23	17.500	0.96	23.58	0.48
5.417	2.88	11.500	6.23	17.583	0.96	23.67	0.48
5.500	2.88	11.583	6.23	17.667	0.96	23.75	0.48
5.583	2.88	11.667	6.23	17.750	0.96	23.83	0.48
5.667	2.88	11.750	6.23	17.833	0.96	23.92	0.48
5.750	2.88	11.833	6.23	17.917	0.96	24.00	0.48
5.833	2.88	11.917	6.23	18.000	0.96	24.08	0.48
5.917	2.88	12.000	6.23	18.083	0.96	24.17	0.48
6.000	2.88	12.083	6.23	18.167	0.96	24.25	0.48
6.083	2.88	12.167	6.23	18.250	0.96		

Unit Hyd Qpeak (cms)= 0.173

PEAK FLOW (cms)= 0.022 (i)
TIME TO PEAK (hrs)= 10.250
RUNOFF VOLUME (mm)= 33.224
TOTAL RAINFALL (mm)= 95.920
RUNOFF COEFFICIENT = 0.346

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

CALIB STANDHYD (0102) | ID= 1 DT= 5.0 min	Area (ha)= 0.94 Total Imp(%)= 35.00 Dir. Conn.(%)= 28.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.33	0.61
Dep. Storage	(mm)=	1.00	2.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	79.16	40.00
Mannings n	=	0.013	0.250

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	6.167	2.88	12.250	6.23	18.33	0.48
0.167	0.00	6.250	2.88	12.333	3.36	18.42	0.48
0.250	0.00	6.333	8.15	12.417	3.36	18.50	0.48
0.333	0.48	6.417	8.15	12.500	3.36	18.58	0.48
0.417	0.48	6.500	8.15	12.583	3.36	18.67	0.48
0.500	0.48	6.583	8.15	12.667	3.36	18.75	0.48
0.583	0.48	6.667	8.15	12.750	3.36	18.83	0.48
0.667	0.48	6.750	8.15	12.833	3.36	18.92	0.48
0.750	0.48	6.833	8.15	12.917	3.36	19.00	0.48
0.833	0.48	6.917	8.15	13.000	3.36	19.08	0.48
0.917	0.48	7.000	8.15	13.083	3.36	19.17	0.48
1.000	0.48	7.083	8.15	13.167	3.36	19.25	0.48
1.083	0.48	7.167	8.15	13.250	3.36	19.33	0.48
1.167	0.48	7.250	8.15	13.333	3.36	19.42	0.48
1.250	0.48	7.333	8.15	13.417	3.36	19.50	0.48
1.333	0.48	7.417	8.15	13.500	3.36	19.58	0.48
1.417	0.48	7.500	8.15	13.583	3.36	19.67	0.48
1.500	0.48	7.583	8.15	13.667	3.36	19.75	0.48
1.583	0.48	7.667	8.15	13.750	3.36	19.83	0.48
1.667	0.48	7.750	8.15	13.833	3.36	19.92	0.48
1.750	0.48	7.833	8.15	13.917	3.36	20.00	0.48
1.833	0.48	7.917	8.15	14.000	3.36	20.08	0.48
1.917	0.48	8.000	8.15	14.083	3.36	20.17	0.48

2.000	0.48	8.083	8.15	14.167	3.36	20.25	0.48
2.083	0.48	8.167	8.15	14.250	3.36	20.33	0.48
2.167	0.48	8.250	8.15	14.333	1.92	20.42	0.48
2.250	0.48	8.333	22.06	14.417	1.92	20.50	0.48
2.333	0.48	8.417	22.06	14.500	1.92	20.58	0.48
2.417	0.48	8.500	22.06	14.583	1.92	20.67	0.48
2.500	0.48	8.583	22.06	14.667	1.92	20.75	0.48
2.583	0.48	8.667	22.06	14.750	1.92	20.83	0.48
2.667	0.48	8.750	22.06	14.833	1.92	20.92	0.48
2.750	0.48	8.833	22.06	14.917	1.92	21.00	0.48
2.833	0.48	8.917	22.06	15.000	1.92	21.08	0.48
2.917	0.48	9.000	22.06	15.083	1.92	21.17	0.48
3.000	0.48	9.083	22.06	15.167	1.92	21.25	0.48
3.083	0.48	9.167	22.06	15.250	1.92	21.33	0.48
3.167	0.48	9.250	22.06	15.333	1.92	21.42	0.48
3.250	0.48	9.333	22.06	15.417	1.92	21.50	0.48
3.333	0.48	9.417	22.06	15.500	1.92	21.58	0.48
3.417	0.48	9.500	22.06	15.583	1.92	21.67	0.48
3.500	0.48	9.583	22.06	15.667	1.92	21.75	0.48
3.583	0.48	9.667	22.06	15.750	1.92	21.83	0.48
3.667	0.48	9.750	22.06	15.833	1.92	21.92	0.48
3.750	0.48	9.833	22.06	15.917	1.92	22.00	0.48
3.833	0.48	9.917	22.06	16.000	1.92	22.08	0.48
3.917	0.48	10.000	22.06	16.083	1.92	22.17	0.48
4.000	0.48	10.083	22.06	16.167	1.92	22.25	0.48
4.083	0.48	10.167	22.06	16.250	1.92	22.33	0.48
4.167	0.48	10.250	22.06	16.333	0.96	22.42	0.48
4.250	0.48	10.333	6.23	16.417	0.96	22.50	0.48
4.333	2.88	10.417	6.23	16.500	0.96	22.58	0.48
4.417	2.88	10.500	6.23	16.583	0.96	22.67	0.48
4.500	2.88	10.583	6.23	16.667	0.96	22.75	0.48
4.583	2.88	10.667	6.23	16.750	0.96	22.83	0.48
4.667	2.88	10.750	6.23	16.833	0.96	22.92	0.48
4.750	2.88	10.833	6.23	16.917	0.96	23.00	0.48
4.833	2.88	10.917	6.23	17.000	0.96	23.08	0.48
4.917	2.88	11.000	6.23	17.083	0.96	23.17	0.48
5.000	2.88	11.083	6.23	17.167	0.96	23.25	0.48
5.083	2.88	11.167	6.23	17.250	0.96	23.33	0.48
5.167	2.88	11.250	6.23	17.333	0.96	23.42	0.48
5.250	2.88	11.333	6.23	17.417	0.96	23.50	0.48
5.333	2.88	11.417	6.23	17.500	0.96	23.58	0.48
5.417	2.88	11.500	6.23	17.583	0.96	23.67	0.48
5.500	2.88	11.583	6.23	17.667	0.96	23.75	0.48
5.583	2.88	11.667	6.23	17.750	0.96	23.83	0.48
5.667	2.88	11.750	6.23	17.833	0.96	23.92	0.48
5.750	2.88	11.833	6.23	17.917	0.96	24.00	0.48
5.833	2.88	11.917	6.23	18.000	0.96	24.08	0.48
5.917	2.88	12.000	6.23	18.083	0.96	24.17	0.48
6.000	2.88	12.083	6.23	18.167	0.96	24.25	0.48
6.083	2.88	12.167	6.23	18.250	0.96		

Max.Eff.Inten.(mm/hr)=	22.06	12.56		
over (min)	5.00	25.00		
Storage Coeff. (min)=	4.06 (ii)	20.25 (ii)		
Unit Hyd. Tpeak (min)=	5.00	25.00		
Unit Hyd. peak (cms)=	0.24	0.05		
			TOTALS	
PEAK FLOW (cms)=	0.02	0.02	0.036 (iii)	
TIME TO PEAK (hrs)=	9.50	10.25	10.25	
RUNOFF VOLUME (mm)=	94.92	37.17	53.33	
TOTAL RAINFALL (mm)=	95.92	95.92	95.92	
RUNOFF COEFFICIENT =	0.99	0.39	0.56	

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 61.4 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB			
STANDHYD (0103)	Area (ha)=	0.46	
ID= 1 DT= 5.0 min	Total Imp(%)=	41.00	Dir. Conn.(%)= 33.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.19	0.27
Dep. Storage	(mm)=	1.00	2.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	55.38	40.00
Mannings n	=	0.013	0.250

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	6.167	2.88	12.250	6.23	18.33	0.48
0.167	0.00	6.250	2.88	12.333	3.36	18.42	0.48
0.250	0.00	6.333	8.15	12.417	3.36	18.50	0.48
0.333	0.48	6.417	8.15	12.500	3.36	18.58	0.48
0.417	0.48	6.500	8.15	12.583	3.36	18.67	0.48
0.500	0.48	6.583	8.15	12.667	3.36	18.75	0.48
0.583	0.48	6.667	8.15	12.750	3.36	18.83	0.48
0.667	0.48	6.750	8.15	12.833	3.36	18.92	0.48
0.750	0.48	6.833	8.15	12.917	3.36	19.00	0.48
0.833	0.48	6.917	8.15	13.000	3.36	19.08	0.48
0.917	0.48	7.000	8.15	13.083	3.36	19.17	0.48
1.000	0.48	7.083	8.15	13.167	3.36	19.25	0.48
1.083	0.48	7.167	8.15	13.250	3.36	19.33	0.48
1.167	0.48	7.250	8.15	13.333	3.36	19.42	0.48
1.250	0.48	7.333	8.15	13.417	3.36	19.50	0.48
1.333	0.48	7.417	8.15	13.500	3.36	19.58	0.48
1.417	0.48	7.500	8.15	13.583	3.36	19.67	0.48
1.500	0.48	7.583	8.15	13.667	3.36	19.75	0.48
1.583	0.48	7.667	8.15	13.750	3.36	19.83	0.48
1.667	0.48	7.750	8.15	13.833	3.36	19.92	0.48
1.750	0.48	7.833	8.15	13.917	3.36	20.00	0.48
1.833	0.48	7.917	8.15	14.000	3.36	20.08	0.48
1.917	0.48	8.000	8.15	14.083	3.36	20.17	0.48
2.000	0.48	8.083	8.15	14.167	3.36	20.25	0.48
2.083	0.48	8.167	8.15	14.250	3.36	20.33	0.48
2.167	0.48	8.250	8.15	14.333	1.92	20.42	0.48
2.250	0.48	8.333	22.06	14.417	1.92	20.50	0.48
2.333	0.48	8.417	22.06	14.500	1.92	20.58	0.48
2.417	0.48	8.500	22.06	14.583	1.92	20.67	0.48
2.500	0.48	8.583	22.06	14.667	1.92	20.75	0.48
2.583	0.48	8.667	22.06	14.750	1.92	20.83	0.48
2.667	0.48	8.750	22.06	14.833	1.92	20.92	0.48
2.750	0.48	8.833	22.06	14.917	1.92	21.00	0.48
2.833	0.48	8.917	22.06	15.000	1.92	21.08	0.48
2.917	0.48	9.000	22.06	15.083	1.92	21.17	0.48
3.000	0.48	9.083	22.06	15.167	1.92	21.25	0.48
3.083	0.48	9.167	22.06	15.250	1.92	21.33	0.48
3.167	0.48	9.250	22.06	15.333	1.92	21.42	0.48
3.250	0.48	9.333	22.06	15.417	1.92	21.50	0.48
3.333	0.48	9.417	22.06	15.500	1.92	21.58	0.48
3.417	0.48	9.500	22.06	15.583	1.92	21.67	0.48
3.500	0.48	9.583	22.06	15.667	1.92	21.75	0.48
3.583	0.48	9.667	22.06	15.750	1.92	21.83	0.48
3.667	0.48	9.750	22.06	15.833	1.92	21.92	0.48
3.750	0.48	9.833	22.06	15.917	1.92	22.00	0.48
3.833	0.48	9.917	22.06	16.000	1.92	22.08	0.48
3.917	0.48	10.000	22.06	16.083	1.92	22.17	0.48
4.000	0.48	10.083	22.06	16.167	1.92	22.25	0.48
4.083	0.48	10.167	22.06	16.250	1.92	22.33	0.48
4.167	0.48	10.250	22.06	16.333	0.96	22.42	0.48
4.250	0.48	10.333	6.23	16.417	0.96	22.50	0.48
4.333	2.88	10.417	6.23	16.500	0.96	22.58	0.48
4.417	2.88	10.500	6.23	16.583	0.96	22.67	0.48
4.500	2.88	10.583	6.23	16.667	0.96	22.75	0.48
4.583	2.88	10.667	6.23	16.750	0.96	22.83	0.48
4.667	2.88	10.750	6.23	16.833	0.96	22.92	0.48
4.750	2.88	10.833	6.23	16.917	0.96	23.00	0.48
4.833	2.88	10.917	6.23	17.000	0.96	23.08	0.48
4.917	2.88	11.000	6.23	17.083	0.96	23.17	0.48
5.000	2.88	11.083	6.23	17.167	0.96	23.25	0.48
5.083	2.88	11.167	6.23	17.250	0.96	23.33	0.48
5.167	2.88	11.250	6.23	17.333	0.96	23.42	0.48
5.250	2.88	11.333	6.23	17.417	0.96	23.50	0.48
5.333	2.88	11.417	6.23	17.500	0.96	23.58	0.48
5.417	2.88	11.500	6.23	17.583	0.96	23.67	0.48
5.500	2.88	11.583	6.23	17.667	0.96	23.75	0.48
5.583	2.88	11.667	6.23	17.750	0.96	23.83	0.48
5.667	2.88	11.750	6.23	17.833	0.96	23.92	0.48
5.750	2.88	11.833	6.23	17.917	0.96	24.00	0.48
5.833	2.88	11.917	6.23	18.000	0.96	24.08	0.48
5.917	2.88	12.000	6.23	18.083	0.96	24.17	0.48
6.000	2.88	12.083	6.23	18.167	0.96	24.25	0.48
6.083	2.88	12.167	6.23	18.250	0.96		

Max.Eff.Inten.(mm/hr)=	22.06	13.06
over (min)	5.00	20.00
Storage Coeff. (min)=	3.28 (ii)	19.21 (ii)
Unit Hyd. Tpeak (min)=	5.00	20.00

```
     Unit Hyd. peak  (cms)=       0.27         0.06
                                                              *TOTALS*
     PEAK FLOW       (cms)=       0.01         0.01           0.018 (iii)
     TIME TO PEAK    (hrs)=       9.50        10.25          10.25
     RUNOFF VOLUME    (mm)=      94.92        37.76          56.60
     TOTAL RAINFALL   (mm)=      95.92        95.92          95.92
     RUNOFF COEFFICIENT   =       0.99         0.39           0.59

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  61.4    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

--------------------
| ADD HYD  (  0001)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0101):     0.77   0.022    10.25    33.22
      + ID2= 2 (  0102):     0.94   0.036    10.25    53.33
        ==================================================
        ID = 3 (  0001):     1.71   0.058    10.25    44.28

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

--------------------
| ADD HYD  (  0001)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0001):     1.71   0.058    10.25    44.28
      + ID2= 2 (  0103):     0.46   0.018    10.25    56.60
        ==================================================
        ID = 1 (  0001):     2.17   0.076    10.25    46.89

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0201)|   Area    (ha)=   0.45   Curve Number   (CN)= 61.4
|ID= 1 DT= 5.0 min |   Ia      (mm)=   4.40   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.17

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


                        ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    0.00 | 6.167    2.88 |12.250    6.23 | 18.33    0.48
               0.167    0.00 | 6.250    2.88 |12.333    3.36 | 18.42    0.48
               0.250    0.00 | 6.333    8.15 |12.417    3.36 | 18.50    0.48
               0.333    0.48 | 6.417    8.15 |12.500    3.36 | 18.58    0.48
               0.417    0.48 | 6.500    8.15 |12.583    3.36 | 18.67    0.48
               0.500    0.48 | 6.583    8.15 |12.667    3.36 | 18.75    0.48
               0.583    0.48 | 6.667    8.15 |12.750    3.36 | 18.83    0.48
               0.667    0.48 | 6.750    8.15 |12.833    3.36 | 18.92    0.48
               0.750    0.48 | 6.833    8.15 |12.917    3.36 | 19.00    0.48
               0.833    0.48 | 6.917    8.15 |13.000    3.36 | 19.08    0.48
               0.917    0.48 | 7.000    8.15 |13.083    3.36 | 19.17    0.48
               1.000    0.48 | 7.083    8.15 |13.167    3.36 | 19.25    0.48
               1.083    0.48 | 7.167    8.15 |13.250    3.36 | 19.33    0.48
               1.167    0.48 | 7.250    8.15 |13.333    3.36 | 19.42    0.48
               1.250    0.48 | 7.333    8.15 |13.417    3.36 | 19.50    0.48
               1.333    0.48 | 7.417    8.15 |13.500    3.36 | 19.58    0.48
               1.417    0.48 | 7.500    8.15 |13.583    3.36 | 19.67    0.48
               1.500    0.48 | 7.583    8.15 |13.667    3.36 | 19.75    0.48
               1.583    0.48 | 7.667    8.15 |13.750    3.36 | 19.83    0.48
               1.667    0.48 | 7.750    8.15 |13.833    3.36 | 19.92    0.48
               1.750    0.48 | 7.833    8.15 |13.917    3.36 | 20.00    0.48
               1.833    0.48 | 7.917    8.15 |14.000    3.36 | 20.08    0.48
               1.917    0.48 | 8.000    8.15 |14.083    3.36 | 20.17    0.48
               2.000    0.48 | 8.083    8.15 |14.167    3.36 | 20.25    0.48
               2.083    0.48 | 8.167    8.15 |14.250    3.36 | 20.33    0.48
               2.167    0.48 | 8.250    8.15 |14.333    1.92 | 20.42    0.48
               2.250    0.48 | 8.333   22.06 |14.417    1.92 | 20.50    0.48
               2.333    0.48 | 8.417   22.06 |14.500    1.92 | 20.58    0.48
               2.417    0.48 | 8.500   22.06 |14.583    1.92 | 20.67    0.48
               2.500    0.48 | 8.583   22.06 |14.667    1.92 | 20.75    0.48
               2.583    0.48 | 8.667   22.06 |14.750    1.92 | 20.83    0.48
```

2.667	0.48	8.750	22.06	14.833	1.92	20.92	0.48
2.750	0.48	8.833	22.06	14.917	1.92	21.00	0.48
2.833	0.48	8.917	22.06	15.000	1.92	21.08	0.48
2.917	0.48	9.000	22.06	15.083	1.92	21.17	0.48
3.000	0.48	9.083	22.06	15.167	1.92	21.25	0.48
3.083	0.48	9.167	22.06	15.250	1.92	21.33	0.48
3.167	0.48	9.250	22.06	15.333	1.92	21.42	0.48
3.250	0.48	9.333	22.06	15.417	1.92	21.50	0.48
3.333	0.48	9.417	22.06	15.500	1.92	21.58	0.48
3.417	0.48	9.500	22.06	15.583	1.92	21.67	0.48
3.500	0.48	9.583	22.06	15.667	1.92	21.75	0.48
3.583	0.48	9.667	22.06	15.750	1.92	21.83	0.48
3.667	0.48	9.750	22.06	15.833	1.92	21.92	0.48
3.750	0.48	9.833	22.06	15.917	1.92	22.00	0.48
3.833	0.48	9.917	22.06	16.000	1.92	22.08	0.48
3.917	0.48	10.000	22.06	16.083	1.92	22.17	0.48
4.000	0.48	10.083	22.06	16.167	1.92	22.25	0.48
4.083	0.48	10.167	22.06	16.250	1.92	22.33	0.48
4.167	0.48	10.250	22.06	16.333	0.96	22.42	0.48
4.250	0.48	10.333	6.23	16.417	0.96	22.50	0.48
4.333	2.88	10.417	6.23	16.500	0.96	22.58	0.48
4.417	2.88	10.500	6.23	16.583	0.96	22.67	0.48
4.500	2.88	10.583	6.23	16.667	0.96	22.75	0.48
4.583	2.88	10.667	6.23	16.750	0.96	22.83	0.48
4.667	2.88	10.750	6.23	16.833	0.96	22.92	0.48
4.750	2.88	10.833	6.23	16.917	0.96	23.00	0.48
4.833	2.88	10.917	6.23	17.000	0.96	23.08	0.48
4.917	2.88	11.000	6.23	17.083	0.96	23.17	0.48
5.000	2.88	11.083	6.23	17.167	0.96	23.25	0.48
5.083	2.88	11.167	6.23	17.250	0.96	23.33	0.48
5.167	2.88	11.250	6.23	17.333	0.96	23.42	0.48
5.250	2.88	11.333	6.23	17.417	0.96	23.50	0.48
5.333	2.88	11.417	6.23	17.500	0.96	23.58	0.48
5.417	2.88	11.500	6.23	17.583	0.96	23.67	0.48
5.500	2.88	11.583	6.23	17.667	0.96	23.75	0.48
5.583	2.88	11.667	6.23	17.750	0.96	23.83	0.48
5.667	2.88	11.750	6.23	17.833	0.96	23.92	0.48
5.750	2.88	11.833	6.23	17.917	0.96	24.00	0.48
5.833	2.88	11.917	6.23	18.000	0.96	24.08	0.48
5.917	2.88	12.000	6.23	18.083	0.96	24.17	0.48
6.000	2.88	12.083	6.23	18.167	0.96	24.25	0.48
6.083	2.88	12.167	6.23	18.250	0.96		

Unit Hyd Qpeak (cms)= 0.101

PEAK FLOW (cms)= 0.013 (i)
TIME TO PEAK (hrs)= 10.250
RUNOFF VOLUME (mm)= 33.223
TOTAL RAINFALL (mm)= 95.920
RUNOFF COEFFICIENT = 0.346

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

ADD HYD (0015)		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
1 + 2 = 3	ID1= 1 (0001):	2.17	0.076	10.25	46.89
	+ ID2= 2 (0201):	0.45	0.013	10.25	33.22
	ID = 3 (0015):	2.62	0.089	10.25	44.54

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB NASHYD (0601)				
ID= 1 DT= 5.0 min	Area (ha)=	8.75	Curve Number (CN)=	61.4
	Ia (mm)=	4.40	# of Linear Res.(N)=	3.00
	U.H. Tp(hrs)=	1.44		

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	6.167	2.88	12.250	6.23	18.33	0.48
0.167	0.00	6.250	2.88	12.333	3.36	18.42	0.48
0.250	0.00	6.333	8.15	12.417	3.36	18.50	0.48
0.333	0.48	6.417	8.15	12.500	3.36	18.58	0.48
0.417	0.48	6.500	8.15	12.583	3.36	18.67	0.48
0.500	0.48	6.583	8.15	12.667	3.36	18.75	0.48

0.583	0.48	6.667	8.15	12.750	3.36	18.83	0.48
0.667	0.48	6.750	8.15	12.833	3.36	18.92	0.48
0.750	0.48	6.833	8.15	12.917	3.36	19.00	0.48
0.833	0.48	6.917	8.15	13.000	3.36	19.08	0.48
0.917	0.48	7.000	8.15	13.083	3.36	19.17	0.48
1.000	0.48	7.083	8.15	13.167	3.36	19.25	0.48
1.083	0.48	7.167	8.15	13.250	3.36	19.33	0.48
1.167	0.48	7.250	8.15	13.333	3.36	19.42	0.48
1.250	0.48	7.333	8.15	13.417	3.36	19.50	0.48
1.333	0.48	7.417	8.15	13.500	3.36	19.58	0.48
1.417	0.48	7.500	8.15	13.583	3.36	19.67	0.48
1.500	0.48	7.583	8.15	13.667	3.36	19.75	0.48
1.583	0.48	7.667	8.15	13.750	3.36	19.83	0.48
1.667	0.48	7.750	8.15	13.833	3.36	19.92	0.48
1.750	0.48	7.833	8.15	13.917	3.36	20.00	0.48
1.833	0.48	7.917	8.15	14.000	3.36	20.08	0.48
1.917	0.48	8.000	8.15	14.083	3.36	20.17	0.48
2.000	0.48	8.083	8.15	14.167	3.36	20.25	0.48
2.083	0.48	8.167	8.15	14.250	3.36	20.33	0.48
2.167	0.48	8.250	8.15	14.333	1.92	20.42	0.48
2.250	0.48	8.333	22.06	14.417	1.92	20.50	0.48
2.333	0.48	8.417	22.06	14.500	1.92	20.58	0.48
2.417	0.48	8.500	22.06	14.583	1.92	20.67	0.48
2.500	0.48	8.583	22.06	14.667	1.92	20.75	0.48
2.583	0.48	8.667	22.06	14.750	1.92	20.83	0.48
2.667	0.48	8.750	22.06	14.833	1.92	20.92	0.48
2.750	0.48	8.833	22.06	14.917	1.92	21.00	0.48
2.833	0.48	8.917	22.06	15.000	1.92	21.08	0.48
2.917	0.48	9.000	22.06	15.083	1.92	21.17	0.48
3.000	0.48	9.083	22.06	15.167	1.92	21.25	0.48
3.083	0.48	9.167	22.06	15.250	1.92	21.33	0.48
3.167	0.48	9.250	22.06	15.333	1.92	21.42	0.48
3.250	0.48	9.333	22.06	15.417	1.92	21.50	0.48
3.333	0.48	9.417	22.06	15.500	1.92	21.58	0.48
3.417	0.48	9.500	22.06	15.583	1.92	21.67	0.48
3.500	0.48	9.583	22.06	15.667	1.92	21.75	0.48
3.583	0.48	9.667	22.06	15.750	1.92	21.83	0.48
3.667	0.48	9.750	22.06	15.833	1.92	21.92	0.48
3.750	0.48	9.833	22.06	15.917	1.92	22.00	0.48
3.833	0.48	9.917	22.06	16.000	1.92	22.08	0.48
3.917	0.48	10.000	22.06	16.083	1.92	22.17	0.48
4.000	0.48	10.083	22.06	16.167	1.92	22.25	0.48
4.083	0.48	10.167	22.06	16.250	1.92	22.33	0.48
4.167	0.48	10.250	22.06	16.333	0.96	22.42	0.48
4.250	0.48	10.333	6.23	16.417	0.96	22.50	0.48
4.333	2.88	10.417	6.23	16.500	0.96	22.58	0.48
4.417	2.88	10.500	6.23	16.583	0.96	22.67	0.48
4.500	2.88	10.583	6.23	16.667	0.96	22.75	0.48
4.583	2.88	10.667	6.23	16.750	0.96	22.83	0.48
4.667	2.88	10.750	6.23	16.833	0.96	22.92	0.48
4.750	2.88	10.833	6.23	16.917	0.96	23.00	0.48
4.833	2.88	10.917	6.23	17.000	0.96	23.08	0.48
4.917	2.88	11.000	6.23	17.083	0.96	23.17	0.48
5.000	2.88	11.083	6.23	17.167	0.96	23.25	0.48
5.083	2.88	11.167	6.23	17.250	0.96	23.33	0.48
5.167	2.88	11.250	6.23	17.333	0.96	23.42	0.48
5.250	2.88	11.333	6.23	17.417	0.96	23.50	0.48
5.333	2.88	11.417	6.23	17.500	0.96	23.58	0.48
5.417	2.88	11.500	6.23	17.583	0.96	23.67	0.48
5.500	2.88	11.583	6.23	17.667	0.96	23.75	0.48
5.583	2.88	11.667	6.23	17.750	0.96	23.83	0.48
5.667	2.88	11.750	6.23	17.833	0.96	23.92	0.48
5.750	2.88	11.833	6.23	17.917	0.96	24.00	0.48
5.833	2.88	11.917	6.23	18.000	0.96	24.08	0.48
5.917	2.88	12.000	6.23	18.083	0.96	24.17	0.48
6.000	2.88	12.083	6.23	18.167	0.96	24.25	0.48
6.083	2.88	12.167	6.23	18.250	0.96		

Unit Hyd Qpeak (cms)= 0.232

PEAK FLOW (cms)= 0.144 (i)
TIME TO PEAK (hrs)= 11.167
RUNOFF VOLUME (mm)= 33.343
TOTAL RAINFALL (mm)= 95.920
RUNOFF COEFFICIENT = 0.348

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

CALIB					
NASHYD (0401)	Area	(ha)=	2.39	Curve Number	(CN)= 61.4
ID= 1 DT= 5.0 min	Ia	(mm)=	4.40	# of Linear Res.	(N)= 3.00
	U.H. Tp	(hrs)=	0.29		

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	6.167	2.88	12.250	6.23	18.33	0.48
0.167	0.00	6.250	2.88	12.333	3.36	18.42	0.48
0.250	0.00	6.333	8.15	12.417	3.36	18.50	0.48
0.333	0.48	6.417	8.15	12.500	3.36	18.58	0.48
0.417	0.48	6.500	8.15	12.583	3.36	18.67	0.48
0.500	0.48	6.583	8.15	12.667	3.36	18.75	0.48
0.583	0.48	6.667	8.15	12.750	3.36	18.83	0.48
0.667	0.48	6.750	8.15	12.833	3.36	18.92	0.48
0.750	0.48	6.833	8.15	12.917	3.36	19.00	0.48
0.833	0.48	6.917	8.15	13.000	3.36	19.08	0.48
0.917	0.48	7.000	8.15	13.083	3.36	19.17	0.48
1.000	0.48	7.083	8.15	13.167	3.36	19.25	0.48
1.083	0.48	7.167	8.15	13.250	3.36	19.33	0.48
1.167	0.48	7.250	8.15	13.333	3.36	19.42	0.48
1.250	0.48	7.333	8.15	13.417	3.36	19.50	0.48
1.333	0.48	7.417	8.15	13.500	3.36	19.58	0.48
1.417	0.48	7.500	8.15	13.583	3.36	19.67	0.48
1.500	0.48	7.583	8.15	13.667	3.36	19.75	0.48
1.583	0.48	7.667	8.15	13.750	3.36	19.83	0.48
1.667	0.48	7.750	8.15	13.833	3.36	19.92	0.48
1.750	0.48	7.833	8.15	13.917	3.36	20.00	0.48
1.833	0.48	7.917	8.15	14.000	3.36	20.08	0.48
1.917	0.48	8.000	8.15	14.083	3.36	20.17	0.48
2.000	0.48	8.083	8.15	14.167	3.36	20.25	0.48
2.083	0.48	8.167	8.15	14.250	3.36	20.33	0.48
2.167	0.48	8.250	8.15	14.333	1.92	20.42	0.48
2.250	0.48	8.333	22.06	14.417	1.92	20.50	0.48
2.333	0.48	8.417	22.06	14.500	1.92	20.58	0.48
2.417	0.48	8.500	22.06	14.583	1.92	20.67	0.48
2.500	0.48	8.583	22.06	14.667	1.92	20.75	0.48
2.583	0.48	8.667	22.06	14.750	1.92	20.83	0.48
2.667	0.48	8.750	22.06	14.833	1.92	20.92	0.48
2.750	0.48	8.833	22.06	14.917	1.92	21.00	0.48
2.833	0.48	8.917	22.06	15.000	1.92	21.08	0.48
2.917	0.48	9.000	22.06	15.083	1.92	21.17	0.48
3.000	0.48	9.083	22.06	15.167	1.92	21.25	0.48
3.083	0.48	9.167	22.06	15.250	1.92	21.33	0.48
3.167	0.48	9.250	22.06	15.333	1.92	21.42	0.48
3.250	0.48	9.333	22.06	15.417	1.92	21.50	0.48
3.333	0.48	9.417	22.06	15.500	1.92	21.58	0.48
3.417	0.48	9.500	22.06	15.583	1.92	21.67	0.48
3.500	0.48	9.583	22.06	15.667	1.92	21.75	0.48
3.583	0.48	9.667	22.06	15.750	1.92	21.83	0.48
3.667	0.48	9.750	22.06	15.833	1.92	21.92	0.48
3.750	0.48	9.833	22.06	15.917	1.92	22.00	0.48
3.833	0.48	9.917	22.06	16.000	1.92	22.08	0.48
3.917	0.48	10.000	22.06	16.083	1.92	22.17	0.48
4.000	0.48	10.083	22.06	16.167	1.92	22.25	0.48
4.083	0.48	10.167	22.06	16.250	1.92	22.33	0.48
4.167	0.48	10.250	22.06	16.333	0.96	22.42	0.48
4.250	0.48	10.333	6.23	16.417	0.96	22.50	0.48
4.333	2.88	10.417	6.23	16.500	0.96	22.58	0.48
4.417	2.88	10.500	6.23	16.583	0.96	22.67	0.48
4.500	2.88	10.583	6.23	16.667	0.96	22.75	0.48
4.583	2.88	10.667	6.23	16.750	0.96	22.83	0.48
4.667	2.88	10.750	6.23	16.833	0.96	22.92	0.48
4.750	2.88	10.833	6.23	16.917	0.96	23.00	0.48
4.833	2.88	10.917	6.23	17.000	0.96	23.08	0.48
4.917	2.88	11.000	6.23	17.083	0.96	23.17	0.48
5.000	2.88	11.083	6.23	17.167	0.96	23.25	0.48
5.083	2.88	11.167	6.23	17.250	0.96	23.33	0.48
5.167	2.88	11.250	6.23	17.333	0.96	23.42	0.48
5.250	2.88	11.333	6.23	17.417	0.96	23.50	0.48
5.333	2.88	11.417	6.23	17.500	0.96	23.58	0.48
5.417	2.88	11.500	6.23	17.583	0.96	23.67	0.48
5.500	2.88	11.583	6.23	17.667	0.96	23.75	0.48
5.583	2.88	11.667	6.23	17.750	0.96	23.83	0.48
5.667	2.88	11.750	6.23	17.833	0.96	23.92	0.48
5.750	2.88	11.833	6.23	17.917	0.96	24.00	0.48
5.833	2.88	11.917	6.23	18.000	0.96	24.08	0.48
5.917	2.88	12.000	6.23	18.083	0.96	24.17	0.48
6.000	2.88	12.083	6.23	18.167	0.96	24.25	0.48
6.083	2.88	12.167	6.23	18.250	0.96		

Unit Hyd Qpeak (cms)= 0.315

PEAK FLOW (cms)= 0.065 (i)

```
     TIME TO PEAK    (hrs)=  10.250
     RUNOFF VOLUME    (mm)=  33.328
     TOTAL RAINFALL   (mm)=  95.920
     RUNOFF COEFFICIENT   =   0.347

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

--------------------------------------------------------------------------------
--------------------
| CALIB             |
| NASHYD   (  0502)|   Area    (ha)=   1.41   Curve Number   (CN)= 61.4
|ID= 1 DT= 5.0 min |   Ia      (mm)=   4.40   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.45

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	6.167	2.88	12.250	6.23	18.33	0.48
0.167	0.00	6.250	2.88	12.333	3.36	18.42	0.48
0.250	0.00	6.333	8.15	12.417	3.36	18.50	0.48
0.333	0.48	6.417	8.15	12.500	3.36	18.58	0.48
0.417	0.48	6.500	8.15	12.583	3.36	18.67	0.48
0.500	0.48	6.583	8.15	12.667	3.36	18.75	0.48
0.583	0.48	6.667	8.15	12.750	3.36	18.83	0.48
0.667	0.48	6.750	8.15	12.833	3.36	18.92	0.48
0.750	0.48	6.833	8.15	12.917	3.36	19.00	0.48
0.833	0.48	6.917	8.15	13.000	3.36	19.08	0.48
0.917	0.48	7.000	8.15	13.083	3.36	19.17	0.48
1.000	0.48	7.083	8.15	13.167	3.36	19.25	0.48
1.083	0.48	7.167	8.15	13.250	3.36	19.33	0.48
1.167	0.48	7.250	8.15	13.333	3.36	19.42	0.48
1.250	0.48	7.333	8.15	13.417	3.36	19.50	0.48
1.333	0.48	7.417	8.15	13.500	3.36	19.58	0.48
1.417	0.48	7.500	8.15	13.583	3.36	19.67	0.48
1.500	0.48	7.583	8.15	13.667	3.36	19.75	0.48
1.583	0.48	7.667	8.15	13.750	3.36	19.83	0.48
1.667	0.48	7.750	8.15	13.833	3.36	19.92	0.48
1.750	0.48	7.833	8.15	13.917	3.36	20.00	0.48
1.833	0.48	7.917	8.15	14.000	3.36	20.08	0.48
1.917	0.48	8.000	8.15	14.083	3.36	20.17	0.48
2.000	0.48	8.083	8.15	14.167	3.36	20.25	0.48
2.083	0.48	8.167	8.15	14.250	3.36	20.33	0.48
2.167	0.48	8.250	8.15	14.333	1.92	20.42	0.48
2.250	0.48	8.333	22.06	14.417	1.92	20.50	0.48
2.333	0.48	8.417	22.06	14.500	1.92	20.58	0.48
2.417	0.48	8.500	22.06	14.583	1.92	20.67	0.48
2.500	0.48	8.583	22.06	14.667	1.92	20.75	0.48
2.583	0.48	8.667	22.06	14.750	1.92	20.83	0.48
2.667	0.48	8.750	22.06	14.833	1.92	20.92	0.48
2.750	0.48	8.833	22.06	14.917	1.92	21.00	0.48
2.833	0.48	8.917	22.06	15.000	1.92	21.08	0.48
2.917	0.48	9.000	22.06	15.083	1.92	21.17	0.48
3.000	0.48	9.083	22.06	15.167	1.92	21.25	0.48
3.083	0.48	9.167	22.06	15.250	1.92	21.33	0.48
3.167	0.48	9.250	22.06	15.333	1.92	21.42	0.48
3.250	0.48	9.333	22.06	15.417	1.92	21.50	0.48
3.333	0.48	9.417	22.06	15.500	1.92	21.58	0.48
3.417	0.48	9.500	22.06	15.583	1.92	21.67	0.48
3.500	0.48	9.583	22.06	15.667	1.92	21.75	0.48
3.583	0.48	9.667	22.06	15.750	1.92	21.83	0.48
3.667	0.48	9.750	22.06	15.833	1.92	21.92	0.48
3.750	0.48	9.833	22.06	15.917	1.92	22.00	0.48
3.833	0.48	9.917	22.06	16.000	1.92	22.08	0.48
3.917	0.48	10.000	22.06	16.083	1.92	22.17	0.48
4.000	0.48	10.083	22.06	16.167	1.92	22.25	0.48
4.083	0.48	10.167	22.06	16.250	1.92	22.33	0.48
4.167	0.48	10.250	22.06	16.333	0.96	22.42	0.48
4.250	0.48	10.333	6.23	16.417	0.96	22.50	0.48
4.333	2.88	10.417	6.23	16.500	0.96	22.58	0.48
4.417	2.88	10.500	6.23	16.583	0.96	22.67	0.48
4.500	2.88	10.583	6.23	16.667	0.96	22.75	0.48
4.583	2.88	10.667	6.23	16.750	0.96	22.83	0.48
4.667	2.88	10.750	6.23	16.833	0.96	22.92	0.48
4.750	2.88	10.833	6.23	16.917	0.96	23.00	0.48
4.833	2.88	10.917	6.23	17.000	0.96	23.08	0.48
4.917	2.88	11.000	6.23	17.083	0.96	23.17	0.48
5.000	2.88	11.083	6.23	17.167	0.96	23.25	0.48
5.083	2.88	11.167	6.23	17.250	0.96	23.33	0.48
5.167	2.88	11.250	6.23	17.333	0.96	23.42	0.48
5.250	2.88	11.333	6.23	17.417	0.96	23.50	0.48
5.333	2.88	11.417	6.23	17.500	0.96	23.58	0.48

5.417	2.88	11.500	6.23	17.583	0.96	23.67	0.48
5.500	2.88	11.583	6.23	17.667	0.96	23.75	0.48
5.583	2.88	11.667	6.23	17.750	0.96	23.83	0.48
5.667	2.88	11.750	6.23	17.833	0.96	23.92	0.48
5.750	2.88	11.833	6.23	17.917	0.96	24.00	0.48
5.833	2.88	11.917	6.23	18.000	0.96	24.08	0.48
5.917	2.88	12.000	6.23	18.083	0.96	24.17	0.48
6.000	2.88	12.083	6.23	18.167	0.96	24.25	0.48
6.083	2.88	12.167	6.23	18.250	0.96		

Unit Hyd Qpeak (cms)= 0.120

PEAK FLOW (cms)= 0.036 (i)
TIME TO PEAK (hrs)= 10.333
RUNOFF VOLUME (mm)= 33.340
TOTAL RAINFALL (mm)= 95.920
RUNOFF COEFFICIENT = 0.348

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

CALIB NASHYD (0510)	Area (ha)= 0.22	Curve Number (CN)= 61.4
ID= 1 DT= 5.0 min	Ia (mm)= 4.40	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 0.13	

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	6.167	2.88	12.250	6.23	18.33	0.48
0.167	0.00	6.250	2.88	12.333	3.36	18.42	0.48
0.250	0.00	6.333	8.15	12.417	3.36	18.50	0.48
0.333	0.48	6.417	8.15	12.500	3.36	18.58	0.48
0.417	0.48	6.500	8.15	12.583	3.36	18.67	0.48
0.500	0.48	6.583	8.15	12.667	3.36	18.75	0.48
0.583	0.48	6.667	8.15	12.750	3.36	18.83	0.48
0.667	0.48	6.750	8.15	12.833	3.36	18.92	0.48
0.750	0.48	6.833	8.15	12.917	3.36	19.00	0.48
0.833	0.48	6.917	8.15	13.000	3.36	19.08	0.48
0.917	0.48	7.000	8.15	13.083	3.36	19.17	0.48
1.000	0.48	7.083	8.15	13.167	3.36	19.25	0.48
1.083	0.48	7.167	8.15	13.250	3.36	19.33	0.48
1.167	0.48	7.250	8.15	13.333	3.36	19.42	0.48
1.250	0.48	7.333	8.15	13.417	3.36	19.50	0.48
1.333	0.48	7.417	8.15	13.500	3.36	19.58	0.48
1.417	0.48	7.500	8.15	13.583	3.36	19.67	0.48
1.500	0.48	7.583	8.15	13.667	3.36	19.75	0.48
1.583	0.48	7.667	8.15	13.750	3.36	19.83	0.48
1.667	0.48	7.750	8.15	13.833	3.36	19.92	0.48
1.750	0.48	7.833	8.15	13.917	3.36	20.00	0.48
1.833	0.48	7.917	8.15	14.000	3.36	20.08	0.48
1.917	0.48	8.000	8.15	14.083	3.36	20.17	0.48
2.000	0.48	8.083	8.15	14.167	3.36	20.25	0.48
2.083	0.48	8.167	8.15	14.250	3.36	20.33	0.48
2.167	0.48	8.250	8.15	14.333	1.92	20.42	0.48
2.250	0.48	8.333	22.06	14.417	1.92	20.50	0.48
2.333	0.48	8.417	22.06	14.500	1.92	20.58	0.48
2.417	0.48	8.500	22.06	14.583	1.92	20.67	0.48
2.500	0.48	8.583	22.06	14.667	1.92	20.75	0.48
2.583	0.48	8.667	22.06	14.750	1.92	20.83	0.48
2.667	0.48	8.750	22.06	14.833	1.92	20.92	0.48
2.750	0.48	8.833	22.06	14.917	1.92	21.00	0.48
2.833	0.48	8.917	22.06	15.000	1.92	21.08	0.48
2.917	0.48	9.000	22.06	15.083	1.92	21.17	0.48
3.000	0.48	9.083	22.06	15.167	1.92	21.25	0.48
3.083	0.48	9.167	22.06	15.250	1.92	21.33	0.48
3.167	0.48	9.250	22.06	15.333	1.92	21.42	0.48
3.250	0.48	9.333	22.06	15.417	1.92	21.50	0.48
3.333	0.48	9.417	22.06	15.500	1.92	21.58	0.48
3.417	0.48	9.500	22.06	15.583	1.92	21.67	0.48
3.500	0.48	9.583	22.06	15.667	1.92	21.75	0.48
3.583	0.48	9.667	22.06	15.750	1.92	21.83	0.48
3.667	0.48	9.750	22.06	15.833	1.92	21.92	0.48
3.750	0.48	9.833	22.06	15.917	1.92	22.00	0.48
3.833	0.48	9.917	22.06	16.000	1.92	22.08	0.48
3.917	0.48	10.000	22.06	16.083	1.92	22.17	0.48
4.000	0.48	10.083	22.06	16.167	1.92	22.25	0.48
4.083	0.48	10.167	22.06	16.250	1.92	22.33	0.48
4.167	0.48	10.250	22.06	16.333	0.96	22.42	0.48
4.250	0.48	10.333	6.23	16.417	0.96	22.50	0.48

4.333	2.88	10.417	6.23	16.500	0.96	22.58	0.48
4.417	2.88	10.500	6.23	16.583	0.96	22.67	0.48
4.500	2.88	10.583	6.23	16.667	0.96	22.75	0.48
4.583	2.88	10.667	6.23	16.750	0.96	22.83	0.48
4.667	2.88	10.750	6.23	16.833	0.96	22.92	0.48
4.750	2.88	10.833	6.23	16.917	0.96	23.00	0.48
4.833	2.88	10.917	6.23	17.000	0.96	23.08	0.48
4.917	2.88	11.000	6.23	17.083	0.96	23.17	0.48
5.000	2.88	11.083	6.23	17.167	0.96	23.25	0.48
5.083	2.88	11.167	6.23	17.250	0.96	23.33	0.48
5.167	2.88	11.250	6.23	17.333	0.96	23.42	0.48
5.250	2.88	11.333	6.23	17.417	0.96	23.50	0.48
5.333	2.88	11.417	6.23	17.500	0.96	23.58	0.48
5.417	2.88	11.500	6.23	17.583	0.96	23.67	0.48
5.500	2.88	11.583	6.23	17.667	0.96	23.75	0.48
5.583	2.88	11.667	6.23	17.750	0.96	23.83	0.48
5.667	2.88	11.750	6.23	17.833	0.96	23.92	0.48
5.750	2.88	11.833	6.23	17.917	0.96	24.00	0.48
5.833	2.88	11.917	6.23	18.000	0.96	24.08	0.48
5.917	2.88	12.000	6.23	18.083	0.96	24.17	0.48
6.000	2.88	12.083	6.23	18.167	0.96	24.25	0.48
6.083	2.88	12.167	6.23	18.250	0.96		

Unit Hyd Qpeak (cms)= 0.065

PEAK FLOW (cms)= 0.006 (i)
TIME TO PEAK (hrs)= 10.250
RUNOFF VOLUME (mm)= 33.012
TOTAL RAINFALL (mm)= 95.920
RUNOFF COEFFICIENT = 0.344

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

ADD HYD (0027)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0502):	1.41	0.036	10.33	33.34
+ ID2= 2 (0510):	0.22	0.006	10.25	33.01
ID = 3 (0027):	1.63	0.042	10.25	33.30

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB
STANDHYD (0501)
ID= 1 DT= 5.0 min

Area (ha)= 1.17
Total Imp(%)= 43.00 Dir. Conn.(%)= 34.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.50	0.67
Dep. Storage	(mm)=	1.00	2.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	88.32	40.00
Mannings n	=	0.013	0.250

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	6.167	2.88	12.250	6.23	18.33	0.48
0.167	0.00	6.250	2.88	12.333	3.36	18.42	0.48
0.250	0.00	6.333	8.15	12.417	3.36	18.50	0.48
0.333	0.48	6.417	8.15	12.500	3.36	18.58	0.48
0.417	0.48	6.500	8.15	12.583	3.36	18.67	0.48
0.500	0.48	6.583	8.15	12.667	3.36	18.75	0.48
0.583	0.48	6.667	8.15	12.750	3.36	18.83	0.48
0.667	0.48	6.750	8.15	12.833	3.36	18.92	0.48
0.750	0.48	6.833	8.15	12.917	3.36	19.00	0.48
0.833	0.48	6.917	8.15	13.000	3.36	19.08	0.48
0.917	0.48	7.000	8.15	13.083	3.36	19.17	0.48
1.000	0.48	7.083	8.15	13.167	3.36	19.25	0.48
1.083	0.48	7.167	8.15	13.250	3.36	19.33	0.48
1.167	0.48	7.250	8.15	13.333	3.36	19.42	0.48
1.250	0.48	7.333	8.15	13.417	3.36	19.50	0.48
1.333	0.48	7.417	8.15	13.500	3.36	19.58	0.48
1.417	0.48	7.500	8.15	13.583	3.36	19.67	0.48
1.500	0.48	7.583	8.15	13.667	3.36	19.75	0.48
1.583	0.48	7.667	8.15	13.750	3.36	19.83	0.48
1.667	0.48	7.750	8.15	13.833	3.36	19.92	0.48

1.750	0.48	7.833	8.15	13.917	3.36	20.00	0.48
1.833	0.48	7.917	8.15	14.000	3.36	20.08	0.48
1.917	0.48	8.000	8.15	14.083	3.36	20.17	0.48
2.000	0.48	8.083	8.15	14.167	3.36	20.25	0.48
2.083	0.48	8.167	8.15	14.250	3.36	20.33	0.48
2.167	0.48	8.250	8.15	14.333	1.92	20.42	0.48
2.250	0.48	8.333	22.06	14.417	1.92	20.50	0.48
2.333	0.48	8.417	22.06	14.500	1.92	20.58	0.48
2.417	0.48	8.500	22.06	14.583	1.92	20.67	0.48
2.500	0.48	8.583	22.06	14.667	1.92	20.75	0.48
2.583	0.48	8.667	22.06	14.750	1.92	20.83	0.48
2.667	0.48	8.750	22.06	14.833	1.92	20.92	0.48
2.750	0.48	8.833	22.06	14.917	1.92	21.00	0.48
2.833	0.48	8.917	22.06	15.000	1.92	21.08	0.48
2.917	0.48	9.000	22.06	15.083	1.92	21.17	0.48
3.000	0.48	9.083	22.06	15.167	1.92	21.25	0.48
3.083	0.48	9.167	22.06	15.250	1.92	21.33	0.48
3.167	0.48	9.250	22.06	15.333	1.92	21.42	0.48
3.250	0.48	9.333	22.06	15.417	1.92	21.50	0.48
3.333	0.48	9.417	22.06	15.500	1.92	21.58	0.48
3.417	0.48	9.500	22.06	15.583	1.92	21.67	0.48
3.500	0.48	9.583	22.06	15.667	1.92	21.75	0.48
3.583	0.48	9.667	22.06	15.750	1.92	21.83	0.48
3.667	0.48	9.750	22.06	15.833	1.92	21.92	0.48
3.750	0.48	9.833	22.06	15.917	1.92	22.00	0.48
3.833	0.48	9.917	22.06	16.000	1.92	22.08	0.48
3.917	0.48	10.000	22.06	16.083	1.92	22.17	0.48
4.000	0.48	10.083	22.06	16.167	1.92	22.25	0.48
4.083	0.48	10.167	22.06	16.250	1.92	22.33	0.48
4.167	0.48	10.250	22.06	16.333	0.96	22.42	0.48
4.250	0.48	10.333	6.23	16.417	0.96	22.50	0.48
4.333	2.88	10.417	6.23	16.500	0.96	22.58	0.48
4.417	2.88	10.500	6.23	16.583	0.96	22.67	0.48
4.500	2.88	10.583	6.23	16.667	0.96	22.75	0.48
4.583	2.88	10.667	6.23	16.750	0.96	22.83	0.48
4.667	2.88	10.750	6.23	16.833	0.96	22.92	0.48
4.750	2.88	10.833	6.23	16.917	0.96	23.00	0.48
4.833	2.88	10.917	6.23	17.000	0.96	23.08	0.48
4.917	2.88	11.000	6.23	17.083	0.96	23.17	0.48
5.000	2.88	11.083	6.23	17.167	0.96	23.25	0.48
5.083	2.88	11.167	6.23	17.250	0.96	23.33	0.48
5.167	2.88	11.250	6.23	17.333	0.96	23.42	0.48
5.250	2.88	11.333	6.23	17.417	0.96	23.50	0.48
5.333	2.88	11.417	6.23	17.500	0.96	23.58	0.48
5.417	2.88	11.500	6.23	17.583	0.96	23.67	0.48
5.500	2.88	11.583	6.23	17.667	0.96	23.75	0.48
5.583	2.88	11.667	6.23	17.750	0.96	23.83	0.48
5.667	2.88	11.750	6.23	17.833	0.96	23.92	0.48
5.750	2.88	11.833	6.23	17.917	0.96	24.00	0.48
5.833	2.88	11.917	6.23	18.000	0.96	24.08	0.48
5.917	2.88	12.000	6.23	18.083	0.96	24.17	0.48
6.000	2.88	12.083	6.23	18.167	0.96	24.25	0.48
6.083	2.88	12.167	6.23	18.250	0.96		

Max.Eff.Inten.(mm/hr)=	22.06	13.47		
over (min)	5.00	25.00		
Storage Coeff. (min)=	4.34 (ii)	20.08 (ii)		
Unit Hyd. Tpeak (min)=	5.00	25.00		
Unit Hyd. peak (cms)=	0.23	0.05		
			TOTALS	
PEAK FLOW (cms)=	0.02	0.02	0.047 (iii)	
TIME TO PEAK (hrs)=	9.50	10.25	10.25	
RUNOFF VOLUME (mm)=	94.92	38.23	57.49	
TOTAL RAINFALL (mm)=	95.92	95.92	95.92	
RUNOFF COEFFICIENT =	0.99	0.40	0.60	

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 61.4 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0005)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0027):		1.63	0.042	10.25	33.30
+ ID2= 2 (0501):		1.17	0.047	10.25	57.49
ID = 3 (0005):		2.80	0.089	10.25	43.41

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0016)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0401):		2.39	0.065	10.25	33.33
+ ID2= 2 (0005):		2.80	0.089	10.25	43.41
ID = 3 (0016):		5.19	0.155	10.25	38.77

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0017)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0015):		2.62	0.089	10.25	44.54
+ ID2= 2 (0016):		5.19	0.155	10.25	38.77
ID = 3 (0017):		7.81	0.244	10.25	40.70

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0017)		AREA	QPEAK	TPEAK	R.V.
3 + 2 = 1		(ha)	(cms)	(hrs)	(mm)
ID1= 3 (0017):		7.81	0.244	10.25	40.70
+ ID2= 2 (0601):		8.75	0.144	11.17	33.34
ID = 1 (0017):		16.56	0.351	10.25	36.81

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0019)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (11801):		109.96	1.015	14.42	33.34
+ ID2= 2 (0017):		16.56	0.351	10.25	36.81
ID = 3 (0019):		126.52	1.129	14.17	33.80

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (3102)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0019):		126.52	1.129	14.17	33.80
+ ID2= 2 (2180):		576.27	4.614	18.00	48.68
ID = 3 (3102):		702.79	5.442	17.17	46.00

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB NASHYD (0301)	ID= 1 DT= 5.0 min	Area (ha)= 1.38	Curve Number (CN)= 61.4	Ia (mm)= 4.40	# of Linear Res.(N)= 3.00	U.H. Tp(hrs)= 0.31

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	6.167	2.88	12.250	6.23	18.33	0.48
0.167	0.00	6.250	2.88	12.333	3.36	18.42	0.48
0.250	0.00	6.333	8.15	12.417	3.36	18.50	0.48
0.333	0.48	6.417	8.15	12.500	3.36	18.58	0.48
0.417	0.48	6.500	8.15	12.583	3.36	18.67	0.48
0.500	0.48	6.583	8.15	12.667	3.36	18.75	0.48
0.583	0.48	6.667	8.15	12.750	3.36	18.83	0.48
0.667	0.48	6.750	8.15	12.833	3.36	18.92	0.48
0.750	0.48	6.833	8.15	12.917	3.36	19.00	0.48

0.833	0.48	6.917	8.15	13.000	3.36	19.08	0.48
0.917	0.48	7.000	8.15	13.083	3.36	19.17	0.48
1.000	0.48	7.083	8.15	13.167	3.36	19.25	0.48
1.083	0.48	7.167	8.15	13.250	3.36	19.33	0.48
1.167	0.48	7.250	8.15	13.333	3.36	19.42	0.48
1.250	0.48	7.333	8.15	13.417	3.36	19.50	0.48
1.333	0.48	7.417	8.15	13.500	3.36	19.58	0.48
1.417	0.48	7.500	8.15	13.583	3.36	19.67	0.48
1.500	0.48	7.583	8.15	13.667	3.36	19.75	0.48
1.583	0.48	7.667	8.15	13.750	3.36	19.83	0.48
1.667	0.48	7.750	8.15	13.833	3.36	19.92	0.48
1.750	0.48	7.833	8.15	13.917	3.36	20.00	0.48
1.833	0.48	7.917	8.15	14.000	3.36	20.08	0.48
1.917	0.48	8.000	8.15	14.083	3.36	20.17	0.48
2.000	0.48	8.083	8.15	14.167	3.36	20.25	0.48
2.083	0.48	8.167	8.15	14.250	3.36	20.33	0.48
2.167	0.48	8.250	8.15	14.333	1.92	20.42	0.48
2.250	0.48	8.333	22.06	14.417	1.92	20.50	0.48
2.333	0.48	8.417	22.06	14.500	1.92	20.58	0.48
2.417	0.48	8.500	22.06	14.583	1.92	20.67	0.48
2.500	0.48	8.583	22.06	14.667	1.92	20.75	0.48
2.583	0.48	8.667	22.06	14.750	1.92	20.83	0.48
2.667	0.48	8.750	22.06	14.833	1.92	20.92	0.48
2.750	0.48	8.833	22.06	14.917	1.92	21.00	0.48
2.833	0.48	8.917	22.06	15.000	1.92	21.08	0.48
2.917	0.48	9.000	22.06	15.083	1.92	21.17	0.48
3.000	0.48	9.083	22.06	15.167	1.92	21.25	0.48
3.083	0.48	9.167	22.06	15.250	1.92	21.33	0.48
3.167	0.48	9.250	22.06	15.333	1.92	21.42	0.48
3.250	0.48	9.333	22.06	15.417	1.92	21.50	0.48
3.333	0.48	9.417	22.06	15.500	1.92	21.58	0.48
3.417	0.48	9.500	22.06	15.583	1.92	21.67	0.48
3.500	0.48	9.583	22.06	15.667	1.92	21.75	0.48
3.583	0.48	9.667	22.06	15.750	1.92	21.83	0.48
3.667	0.48	9.750	22.06	15.833	1.92	21.92	0.48
3.750	0.48	9.833	22.06	15.917	1.92	22.00	0.48
3.833	0.48	9.917	22.06	16.000	1.92	22.08	0.48
3.917	0.48	10.000	22.06	16.083	1.92	22.17	0.48
4.000	0.48	10.083	22.06	16.167	1.92	22.25	0.48
4.083	0.48	10.167	22.06	16.250	1.92	22.33	0.48
4.167	0.48	10.250	22.06	16.333	0.96	22.42	0.48
4.250	0.48	10.333	6.23	16.417	0.96	22.50	0.48
4.333	2.88	10.417	6.23	16.500	0.96	22.58	0.48
4.417	2.88	10.500	6.23	16.583	0.96	22.67	0.48
4.500	2.88	10.583	6.23	16.667	0.96	22.75	0.48
4.583	2.88	10.667	6.23	16.750	0.96	22.83	0.48
4.667	2.88	10.750	6.23	16.833	0.96	22.92	0.48
4.750	2.88	10.833	6.23	16.917	0.96	23.00	0.48
4.833	2.88	10.917	6.23	17.000	0.96	23.08	0.48
4.917	2.88	11.000	6.23	17.083	0.96	23.17	0.48
5.000	2.88	11.083	6.23	17.167	0.96	23.25	0.48
5.083	2.88	11.167	6.23	17.250	0.96	23.33	0.48
5.167	2.88	11.250	6.23	17.333	0.96	23.42	0.48
5.250	2.88	11.333	6.23	17.417	0.96	23.50	0.48
5.333	2.88	11.417	6.23	17.500	0.96	23.58	0.48
5.417	2.88	11.500	6.23	17.583	0.96	23.67	0.48
5.500	2.88	11.583	6.23	17.667	0.96	23.75	0.48
5.583	2.88	11.667	6.23	17.750	0.96	23.83	0.48
5.667	2.88	11.750	6.23	17.833	0.96	23.92	0.48
5.750	2.88	11.833	6.23	17.917	0.96	24.00	0.48
5.833	2.88	11.917	6.23	18.000	0.96	24.08	0.48
5.917	2.88	12.000	6.23	18.083	0.96	24.17	0.48
6.000	2.88	12.083	6.23	18.167	0.96	24.25	0.48
6.083	2.88	12.167	6.23	18.250	0.96		

Unit Hyd Qpeak (cms)= 0.170

PEAK FLOW (cms)= 0.037 (i)
TIME TO PEAK (hrs)= 10.250
RUNOFF VOLUME (mm)= 33.332
TOTAL RAINFALL (mm)= 95.920
RUNOFF COEFFICIENT = 0.347

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

CALIB NASHYD (0302) ID= 1 DT= 5.0 min	Area (ha)= 0.19	Curve Number (CN)= 61.4
	Ia (mm)= 4.40	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 0.17	

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	6.167	2.88	12.250	6.23	18.33	0.48
0.167	0.00	6.250	2.88	12.333	3.36	18.42	0.48
0.250	0.00	6.333	8.15	12.417	3.36	18.50	0.48
0.333	0.48	6.417	8.15	12.500	3.36	18.58	0.48
0.417	0.48	6.500	8.15	12.583	3.36	18.67	0.48
0.500	0.48	6.583	8.15	12.667	3.36	18.75	0.48
0.583	0.48	6.667	8.15	12.750	3.36	18.83	0.48
0.667	0.48	6.750	8.15	12.833	3.36	18.92	0.48
0.750	0.48	6.833	8.15	12.917	3.36	19.00	0.48
0.833	0.48	6.917	8.15	13.000	3.36	19.08	0.48
0.917	0.48	7.000	8.15	13.083	3.36	19.17	0.48
1.000	0.48	7.083	8.15	13.167	3.36	19.25	0.48
1.083	0.48	7.167	8.15	13.250	3.36	19.33	0.48
1.167	0.48	7.250	8.15	13.333	3.36	19.42	0.48
1.250	0.48	7.333	8.15	13.417	3.36	19.50	0.48
1.333	0.48	7.417	8.15	13.500	3.36	19.58	0.48
1.417	0.48	7.500	8.15	13.583	3.36	19.67	0.48
1.500	0.48	7.583	8.15	13.667	3.36	19.75	0.48
1.583	0.48	7.667	8.15	13.750	3.36	19.83	0.48
1.667	0.48	7.750	8.15	13.833	3.36	19.92	0.48
1.750	0.48	7.833	8.15	13.917	3.36	20.00	0.48
1.833	0.48	7.917	8.15	14.000	3.36	20.08	0.48
1.917	0.48	8.000	8.15	14.083	3.36	20.17	0.48
2.000	0.48	8.083	8.15	14.167	3.36	20.25	0.48
2.083	0.48	8.167	8.15	14.250	3.36	20.33	0.48
2.167	0.48	8.250	8.15	14.333	1.92	20.42	0.48
2.250	0.48	8.333	22.06	14.417	1.92	20.50	0.48
2.333	0.48	8.417	22.06	14.500	1.92	20.58	0.48
2.417	0.48	8.500	22.06	14.583	1.92	20.67	0.48
2.500	0.48	8.583	22.06	14.667	1.92	20.75	0.48
2.583	0.48	8.667	22.06	14.750	1.92	20.83	0.48
2.667	0.48	8.750	22.06	14.833	1.92	20.92	0.48
2.750	0.48	8.833	22.06	14.917	1.92	21.00	0.48
2.833	0.48	8.917	22.06	15.000	1.92	21.08	0.48
2.917	0.48	9.000	22.06	15.083	1.92	21.17	0.48
3.000	0.48	9.083	22.06	15.167	1.92	21.25	0.48
3.083	0.48	9.167	22.06	15.250	1.92	21.33	0.48
3.167	0.48	9.250	22.06	15.333	1.92	21.42	0.48
3.250	0.48	9.333	22.06	15.417	1.92	21.50	0.48
3.333	0.48	9.417	22.06	15.500	1.92	21.58	0.48
3.417	0.48	9.500	22.06	15.583	1.92	21.67	0.48
3.500	0.48	9.583	22.06	15.667	1.92	21.75	0.48
3.583	0.48	9.667	22.06	15.750	1.92	21.83	0.48
3.667	0.48	9.750	22.06	15.833	1.92	21.92	0.48
3.750	0.48	9.833	22.06	15.917	1.92	22.00	0.48
3.833	0.48	9.917	22.06	16.000	1.92	22.08	0.48
3.917	0.48	10.000	22.06	16.083	1.92	22.17	0.48
4.000	0.48	10.083	22.06	16.167	1.92	22.25	0.48
4.083	0.48	10.167	22.06	16.250	1.92	22.33	0.48
4.167	0.48	10.250	22.06	16.333	0.96	22.42	0.48
4.250	0.48	10.333	6.23	16.417	0.96	22.50	0.48
4.333	2.88	10.417	6.23	16.500	0.96	22.58	0.48
4.417	2.88	10.500	6.23	16.583	0.96	22.67	0.48
4.500	2.88	10.583	6.23	16.667	0.96	22.75	0.48
4.583	2.88	10.667	6.23	16.750	0.96	22.83	0.48
4.667	2.88	10.750	6.23	16.833	0.96	22.92	0.48
4.750	2.88	10.833	6.23	16.917	0.96	23.00	0.48
4.833	2.88	10.917	6.23	17.000	0.96	23.08	0.48
4.917	2.88	11.000	6.23	17.083	0.96	23.17	0.48
5.000	2.88	11.083	6.23	17.167	0.96	23.25	0.48
5.083	2.88	11.167	6.23	17.250	0.96	23.33	0.48
5.167	2.88	11.250	6.23	17.333	0.96	23.42	0.48
5.250	2.88	11.333	6.23	17.417	0.96	23.50	0.48
5.333	2.88	11.417	6.23	17.500	0.96	23.58	0.48
5.417	2.88	11.500	6.23	17.583	0.96	23.67	0.48
5.500	2.88	11.583	6.23	17.667	0.96	23.75	0.48
5.583	2.88	11.667	6.23	17.750	0.96	23.83	0.48
5.667	2.88	11.750	6.23	17.833	0.96	23.92	0.48
5.750	2.88	11.833	6.23	17.917	0.96	24.00	0.48
5.833	2.88	11.917	6.23	18.000	0.96	24.08	0.48
5.917	2.88	12.000	6.23	18.083	0.96	24.17	0.48
6.000	2.88	12.083	6.23	18.167	0.96	24.25	0.48
6.083	2.88	12.167	6.23	18.250	0.96		

Unit Hyd Qpeak (cms)= 0.043

PEAK FLOW (cms)= 0.005 (i)
TIME TO PEAK (hrs)= 10.250
RUNOFF VOLUME (mm)= 33.222
TOTAL RAINFALL (mm)= 95.920

RUNOFF COEFFICIENT = 0.346

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

ADD HYD (0003) 1 + 2 = 3		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
	ID1= 1 (0301):	1.38	0.037	10.25	33.33
+	ID2= 2 (0302):	0.19	0.005	10.25	33.22
	ID = 3 (0003):	1.57	0.043	10.25	33.32

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB NASHYD (11791) ID= 1 DT= 5.0 min				
	Area (ha)=	92.12	Curve Number (CN)=	54.6
	Ia (mm)=	4.60	# of Linear Res.(N)=	3.00
	U.H. Tp(hrs)=	4.68		

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

---- TRANSFORMED HYETOGRAPH ----

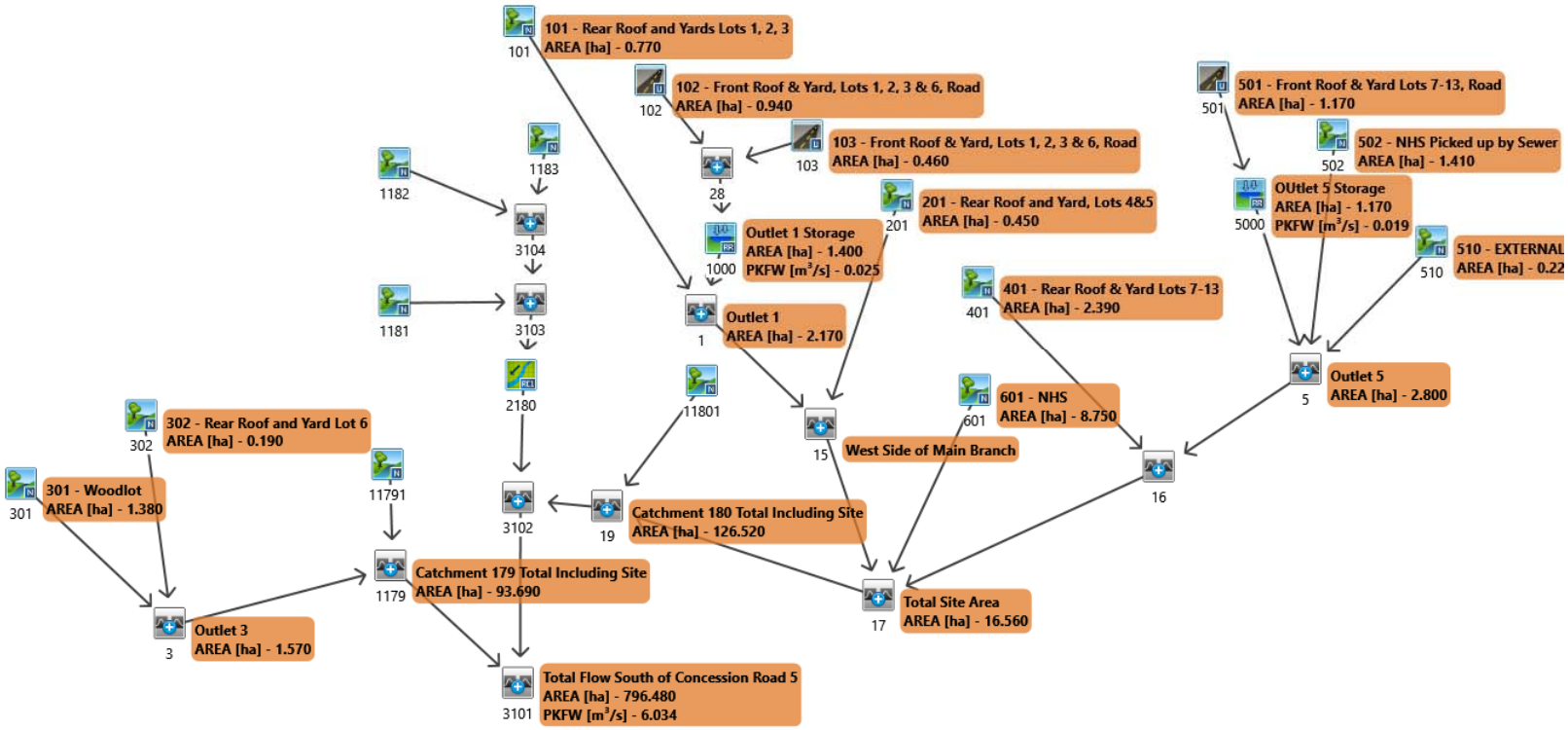
TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	6.167	2.88	12.250	6.23	18.33	0.48
0.167	0.00	6.250	2.88	12.333	3.36	18.42	0.48
0.250	0.00	6.333	8.15	12.417	3.36	18.50	0.48
0.333	0.48	6.417	8.15	12.500	3.36	18.58	0.48
0.417	0.48	6.500	8.15	12.583	3.36	18.67	0.48
0.500	0.48	6.583	8.15	12.667	3.36	18.75	0.48
0.583	0.48	6.667	8.15	12.750	3.36	18.83	0.48
0.667	0.48	6.750	8.15	12.833	3.36	18.92	0.48
0.750	0.48	6.833	8.15	12.917	3.36	19.00	0.48
0.833	0.48	6.917	8.15	13.000	3.36	19.08	0.48
0.917	0.48	7.000	8.15	13.083	3.36	19.17	0.48
1.000	0.48	7.083	8.15	13.167	3.36	19.25	0.48
1.083	0.48	7.167	8.15	13.250	3.36	19.33	0.48
1.167	0.48	7.250	8.15	13.333	3.36	19.42	0.48
1.250	0.48	7.333	8.15	13.417	3.36	19.50	0.48
1.333	0.48	7.417	8.15	13.500	3.36	19.58	0.48
1.417	0.48	7.500	8.15	13.583	3.36	19.67	0.48
1.500	0.48	7.583	8.15	13.667	3.36	19.75	0.48
1.583	0.48	7.667	8.15	13.750	3.36	19.83	0.48
1.667	0.48	7.750	8.15	13.833	3.36	19.92	0.48
1.750	0.48	7.833	8.15	13.917	3.36	20.00	0.48
1.833	0.48	7.917	8.15	14.000	3.36	20.08	0.48
1.917	0.48	8.000	8.15	14.083	3.36	20.17	0.48
2.000	0.48	8.083	8.15	14.167	3.36	20.25	0.48
2.083	0.48	8.167	8.15	14.250	3.36	20.33	0.48
2.167	0.48	8.250	8.15	14.333	1.92	20.42	0.48
2.250	0.48	8.333	22.06	14.417	1.92	20.50	0.48
2.333	0.48	8.417	22.06	14.500	1.92	20.58	0.48
2.417	0.48	8.500	22.06	14.583	1.92	20.67	0.48
2.500	0.48	8.583	22.06	14.667	1.92	20.75	0.48
2.583	0.48	8.667	22.06	14.750	1.92	20.83	0.48
2.667	0.48	8.750	22.06	14.833	1.92	20.92	0.48
2.750	0.48	8.833	22.06	14.917	1.92	21.00	0.48
2.833	0.48	8.917	22.06	15.000	1.92	21.08	0.48
2.917	0.48	9.000	22.06	15.083	1.92	21.17	0.48
3.000	0.48	9.083	22.06	15.167	1.92	21.25	0.48
3.083	0.48	9.167	22.06	15.250	1.92	21.33	0.48
3.167	0.48	9.250	22.06	15.333	1.92	21.42	0.48
3.250	0.48	9.333	22.06	15.417	1.92	21.50	0.48
3.333	0.48	9.417	22.06	15.500	1.92	21.58	0.48
3.417	0.48	9.500	22.06	15.583	1.92	21.67	0.48
3.500	0.48	9.583	22.06	15.667	1.92	21.75	0.48
3.583	0.48	9.667	22.06	15.750	1.92	21.83	0.48
3.667	0.48	9.750	22.06	15.833	1.92	21.92	0.48
3.750	0.48	9.833	22.06	15.917	1.92	22.00	0.48
3.833	0.48	9.917	22.06	16.000	1.92	22.08	0.48
3.917	0.48	10.000	22.06	16.083	1.92	22.17	0.48
4.000	0.48	10.083	22.06	16.167	1.92	22.25	0.48
4.083	0.48	10.167	22.06	16.250	1.92	22.33	0.48
4.167	0.48	10.250	22.06	16.333	0.96	22.42	0.48
4.250	0.48	10.333	6.23	16.417	0.96	22.50	0.48
4.333	2.88	10.417	6.23	16.500	0.96	22.58	0.48
4.417	2.88	10.500	6.23	16.583	0.96	22.67	0.48
4.500	2.88	10.583	6.23	16.667	0.96	22.75	0.48
4.583	2.88	10.667	6.23	16.750	0.96	22.83	0.48

```
                4.667    2.88 |10.750    6.23 |16.833    0.96 | 22.92    0.48
                4.750    2.88 |10.833    6.23 |16.917    0.96 | 23.00    0.48
                4.833    2.88 |10.917    6.23 |17.000    0.96 | 23.08    0.48
                4.917    2.88 |11.000    6.23 |17.083    0.96 | 23.17    0.48
                5.000    2.88 |11.083    6.23 |17.167    0.96 | 23.25    0.48
                5.083    2.88 |11.167    6.23 |17.250    0.96 | 23.33    0.48
                5.167    2.88 |11.250    6.23 |17.333    0.96 | 23.42    0.48
                5.250    2.88 |11.333    6.23 |17.417    0.96 | 23.50    0.48
                5.333    2.88 |11.417    6.23 |17.500    0.96 | 23.58    0.48
                5.417    2.88 |11.500    6.23 |17.583    0.96 | 23.67    0.48
                5.500    2.88 |11.583    6.23 |17.667    0.96 | 23.75    0.48
                5.583    2.88 |11.667    6.23 |17.750    0.96 | 23.83    0.48
                5.667    2.88 |11.750    6.23 |17.833    0.96 | 23.92    0.48
                5.750    2.88 |11.833    6.23 |17.917    0.96 | 24.00    0.48
                5.833    2.88 |11.917    6.23 |18.000    0.96 | 24.08    0.48
                5.917    2.88 |12.000    6.23 |18.083    0.96 | 24.17    0.48
                6.000    2.88 |12.083    6.23 |18.167    0.96 | 24.25    0.48
                6.083    2.88 |12.167    6.23 |18.250    0.96 |

     Unit Hyd Qpeak  (cms)=   0.752

     PEAK FLOW       (cms)=   0.608 (i)
     TIME TO PEAK    (hrs)=  15.583
     RUNOFF VOLUME    (mm)=  27.566
     TOTAL RAINFALL   (mm)=  95.920
     RUNOFF COEFFICIENT   =   0.287

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

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

--------------------
| ADD HYD  (  1179)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 ( 11791):    92.12   0.608    15.58    27.57
     + ID2= 2 (  0003):     1.57   0.043    10.25    33.32
       ================================================
       ID = 3 (  1179):    93.69   0.613    15.58    27.66

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

--------------------
| ADD HYD  (  3101)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  1179):    93.69   0.613    15.58    27.66
     + ID2= 2 (  3102):   702.79   5.442    17.17    46.00
       ================================================
       ID = 3 (  3101):   796.48   6.025    16.92    43.84

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

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

Appendix C3

Post Development Controlled Conditions

Visual Otthymo Model Schematic – Post-Development Controlled Conditions



Project Name:	Frisque Lands	**Prepared By:** AK
Project No.:	E21007	**Checked By:** RB
Subject:	Post-Development Visual Otthymo Model Parameters (Uncontrolled and Controlled)	

Rural - Nashyd Commands

NHYD	Name	Outlet	Area	Cn	Ia	N	Tp
1181	NasHyd - 1181	3103	118.7	74.6	4.4	3	4.55
1183	NasHyd - 1183	3104	176.21	76.1	3.9	3	5.98
1182	NasHyd - 1182	3104	281.36	76.1	4.3	3	9.88
11801	Catchment 180 less Site Area	19	109.96	61.4	4.4	3	3.8
101	101 - Rear Roof and Yards Lots 1, 2, 3	1	0.77	61.4	4.4	3	0.17
301	301 - Woodlot	3	1.38	61.4	4.4	3	0.31
201	201 - Rear Roof and Yard, Lots 4&5	15	0.45	61.4	4.4	3	0.17
11791	Catchment 1179 less Site Area	1179	92.12	54.6	4.6	3	4.68
601	601 - NHS	17	8.75	61.4	4.4	3	1.44
401	401 - Rear Roof & Yard Lots 7-13	16	2.39	61.4	4.4	3	0.29
502	502 - NHS Picked up by Sewer	27	1.41	61.4	4.4	3	0.45
510	510 - EXTERNAL	27	0.22	61.4	4.4	3	0.13
302	302 - Rear Roof and Yard Lot 6	3	0.19	61.4	4.4	3	0.17

Urban - Standhyd Commands

NHYD	Name	Area	Timp	Ximp	Slpp	Lgp	Mnp	Scp	Dpsi	Slpi	Lgi	Mni
102	102 - Front Roof & Yard, Lots 1, 2, 3 & 6, Road	0.94	0.35	0.28	2	40	0.25	0	1	1	79.16	0.013
103	103 - Front Roof & Yard, Lots 1, 2, 3 & 6, Road	0.46	0.41	0.33	2	40	0.25	0	1	1	55.38	0.013
501	501 - Front Roof & Yard Lots 7-13, Road	1.17	0.43	0.34	2	40	0.25	0	1	1	88.32	0.013

```
       V    V   I    SSSSS  U   U    A    L             (v 6.2.2011)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
Developed and Distributed by Smart City Water Inc
Copyright 2007 - 2021 Smart City Water Inc
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 6.2\VO2\voin.dat
Output filename: C:\Users\akeeping\AppData\Local\Civica\VH5\3bf9ac1f-e66b-45e5-875b-87a83afa1a0b\b4d0386f-2
Summary filename: C:\Users\akeeping\AppData\Local\Civica\VH5\3bf9ac1f-e66b-45e5-875b-87a83afa1a0b\b4d0386f-2

DATE: 07-17-2023 TIME: 09:15:50

USER:

COMMENTS: _____

****
** SIMULATION : 100yr24_AES **
****

READ STORM	Filename: C:\Users\akeeping\AppD ata\Local\Temp\ 488d52e9-32f0-47de-a2ef-334b5e83a362\0130180c
Ptotal= 95.92 mm	Comments: 100y24_AES

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	0.00	6.25	8.15	12.50	3.36	18.75	0.48
0.25	0.48	6.50	8.15	12.75	3.36	19.00	0.48
0.50	0.48	6.75	8.15	13.00	3.36	19.25	0.48
0.75	0.48	7.00	8.15	13.25	3.36	19.50	0.48
1.00	0.48	7.25	8.15	13.50	3.36	19.75	0.48
1.25	0.48	7.50	8.15	13.75	3.36	20.00	0.48
1.50	0.48	7.75	8.15	14.00	3.36	20.25	0.48
1.75	0.48	8.00	8.15	14.25	1.92	20.50	0.48
2.00	0.48	8.25	22.06	14.50	1.92	20.75	0.48
2.25	0.48	8.50	22.06	14.75	1.92	21.00	0.48
2.50	0.48	8.75	22.06	15.00	1.92	21.25	0.48
2.75	0.48	9.00	22.06	15.25	1.92	21.50	0.48
3.00	0.48	9.25	22.06	15.50	1.92	21.75	0.48
3.25	0.48	9.50	22.06	15.75	1.92	22.00	0.48
3.50	0.48	9.75	22.06	16.00	1.92	22.25	0.48
3.75	0.48	10.00	22.06	16.25	0.96	22.50	0.48
4.00	0.48	10.25	6.23	16.50	0.96	22.75	0.48
4.25	2.88	10.50	6.23	16.75	0.96	23.00	0.48
4.50	2.88	10.75	6.23	17.00	0.96	23.25	0.48
4.75	2.88	11.00	6.23	17.25	0.96	23.50	0.48
5.00	2.88	11.25	6.23	17.50	0.96	23.75	0.48
5.25	2.88	11.50	6.23	17.75	0.96	24.00	0.48
5.50	2.88	11.75	6.23	18.00	0.96		
5.75	2.88	12.00	6.23	18.25	0.48		
6.00	2.88	12.25	3.36	18.50	0.48		

CALIB NASHYD (1181) ID= 1 DT= 5.0 min	Area (ha)= 118.70 Curve Number (CN)= 74.6 Ia (mm)= 4.40 # of Linear Res.(N)= 3.00 U.H. Tp(hrs)= 4.55

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	6.167	2.88	12.250	6.23	18.33	0.48
0.167	0.00	6.250	2.88	12.333	3.36	18.42	0.48
0.250	0.00	6.333	8.15	12.417	3.36	18.50	0.48
0.333	0.48	6.417	8.15	12.500	3.36	18.58	0.48
0.417	0.48	6.500	8.15	12.583	3.36	18.67	0.48
0.500	0.48	6.583	8.15	12.667	3.36	18.75	0.48
0.583	0.48	6.667	8.15	12.750	3.36	18.83	0.48
0.667	0.48	6.750	8.15	12.833	3.36	18.92	0.48
0.750	0.48	6.833	8.15	12.917	3.36	19.00	0.48
0.833	0.48	6.917	8.15	13.000	3.36	19.08	0.48
0.917	0.48	7.000	8.15	13.083	3.36	19.17	0.48
1.000	0.48	7.083	8.15	13.167	3.36	19.25	0.48
1.083	0.48	7.167	8.15	13.250	3.36	19.33	0.48
1.167	0.48	7.250	8.15	13.333	3.36	19.42	0.48
1.250	0.48	7.333	8.15	13.417	3.36	19.50	0.48
1.333	0.48	7.417	8.15	13.500	3.36	19.58	0.48
1.417	0.48	7.500	8.15	13.583	3.36	19.67	0.48
1.500	0.48	7.583	8.15	13.667	3.36	19.75	0.48
1.583	0.48	7.667	8.15	13.750	3.36	19.83	0.48
1.667	0.48	7.750	8.15	13.833	3.36	19.92	0.48
1.750	0.48	7.833	8.15	13.917	3.36	20.00	0.48
1.833	0.48	7.917	8.15	14.000	3.36	20.08	0.48
1.917	0.48	8.000	8.15	14.083	3.36	20.17	0.48
2.000	0.48	8.083	8.15	14.167	3.36	20.25	0.48
2.083	0.48	8.167	8.15	14.250	3.36	20.33	0.48
2.167	0.48	8.250	8.15	14.333	1.92	20.42	0.48
2.250	0.48	8.333	22.06	14.417	1.92	20.50	0.48
2.333	0.48	8.417	22.06	14.500	1.92	20.58	0.48
2.417	0.48	8.500	22.06	14.583	1.92	20.67	0.48
2.500	0.48	8.583	22.06	14.667	1.92	20.75	0.48
2.583	0.48	8.667	22.06	14.750	1.92	20.83	0.48
2.667	0.48	8.750	22.06	14.833	1.92	20.92	0.48
2.750	0.48	8.833	22.06	14.917	1.92	21.00	0.48
2.833	0.48	8.917	22.06	15.000	1.92	21.08	0.48
2.917	0.48	9.000	22.06	15.083	1.92	21.17	0.48
3.000	0.48	9.083	22.06	15.167	1.92	21.25	0.48
3.083	0.48	9.167	22.06	15.250	1.92	21.33	0.48
3.167	0.48	9.250	22.06	15.333	1.92	21.42	0.48
3.250	0.48	9.333	22.06	15.417	1.92	21.50	0.48
3.333	0.48	9.417	22.06	15.500	1.92	21.58	0.48
3.417	0.48	9.500	22.06	15.583	1.92	21.67	0.48
3.500	0.48	9.583	22.06	15.667	1.92	21.75	0.48
3.583	0.48	9.667	22.06	15.750	1.92	21.83	0.48
3.667	0.48	9.750	22.06	15.833	1.92	21.92	0.48
3.750	0.48	9.833	22.06	15.917	1.92	22.00	0.48
3.833	0.48	9.917	22.06	16.000	1.92	22.08	0.48
3.917	0.48	10.000	22.06	16.083	1.92	22.17	0.48
4.000	0.48	10.083	22.06	16.167	1.92	22.25	0.48
4.083	0.48	10.167	22.06	16.250	1.92	22.33	0.48
4.167	0.48	10.250	22.06	16.333	0.96	22.42	0.48
4.250	0.48	10.333	6.23	16.417	0.96	22.50	0.48
4.333	2.88	10.417	6.23	16.500	0.96	22.58	0.48
4.417	2.88	10.500	6.23	16.583	0.96	22.67	0.48
4.500	2.88	10.583	6.23	16.667	0.96	22.75	0.48
4.583	2.88	10.667	6.23	16.750	0.96	22.83	0.48
4.667	2.88	10.750	6.23	16.833	0.96	22.92	0.48
4.750	2.88	10.833	6.23	16.917	0.96	23.00	0.48
4.833	2.88	10.917	6.23	17.000	0.96	23.08	0.48
4.917	2.88	11.000	6.23	17.083	0.96	23.17	0.48
5.000	2.88	11.083	6.23	17.167	0.96	23.25	0.48
5.083	2.88	11.167	6.23	17.250	0.96	23.33	0.48
5.167	2.88	11.250	6.23	17.333	0.96	23.42	0.48
5.250	2.88	11.333	6.23	17.417	0.96	23.50	0.48
5.333	2.88	11.417	6.23	17.500	0.96	23.58	0.48
5.417	2.88	11.500	6.23	17.583	0.96	23.67	0.48
5.500	2.88	11.583	6.23	17.667	0.96	23.75	0.48
5.583	2.88	11.667	6.23	17.750	0.96	23.83	0.48
5.667	2.88	11.750	6.23	17.833	0.96	23.92	0.48
5.750	2.88	11.833	6.23	17.917	0.96	24.00	0.48
5.833	2.88	11.917	6.23	18.000	0.96	24.08	0.48
5.917	2.88	12.000	6.23	18.083	0.96	24.17	0.48
6.000	2.88	12.083	6.23	18.167	0.96	24.25	0.48
6.083	2.88	12.167	6.23	18.250	0.96		

Unit Hyd Qpeak (cms)= 0.996

PEAK FLOW (cms)= 1.388 (i)
TIME TO PEAK (hrs)= 15.167
RUNOFF VOLUME (mm)= 47.055
TOTAL RAINFALL (mm)= 95.920

RUNOFF COEFFICIENT = 0.491

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

CALIB	
NASHYD (1183)	Area (ha)= 176.21 Curve Number (CN)= 76.1
ID= 1 DT= 5.0 min	Ia (mm)= 3.90 # of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 5.98

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	6.167	2.88	12.250	6.23	18.33	0.48
0.167	0.00	6.250	2.88	12.333	3.36	18.42	0.48
0.250	0.00	6.333	8.15	12.417	3.36	18.50	0.48
0.333	0.48	6.417	8.15	12.500	3.36	18.58	0.48
0.417	0.48	6.500	8.15	12.583	3.36	18.67	0.48
0.500	0.48	6.583	8.15	12.667	3.36	18.75	0.48
0.583	0.48	6.667	8.15	12.750	3.36	18.83	0.48
0.667	0.48	6.750	8.15	12.833	3.36	18.92	0.48
0.750	0.48	6.833	8.15	12.917	3.36	19.00	0.48
0.833	0.48	6.917	8.15	13.000	3.36	19.08	0.48
0.917	0.48	7.000	8.15	13.083	3.36	19.17	0.48
1.000	0.48	7.083	8.15	13.167	3.36	19.25	0.48
1.083	0.48	7.167	8.15	13.250	3.36	19.33	0.48
1.167	0.48	7.250	8.15	13.333	3.36	19.42	0.48
1.250	0.48	7.333	8.15	13.417	3.36	19.50	0.48
1.333	0.48	7.417	8.15	13.500	3.36	19.58	0.48
1.417	0.48	7.500	8.15	13.583	3.36	19.67	0.48
1.500	0.48	7.583	8.15	13.667	3.36	19.75	0.48
1.583	0.48	7.667	8.15	13.750	3.36	19.83	0.48
1.667	0.48	7.750	8.15	13.833	3.36	19.92	0.48
1.750	0.48	7.833	8.15	13.917	3.36	20.00	0.48
1.833	0.48	7.917	8.15	14.000	3.36	20.08	0.48
1.917	0.48	8.000	8.15	14.083	3.36	20.17	0.48
2.000	0.48	8.083	8.15	14.167	3.36	20.25	0.48
2.083	0.48	8.167	8.15	14.250	3.36	20.33	0.48
2.167	0.48	8.250	8.15	14.333	1.92	20.42	0.48
2.250	0.48	8.333	22.06	14.417	1.92	20.50	0.48
2.333	0.48	8.417	22.06	14.500	1.92	20.58	0.48
2.417	0.48	8.500	22.06	14.583	1.92	20.67	0.48
2.500	0.48	8.583	22.06	14.667	1.92	20.75	0.48
2.583	0.48	8.667	22.06	14.750	1.92	20.83	0.48
2.667	0.48	8.750	22.06	14.833	1.92	20.92	0.48
2.750	0.48	8.833	22.06	14.917	1.92	21.00	0.48
2.833	0.48	8.917	22.06	15.000	1.92	21.08	0.48
2.917	0.48	9.000	22.06	15.083	1.92	21.17	0.48
3.000	0.48	9.083	22.06	15.167	1.92	21.25	0.48
3.083	0.48	9.167	22.06	15.250	1.92	21.33	0.48
3.167	0.48	9.250	22.06	15.333	1.92	21.42	0.48
3.250	0.48	9.333	22.06	15.417	1.92	21.50	0.48
3.333	0.48	9.417	22.06	15.500	1.92	21.58	0.48
3.417	0.48	9.500	22.06	15.583	1.92	21.67	0.48
3.500	0.48	9.583	22.06	15.667	1.92	21.75	0.48
3.583	0.48	9.667	22.06	15.750	1.92	21.83	0.48
3.667	0.48	9.750	22.06	15.833	1.92	21.92	0.48
3.750	0.48	9.833	22.06	15.917	1.92	22.00	0.48
3.833	0.48	9.917	22.06	16.000	1.92	22.08	0.48
3.917	0.48	10.000	22.06	16.083	1.92	22.17	0.48
4.000	0.48	10.083	22.06	16.167	1.92	22.25	0.48
4.083	0.48	10.167	22.06	16.250	1.92	22.33	0.48
4.167	0.48	10.250	22.06	16.333	0.96	22.42	0.48
4.250	0.48	10.333	6.23	16.417	0.96	22.50	0.48
4.333	2.88	10.417	6.23	16.500	0.96	22.58	0.48
4.417	2.88	10.500	6.23	16.583	0.96	22.67	0.48
4.500	2.88	10.583	6.23	16.667	0.96	22.75	0.48
4.583	2.88	10.667	6.23	16.750	0.96	22.83	0.48
4.667	2.88	10.750	6.23	16.833	0.96	22.92	0.48
4.750	2.88	10.833	6.23	16.917	0.96	23.00	0.48
4.833	2.88	10.917	6.23	17.000	0.96	23.08	0.48
4.917	2.88	11.000	6.23	17.083	0.96	23.17	0.48
5.000	2.88	11.083	6.23	17.167	0.96	23.25	0.48
5.083	2.88	11.167	6.23	17.250	0.96	23.33	0.48
5.167	2.88	11.250	6.23	17.333	0.96	23.42	0.48
5.250	2.88	11.333	6.23	17.417	0.96	23.50	0.48
5.333	2.88	11.417	6.23	17.500	0.96	23.58	0.48
5.417	2.88	11.500	6.23	17.583	0.96	23.67	0.48
5.500	2.88	11.583	6.23	17.667	0.96	23.75	0.48
5.583	2.88	11.667	6.23	17.750	0.96	23.83	0.48

5.667	2.88	11.750	6.23	17.833	0.96	23.92	0.48
5.750	2.88	11.833	6.23	17.917	0.96	24.00	0.48
5.833	2.88	11.917	6.23	18.000	0.96	24.08	0.48
5.917	2.88	12.000	6.23	18.083	0.96	24.17	0.48
6.000	2.88	12.083	6.23	18.167	0.96	24.25	0.48
6.083	2.88	12.167	6.23	18.250	0.96		

Unit Hyd Qpeak (cms)= 1.125

PEAK FLOW (cms)= 1.773 (i)
TIME TO PEAK (hrs)= 16.833
RUNOFF VOLUME (mm)= 49.290
TOTAL RAINFALL (mm)= 95.920
RUNOFF COEFFICIENT = 0.514

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

CALIB			
NASHYD (1182)	Area (ha)= 281.36	Curve Number (CN)= 76.1	
ID= 1 DT= 5.0 min	Ia (mm)= 4.30	# of Linear Res.(N)= 3.00	
	U.H. Tp(hrs)= 9.88		

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	6.167	2.88	12.250	6.23	18.33	0.48
0.167	0.00	6.250	2.88	12.333	3.36	18.42	0.48
0.250	0.00	6.333	8.15	12.417	3.36	18.50	0.48
0.333	0.48	6.417	8.15	12.500	3.36	18.58	0.48
0.417	0.48	6.500	8.15	12.583	3.36	18.67	0.48
0.500	0.48	6.583	8.15	12.667	3.36	18.75	0.48
0.583	0.48	6.667	8.15	12.750	3.36	18.83	0.48
0.667	0.48	6.750	8.15	12.833	3.36	18.92	0.48
0.750	0.48	6.833	8.15	12.917	3.36	19.00	0.48
0.833	0.48	6.917	8.15	13.000	3.36	19.08	0.48
0.917	0.48	7.000	8.15	13.083	3.36	19.17	0.48
1.000	0.48	7.083	8.15	13.167	3.36	19.25	0.48
1.083	0.48	7.167	8.15	13.250	3.36	19.33	0.48
1.167	0.48	7.250	8.15	13.333	3.36	19.42	0.48
1.250	0.48	7.333	8.15	13.417	3.36	19.50	0.48
1.333	0.48	7.417	8.15	13.500	3.36	19.58	0.48
1.417	0.48	7.500	8.15	13.583	3.36	19.67	0.48
1.500	0.48	7.583	8.15	13.667	3.36	19.75	0.48
1.583	0.48	7.667	8.15	13.750	3.36	19.83	0.48
1.667	0.48	7.750	8.15	13.833	3.36	19.92	0.48
1.750	0.48	7.833	8.15	13.917	3.36	20.00	0.48
1.833	0.48	7.917	8.15	14.000	3.36	20.08	0.48
1.917	0.48	8.000	8.15	14.083	3.36	20.17	0.48
2.000	0.48	8.083	8.15	14.167	3.36	20.25	0.48
2.083	0.48	8.167	8.15	14.250	3.36	20.33	0.48
2.167	0.48	8.250	8.15	14.333	1.92	20.42	0.48
2.250	0.48	8.333	22.06	14.417	1.92	20.50	0.48
2.333	0.48	8.417	22.06	14.500	1.92	20.58	0.48
2.417	0.48	8.500	22.06	14.583	1.92	20.67	0.48
2.500	0.48	8.583	22.06	14.667	1.92	20.75	0.48
2.583	0.48	8.667	22.06	14.750	1.92	20.83	0.48
2.667	0.48	8.750	22.06	14.833	1.92	20.92	0.48
2.750	0.48	8.833	22.06	14.917	1.92	21.00	0.48
2.833	0.48	8.917	22.06	15.000	1.92	21.08	0.48
2.917	0.48	9.000	22.06	15.083	1.92	21.17	0.48
3.000	0.48	9.083	22.06	15.167	1.92	21.25	0.48
3.083	0.48	9.167	22.06	15.250	1.92	21.33	0.48
3.167	0.48	9.250	22.06	15.333	1.92	21.42	0.48
3.250	0.48	9.333	22.06	15.417	1.92	21.50	0.48
3.333	0.48	9.417	22.06	15.500	1.92	21.58	0.48
3.417	0.48	9.500	22.06	15.583	1.92	21.67	0.48
3.500	0.48	9.583	22.06	15.667	1.92	21.75	0.48
3.583	0.48	9.667	22.06	15.750	1.92	21.83	0.48
3.667	0.48	9.750	22.06	15.833	1.92	21.92	0.48
3.750	0.48	9.833	22.06	15.917	1.92	22.00	0.48
3.833	0.48	9.917	22.06	16.000	1.92	22.08	0.48
3.917	0.48	10.000	22.06	16.083	1.92	22.17	0.48
4.000	0.48	10.083	22.06	16.167	1.92	22.25	0.48
4.083	0.48	10.167	22.06	16.250	1.92	22.33	0.48
4.167	0.48	10.250	22.06	16.333	0.96	22.42	0.48
4.250	0.48	10.333	6.23	16.417	0.96	22.50	0.48
4.333	2.88	10.417	6.23	16.500	0.96	22.58	0.48
4.417	2.88	10.500	6.23	16.583	0.96	22.67	0.48
4.500	2.88	10.583	6.23	16.667	0.96	22.75	0.48

4.583	2.88	10.667	6.23	16.750	0.96	22.83	0.48
4.667	2.88	10.750	6.23	16.833	0.96	22.92	0.48
4.750	2.88	10.833	6.23	16.917	0.96	23.00	0.48
4.833	2.88	10.917	6.23	17.000	0.96	23.08	0.48
4.917	2.88	11.000	6.23	17.083	0.96	23.17	0.48
5.000	2.88	11.083	6.23	17.167	0.96	23.25	0.48
5.083	2.88	11.167	6.23	17.250	0.96	23.33	0.48
5.167	2.88	11.250	6.23	17.333	0.96	23.42	0.48
5.250	2.88	11.333	6.23	17.417	0.96	23.50	0.48
5.333	2.88	11.417	6.23	17.500	0.96	23.58	0.48
5.417	2.88	11.500	6.23	17.583	0.96	23.67	0.48
5.500	2.88	11.583	6.23	17.667	0.96	23.75	0.48
5.583	2.88	11.667	6.23	17.750	0.96	23.83	0.48
5.667	2.88	11.750	6.23	17.833	0.96	23.92	0.48
5.750	2.88	11.833	6.23	17.917	0.96	24.00	0.48
5.833	2.88	11.917	6.23	18.000	0.96	24.08	0.48
5.917	2.88	12.000	6.23	18.083	0.96	24.17	0.48
6.000	2.88	12.083	6.23	18.167	0.96	24.25	0.48
6.083	2.88	12.167	6.23	18.250	0.96		

Unit Hyd Qpeak (cms)= 1.088

PEAK FLOW (cms)= 1.883 (i)
TIME TO PEAK (hrs)= 21.083
RUNOFF VOLUME (mm)= 48.974
TOTAL RAINFALL (mm)= 95.920
RUNOFF COEFFICIENT = 0.511

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

ADD HYD (3104)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (1182):		281.36	1.883	21.08	48.97
+ ID2= 2 (1183):		176.21	1.773	16.83	49.29
ID = 3 (3104):		457.57	3.461	18.58	49.10

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (3103)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (1181):		118.70	1.388	15.17	47.05
+ ID2= 2 (3104):		457.57	3.461	18.58	49.10
ID = 3 (3103):		576.27	4.642	17.33	48.68

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ROUTE CHN(2180)		
IN= 2---> OUT= 1	Routing time step (min)'=	5.00

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

Distance	Elevation	Manning	
0.00	138.00	0.0500	
55.00	131.00	0.0500	
95.00	130.00	0.0500	
150.00	129.00	0.0300	Main Channel
160.00	130.00	0.0300 /0.0500	Main Channel
175.00	133.00	0.0500	
350.00	140.00	0.0500	

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

DEPTH (m)	ELEV (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME (min)
0.47	129.47	.138E+05	6.2	0.84	37.35
0.95	129.95	.551E+05	39.1	1.34	23.53
1.42	130.42	.121E+06	119.1	1.87	16.89
1.89	130.89	.205E+06	248.2	2.28	13.79
2.37	131.37	.305E+06	448.4	2.78	11.34
2.84	131.84	.410E+06	706.0	3.25	9.69
3.32	132.32	.521E+06	1013.8	3.67	8.57
3.79	132.79	.638E+06	1370.8	4.06	7.75
4.26	133.26	.761E+06	1767.1	4.39	7.18
4.74	133.74	.897E+06	2217.5	4.67	6.74
5.21	134.21	.105E+07	2730.9	4.93	6.39
5.68	134.68	.121E+07	3309.3	5.16	6.10

6.16	135.16	.139E+07	3955.8	5.38	5.85
6.63	135.63	.158E+07	4674.0	5.59	5.64
7.11	136.11	.179E+07	5467.2	5.78	5.45
7.58	136.58	.201E+07	6338.9	5.97	5.28
8.05	137.05	.224E+07	7292.2	6.15	5.12
8.53	137.53	.249E+07	8330.6	6.33	4.98
9.00	138.00	.275E+07	9457.1	6.50	4.85

		<---- hydrograph ---->			<-pipe / channel->	
	AREA	QPEAK	TPEAK	R.V.	MAX DEPTH	MAX VEL
	(ha)	(cms)	(hrs)	(mm)	(m)	(m/s)
INFLOW : ID= 2 (3103)	576.27	4.64	17.33	48.68	0.36	0.84
OUTFLOW: ID= 1 (2180)	576.27	4.61	18.00	48.68	0.36	0.84

CALIB		
NASHYD (11801)	Area (ha)= 109.96	Curve Number (CN)= 61.4
ID= 1 DT= 5.0 min	Ia (mm)= 4.40	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 3.80	

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	6.167	2.88	12.250	6.23	18.33	0.48
0.167	0.00	6.250	2.88	12.333	3.36	18.42	0.48
0.250	0.00	6.333	8.15	12.417	3.36	18.50	0.48
0.333	0.48	6.417	8.15	12.500	3.36	18.58	0.48
0.417	0.48	6.500	8.15	12.583	3.36	18.67	0.48
0.500	0.48	6.583	8.15	12.667	3.36	18.75	0.48
0.583	0.48	6.667	8.15	12.750	3.36	18.83	0.48
0.667	0.48	6.750	8.15	12.833	3.36	18.92	0.48
0.750	0.48	6.833	8.15	12.917	3.36	19.00	0.48
0.833	0.48	6.917	8.15	13.000	3.36	19.08	0.48
0.917	0.48	7.000	8.15	13.083	3.36	19.17	0.48
1.000	0.48	7.083	8.15	13.167	3.36	19.25	0.48
1.083	0.48	7.167	8.15	13.250	3.36	19.33	0.48
1.167	0.48	7.250	8.15	13.333	3.36	19.42	0.48
1.250	0.48	7.333	8.15	13.417	3.36	19.50	0.48
1.333	0.48	7.417	8.15	13.500	3.36	19.58	0.48
1.417	0.48	7.500	8.15	13.583	3.36	19.67	0.48
1.500	0.48	7.583	8.15	13.667	3.36	19.75	0.48
1.583	0.48	7.667	8.15	13.750	3.36	19.83	0.48
1.667	0.48	7.750	8.15	13.833	3.36	19.92	0.48
1.750	0.48	7.833	8.15	13.917	3.36	20.00	0.48
1.833	0.48	7.917	8.15	14.000	3.36	20.08	0.48
1.917	0.48	8.000	8.15	14.083	3.36	20.17	0.48
2.000	0.48	8.083	8.15	14.167	3.36	20.25	0.48
2.083	0.48	8.167	8.15	14.250	3.36	20.33	0.48
2.167	0.48	8.250	8.15	14.333	1.92	20.42	0.48
2.250	0.48	8.333	22.06	14.417	1.92	20.50	0.48
2.333	0.48	8.417	22.06	14.500	1.92	20.58	0.48
2.417	0.48	8.500	22.06	14.583	1.92	20.67	0.48
2.500	0.48	8.583	22.06	14.667	1.92	20.75	0.48
2.583	0.48	8.667	22.06	14.750	1.92	20.83	0.48
2.667	0.48	8.750	22.06	14.833	1.92	20.92	0.48
2.750	0.48	8.833	22.06	14.917	1.92	21.00	0.48
2.833	0.48	8.917	22.06	15.000	1.92	21.08	0.48
2.917	0.48	9.000	22.06	15.083	1.92	21.17	0.48
3.000	0.48	9.083	22.06	15.167	1.92	21.25	0.48
3.083	0.48	9.167	22.06	15.250	1.92	21.33	0.48
3.167	0.48	9.250	22.06	15.333	1.92	21.42	0.48
3.250	0.48	9.333	22.06	15.417	1.92	21.50	0.48
3.333	0.48	9.417	22.06	15.500	1.92	21.58	0.48
3.417	0.48	9.500	22.06	15.583	1.92	21.67	0.48
3.500	0.48	9.583	22.06	15.667	1.92	21.75	0.48
3.583	0.48	9.667	22.06	15.750	1.92	21.83	0.48
3.667	0.48	9.750	22.06	15.833	1.92	21.92	0.48
3.750	0.48	9.833	22.06	15.917	1.92	22.00	0.48
3.833	0.48	9.917	22.06	16.000	1.92	22.08	0.48
3.917	0.48	10.000	22.06	16.083	1.92	22.17	0.48
4.000	0.48	10.083	22.06	16.167	1.92	22.25	0.48
4.083	0.48	10.167	22.06	16.250	1.92	22.33	0.48
4.167	0.48	10.250	22.06	16.333	0.96	22.42	0.48
4.250	0.48	10.333	6.23	16.417	0.96	22.50	0.48
4.333	2.88	10.417	6.23	16.500	0.96	22.58	0.48
4.417	2.88	10.500	6.23	16.583	0.96	22.67	0.48
4.500	2.88	10.583	6.23	16.667	0.96	22.75	0.48
4.583	2.88	10.667	6.23	16.750	0.96	22.83	0.48

4.667	2.88	10.750	6.23	16.833	0.96	22.92	0.48
4.750	2.88	10.833	6.23	16.917	0.96	23.00	0.48
4.833	2.88	10.917	6.23	17.000	0.96	23.08	0.48
4.917	2.88	11.000	6.23	17.083	0.96	23.17	0.48
5.000	2.88	11.083	6.23	17.167	0.96	23.25	0.48
5.083	2.88	11.167	6.23	17.250	0.96	23.33	0.48
5.167	2.88	11.250	6.23	17.333	0.96	23.42	0.48
5.250	2.88	11.333	6.23	17.417	0.96	23.50	0.48
5.333	2.88	11.417	6.23	17.500	0.96	23.58	0.48
5.417	2.88	11.500	6.23	17.583	0.96	23.67	0.48
5.500	2.88	11.583	6.23	17.667	0.96	23.75	0.48
5.583	2.88	11.667	6.23	17.750	0.96	23.83	0.48
5.667	2.88	11.750	6.23	17.833	0.96	23.92	0.48
5.750	2.88	11.833	6.23	17.917	0.96	24.00	0.48
5.833	2.88	11.917	6.23	18.000	0.96	24.08	0.48
5.917	2.88	12.000	6.23	18.083	0.96	24.17	0.48
6.000	2.88	12.083	6.23	18.167	0.96	24.25	0.48
6.083	2.88	12.167	6.23	18.250	0.96		

Unit Hyd Qpeak (cms)= 1.105

PEAK FLOW (cms)= 1.015 (i)
TIME TO PEAK (hrs)= 14.417
RUNOFF VOLUME (mm)= 33.343
TOTAL RAINFALL (mm)= 95.920
RUNOFF COEFFICIENT = 0.348

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

CALIB NASHYD (0101) ID= 1 DT= 5.0 min	Area (ha)= 0.77	Curve Number (CN)= 61.4
	Ia (mm)= 4.40	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 0.17	

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	6.167	2.88	12.250	6.23	18.33	0.48
0.167	0.00	6.250	2.88	12.333	3.36	18.42	0.48
0.250	0.00	6.333	8.15	12.417	3.36	18.50	0.48
0.333	0.48	6.417	8.15	12.500	3.36	18.58	0.48
0.417	0.48	6.500	8.15	12.583	3.36	18.67	0.48
0.500	0.48	6.583	8.15	12.667	3.36	18.75	0.48
0.583	0.48	6.667	8.15	12.750	3.36	18.83	0.48
0.667	0.48	6.750	8.15	12.833	3.36	18.92	0.48
0.750	0.48	6.833	8.15	12.917	3.36	19.00	0.48
0.833	0.48	6.917	8.15	13.000	3.36	19.08	0.48
0.917	0.48	7.000	8.15	13.083	3.36	19.17	0.48
1.000	0.48	7.083	8.15	13.167	3.36	19.25	0.48
1.083	0.48	7.167	8.15	13.250	3.36	19.33	0.48
1.167	0.48	7.250	8.15	13.333	3.36	19.42	0.48
1.250	0.48	7.333	8.15	13.417	3.36	19.50	0.48
1.333	0.48	7.417	8.15	13.500	3.36	19.58	0.48
1.417	0.48	7.500	8.15	13.583	3.36	19.67	0.48
1.500	0.48	7.583	8.15	13.667	3.36	19.75	0.48
1.583	0.48	7.667	8.15	13.750	3.36	19.83	0.48
1.667	0.48	7.750	8.15	13.833	3.36	19.92	0.48
1.750	0.48	7.833	8.15	13.917	3.36	20.00	0.48
1.833	0.48	7.917	8.15	14.000	3.36	20.08	0.48
1.917	0.48	8.000	8.15	14.083	3.36	20.17	0.48
2.000	0.48	8.083	8.15	14.167	3.36	20.25	0.48
2.083	0.48	8.167	8.15	14.250	3.36	20.33	0.48
2.167	0.48	8.250	8.15	14.333	1.92	20.42	0.48
2.250	0.48	8.333	22.06	14.417	1.92	20.50	0.48
2.333	0.48	8.417	22.06	14.500	1.92	20.58	0.48
2.417	0.48	8.500	22.06	14.583	1.92	20.67	0.48
2.500	0.48	8.583	22.06	14.667	1.92	20.75	0.48
2.583	0.48	8.667	22.06	14.750	1.92	20.83	0.48
2.667	0.48	8.750	22.06	14.833	1.92	20.92	0.48
2.750	0.48	8.833	22.06	14.917	1.92	21.00	0.48
2.833	0.48	8.917	22.06	15.000	1.92	21.08	0.48
2.917	0.48	9.000	22.06	15.083	1.92	21.17	0.48
3.000	0.48	9.083	22.06	15.167	1.92	21.25	0.48
3.083	0.48	9.167	22.06	15.250	1.92	21.33	0.48
3.167	0.48	9.250	22.06	15.333	1.92	21.42	0.48
3.250	0.48	9.333	22.06	15.417	1.92	21.50	0.48
3.333	0.48	9.417	22.06	15.500	1.92	21.58	0.48
3.417	0.48	9.500	22.06	15.583	1.92	21.67	0.48
3.500	0.48	9.583	22.06	15.667	1.92	21.75	0.48

3.583	0.48	9.667	22.06	15.750	1.92	21.83	0.48
3.667	0.48	9.750	22.06	15.833	1.92	21.92	0.48
3.750	0.48	9.833	22.06	15.917	1.92	22.00	0.48
3.833	0.48	9.917	22.06	16.000	1.92	22.08	0.48
3.917	0.48	10.000	22.06	16.083	1.92	22.17	0.48
4.000	0.48	10.083	22.06	16.167	1.92	22.25	0.48
4.083	0.48	10.167	22.06	16.250	1.92	22.33	0.48
4.167	0.48	10.250	22.06	16.333	0.96	22.42	0.48
4.250	0.48	10.333	6.23	16.417	0.96	22.50	0.48
4.333	2.88	10.417	6.23	16.500	0.96	22.58	0.48
4.417	2.88	10.500	6.23	16.583	0.96	22.67	0.48
4.500	2.88	10.583	6.23	16.667	0.96	22.75	0.48
4.583	2.88	10.667	6.23	16.750	0.96	22.83	0.48
4.667	2.88	10.750	6.23	16.833	0.96	22.92	0.48
4.750	2.88	10.833	6.23	16.917	0.96	23.00	0.48
4.833	2.88	10.917	6.23	17.000	0.96	23.08	0.48
4.917	2.88	11.000	6.23	17.083	0.96	23.17	0.48
5.000	2.88	11.083	6.23	17.167	0.96	23.25	0.48
5.083	2.88	11.167	6.23	17.250	0.96	23.33	0.48
5.167	2.88	11.250	6.23	17.333	0.96	23.42	0.48
5.250	2.88	11.333	6.23	17.417	0.96	23.50	0.48
5.333	2.88	11.417	6.23	17.500	0.96	23.58	0.48
5.417	2.88	11.500	6.23	17.583	0.96	23.67	0.48
5.500	2.88	11.583	6.23	17.667	0.96	23.75	0.48
5.583	2.88	11.667	6.23	17.750	0.96	23.83	0.48
5.667	2.88	11.750	6.23	17.833	0.96	23.92	0.48
5.750	2.88	11.833	6.23	17.917	0.96	24.00	0.48
5.833	2.88	11.917	6.23	18.000	0.96	24.08	0.48
5.917	2.88	12.000	6.23	18.083	0.96	24.17	0.48
6.000	2.88	12.083	6.23	18.167	0.96	24.25	0.48
6.083	2.88	12.167	6.23	18.250	0.96		

Unit Hyd Qpeak (cms)= 0.173

PEAK FLOW (cms)= 0.022 (i)
TIME TO PEAK (hrs)= 10.250
RUNOFF VOLUME (mm)= 33.224
TOTAL RAINFALL (mm)= 95.920
RUNOFF COEFFICIENT = 0.346

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

CALIB STANDHYD (0102) | ID= 1 DT= 5.0 min	Area (ha)= 0.94 Total Imp(%)= 35.00 Dir. Conn.(%)= 28.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.33	0.61
Dep. Storage	(mm)=	1.00	2.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	79.16	40.00
Mannings n	=	0.013	0.250

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	6.167	2.88	12.250	6.23	18.33	0.48
0.167	0.00	6.250	2.88	12.333	3.36	18.42	0.48
0.250	0.00	6.333	8.15	12.417	3.36	18.50	0.48
0.333	0.48	6.417	8.15	12.500	3.36	18.58	0.48
0.417	0.48	6.500	8.15	12.583	3.36	18.67	0.48
0.500	0.48	6.583	8.15	12.667	3.36	18.75	0.48
0.583	0.48	6.667	8.15	12.750	3.36	18.83	0.48
0.667	0.48	6.750	8.15	12.833	3.36	18.92	0.48
0.750	0.48	6.833	8.15	12.917	3.36	19.00	0.48
0.833	0.48	6.917	8.15	13.000	3.36	19.08	0.48
0.917	0.48	7.000	8.15	13.083	3.36	19.17	0.48
1.000	0.48	7.083	8.15	13.167	3.36	19.25	0.48
1.083	0.48	7.167	8.15	13.250	3.36	19.33	0.48
1.167	0.48	7.250	8.15	13.333	3.36	19.42	0.48
1.250	0.48	7.333	8.15	13.417	3.36	19.50	0.48
1.333	0.48	7.417	8.15	13.500	3.36	19.58	0.48
1.417	0.48	7.500	8.15	13.583	3.36	19.67	0.48
1.500	0.48	7.583	8.15	13.667	3.36	19.75	0.48
1.583	0.48	7.667	8.15	13.750	3.36	19.83	0.48
1.667	0.48	7.750	8.15	13.833	3.36	19.92	0.48
1.750	0.48	7.833	8.15	13.917	3.36	20.00	0.48
1.833	0.48	7.917	8.15	14.000	3.36	20.08	0.48
1.917	0.48	8.000	8.15	14.083	3.36	20.17	0.48

2.000	0.48	8.083	8.15	14.167	3.36	20.25	0.48
2.083	0.48	8.167	8.15	14.250	3.36	20.33	0.48
2.167	0.48	8.250	8.15	14.333	1.92	20.42	0.48
2.250	0.48	8.333	22.06	14.417	1.92	20.50	0.48
2.333	0.48	8.417	22.06	14.500	1.92	20.58	0.48
2.417	0.48	8.500	22.06	14.583	1.92	20.67	0.48
2.500	0.48	8.583	22.06	14.667	1.92	20.75	0.48
2.583	0.48	8.667	22.06	14.750	1.92	20.83	0.48
2.667	0.48	8.750	22.06	14.833	1.92	20.92	0.48
2.750	0.48	8.833	22.06	14.917	1.92	21.00	0.48
2.833	0.48	8.917	22.06	15.000	1.92	21.08	0.48
2.917	0.48	9.000	22.06	15.083	1.92	21.17	0.48
3.000	0.48	9.083	22.06	15.167	1.92	21.25	0.48
3.083	0.48	9.167	22.06	15.250	1.92	21.33	0.48
3.167	0.48	9.250	22.06	15.333	1.92	21.42	0.48
3.250	0.48	9.333	22.06	15.417	1.92	21.50	0.48
3.333	0.48	9.417	22.06	15.500	1.92	21.58	0.48
3.417	0.48	9.500	22.06	15.583	1.92	21.67	0.48
3.500	0.48	9.583	22.06	15.667	1.92	21.75	0.48
3.583	0.48	9.667	22.06	15.750	1.92	21.83	0.48
3.667	0.48	9.750	22.06	15.833	1.92	21.92	0.48
3.750	0.48	9.833	22.06	15.917	1.92	22.00	0.48
3.833	0.48	9.917	22.06	16.000	1.92	22.08	0.48
3.917	0.48	10.000	22.06	16.083	1.92	22.17	0.48
4.000	0.48	10.083	22.06	16.167	1.92	22.25	0.48
4.083	0.48	10.167	22.06	16.250	1.92	22.33	0.48
4.167	0.48	10.250	22.06	16.333	0.96	22.42	0.48
4.250	0.48	10.333	6.23	16.417	0.96	22.50	0.48
4.333	2.88	10.417	6.23	16.500	0.96	22.58	0.48
4.417	2.88	10.500	6.23	16.583	0.96	22.67	0.48
4.500	2.88	10.583	6.23	16.667	0.96	22.75	0.48
4.583	2.88	10.667	6.23	16.750	0.96	22.83	0.48
4.667	2.88	10.750	6.23	16.833	0.96	22.92	0.48
4.750	2.88	10.833	6.23	16.917	0.96	23.00	0.48
4.833	2.88	10.917	6.23	17.000	0.96	23.08	0.48
4.917	2.88	11.000	6.23	17.083	0.96	23.17	0.48
5.000	2.88	11.083	6.23	17.167	0.96	23.25	0.48
5.083	2.88	11.167	6.23	17.250	0.96	23.33	0.48
5.167	2.88	11.250	6.23	17.333	0.96	23.42	0.48
5.250	2.88	11.333	6.23	17.417	0.96	23.50	0.48
5.333	2.88	11.417	6.23	17.500	0.96	23.58	0.48
5.417	2.88	11.500	6.23	17.583	0.96	23.67	0.48
5.500	2.88	11.583	6.23	17.667	0.96	23.75	0.48
5.583	2.88	11.667	6.23	17.750	0.96	23.83	0.48
5.667	2.88	11.750	6.23	17.833	0.96	23.92	0.48
5.750	2.88	11.833	6.23	17.917	0.96	24.00	0.48
5.833	2.88	11.917	6.23	18.000	0.96	24.08	0.48
5.917	2.88	12.000	6.23	18.083	0.96	24.17	0.48
6.000	2.88	12.083	6.23	18.167	0.96	24.25	0.48
6.083	2.88	12.167	6.23	18.250	0.96		

Max.Eff.Inten.(mm/hr)=	22.06	12.56		
over (min)	5.00	25.00		
Storage Coeff. (min)=	4.06 (ii)	20.25 (ii)		
Unit Hyd. Tpeak (min)=	5.00	25.00		
Unit Hyd. peak (cms)=	0.24	0.05		
			TOTALS	
PEAK FLOW (cms)=	0.02	0.02	0.036 (iii)	
TIME TO PEAK (hrs)=	9.50	10.25	10.25	
RUNOFF VOLUME (mm)=	94.92	37.17	53.33	
TOTAL RAINFALL (mm)=	95.92	95.92	95.92	
RUNOFF COEFFICIENT =	0.99	0.39	0.56	

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 61.4 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB
STANDHYD (0103)
ID= 1 DT= 5.0 min

Area (ha)= 0.46
Total Imp(%)= 42.00 Dir. Conn.(%)= 34.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.19	0.27
Dep. Storage	(mm)=	1.00	2.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	55.38	40.00
Mannings n	=	0.013	0.250

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	6.167	2.88	12.250	6.23	18.33	0.48
0.167	0.00	6.250	2.88	12.333	3.36	18.42	0.48
0.250	0.00	6.333	8.15	12.417	3.36	18.50	0.48
0.333	0.48	6.417	8.15	12.500	3.36	18.58	0.48
0.417	0.48	6.500	8.15	12.583	3.36	18.67	0.48
0.500	0.48	6.583	8.15	12.667	3.36	18.75	0.48
0.583	0.48	6.667	8.15	12.750	3.36	18.83	0.48
0.667	0.48	6.750	8.15	12.833	3.36	18.92	0.48
0.750	0.48	6.833	8.15	12.917	3.36	19.00	0.48
0.833	0.48	6.917	8.15	13.000	3.36	19.08	0.48
0.917	0.48	7.000	8.15	13.083	3.36	19.17	0.48
1.000	0.48	7.083	8.15	13.167	3.36	19.25	0.48
1.083	0.48	7.167	8.15	13.250	3.36	19.33	0.48
1.167	0.48	7.250	8.15	13.333	3.36	19.42	0.48
1.250	0.48	7.333	8.15	13.417	3.36	19.50	0.48
1.333	0.48	7.417	8.15	13.500	3.36	19.58	0.48
1.417	0.48	7.500	8.15	13.583	3.36	19.67	0.48
1.500	0.48	7.583	8.15	13.667	3.36	19.75	0.48
1.583	0.48	7.667	8.15	13.750	3.36	19.83	0.48
1.667	0.48	7.750	8.15	13.833	3.36	19.92	0.48
1.750	0.48	7.833	8.15	13.917	3.36	20.00	0.48
1.833	0.48	7.917	8.15	14.000	3.36	20.08	0.48
1.917	0.48	8.000	8.15	14.083	3.36	20.17	0.48
2.000	0.48	8.083	8.15	14.167	3.36	20.25	0.48
2.083	0.48	8.167	8.15	14.250	3.36	20.33	0.48
2.167	0.48	8.250	8.15	14.333	1.92	20.42	0.48
2.250	0.48	8.333	22.06	14.417	1.92	20.50	0.48
2.333	0.48	8.417	22.06	14.500	1.92	20.58	0.48
2.417	0.48	8.500	22.06	14.583	1.92	20.67	0.48
2.500	0.48	8.583	22.06	14.667	1.92	20.75	0.48
2.583	0.48	8.667	22.06	14.750	1.92	20.83	0.48
2.667	0.48	8.750	22.06	14.833	1.92	20.92	0.48
2.750	0.48	8.833	22.06	14.917	1.92	21.00	0.48
2.833	0.48	8.917	22.06	15.000	1.92	21.08	0.48
2.917	0.48	9.000	22.06	15.083	1.92	21.17	0.48
3.000	0.48	9.083	22.06	15.167	1.92	21.25	0.48
3.083	0.48	9.167	22.06	15.250	1.92	21.33	0.48
3.167	0.48	9.250	22.06	15.333	1.92	21.42	0.48
3.250	0.48	9.333	22.06	15.417	1.92	21.50	0.48
3.333	0.48	9.417	22.06	15.500	1.92	21.58	0.48
3.417	0.48	9.500	22.06	15.583	1.92	21.67	0.48
3.500	0.48	9.583	22.06	15.667	1.92	21.75	0.48
3.583	0.48	9.667	22.06	15.750	1.92	21.83	0.48
3.667	0.48	9.750	22.06	15.833	1.92	21.92	0.48
3.750	0.48	9.833	22.06	15.917	1.92	22.00	0.48
3.833	0.48	9.917	22.06	16.000	1.92	22.08	0.48
3.917	0.48	10.000	22.06	16.083	1.92	22.17	0.48
4.000	0.48	10.083	22.06	16.167	1.92	22.25	0.48
4.083	0.48	10.167	22.06	16.250	1.92	22.33	0.48
4.167	0.48	10.250	22.06	16.333	0.96	22.42	0.48
4.250	0.48	10.333	6.23	16.417	0.96	22.50	0.48
4.333	2.88	10.417	6.23	16.500	0.96	22.58	0.48
4.417	2.88	10.500	6.23	16.583	0.96	22.67	0.48
4.500	2.88	10.583	6.23	16.667	0.96	22.75	0.48
4.583	2.88	10.667	6.23	16.750	0.96	22.83	0.48
4.667	2.88	10.750	6.23	16.833	0.96	22.92	0.48
4.750	2.88	10.833	6.23	16.917	0.96	23.00	0.48
4.833	2.88	10.917	6.23	17.000	0.96	23.08	0.48
4.917	2.88	11.000	6.23	17.083	0.96	23.17	0.48
5.000	2.88	11.083	6.23	17.167	0.96	23.25	0.48
5.083	2.88	11.167	6.23	17.250	0.96	23.33	0.48
5.167	2.88	11.250	6.23	17.333	0.96	23.42	0.48
5.250	2.88	11.333	6.23	17.417	0.96	23.50	0.48
5.333	2.88	11.417	6.23	17.500	0.96	23.58	0.48
5.417	2.88	11.500	6.23	17.583	0.96	23.67	0.48
5.500	2.88	11.583	6.23	17.667	0.96	23.75	0.48
5.583	2.88	11.667	6.23	17.750	0.96	23.83	0.48
5.667	2.88	11.750	6.23	17.833	0.96	23.92	0.48
5.750	2.88	11.833	6.23	17.917	0.96	24.00	0.48
5.833	2.88	11.917	6.23	18.000	0.96	24.08	0.48
5.917	2.88	12.000	6.23	18.083	0.96	24.17	0.48
6.000	2.88	12.083	6.23	18.167	0.96	24.25	0.48
6.083	2.88	12.167	6.23	18.250	0.96		

Max.Eff.Inten.(mm/hr)=	22.06	13.10
over (min)	5.00	20.00
Storage Coeff. (min)=	3.28 (ii)	19.19 (ii)
Unit Hyd. Tpeak (min)=	5.00	20.00

```
     Unit Hyd. peak  (cms)=       0.27         0.06
                                                              *TOTALS*
     PEAK FLOW       (cms)=       0.01         0.01           0.019 (iii)
     TIME TO PEAK    (hrs)=       9.50        10.25           10.25
     RUNOFF VOLUME    (mm)=      94.92        37.81           57.20
     TOTAL RAINFALL   (mm)=      95.92        95.92           95.92
     RUNOFF COEFFICIENT   =       0.99         0.39            0.60

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  61.4    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

--------------------
| ADD HYD  (  0028)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0102):     0.94   0.036    10.25    53.33
      + ID2= 2 (  0103):     0.46   0.019    10.25    57.20
        ================================================
        ID = 3 (  0028):     1.40   0.054    10.25    54.60

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  1000)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE    |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)    |   (cms)     (ha.m.)
                          0.0000     0.0000    |   0.0170      0.0291
                          0.0080     0.0221    |   0.0360      0.0332

                                 AREA     QPEAK     TPEAK       R.V.
                                 (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0028)      1.400     0.054     10.25       54.60
   OUTFLOW: ID= 1 (  1000)      1.400     0.036     10.42       54.10

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 65.91
                  TIME SHIFT OF PEAK FLOW         (min)= 10.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0332

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

--------------------
| ADD HYD  (  0001)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  1000):     1.40   0.036    10.42    54.10
      + ID2= 2 (  0101):     0.77   0.022    10.25    33.22
        ================================================
        ID = 3 (  0001):     2.17   0.056    10.25    46.69

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0201)|   Area    (ha)=   0.45   Curve Number   (CN)= 61.4
|ID= 1 DT= 5.0 min |   Ia      (mm)=   4.40   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.17

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


                          ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
              0.083    0.00 | 6.167    2.88 |12.250    6.23 | 18.33    0.48
              0.167    0.00 | 6.250    2.88 |12.333    3.36 | 18.42    0.48
              0.250    0.00 | 6.333    8.15 |12.417    3.36 | 18.50    0.48
              0.333    0.48 | 6.417    8.15 |12.500    3.36 | 18.58    0.48
              0.417    0.48 | 6.500    8.15 |12.583    3.36 | 18.67    0.48
              0.500    0.48 | 6.583    8.15 |12.667    3.36 | 18.75    0.48
              0.583    0.48 | 6.667    8.15 |12.750    3.36 | 18.83    0.48
              0.667    0.48 | 6.750    8.15 |12.833    3.36 | 18.92    0.48
              0.750    0.48 | 6.833    8.15 |12.917    3.36 | 19.00    0.48
              0.833    0.48 | 6.917    8.15 |13.000    3.36 | 19.08    0.48
              0.917    0.48 | 7.000    8.15 |13.083    3.36 | 19.17    0.48
              1.000    0.48 | 7.083    8.15 |13.167    3.36 | 19.25    0.48
              1.083    0.48 | 7.167    8.15 |13.250    3.36 | 19.33    0.48
```

1.167	0.48	7.250	8.15	13.333	3.36	19.42	0.48
1.250	0.48	7.333	8.15	13.417	3.36	19.50	0.48
1.333	0.48	7.417	8.15	13.500	3.36	19.58	0.48
1.417	0.48	7.500	8.15	13.583	3.36	19.67	0.48
1.500	0.48	7.583	8.15	13.667	3.36	19.75	0.48
1.583	0.48	7.667	8.15	13.750	3.36	19.83	0.48
1.667	0.48	7.750	8.15	13.833	3.36	19.92	0.48
1.750	0.48	7.833	8.15	13.917	3.36	20.00	0.48
1.833	0.48	7.917	8.15	14.000	3.36	20.08	0.48
1.917	0.48	8.000	8.15	14.083	3.36	20.17	0.48
2.000	0.48	8.083	8.15	14.167	3.36	20.25	0.48
2.083	0.48	8.167	8.15	14.250	3.36	20.33	0.48
2.167	0.48	8.250	8.15	14.333	1.92	20.42	0.48
2.250	0.48	8.333	22.06	14.417	1.92	20.50	0.48
2.333	0.48	8.417	22.06	14.500	1.92	20.58	0.48
2.417	0.48	8.500	22.06	14.583	1.92	20.67	0.48
2.500	0.48	8.583	22.06	14.667	1.92	20.75	0.48
2.583	0.48	8.667	22.06	14.750	1.92	20.83	0.48
2.667	0.48	8.750	22.06	14.833	1.92	20.92	0.48
2.750	0.48	8.833	22.06	14.917	1.92	21.00	0.48
2.833	0.48	8.917	22.06	15.000	1.92	21.08	0.48
2.917	0.48	9.000	22.06	15.083	1.92	21.17	0.48
3.000	0.48	9.083	22.06	15.167	1.92	21.25	0.48
3.083	0.48	9.167	22.06	15.250	1.92	21.33	0.48
3.167	0.48	9.250	22.06	15.333	1.92	21.42	0.48
3.250	0.48	9.333	22.06	15.417	1.92	21.50	0.48
3.333	0.48	9.417	22.06	15.500	1.92	21.58	0.48
3.417	0.48	9.500	22.06	15.583	1.92	21.67	0.48
3.500	0.48	9.583	22.06	15.667	1.92	21.75	0.48
3.583	0.48	9.667	22.06	15.750	1.92	21.83	0.48
3.667	0.48	9.750	22.06	15.833	1.92	21.92	0.48
3.750	0.48	9.833	22.06	15.917	1.92	22.00	0.48
3.833	0.48	9.917	22.06	16.000	1.92	22.08	0.48
3.917	0.48	10.000	22.06	16.083	1.92	22.17	0.48
4.000	0.48	10.083	22.06	16.167	1.92	22.25	0.48
4.083	0.48	10.167	22.06	16.250	1.92	22.33	0.48
4.167	0.48	10.250	22.06	16.333	0.96	22.42	0.48
4.250	0.48	10.333	6.23	16.417	0.96	22.50	0.48
4.333	2.88	10.417	6.23	16.500	0.96	22.58	0.48
4.417	2.88	10.500	6.23	16.583	0.96	22.67	0.48
4.500	2.88	10.583	6.23	16.667	0.96	22.75	0.48
4.583	2.88	10.667	6.23	16.750	0.96	22.83	0.48
4.667	2.88	10.750	6.23	16.833	0.96	22.92	0.48
4.750	2.88	10.833	6.23	16.917	0.96	23.00	0.48
4.833	2.88	10.917	6.23	17.000	0.96	23.08	0.48
4.917	2.88	11.000	6.23	17.083	0.96	23.17	0.48
5.000	2.88	11.083	6.23	17.167	0.96	23.25	0.48
5.083	2.88	11.167	6.23	17.250	0.96	23.33	0.48
5.167	2.88	11.250	6.23	17.333	0.96	23.42	0.48
5.250	2.88	11.333	6.23	17.417	0.96	23.50	0.48
5.333	2.88	11.417	6.23	17.500	0.96	23.58	0.48
5.417	2.88	11.500	6.23	17.583	0.96	23.67	0.48
5.500	2.88	11.583	6.23	17.667	0.96	23.75	0.48
5.583	2.88	11.667	6.23	17.750	0.96	23.83	0.48
5.667	2.88	11.750	6.23	17.833	0.96	23.92	0.48
5.750	2.88	11.833	6.23	17.917	0.96	24.00	0.48
5.833	2.88	11.917	6.23	18.000	0.96	24.08	0.48
5.917	2.88	12.000	6.23	18.083	0.96	24.17	0.48
6.000	2.88	12.083	6.23	18.167	0.96	24.25	0.48
6.083	2.88	12.167	6.23	18.250	0.96		

Unit Hyd Qpeak (cms)= 0.101

PEAK FLOW (cms)= 0.013 (i)
TIME TO PEAK (hrs)= 10.250
RUNOFF VOLUME (mm)= 33.223
TOTAL RAINFALL (mm)= 95.920
RUNOFF COEFFICIENT = 0.346

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

ADD HYD (0015)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0001):	2.17	0.056	10.25	46.69
+ ID2= 2 (0201):	0.45	0.013	10.25	33.22
ID = 3 (0015):	2.62	0.068	10.25	44.38

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```
--------------------
| CALIB            |
| NASHYD   (  0601)|   Area    (ha)=   8.75   Curve Number   (CN)= 61.4
|ID= 1 DT= 5.0 min |   Ia      (mm)=   4.40   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   1.44

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	6.167	2.88	12.250	6.23	18.33	0.48
0.167	0.00	6.250	2.88	12.333	3.36	18.42	0.48
0.250	0.00	6.333	8.15	12.417	3.36	18.50	0.48
0.333	0.48	6.417	8.15	12.500	3.36	18.58	0.48
0.417	0.48	6.500	8.15	12.583	3.36	18.67	0.48
0.500	0.48	6.583	8.15	12.667	3.36	18.75	0.48
0.583	0.48	6.667	8.15	12.750	3.36	18.83	0.48
0.667	0.48	6.750	8.15	12.833	3.36	18.92	0.48
0.750	0.48	6.833	8.15	12.917	3.36	19.00	0.48
0.833	0.48	6.917	8.15	13.000	3.36	19.08	0.48
0.917	0.48	7.000	8.15	13.083	3.36	19.17	0.48
1.000	0.48	7.083	8.15	13.167	3.36	19.25	0.48
1.083	0.48	7.167	8.15	13.250	3.36	19.33	0.48
1.167	0.48	7.250	8.15	13.333	3.36	19.42	0.48
1.250	0.48	7.333	8.15	13.417	3.36	19.50	0.48
1.333	0.48	7.417	8.15	13.500	3.36	19.58	0.48
1.417	0.48	7.500	8.15	13.583	3.36	19.67	0.48
1.500	0.48	7.583	8.15	13.667	3.36	19.75	0.48
1.583	0.48	7.667	8.15	13.750	3.36	19.83	0.48
1.667	0.48	7.750	8.15	13.833	3.36	19.92	0.48
1.750	0.48	7.833	8.15	13.917	3.36	20.00	0.48
1.833	0.48	7.917	8.15	14.000	3.36	20.08	0.48
1.917	0.48	8.000	8.15	14.083	3.36	20.17	0.48
2.000	0.48	8.083	8.15	14.167	3.36	20.25	0.48
2.083	0.48	8.167	8.15	14.250	3.36	20.33	0.48
2.167	0.48	8.250	8.15	14.333	1.92	20.42	0.48
2.250	0.48	8.333	22.06	14.417	1.92	20.50	0.48
2.333	0.48	8.417	22.06	14.500	1.92	20.58	0.48
2.417	0.48	8.500	22.06	14.583	1.92	20.67	0.48
2.500	0.48	8.583	22.06	14.667	1.92	20.75	0.48
2.583	0.48	8.667	22.06	14.750	1.92	20.83	0.48
2.667	0.48	8.750	22.06	14.833	1.92	20.92	0.48
2.750	0.48	8.833	22.06	14.917	1.92	21.00	0.48
2.833	0.48	8.917	22.06	15.000	1.92	21.08	0.48
2.917	0.48	9.000	22.06	15.083	1.92	21.17	0.48
3.000	0.48	9.083	22.06	15.167	1.92	21.25	0.48
3.083	0.48	9.167	22.06	15.250	1.92	21.33	0.48
3.167	0.48	9.250	22.06	15.333	1.92	21.42	0.48
3.250	0.48	9.333	22.06	15.417	1.92	21.50	0.48
3.333	0.48	9.417	22.06	15.500	1.92	21.58	0.48
3.417	0.48	9.500	22.06	15.583	1.92	21.67	0.48
3.500	0.48	9.583	22.06	15.667	1.92	21.75	0.48
3.583	0.48	9.667	22.06	15.750	1.92	21.83	0.48
3.667	0.48	9.750	22.06	15.833	1.92	21.92	0.48
3.750	0.48	9.833	22.06	15.917	1.92	22.00	0.48
3.833	0.48	9.917	22.06	16.000	1.92	22.08	0.48
3.917	0.48	10.000	22.06	16.083	1.92	22.17	0.48
4.000	0.48	10.083	22.06	16.167	1.92	22.25	0.48
4.083	0.48	10.167	22.06	16.250	1.92	22.33	0.48
4.167	0.48	10.250	22.06	16.333	0.96	22.42	0.48
4.250	0.48	10.333	6.23	16.417	0.96	22.50	0.48
4.333	2.88	10.417	6.23	16.500	0.96	22.58	0.48
4.417	2.88	10.500	6.23	16.583	0.96	22.67	0.48
4.500	2.88	10.583	6.23	16.667	0.96	22.75	0.48
4.583	2.88	10.667	6.23	16.750	0.96	22.83	0.48
4.667	2.88	10.750	6.23	16.833	0.96	22.92	0.48
4.750	2.88	10.833	6.23	16.917	0.96	23.00	0.48
4.833	2.88	10.917	6.23	17.000	0.96	23.08	0.48
4.917	2.88	11.000	6.23	17.083	0.96	23.17	0.48
5.000	2.88	11.083	6.23	17.167	0.96	23.25	0.48
5.083	2.88	11.167	6.23	17.250	0.96	23.33	0.48
5.167	2.88	11.250	6.23	17.333	0.96	23.42	0.48
5.250	2.88	11.333	6.23	17.417	0.96	23.50	0.48
5.333	2.88	11.417	6.23	17.500	0.96	23.58	0.48
5.417	2.88	11.500	6.23	17.583	0.96	23.67	0.48
5.500	2.88	11.583	6.23	17.667	0.96	23.75	0.48
5.583	2.88	11.667	6.23	17.750	0.96	23.83	0.48
5.667	2.88	11.750	6.23	17.833	0.96	23.92	0.48
5.750	2.88	11.833	6.23	17.917	0.96	24.00	0.48
5.833	2.88	11.917	6.23	18.000	0.96	24.08	0.48
5.917	2.88	12.000	6.23	18.083	0.96	24.17	0.48
6.000	2.88	12.083	6.23	18.167	0.96	24.25	0.48

	6.083	2.88	12.167	6.23	18.250	0.96		

Unit Hyd Qpeak (cms)= 0.232

PEAK FLOW (cms)= 0.144 (i)
TIME TO PEAK (hrs)= 11.167
RUNOFF VOLUME (mm)= 33.343
TOTAL RAINFALL (mm)= 95.920
RUNOFF COEFFICIENT = 0.348

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

CALIB			
NASHYD (0401)	Area (ha)=	2.39	Curve Number (CN)= 61.4
ID= 1 DT= 5.0 min	Ia (mm)=	4.40	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)=	0.29	

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	6.167	2.88	12.250	6.23	18.33	0.48
0.167	0.00	6.250	2.88	12.333	3.36	18.42	0.48
0.250	0.00	6.333	8.15	12.417	3.36	18.50	0.48
0.333	0.48	6.417	8.15	12.500	3.36	18.58	0.48
0.417	0.48	6.500	8.15	12.583	3.36	18.67	0.48
0.500	0.48	6.583	8.15	12.667	3.36	18.75	0.48
0.583	0.48	6.667	8.15	12.750	3.36	18.83	0.48
0.667	0.48	6.750	8.15	12.833	3.36	18.92	0.48
0.750	0.48	6.833	8.15	12.917	3.36	19.00	0.48
0.833	0.48	6.917	8.15	13.000	3.36	19.08	0.48
0.917	0.48	7.000	8.15	13.083	3.36	19.17	0.48
1.000	0.48	7.083	8.15	13.167	3.36	19.25	0.48
1.083	0.48	7.167	8.15	13.250	3.36	19.33	0.48
1.167	0.48	7.250	8.15	13.333	3.36	19.42	0.48
1.250	0.48	7.333	8.15	13.417	3.36	19.50	0.48
1.333	0.48	7.417	8.15	13.500	3.36	19.58	0.48
1.417	0.48	7.500	8.15	13.583	3.36	19.67	0.48
1.500	0.48	7.583	8.15	13.667	3.36	19.75	0.48
1.583	0.48	7.667	8.15	13.750	3.36	19.83	0.48
1.667	0.48	7.750	8.15	13.833	3.36	19.92	0.48
1.750	0.48	7.833	8.15	13.917	3.36	20.00	0.48
1.833	0.48	7.917	8.15	14.000	3.36	20.08	0.48
1.917	0.48	8.000	8.15	14.083	3.36	20.17	0.48
2.000	0.48	8.083	8.15	14.167	3.36	20.25	0.48
2.083	0.48	8.167	8.15	14.250	3.36	20.33	0.48
2.167	0.48	8.250	8.15	14.333	1.92	20.42	0.48
2.250	0.48	8.333	22.06	14.417	1.92	20.50	0.48
2.333	0.48	8.417	22.06	14.500	1.92	20.58	0.48
2.417	0.48	8.500	22.06	14.583	1.92	20.67	0.48
2.500	0.48	8.583	22.06	14.667	1.92	20.75	0.48
2.583	0.48	8.667	22.06	14.750	1.92	20.83	0.48
2.667	0.48	8.750	22.06	14.833	1.92	20.92	0.48
2.750	0.48	8.833	22.06	14.917	1.92	21.00	0.48
2.833	0.48	8.917	22.06	15.000	1.92	21.08	0.48
2.917	0.48	9.000	22.06	15.083	1.92	21.17	0.48
3.000	0.48	9.083	22.06	15.167	1.92	21.25	0.48
3.083	0.48	9.167	22.06	15.250	1.92	21.33	0.48
3.167	0.48	9.250	22.06	15.333	1.92	21.42	0.48
3.250	0.48	9.333	22.06	15.417	1.92	21.50	0.48
3.333	0.48	9.417	22.06	15.500	1.92	21.58	0.48
3.417	0.48	9.500	22.06	15.583	1.92	21.67	0.48
3.500	0.48	9.583	22.06	15.667	1.92	21.75	0.48
3.583	0.48	9.667	22.06	15.750	1.92	21.83	0.48
3.667	0.48	9.750	22.06	15.833	1.92	21.92	0.48
3.750	0.48	9.833	22.06	15.917	1.92	22.00	0.48
3.833	0.48	9.917	22.06	16.000	1.92	22.08	0.48
3.917	0.48	10.000	22.06	16.083	1.92	22.17	0.48
4.000	0.48	10.083	22.06	16.167	1.92	22.25	0.48
4.083	0.48	10.167	22.06	16.250	1.92	22.33	0.48
4.167	0.48	10.250	22.06	16.333	0.96	22.42	0.48
4.250	0.48	10.333	6.23	16.417	0.96	22.50	0.48
4.333	2.88	10.417	6.23	16.500	0.96	22.58	0.48
4.417	2.88	10.500	6.23	16.583	0.96	22.67	0.48
4.500	2.88	10.583	6.23	16.667	0.96	22.75	0.48
4.583	2.88	10.667	6.23	16.750	0.96	22.83	0.48
4.667	2.88	10.750	6.23	16.833	0.96	22.92	0.48
4.750	2.88	10.833	6.23	16.917	0.96	23.00	0.48
4.833	2.88	10.917	6.23	17.000	0.96	23.08	0.48
4.917	2.88	11.000	6.23	17.083	0.96	23.17	0.48

5.000	2.88	11.083	6.23	17.167	0.96	23.25	0.48
5.083	2.88	11.167	6.23	17.250	0.96	23.33	0.48
5.167	2.88	11.250	6.23	17.333	0.96	23.42	0.48
5.250	2.88	11.333	6.23	17.417	0.96	23.50	0.48
5.333	2.88	11.417	6.23	17.500	0.96	23.58	0.48
5.417	2.88	11.500	6.23	17.583	0.96	23.67	0.48
5.500	2.88	11.583	6.23	17.667	0.96	23.75	0.48
5.583	2.88	11.667	6.23	17.750	0.96	23.83	0.48
5.667	2.88	11.750	6.23	17.833	0.96	23.92	0.48
5.750	2.88	11.833	6.23	17.917	0.96	24.00	0.48
5.833	2.88	11.917	6.23	18.000	0.96	24.08	0.48
5.917	2.88	12.000	6.23	18.083	0.96	24.17	0.48
6.000	2.88	12.083	6.23	18.167	0.96	24.25	0.48
6.083	2.88	12.167	6.23	18.250	0.96		

Unit Hyd Qpeak (cms)= 0.315

PEAK FLOW (cms)= 0.065 (i)
TIME TO PEAK (hrs)= 10.250
RUNOFF VOLUME (mm)= 33.328
TOTAL RAINFALL (mm)= 95.920
RUNOFF COEFFICIENT = 0.347

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

CALIB			
NASHYD (0502)	Area (ha)=	1.41	Curve Number (CN)= 61.4
ID= 1 DT= 5.0 min	Ia (mm)=	4.40	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)=	0.36	

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	6.167	2.88	12.250	6.23	18.33	0.48
0.167	0.00	6.250	2.88	12.333	3.36	18.42	0.48
0.250	0.00	6.333	8.15	12.417	3.36	18.50	0.48
0.333	0.48	6.417	8.15	12.500	3.36	18.58	0.48
0.417	0.48	6.500	8.15	12.583	3.36	18.67	0.48
0.500	0.48	6.583	8.15	12.667	3.36	18.75	0.48
0.583	0.48	6.667	8.15	12.750	3.36	18.83	0.48
0.667	0.48	6.750	8.15	12.833	3.36	18.92	0.48
0.750	0.48	6.833	8.15	12.917	3.36	19.00	0.48
0.833	0.48	6.917	8.15	13.000	3.36	19.08	0.48
0.917	0.48	7.000	8.15	13.083	3.36	19.17	0.48
1.000	0.48	7.083	8.15	13.167	3.36	19.25	0.48
1.083	0.48	7.167	8.15	13.250	3.36	19.33	0.48
1.167	0.48	7.250	8.15	13.333	3.36	19.42	0.48
1.250	0.48	7.333	8.15	13.417	3.36	19.50	0.48
1.333	0.48	7.417	8.15	13.500	3.36	19.58	0.48
1.417	0.48	7.500	8.15	13.583	3.36	19.67	0.48
1.500	0.48	7.583	8.15	13.667	3.36	19.75	0.48
1.583	0.48	7.667	8.15	13.750	3.36	19.83	0.48
1.667	0.48	7.750	8.15	13.833	3.36	19.92	0.48
1.750	0.48	7.833	8.15	13.917	3.36	20.00	0.48
1.833	0.48	7.917	8.15	14.000	3.36	20.08	0.48
1.917	0.48	8.000	8.15	14.083	3.36	20.17	0.48
2.000	0.48	8.083	8.15	14.167	3.36	20.25	0.48
2.083	0.48	8.167	8.15	14.250	3.36	20.33	0.48
2.167	0.48	8.250	8.15	14.333	1.92	20.42	0.48
2.250	0.48	8.333	22.06	14.417	1.92	20.50	0.48
2.333	0.48	8.417	22.06	14.500	1.92	20.58	0.48
2.417	0.48	8.500	22.06	14.583	1.92	20.67	0.48
2.500	0.48	8.583	22.06	14.667	1.92	20.75	0.48
2.583	0.48	8.667	22.06	14.750	1.92	20.83	0.48
2.667	0.48	8.750	22.06	14.833	1.92	20.92	0.48
2.750	0.48	8.833	22.06	14.917	1.92	21.00	0.48
2.833	0.48	8.917	22.06	15.000	1.92	21.08	0.48
2.917	0.48	9.000	22.06	15.083	1.92	21.17	0.48
3.000	0.48	9.083	22.06	15.167	1.92	21.25	0.48
3.083	0.48	9.167	22.06	15.250	1.92	21.33	0.48
3.167	0.48	9.250	22.06	15.333	1.92	21.42	0.48
3.250	0.48	9.333	22.06	15.417	1.92	21.50	0.48
3.333	0.48	9.417	22.06	15.500	1.92	21.58	0.48
3.417	0.48	9.500	22.06	15.583	1.92	21.67	0.48
3.500	0.48	9.583	22.06	15.667	1.92	21.75	0.48
3.583	0.48	9.667	22.06	15.750	1.92	21.83	0.48
3.667	0.48	9.750	22.06	15.833	1.92	21.92	0.48
3.750	0.48	9.833	22.06	15.917	1.92	22.00	0.48
3.833	0.48	9.917	22.06	16.000	1.92	22.08	0.48

3.917	0.48	10.000	22.06	16.083	1.92	22.17	0.48
4.000	0.48	10.083	22.06	16.167	1.92	22.25	0.48
4.083	0.48	10.167	22.06	16.250	1.92	22.33	0.48
4.167	0.48	10.250	22.06	16.333	0.96	22.42	0.48
4.250	0.48	10.333	6.23	16.417	0.96	22.50	0.48
4.333	2.88	10.417	6.23	16.500	0.96	22.58	0.48
4.417	2.88	10.500	6.23	16.583	0.96	22.67	0.48
4.500	2.88	10.583	6.23	16.667	0.96	22.75	0.48
4.583	2.88	10.667	6.23	16.750	0.96	22.83	0.48
4.667	2.88	10.750	6.23	16.833	0.96	22.92	0.48
4.750	2.88	10.833	6.23	16.917	0.96	23.00	0.48
4.833	2.88	10.917	6.23	17.000	0.96	23.08	0.48
4.917	2.88	11.000	6.23	17.083	0.96	23.17	0.48
5.000	2.88	11.083	6.23	17.167	0.96	23.25	0.48
5.083	2.88	11.167	6.23	17.250	0.96	23.33	0.48
5.167	2.88	11.250	6.23	17.333	0.96	23.42	0.48
5.250	2.88	11.333	6.23	17.417	0.96	23.50	0.48
5.333	2.88	11.417	6.23	17.500	0.96	23.58	0.48
5.417	2.88	11.500	6.23	17.583	0.96	23.67	0.48
5.500	2.88	11.583	6.23	17.667	0.96	23.75	0.48
5.583	2.88	11.667	6.23	17.750	0.96	23.83	0.48
5.667	2.88	11.750	6.23	17.833	0.96	23.92	0.48
5.750	2.88	11.833	6.23	17.917	0.96	24.00	0.48
5.833	2.88	11.917	6.23	18.000	0.96	24.08	0.48
5.917	2.88	12.000	6.23	18.083	0.96	24.17	0.48
6.000	2.88	12.083	6.23	18.167	0.96	24.25	0.48
6.083	2.88	12.167	6.23	18.250	0.96		

Unit Hyd Qpeak (cms)= 0.150

PEAK FLOW (cms)= 0.037 (i)
TIME TO PEAK (hrs)= 10.250
RUNOFF VOLUME (mm)= 33.337
TOTAL RAINFALL (mm)= 95.920
RUNOFF COEFFICIENT = 0.348

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

CALIB			
NASHYD (0510)	Area (ha)=	0.22	Curve Number (CN)= 61.4
ID= 1 DT= 5.0 min	Ia (mm)=	4.40	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)=	0.13	

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	6.167	2.88	12.250	6.23	18.33	0.48
0.167	0.00	6.250	2.88	12.333	3.36	18.42	0.48
0.250	0.00	6.333	8.15	12.417	3.36	18.50	0.48
0.333	0.48	6.417	8.15	12.500	3.36	18.58	0.48
0.417	0.48	6.500	8.15	12.583	3.36	18.67	0.48
0.500	0.48	6.583	8.15	12.667	3.36	18.75	0.48
0.583	0.48	6.667	8.15	12.750	3.36	18.83	0.48
0.667	0.48	6.750	8.15	12.833	3.36	18.92	0.48
0.750	0.48	6.833	8.15	12.917	3.36	19.00	0.48
0.833	0.48	6.917	8.15	13.000	3.36	19.08	0.48
0.917	0.48	7.000	8.15	13.083	3.36	19.17	0.48
1.000	0.48	7.083	8.15	13.167	3.36	19.25	0.48
1.083	0.48	7.167	8.15	13.250	3.36	19.33	0.48
1.167	0.48	7.250	8.15	13.333	3.36	19.42	0.48
1.250	0.48	7.333	8.15	13.417	3.36	19.50	0.48
1.333	0.48	7.417	8.15	13.500	3.36	19.58	0.48
1.417	0.48	7.500	8.15	13.583	3.36	19.67	0.48
1.500	0.48	7.583	8.15	13.667	3.36	19.75	0.48
1.583	0.48	7.667	8.15	13.750	3.36	19.83	0.48
1.667	0.48	7.750	8.15	13.833	3.36	19.92	0.48
1.750	0.48	7.833	8.15	13.917	3.36	20.00	0.48
1.833	0.48	7.917	8.15	14.000	3.36	20.08	0.48
1.917	0.48	8.000	8.15	14.083	3.36	20.17	0.48
2.000	0.48	8.083	8.15	14.167	3.36	20.25	0.48
2.083	0.48	8.167	8.15	14.250	3.36	20.33	0.48
2.167	0.48	8.250	8.15	14.333	1.92	20.42	0.48
2.250	0.48	8.333	22.06	14.417	1.92	20.50	0.48
2.333	0.48	8.417	22.06	14.500	1.92	20.58	0.48
2.417	0.48	8.500	22.06	14.583	1.92	20.67	0.48
2.500	0.48	8.583	22.06	14.667	1.92	20.75	0.48
2.583	0.48	8.667	22.06	14.750	1.92	20.83	0.48
2.667	0.48	8.750	22.06	14.833	1.92	20.92	0.48
2.750	0.48	8.833	22.06	14.917	1.92	21.00	0.48

2.833	0.48	8.917	22.06	15.000	1.92	21.08	0.48
2.917	0.48	9.000	22.06	15.083	1.92	21.17	0.48
3.000	0.48	9.083	22.06	15.167	1.92	21.25	0.48
3.083	0.48	9.167	22.06	15.250	1.92	21.33	0.48
3.167	0.48	9.250	22.06	15.333	1.92	21.42	0.48
3.250	0.48	9.333	22.06	15.417	1.92	21.50	0.48
3.333	0.48	9.417	22.06	15.500	1.92	21.58	0.48
3.417	0.48	9.500	22.06	15.583	1.92	21.67	0.48
3.500	0.48	9.583	22.06	15.667	1.92	21.75	0.48
3.583	0.48	9.667	22.06	15.750	1.92	21.83	0.48
3.667	0.48	9.750	22.06	15.833	1.92	21.92	0.48
3.750	0.48	9.833	22.06	15.917	1.92	22.00	0.48
3.833	0.48	9.917	22.06	16.000	1.92	22.08	0.48
3.917	0.48	10.000	22.06	16.083	1.92	22.17	0.48
4.000	0.48	10.083	22.06	16.167	1.92	22.25	0.48
4.083	0.48	10.167	22.06	16.250	1.92	22.33	0.48
4.167	0.48	10.250	22.06	16.333	0.96	22.42	0.48
4.250	0.48	10.333	6.23	16.417	0.96	22.50	0.48
4.333	2.88	10.417	6.23	16.500	0.96	22.58	0.48
4.417	2.88	10.500	6.23	16.583	0.96	22.67	0.48
4.500	2.88	10.583	6.23	16.667	0.96	22.75	0.48
4.583	2.88	10.667	6.23	16.750	0.96	22.83	0.48
4.667	2.88	10.750	6.23	16.833	0.96	22.92	0.48
4.750	2.88	10.833	6.23	16.917	0.96	23.00	0.48
4.833	2.88	10.917	6.23	17.000	0.96	23.08	0.48
4.917	2.88	11.000	6.23	17.083	0.96	23.17	0.48
5.000	2.88	11.083	6.23	17.167	0.96	23.25	0.48
5.083	2.88	11.167	6.23	17.250	0.96	23.33	0.48
5.167	2.88	11.250	6.23	17.333	0.96	23.42	0.48
5.250	2.88	11.333	6.23	17.417	0.96	23.50	0.48
5.333	2.88	11.417	6.23	17.500	0.96	23.58	0.48
5.417	2.88	11.500	6.23	17.583	0.96	23.67	0.48
5.500	2.88	11.583	6.23	17.667	0.96	23.75	0.48
5.583	2.88	11.667	6.23	17.750	0.96	23.83	0.48
5.667	2.88	11.750	6.23	17.833	0.96	23.92	0.48
5.750	2.88	11.833	6.23	17.917	0.96	24.00	0.48
5.833	2.88	11.917	6.23	18.000	0.96	24.08	0.48
5.917	2.88	12.000	6.23	18.083	0.96	24.17	0.48
6.000	2.88	12.083	6.23	18.167	0.96	24.25	0.48
6.083	2.88	12.167	6.23	18.250	0.96		

Unit Hyd Qpeak (cms)= 0.065

PEAK FLOW (cms)= 0.006 (i)
TIME TO PEAK (hrs)= 10.250
RUNOFF VOLUME (mm)= 33.012
TOTAL RAINFALL (mm)= 95.920
RUNOFF COEFFICIENT = 0.344

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

CALIB STANDHYD (0501)	Area (ha)= 1.17
ID= 1 DT= 5.0 min	Total Imp(%)= 43.00 Dir. Conn.(%)= 34.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.50	0.67
Dep. Storage	(mm)=	1.00	2.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	88.32	40.00
Mannings n	=	0.013	0.250

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	6.167	2.88	12.250	6.23	18.33	0.48
0.167	0.00	6.250	2.88	12.333	3.36	18.42	0.48
0.250	0.00	6.333	8.15	12.417	3.36	18.50	0.48
0.333	0.48	6.417	8.15	12.500	3.36	18.58	0.48
0.417	0.48	6.500	8.15	12.583	3.36	18.67	0.48
0.500	0.48	6.583	8.15	12.667	3.36	18.75	0.48
0.583	0.48	6.667	8.15	12.750	3.36	18.83	0.48
0.667	0.48	6.750	8.15	12.833	3.36	18.92	0.48
0.750	0.48	6.833	8.15	12.917	3.36	19.00	0.48
0.833	0.48	6.917	8.15	13.000	3.36	19.08	0.48
0.917	0.48	7.000	8.15	13.083	3.36	19.17	0.48
1.000	0.48	7.083	8.15	13.167	3.36	19.25	0.48
1.083	0.48	7.167	8.15	13.250	3.36	19.33	0.48
1.167	0.48	7.250	8.15	13.333	3.36	19.42	0.48

1.250	0.48	7.333	8.15	13.417	3.36	19.50	0.48
1.333	0.48	7.417	8.15	13.500	3.36	19.58	0.48
1.417	0.48	7.500	8.15	13.583	3.36	19.67	0.48
1.500	0.48	7.583	8.15	13.667	3.36	19.75	0.48
1.583	0.48	7.667	8.15	13.750	3.36	19.83	0.48
1.667	0.48	7.750	8.15	13.833	3.36	19.92	0.48
1.750	0.48	7.833	8.15	13.917	3.36	20.00	0.48
1.833	0.48	7.917	8.15	14.000	3.36	20.08	0.48
1.917	0.48	8.000	8.15	14.083	3.36	20.17	0.48
2.000	0.48	8.083	8.15	14.167	3.36	20.25	0.48
2.083	0.48	8.167	8.15	14.250	3.36	20.33	0.48
2.167	0.48	8.250	8.15	14.333	1.92	20.42	0.48
2.250	0.48	8.333	22.06	14.417	1.92	20.50	0.48
2.333	0.48	8.417	22.06	14.500	1.92	20.58	0.48
2.417	0.48	8.500	22.06	14.583	1.92	20.67	0.48
2.500	0.48	8.583	22.06	14.667	1.92	20.75	0.48
2.583	0.48	8.667	22.06	14.750	1.92	20.83	0.48
2.667	0.48	8.750	22.06	14.833	1.92	20.92	0.48
2.750	0.48	8.833	22.06	14.917	1.92	21.00	0.48
2.833	0.48	8.917	22.06	15.000	1.92	21.08	0.48
2.917	0.48	9.000	22.06	15.083	1.92	21.17	0.48
3.000	0.48	9.083	22.06	15.167	1.92	21.25	0.48
3.083	0.48	9.167	22.06	15.250	1.92	21.33	0.48
3.167	0.48	9.250	22.06	15.333	1.92	21.42	0.48
3.250	0.48	9.333	22.06	15.417	1.92	21.50	0.48
3.333	0.48	9.417	22.06	15.500	1.92	21.58	0.48
3.417	0.48	9.500	22.06	15.583	1.92	21.67	0.48
3.500	0.48	9.583	22.06	15.667	1.92	21.75	0.48
3.583	0.48	9.667	22.06	15.750	1.92	21.83	0.48
3.667	0.48	9.750	22.06	15.833	1.92	21.92	0.48
3.750	0.48	9.833	22.06	15.917	1.92	22.00	0.48
3.833	0.48	9.917	22.06	16.000	1.92	22.08	0.48
3.917	0.48	10.000	22.06	16.083	1.92	22.17	0.48
4.000	0.48	10.083	22.06	16.167	1.92	22.25	0.48
4.083	0.48	10.167	22.06	16.250	1.92	22.33	0.48
4.167	0.48	10.250	22.06	16.333	0.96	22.42	0.48
4.250	0.48	10.333	6.23	16.417	0.96	22.50	0.48
4.333	2.88	10.417	6.23	16.500	0.96	22.58	0.48
4.417	2.88	10.500	6.23	16.583	0.96	22.67	0.48
4.500	2.88	10.583	6.23	16.667	0.96	22.75	0.48
4.583	2.88	10.667	6.23	16.750	0.96	22.83	0.48
4.667	2.88	10.750	6.23	16.833	0.96	22.92	0.48
4.750	2.88	10.833	6.23	16.917	0.96	23.00	0.48
4.833	2.88	10.917	6.23	17.000	0.96	23.08	0.48
4.917	2.88	11.000	6.23	17.083	0.96	23.17	0.48
5.000	2.88	11.083	6.23	17.167	0.96	23.25	0.48
5.083	2.88	11.167	6.23	17.250	0.96	23.33	0.48
5.167	2.88	11.250	6.23	17.333	0.96	23.42	0.48
5.250	2.88	11.333	6.23	17.417	0.96	23.50	0.48
5.333	2.88	11.417	6.23	17.500	0.96	23.58	0.48
5.417	2.88	11.500	6.23	17.583	0.96	23.67	0.48
5.500	2.88	11.583	6.23	17.667	0.96	23.75	0.48
5.583	2.88	11.667	6.23	17.750	0.96	23.83	0.48
5.667	2.88	11.750	6.23	17.833	0.96	23.92	0.48
5.750	2.88	11.833	6.23	17.917	0.96	24.00	0.48
5.833	2.88	11.917	6.23	18.000	0.96	24.08	0.48
5.917	2.88	12.000	6.23	18.083	0.96	24.17	0.48
6.000	2.88	12.083	6.23	18.167	0.96	24.25	0.48
6.083	2.88	12.167	6.23	18.250	0.96		

Max.Eff.Inten.(mm/hr)=	22.06	13.47		
over (min)	5.00	25.00		
Storage Coeff. (min)=	4.34 (ii)	20.08 (ii)		
Unit Hyd. Tpeak (min)=	5.00	25.00		
Unit Hyd. peak (cms)=	0.23	0.05		
			TOTALS	
PEAK FLOW (cms)=	0.02	0.02	0.047 (iii)	
TIME TO PEAK (hrs)=	9.50	10.25	10.25	
RUNOFF VOLUME (mm)=	94.92	38.23	57.49	
TOTAL RAINFALL (mm)=	95.92	95.92	95.92	
RUNOFF COEFFICIENT =	0.99	0.40	0.60	

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 61.4 Ia = Dep. 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(5000)| OVERFLOW IS OFF
| IN= 2---> OUT= 1 |

```
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
-------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                         0.0000     0.0000   |   0.0140      0.0264
                         0.0070     0.0200   |   0.0300      0.0302

                                  AREA     QPEAK     TPEAK       R.V.
                                  (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0501)      1.170      0.047     10.25      57.49
   OUTFLOW: ID= 1 (  5000)      1.170      0.030     10.42      56.88

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 62.80
                  TIME SHIFT OF PEAK FLOW         (min)= 10.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0301

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


--------------------
| ADD HYD  (  0005)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  5000):     1.17   0.030    10.42    56.88
     + ID2= 2 (  0502):     1.41   0.037    10.25    33.34
       ================================================
       ID = 3 (  0005):     2.58   0.067    10.33    44.01

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


--------------------
| ADD HYD  (  0005)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0005):     2.58   0.067    10.33    44.01
     + ID2= 2 (  0510):     0.22   0.006    10.25    33.01
       ================================================
       ID = 1 (  0005):     2.80   0.072    10.33    43.15

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


--------------------
| ADD HYD  (  0016)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0401):     2.39   0.065    10.25    33.33
     + ID2= 2 (  0005):     2.80   0.072    10.33    43.15
       ================================================
       ID = 3 (  0016):     5.19   0.137    10.25    38.63

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


--------------------
| ADD HYD  (  0017)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0015):     2.62   0.068    10.25    44.38
     + ID2= 2 (  0016):     5.19   0.137    10.25    38.63
       ================================================
       ID = 3 (  0017):     7.81   0.205    10.25    40.56

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


--------------------
| ADD HYD  (  0017)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0017):     7.81   0.205    10.25    40.56
     + ID2= 2 (  0601):     8.75   0.144    11.17    33.34
       ================================================
       ID = 1 (  0017):    16.56   0.315    10.33    36.75

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


--------------------
| ADD HYD  (  0019)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 ( 11801):   109.96   1.015    14.42    33.34
     + ID2= 2 (  0017):    16.56   0.315    10.33    36.75
       ================================================
       ID = 3 (  0019):   126.52   1.137    14.08    33.79
```

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (3102)		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
1 + 2 = 3	ID1= 1 (0019):	126.52	1.137	14.08	33.79
	+ ID2= 2 (2180):	576.27	4.614	18.00	48.68
	ID = 3 (3102):	702.79	5.450	17.17	46.00

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB NASHYD (0301)	ID= 1 DT= 5.0 min	Area (ha)= 1.38	Curve Number (CN)= 61.4
		Ia (mm)= 4.40	# of Linear Res.(N)= 3.00
		U.H. Tp(hrs)= 0.31	

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	6.167	2.88	12.250	6.23	18.33	0.48
0.167	0.00	6.250	2.88	12.333	3.36	18.42	0.48
0.250	0.00	6.333	8.15	12.417	3.36	18.50	0.48
0.333	0.48	6.417	8.15	12.500	3.36	18.58	0.48
0.417	0.48	6.500	8.15	12.583	3.36	18.67	0.48
0.500	0.48	6.583	8.15	12.667	3.36	18.75	0.48
0.583	0.48	6.667	8.15	12.750	3.36	18.83	0.48
0.667	0.48	6.750	8.15	12.833	3.36	18.92	0.48
0.750	0.48	6.833	8.15	12.917	3.36	19.00	0.48
0.833	0.48	6.917	8.15	13.000	3.36	19.08	0.48
0.917	0.48	7.000	8.15	13.083	3.36	19.17	0.48
1.000	0.48	7.083	8.15	13.167	3.36	19.25	0.48
1.083	0.48	7.167	8.15	13.250	3.36	19.33	0.48
1.167	0.48	7.250	8.15	13.333	3.36	19.42	0.48
1.250	0.48	7.333	8.15	13.417	3.36	19.50	0.48
1.333	0.48	7.417	8.15	13.500	3.36	19.58	0.48
1.417	0.48	7.500	8.15	13.583	3.36	19.67	0.48
1.500	0.48	7.583	8.15	13.667	3.36	19.75	0.48
1.583	0.48	7.667	8.15	13.750	3.36	19.83	0.48
1.667	0.48	7.750	8.15	13.833	3.36	19.92	0.48
1.750	0.48	7.833	8.15	13.917	3.36	20.00	0.48
1.833	0.48	7.917	8.15	14.000	3.36	20.08	0.48
1.917	0.48	8.000	8.15	14.083	3.36	20.17	0.48
2.000	0.48	8.083	8.15	14.167	3.36	20.25	0.48
2.083	0.48	8.167	8.15	14.250	3.36	20.33	0.48
2.167	0.48	8.250	8.15	14.333	1.92	20.42	0.48
2.250	0.48	8.333	22.06	14.417	1.92	20.50	0.48
2.333	0.48	8.417	22.06	14.500	1.92	20.58	0.48
2.417	0.48	8.500	22.06	14.583	1.92	20.67	0.48
2.500	0.48	8.583	22.06	14.667	1.92	20.75	0.48
2.583	0.48	8.667	22.06	14.750	1.92	20.83	0.48
2.667	0.48	8.750	22.06	14.833	1.92	20.92	0.48
2.750	0.48	8.833	22.06	14.917	1.92	21.00	0.48
2.833	0.48	8.917	22.06	15.000	1.92	21.08	0.48
2.917	0.48	9.000	22.06	15.083	1.92	21.17	0.48
3.000	0.48	9.083	22.06	15.167	1.92	21.25	0.48
3.083	0.48	9.167	22.06	15.250	1.92	21.33	0.48
3.167	0.48	9.250	22.06	15.333	1.92	21.42	0.48
3.250	0.48	9.333	22.06	15.417	1.92	21.50	0.48
3.333	0.48	9.417	22.06	15.500	1.92	21.58	0.48
3.417	0.48	9.500	22.06	15.583	1.92	21.67	0.48
3.500	0.48	9.583	22.06	15.667	1.92	21.75	0.48
3.583	0.48	9.667	22.06	15.750	1.92	21.83	0.48
3.667	0.48	9.750	22.06	15.833	1.92	21.92	0.48
3.750	0.48	9.833	22.06	15.917	1.92	22.00	0.48
3.833	0.48	9.917	22.06	16.000	1.92	22.08	0.48
3.917	0.48	10.000	22.06	16.083	1.92	22.17	0.48
4.000	0.48	10.083	22.06	16.167	1.92	22.25	0.48
4.083	0.48	10.167	22.06	16.250	1.92	22.33	0.48
4.167	0.48	10.250	22.06	16.333	0.96	22.42	0.48
4.250	0.48	10.333	6.23	16.417	0.96	22.50	0.48
4.333	2.88	10.417	6.23	16.500	0.96	22.58	0.48
4.417	2.88	10.500	6.23	16.583	0.96	22.67	0.48
4.500	2.88	10.583	6.23	16.667	0.96	22.75	0.48
4.583	2.88	10.667	6.23	16.750	0.96	22.83	0.48
4.667	2.88	10.750	6.23	16.833	0.96	22.92	0.48
4.750	2.88	10.833	6.23	16.917	0.96	23.00	0.48

4.833	2.88	10.917	6.23	17.000	0.96	23.08	0.48
4.917	2.88	11.000	6.23	17.083	0.96	23.17	0.48
5.000	2.88	11.083	6.23	17.167	0.96	23.25	0.48
5.083	2.88	11.167	6.23	17.250	0.96	23.33	0.48
5.167	2.88	11.250	6.23	17.333	0.96	23.42	0.48
5.250	2.88	11.333	6.23	17.417	0.96	23.50	0.48
5.333	2.88	11.417	6.23	17.500	0.96	23.58	0.48
5.417	2.88	11.500	6.23	17.583	0.96	23.67	0.48
5.500	2.88	11.583	6.23	17.667	0.96	23.75	0.48
5.583	2.88	11.667	6.23	17.750	0.96	23.83	0.48
5.667	2.88	11.750	6.23	17.833	0.96	23.92	0.48
5.750	2.88	11.833	6.23	17.917	0.96	24.00	0.48
5.833	2.88	11.917	6.23	18.000	0.96	24.08	0.48
5.917	2.88	12.000	6.23	18.083	0.96	24.17	0.48
6.000	2.88	12.083	6.23	18.167	0.96	24.25	0.48
6.083	2.88	12.167	6.23	18.250	0.96		

Unit Hyd Qpeak (cms)= 0.170

PEAK FLOW (cms)= 0.037 (i)
TIME TO PEAK (hrs)= 10.250
RUNOFF VOLUME (mm)= 33.332
TOTAL RAINFALL (mm)= 95.920
RUNOFF COEFFICIENT = 0.347

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

CALIB					
NASHYD (0302)	Area (ha)=	0.19	Curve Number (CN)=	61.4	
ID= 1 DT= 5.0 min	Ia (mm)=	4.40	# of Linear Res.(N)=	3.00	
	U.H. Tp(hrs)=	0.17			

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	6.167	2.88	12.250	6.23	18.33	0.48
0.167	0.00	6.250	2.88	12.333	3.36	18.42	0.48
0.250	0.00	6.333	8.15	12.417	3.36	18.50	0.48
0.333	0.48	6.417	8.15	12.500	3.36	18.58	0.48
0.417	0.48	6.500	8.15	12.583	3.36	18.67	0.48
0.500	0.48	6.583	8.15	12.667	3.36	18.75	0.48
0.583	0.48	6.667	8.15	12.750	3.36	18.83	0.48
0.667	0.48	6.750	8.15	12.833	3.36	18.92	0.48
0.750	0.48	6.833	8.15	12.917	3.36	19.00	0.48
0.833	0.48	6.917	8.15	13.000	3.36	19.08	0.48
0.917	0.48	7.000	8.15	13.083	3.36	19.17	0.48
1.000	0.48	7.083	8.15	13.167	3.36	19.25	0.48
1.083	0.48	7.167	8.15	13.250	3.36	19.33	0.48
1.167	0.48	7.250	8.15	13.333	3.36	19.42	0.48
1.250	0.48	7.333	8.15	13.417	3.36	19.50	0.48
1.333	0.48	7.417	8.15	13.500	3.36	19.58	0.48
1.417	0.48	7.500	8.15	13.583	3.36	19.67	0.48
1.500	0.48	7.583	8.15	13.667	3.36	19.75	0.48
1.583	0.48	7.667	8.15	13.750	3.36	19.83	0.48
1.667	0.48	7.750	8.15	13.833	3.36	19.92	0.48
1.750	0.48	7.833	8.15	13.917	3.36	20.00	0.48
1.833	0.48	7.917	8.15	14.000	3.36	20.08	0.48
1.917	0.48	8.000	8.15	14.083	3.36	20.17	0.48
2.000	0.48	8.083	8.15	14.167	3.36	20.25	0.48
2.083	0.48	8.167	8.15	14.250	3.36	20.33	0.48
2.167	0.48	8.250	8.15	14.333	1.92	20.42	0.48
2.250	0.48	8.333	22.06	14.417	1.92	20.50	0.48
2.333	0.48	8.417	22.06	14.500	1.92	20.58	0.48
2.417	0.48	8.500	22.06	14.583	1.92	20.67	0.48
2.500	0.48	8.583	22.06	14.667	1.92	20.75	0.48
2.583	0.48	8.667	22.06	14.750	1.92	20.83	0.48
2.667	0.48	8.750	22.06	14.833	1.92	20.92	0.48
2.750	0.48	8.833	22.06	14.917	1.92	21.00	0.48
2.833	0.48	8.917	22.06	15.000	1.92	21.08	0.48
2.917	0.48	9.000	22.06	15.083	1.92	21.17	0.48
3.000	0.48	9.083	22.06	15.167	1.92	21.25	0.48
3.083	0.48	9.167	22.06	15.250	1.92	21.33	0.48
3.167	0.48	9.250	22.06	15.333	1.92	21.42	0.48
3.250	0.48	9.333	22.06	15.417	1.92	21.50	0.48
3.333	0.48	9.417	22.06	15.500	1.92	21.58	0.48
3.417	0.48	9.500	22.06	15.583	1.92	21.67	0.48
3.500	0.48	9.583	22.06	15.667	1.92	21.75	0.48
3.583	0.48	9.667	22.06	15.750	1.92	21.83	0.48
3.667	0.48	9.750	22.06	15.833	1.92	21.92	0.48

3.750	0.48	9.833	22.06	15.917	1.92	22.00	0.48
3.833	0.48	9.917	22.06	16.000	1.92	22.08	0.48
3.917	0.48	10.000	22.06	16.083	1.92	22.17	0.48
4.000	0.48	10.083	22.06	16.167	1.92	22.25	0.48
4.083	0.48	10.167	22.06	16.250	1.92	22.33	0.48
4.167	0.48	10.250	22.06	16.333	0.96	22.42	0.48
4.250	0.48	10.333	6.23	16.417	0.96	22.50	0.48
4.333	2.88	10.417	6.23	16.500	0.96	22.58	0.48
4.417	2.88	10.500	6.23	16.583	0.96	22.67	0.48
4.500	2.88	10.583	6.23	16.667	0.96	22.75	0.48
4.583	2.88	10.667	6.23	16.750	0.96	22.83	0.48
4.667	2.88	10.750	6.23	16.833	0.96	22.92	0.48
4.750	2.88	10.833	6.23	16.917	0.96	23.00	0.48
4.833	2.88	10.917	6.23	17.000	0.96	23.08	0.48
4.917	2.88	11.000	6.23	17.083	0.96	23.17	0.48
5.000	2.88	11.083	6.23	17.167	0.96	23.25	0.48
5.083	2.88	11.167	6.23	17.250	0.96	23.33	0.48
5.167	2.88	11.250	6.23	17.333	0.96	23.42	0.48
5.250	2.88	11.333	6.23	17.417	0.96	23.50	0.48
5.333	2.88	11.417	6.23	17.500	0.96	23.58	0.48
5.417	2.88	11.500	6.23	17.583	0.96	23.67	0.48
5.500	2.88	11.583	6.23	17.667	0.96	23.75	0.48
5.583	2.88	11.667	6.23	17.750	0.96	23.83	0.48
5.667	2.88	11.750	6.23	17.833	0.96	23.92	0.48
5.750	2.88	11.833	6.23	17.917	0.96	24.00	0.48
5.833	2.88	11.917	6.23	18.000	0.96	24.08	0.48
5.917	2.88	12.000	6.23	18.083	0.96	24.17	0.48
6.000	2.88	12.083	6.23	18.167	0.96	24.25	0.48
6.083	2.88	12.167	6.23	18.250	0.96		

Unit Hyd Qpeak (cms)= 0.043

PEAK FLOW (cms)= 0.005 (i)
TIME TO PEAK (hrs)= 10.250
RUNOFF VOLUME (mm)= 33.222
TOTAL RAINFALL (mm)= 95.920
RUNOFF COEFFICIENT = 0.346

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

ADD HYD (0003)		AREA	QPEAK	TPEAK	R.V.
		(ha)	(cms)	(hrs)	(mm)
1 + 2 = 3	ID1= 1 (0301):	1.38	0.037	10.25	33.33
	+ ID2= 2 (0302):	0.19	0.005	10.25	33.22
	ID = 3 (0003):	1.57	0.043	10.25	33.32

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB NASHYD (11791) ID= 1 DT= 5.0 min			
	Area (ha)= 92.12	Curve Number (CN)= 54.6	
	Ia (mm)= 4.60	# of Linear Res.(N)= 3.00	
	U.H. Tp(hrs)= 4.68		

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	6.167	2.88	12.250	6.23	18.33	0.48
0.167	0.00	6.250	2.88	12.333	3.36	18.42	0.48
0.250	0.00	6.333	8.15	12.417	3.36	18.50	0.48
0.333	0.48	6.417	8.15	12.500	3.36	18.58	0.48
0.417	0.48	6.500	8.15	12.583	3.36	18.67	0.48
0.500	0.48	6.583	8.15	12.667	3.36	18.75	0.48
0.583	0.48	6.667	8.15	12.750	3.36	18.83	0.48
0.667	0.48	6.750	8.15	12.833	3.36	18.92	0.48
0.750	0.48	6.833	8.15	12.917	3.36	19.00	0.48
0.833	0.48	6.917	8.15	13.000	3.36	19.08	0.48
0.917	0.48	7.000	8.15	13.083	3.36	19.17	0.48
1.000	0.48	7.083	8.15	13.167	3.36	19.25	0.48
1.083	0.48	7.167	8.15	13.250	3.36	19.33	0.48
1.167	0.48	7.250	8.15	13.333	3.36	19.42	0.48
1.250	0.48	7.333	8.15	13.417	3.36	19.50	0.48
1.333	0.48	7.417	8.15	13.500	3.36	19.58	0.48
1.417	0.48	7.500	8.15	13.583	3.36	19.67	0.48
1.500	0.48	7.583	8.15	13.667	3.36	19.75	0.48
1.583	0.48	7.667	8.15	13.750	3.36	19.83	0.48

1.667	0.48	7.750	8.15	13.833	3.36	19.92	0.48
1.750	0.48	7.833	8.15	13.917	3.36	20.00	0.48
1.833	0.48	7.917	8.15	14.000	3.36	20.08	0.48
1.917	0.48	8.000	8.15	14.083	3.36	20.17	0.48
2.000	0.48	8.083	8.15	14.167	3.36	20.25	0.48
2.083	0.48	8.167	8.15	14.250	3.36	20.33	0.48
2.167	0.48	8.250	8.15	14.333	1.92	20.42	0.48
2.250	0.48	8.333	22.06	14.417	1.92	20.50	0.48
2.333	0.48	8.417	22.06	14.500	1.92	20.58	0.48
2.417	0.48	8.500	22.06	14.583	1.92	20.67	0.48
2.500	0.48	8.583	22.06	14.667	1.92	20.75	0.48
2.583	0.48	8.667	22.06	14.750	1.92	20.83	0.48
2.667	0.48	8.750	22.06	14.833	1.92	20.92	0.48
2.750	0.48	8.833	22.06	14.917	1.92	21.00	0.48
2.833	0.48	8.917	22.06	15.000	1.92	21.08	0.48
2.917	0.48	9.000	22.06	15.083	1.92	21.17	0.48
3.000	0.48	9.083	22.06	15.167	1.92	21.25	0.48
3.083	0.48	9.167	22.06	15.250	1.92	21.33	0.48
3.167	0.48	9.250	22.06	15.333	1.92	21.42	0.48
3.250	0.48	9.333	22.06	15.417	1.92	21.50	0.48
3.333	0.48	9.417	22.06	15.500	1.92	21.58	0.48
3.417	0.48	9.500	22.06	15.583	1.92	21.67	0.48
3.500	0.48	9.583	22.06	15.667	1.92	21.75	0.48
3.583	0.48	9.667	22.06	15.750	1.92	21.83	0.48
3.667	0.48	9.750	22.06	15.833	1.92	21.92	0.48
3.750	0.48	9.833	22.06	15.917	1.92	22.00	0.48
3.833	0.48	9.917	22.06	16.000	1.92	22.08	0.48
3.917	0.48	10.000	22.06	16.083	1.92	22.17	0.48
4.000	0.48	10.083	22.06	16.167	1.92	22.25	0.48
4.083	0.48	10.167	22.06	16.250	1.92	22.33	0.48
4.167	0.48	10.250	22.06	16.333	0.96	22.42	0.48
4.250	0.48	10.333	6.23	16.417	0.96	22.50	0.48
4.333	2.88	10.417	6.23	16.500	0.96	22.58	0.48
4.417	2.88	10.500	6.23	16.583	0.96	22.67	0.48
4.500	2.88	10.583	6.23	16.667	0.96	22.75	0.48
4.583	2.88	10.667	6.23	16.750	0.96	22.83	0.48
4.667	2.88	10.750	6.23	16.833	0.96	22.92	0.48
4.750	2.88	10.833	6.23	16.917	0.96	23.00	0.48
4.833	2.88	10.917	6.23	17.000	0.96	23.08	0.48
4.917	2.88	11.000	6.23	17.083	0.96	23.17	0.48
5.000	2.88	11.083	6.23	17.167	0.96	23.25	0.48
5.083	2.88	11.167	6.23	17.250	0.96	23.33	0.48
5.167	2.88	11.250	6.23	17.333	0.96	23.42	0.48
5.250	2.88	11.333	6.23	17.417	0.96	23.50	0.48
5.333	2.88	11.417	6.23	17.500	0.96	23.58	0.48
5.417	2.88	11.500	6.23	17.583	0.96	23.67	0.48
5.500	2.88	11.583	6.23	17.667	0.96	23.75	0.48
5.583	2.88	11.667	6.23	17.750	0.96	23.83	0.48
5.667	2.88	11.750	6.23	17.833	0.96	23.92	0.48
5.750	2.88	11.833	6.23	17.917	0.96	24.00	0.48
5.833	2.88	11.917	6.23	18.000	0.96	24.08	0.48
5.917	2.88	12.000	6.23	18.083	0.96	24.17	0.48
6.000	2.88	12.083	6.23	18.167	0.96	24.25	0.48
6.083	2.88	12.167	6.23	18.250	0.96		

Unit Hyd Qpeak (cms)= 0.752

PEAK FLOW (cms)= 0.608 (i)
TIME TO PEAK (hrs)= 15.583
RUNOFF VOLUME (mm)= 27.566
TOTAL RAINFALL (mm)= 95.920
RUNOFF COEFFICIENT = 0.287

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

ADD HYD (1179)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (11791):	92.12	0.608	15.58	27.57
+ ID2= 2 (0003):	1.57	0.043	10.25	33.32
ID = 3 (1179):	93.69	0.613	15.58	27.66

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (3101)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (1179):	93.69	0.613	15.58	27.66

```
      + ID2= 2 (  3102):   702.79   5.450    17.17    46.00
        ================================================
        ID = 3 (  3101):   796.48   6.034    16.92    43.84

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

Appendix D

Oil/Grit Separator Sizing

Stormceptor®

FORTERRA

Stormceptor® EF Sizing Report

STORMCEPTOR®
ESTIMATED NET ANNUAL SEDIMENT (TSS) LOAD REDUCTION

07/10/2023

Province:	Ontario
City:	Pickering
Nearest Rainfall Station:	TORONTO INTL AP
Climate Station Id:	6158731
Years of Rainfall Data:	20

Site Name:	Frisque - East

Drainage Area (ha):	1.17
% Imperviousness:	43.00

Runoff Coefficient 'c': 0.55

Particle Size Distribution:	CA ETV
Target TSS Removal (%):	60.0

Required Water Quality Runoff Volume Capture (%):	90.00
Estimated Water Quality Flow Rate (L/s):	20.30
Oil / Fuel Spill Risk Site?	No
Upstream Flow Control?	Yes
Upstream Orifice Control Flow Rate to Stormceptor (L/s):	30.00
Peak Conveyance (maximum) Flow Rate (L/s):	
Site Sediment Transport Rate (kg/ha/yr):	

Project Name:	Frisque
Project Number:	E21007
Designer Name:	Andrea Keeping
Designer Company:	Candevcon LImited
Designer Email:	akeeping@candevcon.com
Designer Phone:	289-315-3680
EOR Name:	
EOR Company:	
EOR Email:	
EOR Phone:	

Net Annual Sediment (TSS) Load Reduction Sizing Summary

Stormceptor Model	TSS Removal Provided (%)
EF4	55
EF6	60
EF8	64
EF10	66
EF12	69

Recommended Stormceptor EF Model: EF6

Estimated Net Annual Sediment (TSS) Load Reduction (%): 60

Water Quality Runoff Volume Capture (%): > 90

imbrium

THIRD-PARTY TESTING AND VERIFICATION

►**Stormceptor® EF and Stormceptor® EFO** are the latest evolutions in the Stormceptor® oil-grit separator (OGS) technology series, and are designed to remove a wide variety of pollutants from stormwater and snowmelt runoff. These technologies have been third-party tested in accordance with the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators** and performance has been third-party verified in accordance with the **ISO 14034 Environmental Technology Verification (ETV)** protocol.

PERFORMANCE

►**Stormceptor® EF and EFO** remove stormwater pollutants through gravity separation and floatation, and feature a patent-pending design that generates positive removal of total suspended solids (TSS) throughout each storm event, including high-intensity storms. Captured pollutants include sediment, free oils, and sediment-bound pollutants such as nutrients, heavy metals, and petroleum hydrocarbons. Stormceptor is sized to remove a high level of TSS from the frequent rainfall events that contribute the vast majority of annual runoff volume and pollutant load. The technology incorporates an internal bypass to convey excessive stormwater flows from high-intensity storms through the device without resuspension and washout (scour) of previously captured pollutants. Proper routine maintenance ensures high pollutant removal performance and protection of downstream waterwavs.

PARTICLE SIZE DISTRIBUTION (PSD)

►The **Canadian ETV PSD** shown in the table below was used, or in part, for this sizing. This is the identical PSD that is referenced in the Canadian ETV ***Procedure for Laboratory Testing of Oil-Grit Separators*** for both sediment removal testing and scour testing. The Canadian ETV PSD contains a wide range of particle sizes in the sand and silt fractions, and is considered reasonably representative of the particle size fractions found in typical urban stormwater runoff.

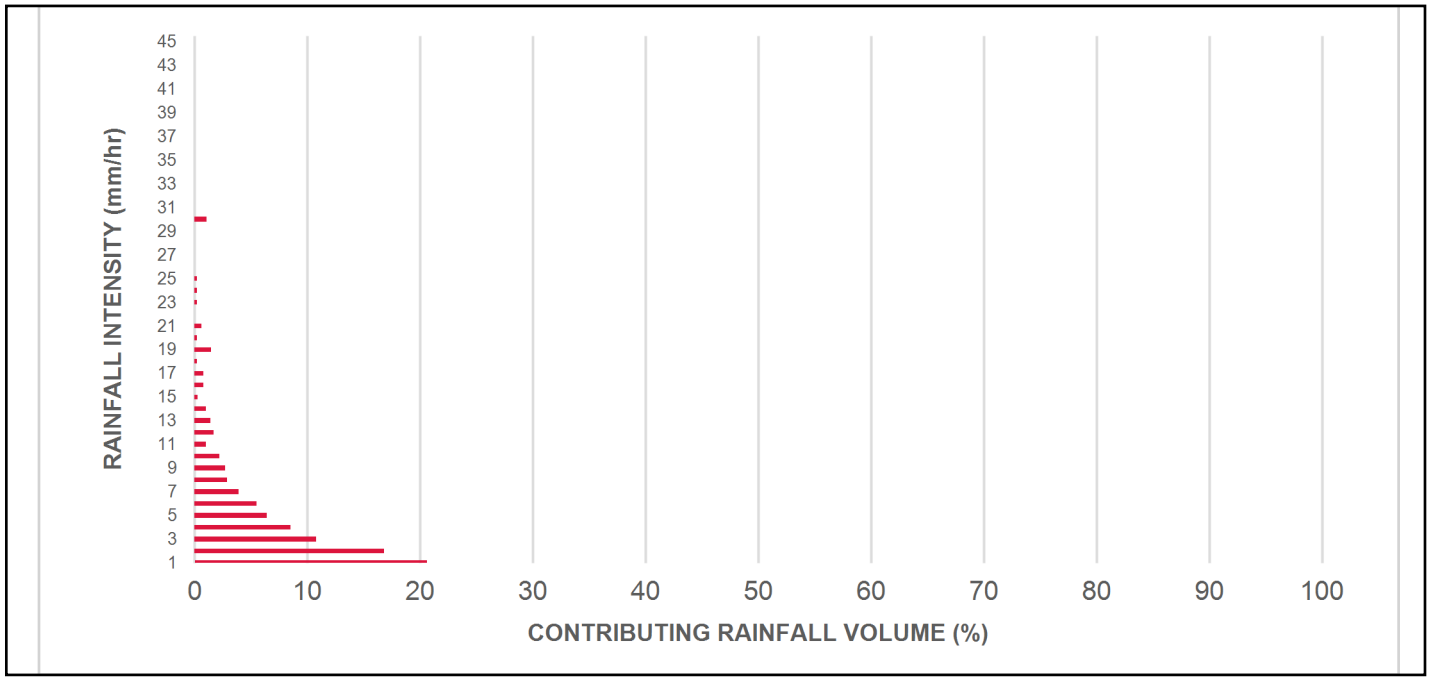
Particle Size (µm)	Percent Less Than	Particle Size Fraction (µm)	Percent
1000	100	500-1000	5
500	95	250-500	5
250	90	150-250	15
150	75	100-150	15
100	60	75-100	10
75	50	50-75	5
50	45	20-50	10
20	35	8-20	15
8	20	5-8	10
5	10	2-5	5
2	5	<2	5

Upstream Flow Controlled Results

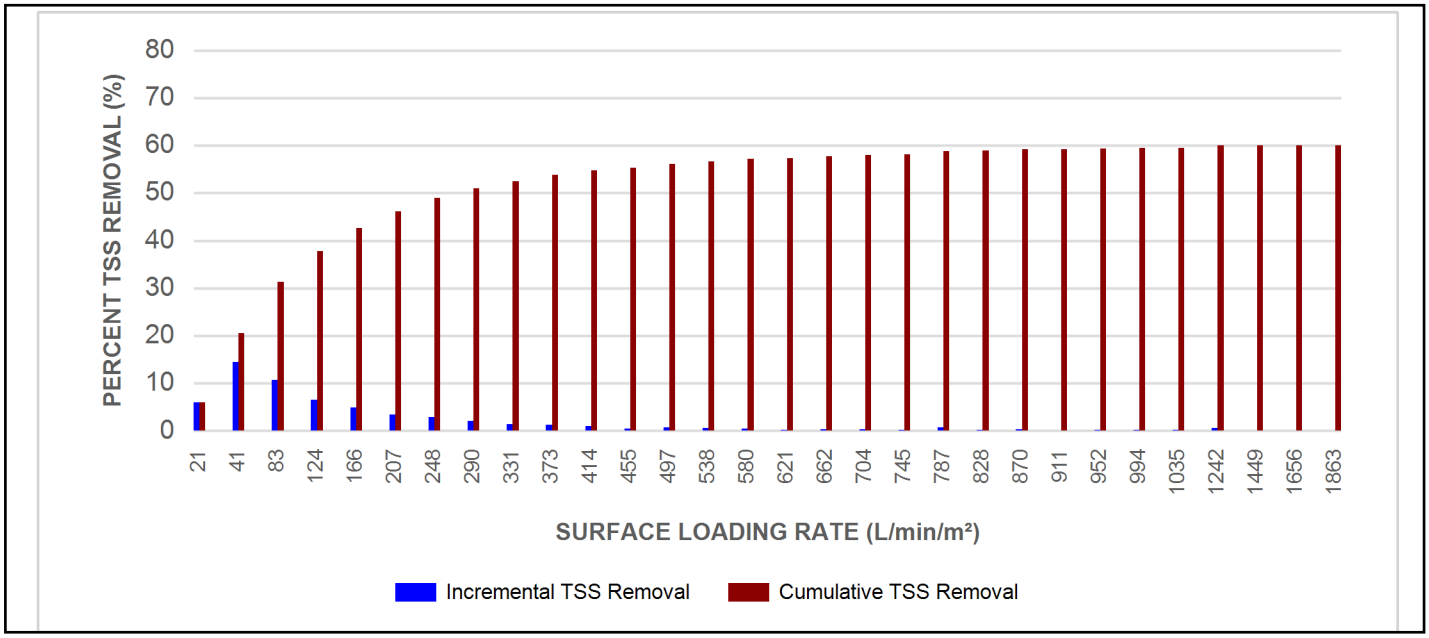
Rainfall Intensity (mm / hr)	Percent Rainfall Volume (%)	Cumulative Rainfall Volume (%)	Flow Rate (L/s)	Flow Rate (L/min)	Surface Loading Rate (L/min/m²)	Removal Efficiency (%)	Incremental Removal (%)	Cumulative Removal (%)
0.5	8.5	8.5	0.91	54.0	21.0	70	6.0	6.0
1	20.6	29.1	1.81	109.0	41.0	70	14.5	20.5
2	16.8	45.9	3.63	218.0	83.0	64	10.8	31.3
3	10.8	56.7	5.44	327.0	124.0	61	6.5	37.8
4	8.5	65.2	7.26	436.0	166.0	57	4.8	42.6
5	6.4	71.6	9.07	544.0	207.0	54	3.5	46.1
6	5.5	77.0	10.89	653.0	248.0	53	2.9	49.0
7	3.9	81.0	12.70	762.0	290.0	51	2.0	51.0
8	2.9	83.9	14.52	871.0	331.0	50	1.5	52.5
9	2.7	86.5	16.33	980.0	373.0	49	1.3	53.8
10	2.2	88.7	18.15	1089.0	414.0	48	1.0	54.8
11	1.0	89.7	19.96	1198.0	455.0	48	0.5	55.3
12	1.7	91.3	21.78	1307.0	497.0	47	0.8	56.1
13	1.4	92.8	23.59	1416.0	538.0	47	0.7	56.7
14	1.0	93.7	25.41	1525.0	580.0	46	0.4	57.2
15	0.3	94.0	27.22	1633.0	621.0	46	0.1	57.3
16	6.0	100.0	29.04	1742.0	662.0	46	2.7	60.0
17	0.0	100.0	30.00	1800.0	684.0	46	0.0	60.0
18	0.0	100.0	30.00	1800.0	684.0	46	0.0	60.0
19	0.0	100.0	30.00	1800.0	684.0	46	0.0	60.0
20	0.0	100.0	30.00	1800.0	684.0	46	0.0	60.0
21	0.0	100.0	30.00	1800.0	684.0	46	0.0	60.0
22	0.0	100.0	30.00	1800.0	684.0	46	0.0	60.0
23	0.0	100.0	30.00	1800.0	684.0	46	0.0	60.0
24	0.0	100.0	30.00	1800.0	684.0	46	0.0	60.0
25	0.0	100.0	30.00	1800.0	684.0	46	0.0	60.0
30	0.0	100.0	30.00	1800.0	684.0	46	0.0	60.0
35	0.0	100.0	30.00	1800.0	684.0	46	0.0	60.0
40	0.0	100.0	30.00	1800.0	684.0	46	0.0	60.0
45	0.0	100.0	30.00	1800.0	684.0	46	0.0	60.0
Estimated Net Annual Sediment (TSS) Load Reduction =								**60 %**

Climate Station ID: 6158731 *Years of Rainfall Data*: 20

RAINFALL DATA FROM TORONTO INTL AP RAINFALL STATION



INCREMENTAL AND CUMULATIVE TSS REMOVAL FOR THE RECOMMENDED STORMCEPTOR® MODEL



imbrium

Maximum Pipe Diameter / Peak Conveyance

Stormceptor EF / EFO	Model Diameter		Min Angle Inlet / Outlet Pipes	Max Inlet Pipe Diameter		Max Outlet Pipe Diameter		Peak Conveyance Flow Rate	
	(m)	(ft)		(mm)	(in)	(mm)	(in)	(L/s)	(cfs)
EF4 / EFO4	1.2	4	90	609	24	609	24	425	15
EF6 / EFO6	1.8	6	90	914	36	914	36	990	35
EF8 / EFO8	2.4	8	90	1219	48	1219	48	1700	60
EF10 / EFO10	3.0	10	90	1828	72	1828	72	2830	100
EF12 / EFO12	3.6	12	90	1828	72	1828	72	2830	100

SCOUR PREVENTION AND ONLINE CONFIGURATION

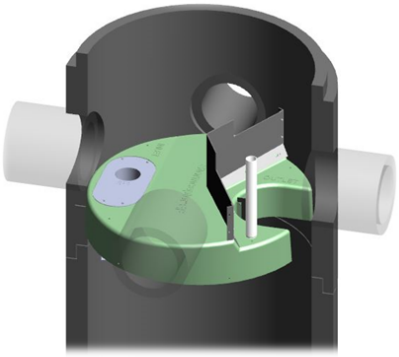
►**Stormceptor® EF and EFO** feature an internal bypass and superior scour prevention technology that have been demonstrated in third-party testing according to the scour testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**, and the exceptional scour test performance has been third-party verified in accordance with the ISO 14034 ETV protocol. As a result, Stormceptor EF and EFO are approved for online installation, eliminating the need for costly additional bypass structures, piping, and installation expense.

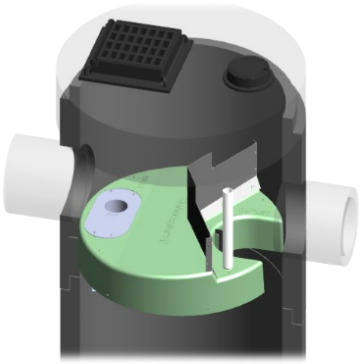
DESIGN FLEXIBILITY

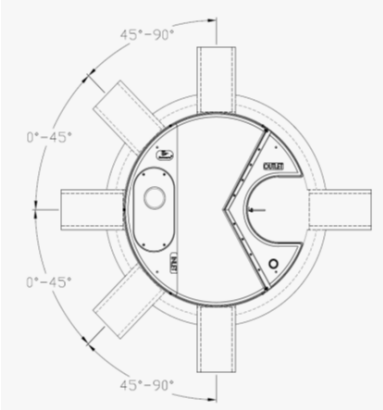
►**Stormceptor® EF** and **EFO** offers design flexibility in one simplified platform, accepting stormwater flow from a single inlet pipe or multiple inlet pipes, and/or surface runoff through an inlet grate. The device can also serve as a junction structure, accommodate a 90-degree inlet-to-outlet bend angle, and can be modified to ensure performance in submerged conditions.

OIL CAPTURE AND RETENTION

►While Stormceptor® EF will capture and retain oil from dry weather spills and low intensity runoff, **Stormceptor® EFO** has demonstrated superior oil capture and greater than 99% oil retention in third-party testing according to the light liquid re-entrainment testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**. Stormceptor EFO is recommended for sites where oil capture and retention is a requirement.







INLET-TO-OUTLET DROP

Elevation differential between inlet and outlet pipe inverts is dictated by the angle at which the inlet pipe(s) enters the unit.

0° - 45° : The inlet pipe is 1-inch (25mm) higher than the outlet pipe.

45° - 90° : The inlet pipe is 2-inches (50mm) higher than the outlet pipe.

HEAD LOSS

The head loss through Stormceptor EF is similar to that of a 60-degree bend structure. The applicable K value for calculating minor losses through the unit is 1.1. For submerged conditions the applicable K value is 3.0.

Pollutant Capacity

Stormceptor EF / EFO	Model Diameter		Depth (Outlet Pipe Invert to Sump Floor)		Oil Volume		Recommended Sediment Maintenance Depth *		Maximum Sediment Volume *		Maximum Sediment Mass **	
	(m)	(ft)	(m)	(ft)	(L)	(Gal)	(mm)	(in)	(L)	(ft^3)	(kg)	(lb)
EF4 / EFO4	1.2	4	1.52	5.0	265	70	203	8	1190	42	1904	5250
EF6 / EFO6	1.8	6	1.93	6.3	610	160	305	12	3470	123	5552	15375
EF8 / EFO8	2.4	8	2.59	8.5	1070	280	610	24	8780	310	14048	38750
EF10 / EFO10	3.0	10	3.25	10.7	1670	440	610	24	17790	628	28464	78500
EF12 / EFO12	3.6	12	3.89	12.8	2475	655	610	24	31220	1103	49952	137875

*Increased sump depth may be added to increase sediment storage capacity

** Average density of wet packed sediment in sump = 1.6 kg/L (100 lb/ft^3)

Feature	Benefit	Feature Appeals To
Patent-pending enhanced flow treatment and scour prevention technology	Superior, verified third-party performance	Regulator, Specifying & Design Engineer
Third-party verified light liquid capture and retention for EFO version	Proven performance for fuel/oil hotspot locations	Regulator, Specifying & Design Engineer, Site Owner
Functions as bend, junction or inlet structure	Design flexibility	Specifying & Design Engineer
Minimal drop between inlet and outlet	Site installation ease	Contractor
Large diameter outlet riser for inspection and maintenance	Easy maintenance access from grade	Maintenance Contractor & Site Owner

STANDARD STORMCEPTOR EF/EFO DRAWINGS

For standard details, please visit http://www.imbriumsystems.com/stormwater-treatment-solutions/stormceptor-ef

STANDARD STORMCEPTOR EF/EFO SPECIFICATION

For specifications, please visit http://www.imbriumsystems.com/stormwater-treatment-solutions/stormceptor-ef

Table of TSS Removal vs Surface Loading Rate Based on Third-Party Test Results Stormceptor® EF

SLR (L/min/m²)	TSS % REMOVAL	SLR (L/min/m²)	TSS % REMOVAL	SLR (L/min/m²)	TSS % REMOVAL	SLR (L/min/m²)	TSS % REMOVAL
1	70	660	46	1320	48	1980	35
30	70	690	46	1350	48	2010	34
60	67	720	45	1380	49	2040	34
90	63	750	45	1410	49	2070	33
120	61	780	45	1440	48	2100	33
150	58	810	45	1470	47	2130	32
180	56	840	45	1500	46	2160	32
210	54	870	45	1530	45	2190	31
240	53	900	45	1560	44	2220	31
270	52	930	44	1590	43	2250	30
300	51	960	44	1620	42	2280	30
330	50	990	44	1650	42	2310	30
360	49	1020	44	1680	41	2340	29
390	48	1050	45	1710	40	2370	29
420	48	1080	45	1740	39	2400	29
450	48	1110	45	1770	39	2430	28
480	47	1140	46	1800	38	2460	28
510	47	1170	46	1830	37	2490	28
540	47	1200	47	1860	37	2520	27
570	46	1230	47	1890	36	2550	27
600	46	1260	47	1920	36	2580	27
630	46	1290	48	1950	35		

STANDARD PERFORMANCE SPECIFICATION FOR "OIL GRIT SEPARATOR" (OGS) STORMWATER QUALITY TREATMENT DEVICE

PART 1 – GENERAL

1.1 WORK INCLUDED

This section specifies requirements for selecting, sizing, and designing an underground Oil Grit Separator (OGS) device for stormwater quality treatment, with third-party testing results and a Statement of Verification in accordance with ISO 14034 Environmental Management – Environmental Technology Verification (ETV).

1.2 REFERENCE STANDARDS & PROCEDURES

ISO 14034:2016 Environmental management – Environmental technology verification (ETV)

Canadian Environmental Technology Verification (ETV) Program's **Procedure for Laboratory Testing of Oil-Grit Separators.**

1.3 SUBMITTALS

1.3.1 All submittals, including sizing reports & shop drawings, shall be submitted upon request with each order to the contractor then forwarded to the Engineer of Record for review and acceptance. Shop drawings shall detail all OGS components, elevations, and sequence of construction.

1.3.2 Alternative devices shall have features identical to or greater than the specified device, including: treatment chamber diameter, treatment chamber wet volume, sediment storage volume, and oil storage volume.

1.3.3 Unless directed otherwise by the Engineer of Record, OGS stormwater quality treatment product substitutions or alternatives submitted within ten days prior to project bid shall not be accepted. All alternatives or substitutions submitted shall be signed and sealed by a local registered Professional Engineer, based on the exact same criteria detailed in Section 3, in entirety, subject to review and approval by the Engineer of Record.

PART 2 – PRODUCTS

2.1 OGS POLLUTANT STORAGE

The OGS device shall include a sump for sediment storage, and a protected volume for the capture and storage of petroleum hydrocarbons and buoyant gross pollutants. The **minimum** sediment & petroleum hydrocarbon storage capacity shall be as follows:

2.1.1

4 ft (1219 mm) Diameter OGS Units:	1.19 m^3 sediment / 265 L oil
6 ft (1829 mm) Diameter OGS Units:	3.48 m^3 sediment / 609 L oil
8 ft (2438 mm) Diameter OGS Units:	8.78 m^3 sediment / 1,071 L oil
10 ft (3048 mm) Diameter OGS Units:	17.78 m^3 sediment / 1,673 L oil
12 ft (3657 mm) Diameter OGS Units:	31.23 m^3 sediment / 2,476 L oil

PART 3 – PERFORMANCE & DESIGN

3.1 GENERAL

The OGS stormwater quality treatment device shall be verified in accordance with ISO 14034:2016 Environmental management – Environmental technology verification (ETV). The OGS stormwater quality treatment device shall remove oil, sediment and gross pollutants from stormwater runoff during frequent wet weather events, and retain these pollutants during less frequent high flow wet weather events below the insert within the OGS for later removal during maintenance. The Manufacturer shall have at least ten (10) years of local experience, history and success in engineering design, manufacturing and production and supply of OGS stormwater quality treatment device systems, acceptable to the Engineer of Record.

3.2 SIZING METHODOLOGY

The OGS device shall be engineered, designed and sized to provide stormwater quality treatment based on treating a minimum of 90 percent of the average annual runoff volume and a minimum removal of an annual average 60% of the sediment (TSS) load based on the Particle Size Distribution (PSD) specified in the sizing report for the specified device. Sizing of the OGS shall be determined by use of a minimum ten (10) years of local historical rainfall data provided by Environment Canada. Sizing shall also be determined by use of the sediment removal performance data derived from the ISO 14034 ETV third-party verified laboratory testing data from testing conducted in accordance with the Canadian ETV protocol Procedure for Laboratory Testing of Oil-Grit Separators, as follows:

3.2.1 Sediment removal efficiency for a given surface loading rate and its associated flow rate shall be based on sediment removal efficiency demonstrated at the seven (7) tested surface loading rates specified in the protocol, ranging 40 L/min/m^2 to 1400 L/min/m^2, and as stated in the ISO 14034 ETV Verification Statement for the OGS device.

3.2.2 Sediment removal efficiency for surface loading rates between 40 L/min/m^2 and 1400 L/min/m^2 shall be based on linear interpolation of data between consecutive tested surface loading rates.

3.2.3 Sediment removal efficiency for surface loading rates less than the lowest tested surface loading rate of 40 L/min/m^2 shall be assumed to be identical to the sediment removal efficiency at 40 L/min/m^2. No extrapolation shall be allowed that results in a sediment removal efficiency that is greater than that demonstrated at 40 L/min/m^2.

3.2.4 Sediment removal efficiency for surface loading rates greater than the highest tested surface loading rate of 1400 L/min/m^2 shall assume zero sediment removal for the portion of flow that exceeds 1400 L/min/m^2, and shall be calculated using a simple proportioning formula, with 1400 L/min/m^2 in the numerator and the higher surface loading rate in the denominator, and multiplying the resulting fraction times the sediment removal efficiency at 1400 L/min/m^2.

The OGS device shall also have sufficient annual sediment storage capacity as specified and calculated in Section 2.1.

3.3 CANADIAN ETV or ISO 14034 ETV VERIFICATION OF SCOUR TESTING

The OGS device shall have Canadian ETV or ISO 14034 ETV Verification of third-party scour testing conducted in accordance with the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators.**

3.3.1 To be acceptable for on-line installation, the OGS device must demonstrate an average scour test effluent concentration less than 10 mg/L at each surface loading rate tested, up to and including 2600 L/min/m^2.

Stormceptor®

FORTERRA

Stormceptor® EF Sizing Report

STORMCEPTOR®
ESTIMATED NET ANNUAL SEDIMENT (TSS) LOAD REDUCTION

07/10/2023

Province:	Ontario
City:	Pickering
Nearest Rainfall Station:	TORONTO INTL AP
Climate Station Id:	6158731
Years of Rainfall Data:	20

Site Name:	Frisque - West

Drainage Area (ha):	1.40
% Imperviousness:	37.00

Runoff Coefficient 'c': 0.52

Particle Size Distribution:	CA ETV
Target TSS Removal (%):	60.0

Required Water Quality Runoff Volume Capture (%):	90.00
Estimated Water Quality Flow Rate (L/s):	22.73
Oil / Fuel Spill Risk Site?	No
Upstream Flow Control?	Yes
Upstream Orifice Control Flow Rate to Stormceptor (L/s):	36.00
Peak Conveyance (maximum) Flow Rate (L/s):	
Site Sediment Transport Rate (kg/ha/yr):	

Project Name:	Frisque
Project Number:	E21007
Designer Name:	Andrea Keeping
Designer Company:	Candevcon LImited
Designer Email:	akeeping@candevcon.com
Designer Phone:	289-315-3680
EOR Name:	
EOR Company:	
EOR Email:	
EOR Phone:	

Net Annual Sediment (TSS) Load Reduction Sizing Summary

Stormceptor Model	TSS Removal Provided (%)
EF4	53
EF6	59
EF8	63
EF10	66
EF12	68

Recommended Stormceptor EF Model: EF8

Estimated Net Annual Sediment (TSS) Load Reduction (%): 63

Water Quality Runoff Volume Capture (%): > 90

imbrium

THIRD-PARTY TESTING AND VERIFICATION

►**Stormceptor® EF and Stormceptor® EFO** are the latest evolutions in the Stormceptor® oil-grit separator (OGS) technology series, and are designed to remove a wide variety of pollutants from stormwater and snowmelt runoff. These technologies have been third-party tested in accordance with the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators** and performance has been third-party verified in accordance with the **ISO 14034 Environmental Technology Verification (ETV)** protocol.

PERFORMANCE

►**Stormceptor® EF and EFO** remove stormwater pollutants through gravity separation and floatation, and feature a patent-pending design that generates positive removal of total suspended solids (TSS) throughout each storm event, including high-intensity storms. Captured pollutants include sediment, free oils, and sediment-bound pollutants such as nutrients, heavy metals, and petroleum hydrocarbons. Stormceptor is sized to remove a high level of TSS from the frequent rainfall events that contribute the vast majority of annual runoff volume and pollutant load. The technology incorporates an internal bypass to convey excessive stormwater flows from high-intensity storms through the device without resuspension and washout (scour) of previously captured pollutants. Proper routine maintenance ensures high pollutant removal performance and protection of downstream waterwavs.

PARTICLE SIZE DISTRIBUTION (PSD)

►The **Canadian ETV PSD** shown in the table below was used, or in part, for this sizing. This is the identical PSD that is referenced in the Canadian ETV ***Procedure for Laboratory Testing of Oil-Grit Separators*** for both sediment removal testing and scour testing. The Canadian ETV PSD contains a wide range of particle sizes in the sand and silt fractions, and is considered reasonably representative of the particle size fractions found in typical urban stormwater runoff.

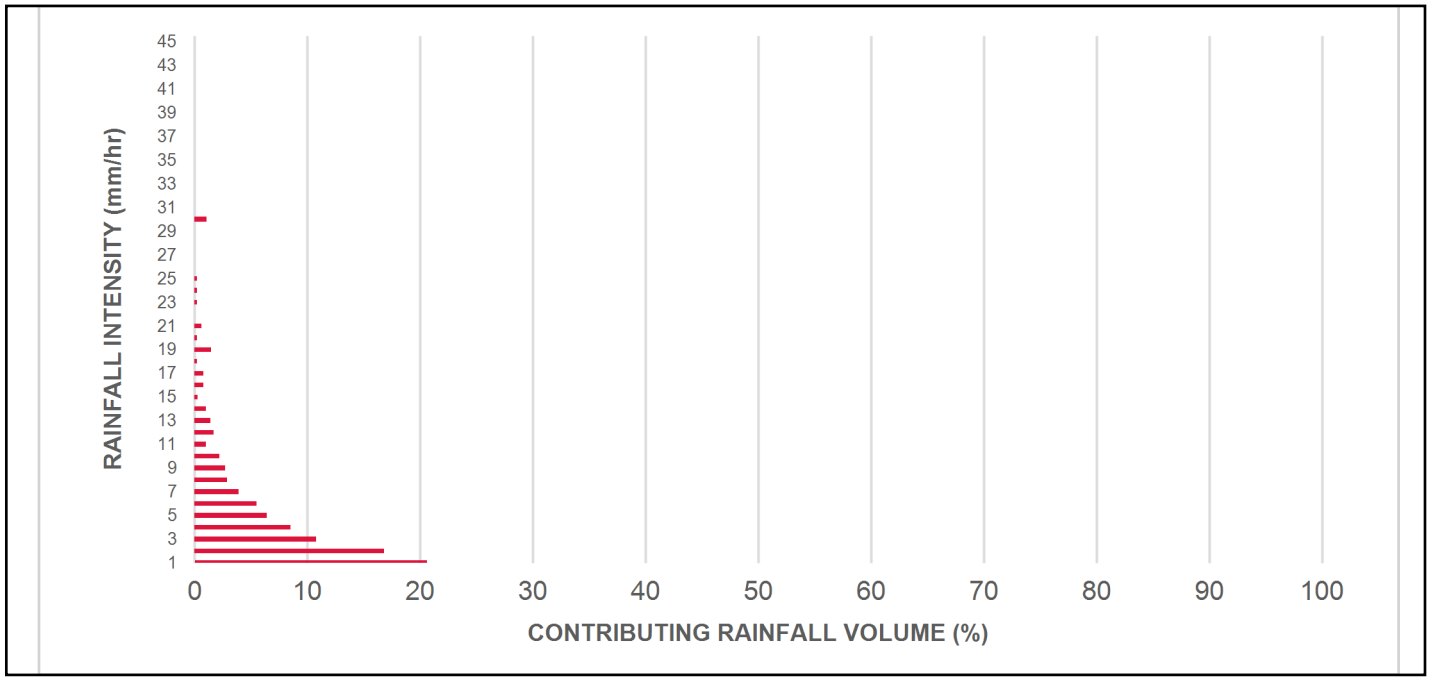
Particle Size (µm)	Percent Less Than	Particle Size Fraction (µm)	Percent
1000	100	500-1000	5
500	95	250-500	5
250	90	150-250	15
150	75	100-150	15
100	60	75-100	10
75	50	50-75	5
50	45	20-50	10
20	35	8-20	15
8	20	5-8	10
5	10	2-5	5
2	5	<2	5

Upstream Flow Controlled Results

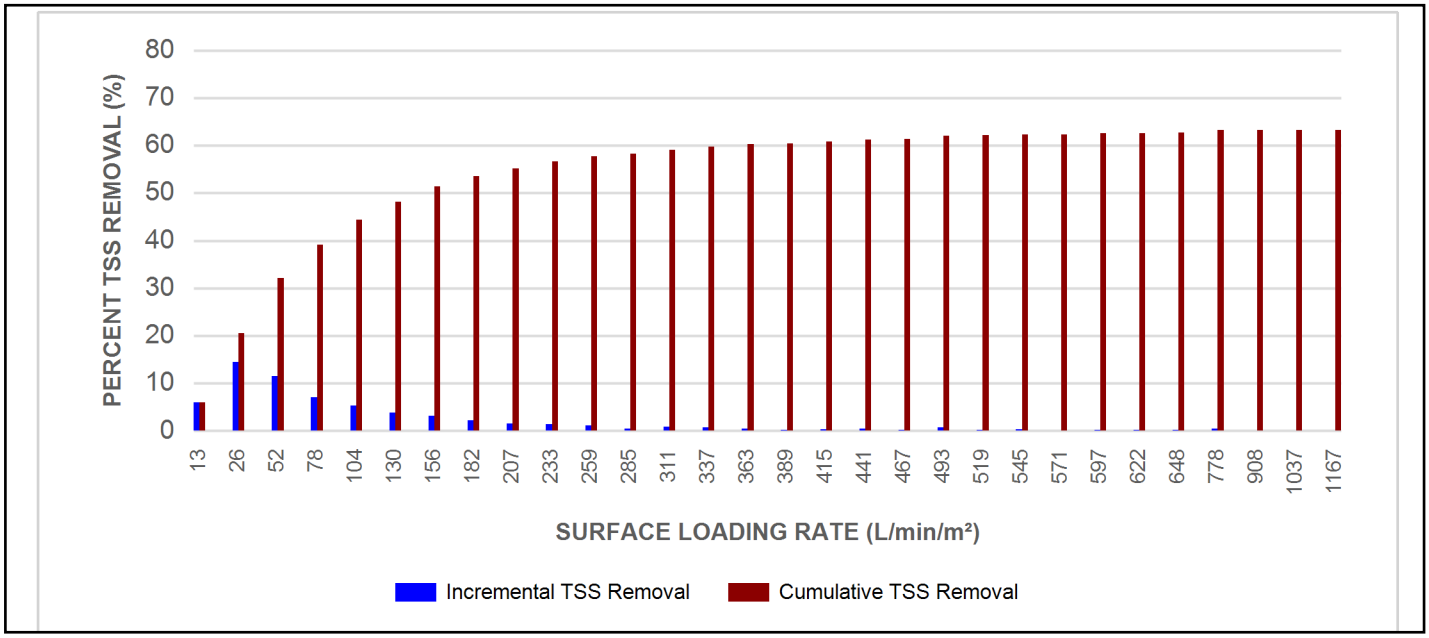
Rainfall Intensity (mm / hr)	Percent Rainfall Volume (%)	Cumulative Rainfall Volume (%)	Flow Rate (L/s)	Flow Rate (L/min)	Surface Loading Rate (L/min/m²)	Removal Efficiency (%)	Incremental Removal (%)	Cumulative Removal (%)
0.5	8.5	8.5	1.02	61.0	13.0	70	6.0	6.0
1	20.6	29.1	2.03	122.0	26.0	70	14.5	20.5
2	16.8	45.9	4.06	244.0	52.0	69	11.6	32.1
3	10.8	56.7	6.09	366.0	78.0	66	7.1	39.1
4	8.5	65.2	8.13	488.0	104.0	62	5.3	44.4
5	6.4	71.6	10.16	609.0	130.0	60	3.8	48.2
6	5.5	77.0	12.19	731.0	156.0	58	3.2	51.4
7	3.9	81.0	14.22	853.0	182.0	56	2.2	53.6
8	2.9	83.9	16.25	975.0	207.0	54	1.6	55.2
9	2.7	86.5	18.28	1097.0	233.0	53	1.4	56.6
10	2.2	88.7	20.32	1219.0	259.0	52	1.1	57.7
11	1.0	89.7	22.35	1341.0	285.0	52	0.5	58.2
12	1.7	91.3	24.38	1463.0	311.0	51	0.8	59.1
13	1.4	92.8	26.41	1585.0	337.0	50	0.7	59.8
14	1.0	93.7	28.44	1707.0	363.0	49	0.5	60.3
15	0.3	94.0	30.47	1828.0	389.0	48	0.1	60.4
16	0.8	94.8	32.51	1950.0	415.0	48	0.4	60.8
17	5.2	100.0	34.54	2072.0	441.0	48	2.5	63.2
18	0.0	100.0	36.00	2160.0	460.0	47	0.0	63.2
19	0.0	100.0	36.00	2160.0	460.0	47	0.0	63.2
20	0.0	100.0	36.00	2160.0	460.0	47	0.0	63.2
21	0.0	100.0	36.00	2160.0	460.0	47	0.0	63.2
22	0.0	100.0	36.00	2160.0	460.0	47	0.0	63.2
23	0.0	100.0	36.00	2160.0	460.0	47	0.0	63.2
24	0.0	100.0	36.00	2160.0	460.0	47	0.0	63.2
25	0.0	100.0	36.00	2160.0	460.0	47	0.0	63.2
30	0.0	100.0	36.00	2160.0	460.0	47	0.0	63.2
35	0.0	100.0	36.00	2160.0	460.0	47	0.0	63.2
40	0.0	100.0	36.00	2160.0	460.0	47	0.0	63.2
45	0.0	100.0	36.00	2160.0	460.0	47	0.0	63.2
Estimated Net Annual Sediment (TSS) Load Reduction =								**63 %**

Climate Station ID: 6158731 *Years of Rainfall Data*: 20

RAINFALL DATA FROM TORONTO INTL AP RAINFALL STATION



INCREMENTAL AND CUMULATIVE TSS REMOVAL FOR THE RECOMMENDED STORMCEPTOR® MODEL



Maximum Pipe Diameter / Peak Conveyance

Stormceptor EF / EFO	Model Diameter		Min Angle Inlet / Outlet Pipes	Max Inlet Pipe Diameter		Max Outlet Pipe Diameter		Peak Conveyance Flow Rate	
	(m)	(ft)		(mm)	(in)	(mm)	(in)	(L/s)	(cfs)
EF4 / EFO4	1.2	4	90	609	24	609	24	425	15
EF6 / EFO6	1.8	6	90	914	36	914	36	990	35
EF8 / EFO8	2.4	8	90	1219	48	1219	48	1700	60
EF10 / EFO10	3.0	10	90	1828	72	1828	72	2830	100
EF12 / EFO12	3.6	12	90	1828	72	1828	72	2830	100

SCOUR PREVENTION AND ONLINE CONFIGURATION

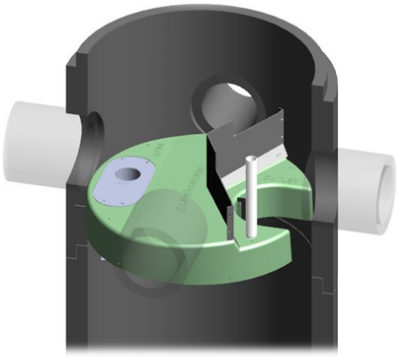
►**Stormceptor® EF and EFO** feature an internal bypass and superior scour prevention technology that have been demonstrated in third-party testing according to the scour testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**, and the exceptional scour test performance has been third-party verified in accordance with the ISO 14034 ETV protocol. As a result, Stormceptor EF and EFO are approved for online installation, eliminating the need for costly additional bypass structures, piping, and installation expense.

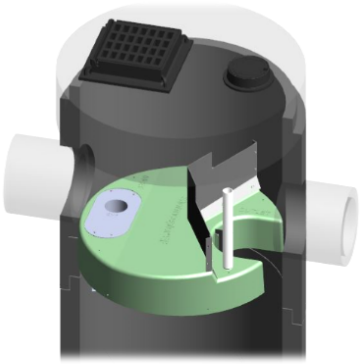
DESIGN FLEXIBILITY

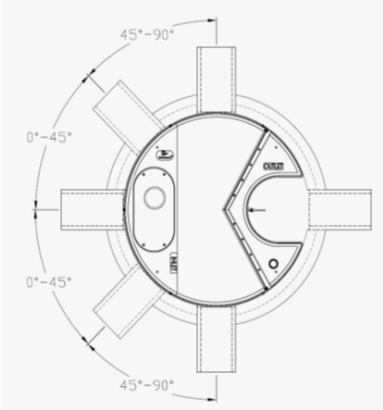
►**Stormceptor® EF** and **EFO** offers design flexibility in one simplified platform, accepting stormwater flow from a single inlet pipe or multiple inlet pipes, and/or surface runoff through an inlet grate. The device can also serve as a junction structure, accommodate a 90-degree inlet-to-outlet bend angle, and can be modified to ensure performance in submerged conditions.

OIL CAPTURE AND RETENTION

►While Stormceptor® EF will capture and retain oil from dry weather spills and low intensity runoff, **Stormceptor® EFO** has demonstrated superior oil capture and greater than 99% oil retention in third-party testing according to the light liquid re-entrainment testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**. Stormceptor EFO is recommended for sites where oil capture and retention is a requirement.







INLET-TO-OUTLET DROP

Elevation differential between inlet and outlet pipe inverts is dictated by the angle at which the inlet pipe(s) enters the unit.

0° - 45° : The inlet pipe is 1-inch (25mm) higher than the outlet pipe.

45° - 90° : The inlet pipe is 2-inches (50mm) higher than the outlet pipe.

HEAD LOSS

The head loss through Stormceptor EF is similar to that of a 60-degree bend structure. The applicable K value for calculating minor losses through the unit is 1.1. For submerged conditions the applicable K value is 3.0.

Pollutant Capacity

Stormceptor EF / EFO	Model Diameter		Depth (Outlet Pipe Invert to Sump Floor)		Oil Volume		Recommended Sediment Maintenance Depth *		Maximum Sediment Volume *		Maximum Sediment Mass **	
	(m)	(ft)	(m)	(ft)	(L)	(Gal)	(mm)	(in)	(L)	(ft^3)	(kg)	(lb)
EF4 / EFO4	1.2	4	1.52	5.0	265	70	203	8	1190	42	1904	5250
EF6 / EFO6	1.8	6	1.93	6.3	610	160	305	12	3470	123	5552	15375
EF8 / EFO8	2.4	8	2.59	8.5	1070	280	610	24	8780	310	14048	38750
EF10 / EFO10	3.0	10	3.25	10.7	1670	440	610	24	17790	628	28464	78500
EF12 / EFO12	3.6	12	3.89	12.8	2475	655	610	24	31220	1103	49952	137875

*Increased sump depth may be added to increase sediment storage capacity

** Average density of wet packed sediment in sump = 1.6 kg/L (100 lb/ft^3)

Feature	Benefit	Feature Appeals To
Patent-pending enhanced flow treatment and scour prevention technology	Superior, verified third-party performance	Regulator, Specifying & Design Engineer
Third-party verified light liquid capture and retention for EFO version	Proven performance for fuel/oil hotspot locations	Regulator, Specifying & Design Engineer, Site Owner
Functions as bend, junction or inlet structure	Design flexibility	Specifying & Design Engineer
Minimal drop between inlet and outlet	Site installation ease	Contractor
Large diameter outlet riser for inspection and maintenance	Easy maintenance access from grade	Maintenance Contractor & Site Owner

STANDARD STORMCEPTOR EF/EFO DRAWINGS

For standard details, please visit http://www.imbriumsystems.com/stormwater-treatment-solutions/stormceptor-ef

STANDARD STORMCEPTOR EF/EFO SPECIFICATION

For specifications, please visit http://www.imbriumsystems.com/stormwater-treatment-solutions/stormceptor-ef

Table of TSS Removal vs Surface Loading Rate Based on Third-Party Test Results Stormceptor® EF

SLR (L/min/m²)	TSS % REMOVAL	SLR (L/min/m²)	TSS % REMOVAL	SLR (L/min/m²)	TSS % REMOVAL	SLR (L/min/m²)	TSS % REMOVAL
1	70	660	46	1320	48	1980	35
30	70	690	46	1350	48	2010	34
60	67	720	45	1380	49	2040	34
90	63	750	45	1410	49	2070	33
120	61	780	45	1440	48	2100	33
150	58	810	45	1470	47	2130	32
180	56	840	45	1500	46	2160	32
210	54	870	45	1530	45	2190	31
240	53	900	45	1560	44	2220	31
270	52	930	44	1590	43	2250	30
300	51	960	44	1620	42	2280	30
330	50	990	44	1650	42	2310	30
360	49	1020	44	1680	41	2340	29
390	48	1050	45	1710	40	2370	29
420	48	1080	45	1740	39	2400	29
450	48	1110	45	1770	39	2430	28
480	47	1140	46	1800	38	2460	28
510	47	1170	46	1830	37	2490	28
540	47	1200	47	1860	37	2520	27
570	46	1230	47	1890	36	2550	27
600	46	1260	47	1920	36	2580	27
630	46	1290	48	1950	35		

STANDARD PERFORMANCE SPECIFICATION FOR "OIL GRIT SEPARATOR" (OGS) STORMWATER QUALITY TREATMENT DEVICE

PART 1 – GENERAL

1.1 WORK INCLUDED

This section specifies requirements for selecting, sizing, and designing an underground Oil Grit Separator (OGS) device for stormwater quality treatment, with third-party testing results and a Statement of Verification in accordance with ISO 14034 Environmental Management – Environmental Technology Verification (ETV).

1.2 REFERENCE STANDARDS & PROCEDURES

ISO 14034:2016 Environmental management – Environmental technology verification (ETV)

Canadian Environmental Technology Verification (ETV) Program's **Procedure for Laboratory Testing of Oil-Grit Separators.**

1.3 SUBMITTALS

1.3.1 All submittals, including sizing reports & shop drawings, shall be submitted upon request with each order to the contractor then forwarded to the Engineer of Record for review and acceptance. Shop drawings shall detail all OGS components, elevations, and sequence of construction.

1.3.2 Alternative devices shall have features identical to or greater than the specified device, including: treatment chamber diameter, treatment chamber wet volume, sediment storage volume, and oil storage volume.

1.3.3 Unless directed otherwise by the Engineer of Record, OGS stormwater quality treatment product substitutions or alternatives submitted within ten days prior to project bid shall not be accepted. All alternatives or substitutions submitted shall be signed and sealed by a local registered Professional Engineer, based on the exact same criteria detailed in Section 3, in entirety, subject to review and approval by the Engineer of Record.

PART 2 – PRODUCTS

2.1 OGS POLLUTANT STORAGE

The OGS device shall include a sump for sediment storage, and a protected volume for the capture and storage of petroleum hydrocarbons and buoyant gross pollutants. The **minimum** sediment & petroleum hydrocarbon storage capacity shall be as follows:

2.1.1

4 ft (1219 mm) Diameter OGS Units:	1.19 m^3 sediment / 265 L oil
6 ft (1829 mm) Diameter OGS Units:	3.48 m^3 sediment / 609 L oil
8 ft (2438 mm) Diameter OGS Units:	8.78 m^3 sediment / 1,071 L oil
10 ft (3048 mm) Diameter OGS Units:	17.78 m^3 sediment / 1,673 L oil
12 ft (3657 mm) Diameter OGS Units:	31.23 m^3 sediment / 2,476 L oil

PART 3 – PERFORMANCE & DESIGN

3.1 GENERAL

The OGS stormwater quality treatment device shall be verified in accordance with ISO 14034:2016 Environmental management – Environmental technology verification (ETV). The OGS stormwater quality treatment device shall remove oil, sediment and gross pollutants from stormwater runoff during frequent wet weather events, and retain these pollutants during less frequent high flow wet weather events below the insert within the OGS for later removal during maintenance. The Manufacturer shall have at least ten (10) years of local experience, history and success in engineering design, manufacturing and production and supply of OGS stormwater quality treatment device systems, acceptable to the Engineer of Record.

3.2 SIZING METHODOLOGY

The OGS device shall be engineered, designed and sized to provide stormwater quality treatment based on treating a minimum of 90 percent of the average annual runoff volume and a minimum removal of an annual average 60% of the sediment (TSS) load based on the Particle Size Distribution (PSD) specified in the sizing report for the specified device. Sizing of the OGS shall be determined by use of a minimum ten (10) years of local historical rainfall data provided by Environment Canada. Sizing shall also be determined by use of the sediment removal performance data derived from the ISO 14034 ETV third-party verified laboratory testing data from testing conducted in accordance with the Canadian ETV protocol Procedure for Laboratory Testing of Oil-Grit Separators, as follows:

3.2.1 Sediment removal efficiency for a given surface loading rate and its associated flow rate shall be based on sediment removal efficiency demonstrated at the seven (7) tested surface loading rates specified in the protocol, ranging 40 L/min/m^2 to 1400 L/min/m^2, and as stated in the ISO 14034 ETV Verification Statement for the OGS device.

3.2.2 Sediment removal efficiency for surface loading rates between 40 L/min/m^2 and 1400 L/min/m^2 shall be based on linear interpolation of data between consecutive tested surface loading rates.

3.2.3 Sediment removal efficiency for surface loading rates less than the lowest tested surface loading rate of 40 L/min/m^2 shall be assumed to be identical to the sediment removal efficiency at 40 L/min/m^2. No extrapolation shall be allowed that results in a sediment removal efficiency that is greater than that demonstrated at 40 L/min/m^2.

3.2.4 Sediment removal efficiency for surface loading rates greater than the highest tested surface loading rate of 1400 L/min/m^2 shall assume zero sediment removal for the portion of flow that exceeds 1400 L/min/m^2, and shall be calculated using a simple proportioning formula, with 1400 L/min/m^2 in the numerator and the higher surface loading rate in the denominator, and multiplying the resulting fraction times the sediment removal efficiency at 1400 L/min/m^2.

The OGS device shall also have sufficient annual sediment storage capacity as specified and calculated in Section 2.1.

3.3 CANADIAN ETV or ISO 14034 ETV VERIFICATION OF SCOUR TESTING

The OGS device shall have Canadian ETV or ISO 14034 ETV Verification of third-party scour testing conducted in accordance with the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators.**

3.3.1 To be acceptable for on-line installation, the OGS device must demonstrate an average scour test effluent concentration less than 10 mg/L at each surface loading rate tested, up to and including 2600 L/min/m^2.

Appendix E

LID Sizing Calculations

Project Name:	Frisque Lands	**Prepared By:**	RB
Project No.:	E21007	**Checked By:**	AK
Subject:	5mm Retention		

Impervious Site Area for 5mm Retention

	West (Areas 101, 102, 103, 201, 302)	East (Areas 401, 501)
Area (ha)	2.81	3.56
Total Imperviousness	23%	20%
Impervious Area (ha)	0.66	0.71
Required Volume for 5mm Retention (m^3) =	33	36

West Side of Carruthers Creek with 5mm Retention Provided with LIDs

LID Description	Catchment Area (ha)	Catchment Imperviousness	Impervious Area to LID (m^2)	Volume to LID (m^3)
Rear Roof Area to Soakaway Pits (Areas 101, 201 and 302)[1]	1.41	10%	987	5
Front Roof Leaders, Driveways to Soil Amendments (Areas 102 and 103)[2]	1.40	37%	5200	13
Total for West Side On-Site LIDs	2.81	22%	6187	18
End-of-Pipe Infiltration Trench/Bioretention Area Required Storage at Outlet 1 (m^3)				15

East Area with 5mm Retention Provided with LIDs

LID Description	Catchment Area (ha)	Catchment Imperviousness	Impervious Area to LID (m^2)	Volume to LID (m^3)
Rear Roof Area to Soakaway Pits (Area 401)[1]	2.39	9%	1762	9
Front Roof Leaders, Driveways to Soil Amendments (Area 501)[1,2]	1.17	43%	5000	13
Total for East Side On-Site LIDs	3.56	19%	6762	21
End-of-Pipe Infiltration Trench/Bioretention Area Required Storage at Outlet 5 (m^3)				14

[1] Impervious area to LID is equal to the roof area only. Roof area measured based on conceptual building envelop design by Blackthorn Development Corp.

[2] Only half the impervious area directed to LID is considered as per TRCA criteria crediting only 2.5mm retention for area directed to soil amendments. Impervious area includes roof and driveway.

Project Name:	Frisque Lands	**Prepared By:**	AK
Project No.:	E21007	**Checked By:**	RB
Subject:	Infiltration Trench Characteristics		

Volume to Infiltrate at the end-of-pipe infiltration trench or bioretention area determined based on 5mm of runoff from impervious areas less the water infiltrated via soakaway pits and soil ammendments.

		West (Outlet 1)	East (Outlet 5)	
Vreq'd =	Volume to infiltrate	15	14	m^3

Calculate Maximum Allowable Infiltration Trench Depth

d = PT / 1000 (Equation 4.2: MOE SWMP Manual, 2003)

		West (Outlet 1)	East (Outlet 5)	
P =	Percolation Rate[1]	12	12	mm/hr
T =	Drawdown time	72	72	hr
d =	**Maximum allowable depth**	**0.86**	**0.86**	**m**

[1] Percolation Rates range from 12mm/hr to 35mm/hr for the west side (Outlet 1) and 12mm/hr to 33mm/hr on the east side (Outlet 5) as per the Water Balance Assessment (R.J. Burnside & Associates, February 14, 2023)

Calculate Bottom area of Infiltration trench to determine trench dimensions

A = 1000 V / PnT (Equation 4.3: MOE SWMP Manual, 2003)

Substitute Eq. 4.2 into 4.3 and ensure that actual depth used in design is in calculation

A = V / dn

		West (Outlet 1)	East (Outlet 5)	
V =	Runoff Volume to be infiltrated	15	14	m^3
d =	Actual depth used for trench design	0.85	0.85	m
n =	Porosity of the storage media (use 0.4 for clear stone)	0.4	0.4	
A =	Bottom Area of Trench	44	42	m^2
W =	Width of Trench	3	3	m
L =	Length of Trench	15	14	m

Project Name:	Frisque Lands	Prepared By: AK
Project Number:	E21007	Checked By: RB
Subject:	BMP/LID In Series TSS and TP Removal Efficiencies	

Overall Treatment Efficiency (%)

$$E = A + B - \frac{(A \times B)}{100}$$

Where:
E = Overall Treatment Efficiency (%)
A = Efficiency of the First or Upstream BMP / LID SWM feature
B = Efficiency of the First or Downstream BMP / LID SWM feature

N.B. Efficiency of Facilities A and B determined, and then calculated in series with Facility C. This 'in series' removal efficiency calculation continues, as you consider additional downstream BMP or LID features.

	LID/BMP Description	**TSS Removal Eff. (%)**	**TP Removal Eff. (%)**
LID1	Oil Grit Separator	59	0
LID2	Infiltration Trenches	75	60
$E_{(A+B)}$		90	60

Equation Reference:

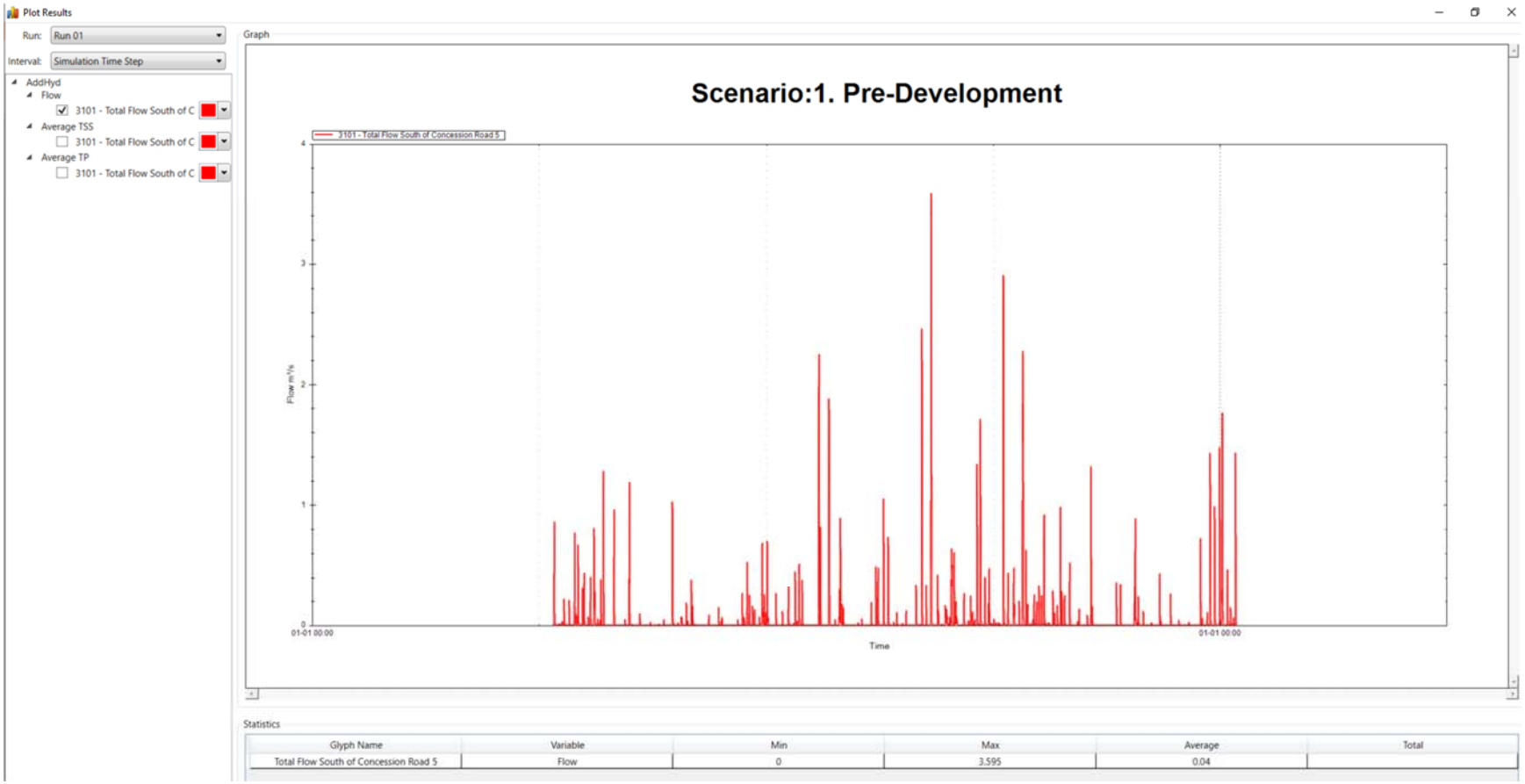
North Carolina Department for Water Quality – Stormwater BMP Manual.

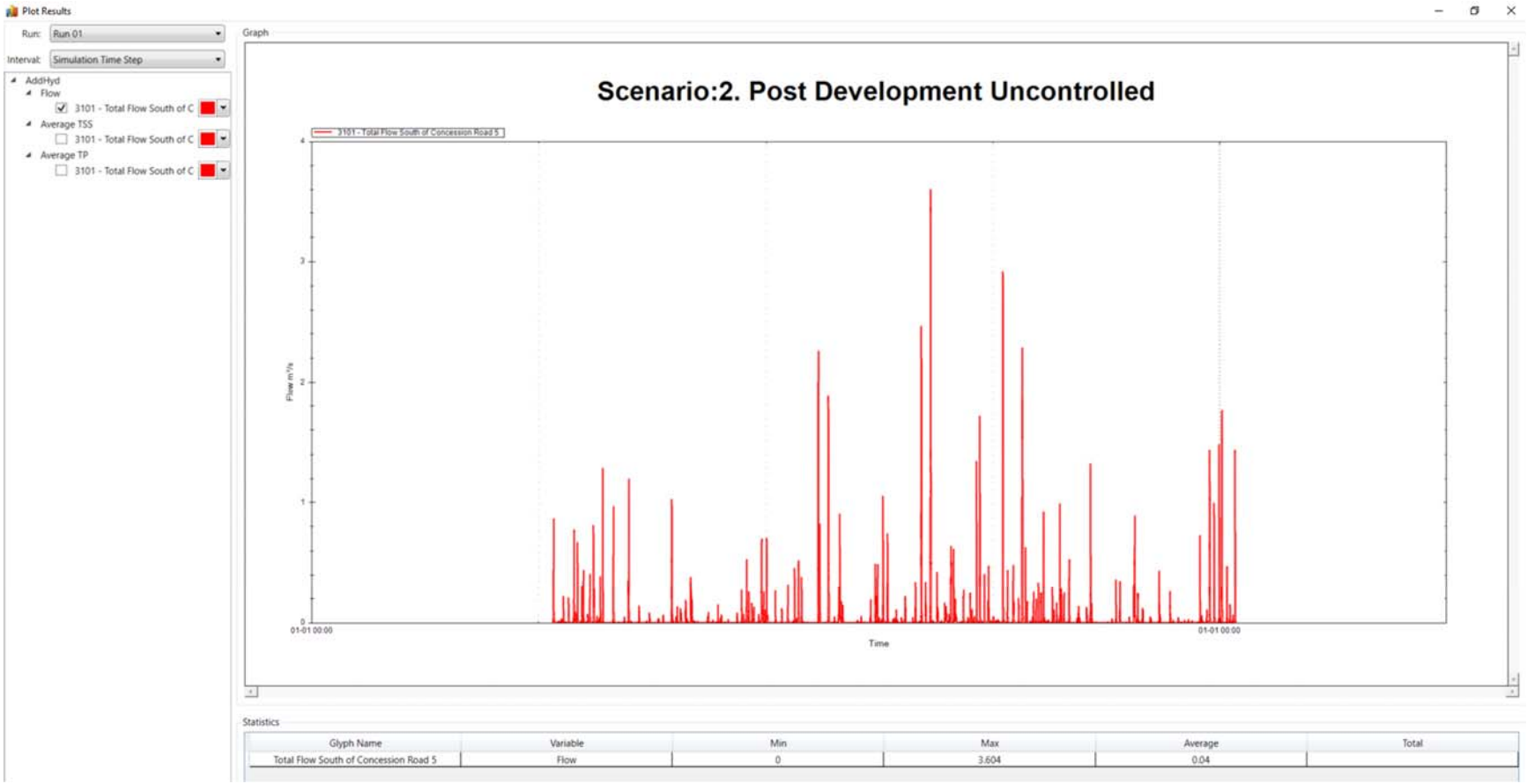
http://www.ncsu.edu/ehs/environ/DWQ_StormwaterBMPmanual_001[1].pdf

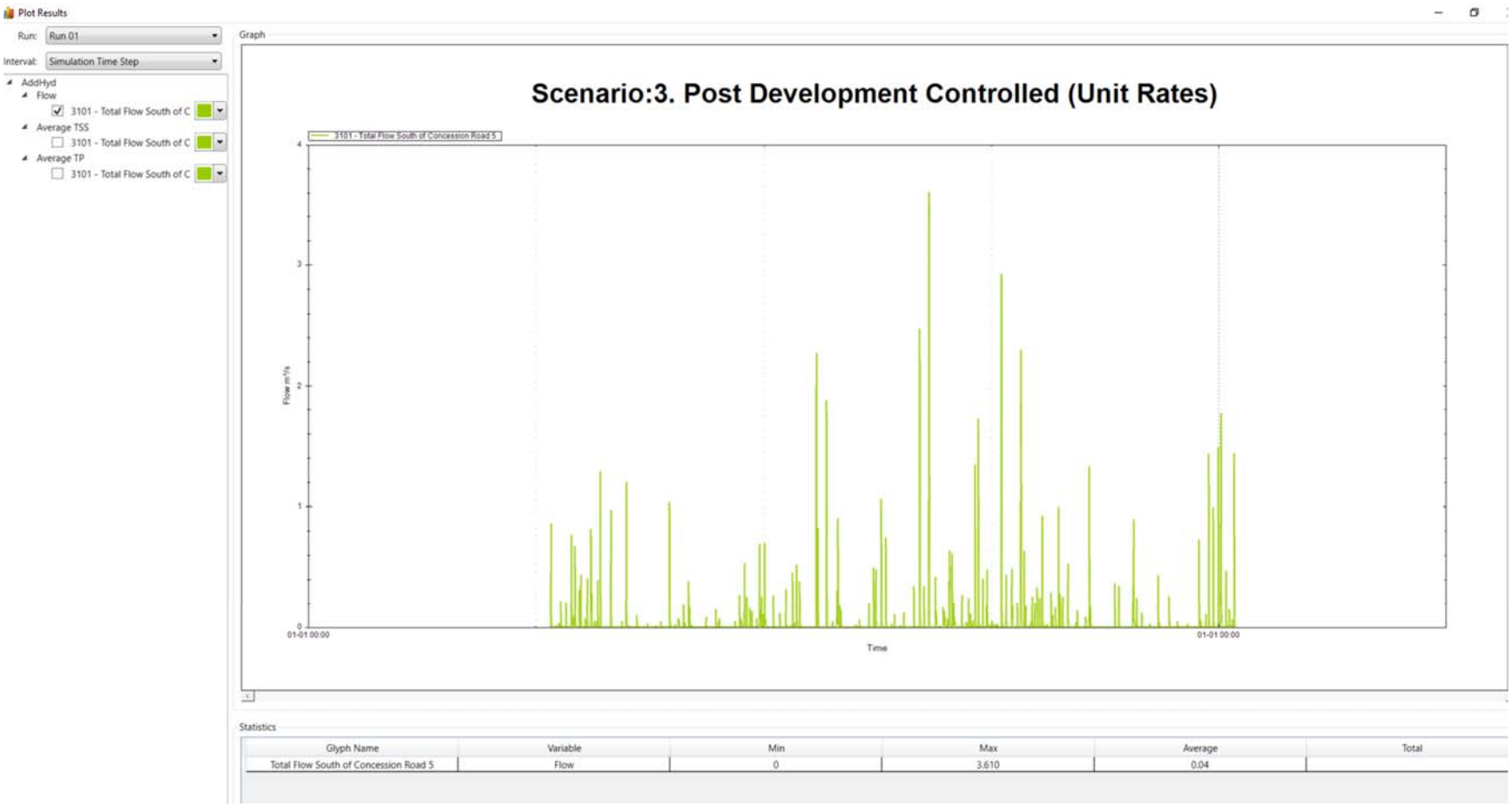
The 'BMPs in Series' total pollutant removal efficiency equation may be found in Section 3.9.4 of this Manual.

Appendix F

Continuous Simulation Hydrologic Modelling


Plot Results
Run: Run 01
Interval: Simulation Time Step
AddHyd
Flow
3101 - Total Flow South of C
Average TSS
3101 - Total Flow South of C
Average TP
3101 - Total Flow South of C
Graph
Scenario:1. Pre-Development
3101 - Total Flow South of Concession Road 5
Flow m³/s
Time
01-01 00:00
01-01 00:00
Statistics
Glyph Name | Variable | Min | Max | Average | Total
Total Flow South of Concession Road 5 | Flow | 0 | 3.595 | 0.04


Plot Results
Run: Run 01
Interval: Simulation Time Step
AddHyd
Flow
3101 - Total Flow South of C
Average TSS
3101 - Total Flow South of C
Average TP
3101 - Total Flow South of C
Graph
Scenario:2. Post Development Uncontrolled
3101 - Total Flow South of Concession Road 5
Flow m^3/s
0
1
3
4
01-01 00:00
01-01 00:00
Time
Statistics
Glyph Name | Variable | Min | Max | Average | Total
Total Flow South of Concession Road 5 | Flow | 0 | 3.604 | 0.04


Plot Results
Run: Run 01
Interval: Simulation Time Step
AddHyd
Flow
3101 - Total Flow South of C
Average TSS
3101 - Total Flow South of C
Average TP
3101 - Total Flow South of C
Graph
Scenario:3. Post Development Controlled (Unit Rates)
3101 - Total Flow South of Concession Road 5
Flow m^3/s
0
1
2
3
4
01-01 00:00
01-01 00:00
Time
Statistics
Glyph Name | Variable | Min | Max | Average | Total
Total Flow South of Concession Road 5 | Flow | 0 | 3.610 | 0.04