STORMWATER MANAGEMENT REPORT
UPPER'S GROVE AND UPPER'S LANE
RESIDENTIAL DEVELOPMENT

City of Thorold, ON

April 1, 2026

Prepared for:
QuadReal Property Group (previously known as Parkbridge Lifestyle Communities Inc.)

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1 Introduction

Stantec Consulting Ltd. (Stantec) has been retained by QuadReal Property Group (previously know as Parkbridge Lifestyle Communities) (the 'Owner') to prepare this Stormwater Management (SWM) Report in support of the Zoning By-Law Amendment and Draft approval for the proposed development of the Upper's Lane Residential Development (ULRD), (hereafter, the 'Site'). As amended, the subject site is zoned as Future Development 'FD',' Open Space Conservation 'OS2', Utility 'U', & Environmental Protection Two 'EP2' in the City of Thorold's Zoning By-Law No. 60-2019.

This report was previously submitted in support of the Upper's Grove Subdivision (UGS) Plan of Subdivision: Modification (D14-04-2025) and Zoning By-law Amendment (D12-01-2019) applications. This report has been further detailed to include information pertaining to the development of the Upper's Lane Subdivision. This report is submitted in conjunction with the Functional Servicing and Stormwater Management Report, prepared by Stantec, dated March 2026.

The development of UGS development will precede the future development of the lands north and east of the Site which consists of ULRD by Parkridge Lifestyle Communities Inc.

The site is approximately 40 hectares in size and is bounded by the future Upper's Lane Road allowance to the south, the Rolling Meadows Subdivision (RMS) and Upper's Grove Subdivision (UGS) to the west, Hydro One Corridor to the north and future employment-dedicated development lands to the east. A TransCanada Pipeline (TCPL) easement bisects the property in a northeast direction. At the time of this report preparation, RMS has an approved subdivision plan and is undergoing service constructions; UGS has draft plan approval and is progressing through a detail design for subdivision agreement.

The site is generally divided into three (3) zones - North, Central and South, see **Figure 1** below. The North Zone is approximately 21.75 ha, the Central Zone is approximately 11.25 ha, and the South Zone is approximately 6.75 ha. The North and South Zones consist of undeveloped agricultural lands. The Central Zone is occupied by a woodlot, which is identified as an Environmental Protection area in the Town's Official Plan and development within this zone is not proposed. The unit types proposed include singles, townhomes; and Mid-rise units. The pond block, servicing both UGS ands ULRD, is proposed in the North Zone.

The UGS development area is approximately 14.93 ha which includes a park Block; public open space and reserves, and a pipeline easement, and single, semi-detached, and townhouse residential units. An interim condition will exist as development of UGS precedes ULRD. To accommodate this, the pond has been designed with a modifiable control structure that will provide adequate control for both the interim and ultimate development of both UGS and ULRD lands without the need to regrade the pond. Under both the interim and ultimate condition the external lands have been assumed to remain undeveloped.

This report outlines the applicable design criteria, SWM opportunities and constraints, and the proposed SWM plan. The SWM plan is considered in general accordance with the current municipal design requirements of the City of Thorold (the City), Niagara Region (the Region), and Niagara Peninsula Conservation Authority (NPCA). The total drainage area considered is approximate 71.5 ha. This includes

the ULRD and UGS development area, a proposed pond, and undeveloped external drainage routed through the ULRD and UGS lands.

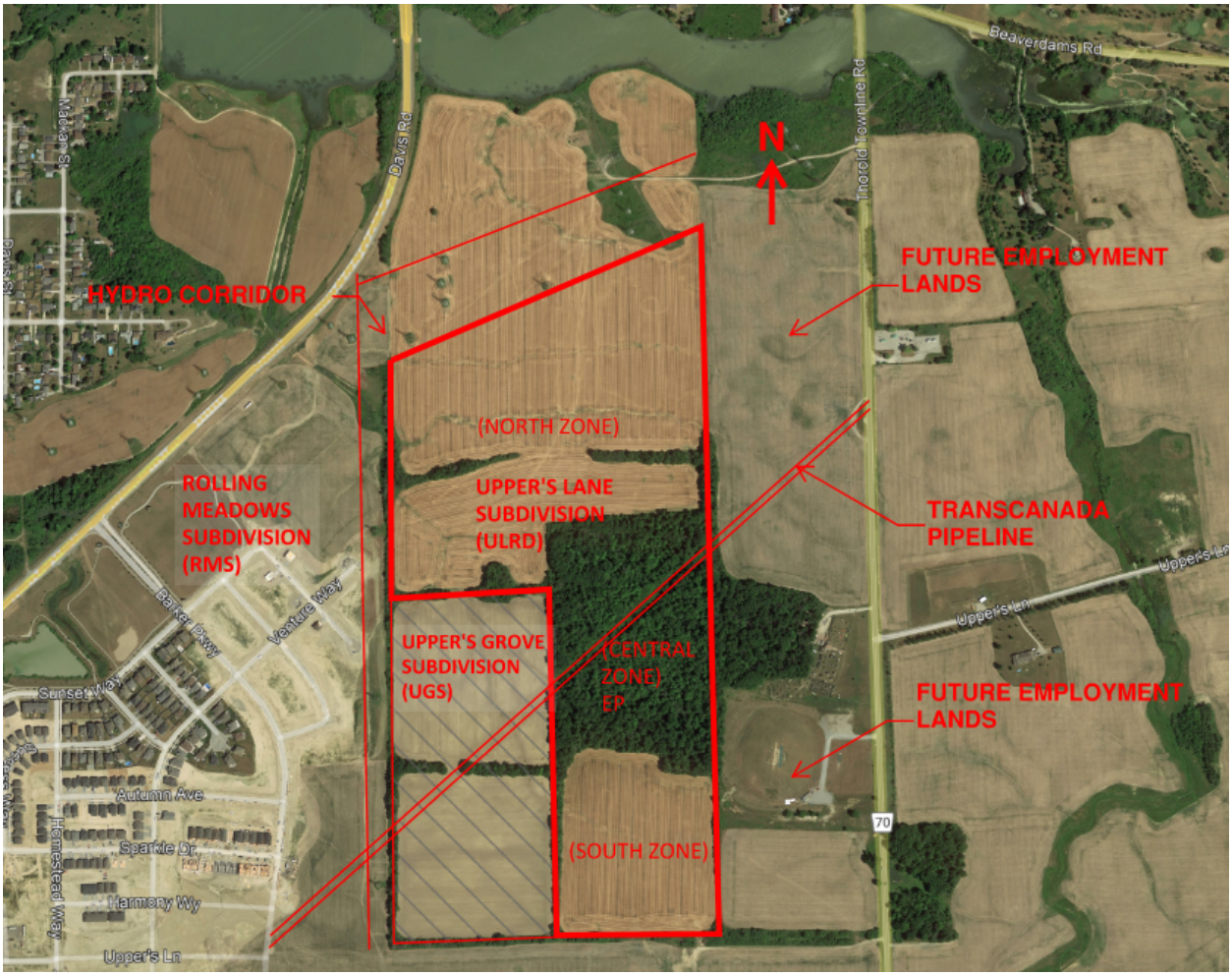


Figure 1 Site Location Plan

2 Background

The following background documents are considered in the preparation of this Stormwater Management (SWM) report:

- Stormwater Management Planning and Design Manual, Ministry of the Environment, March 2003 [MOE 2003]
- Niagara Peninsula Conservation Authority Stormwater Management Guidelines, January 10, 2010
- Low Impact Development Stormwater Management Planning and Design Guide, Toronto and Region Conservation Authority / Credit Valley Conservation, 2010 [LID Guide].
- Beaverdams and Shriners Creek Watershed Plan Phase One, Watershed Characterization and Preliminary Issues Identification, Niagara Peninsula Conservation Authority, June 2011
- Erosion & Sediment Control Guideline for Urban Construction, Greater Golden Horseshoe Conservation Authorities, 2019
- Niagara Region Stormwater Management Guidelines, December 2022
- Engineering Standards Manual, City of St. Catharines, June 2015
- Neighbourhoods Of Rolling Meadows Secondary Plan Sub-Watershed Study and Functional Engineering Report, Weslake Inc., 2006 [SWS]
- Preliminary Stormwater Management Plan Rolling Meadows City of Thorold, Upper Canada Consultants, 2007 [SWM-2007]
- Functional Servicing Report in Support of Zoning By-Law Amendment and Draft Plan Approval Upper's Grove Block Plan Residential Development, Counterpoint Engineering Inc., Issued for 4th Submission December 18, 2020 [FSR]
- Preliminary Stormwater Management Plan Rolling Meadows Phase 17 City of Thorold, Upper Canada Consultants, 2022 [SWM-2022]
- As-Constructed drawing records for Rolling Meadows Phase 14 and Phase 16 (as provided by the City of Thorold)
- Environmental Impact Statement Upper's Lane Property – City Of Thorold, Colville Consulting Inc. September 2018
- Scoped Environmental Impact Study Upper's Lane Development, Colville Consulting Inc., January 2024

- Preliminary Geotechnical Comment and Recommendations, DS Consultants LTD., April 21 2025
- Proposed SWM Pond and Underground Stormwater Management (SWM) Tank [Geotech Memo], DS Consultants LTD., June 26 2025
- Comments on Impact of Diversion Swale on Proposed Stormwater Management (SWM) Pond Embankment, DS Consultants LTD [Geotech Swale Memo]., March 18 2026
- Stormwater Management Report Upper's Grove Residential Development (UGSWM), Stantec Consulting, May 2025

3 Existing Conditions

Under existing conditions, the ULRD and UGS lands consists of primarily agricultural lands and a TransCanada Pipeline easement which is also vacant of existing developments and naturalized.

The drainage regime flows from south to north with some drainage routed through existing drainage paths following the same drainage regimes.

The existing topographic information indicates that most of the lands drains to what is referred to as Outlet D in the SWM-2007 and SWM-2022, crossing Highway 58 via a culvert and ultimately discharging into Beaverdams Creek north of the Site. The existing drainage drawings from the SWM-2007 (DWG 0695-EX.STM) and SWM-2022 (Figure 2) are included in **Appendix A.**

3.1 Existing Drainage Paths

Per the SWS the existing streams located within the ULRD and UGS lands were considered as dry channel bed watercourses, not important to fish populations, and that a majority of the watercourses located within the project can be filled.

Per the Environmental Impact Statement Upper's Lane Property (2018) and the Scoped Environmental Impact Study Upper's Lane Development (2024), both prepared by Colville Consulting, the drainage paths that traverse the ULRD and UGS lands are not critical watercourses and the surface flow paths do not have to be maintained within the development plan. It was also recommended that water from the lands be captured in the stormwater management system, treated and discharged to the main branch of this tributary downstream of the property.

In post-development conditions, the external areas east of the Site, which are currently routed via the existing drainage paths, are proposed to be conveyed through the Site via proposed stormwater conveyance infrastructure.

During the interim condition, where UGS land development precedes ULRD development, the proposed pond location will require a diversion channel in order to convey the existing external drainage areas north/east of the UGS and ULRD lands.

3.2 Existing Infrastructure

There is no existing stormwater infrastructure within the Site limits.

Upper's Lane along the southern limits of UGS will be extended to provide additional access to the Site. This extension includes the construction of existing stormwater sewers within the right of way (ROW) which connect to the Rolling Meadows Phase 14 development area to the south. The drainage associated with the Upper's Lane extension is accommodated within the Rolling Meadows Phase 14 development and associated storm pond. No additional review of the Upper's Lane extension is considered in this report.

4 Design Criteria

The adjacent Rolling Meadows development area provides the ultimate servicing and SWM support for the Site. The related design criteria applicable to the Site are taken from the SWS (2006), the SWM-2007, the FSR (2020), SWM-2022, and UGSWM reports (as listed in Section 1). A copy of the key reference figures and tables from these reports is included in **Appendix A** for information.

4.1 Storm Water Conveyance

Per the 2015 City of St Catharines' Engineering Standards Manual (ESM), the Site drainage conveyance system adheres to the dual drainage approach. The minor system is comprised of storm sewers within the Site which sized to capture and convey runoff for storm events up to and including the 5-year storm event (minor storms).

Flows exceeding the 5-year storm event (major storms) are routed overland within the ROW and other designated overland flow routes. There are several locations where a 100-year capture pipe is required to collect and convey major system flows.

The design criteria applied to each system are as described in the 2015 City of St Catharines' ESM. Key design criteria applied are:

- The minor drainage system is designed to accommodate the 5-year design storm.
- The rational method is used to size the storm sewers.
- Runoff coefficients as per ESM City standards.
- Minimum storm sewer size shall be 250 mm diameter.
- Minimum sewer pipe velocity: 0.6 m/s.
- Maximum sewer pipe velocity: 6.0 m/s.
- Minimum sewer grade: 0.28%.
- The storm sewers shall be sufficiently deep to service the contributory lands and to prevent freezing, generally a minimum sewer cover 1.4 m.
- Maximum manhole spacing:
    - sewers 250 mm diameter to 750 mm diameter: 100 m.
    - sewers 825 mm diameter to 1200 mm diameter: 120 m.
    - sewers greater than 1200 mm diameter: 150 m
- The depths of flooding permitted on streets while acting as part of the minor drainage for the 5-year storm are as follows:
    - No curb overtopping.
    - On local roads, the flow may spread to the crown.
    - Flow across road intersections shall not be permitted for the 5-year storm.

- The major drainage system is designed to accommodate all storms greater than the 5-year design storm up to and including the 100-year design storm.
- The depths of flooding permitted on streets and at intersections during the 100-year storm are as follows:
    - No building should be inundated at the ground line unless the building has been floodproofed.
    - For all classes of roads, the product of depth of water at the gutter times the velocity of flow should not exceed 0.65 sq m/s except in special cases.
- All foundation drainage is directed to a sump that will have a pump discharge to grade. Direct gravity or piped connections with sump pump to the storm sewer system are not permitted.

4.2 SWM Pond

Per the background documents a SWM pond within the Rolling Meadows development area described as 'Pond D' was previously intended to provide the ultimate water quantity control, water quality control, and erosion control for both ULRD and UGS lands in addition to other areas of the Rolling Meadows development. However, Pond D is no longer being constructed for this purpose, and therefore ULRD and UGS lands will be serviced by a SWM pond located in the northwest corner of the Site and an underground storm tank located in the park block.

For consistency, the design criteria applied to the ultimate 'Pond D' condition (as described by the SWM-2022 report) is applied to the proposed pond design. The SWM Pond has been sized in anticipation of the future buildout of both the UGS and ULRD lands.

4.2.1 WATER QUANTITY CONTROL

Peak flow rate conditions for the 2-year to 100-year design storm events are to be maintained at or below established pre-development values established in the Rolling Meadows SWM-2022. The peak flow limit to the adjacent Ministry of Transportation land is to be based on the 100-year 24-hour design storm event.

The pre-development peak flow rates established with the SWM-2022 for the associated 'Outlet D' location are summarized in **Table 4-1**. The unit area peak flow rate is based on the 87.51 ha contributing area evaluated in the SWM-2022 analysis. The unit area peak flow values are used to develop the total allowable release rates from the proposed pond for both the ULRD and UGS lands.

Table 4-1 Pre-Development Peak Flow at 'Outlet D'

Design Storm / Return Period	Peak Flow (m^3/s)[1]	Unit Area Peak Flow (L/s/ha)[2]
25 mm	0.059	0.67
2 Year	0.220	2.51
5 Year	0.366	4.18
10 Year	0.506	5.78
25 Year	0.763	8.72
50 Year	0.985	11.26
100 Year	1.259	14.39
100 Year, 24 Hour	3.048	34.83

1. Values per the Preliminary Stormwater Management Plan Rolling Meadows Phase 17 City of Thorold, Upper Canada Consultants, 2022 [SWM-2022]
2. The unit area peak flow rate is based on the 87.51 ha contributing area evaluated in the SWM-2022 analysis

Per comments received from the Region it was requested the allowable release rate be determined as follows:

> *To maintain consistency with the modeling platform used in SWM analyses and pond sizing, and to reflect the original drainage condition, use VO6 software to assess pre-development flows from the drainage area of 76.38 ha, as shown on plan '0695-EX.STM' (dated 2007). Based on this assessment, determine the allowable unit area peak flow for the proposed development.*

Using VO6, an analysis was completed based on defining characteristics consistent with the SWM 2007 report to compare existing flow rates for the 76.38 ha drainage area shown on drawing '0695-EX.STM'. It should be noted that the 2007 SWM hydrologic model output reports a total drainage area of 86.82 ha. For the purposes of this analysis, the modeled area (86.82 ha) was used, as it aligns with the values documented in the 2007 reporting. The reason for the discrepancy between drawing '0695-EX.STM' and the model outputs is unclear as the original delineations were completed by others.

When applying similar drainage area parameters, the VO6-modeled SWM 2007 existing flows were found to be significantly higher than the MIDUSS results presented in the SWM 2007 report. Therefore, to remain conservative and consistent with the previously approved works documented in the SWM 2007 and SWM 2022 reports, the allowable release rates were based on the approved SWM 2022 values. **Table 4-2** below summarizes the comparison of flows in the analysis and detailed modeling can be found in **Appendix C**.

Table 4-2 Flow Comparison of MIDUSS and VO6 under existing conditions of SWM 2007

Design Storm	SWM 2007 Peak Flow (m3/s)	Stantec VO6 Peak Flow (m3/s)
25mm	0.023	0.134
2 Year	0.033	0.268
5 Year	0.080	0.542
25 Year	0.205	1.122
100 Year	0.362	2.354
MTO 100 Year	2.983	3.237

4.2.2 WATER QUALITY TREATMENT

As per the NPCA SWM Guidelines, the receiving watercourse (tributary to Beaverdams Creek) is classified as 'Important' (Type 2) Fish Habitat. Based on this classification, the corresponding Ministry of Environment Conservation and Parks (MECP) level of protection is assigned as Normal (70% TSS Removal). Water quality treatment considerations in the pond are based on the permanent pool volume as described by the Ministry of the Environment's "Stormwater Planning and Design Manual", dated March, 2003 (the SWMPDM).

4.2.3 EROSION CONTROL

Erosion control considerations are based on the allowance for an extended detention volume as described by the SWMPDM.

4.2.4 HYDROLOGIC MODEL

Previous modeling of the Rolling Meadows development area was conducted using MIDUSS. As per Niagara Region Stormwater Guidelines (2022) the use of MIDUSS for new assessments is generally discouraged given the model software is vintage and has limited supportability.

Visual OTTHYMO Version 6 (VO6), is therefore selected to model the hydrologic conditions for the Site as it provides a relatively easy interface for review and allows for the modification of multiple inputs that determine Site characteristics such as, but not limited to, soil types, infiltration conditions, and allows for analysis of both developed conditions and undeveloped rural conditions. VO6 modeling is amongst the approved software programs for the Niagara Region.

Design storms for the proposed conditions use a Chicago distribution based on the City of St. Catharines Intensity-Duration-Frequency (IDF) curves. The curves are used to generate Hyetographs for the 2, 5, 25 and 100-year storm events with a 4-hour Chicago distribution. The 25mm design storm event parameters are derived using the IDF curve and a 4-hour Chicago distribution. In addition to this, the 100-year MTO design storm is also analyzed as pond outflow are routed across MTO controlled lands through the existing downstream culvert. **Table 4-3** below summarizes the design storms assessed.

Table 4-3 Design Storms

Design Storm (Return Period)	Chicago Distribution Parameters			Duration (minutes)
	a	b	C	
25mm	567.00	6.0	0.800	240
2 Year	664.00	5.2	0.746	240
5 Year	724.00	4.7	0.744	240
10 Year	821.00	4.3	0.739	240
25 Year	900.00	4.0	0.735	240
50 Year	980.00	3.8	0.734	240
100 Year	567.00	3.7	0.732	240
100 Year MTO	915.40	0.0	0.699	1440
Rainfall Intensity (mm/hr) = a / (td + b)^c td - Time of concentration/duration				

4.3 Water Balance

The SWS and FSR indicate no requirement for water balance measures to be applied for the ULRD and UGS lands.

5 SWM Opportunities and Constraints

SWM practices for the management of development runoff fall into the categories of water quality, water balance, erosion control and water quantity. Various SWM measures to address the above mentioned SWM practices are explored as part of this SWM Report. End-of-Pipe controls are implemented at the end of the major/minor collection system. These types of facilities typically include:

- Wet Pond: Designed to provide quality treatment through settling of suspended solids into the forebay (typically 1.0 to 1.5 m deep) and permanent pool of the main pond area (typically 1.5 m to 3.0 m deep). The active storage component offers extended detention and quantity control.
- Engineered Wetland: Designed to provide quality treatment through settling of suspended solids into the forebay (typically 1 m deep) and shallow permanent pool (typically 0.15 m to 0.3 m deep). The active storage component offers extended detention and quantity control.
- Dry Pond: Provide some quality treatment through detention time, and primarily provide extended detention and quantity control within the active storage component. Dry ponds, with proper pre-treatment, can also be designed as surface infiltration facilities or soakaways to help to achieve water balance/erosion control targets.
- Manufactured Treatment Device (Oil-Grit Separator or Filter): Prefabricated infrastructure units designed to settle suspended solids. Typical units designed for suspended solids are generally less effective at nutrient removal. However, some types of units are specifically designed for nutrient removal. These devices are generally acceptable for use as a pre-treatment system or as a component in a treatment train approach to address water quality.
- Oversized Pipe: Pre-manufactured pipes are oversized and equipped with orifices in the system to create pipe storage. Oversized pipes are generally used for small or isolated project areas which lack sufficient surface space to construct detention facilities. Pipe slopes are kept to a minimum to increase the amount of storage available within the pipe. Oversized pipes provide only marginal water quality benefits as some of the coarse sediment may settle.

On review of the various LID/SWM measures and end-of-pipe controls, the following LID/SWM measures are considered appropriate for the Site.

- Wet Pond providing Normal quality control (70% TSS Removal), additional quantity storage via underground storm chambers

6 Proposed SWM Plan

This section describes the applicable design criteria, SWM opportunities and constraints, and the proposed SWM plan. The SWM plan is considered in general accordance with the current municipal design requirements of the City of Thorold (the City), Niagara Region, and Niagara Peninsula Conservation Authority (NPCA).

6.1 Site Characteristics

This section describes the general characteristics related to grading and resultant drainage areas.

6.1.1 GRADING

The Site grading is designed in general accordance with the 2015 St Catharines ESM respecting minimum and maximum road and lot slopes. The overall grading pattern is such that both minor and major systems are directed to the northwest corner of the ULRD lands where the pond is located. The UGS and ULRD grading pattern is reflected in the Storm Drainage Area drawings included in **Appendix B**.

6.1.2 DRAINAGE AREAS

The drainage areas are reflected in the Storm Drainage Area drawings and the Storm Sewer Design Sheet included in **Appendix B**. The drainage areas considered includes contributions from external areas.

The drainage area for the extension of Upper's Lane is accommodated by the Rolling Meadows Phase 14 development to the southeast. A copy of the Rolling Meadows Phase 14 Storm Drainage Area Plan is included in **Appendix A**.

Runoff coefficients and impervious percentages applied are based on the associated land use and the 2015 St Catharines ESM. The coefficients applied vary from 0.25 for pre-development and open space contributions, to 0.85 for the pond block. Weighted coefficients are applied where drainage areas overlap land use conditions. For the evaluation of the SWM pond, lumped drainage areas with associated weighted runoff coefficients have been used.

6.2 Drainage Conveyance

The storm sewers within the UGS and ULRD lands are designed to convey peak flows up to and including the 5-year design storm event for the entirety of the Site as well as additional external areas previously noted.

Major storm events (greater than the 5-year design storm event) are to be conveyed overland within the public road ROWs and spillways discharging to the SWM Pond. Supporting calculations are provided in **Appendix C**.

The proposed storm sewer layout plan, overland flow routes, storm drainage areas, and storm sewer design sheets are presented on the design drawings included in **Appendix B.**

6.2.1 EXISTING DRAINAGE PATHS & DIVERSION SWALE

Under the interim condition the proposed pond location will require that a diversion swale be provided in order to continue to convey the flow contributions from the existing external drainage areas north-east of the development lands. The proposed diversion swale is presented on **Drawings C-404** and **C-405**.

The diversion swale has a 4m bottom width, 3:1 side slopes, a minimum height of 0.6m, and has been sized to convey both the 100yr 4-hour Chicago design storm and the 24hr 100-year MTO design storm. Supporting calculations are provided in **Appendix C**.

6.2.2 STORM SEWERS

The proposed residential units are to be built on lots with split drainage (high point at the middle of the lot with half the lot graded towards the street and half to the backyard). All stormwater generated by the rear lots will be directed towards rear lot catch basins which have been sized to provide capture and conveyance of the 100-year storm event of contributing areas which includes external areas when applicable.

As noted in Section 4.1, all foundation drainage is directed to a sump that will have a pump discharge to grade. Direct gravity or piped connections with sump pump to the storm sewer system are not permitted. Related lot grading and basement elevations are therefore not impacted by hydraulic conditions associated with the storm sewer. As a result, no review of hydraulic grade line conditions is included in this SWM report.

6.2.3 OVERLAND FLOW ROUTE

Major overland flow will be conveyed overland via road right of ways and ultimately into the Pond via two overland flow routes. The overland flow routes are located at southwest corner of Pond, and east limits of the pond, as shown on **Drawing C-1001 and Drawing GR-1**.

Residential areas draining to rear yard catch basins have been designed to pickup the 100-year flows while the remaining drainage areas drainage towards the right of ways have been assessed as having a dual drainage major-minor split. Using VO6, two representative areas for the Site were assessed on this basis to determine the appropriate ratio to be applied to the overland flow analysis It is anticipated that ULRD will follow similar drainage regimes as the Site progresses through detailed design. Should this not be the case further investigation may be required to assess if additional 100-year pickup locations are required.

The analysis of the two representative areas shows that approximately 24-27% of the total 100-year flows modeled in VO6 contribute to overland flow. To remain conservative, overland flow analysis has been assumed as 30% of 100-year flows.

The capacity of the overland spillways within the right of ways has been assessed at critical junctions: the junction locations are based on the proposed drainage regimes where flows will congregate and result in maximum design flows through the right of ways. To remain conservative the analysis has assumed colliding peaks for the upstream contributing drainage areas to each junction. Supporting calculations are provided in **Appendix C**.

6.3 SWM Pond

This section describes the design conditions associated with the SWM pond proposed to support both the ULRD and UGS developments. The proposed SWM Pond has been sized to also consider the future development of external lands to the east. Under the condition that the external lands are fully developed, it is assumed that these areas will implement their own stormwater control strategies. Details regarding future developments and subsequent modifications to the outlet structure will be provided under separate cover in future submissions.

6.3.1 DRAINAGE AREA

INTERIM CONDITIONS

The SWM pond will provide conveyance of the adjacent existing external areas east of the Site prior to the development of ULRD. **Table 6-1** below summarizes the drainage areas serviced by the SWM pond prior to the buildout of ULRD. The drainage areas to the pond are illustrated on **Drawing C-203**.

Table 6-1 Overall Pond Drainage Areas – Interim Condtions

Catchment	Area (ha)	Imperviousness (%)
Phase 1&2 (UG)	14.93	60
SWM POND	2.33	89
INT-1 TO HW20	5.15	22
INT-2 TO HW	2.47	22
INT-NORTH ROAD	0.34	83
HYD-1 TO DCB1	1.45	22
NHS-1 TO RYCB 33	5.90	22
Total	**32.57**	**45**

The catchment data parameters applied to the VO6 analysis are provided in the model data files in **Appendix C**.

ULTIMATE CONDITIONS

The SWM pond will provide conveyance of the adjacent existing external areas east of the Site. **Table 6-2**Table 4-1 below summarizes the drainage areas serviced by the SWM with the buildout of ULRD. The drainage areas to the pond are illustrated on **Drawing C-203**.

Table 6-2 Overall Pond Drainage Areas – Ultimate Conditons

Catchment	Area (ha)	Imperviousness (%)
UL/UG POND	2.33	89%
PHASE 1&2 TO HW1	15.38	60%
Phase 3N to HW1	1.89	60%
FUT(UL)-2	6.54	70%
FUT(UL)-3	17.38	60%
Hydro Corridor to CB1	1.45	22%
NHS-1 TO RYCB 33	4.01	22%
Hydro Corridor to CB2	1.01	22%
NHS-2 TO PARK	7.69	22%
EXT-1 TO PARK [1]	13.79	22%
Total	**71.47**	**45**

1. EXT-1 lands are to be conveyed through the ULRD lands and conveyance of external flows has been accounted for in the pond design

The catchment data parameters applied to the VO6 analysis are provided in the model data files in **Appendix C**.

6.3.2 ALLOWABLE PEAK FLOW

INTERIM CONDITIONS

The 32.57 ha total area contributing to the SWM pond is used to define the interim allowable peak flow from the pond relative to the unit area rates from **Table 4-1**, the allowable peak flow is summarized in **Table 6-3**.

Table 6-3 Interim Pond Allowable Peak Flow to 'Outlet D'

Return Period	Unit Area Peak Flow (L/s/ha)	Interim Allowable Peak Flow (m^3/s)
25 mm	0.67	0.022
2 Year	2.51	0.082
5 Year	4.18	0.136
10 Year	5.78	0.188
25 Year	8.72	0.284
50 Year	11.26	0.367
100 Year	14.39	0.469
MTO 100 Year	34.83	1.134

ULTIMATE CONDITIONS

The 71.47 ha total area contributing to the SWM pond is used to define the ultimate allowable peak flow from the pond relative to the unit area rates from **Table 4-1**. The allowable peak flow accounts for the conveyance of external lands east of the UGS and ULRD lands through the pond, the allowable flow is summarized in **Table 6-4.**

Table 6-4 Ultimate Pond Allowable Peak Flow to 'Outlet D'

Return Period	Unit Area Peak Flow (L/s/ha)	Pond Drainage Area Allowable Release Rate (m^3/s)	EXT-1 Conveyance (m^3/s)	Total Pond Allowable Release Rate (m^3/s)
25 mm	0.67	0.039	0.070	0.109
2 Year	2.51	0.145	0.158	0.303
5 Year	4.18	0.241	0.223	0.464
10 Year	5.78	0.334	0.277	0.611
25 Year	8.72	0.503	0.364	0.867
50 Year	11.26	0.649	0.434	1.083
100 Year	14.39	0.830	0.513	1.343
MTO 100 Year	34.83	2.009	0.907	2.916

6.3.3 INTERIM AREA INT-2 TO HEADWALL

Drainage area INT-2 is located south of the pond and is within a low-lying area. Grading in this area will be altered in order to provide positive drainage towards an interim swale in a west direction to a low point of 177.85m. In order to convey this flow to the pond a headwall equipped with a 450 mm diameter storm pipe is provided at the low point to route flow to the proposed storm sewer system discharging to Headwall 1 within the pond. This is illustrated on **Drawing C-103**

During the storm events greater than the 50-yr event, the water levels within the pond will rise to elevations higher than invert elevation of the 450 mm within INT-2, as a result backflow from the 450 mm pipe will cause this area to become temporarily inundated. As water elevation in the pond subside, INT-2 will drain back into the pond via the 450 mm storm pipe. The inundation will remain within the limits of INT-2 drainage area and will not flood any proposed lots.

6.3.4 POND CHARACTERISTICS

INTERIM CONDITION

An outlet control structure is used to create the discharge condition from the pond that aligns with the allowable peak flow rates listed in **Table 6-3** and **Table 6-4**. An emergency overland spillway from the pond is also incorporated into the grading configuration of the pond. The proposed pond design conditions and outlet control structure configuration are provided on **Drawings C-1001**, and **C-1002** in **Appendix B**.

A summary of the pond design volume and hydraulic control features is provided in **Table 6-5**.

Table 6-5 Interim Pond Design Volume and Hydraulic Control Details

Elevation (m)	Total Volume[1] (m^3)	Active Volume (m^3)	Control Structure
175.00 (Pond Bottom)	0	0	Bottom of Pond
177.00 (NWL)	15,126	-	Orifice 1 – 100mm diameter
177.50	21,267	6,142	Orifice 2 – 550mm x 750 mm Square Orifice Cutout (W x H)
178.50	35,372	20,141	Sharp Crested Weir 1250mm x 800mm (W x H)
178.30 (HWL)	32,415	17,170	
179.00	43,079	27,953	Emergency Overland Spillway 44m Broad Crested Weir
179.30 (Top of Pond)	47,929	32,803	Top of Pond

1. Total Volume includes both the permanent pool and active storage volumes

ULTIMATE CONDITION

Under the ultimate condition the control structure has been designed so that no modifications are required to the control structure configuration. The proposed pond design conditions and outlet control structure configuration are provided on **Drawings C-1001**, and **C-1002** in **Appendix B**.

A summary of the pond design volume and hydraulic control features is provided in **Table 6-6.**

Table 6-6 Ultimate Pond Design Volume and Hydraulic Control Details

Elevation (m)	Total Volume[1] (m^3)	Active Volume (m^3)	Control Structure
175.00 (Pond Bottom)	0	0	Bottom of Pond
177.00 (NWL)	15,126	-	Orifice 1 – 100mm diameter
177.50	21,267	6,142	Orifice 2 – 550mm x 750 mm Square Orifice Cutout (W x H)
177.70	23,932	8,806	Extended Detention Volume Provided
178.50	35,372	20,141	Sharp Crested Weir 1250mm x 800mm (W x H)
179.00	43,079	27,953	Emergency Overland Spillway 44m Broad Crested Weir
179.05 (HWL)	32,415	28,556	100yr MTO Storm Event
179.30 (Top of Pond)	47,929	32,803	Top of Pond

1. Total Volume includes both the permanent pool and active storage volumes

6.3.4.2 Pond Grading

The pond has been designed such that regrading of the pond is not required as the ULRD lands are developed.

A 4.0 m access road is located along the west edge of the pond block. A 2.0 m buffer around remainder of the pond block has been provided in areas without an access road and graded at a maximum slope of 5%. From the edge of the buffer, the pond is graded at a 3:1 side slope to an elevation of 177.50 m, at the top of the planting shelf. The planting shelf is graded at a 7:1 side slope to an elevation of 176.50 m, and the side slopes below the planting shelf are graded at 3:1.

A 2.0 m wide berm is provided between the sediment forebay and the wet pond, graded with side slopes at a maximum of 3:1. The forebay berm is set at an elevation of 177.30 m, which is 0.30 m above the normal water level of 177.00 m. The proposed pond grading is shown on **Drawing C-1001 and C-1002.**

6.3.4.3 Permanent Pool (Quality Control)

INTERIM CONDITION

The sizing of the permanent pool is based on a wet pond with Level 2 'Normal' protection for the entire pond drainage area and a total lumped site imperviousness of approximately 45%. As per MOE 2003 criteria, during interim conditions the required permanent pool volume is 1,952 m^3. The pond satisfies this requirement by providing a permanent pool volume of 15,126 m^3. Supporting calculations are provided in **Appendix C**.

ULTIMATE CONDITION

The sizing of the permanent pool is based on a wet pond with Level 2 'Normal' protection for the entire pond drainage area and a total lumped site imperviousness of approximately 47%. As per MOE 2003 criteria, during ultimate conditions the required permanent pool volume is 4,437 m^3. The pond satisfies this requirement by providing a permanent pool volume of 15,126 m^3. Supporting calculations are provided in **Appendix C**.

6.3.4.4 Extended Detention Storage

INTERIM CONDITION

As per MOE 2003 criteria, the volume required for extended detention storage (as erosion control mitigation) is 3,542 m^3 during the interim condition. This volume is based on the runoff volume depth of the modeled 25mm event run in the VO6 modeling.

The extended detention storage volume is intended to be provided within the 6,141 m^3 active storage volume between the NWL elevation of 177.00 m and the 177.27 m elevation, as noted in **Table 6-5** above. Supporting calculations are provided in **Appendix C**.

ULTIMATE CONDITION

As per MOE 2003 criteria, the volume required for extended detention storage (as erosion control mitigation) is 8,279 m^3 during the ultimate condition. This volume is based on the runoff volume depth of the modeled 25mm event run in the VO6 modeling.

The extended detention storage volume is intended to be provided within the 8,806 m^3 active storage volume between the NWL elevation of 177.00 m and the 177.70 m elevation, as noted in **Table 6-6** above. Supporting calculations are provided in **Appendix C**.

6.3.4.5 Maintenance Access

Maintenance access to the sediment forebay, and the pond outlet is provided via 4 m wide roads with a cross fall of 2.5% and at a maximum slope of 10:1 within the proposed emergency spillway (see **Drawing C-1001 and C-1002**). The access roads will be constructed as per the details provided on **Drawing C-**

1002. As the ULRD North Zone lands are develop additional access to the pond will be provided as the maintenance access road will be connected to the right of way north of the pond.

6.3.4.6 Pond Overland Flow Route

INTERIM CONDITION

Per the analysis outlined in Section 6.2.3, during the 100yr event, the ultimate conditions require that the south overland flow route convey 1.8 m^3/s. During the interim condition a 20m temporary granular access road will convey overland flow from UGS lands to the south overland flow route for the pond. The spillways has been designed with capacity under the ultimate condition flow, therefore during the interim conditions of reduced flows the spillways is adequately sized.

The capacity of the overland flow routes was confirmed at two points; within the reverse graded right-of-way, and within the pond block. Supporting calculations are provided in **Appendix C**.

ULTIMATE CONDITION

As noted above, the south spillway has been designed to convey the ultimate flow condition in the interim condition and therefore does not require modification under the ultimate condition.

Per the analysis outlined in Section 6.2.3, the ultimate conditions 100yr event requires that the east overland flow route conveys 1.22 m^3/s.

The capacity of the anticipated east spillway was assessed at two points; within a reverse graded right-of-way, and within the pond block. Supporting calculations are provided in **Appendix C.**

6.3.5 QUANTITY CONTROL

To assess the quantity control requirements and resultant storage volume, the anticipated flow rates achieved by the various hydraulic controls of the SWM pond and SWM tank are modeled via a discharge rating curve. The discharge rating curve is applied to the VO6 hydrologic model in combination with the design active storage volume to assess the design of the pond and tank.

During the interim condition the storm tank located within the park land in ULRD will not be constructed and only the proposed pond works will proceed. Under ultimate conditions the storm tank within the park block will be provided.

ITNERIM CONDITIONS

The resultant pond operating characteristics for the interim conditions are provided in

Table 6-7**.** A copy of the VO6 model data is included in **Appendix C**.

Table 6-7 Interim Pond Operating Characteristics

Return Storm	Target Outflow (m^3/s)	Actual Outflow (m^3/s)	Required Storage (m^3)	Elevation (m)
Extended Det. (25 mm)	0.022	0.010	3,144	177.27
2 Year	0.082	0.026	6,782	177.55
5 Year	0.136	0.044	7,374	177.59
10 Year	0.188	0.084	8,389	177.67
25 Year	0.284	0.153	9,756	177.77
50 Year	0.367	0.215	10,814	177.85
100 Year	0.469	0.290	11,959	177.93
MTO 100 Year[1]	1.134	0.757	17,170	178.30

1. The Emergency Overland Spillway is not activated in the design storm events evaluated.

The maximum water level for the MTO 100-year design storm is 178.30 m. The emergency spillway elevation is 179.00m, which provides 0.70 m of available freeboard above the MTO 100-year design storm condition.

ULTIMATE CONDITIONS

The resultant pond operating characteristics for the ultimate conditions are provided in **Table 6-8.** A copy of the VO6 model data is included in **Appendix C**.

Table 6-8 Ultimate Pond Operating Characteristics

Return Storm	Target Outflow (m^3/s)	Actual Outflow (m^3/s)	Required Storage (m^3)	Elevation (m)
Extended Det. (25 mm)	0.072	0.060	7,798	177.62
2 Year	0.303	0.273	11,703	177.91
5 Year	0.464	0.417	13,715	178.06
10 Year	0.611	0.539	15,252	178.16
25 Year	0.867	0.733	17,027	178.29
50 Year	1.083	0.873	19,186	178.44
100 Year	1.343	1.008	21,125	178.57
MTO 100 Year[1]	2.916	2.844	28,556	179.05

1. The Emergency Overland Spillway is activated only in the MTO 100 year design storm.

During the Chicago 100yr event a freeboard of approximately 0.43m. The maximum water level for the MTO 100-year design storm is 179.05 m. The emergency spillway elevation is 179.00m, which means during the MTO 100 year event 0.05m of emergency spillway is activated.

An underground stormwater tank is proposed within the park block to provide additional quantity-control storage to supplement pond storage. The preliminary storage volume of the tank is estimated to be

approximately 5,677 m³. A 375-mm orifice is proposed downstream of the tank to function as an orifice control tube, regulating discharge into the pond and ensuring full utilization of the tank's storage capacity. Further design of the tank will be advanced and refined during detailed design.

6.3.6 POND OUTLET STRUCTURES

The SWM pond will discharge flows to the existing drainage channel west of the pond ultimately draining to Beaverdams Creek.

Future detailed design of the ULRD lands may result in updated allowable release rates for the pond operations during the prescribed storm events. In order to adhere to the updated allowable release rates, this may require the alteration of the control structure design within Control MH 60. Therefore, the proposed outlet structure, Control MH 60, has been designed to provide the ability for alterations to the outlet control structure without the need to for full removal and reconstruction of Control MH 60.

Control MH 60 is proposed to consist of a 3.50m x 2.90m concrete box structure. A rectangular 2.00m wide x 1.80m high cutout within the structure is to be covered by a 2.20m wide x 1.9m high steel plate, the steel plate is to be bolted on the outside of the structure. Detailed cutouts for the steel plate is discussed in the subsequent sections. The concrete cutout and associated steel plate will be located on the east face of the control structure. Additional weir cutouts can also be accommodated on the north and south face of the outlet structure during future alterations if required. The steel plate will be equipped with the specified weir cutouts which have been outlined in **Table 6-5.**

The proposed configuration of weir cutouts has been designed based on the development of UGS and the anticipated build out of ULRD, this has been done so that the steel plate does not need to be replaced as ULRD is developed. The design of the outlet configuration will need to be confirmed during further detailed design of ULRD.

Interim Condition

The interim release rates for the proposed buildout of the UGS is outlined in **Table 6-9**.

Table 6-9 Proposed and Allowable Release Rates

Return Storm	Proposed Site	
	Target Outflow (m^3/s)	Actual Outflow (m^3/s)
Extend. Det. (25 mm)	0.022	0.010
2 Year	0.082	0.026
5 Year	0.136	0.044
10 Year	0.188	0.084
25 Year	0.284	0.153
50 Year	0.367	0.215
100 Year	0.469	0.290
MTO 100 Year	1.134	0.757

Ultimate Condition

The ultimate condition release rates for the proposed buildout of the UGS and ULRD is outlined in **Table 6-10**.

Table 6-10 Proposed and Allowable Release Rates

Return Storm	Proposed Site	
	Target Outflow (m^3/s)	Actual Outflow (m^3/s)
Extend. Det. (25 mm)	0.072	0.060
2 Year	0.303	0.273
5 Year	0.464	0.417
10 Year	0.611	0.539
25 Year	0.867	0.733
50 Year	1.083	0.873
100 Year	1.343	1.008
MTO 100 Year	2.916	2.844

6.3.6.2 Emergency Spillway

An emergency spillway has been provided on the west side of the SWM Pond. The emergency spillway is a broad-crested weir/overflow spillway 44.0 m wide, 0.30 m high, and set at an elevation of 179.00 m. This spillway is situated above the 100-year ponding elevation for both the interim and the ultimate condition.

The emergency spillway has been sized for capacity to convey the unrouted contributing flow to the pond during the full buildout of the UGS and ULRD for the 100-year storm event, assuming that the outlet weirs and the orifice plate located within control MH 60 are completely blocked.

Under the ultimate development, a freeboard of 0.43m above the 100-year storm event has been provided. During the interim condition there is approximately 1.07m of freeboard provided.

During the interim condition, the 100-year MTO storm will not activate the emergency spillway and the spillway has capacity to convey the unrouted 100-year MTO contributing flow assuming that the outlet weirs and the orifice plate located within control MH 60 are completely blocked.

Under the ultimate condition the 100-year MTO storm will activate the emergency spillway to a depth of about 0.05m equating to an elevation of approximately 179.05 m. Further investigation during detailed of ULRD design may be conducted in order to assess if the activation of the emergency spillway during the 100-year MTO event can be avoided, this may include alterations to the outlet control structure steel plate.

Detailed stage/storage/discharge calculations are provided in **Appendix C.** The pond outlet configuration described above are shown on **Drawing C-1002**.

6.3.7 FOREBAY AND SEDIMENT REMOVAL

It is anticipated that the buildout of ULRD will occur before a pond cleanout is required, therefore it is proposed that the SWM pond be inspected prior to build out of ULRD to assess if a cleanout is required. Should cleanout of the SWM pond be required at that time, the adjacent undeveloped lands to the east of the pond can be used as a drying area.

It is recommended that sediment levels within the pond be inspected visually once per year to assess if a cleanout is required and to determine an estimate for sediment loading to the pond prior to development of ULRD.

Under the ultimate conditions, the forebay of the pond receives a total contributing drainage area of 71.47 ha. The weighted imperviousness of these areas is calculated to be 47%. The forebay has an available forebay volume of 7,775 m^3. Cleanout for the forebay will be required once 3,888 m^3 of sediment accumulates, which will take approximately 39 years.

The total permanent pool volume provided is 15,125 m^3 with a TSS removal efficiency of 70% (the removal efficiency is actually higher due the fact that permanent pool is larger than required therefore providing greater than 80% based on MECP Table 3.1. The pond will have to accumulate an equivalent sediment load of 12,037 m^3 in order to reach the 65% removal efficiency. Based on an accumulation rate of 98.1 m^3/yr, it will take approximately 122 years for the pond to reach a TSS removal efficiency of 65%. Therefore, the Pond cleanout is recommended approximately every 39 years, annual inspections should conducted to confirm estimated sediment loading and anticipated cleanout frequency. See **Appendix C** for detailed calculations.

Cleanout should occur following appropriate practices at the time of cleanout.

6.3.8 GEOTECHNICAL CONSIDERATIONS

Per the Geotech Memo (June 2025) and Geotech Swale Memo (March 2026) prepared by DS Consultants LTD. the following was noted:

- *Based on the test results, the materials tested can be described as Silty Clay, trace sand. To serve as an effective clay liner, the material should have a clay content of at least 20 % and a plasticity index of 8 or greater. As such, based on the test results, the material represented by BH25-1/SS4/SS5 &SS6 and BH25-2/SS5/SS6 & SS7 from the subject site are considered suitable to serve as a clay liner for the SWM Pond. As the excavated pond bottom and side slope are expected to consist of silty clay deposit, a liner is considered not necessary and under-line drainage to protect against uplift is not required.*

- *The Underground SWM Tank will extend below the present groundwater table and will, therefore, be subjected to hydrostatic uplift pressures…If the combination of the weight of the structure and overburden soils and the mobilized frictional resistance between the exterior walls and the backfill materials is insufficient to resist the uplift forces during any stage of the construction and/or during the operation of the structure, then a fail-safe system of grouted ground anchors is needed.*

- *Based on the provided design drawings … the geometry of Diversion Swale and adjacent SWM Pond are such that the Diversion Swale will not adversely impact the SWM Pond Embankment from a geotechnical perspective.*

Based on the findings of the Geotechnical Memo, a pond liner is not required. However, the design of the proposed storm tank will require additional investigation to evaluate uplift pressures and determine whether anchoring systems are required.

Given the current design of the diversion swale along the east and north limits of the proposed pond, no impacts to the pond embankments are anticipated.

Through further detailed design and ongoing coordination with the geotechnical consultants, all recommendations and requirements provided will be further incorporated into detailed design.

7 Erosion and Sediment Control Requirements

Prior to the initiation of any construction activity, a comprehensive Erosion and Sediment Control (ESC) Plan will be implemented. **Drawings C-601 through C-605 (Appendix B)** depict the proposed ESC Plan for UGS lands, detailed ESC drawings for ULRD lands will be prepared during further detailed design.

The ESC plans will include erosion control measures and siltation control facilities designed in accordance with the City of Thorold, Niagara Region, and NPCA guidelines. The ESC plans will be consistent with the recommendations of the Erosion & Sediment Control Guideline for Urban Construction, Greater Golden Horseshoe Conservation Authorities, 2019.

ESC measures will be installed prior to the beginning of works and will emphasize proactive measures which prevent erosion. All ESC measures will be routinely inspected and repaired during construction and will not be removed until the areas they serve are restored and stable.

8 Closing

The SWM plan is considered in general accordance with the current municipal design requirements of the City of Thorold, Niagara Region, and Niagara Peninsula Conservation Authority.

The storm sewers within the Site are designed to convey peak flows up to and including the 5-year design storm event for the entirety of the Site as well as additional external area. Major storm events (greater than the 5-year design storm event) are to be conveyed overland within the ROWs and spillways discharging to the SWM pond.

- Quality control is provided by SWM pond using a permanent pool and an extended detention volume specified by the MOE 2003.
- The permanent pool within the pond provides Level 2 'Normal' protection, as outlined in the MOE 2003.
- The SWM pond provides storage for the 2-year to 100-year design storms, as well as the 100-year MTO event for the UGS and ULRD lands drainage area. The SWM pond controls discharge to Outlet D in a manner consistent with the SWM-2022 report. The external drainage areas have been considered and are modeled as per their existing conditions.

Future Buildout Conditions:

- The Pond is currently sized to service the buildout of both the UGS and ULRD lands. Revisions, if required, to the outlet structure configuration will be provided in subsequent future submissions.

Prior to the initiation of any construction activity, a comprehensive ESC Plan will be implemented. The ESC plans will include all necessary erosion control measures and siltation control facilities designed in accordance with the current City of Thorold, Niagara Region, NPCA guidelines, and consistent with the recommendations of the Erosion & Sediment Control Guideline for Urban Construction, Greater Golden Horseshoe Conservation Authorities, 2019.

APPENDICES

Appendix A Background Drawings and Documents

Appendix B Design Drawings

Appendix C Stormwater Management Calculations

C.1 Calculation Sheets

C.2 VO6 Model Data

APPENDICES

Appendix A Background Drawings and Documents

NEIGHBOURHOODS OF ROLLING MEADOWS
SECONDARY PLAN
SUB-WATERSHED STUDY AND
FUNCTIONAL ENGINEERING REPORT
Thorold, Ontario

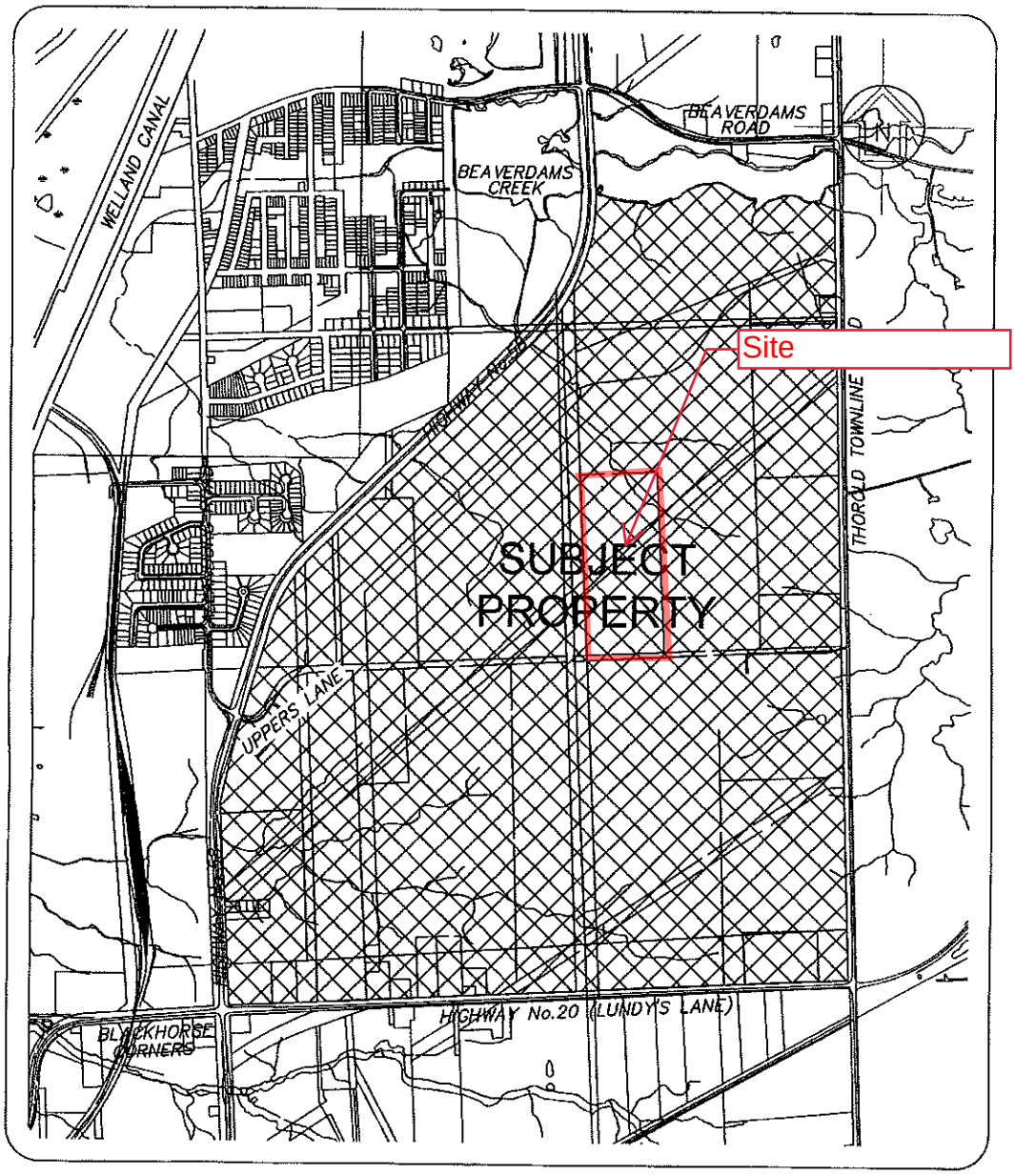
File No. 1495
June 2006

WESLAKE INC.
Consulting Civil Engineers, Municipal and Environmental Planners
8-10, 120 Lancing Drive, Hamilton, ON, L8W 3A1 105-446 Grey Street, Brantford, ON, N3L 7L6
Phone: (905) 574-2300 Fax: (905) 574-3303 Phone: (519) 750-1039 Fax: (519) 750-0293
E-mail: info@weslake.com

1. Introduction

Weslake Inc. was retained to complete a Stormwater Management Report for the neighbourhood of the Rolling Meadows Secondary Plan in the City of Thorold. The property lies between the two major cities in Niagara Region. St. Catharines is just to the north with a population of approximately 130,000 people. Niagara Falls, to the east, has a population of approximately 80,000 people. The site is bordered to the east by Thorold Townline Road and to the north by Beaver Dams Creek (see Figure 1).

Figure 1 – Key Plan



CAD REF. NAME: F:\1495\1495(FIG 08)EX-STM DRAINAGE-REVISED.DWG PLOT DATE: 29-May-06

BLACKHORSE CORNERS

30.8m CONCRETE BOX CULVERT
(2.8m x 2.2m) @ 0.5%
E.INV. = 174.72
W.INV. = 174.57

ALLANBURG ROAD

ALLANBURG ROAD

UPPERS LANE

TRANS CANADA GAS PIPELINE

Hydro One Easement

49.8m CONCRETE BOX CULVERT
(2.8m x 1.3m) @ 0.5%
E.INV. = 176.07
W.INV. = 175.79

Highway No. 58

49.3m CONCRETE BOX CULVERT
(2.8m x 1.5m) @ 0.5%
E.INV. = 175.27
W.INV. = 175.03

BEAVERDAMS CREEK

Highway No. 20

Hydro One Easement

Hydro One Easement

TRANS CANADA GAS PIPELINE

Site

173.431
O.P.G. (FLOOD)
CONTOUR

Beaverdams Road

BEAVERDAMS CREEK

Thorold Townline Road

A	162.8	5.0%
B	70.8	5.0%
C	78.3	5.0%
D	36.5	2.0%
E	5.6	5.0%
F	17.7	5.0%
G	6.1	5.0%
H	13.6	5.0%

KEY PLAN
N.T.S.

LEGEND

- x 180.00 — PROPOSED ELEVATION
- EXISTING STORM DRAINAGE BOUNDARY
- A — EXISTING OUTLET LOCATION
- 1 / 10.0 / 5.0% — DRAINAGE AREA No. / AREA IN HECTARES / (%) IMPERVIOUSNESS

THE POSITION OF POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND ABOVE GROUND UTILITIES AND STRUCTURES ARE NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, THE CONTRACTOR SHALL INFORM HIMSELF OF THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND SHALL ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

BENCHMARK:
CITY OF THOROLD BENCHMARK.

DESCRIPTION: C.N.Ry. BRIDGE (No.10), OVER WELLAND SHIP CANAL. TABLET IN EAST CURVED RETAINING WALL AT NORTH SIDE OF BRIDGE, 16.4 FEET WEST OF STEPS AT EAST END OF WALL, 43 FEET NORTH OF NORTH SIDE OF BRIDGE, 0.9 FOOT FROM EDGE OF CANAL.

ELEVATION: 174.314 m

REVISIONS				
No.	Revision	Date	By	Approved

REGIONAL MUNICIPALITY OF NIAGARA
CITY OF THOROLD

NEIGHBOURHOODS OF ROLLING MEADOWS

EXISTING STORM DRAINAGE PLAN

WESLAKE INC.
CIVIL ENGINEERS, MUNICIPAL AND ENVIRONMENTAL PLANNERS
120 LANCING DRIVE
UNIT No. 10
HAMILTON, ONTARIO
L8W 3A1

40 0 160
METRES

SCALE: 1:4,000
DRAWN BY: M.G. | PROJECT No. 1495
DESIGNED BY: M.G.
CHECKED BY: T.D.B. | FIGURE No. 8
DATE: MAY 2006

NOT FOR CONSTRUCTION UNTIL SIGNED, STAMPED AND DATED

X-REF:F:\1495\1495-Base500.DWG

CAD REF. NAME: F:\1495\1495(FIG 18) IMPLEMENTATION.DWG PLOT DATE: 26-Jun-08

BLACKHORSE CORNERS

ALLANBURG ROAD

ALLANBURG ROAD

UPPERS LANE

TRANS CANADA GAS PIPELINE

Highway No. 58

Hydro One Easement

POND "A"

POND "B"

POND "C"

POND "D"

1

1A

2

3

Highway No. 20

Hydro One Easement

Hydro One Easement

TRANS CANADA GAS PIPELINE

Site

Thorold Townline Road

BEAVERDAMS CREEK

BEAVERDAMS CREEK

Beaverdams Road

N

KEY PLAN
N.T.S.

LEGEND

2 PHASE NUMBER

THE POSITION OF POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND ABOVE GROUND UTILITIES AND STRUCTURES ARE NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, THE CONTRACTOR SHALL INFORM HIMSELF OF THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND SHALL ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

BENCHMARK:
CITY OF THOROLD BENCHMARK.

DESCRIPTION: C.N.R'y. BRIDGE (No.10), OVER WELLAND SHIP CANAL, TABLET IN EAST CURVED RETAINING WALL AT NORTH SIDE OF BRIDGE, 16.4 FEET WEST OF STEPS AT EAST END OF WALL, 43 FEET NORTH OF NORTH SIDE OF BRIDGE, 0.9 FOOT FROM EDGE OF CANAL.

ELEVATION: 174.314 m

REVISIONS				
No.	Revision	Date	By	Approved

REGIONAL MUNICIPALITY OF NIAGARA
CITY OF THOROLD

NEIGHBOURHOODS OF ROLLING MEADOWS

IMPLEMENTATION PLAN

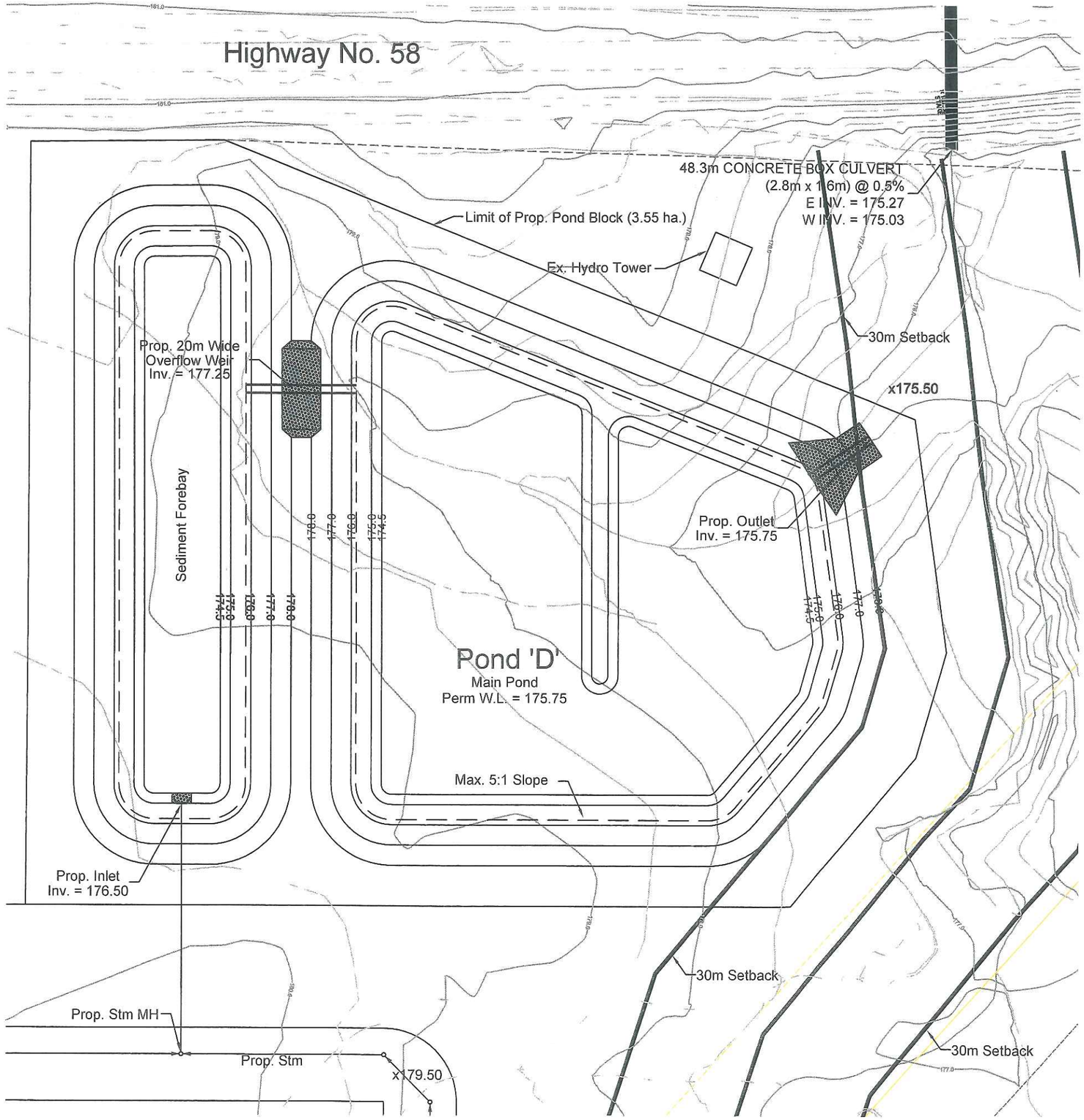
WESLAKE INC.
CIVIL ENGINEERS, MUNICIPAL AND ENVIRONMENTAL PLANNERS
120 LANCING DRIVE
UNIT No. 10
HAMILTON, ONTARIO
L8W 3A1

40 0 160
METRES

SCALE: 1:4,000
DRAWN BY: S.M. PROJECT No. 1495
DESIGNED BY: M.G.
CHECKED BY: T.D.B. FIGURE No. 18
DATE: MAY 2008

NOT FOR CONSTRUCTION UNTIL SIGNED, STAMPED AND DATED

X-REF:F:\1495\1495-Base500.DWG

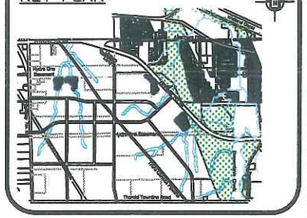


SEDIMENT FOREBAY VOLUME TABLE				
ELEVATION	AREA (S.M.)	VOLUME (C.M.)	Cumulative Volume (C.M.)	COMMENT
174.50	2,515			
175.00	3,285	1,450	1,450	DEAD STORAGE
175.75	4,514	2,925	4,375	DEAD STORAGE
176.00	4,943	1,182	5,557	LIVE STORAGE
176.11	5,135	554	554	LIVE STORAGE
177.00	6,758	5,292	5,847	LIVE STORAGE
178.00	8,679	7,719	13,564	LIVE STORAGE

MAIN POND VOLUME TABLE				
ELEVATION	AREA (S.M.)	VOLUME (C.M.)	Cumulative Volume (C.M.)	COMMENT
174.50	9,033			
175.00	10,351	4,846	4,846	DEAD STORAGE
175.75	12,200	8,457	13,303	DEAD STORAGE
176.00	12,739	3,117	16,420	LIVE STORAGE
176.11	12,979	1,414	1,414	LIVE STORAGE
177.00	14,992	12,447	13,862	LIVE STORAGE
178.00	17,352	16,172	30,034	LIVE STORAGE

TOTAL VOLUME TABLE				
ELEVATION	AREA (S.M.)	VOLUME (C.M.)	Cumulative Volume (C.M.)	COMMENT
174.50	11,548			
175.00	13,636	6,296	6,296	DEAD STORAGE
175.75	16,714	11,381	17,677	DEAD STORAGE
176.00	17,682	4,300	21,977	LIVE STORAGE
176.11	18,114	1,969	1,969	LIVE STORAGE
177.00	21,750	17,739	19,708	LIVE STORAGE
178.00	26,031	23,891	43,599	LIVE STORAGE

KEY PLAN



Legend

~~175.5~~ Prop. Contour

175.5 Ex. Contour

REVISIONS				
No.	Revision	Date	By	Approved

REGIONAL MUNICIPALITY OF NIAGARA
CITY OF THOROLD

NEIGHBOURHOODS OF ROLLING MEADOWS

Preliminary Design Concept

POND 'D'

WESLAKE INC.
CIVIL ENGINEERS, MUNICIPAL AND ENVIRONMENTAL PLANNERS
120 LANCING DRIVE
UNIT No. 10
HAMILTON, ONTARIO
L8W 3A1

10 0 40
METRES

SCALE: HORIZ 1:500	VERT 1:100
DRAWN BY: W.G.	PROJECT No. 1495
DESIGNED BY: G.B.	
CHECKED BY: T.D.B.	FIGURE No. 17
DATE: May 08	

NOT FOR CONSTRUCTION UNTIL SIGNED, STAMPED AND DATED

X-REF:1495\DWG\1495-Base500.DWG

PRELIMINARY
STORMWATER MANAGEMENT PLAN

ROLLING MEADOWS

CITY OF THOROLD

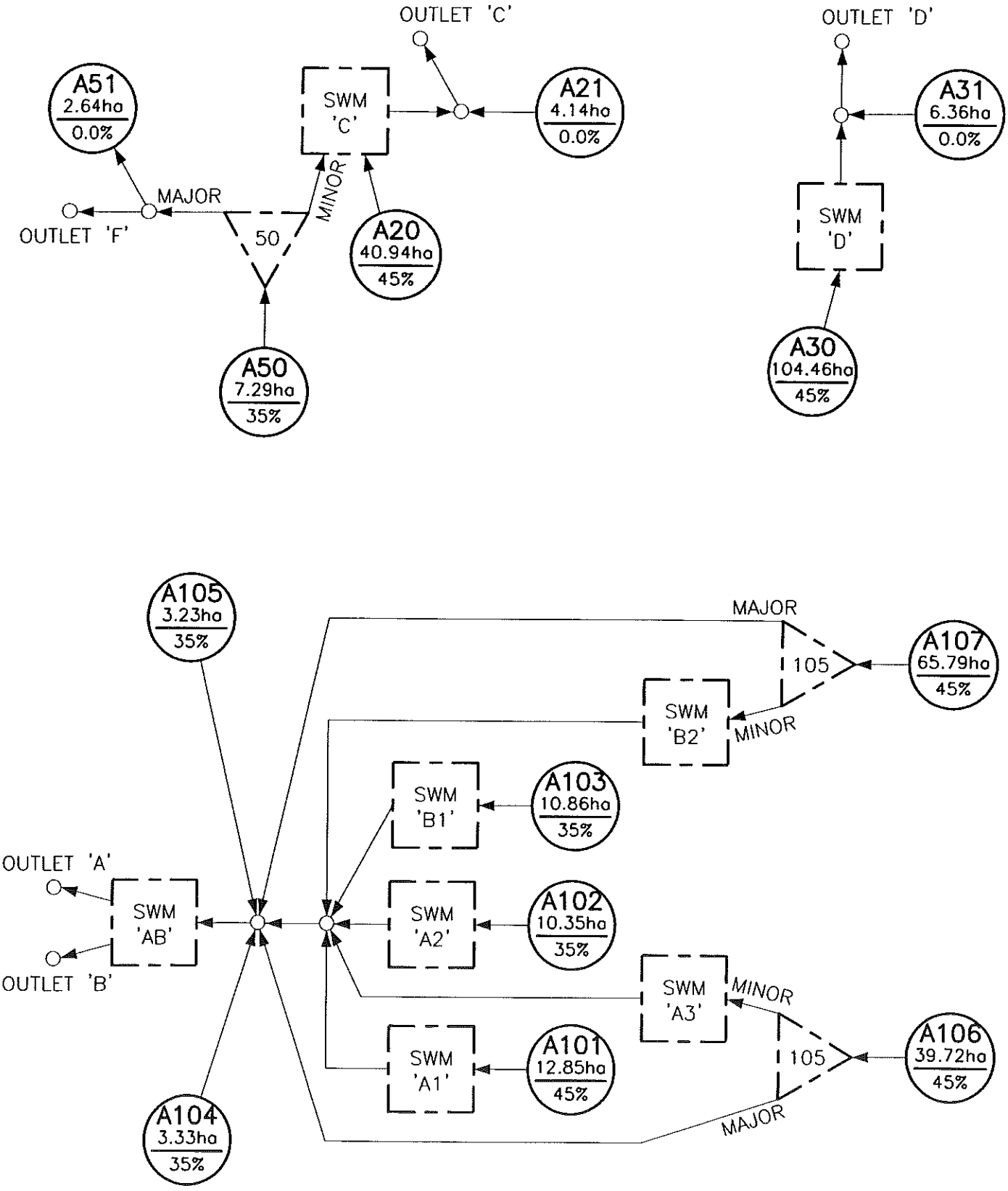
Prepared for:

Rolling Meadows Land Development Corporation
2908 Cataract Road, RR1
Fonthill, ON L0S 1E6

Prepared by:

Upper Canada Consultants
261 Martindale Road, Unit 1
St. Catharines, Ontario
L2W 1A1

March 2007



ROLLING MEADOWS

CITY OF THOROLD

SCHEMATIC OF FUTURE STORMWATER MODELLING
FULL SWM PONDS

UPPER CANADA CONSULTANTS
ENGINEERS/PLANNERS
261 Martindale Road, Unit #1
St. Catharines
Ontario L2W 1A1
Phone:(905)688-9400
Fax: (905)688-5274

DWG. No: FIGURE 4

FUNCTIONAL SERVICING REPORT
IN SUPPORT OF ZONING BY-LAW AMENDMENT
AND DRAFT PLAN APPROVAL

Upper's Grove Block Plan
Residential Development

Rolling Meadows Secondary Plan
City of Thorold, Ontario

counterpoint ENGINEERING

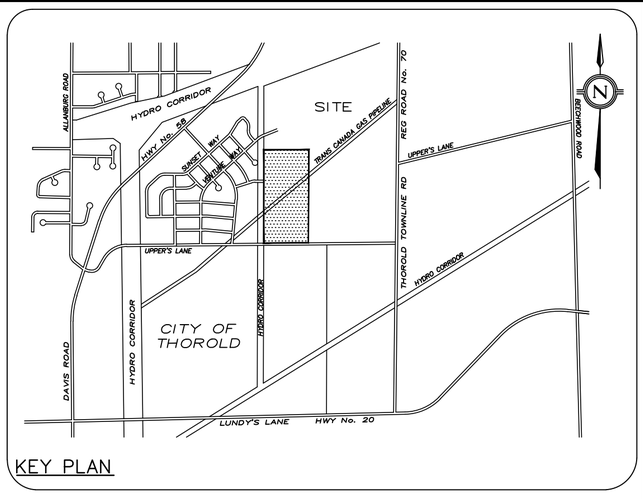
8395 Jane Street, Suite 100
Vaughan, Ontario L4K 5Y2
Tel: (905) 326-1404

File Number: 18020

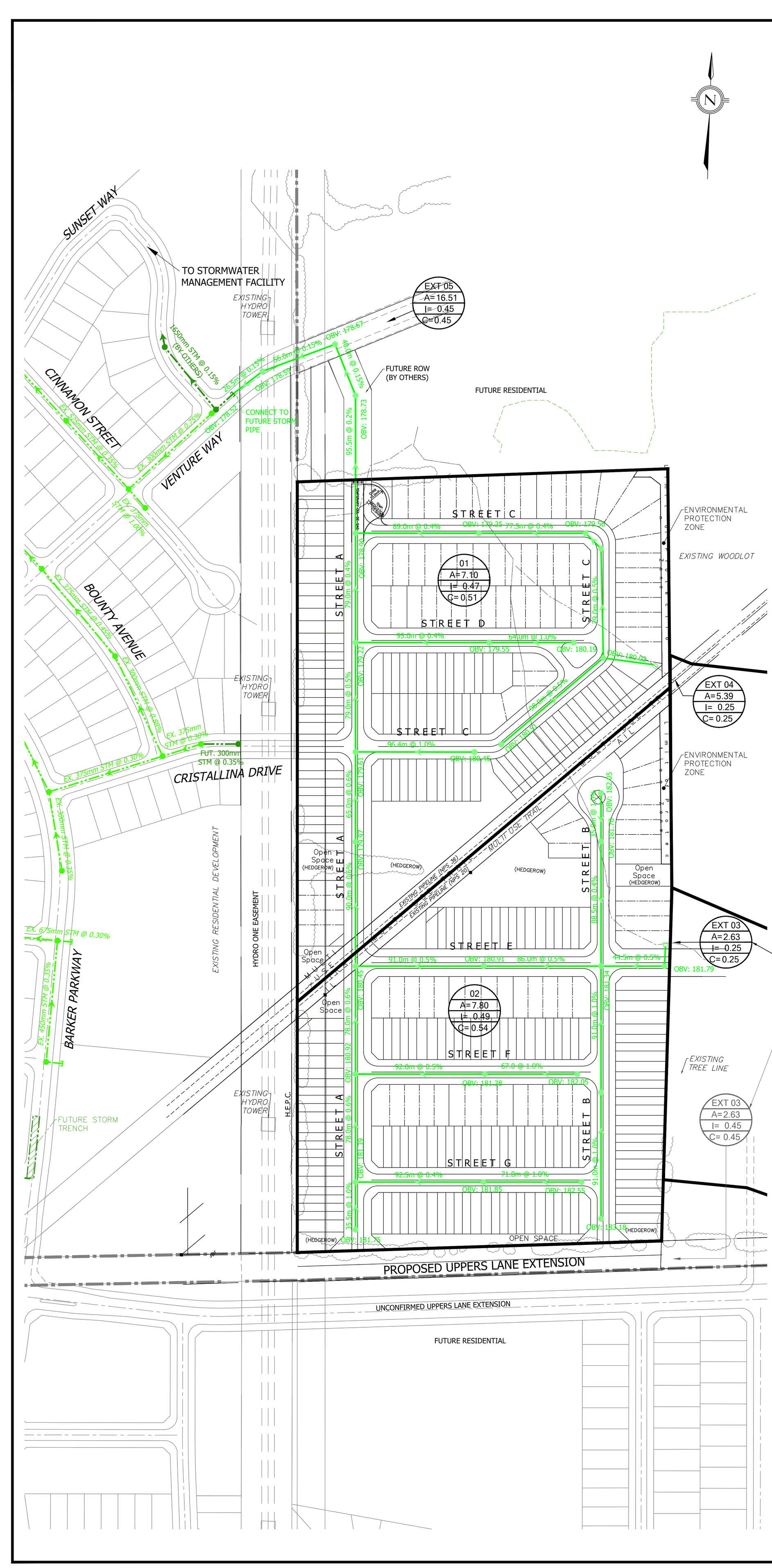
Prepared For:

FARZ Holdings Inc.

No.	Revision	Date
4	Issued For 4th Submission	December 18, 2020
3	Issued For 3rd Submission	July 17, 2020
2	Issued For 2nd Submission	August 6, 2019
1	Issued For 1st Submission	December 11, 2018



KEY PLAN



LEGEND

- 01 / A=7.10 / I= 0.47 / C= 0.51 — DRAINAGE AREA ID; DRAINAGE AREA (HA); IMPERVIOUSNESS; RUNOFF COEFFICIENT
- PROPOSED STORM SEWER
- EXISTING STORM SEWER
- FUTURE STORM SEWER
- EXISTING DITCH CENTRELINE

counterpoint ENGINEERING

COUNTERPOINT ENGINEERING INC.

8395 Jane St., Suite 100, Vaughan, ON L4K 5Y2 Phone 905.326.1404 Fax 905.326.1405

APPLICANT:

KETTLEBECK DEVELOPMENTS
1 SUNSET WAY
THOROLD, ONTARIO
PHONE: 905-320-7233

SITE LOCATION:

UPPER GROVE RESIDENTIAL DEVELOPMENT
UPPERS LANE
THOROLD, ONTARIO
SITE PLAN FILE No.:

STORM DRAINAGE PLAN

DATE:	JULY 2020
PROJECT NO.	18020
SCALE: 1:1250m (0m 15m 30m 45m 60m 75m)	
FIGURE NO.	STM-1

REGION FILE No.:

UPPER CANADA CONSULTANTS
ENGINEERS / PLANNERS

Upper Canada
Planning &
Engineering Ltd.
3-30 Hannover Drive
St. Catharines, ON
L2W 1A3
Phone 905-688-9400
Fax 905-688-5274

PRELIMINARY
STORMWATER MANAGEMENT PLAN

ROLLING MEADOWS
PHASE 17

CITY OF THOROLD

Prepared for:

Rolling Meadows Land Development Corporation
2908 Cataract Road, RR1
Fonthill, ON L0S 1E6

Prepared by:

Upper Canada Consultants
30 Hannover Drive, Unit 3
St. Catharines, Ontario
L2W 1A3

May 2022

The curves were used to generate hyetographs for the 2 through the 100 year City of St. Catharines design storm events with a 4 hour Chicago distribution in accordance with the previously approved phases of the Rolling Meadows subdivision.

The 25mm design storm event IDF curve parameters were derived using a 4 hour Chicago distribution. Since the subject lands convey stormwater drainage to MTO controlled lands, the 100 year IDF curve provided on the Ministry's website shall also be used for the following design. Table 1 summarizes the rainfall data applied in the stormwater modelling.

Table 1. Rainfall Data

Design Storm (Return Period)	Chicago Distribution Parameters			Duration (minutes)
	a	b	c	
25mm	512.00	6.000	0.800	240
2 Year	567.00	5.200	0.746	240
5 Year	664.00	4.700	0.744	240
10 Year	724.00	4.300	0.739	240
25 Year	821.00	4.000	0.735	240
50 Year	900.00	3.800	0.734	240
100 Year	980.00	3.700	0.732	240
100 Year MTO	915.40	0.000	0.699	1440

$$RainfallIntensity\ (mm/hr) = \frac{a}{(t_d + b)^c}$$

t_d = Time of concentration/duration

3.2 Existing Conditions

Existing stormwater flows at the Outlet D were determined based on existing drainage conditions to analyse the impact of the proposed development on the receiving watercourse. Prior to 2008, but after the submission of the 2007 SWMP, drainage ditches were constructed within the Rolling Meadows subdivision area near the intersection of the Trans Canada Pipeline and Uppers Lane, which modified the drainage area A3. The eastern limits of drainage area A3 remain unchanged. The existing drainage area, as shown in Figure 2, was assessed based on the existing parameters shown in Table 2.

Table 2. Hydrologic Parameters for Existing Conditions

Area No.	Area (ha)	Length (m)	Slope (%)	Manning -"n"		Soil Types	SCS CN	Percent Impervious
				Perv	Imperv			
1	80.89	860	0.70	0.25	0.015	CD	75	0.1%

3.3 Proposed Conditions

The proposed stormwater flows to Outlet D were assessed using the proposed conditions as shown in Figure 3.

The future stormwater drainage boundaries have been prepared in accordance with the 2007 SWMP and the previously approved and constructed phases of the Rolling Meadows subdivision.

Input parameters for the computer model for the proposed conditions at Outlet D are shown in Table 3.

Table 3. Hydrologic Parameters for Proposed Conditions

Area No.	Area (ha)	Length (m)	Slope (%)	Manning -"n"		Soil Types	SCS CN	Percent Impervious
				Perv	Imperv			
30a	8.90	313	1.0%	0.25	0.015	CD	75	47.6%
30b	74.63	860	1.0%	0.25	0.015	CD	75	0.1%

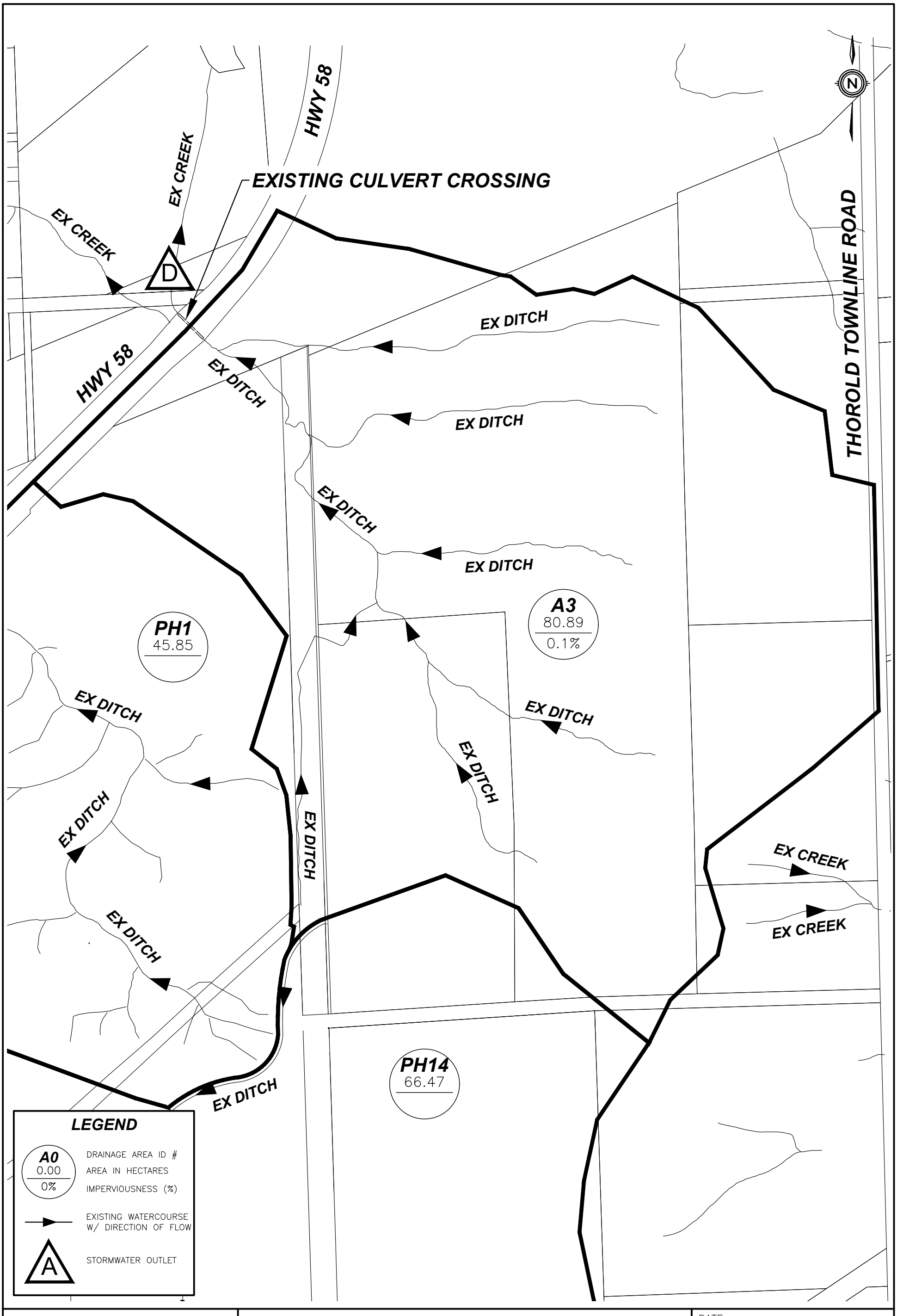
The proposed imperviousness of 47.6% for Area 30a was determined by a weighted average with 60% for the Phase 17 lands (6.46 hectares) and 15% for the park lands west Phase 17 (2.45 hectares).

As shown in Table 4 below, peak stormwater flows and volumes increase above existing levels under future conditions at Outlet D. Therefore, stormwater management quantity controls (storage) will be required.

Table 4. Peak Flows and Runoff Volumes

Design Storm	Peak Flows (m^3/s)			Runoff Volumes (m^3)		
	Existing	Future*	Change	Existing	Future*	Change
2 Year	0.220	0.601	173%	5,985	7,221	21%
5 Year	0.366	0.754	106%	8,668	10,145	17%
10 Year	0.506	0.872	72%	10,981	12,640	15%
25 Year	0.763	1.051	38%	14,696	16,624	13%
50 Year	0.985	1.167	18%	17,667	19,784	12%
100 Year	1.259	1.341	7%	21,061	23,379	11%
100 Year MTO	3.048	3.187	5%	62,152	66,426	7%

*Note: * denotes peak flows without any Stormwater Management Facility in place.*



UPPER CANADA CONSULTANTS
ENGINEERS / PLANNERS

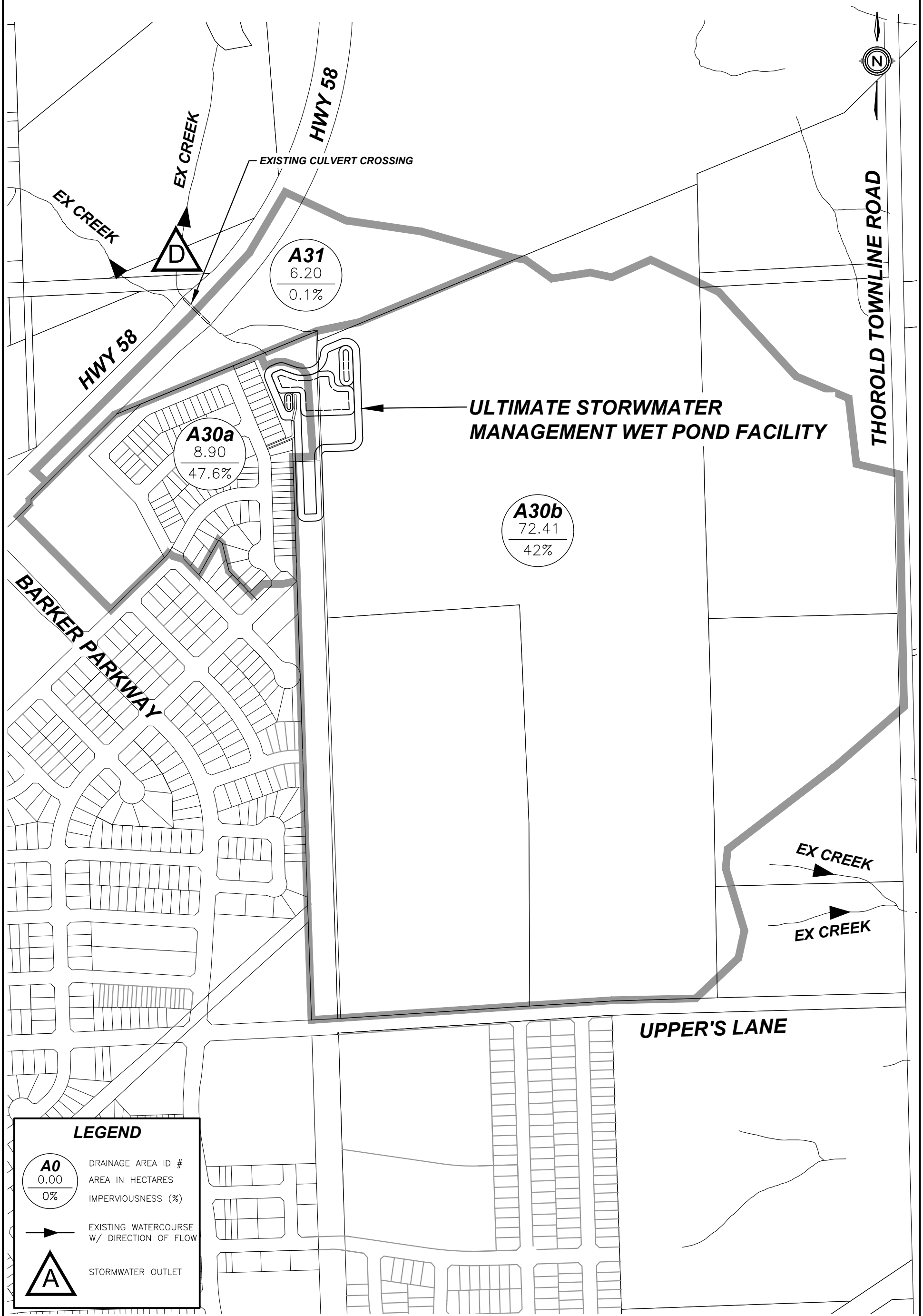
ROLLING MEADOWS PHASE 17

TOWN OF THOROLD

EXISTING STORMWATER DRAINAGE AREAS

DATE	2022-05-18
SCALE	1:5000 m
REF No.	0695
DWG No.	FIGURE 2

DRAWING FILE: F:\0695_SOUTH PHASE 12+\PHASE 17\SWM\0695 SWM BASE_New Properties.dwg PLOTTED: May 19, 2022 – 11:33am PLOTTED BY: brendan



UPPER CANADA CONSULTANTS
ENGINEERS / PLANNERS

ROLLING MEADOWS PHASE 17

TOWN OF THOROLD

ULTIMATE STORMWATER DRAINAGE AREAS

DATE	2022-05-18
SCALE	1:5000 m
REF No.	0695
DWG No.	FIGURE 4

DRAWING FILE: F:\0695_SOUTH PHASE 12+\PHASE 17\SWM\0695 SWM BASE_New Properties.dwg PLOTTED: May 19, 2022 – 11:35am PLOTTED BY: brendan

Highway No. 58

Highway No. 20

Thorold Townline Road

A1N
48.90ha
0.0%

A1S
50.90ha
0.0%

A2
66.91ha
0.0%

A3
76.38ha
0.0%

A4
12.70ha
0.0%

A5
16.59ha
0.0%

EX. CREEK

EX. DITCH

LEGEND

A4 / 12.70ha / 5.0% — CATCHMENT NUMBER, DRAINAGE AREA, IMPERVIOUSNESS

DRAINAGE BOUNDARY

A — STORMWATER OUTLET

No	REVISIONS	DATE	BY
0	ISSUED WITH PRELIMINARY SWM REPORT		

UPPER CANADA CONSULTANTS
ENGINEERS/PLANNERS
261 Martindale Road
Unit #1
St. Catharines, Ontario
L2W 1A1
Phone:(905)688-9400
Fax: (905)688-5274

PROJECT NAME: ROLLING MEADOWS

OWNER: ROLLING MEADOWS LAND DEVELOPMENT CORPORATION
2908 Cataract Road, RR1
FONTHILL, ONTARIO
L0S 1E6

DRAWING TITLE: EXISTING STORMWATER DRAINAGE AREAS

MUNICIPALITY: CITY OF THOROLD

DESIGN:	DRAFTING:
MH	B.V.

DATE: MARCH 30, 2007

SCALE: 1:3000

DRAWING No: 0695-EX.STM

REV. 0

UPPER CANADA CONSULTANTS
30 HANNOVER DRIVE, UNIT #3
ST. CATHARINES, ONTARIO
L2W 1A3

RAINFALL PARAMETERS:
5 YEAR DESIGN STORM EVENT
ST. CATHARINES IDF

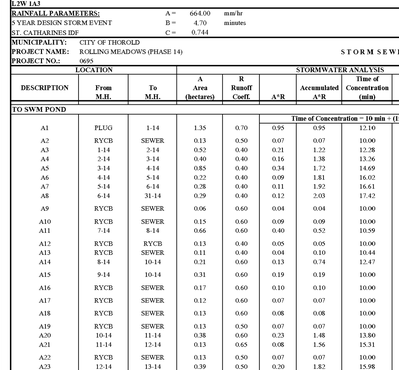
A = 664.00 mm/hr
B = 4.70 minutes
C = 0.744

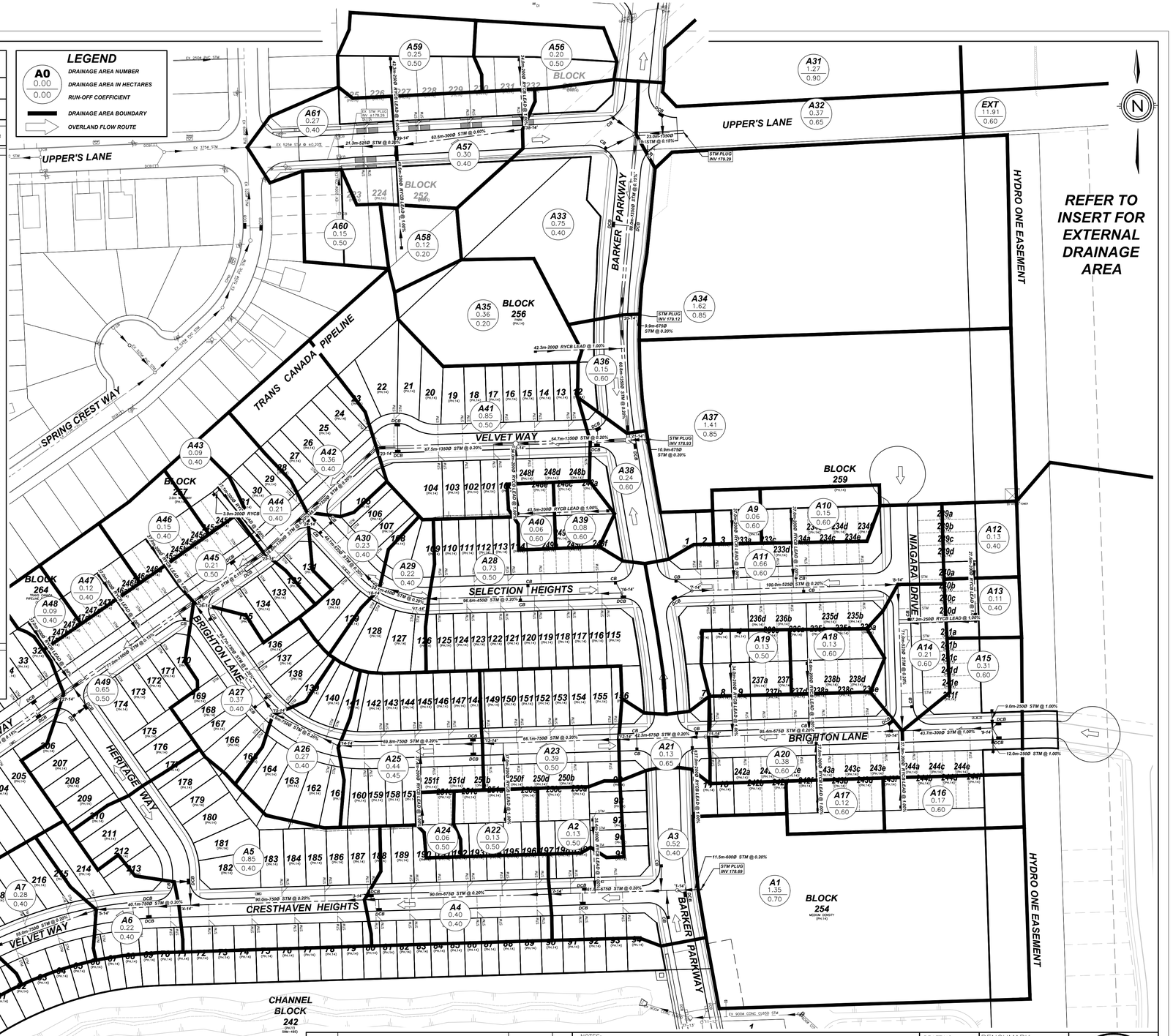
PIPE ROUGHNESS: 0.013 FOR MANNING'S EQUATION
PIPE SIZES: 1.016 IMPERIAL EQUIVALENT FACTOR
PERCENT FULL: TOTAL PEAK FLOW / CAPACITY

MUNICIPALITY: CITY OF THOROLD
PROJECT NAME: ROLLING MEADOWS (PHASE 14)
PROJECT NO.: 0695

STORM SEWER DESIGN SHEET

DESCRIPTION	LOCATION From M.H.	LOCATION To M.H.	STORMWATER ANALYSIS A Area (hectares)	R Runoff Coeff.	A*R	Accumulated A*R	Time of Concentration (min)	Flow Time (min.)	Rainfall Intensity (mm/hr)	Peak Flow (L/s)	STORM SEWER DESIGN Length (m)	Diameter (mm.)	Slope (%)	Full Flow Capacity (L/s)	Full Flow Velocity (m/s)	Percent Full
TO SWM POND						**Time of Concentration = 10 min + (151 m)/(1.2 m/s)/(60 s/min) = 12.10 min**										
A1	PLUG	1-14	1.35	0.70	0.95	0.95	12.10	0.18	81.39	213.66	10.5	600	0.20	274.59	1.0	77.8%
A2	RYCB	SEWER	0.13	0.50	0.07	0.07	10.00	0.57	89.88	16.23	35.4	200	1.00	32.80	1.0	49.5%
A3	1-14	2-14	0.52	0.40	0.21	1.22	12.28	0.98	80.75	273.20	61.8	675	0.20	375.92	1.1	72.7%
A4	2-14	3-14	0.40	0.40	0.16	1.38	13.26	1.43	77.45	296.45	90.0	675	0.20	375.92	1.1	78.9%
A5	3-14	4-14	0.85	0.40	0.34	1.72	14.69	1.33	73.16	349.14	90.0	750	0.20	497.87	1.1	70.1%
A6	4-14	5-14	0.22	0.40	0.09	1.81	16.02	0.59	69.63	349.33	40.1	750	0.20	497.87	1.1	70.2%
A7	5-14	6-14	0.28	0.40	0.11	1.92	16.61	0.81	68.19	363.29	55.0	750	0.20	497.87	1.1	73.0%
A8	6-14	31-14	0.29	0.40	0.12	2.03	17.42	0.76	66.31	374.67	51.5	750	0.20	497.87	1.1	75.3%
A9	RYCB	SEWER	0.06	0.60	0.04	0.04	10.00	0.59	89.88	8.99	37.0	200	1.00	32.80	1.0	27.4%
A10	RYCB	SEWER	0.15	0.60	0.09	0.09	10.00	0.59	89.88	22.47	37.0	200	1.00	32.80	1.0	68.5%
A11	7-14	8-14	0.66	0.60	0.40	0.52	10.59	1.88	87.29	126.57	100.0	525	0.20	192.33	0.9	65.8%
A12	RYCB	RYCB	0.13	0.40	0.05	0.05	10.00	0.44	89.88	12.98	27.6	200	1.00	32.80	1.0	39.6%
A13	RYCB	SEWER	0.11	0.40	0.04	0.10	10.44	0.59	87.93	23.45	37.2	200	1.00	32.80	1.0	71.5%
A14	8-14	10-14	0.21	0.60	0.13	0.74	12.47	1.33	80.09	165.31	71.0	525	0.20	192.33	0.9	86.1%
A15	9-14	10-14	0.31	0.60	0.19	0.19	10.00	0.53	89.88	46.44	43.7	300	1.00	96.70	1.4	48.0%
A16	RYCB	SEWER	0.17	0.60	0.10	0.10	10.00	0.59	89.88	25.47	37.0	200	1.00	32.80	1.0	77.6%
A17	RYCB	SEWER	0.12	0.60	0.07	0.07	10.00	0.59	89.88	17.98	37.0	200	1.00	32.80	1.0	54.8%
A18	RYCB	SEWER	0.13	0.60	0.08	0.08	10.00	0.54	89.88	19.47	34.0	200	1.00	32.80	1.0	59.4%
A19	RYCB	SEWER	0.13	0.50	0.07	0.07	10.00	0.54	89.88	16.23	34.0	200	1.00	32.80	1.0	49.5%
A20	10-14	11-14	0.38	0.60	0.23	1.48	13.80	1.51	75.76	310.39	89.4	675	0.20	375.92	1.1	82.6%
A21	11-14	12-14	0.13	0.65	0.08	1.56	15.31	0.67	71.45	309.52	42.3	675	0.20	375.92	1.1	82.3%
A22	RYCB	SEWER	0.13	0.50	0.07	0.07	10.00	0.59	89.88	16.23	37.0	200	1.00	32.80	1.0	49.5%
A23	12-14	13-14	0.39	0.50	0.20	1.82	15.98	0.98	69.72	352.37	66.1	750	0.20	497.87	1.1	70.8%
A24	RYCB	SEWER	0.06	0.50	0.03	0.03	10.00	0.59	89.88	7.49	37.0	200	1.00	32.80	1.0	22.8%
A25	13-14	14-14	0.44	0.45	0.20	2.05	16.96	1.04	67.36	383.13	70.0	750	0.20	497.87	1.1	77.0%
A26	14-14	15-14	0.27	0.40	0.11	2.16	18.00	0.53	65.06	389.57	35.5	750	0.20	497.87	1.1	78.2%
A27	15-14	26-14	0.37	0.40	0.15	2.30	18.00	0.99	65.06	416.32	66.9	750	0.20	497.87	1.1	83.6%
A28	16-14	17-14	0.73	0.50	0.37	0.37	10.00	2.01	89.88	91.13	96.6	450	0.20	127.50	0.8	71.5%
A29	17-14	18-14	0.22	0.40	0.09	0.45	12.01	0.35	81.72	102.83	24.1	450	0.20	127.50	0.8	80.6%
A30	18-14	24-14	0.23	0.40	0.09	0.55	12.51	0.90	79.94	121.02	48.1	525	0.20	192.33	0.9	62.9%
EXT			11.91	0.60	7.15	7.15	21.38		58.67	1164.63						
A31			1.27	0.90	1.14	1.14			209.96	666.61						
A32	PLUG	19-14	0.37	0.65	0.24	8.53	21.38	0.27	58.67	1390.13	23.0	1350	0.15	2067.17	1.4	67.2%
A33	19-14	20-14	0.75	0.40	0.30	8.83	21.65	1.02	58.23	1428.23	88.0	1350	0.15	2067.17	1.4	69.1%
A34	PLUG	20-14	1.62	0.85	1.38	1.38	11.79	0.16	82.51	315.61	9.9	675	0.20	375.92	1.1	84.0%
A35	CB	SEWER	0.36	0.20	0.07	0.07	10.00	0.68	89.88	17.98	42.3	200	1.00	32.80	1.0	54.8%
A36	20-14	21-14	0.15	0.60	0.09	10.37	22.66	0.57	56.62	1630.63	57.5	1350	0.20	2386.96	1.7	68.3%
A37	PLUG	21-14	1.41	0.85	1.20	1.20	12.07	0.17	81.49	271.31	10.5	675	0.20	375.92	1.1	72.2%
A38	21-14	22-14	0.24	0.60	0.14	11.71	23.24	0.18	55.75	1813.50	18.3	1350	0.20	2386.96	1.7	76.0%
A39	RYCB	RYCB	0.08	0.60	0.05	0.05	10.00	0.69	89.88	11.98	43.5	200	1.00	32.80	1.0	36.5%
A40	RYCB	SEWER	0.06	0.60	0.04	0.08	10.69	0.54	86.85	20.26	34.0	200	1.00	32.80	1.0	61.8%
A41	22-14	23-14	0.85	0.50	0.43	12.22	23.42	1.04	55.48	1883.15	103.7	1350	0.20	2386.96	1.7	78.9%
A42	23-14	24-14	0.36	0.40	0.14	12.36	24.46	0.46	54.00	1854.72	46.0	1350	0.20	2386.96	1.7	77.7%
A43	RYCB	SEWER	0.09	0.40	0.04	0.04	10.00	0.59	89.88	8.99	37.1	200	1.00	32.80	1.0	27.4%
A44	24-14	25-14	0.21	0.40	0.08	13.03	24.91	0.29	53.38	1931.85	28.8	1350	0.20	2386.96	1.7	80.9%
A45	25-14	26-14	0.21	0.50	0.11	15.44	25.20	0.45	53.00	2272.56	45.6	1500	0.15	2737.76	1.5	83.0%
A46	RYCB	26-14	0.15	0.40	0.06	0.06	10.00	0.59	89.88	14.98	37.0	200	1.00	32.80	1.0	45.7%
A47	RYCB	SEWER	0.12	0.40	0.05	0.05	10.00	0.59	89.88	11.98	37.0	200	1.00	32.80	1.0	36.5%
A48	RYCB	SEWER	0.09	0.40	0.04	0.04	10.00	0.59	89.88	8.99	37.0	200	1.00	32.80	1.0	27.4%
A49	26-14	27-14	0.65	0.50	0.33	15.91	25.65	0.83	52.41	2315.86	77.0	1500	0.15	2737.76	1.5	84.6%
A50	27-14	28-14	0.78	0.40	0.31	16.22	26.48	0.93	51.37	2314.45	86.3	1500	0.15	2737.76	1.5	84.5%
A51	28-14	29-14	0.33	0.40	0.13	16.35	27.41	0.31	50.26	2282.90	39.8	1500	0.15	2737.76	1.5	83.4%
A52	29-14	30-14	0.15	0.40	0.06	16.41	27.72	0.42	49.91	2274.91	39.5	1500	0.15	2737.76	1.5	83.1%
A53	30-14	31-14	0.17	0.40	0.07	16.48	28.14	0.39	49.42	2262.31	36.4	1500	0.15	2737.76	1.5	82.6%
	31-14	32-14				18.51	28.53	0.44	48.99	2519.24	46.7	1500	0.20	3161.29	1.8	79.7%
	32-14	33-14				18.51	28.97	0.28	48.53	2494.98	29.6	1500	0.20	3161.29	1.8	78.9%
	33-14	HW				18.51	29.25	0.08	48.22	2479.89	9.1	1500	0.20	3161.29	1.8	78.4%
A54	CB	CB	0.19	0.30	0.06	0.06	10.00	0.59	89.88	14.23	37.2	200	1.00	32.80	1.0	43.4%
A55	CB	POND	0.11	0.30	0.03	0.09	10.09	0.30	89.48	22.37	38.2	200	4.20	67.22	2.1	33.3%
TO UPPER'S LANE																
A56	RYCB	38-14	0.20	0.50	0.10	0.10	10.00	0.54	89.88	24.97	34.0	200	1.00	32.80	1.0	76.1%
A57	38-14	39-14	0.30	0.40	0.12	0.22	10.22	0.98	88.90	54.33	62.5	300	0.60	74.90	1.1	72.5%
A58	RYCB	39-14	0.12	0.20	0.02	0.02	10.00	0.79	89.88	5.99	49.6	200	1.00	32.80	1.0	18.3%
A59	RYCB	39-14	0.25	0.50	0.13	0.13	10.00	0.58	89.88	31.21	42.3	250	1.00	59.47	1.2	52.5%
A60	RYCB	SEWER	0.15	0.50	0.08	0.08	10.00	0.52	89.88	18.73	32.4	200	1.00	32.80	1.0	57.1%
A61	39-14	EX MH	0.27	0.40	0.11	0.55	11.39	1.34	84.77	129.99	71.6	525	0.20	192.33	0.9	67.6%





#	REVISION	DATE	INIT
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3	ISSUED FOR CONSTRUCTION	2022-04-12	BV
2	REVISED PER CITY COMMENTS (FEB. 23, 2022)	2022-03-18	BV
1	ISSUED FOR TRANS CANADA PIPELINE APPROVAL	2022-01-21	BV
0	ISSUED FOR MECP APPROVAL	2022-01-20	BV

NOTES:
1. THE POSITION OF POLE LINES, CONDUITS, WATERMAINS, SEWER, AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS AND, WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, THE CONTRACTOR SHALL INFORM HIMSELF OF THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND SHALL ASSUME ALL LIABILITY FOR DAMAGE TO THEM.
2. PROPERTY LINES WERE PLOTTED USING REGISTERED PLANS AND BARS LOCATED IN THE FIELD. TO VERIFY THE ACCURACY OF THESE PROPERTY LINES, A LEGAL SURVEY SHOULD BE PERFORMED PRIOR TO CONSTRUCTION.
3. ALL CONSTRUCTION MUST COMPLY WITH THE NIAGARA PENINSULA STANDARD CONTRACT DOCUMENT.

DRAFTING	BV
DESIGN	MH
CHECKED BY	AK
APPROVED BY	AK

RENCHMARK:
HYDRANT - SOUTH SIDE OF SPARKLE DRIVE IN FRONT OF BLOCK 131 SOUTH OF VENTURE WAY, ACROSS FROM LOT #117
ELEVATION: 181.22

LICENSED PROFESSIONAL ENGINEER
A. S. KEANE
100109861
APR 12 '22
PROVINCE OF ONTARIO

City of Thorold
Where Ships Climb The Mountain...

UPPER CANADA CONSULTANTS
ENGINEERS / PLANNERS
30 Hannover Drive Unit 3
St. Catharines, Ontario
L2W 1A3
Phone: (905)688-9400
Fax: (905)688-5274

OWNER
ROLLING MEADOWS LAND DEVELOPMENT CORPORATION
2908 CATARACT ROAD, R.R.# 1
FONTHILL, ONTARIO
L0S 1E6

ROLLING MEADOWS PHASE 14

CITY OF THOROLD
STORM DRAINAGE AREA PLAN

CONSULTANT FILE No.	
DATE	2022-04-12
PRINTED	2022-04-12
SCALE	1:1000m
REF No.	.
DWG No.	0695-PH14-STM
REV	3

DRAWING FILE: F:\0695_SOUTH PHASE 12+\PHASE 14\Engineering\0695-ph14-GSP & PP.DWG PLOTTED: Apr 12, 2022 - 1:16pm PLOTTED BY: BVanderValk

UPPER CANADA CONSULTANTS
30 HANNOVER DRIVE, UNIT #3
ST. CATHARINES, ONTARIO
L2W 1A3

RAINFALL PARAMETERS:
5 YEAR DESIGN STORM EVENT
ST. CATHARINES IDF

A = 664.00 mm/hr
B = 4.70 minutes
C = 0.744

PIPE ROUGHNESS: 0.013 FOR MANNING'S EQUATION
PIPE SIZES: 1.016 IMPERIAL EQUIVALENT FACTOR
PERCENT FULL: TOTAL PEAK FLOW / CAPACITY

MUNICIPALITY: CITY OF THOROLD
PROJECT NAME: ROLLING MEADOWS (PHASE 14)
PROJECT NO.: 0695

STORM SEWER DESIGN SHEET

DESCRIPTION	LOCATION From M.H.	LOCATION To M.H.	STORMWATER ANALYSIS A Area (hectares)	R Runoff Coeff.	A*R	Accumulated A*R	Time of Concentration (min)	Flow Time (min.)	Rainfall Intensity (mm/hr)	Peak Flow (L/s)	STORM SEWER DESIGN Length (m)	Diameter (mm.)	Slope (%)	Full Flow Capacity (L/s)	Full Flow Velocity (m/s)	Percent Full
TO SWM POND						**Time of Concentration = 10 min + (151 m)/(1.2 m/s)/(60 s/min) = 12.10 min**										
A1	PLUG	1-14	1.35	0.70	0.95	0.95	12.10	0.18	81.39	213.66	10.5	600	0.20	274.59	1.0	77.8%
A2	RYCB	SEWER	0.13	0.50	0.07	0.07	10.00	0.57	89.88	16.23	35.4	200	1.00	32.80	1.0	49.5%
A3	1-14	2-14	0.52	0.40	0.21	1.22	12.28	0.98	80.75	273.20	61.8	675	0.20	375.92	1.1	72.7%
A4	2-14	3-14	0.40	0.40	0.16	1.38	13.26	1.43	77.45	296.45	90.0	675	0.20	375.92	1.1	78.9%
A5	3-14	4-14	0.85	0.40	0.34	1.72	14.69	1.33	73.16	349.14	90.0	750	0.20	497.87	1.1	70.1%
A6	4-14	5-14	0.22	0.40	0.09	1.81	16.02	0.59	69.63	349.33	40.1	750	0.20	497.87	1.1	70.2%
A7	5-14	6-14	0.28	0.40	0.11	1.92	16.61	0.81	68.19	363.29	55.0	750	0.20	497.87	1.1	73.0%
A8	6-14	31-14	0.29	0.40	0.12	2.03	17.42	0.76	66.31	374.67	51.5	750	0.20	497.87	1.1	75.3%
A9	RYCB	SEWER	0.06	0.60	0.04	0.04	10.00	0.59	89.88	8.99	37.0	200	1.00	32.80	1.0	27.4%
A10	RYCB	SEWER	0.15	0.60	0.09	0.09	10.00	0.59	89.88	22.47	37.0	200	1.00	32.80	1.0	68.5%
A11	7-14	8-14	0.66	0.60	0.40	0.52	10.59	1.88	87.29	126.57	100.0	525	0.20	192.33	0.9	65.8%
A12	RYCB	RYCB	0.13	0.40	0.05	0.05	10.00	0.44	89.88	12.98	27.6	200	1.00	32.80	1.0	39.6%
A13	RYCB	SEWER	0.11	0.40	0.04	0.10	10.44	0.59	87.93	23.45	37.2	200	1.00	32.80	1.0	71.5%
A14	8-14	10-14	0.21	0.60	0.13	0.74	12.47	1.33	80.09	165.31	71.0	525	0.20	192.33	0.9	86.1%
A15	9-14	10-14	0.31	0.60	0.19	0.19	10.00	0.53	89.88	46.44	43.7	300	1.00	96.70	1.4	48.0%
A16	RYCB	SEWER	0.17	0.60	0.10	0.10	10.00	0.59	89.88	25.47	37.0	200	1.00	32.80	1.0	77.6%
A17	RYCB	SEWER	0.12	0.60	0.07	0.07	10.00	0.59	89.88	17.98	37.0	200	1.00	32.80	1.0	54.8%
A18	RYCB	SEWER	0.13	0.60	0.08	0.08	10.00	0.54	89.88	19.47	34.0	200	1.00	32.80	1.0	59.4%
A19	RYCB	SEWER	0.13	0.50	0.07	0.07	10.00	0.54	89.88	16.23	34.0	200	1.00	32.80	1.0	49.5%
A20	10-14	11-14	0.38	0.60	0.23	1.48	13.80	1.51	75.76	310.39	89.4	675	0.20	375.92	1.1	82.6%
A21	11-14	12-14	0.13	0.65	0.08	1.56	15.31	0.67	71.45	309.52	42.3	675	0.20	375.92	1.1	82.3%
A22	RYCB	SEWER	0.13	0.50	0.07	0.07	10.00	0.59	89.88	16.23	37.0	200	1.00	32.80	1.0	49.5%
A23	12-14	13-14	0.39	0.50	0.20	1.82	15.98	0.98	69.72	352.37	66.1	750	0.20	497.87	1.1	70.8%
A24	RYCB	SEWER	0.06	0.50	0.03	0.03	10.00	0.59	89.88	7.49	37.0	200	1.00	32.80	1.0	22.8%
A25	13-14	14-14	0.44	0.45	0.20	2.05	16.96	1.04	67.36	383.13	70.0	750	0.20	497.87	1.1	77.0%
A26	14-14	15-14	0.27	0.40	0.11	2.16	18.00	0.53	65.06	389.57	35.5	750	0.20	497.87	1.1	78.2%
A27	15-14	26-14	0.37	0.40	0.15	2.30	18.00	0.99	65.06	416.32	66.9	750	0.20	497.87	1.1	83.6%
A28	16-14	17-14	0.73	0.50	0.37	0.37	10.00	2.01	89.88	91.13	96.6	450	0.20	127.50	0.8	71.5%
A29	17-14	18-14	0.22	0.40	0.09	0.45	12.01	0.35	81.72	102.83	24.1	450	0.20	127.50	0.8	80.6%
A30	18-14	24-14	0.23	0.40	0.09	0.55	12.51	0.90	79.94	121.02	48.1	525	0.20	192.33	0.9	62.9%
EXT			11.91	0.60	7.15	7.15	21.38		58.67	1164.63						
A31			1.27	0.90	1.14	1.14			209.96	666.61						
A32	PLUG	19-14	0.37	0.65	0.24	8.53	21.38	0.27	58.67	1390.13	23.0	1350	0.15	2067.17	1.4	67.2%
A33	19-14	20-14	0.75	0.40	0.30	8.83	21.65	1.02	58.23	1428.23	88.0	1350	0.15	2067.17	1.4	69.1%
A34	PLUG	20-14	1.62	0.85	1.38	1.38	11.79	0.16	82.51	315.61	9.9	675	0.20	375.92	1.1	84.0%
A35	CB	SEWER	0.36	0.20	0.07	0.07	10.00	0.68	89.88	17.98	42.3	200	1.00	32.80	1.0	54.8%
A36	20-14	21-14	0.15	0.60	0.09	10.37	22.66	0.57	56.62	1630.63	57.5	1350	0.20	2386.96	1.7	68.3%
A37	PLUG	21-14	1.41	0.85	1.20	1.20	12.07	0.17	81.49	271.31	10.5	675	0.20	375.92	1.1	72.2%
A38	21-14	22-14	0.24	0.60	0.14	11.71	23.24	0.18	55.75	1813.50	18.3	1350	0.20	2386.96	1.7	76.0%
A39	RYCB	RYCB	0.08	0.60	0.05	0.05	10.00	0.69	89.88	11.98	43.5	200	1.00	32.80	1.0	36.5%
A40	RYCB	SEWER	0.06	0.60	0.04	0.08	10.69	0.54	86.85	20.26	34.0	200	1.00	32.80	1.0	61.8%
A41	22-14	23-14	0.85	0.50	0.43	12.22	23.42	1.04	55.48	1883.15	103.7	1350	0.20	2386.96	1.7	78.9%
A42	23-14	24-14	0.36	0.40	0.14	12.36	24.46	0.46	54.00	1854.72	46.0	1350	0.20	2386.96	1.7	77.7%
A43	RYCB	SEWER	0.09	0.40	0.04	0.04	10.00	0.59	89.88	8.99	37.1	200	1.00	32.80	1.0	27.4%
A44	24-14	25-14	0.21	0.40	0.08	13.03	24.91	0.29	53.38	1931.85	28.8	1350	0.20	2386.96	1.7	80.9%
A45	25-14	26-14	0.21	0.50	0.11	15.44	25.20	0.45	53.00	2272.56	45.6	1500	0.15	2737.76	1.5	83.0%
A46	RYCB	26-14	0.15	0.40	0.06	0.06	10.00	0.59	89.88	14.98	37.0	200	1.00	32.80	1.0	45.7%
A47	RYCB	SEWER	0.12	0.40	0.05	0.05	10.00	0.59	89.88	11.98	37.0	200	1.00	32.80	1.0	36.5%
A48	RYCB	SEWER	0.09	0.40	0.04	0.04	10.00	0.59	89.88	8.99	37.0	200	1.00	32.80	1.0	27.4%
A49	26-14	27-14	0.65	0.50	0.33	15.91	25.65	0.83	52.41	2315.86	77.0	1500	0.15	2737.76	1.5	84.6%
A50	27-14	28-14	0.78	0.40	0.31	16.22	26.48	0.93	51.37	2314.45	86.3	1500	0.15	2737.76	1.5	84.5%
A51	28-14	29-14	0.33	0.40	0.13	16.35	27.41	0.31	50.26	2282.90	39.8	1500	0.15	2737.76	1.5	83.4%
A52	29-14	30-14	0.15	0.40	0.06	16.41	27.72	0.42	49.91	2274.91	39.5	1500	0.15	2737.76	1.5	83.1%
A53	30-14	31-14	0.17	0.40	0.07	16.48	28.14	0.39	49.42	2262.31	36.4	1500	0.15	2737.76	1.5	82.6%
	31-14	32-14				18.51	28.53	0.44	48.99	2519.24	46.7	1500	0.20	3161.29	1.8	79.7%
	32-14	33-14				18.51	28.97	0.28	48.53	2494.98	29.6	1500	0.20	3161.29	1.8	78.9%
	33-14	HW				18.51	29.25	0.08	48.22	2479.89	9.1	1500	0.20	3161.29	1.8	78.4%
A54	CB	CB	0.19	0.30	0.06	0.06	10.00	0.59	89.88	14.23	37.2	200	1.00	32.80	1.0	43.4%
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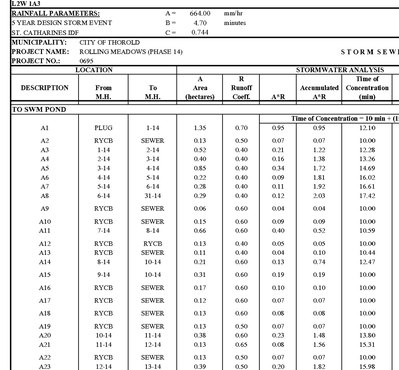
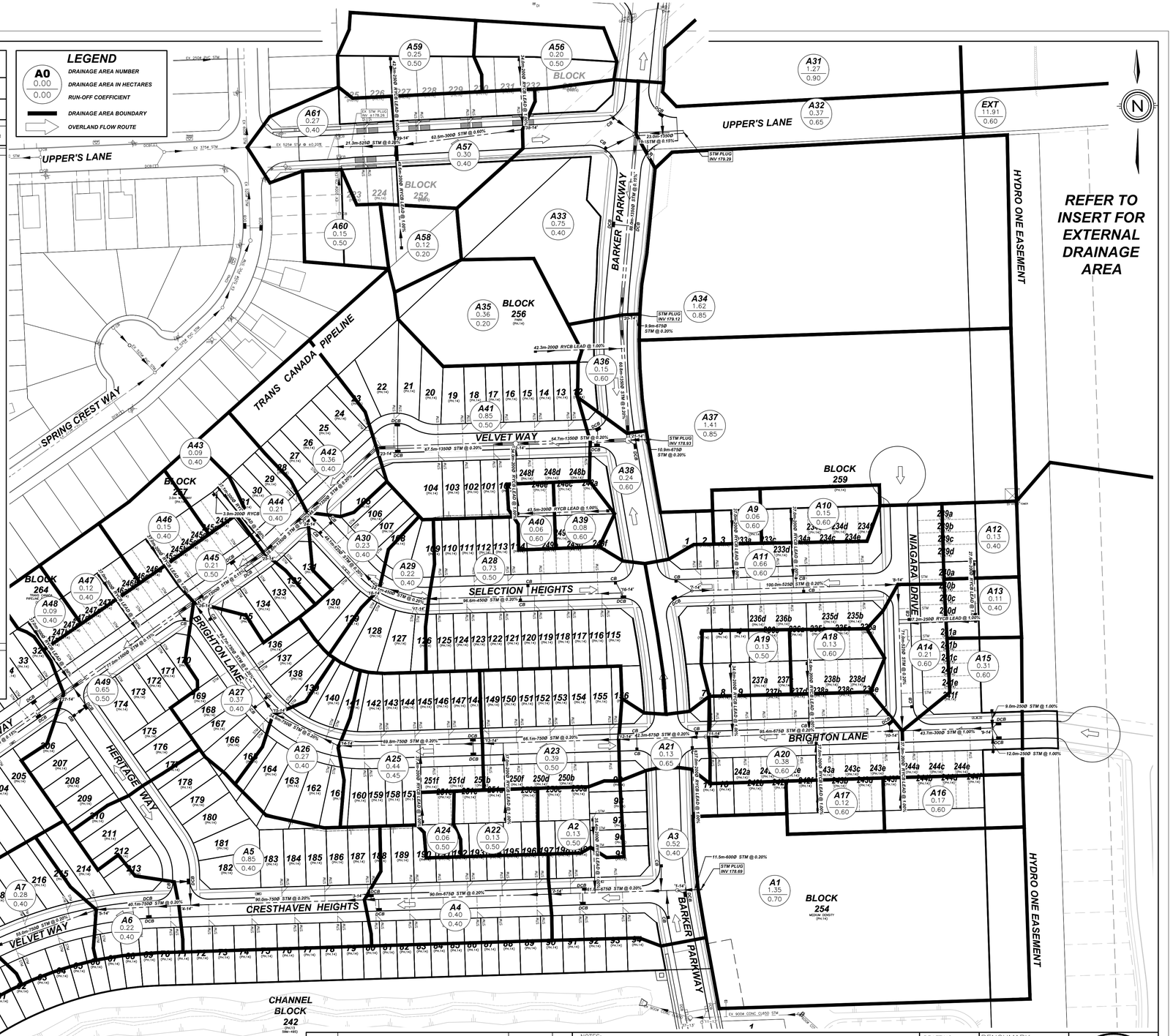
A58	RYCB	39-14	0.12	0.20	0.02	0.02	10.00	0.79	89.88	5.99	49.6	200	1.00	32.80	1.0	18.3%
A59	RYCB	39-14	0.25	0.50	0.13	0.13	10.00	0.58	89.88	31.21	42.3	250	1.00	59.47	1.2	52.5%
A60	RYCB	SEWER	0.15	0.50	0.08	0.08	10.00	0.52	89.88	18.73	32.4	200	1.00	32.80	1.0	57.1%
A61	39-14	EX MH	0.27	0.40	0.11	0.55	11.39	1.34	84.77	129.99	71.6	525	0.20	192.33	0.9	67.6%





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NOTES:
1. THE POSITION OF POLE LINES, CONDUITS, WATERMAINS, SEWER, AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS AND, WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, THE CONTRACTOR SHALL INFORM HIMSELF OF THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND SHALL ASSUME ALL LIABILITY FOR DAMAGE TO THEM.
2. PROPERTY LINES WERE PLOTTED USING REGISTERED PLANS AND BARS LOCATED IN THE FIELD. TO VERIFY THE ACCURACY OF THESE PROPERTY LINES, A LEGAL SURVEY SHOULD BE PERFORMED PRIOR TO CONSTRUCTION.
3. ALL CONSTRUCTION MUST COMPLY WITH THE NIAGARA PENINSULA STANDARD CONTRACT DOCUMENT.

DRAFTING	BV
DESIGN	MH
CHECKED BY	AK
APPROVED BY	AK

RENCHMARK:
HYDRANT - SOUTH SIDE OF SPARKLE DRIVE IN FRONT OF BLOCK 131 SOUTH OF VENTURE WAY, ACROSS FROM LOT #117
ELEVATION: 181.22

LICENSED PROFESSIONAL ENGINEER
A. S. KEANE
100109861
APR 12 '22
PROVINCE OF ONTARIO

City of Thorold
Where Ships Climb The Mountain...

UPPER CANADA CONSULTANTS
ENGINEERS / PLANNERS
30 Hannover Drive Unit 3
St. Catharines, Ontario
L2W 1A3
Phone: (905)688-9400
Fax: (905)688-5274

OWNER
ROLLING MEADOWS LAND DEVELOPMENT CORPORATION
2908 CATARACT ROAD, R.R.# 1
FONTHILL, ONTARIO
L0S 1E6

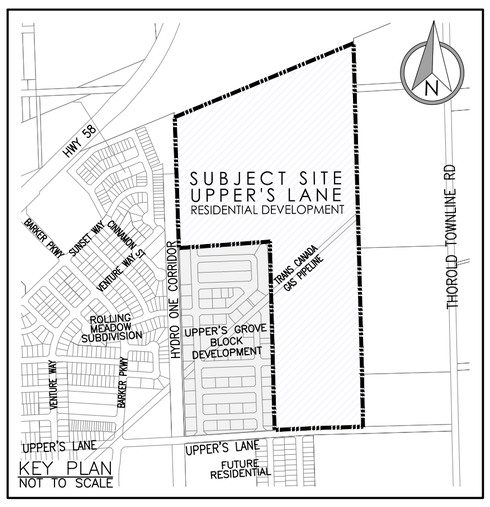
ROLLING MEADOWS PHASE 14

CITY OF THOROLD
STORM DRAINAGE AREA PLAN

CONSULTANT FILE No.	
DATE	2022-04-12
PRINTED	2022-04-12
SCALE	1:1000m
REF No.	.
DWG No.	0695-PH14-STM
REV	3

DRAWING FILE: F:\0695_SOUTH PHASE 12+\PHASE 14\Engineering\0695-ph14-GSP & PP.DWG PLOTTED: Apr 12, 2022 - 1:16pm PLOTTED BY: BVanderValk

Appendix B Design Drawings



Stantec

1:2000 (0, 20, 40, 60, 80, 100)

Legend

- SUBJECT LAND PROPERTY LINE
- UPPER'S GROVE BLOCK DEVELOPMENT
- 163.84 — PROPOSED SPOT ELEVATION
- *163.84* — EXISTING SPOT ELEVATION
- 195.0 — EXISTING CONTOUR AND ELEVATION
- OVERLAND FLOW ARROW
- 3:1 SLOPE

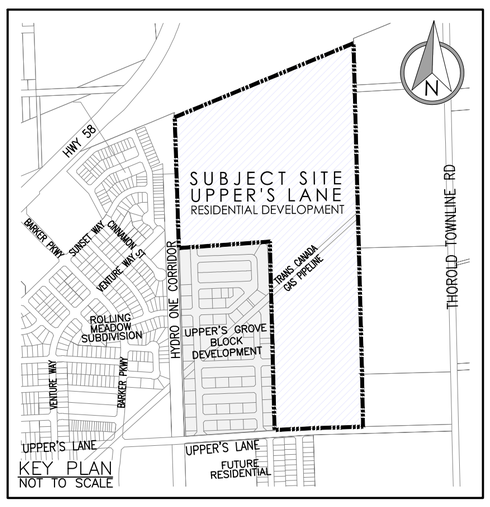
FUNCTIONAL SERVICING AND STORMWATER MANAGEMENT REPORT
UPPER'S LANE SUBDIVISION
RESIDENTIAL DEVELOPMENT
CITY OF THOROLD, ONTARIO

GR-1

PRELIMINARY GRADING PLAN

March 2026

File: \\Ca0215-ppfss01\work_group\01606\Active\160623065\Drawing\sheet_files\160623065_C-FSR Grading.dwg – Revised by <Luk, James> , Thu, Mar 26, 2026 , 12:07 PM



Stantec

0 15 30 45 60 75
1:1500

Legend

- SUBJECT LAND PROPERTY LINE
- UPPER'S GROVE BLOCK DEVELOPMENT
- EXISTING STORM MANHOLE
- STORM MANHOLE
- SINGLE/DOUBLE CATCHBASIN
- STORM DRAINAGE BOUNDARY
- 0.86ha / 0.75 — DRAINAGE AREA / RUNOFF COEFFICIENT
- OVERLAND FLOW ROUTE

EXT-1	DESCRIPTION
21.60ha	EXTERNAL DRAINAGE AREA
0.25	RUNOFF COEFFICIENT
Tc=11.0	TIME OF CONCENTRATION

EXT-1	DESCRIPTION
21.60ha	EXTERNAL DRAINAGE AREA
0.25	RUNOFF COEFFICIENT
Q5=23L/s	5-YR FLOW RATE
Q100=53L/s	100-YR FLOW RATE

FUNCTIONAL SERVICING AND STORMWATER MANAGEMENT REPORT
UPPER'S LANE SUBDIVISION
RESIDENTIAL DEVELOPMENT
CITY OF THOROLD, ONTARIO

STM-1

PRELIMINARY STORM SERVICING PLAN

March 2026

File: \\Ca0215-ppfss01\work_group\01606\Active\160623065\Drawing\sheet_files\160623065_C-FSR Servicing.dwg - Revised by <Luk, James> , Thu, Mar 26, 2026 , 12:07 PM

LEGEND

- LIMIT OF SUBDIVISION
- LIMIT OF PHASE 1 CONSTRUCTION
- PROPOSED STORM
- PROPOSED SANITARY
- PROPOSED WATERMAIN
- SINGLE/DOUBLE CATCHBASIN
- PROPOSED SINGLE SANITARY SERVICE CONNECTION
- WATER SERVICE & BOX
- HYDRANT & VALVE
- VALVE & BOX
- DRIVEWAY LOCATION
- TEMP. DEAD-END BARRICADE (AS PER OPSD 973.130)
- FUTURE STORM
- FUTURE SANITARY
- FUTURE WATERMAIN
- FUTURE SINGLE/DOUBLE CATCHBASIN
- FUTURE SINGLE SANITARY SERVICE CONNECTION
- FUTURE WATER SERVICE & BOX
- FUTURE HYDRANT & VALVE
- FUTURE VALVE & BOX

NOTES

1. MACHINERY/EQUIPMENT CANNOT EXCEED 4.15M REACH HEIGHT WHEN CROSSING OR WORKING UNDER HYDRO CONDUCTORS.
2. WHEN WORKING IN CLOSE PROXIMITY TO EXISTING HYDRO ONE TOWERS, THE PROPONENT'S CONTRACTOR IS TO AVOID HAVING PHYSICAL CONTACT WITH THE HYDRO ONE TOWERS. A TEMPORARY WOODEN OR NON-METALLIC BARRIER IS TO BE PLACED AROUND THE TOWER DURING THE PROPONENT'S WORK.
3. AS PER OHSA, THE PROPONENT NEEDS TO ENSURE THAT THE WORKERS PERFORMING THE WORK WEAR THE NECESSARY PERSONAL PROTECTIVE EQUIPMENT INCLUDING ELECTRIC SHOCK PROTECTIVE SAFETY BOOTS.

No.	DESCRIPTION	DATE	APPROVED
1.	FIRST SUBMISSION TO AGENCIES	JUN 22, 2023	S.A.K.
2.	FIRST SITE ALTERATION PERMIT APPLICATION	NOV 20, 2023	S.A.K.
3.	ADDED CURB CUT AND FENCE	APR 11, 2024	S.A.K.
4.	ADDED HYDRO ONE NOTES & SHIFTED STREET C ACCESS	MAY 03, 2024	S.A.K.
5.	SITE ALTERATION PERMIT RENEWAL APPLICATION	MAY 09, 2025	S.A.K.
6.	PHASE 1 FIRST SUBMISSION TO AGENCIES	MAY 12, 2025	S.A.K.

BENCHMARK: 00119673595 ELEV. 181.240m
TOWNSHIP: NIAGARA FALLS AREA CONCRETE CYLINDER, 8.1m WEST OF CENTRELINE OF THOROLD TOWN LINE ROAD, OPPOSITE HOUSE No.832, ON EAST SIDE OF ROAD, 1.4m SOUTH OF TELEPHONE POLE No.N.I.6, TABLET IN TOP. ESTABLISHED BY TOPOGRAPHICAL SURVEY.

Permit/Seal

LICENSED PROFESSIONAL ENGINEER
S.A. KHAN
100085491
MAY 12, 2025
PROVINCE OF ONTARIO

Stantec
Stantec Consulting Ltd.
300W-675 Cochrane Drive
Markham ON
Tel: 905.944.7777
www.stantec.com

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CITY OF THOROLD APPROVED

DATE

MANAGER, DEVELOPMENT ENGINEERING

City of Thorold
Where Ships Climb The Mountain...

Parkbridge
70 HURON STREET
COLLINGWOOD
ONTARIO, L9Y 3Z1
T: 705 429 6142

UPPER'S GROVE PROPOSED RESIDENTIAL DEVELOPMENT (PHASE 1)
CITY OF THOROLD

GENERAL SERVICING PLAN 3

SCALE:	1:1000	TOWN FILE No.:	DRAWING No.:
DESIGN BY:	J.L.	DRAWN BY: J.L.	C-103
REVIEWED BY:	S.A.		

SEE DWG C-202

EXISTING ROLLING MEADOWS DEVELOPMENT

HYD-1 TO OS-1
1.45ha
0.25
Qs=23 L/s
Q100=53 L/s

EXTERNAL DRAINAGE TO HW20 (SEE DWG C-203)

FUT-4
1.27ha
0.90

FUT-3
4.06ha
0.70
Tc=12.00 min

FUT-2
2.20ha
0.60
Tc=14.61 min

KEY PLAN
NOT TO SCALE

LEGEND

- LIMIT OF SUBDIVISION
- LIMIT OF PHASE 1 CONSTRUCTION
- PROPOSED STORM
- FUTURE STORM
- SINGLE/DOUBLE CATCHBASIN
- MAJOR SYSTEM FLOW DIRECTION

0.57ha / 0.55 — DRAINAGE AREA (ha) / RUNOFF COEFFICIENT

FUT-1 — CATCHMENT ID
5.33ha — DRAINAGE AREA (ha)
0.60 — RUNOFF COEFFICIENT
Tc 15.79 min — TIME OF CONCENTRATION

INT-1 — CATCHMENT ID
5.15ha — DRAINAGE AREA (ha)
0.25 — RUNOFF COEFFICIENT
Q_5=99 L/s — 5YR FLOW RATE
Q_{100}=230 L/s — 100YR FLOW RATE

Tc VALUES TAKEN FROM "ROLLING MEADOWS UPPER'S LANE" DWG:0695-UPPERS-STM PREPARED BY UPPER CANADA CONSULTANTS DATED SEPTEMBER 11, 2024

FLOWS DERIVED FROM VO6 MODEL SEE "STORMWATER MANAGEMENT REPORT" PREPARED FOR TAPPERS GROVE RESIDENTIAL DEVELOPMENT" PREPARED BY STANTEC CONSULTING LTD.

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4.	ADDED HYDRO ONE NOTES & SHIFTED STREET C ACCESS	MAY 03, 2024	S.A.K.
5.	SITE ALTERATION PERMIT RENEWAL APPLICATION	MAY 09, 2025	S.A.K.
6.	PHASE 1 FIRST SUBMISSION TO AGENCIES	MAY 12, 2025	S.A.K.

BENCHMARK: 00119673595 ELEV. 181.240m
TOWNSHIP: NIAGARA FALLS AREA CONCRETE CYLINDER, 8.1m WEST OF CENTRELINE OF THOROLD TOWN LINE ROAD, OPPOSITE HOUSE No.832, ON EAST SIDE OF ROAD, 1.4m SOUTH OF TELEPHONE POLE No.NJ.6, TABLET IN TOP, ESTABLISHED BY TOPOGRAPHICAL SURVEY.

Permit/Seal

LICENSED PROFESSIONAL ENGINEER
S.A. KHAN
100085491
MAY 12, 2025
PROVINCE OF ONTARIO

Stantec

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DATE

MANAGER, DEVELOPMENT ENGINEERING

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COLLINGWOOD
ONTARIO, L9Y 3Z1
T: 705 429 6142

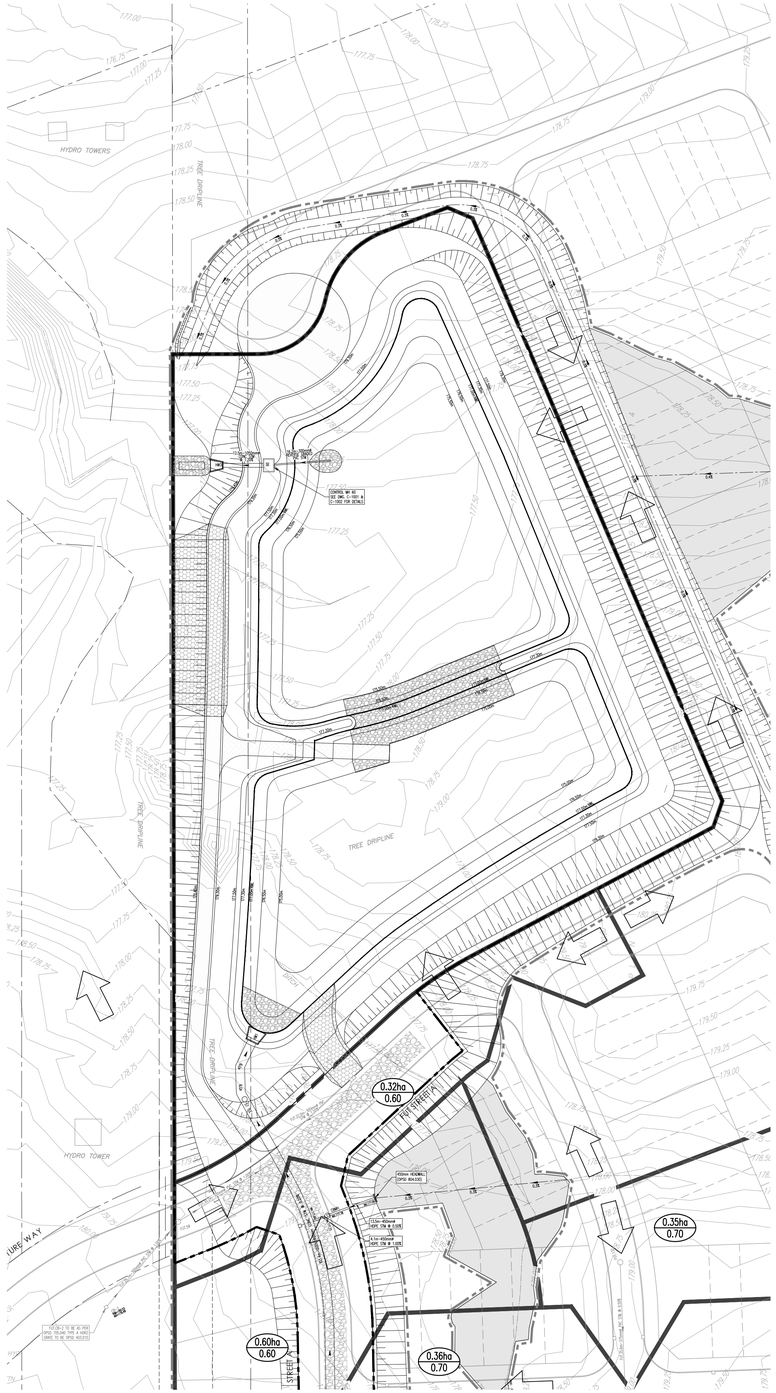
UPPER'S GROVE
PROPOSED RESIDENTIAL DEVELOPMENT (PHASE 1)
CITY OF THOROLD

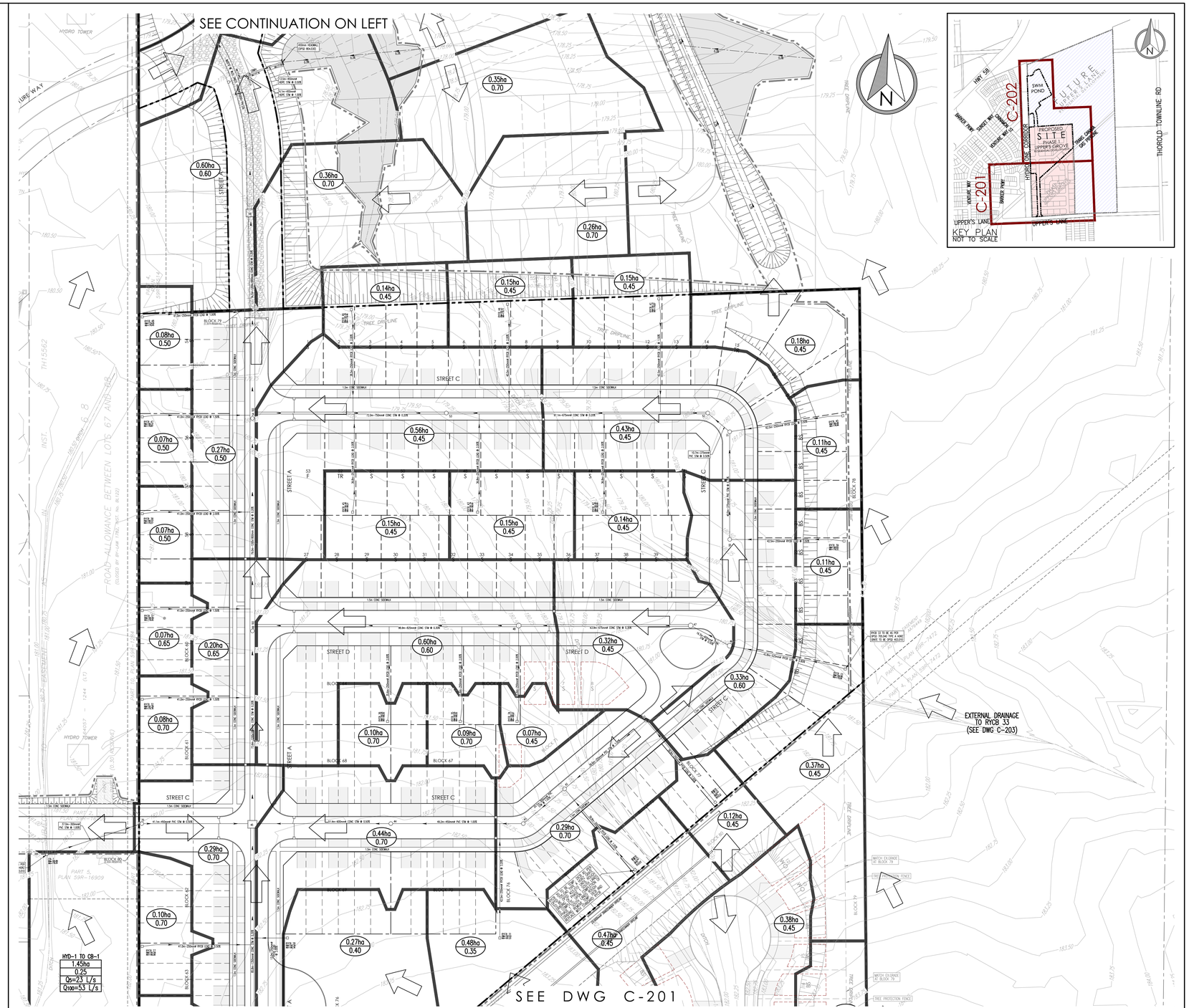
STORM DRAINAGE AREA PLAN 1

SCALE: 1:750	TOWN FILE No.: _____	DRAWING No.: C-201
DESIGN BY: J.L.	DRAWN BY: J.L.	
REVIEWED BY: S.A.		

ORIGINAL SHEET - ARCH D

File: \\Ca0215-pphss01\1606\Active\160623065\Drawing\sheet_files\160623065_C-200 Storm Drainage Plans.dwg – Revised by <Luk, James> : Mon, May 12, 2025 , 10:42 AM





LEGEND

- LIMIT OF SUBDIVISION
- LIMIT OF PHASE 1 CONSTRUCTION
- PROPOSED STORM
- FUTURE STORM
- SINGLE/DOUBLE CATCHBASIN
- MAJOR SYSTEM FLOW DIRECTION

0.57ha / 0.55 — DRAINAGE AREA (ha) / RUNOFF COEFFICIENT

FUT-1 — CATCHMENT ID
5.33ha — DRAINAGE AREA (ha)
0.60 — RUNOFF COEFFICIENT
Tc 15.79 min — TIME OF CONCENTRATION

INT-1 — CATCHMENT ID
5.15ha — DRAINAGE AREA (ha)
0.25 — RUNOFF COEFFICIENT
Q_5=99 L/s — 5YR FLOW RATE
Q_{100}=230 L/s — 100YR FLOW RATE

Tc VALUES TAKEN FROM "ROLLING MEADOWS UPPER'S LANE" DWG.0805-UPPERS-STM PREPARED BY UPPER CANADA CONSULTANTS DATED SEPTEMBER 11, 2024

FLOWS DERIVED FROM VO6 MODEL SEE "STORMWATER MANAGEMENT REPORT" PREPARED FOR "UPPERS GROVE RESIDENTIAL DEVELOPMENT" PREPARED BY STANTEC CONSULTING LTD.

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5.	SITE ALTERATION PERMIT RENEWAL APPLICATION	MAY 09, 2025	S.A.K.
6.	PHASE 1 FIRST SUBMISSION TO AGENCIES	MAY 12, 2025	S.A.K.

BENCHMARK: 00119673595 ELEV. 181.240m
TOWNSHIP: NIAGARA FALLS AREA CONCRETE CYLINDER, 8.1m WEST OF CENTRELINE OF THOROLD TOWN LINE ROAD, OPPOSITE HOUSE No.832, ON EAST SIDE OF ROAD, 1.4m SOUTH OF TELEPHONE POLE No.NJ.6, TABLET IN TOP. ESTABLISHED BY TOPOGRAPHICAL SURVEY.

Permit/Seal

LICENSED PROFESSIONAL ENGINEER
S.A. KHAN
100085491
MAY 12, 2025
PROVINCE OF ONTARIO

Stantec

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DATE

MANAGER, DEVELOPMENT ENGINEERING

City of Thorold — Where Ships Climb The Mountain...

Parkbridge
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ONTARIO, L9Y 3Z1
T: 705 429 6142

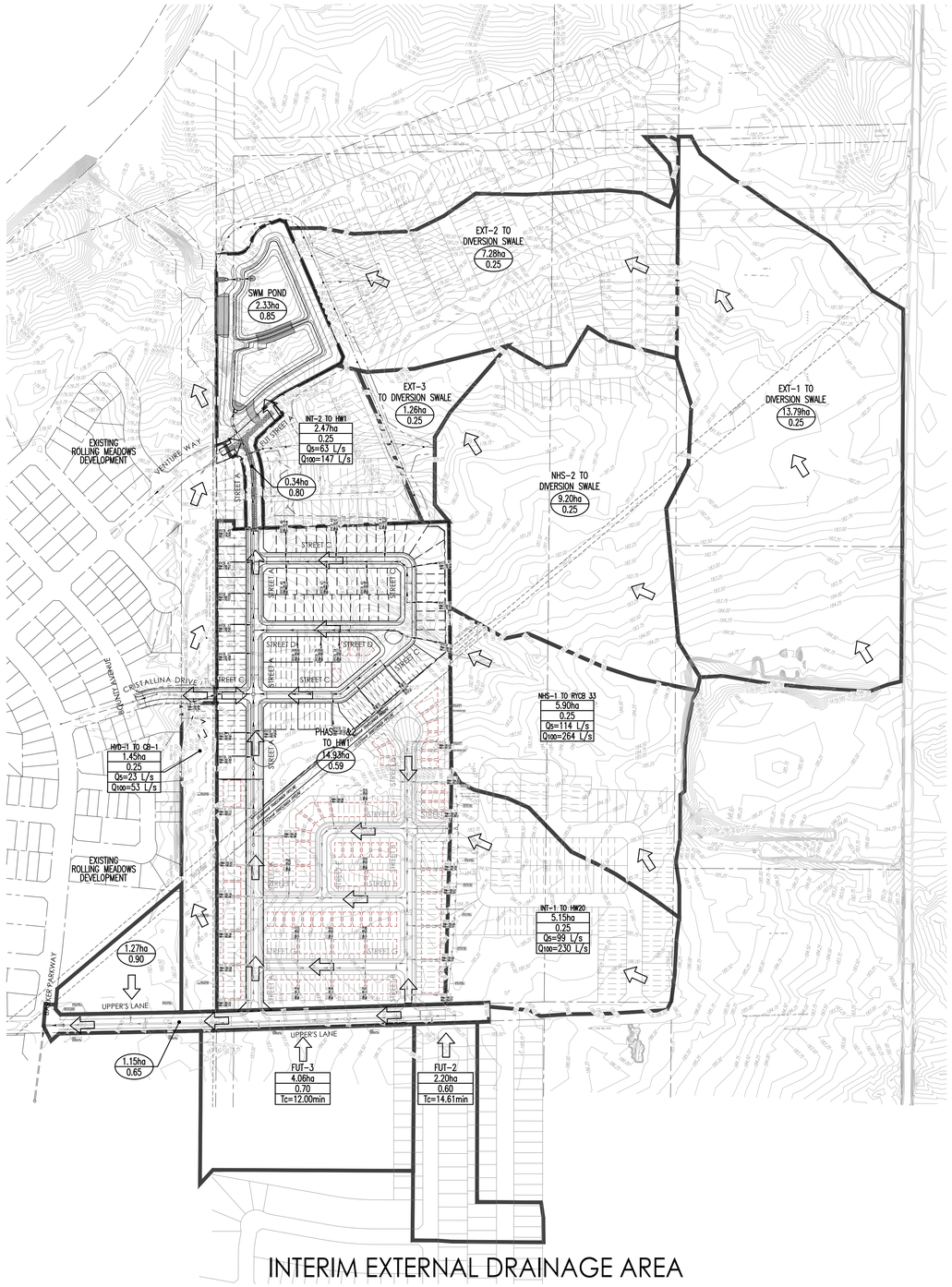
UPPER'S GROVE
PROPOSED RESIDENTIAL DEVELOPMENT (PHASE 1)
CITY OF THOROLD

STORM DRAINAGE AREA PLAN 2

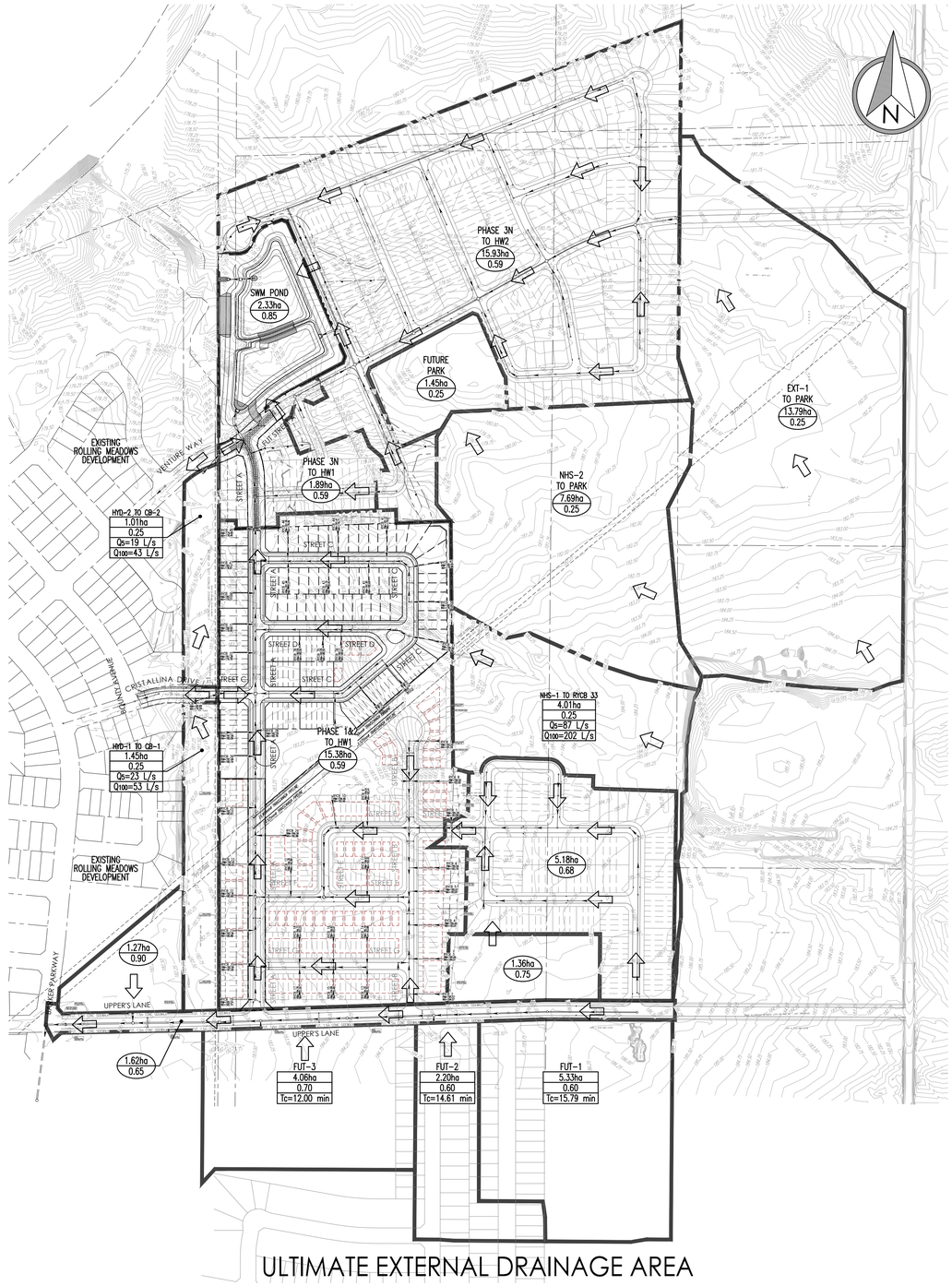
SCALE: 1:750	TOWN FILE No.: _____	DRAWING No.: C-202
DESIGN BY: J.L.	DRAWN BY: J.L.	
REVIEWED BY: S.A.		

ORIGINAL SHEET - ARCH D

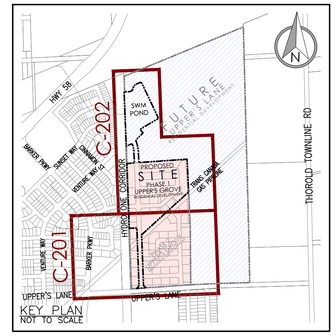
File: \\Cd0215-ppfss01\160E\Active\160623065\Drawing\sheet_files\160623065_C-200 Storm Drainage Plans.dwg – Revised by: <Luk, James> : Mon, May 12, 2025 - 10:43 AM



INTERIM EXTERNAL DRAINAGE AREA



ULTIMATE EXTERNAL DRAINAGE AREA



LEGEND

- LIMIT OF SUBDIVISION
- LIMIT OF PHASE 1 CONSTRUCTION
- PROPOSED STORM
- FUTURE STORM
- SINGLE/DOUBLE CATCHBASIN
- MAJOR SYSTEM FLOW DIRECTION

0.57ha / 0.55 — DRAINAGE AREA (ha) / RUNOFF COEFFICIENT

FUT-1 — CATCHMENT ID
5.33ha — DRAINAGE AREA (ha)
0.60 — RUNOFF COEFFICIENT
Tc 15.79 min — TIME OF CONCENTRATION

INT-1 — CATCHMENT ID
5.15ha — DRAINAGE AREA (ha)
0.25 — RUNOFF COEFFICIENT
Q_S=99 L/s — 5YR FLOW RATE
Q_{100}=230 L/s — 100YR FLOW RATE

Tc VALUES TAKEN FROM "ROLLING MEADOWS UPPER'S LANE" DWG:0605-UPPERS-STM PREPARED BY UPPER CANADA CONSULTANTS DATED SEPTEMBER 11, 2024

FLOWS DERIVED FROM VO6 MODEL SEE "STORMWATER MANAGEMENT REPORT" PREPARED FOR "UPPERS GROVE RESIDENTIAL DEVELOPMENT" PREPARED BY STANTEC CONSULTING LTD.

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BENCHMARK: 00119673595 ELEV. 181.240m
TOWNSHIP, NIAGARA FALLS AREA CONCRETE CYLINDER, 8.1m WEST OF CENTRELINE OF THOROLD TOWN LINE ROAD, OPPOSITE HOUSE No.832, ON EAST SIDE OF ROAD, 1.4m SOUTH OF TELEPHONE POLE No.N.I.-6, TABLET IN TOP. ESTABLISHED BY TOPOGRAPHICAL SURVEY.

Permit/Seal

LICENSED PROFESSIONAL ENGINEER
S.A. KHAN
100085491
MAY 12, 2025
PROVINCE OF ONTARIO

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CITY OF THOROLD APPROVED

DATE

MANAGER, DEVELOPMENT ENGINEERING

City of Thorold — Where Ships Climb The Mountain...

Parkbridge
70 HURON STREET
COLLINGWOOD
ONTARIO, L9Y 3Z1
T: 705 429 6142

UPPER'S GROVE PROPOSED RESIDENTIAL DEVELOPMENT (PHASE 1)
CITY OF THOROLD

EXTERNAL STORM DRAINAGE AREA PLAN

SCALE:	1:750	TOWN FILE No.:	DRAWING No.:
DESIGN BY:	J.L.	DRAWN BY: J.L.	C-203
REVIEWED BY:	S.A.		

ORIGINAL SHEET - ARCH D

Storm Sewer Design Sheet (5-Yr Interim)

Project Number 1606 23065
Date: April 2025
City File Number N/A

Consultant: Stantec Ltd.
Prepared By: James Luk

Design Return Period =5-Yr , n = 0.013 A= 664.00
Rainfall Intensity = A/(T+B)^C B= 4.70
Starting 'T' = 10 min C= 0.74

Manhole			Drainage Area		Runoff Coeff. "R"		Accum. Area	Rainfall Intensity	Total Flow	Pipe Data					Time		
Location	U/S MH	D/S MH	(ha)	AxR		AxR		(mm/hr)	(m³/s)	Length (m)	Size (mm)	Slope (%)	Full Capacity (m³/s)	Full Velocity (m/s)	Section (min)	D/S TC (min)	QA/QC (%)
FUT-1	FUT-1	102	5.33	0.60	3.20	3.20		70.21	0.62	-	-				15.79	0.00	15.79	-
FUT-2	Plug 10	10	2.20	0.60	1.32	1.32		73.37	0.27	7.6	675	0.15	0.33	0.91	14.61	0.14	14.75	83%
Upper's Lane	100	101	0.25	0.60	0.15	0.15		89.88	0.04	103.5	900	0.15	0.70	1.10	1.57	11.57	5%	
Upper's Lane	101	102	0.00	0.00	0.00	0.15		83.37	0.03	45.2	900	0.15	0.70	1.10	0.68	12.25	5%	
Upper's Lane	102	Plug 11	0.22	0.60	0.13	3.48		70.21	0.68	56.0	975	0.15	0.87	1.16	0.80	16.59	78%	
Upper's Lane	Plug 11	10	0.00	0.00	0.00	3.48		68.23	0.66	-	-	-	-	-	16.59	0.00	16.59	-
Upper's Lane	10	11	0.23	0.60	0.14	4.94		68.23	0.94	100.0	1200	0.15	1.51	1.34	16.59	1.25	17.84	62%
Upper's Lane	11	12	0.20	0.60	0.12	5.06		65.40	0.92	100.0	1200	0.15	1.51	1.34	17.84	1.25	19.09	61%
FUT-3	Plug 12	12	4.06	0.70	2.84	2.84		84.71	0.67	90.0	900	0.20	0.81	1.27	1.27	12.10	80%	
Upper's Lane	12	13	0.22	0.60	0.13	8.03		62.83	1.40	47.4	1350	0.15	2.07	1.44	19.09	0.55	19.64	68%
Upper's Lane	13	14	0.22	0.60	0.13	8.16		61.77	1.40	100.0	1350	0.15	2.07	1.44	19.64	1.15	20.79	68%
FUT-4	Plug 14	14	1.27	0.90	1.14	1.14		89.88	0.29	16.0	900	0.20	0.81	1.27	0.21	10.15	35%	
Upper's Lane	14	Plug 19-1A	0.28	0.60	0.17	9.48		59.68	1.57	77.0	1350	0.15	2.07	1.44	20.79	0.89	21.68	76%
INT-1	INT-1	HW20	5.15	0.00														
Street E	RYCB 1	HW20	0.09	0.60	0.05	0.05		89.88	0.01	19.4	250	4.00	0.12	2.42	0.13	10.13	11%	
Street E	HW20	27	0.14	0.70	0.10	0.15		89.28	0.14	55.5	900	0.50	1.28	2.01	0.46	10.59	23%	
Street B	RYCB 2	21	0.06	0.70	0.04	0.04		89.88	0.01	42.9	250	0.50	0.04	0.86	10.00	0.83	10.83	25%
Street B	21	22	0.33	0.70	0.23	0.27		86.27	0.07	40.8	300	1.60	0.12	1.73	0.39	11.23	86%	
Street B	RYCB 3	22	0.08	0.70	0.06	0.06		89.88	0.01	44.1	250	2.00	0.08	1.71	10.00	0.43	10.43	17%
Street B	22	23	0.00	0.00	0.00	0.33		84.68	0.08	39.0	450	0.50	0.20	1.27	11.23	0.51	11.74	38%
Street B	RYCB 4	23	0.14	0.70	0.10	0.43		83.13	0.10	44.2	450	0.50	0.20	1.27	11.74	0.42	12.16	50%
Street B	RYCB 5	27S	0.13	0.70	0.09	0.09		89.88	0.02	46.4	250	3.00	0.10	2.10	10.00	0.37	10.37	22%
Street B	RYCB 6	27S	0.16	0.70	0.11	0.11		89.88	0.03	47.2	250	3.00	0.10	2.10	10.00	0.37	10.37	27%
Street B	27S	24	0.44	0.70	0.31	0.40		85.23	0.09	46.0	300	1.00	0.12	1.73	0.44	10.81	75%	
Street B	RYCB 11	24	0.13	0.60	0.08	0.08		89.88	0.02	38.3	250	1.00	0.06	1.21	10.00	0.53	10.53	33%
Street B	23	24	0.27	0.60	0.16	0.59		82.70	0.14	32.2	525	0.50	0.30	1.40	11.74	0.38	12.12	44%
Street B	24	31	0.37	0.60	0.22	1.33		98.3	0.06	129.82	300	0.48	0.08	0.94	2.14	1.89	4.03	68%
Street B	RYCB 7	25	0.11	0.45	0.05	0.05		89.88	0.01	42.1	250	0.50	0.04	0.86	10.00	0.82	10.82	29%
Street B	25	26	0.38	0.45	0.17	0.22		86.33	0.05	46.3	375	0.50	0.12	1.12	0.82	11.51	43%	
Street B	Plug 26	26	0.00	0.00	0.00	0.00		89.88	0.00	8.5	250	2.00	0.08	1.71	10.00	0.08	10.08	0%
Street B	RYCB 8	26	0.17	0.60	0.10	0.10		89.88	0.02	45.3	250	2.00	0.08	1.71	10.00	0.50	10.50	31%
Street B	26	27	0.22	0.60	0.13	0.45		83.59	0.11	53.9	525	0.40	0.27	1.26	10.50	0.72	12.22	39%
Street B	27	28	0.00	0.00	0.00	0.61		80.95	0.23	48.0	1050	0.30	1.50	1.73	0.46	12.68	78%	
Street B	RYCB 9	28	0.07	0.45	0.03	0.03		89.88	0.01	36.6	250	3.30	0.11	2.20	10.00	0.27	10.27	7%
Street E	RYCB 10	28	0.06	0.45	0.03	0.03		89.88	0.01	36.6	250	3.30	0.11	2.20	10.00	0.28	10.28	6%
Street B	28	29	0.23	0.60	0.14	0.80		79.34	0.26	41.7	1050	0.30	1.50	1.73	0.42	13.09	18%	
Street B	29	30	0.00	0.00	0.00	0.80		78.55	0.26	41.7	1050	0.30	1.50	1.73	0.40	13.49	18%	
Street E	30	31	0.55	0.60	0.33	1.13		77.62	0.33	71.4	1200	0.30	2.14	1.89	0.63	13.83	15%	
Street F	RYCB 12	31	0.11	0.70	0.08	0.08		89.88	0.02	36.4	250	1.00	0.06	1.21	10.00	0.50	10.50	32%
Street F	31	36	0.34	0.60	0.20	2.74		75.65	0.66	79.0	1200	0.30	2.14	1.89	13.83	0.70	14.53	31%
Street G	RYCB 13	32	0.09	0.70	0.06	0.06		89.88	0.02	36.3	250	2.00	0.08	1.71	10.00	0.35	10.35	19%
Street G	RYCB 14	32	0.13	0.60	0.08	0.08		89.88	0.02	39.3	250	1.00	0.06	1.21	10.00	0.54	10.54	33%
Street G	32	33	0.00	0.00	0.00	0.14		87.50	0.03	39.0	300	1.00	0.10	1.37	10.54	0.48	11.02	35%
Street G	RYCB 15	33	0.10	0.70	0.07	0.07		89.88	0.02	36.3	250	2.50	0.09	1.92	10.00	0.32	10.32	22%
Street G	RYCB 16	33	0.13	0.60	0.08	0.08		89.88	0.02	39.3	250	1.00	0.06	1.21	10.00	0.54	10.54	33%
Street G	RYCB 17	33	0.10	0.70	0.07	0.07		89.88	0.02	36.3	250	2.50	0.09	1.92	10.00	0.32	10.32	22%
Street G	RYCB 18	33	0.54	0.70	0.38	0.82		85.53	0.20	90.0	600	0.50	0.43	1.54	11.02	0.98	11.99	45%
Street A	RYCB 19	34	0.09	0.70	0.06	0.06		89.88	0.02	40.9	250	0.50	0.04	0.86	10.00	0.80	10.80	37%
Street A	34	35	0.20	0.70	0.14	0.20		86.43	0.05	37.3	300	1.00	0.10	1.37	10.80	0.45	11.25	50%
Street A	RYCB 20	35	0.03	0.70	0.02	0.02		89.88	0.00	41.0	250	1.00	0.06	1.21	10.00	0.56	10.56	13%
Street A	RYCB 21	35	0.08	0.70	0.06	0.06		89.88	0.01	41.0	250	1.00	0.06	1.21	10.00	0.56	10.56	24%
Street A	35	36	0.30	0.60	0.18	1.28		81.77	0.29	81.0	750	0.30	0.61	1.38	11.99	0.98	12.97	48%
Street A	RYCB 22	36	0.22	0.65	0.14	0.14		82.82	0.03	37.0	375	0.50	0.12	1.12	10.40	0.52	10.92	76%
Street A	RYCB 23	36	0.10	0.35	0.04	0.04		89.88	0.01	38.8	250	1.00	0.06	1.21	10.00	0.53	10.53	15%
Street A	36	37	0.22	0.65	0.14	4.27		73.60	0.95	60.9	1350	0.30	2.92	2.04	14.53	0.50	15.03	33%
Street A	RYCB 24	37	0.07	0.60	0.04	0.04		89.88	0.01	40.3	250	1.00	0.06	1.21	10.00	0.55	10.55	22%
Street A	RYCB 25	37	0.11	0.45	0.05	0.05		89.88	0.01	41.0	250	1.00	0.06	1.21	10.00	0.56	10.56	21%
Street A	37	40	0.00	0.00	0.00	4.36		72.21	0.95	88.5	1350	0.30	2.92	2.04	15.03	0.72	15.75	33%
Street A	RYCB 26	40	0.11	0.45	0.05	0.05		89.88	0.01	40.9	250	0.50	0.04	0.86	10.00	0.80	10.80	29%
Street A	RYCB 27	40	0.10	0.70	0.07	0.07		89.88	0.02	41.0	250	0.50	0.04	0.86	10.00	0.80	10.80	42%
Street A	RYCB 28	40	0.27	0.70	0.19	0.19		89.28	0.05	39.0	300	2.00	0.12	1.73	10.80	0.38	11.18	27%
Street A	40	45	0.96	0.40	0.38	4.97		70.31	1.05	85.8	1350	0.30	2.92	2.04	15.75	0.70	16.45	36%
Street C	RYCB 29	41	0.12	0.45	0.05	0.05		89.88	0.01	39.9	250	1.00	0.06	1.21	10.00	0.55	10.55	27%
Street C	41	42	0.00	0.00	0.00	0.05		89.88	0.01	140.17	300	0.50	0.07	0.97	10.55	1.44	11.99	35%
Street C	RYCB 30	42	0.47	0.45	0.21	0.21		89.88	0.05	39.9	300	1.00	0.10	1.37	10.00	0.49	10.49	55%
Street C	42	43	0.00	0.00	0.00	0.27		89.88	0.07	42.5	300	1.00	0.10	1.37	10.49	0.51	11.00	71%
Street C	RYCB 31	43	0.48	0.35	0.17	0.17		89.88	0.04	42.5	250	3.20	0.11	2.17	10.00	0.33	10.33	39%
Street C	43	44	0.29	0.70	0.20	0.64		84.24	0.15	49.2	450	1.00	0.29	1.79	11.34	0.46	11.80	52%
Street C	44	45	0.42	0.50	0.21	0.94		82.50	0.22	51.4	600	0.50	0.43	1.54	11.80	0.55	12.35	50%
HYD-1	HYD-1	CB-1	1.45	0.00				89.88	0.02	-	-				10.00	0.00	10.00	-
Street C	CB-1	70	0.00	0.00	0.00	0.00		89.88	0.00	37.0	300	1.00	0.10	1.37	10.00	0.45	10.45	24%
Street C	70	45	0.29	0.70	0.20	0.20		87.88	0.07	41.1	450	0.50	0.20	1.27	10.45	0.54	10.99	36%
Street A	RYCB 32	45	0.08	0.70	0.06	0.06		89.88	0.01	41.0	250	1.50	0.07	1.48	10.00	0.46	10.46	19%
Street A	45	49	0.00	0.00	0.00	6.18		68.57	1.27	73.6	1200x1800 Box	0.20	3.76	1.74	10.46	1.15	11.61	34%
NHS-1	NHS-1	RYCB 33	4.01	0.00				89.88	0.11	-	-				10.00	0.00	10.00	-
Street C	RYCB 33	46	0.37	0.45	0.17	0.17		89.88	0.04	42.5	250	3.20	0.11	2.17	10.00	0.33	10.33	39%
Street C	46	47	0.00	0.00	0.00	0.17		141.17	0.15	0.32	0.00	0.32	16.3	600	0.50	0.43	1.54	10.18	10.59	75%
Street D	47	48	0.32	0.45	0.14	0.31		139.89	0.19	0.38	0.00	0.38	63.9	675	0.30	0.46	1.29	10.59	11.88	82%
Street D	48	49	0.00	0.00	0.00	0.31		139.89	0.19	0.38	0.00	0.38	63.9	675	0.30	0.46	1.29	11.88	13.17	82%
Street D	49	48	0.00	0.00	0.00	0.00		139.89	0.00	0.00	0.00	0.00	0.0	675	0.30	0.46	1.29	13.17	13.17	0%
Street A	RYCB 34	48	0.07	0.45	0.03	0.03		89.88	0.01	36.6	250	3.30	0.11	2.20	10.00	0.28	10.28	6%
Street D	RYCB 35	48	0.09	0.70	0.06	0.06		89.88	0.02	35.6	250	2.00	0.08	1.71	10.00	0.35	10.35	19%
Street D	RYCB 36	48	0.10	0.70	0.07	0.07		89.88	0.02	35.6	250	2.00	0.08	1.71	10.00	0.35	10.35	22%
Street D	48	49	0.60	0.60	0.36	0.84		83.94	0.30	98.9	825	0.30	0.79	1.47	11.12	1.12	12.54	38%
Street A	RYCB 37	49	0.07	0.65	0.05	0.05		89.88	0.01	41.0	250	1.50	0.07	1.48	10.00	0.46	10.46	16%
Street A	RYCB 38	49	0.07	0.50	0.04	0.04		89.88	0.01	41.0	250	2.00	0.08	1.71	10.00	0.40	10.40	10%
Street A	49	54	0.20	0.65	0.13	7.22		66.92	1.52	79.0	1200x1800 Box	0.20	3.76	1.74	17.16	0.76	17.91	40%
Street G	RYCB 39	50	0.11	0.45	0.05	0.05		89.88	0.01	42.5	250	0.50	0.04	0.86	10.00	0.83	10.83	29%
Street C	50	51	0.33	0.60	0.20	0.25		86.30	0.06	40.0	375	0.70	0.15	1.33	10.83	0.50	11.33	40%
Street C	RYCB 40	51	0.11	0.45	0.05	0.05		89.88	0.01	42.5	250	0.50	0.04	0.86	10.00	0.83	10.83	29%
Street C	51	52	0.00	0.00	0.00	0.30		84.28	0.07	10.7	375	0.50	0.12	1.12	10.83	0.16	10.99	56%
Street C	RYCB 41	52	0.15	0.45	0.07	0.07		89.88	0.02	42.5	250	0.50	0.04	0.86	10.00	0.83	10.83	38%
Street C	RYCB 42	52	0.14	0.45	0.06	0.06		89.88	0.02	36.8	250	2.00	0.08	1.71	10.00	0.36	10.36	19%
Street C	RYCB 43	52	0.15	0.45	0.07	0.07		89.88	0.02	36.8	250	2.00	0.08	1.71	10.00	0.36	10.36	24%
Street C	RYCB 44	52	0.15	0.45	0.07	0.07		89.88	0.02	36.8	250	2.00	0.08	1.71	10.00	0.36	10.36	24%
Street C	52	53	0.43	0.45	0.19	0.76		83.66	0.18	97.1	675	0.20	0.38	1.05	11.49	1.54	13.03	47%
Street C	RYCB 45	53	0.15	0.45	0.07	0.07		89.88	0.02	36.8	250	2.00	0.08	1.71	10.00	0.36	10.36	32%
Street C	RYCB 46	53	0.14	0.45	0.06	0.06		89.88	0.02	36.8	250	2.00	0.08	1.71	10.00	0.39	10.39	22%
Street C	53	54	0.56	0.45	0.25	1.14		78.19	0.25	72.0	750	0.20	0.50	1.13	13.03	1.06	14.09	50%
Street A	RYCB 47	54	0.07	0.50	0.04	0.04		89.88	0.01	40.9	250	0.50	0.04	0.86	10.00	0.80	10.80	13%
Street A	RYCB 48	54	0.08	0.50	0.04	0.04		89.88	0.01	41.0	250	1.00	0.06	1.21	10.00	0.56	10.56	17%
Street A	54	56	0.27	0.50	0.14	8.57		65.24	1.72	74.7	1200x1800 Box	0.25	4.20	1.95	17.91	0.64	18.55	41%
INT-2	INT-2	56	2.47	0.00				89.88	0.06	-	-				10.00	0.00	10.00	-
Pond	56	HW1	0.60	0.60	0.36	8.93		63.90	1.80	103.4	1200x2400 Box	0.20	5.38	1.87	18.55	0.92	19.47	56%

Storm Sewer Design Sheet (100-Yr Interim)

Project Number 1606 23065
Date: April 2025
City File Number N/A

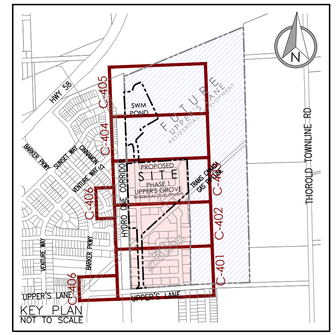
Consultant: Stantec Ltd.
Prepared By: James Luk

Design Return Period =100-Yr , n = 0.013 A= 980.00
Rainfall Intensity = A/(T+B)^C B= 3.70
Starting 'T' = 10 min C= 0.73

Manhole			Drainage Area		Runoff Coeff. "R"		Accum. Area	Rainfall Intensity	Minor Capture	Major Capture	Overland Flow	Total Flow	Pipe Data				Time		
Location	U/S MH	D/S MH	(ha)	AxR		AxR		(mm/hr)	(m³/s)	(m³/s)	(m³/s)	(m³/s)	Length (m)	Size (mm)	Slope (%)	Full Capacity (m³/s)	Full Velocity (m/s)	Section (min)	D/S TC (min)	QA/QC (%)
FUT-1	FUT-1	102	5.33	0.60	3.20	3.20		111.45	0.62	0.62	0.37	0.99	-	-				0.00	15.79	-
FUT-2	Plug 10	10	2.20	0.60	1.32	1.32		116.66	0.27	0.27	0.16	0.43	7.6	675	0.15	0.33	0.91	0.14	14.75	83%
Upper's Lane	100	101	0.25	0.60	0.15	0.15		144.26	0.04	0.04	0.02	0.06	103.5	900	0.15	0.70	1.10	1.57	11.57	5%
Upper's Lane	101	102	0.00	0.00	0.00	0.15		133.28	0.03	0.03	0.02	0.06	45.2	900	0.15	0.70	1.10	0.68	12.25	5%
Upper's Lane	102	Plug 11	0.22	0.60	0.13	3.48		111.45	0.68	0.68	0.40	1.08	56.0	975	0.15	0.87	1.16	0.80	16.59	78%
Upper's Lane	Plug 11	10	0.00	0.00	0.00	3.48		108.21	0.66	0.66	0.39	1.05	-	-	-	-	-	0.00	16.59	-
Upper's Lane	10	11	0.23	0.60	0.14	4.94		108.21	0.94	0.94	0.55	1.49	100.0	1200	0.15	1.51	1.34	1.25	17.84	62%
Upper's Lane	11	12	0.20	0.60	0.12	5.06		103.87	0.92	0.92	0.54	1.46	100.0	1200	0.15	1.51	1.34	1.25	19.09	61%
FUT-3	Plug 12	12	4.06	0.70	2.84	2.84		130.57	0.65	0.65	0.39	1.03	7.6	900	0.20	0.81	1.27	0.10	12.10	80%
Upper's Lane	12	13	0.22	0.60	0.13	8.03		99.40	1.40	1.40	0.82	2.23	47.4	1350	0.15	2.07	1.44	0.55	19.64	68%
Upper's Lane	13	14	0.22	0.60	0.13	8.16		97.68	1.40	1.40	0.82	2.23	100.0	1350	0.15	2.07	1.44	1.15	20.79	68%
FUT-4	Plug 14	14	1.27	0.90	1.14	1.14		144.26	0.29	0.29	0.17	0.46	16.0	900	0.20	0.81	1.27	0.15	10.15	35%
Upper's Lane	14	Plug 19-1A	0.28	0.60	0.17	9.48		94.29	1.57	1.57	0.92	2.49	77.0	1350	0.15	2.07	1.44	0.89	21.68	76%
INT-1	INT-1	HW20	5.15	0.00				144.26	0.10	0.23	0.00	0.23	-	-	-	-	-	0.00	10.00	-
Street E	RYCB 1	HW20	0.09	0.60	0.05	0.05		144.26	0.01	0.02	0.00	0.02	19.4	250	4.00	0.12	2.42	0.13	10.13	18%
Street E	HW20	27	0.14	0.70	0.10	0.15		143.24	0.14	0.29	0.00	0.29	55.5	900	0.50	1.28	2.01	0.46	10.59	23%
Street B	RYCB 2	21	0.06	0.70	0.04	0.04		144.26	0.01	0.02	0.00	0.02	42.9	250	0.50	0.04	0.86	0.83	10.83	40%
Street B	21	22	0.33	0.70	0.23	0.27		138.15	0.07	0.08	0.00	0.08	40.8	300	1.60	0.12	1.73	0.39	11.23	86%
Street B	RYCB 3	22	0.08	0.70	0.06	0.06		144.26	0.01	0.02	0.00	0.02	44.1	250	2.00	0.08	1.71	0.43	10.43	27%
Street B	22	23	0.00	0.00	0.00	0.33		135.48	0.08	0.12	0.00	0.12	39.0	450	0.50	0.20	1.27	0.51	11.74	61%
Street B	RYCB 4	23	0.14	0.70	0.10	0.43		133.55	0.16	0.22	0.00	0.22	44.2	450	0.50	0.20	1.27	0.42	12.16	65%
Street B	RYCB 5	27S	0.13	0.70	0.09	0.09		144.26	0.02	0.04	0.00	0.04	46.4	250	3.00	0.10	2.10	0.37	10.37	35%
Street B	RYCB 6	27S	0.16	0.70	0.11	0.11		144.26	0.03	0.04	0.00	0.04	47.2	250	3.00	0.10	2.10	0.37	10.37	44%
Street B	27S	24	0.44	0.70	0.31	0.40		138.15	0.15	0.17	0.00	0.17	46.0	300	1.00	0.12	1.73	0.44	10.81	100%
Street B	RYCB 11	24	0.13	0.60	0.08	0.08		144.26	0.02	0.03	0.00	0.03	38.3	250	1.00	0.06	1.21	0.53	10.53	53%
Street B	23	24	0.27	0.60	0.16	0.59		132.17	0.14	0.22	0.00	0.22	32.2	525	0.50	0.30	1.40	0.38	12.12	71%
Street B	24	31	0.37	0.60	0.22	1.33		129.82	0.30	0.48	0.00	0.48	98.3	675	0.50	0.59	1.66	0.99	13.11	81%
Street B	RYCB 7	25	0.11	0.45	0.05	0.05		144.26	0.01	0.02	0.00	0.02	42.1	250	0.50	0.04	0.86	0.82	10.82	47%
Street B	25	26	0.38	0.45	0.17	0.22		136.33	0.05	0.06	0.00	0.06	46.3	375	0.50	0.12	1.12	0.69	11.51	68%
Street B	Plug 26	26	0.00	0.00	0.00	0.00		144.26	0.00	0.00	0.00	0.00	8.5	250	2.00	0.08	1.71	0.08	10.08	0%
Street B	RYCB 8	26	0.17	0.60	0.10	0.10		144.26	0.02	0.03	0.00	0.03	45.3	250	2.00	0.08	1.71	0.50	10.50	50%
Street B	26	27	0.22	0.60	0.13	0.45		134.22	0.17	0.20	0.00	0.20	53.9	525	0.40	0.27	1.26	0.72	12.22	52%
Street B	27	28	0.00	0.00	0.00	0.61		133.65	0.11	0.17	0.00	0.17	53.9	525	0.40	0.27	1.26	0.72	12.22	62%
Street B	RYCB 9	28	0.07	0.45	0.03	0.03		144.26	0.01	0.01	0.00	0.01	36.6	250	3.30	0.11	2.20	0.27	10.27	7%
Street E	RYCB 10	28	0.06	0.45	0.03	0.03		144.26	0.01	0.01	0.00	0.01	36.6	250	3.30	0.11	2.20	0.28	10.28	6%
Street B	28	29	0.23	0.60	0.14	0.80		126.55	0.26	0.49	0.00	0.49	41.7	1050	0.30	1.50	1.73	0.40	13.09	32%
Street B	29	30	0.00	0.00	0.00	0.80		124.52	0.26	0.48	0.00	0.48	41.7	1050	0.30	1.50	1.73	0.12	13.20	32%
Street E	30	31	0.55	0.60	0.33	1.13		123.69	0.33	0.58	0.00	0.59	71.4	1200	0.30	2.14	1.89	0.63	13.83	27%
Street F	RYCB 12	31	0.11	0.70	0.08	0.08		144.26	0.02	0.03	0.00	0.03	36.4	250	1.00	0.06	1.21	0.50	10.50	52%
Street F	31	36	0.34	0.60	0.20	2.74		120.42	0.66	1.11	0.00	1.11	79.0	1200	0.30	2.14	1.89	0.70

SEE DWG C-405

SEE DWG C-403



KEY PLAN
NOT TO SCALE

MATCH EX.GRADE ALONG PROPERTY LINE

MAINTENANCE ACCESS ROAD SEE DWG. C-1002 FOR DETAILS

SPLASH PAD SEE DWG. C-1001 & C-1002 FOR DETAILS

OVERLAND FLOW ROUTE SEE DWG. C-1001 & C-1002 FOR DETAILS

MATCH EX.GRADE ALONG PROPERTY LINE

TEMP.GRANULAR ACCESS ROAD SEE DETAIL ON DWG. C-1201

MATCH EX.GRADE ALONG BTM OF SLOPE

MATCH EX.GRADE ALONG TOP OF SLOPE

MATCH EX.GRADE ALONG BTM OF SLOPE

DIVERSION SWALE 468.9m @ 0.30% 4.0m BTM WIDTH 3:1 SIDE SLOPES MIN. DEPTH 0.6m

AREA TO BE FILLED & GRADED TO PROVIDE POSITIVE DRAINAGE TO THE INTERIM SWALE

48.1m INTERIM SWALE @ 0.30%

MATCH EX.GRADE AT LIMITS SHOWN

TOP OF BERM WIDTH=0.5m

MATCH EX.GRADE ALONG BTM OF SLOPE

51.3m INTERIM SWALE @ 0.30%

AREA TO BE FILLED & GRADED TO PROVIDE POSITIVE DRAINAGE TO THE INTERIM SWALE

MATCH EX.GRADE AT LIMITS SHOWN

MATCH EX.GRADE ALONG TOP OF SLOPE

MATCH EX.GRADE ALONG BTM OF SLOPE

MATCH EX.GRADE ALONG PROPERTY LINE

TEMP.GRANULAR ACCESS ROAD SEE DETAIL ON DWG. C-1201

MATCH EX.GRADE ALONG BTM OF SLOPE

MATCH EX.GRADE ALONG BTM OF SLOPE

FUT STREET A

STREET A

VENTURE WAY

BLOCK 79

HYDRO TOWER

TREE DRIPLINE

LEGEND

- LIMIT OF SUBDIVISION
- LIMIT OF PHASE 1 CONSTRUCTION
- PROPOSED STORM/SANITARY
- FUTURE STORM/SANITARY
- SINGLE/DOUBLE CATCHBASIN
- HYDRANT & VALVE
- VALVE & BOX/CHAMBER
- WATER SERVICE BOX LOCATION
- MAJOR SYSTEM FLOW DIRECTION
- DRIVEWAY LOCATION

- 184.15 EXISTING SPOT ELEVATION
- 184.15 PROPOSED SPOT ELEVATION
- 184.15 LP PROPOSED LOW POINT
- 184.15 HP PROPOSED HIGH POINT
- 184.15 BVC BEGINING OF VERTICAL CURVE
- 184.15 EVC END OF VERTICAL CURVE
- ANTICIPATED ENGINEERED FILL LOT (TO BE CONFIRMED BY GEOTECHNICAL ENGINEER)
- 3:1 SLOPE
- 185.0 EXISTING CONTOUR & ELEVATION
- 1.0% SLOPE DIRECTION
- (186.78) SPECIFIED HOUSE GRADE

- F FRONT DRAIN LOT
- S SPLIT DRAIN LOT
- BS BACK-SPLIT LOT
- W/O WALK-OUT LOT
- TR TRANSITION LOT
- TEMP. DEAD-END BARRICADE (AS PER OPSD 973.130)

NOTES

1. MACHINERY/EQUIPMENT CANNOT EXCEED 4.15M REACH HEIGHT WHEN CROSSING OR WORKING UNDER HYDRO CONDUCTORS.
2. WHEN WORKING IN CLOSE PROXIMITY TO EXISTING HYDRO ONE TOWERS, THE PROPONENT'S CONTRACTOR IS TO AVOID HAVING PHYSICAL CONTACT WITH THE HYDRO ONE TOWERS. A TEMPORARY WOODEN OR NON-METALLIC BARRIER IS TO BE PLACED AROUND THE TOWER DURING THE PROPONENT'S WORK.
3. AS PER OHSA, THE PROPONENT NEEDS TO ENSURE THAT THE WORKERS PERFORMING THE WORK WEAR THE NECESSARY PERSONAL PROTECTIVE EQUIPMENT INCLUDING ELECTRIC SHOCK PROTECTIVE SAFETY BOOTS.

No.	DESCRIPTION	DATE	APPROVED
1.	FIRST SUBMISSION TO AGENCIES	JUN 22, 2023	S.A.K.
2.	FIRST SITE ALTERATION PERMIT APPLICATION	NOV 20, 2023	S.A.K.
3.	ADDED CURB CUT AND FENCE	APR 11, 2024	S.A.K.
4.	ADDED HYDRO ONE NOTES & SHIFTED STREET C ACCESS	MAY 03, 2024	S.A.K.
5.	SITE ALTERATION PERMIT RENEWAL APPLICATION	MAY 09, 2025	S.A.K.
6.	PHASE 1 FIRST SUBMISSION TO AGENCIES	MAY 12, 2025	S.A.K.

BENCHMARK: 00119673595 ELEV. 181.240m

TOWNSHIP, NIAGARA FALLS AREA CONCRETE CYLINDER, 8.1m WEST OF CENTRELINE OF THOROLD TOWN LINE ROAD, OPPOSITE HOUSE No.832, ON EAST SIDE OF ROAD, 1.4m SOUTH OF TELEPHONE POLE No.NJ.6, TABLET IN TOP. ESTABLISHED BY TOPOGRAPHICAL SURVEY.

Permit/Seal

LICENSED PROFESSIONAL ENGINEER
S.A. KHAN
100085491
MAY 12, 2025
PROVINCE OF ONTARIO

Stantec
Stantec Consulting Ltd.
300W-675 Cochrane Drive
Markham ON
Tel: 905.944.7777
www.stantec.com

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CITY OF THOROLD APPROVED

DATE

MANAGER, DEVELOPMENT ENGINEERING

City of Thorold
Where Ships Climb The Mountain...

Parkbridge
70 HURON STREET
COLLINGWOOD
ONTARIO, L9Y 3Z1
T: 705 429 6142

UPPER'S GROVE PROPOSED RESIDENTIAL DEVELOPMENT (PHASE 1)
CITY OF THOROLD

GRADING PLAN 4

SCALE:	1:500	TOWN FILE No.:	DRAWING No.:
DESIGN BY:	J.L.	DRAWN BY: J.L.	C-404
REVIEWED BY:	S.A.		

File: \\Cd0215-ppfss01\1606\Active\160623065\Drawing\sheet_files\160623065_C-400 Grading Plans.dwg — Revised by <Lik, James> : Mon, May 12, 2025 , 10:45 AM

LEGEND

- LIMIT OF SUBDIVISION
- LIMIT OF PHASE 1 CONSTRUCTION
- PROPOSED STORM/SANITARY
- FUTURE STORM/SANITARY
- SINGLE/DOUBLE CATCHBASIN
- HYDRANT & VALVE
- VALVE & BOX/CHAMBER
- WATER SERVICE BOX LOCATION
- MAJOR SYSTEM FLOW DIRECTION
- DRIVEWAY LOCATION

184.15	EXISTING SPOT ELEVATION
184.15	PROPOSED SPOT ELEVATION
184.15 LP	PROPOSED LOW POINT
184.15 HP	PROPOSED HIGH POINT
184.15 BVC	BEGINING OF VERTICAL CURVE
184.15 EVC	END OF VERTICAL CURVE
*	ANTICIPATED ENGINEERED FILL LOT (TO BE CONFIRMED BY GEOTECHNICAL ENGINEER)
	3:1 SLOPE
185.0	EXISTING CONTOUR & ELEVATION
1.0%	SLOPE DIRECTION
(186.78)	SPECIFIED HOUSE GRADE

F	FRONT DRAIN LOT
S	SPLIT DRAIN LOT
BS	BACK-SPLIT LOT
W/O	WALK-OUT LOT
TR	TRANSITION LOT
	TEMP. DEAD-END BARRICADE (AS PER OPSD 972.130)

NOTES

1. MACHINERY/EQUIPMENT CANNOT EXCEED 4.15M REACH HEIGHT WHEN CROSSING OR WORKING UNDER HYDRO CONDUCTORS.
2. WHEN WORKING IN CLOSE PROXIMITY TO EXISTING HYDRO ONE TOWERS, THE PROPONENT'S CONTRACTOR IS TO AVOID HAVING PHYSICAL CONTACT WITH THE HYDRO ONE TOWERS. A TEMPORARY WOODEN OR NON-METALLIC BARRIER IS TO BE PLACED AROUND THE TOWER DURING THE PROPONENT'S WORK.
3. AS PER OHSA, THE PROPONENT NEEDS TO ENSURE THAT THE WORKERS PERFORMING THE WORK WEAR THE NECESSARY PERSONAL PROTECTIVE EQUIPMENT INCLUDING ELECTRIC SHOCK PROTECTIVE SAFETY BOOTS.

No.	DESCRIPTION	DATE	APPROVED
1.	FIRST SUBMISSION TO AGENCIES	JUN 22, 2023	S.A.K.
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4.	ADDED HYDRO ONE NOTES & SHIFTED STREET C ACCESS	MAY 03, 2024	S.A.K.
5.	SITE ALTERATION PERMIT RENEWAL APPLICATION	MAY 09, 2025	S.A.K.
6.	PHASE 1 FIRST SUBMISSION TO AGENCIES	MAY 12, 2025	S.A.K.

BENCHMARK: 00119673595 ELEV. 181.240m

TOWNSHIP: NIAGARA FALLS AREA CONCRETE CYLINDER, 8.1m WEST OF CENTRELINE OF THOROLD TOWN LINE ROAD, OPPOSITE HOUSE No.832, ON EAST SIDE OF ROAD, 1.4m SOUTH OF TELEPHONE POLE No.NJ.6, TABLET IN TOP. ESTABLISHED BY TOPOGRAPHICAL SURVEY.

Permit/Seal

LICENSED PROFESSIONAL ENGINEER
S.A. KHAN
100085491
MAY 12, 2025
PROVINCE OF ONTARIO

Stantec

Stantec Consulting Ltd.
300W-675 Cochrane Drive
Markham ON
Tel: 905.944.7777
www.stantec.com

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CITY OF THOROLD APPROVED

DATE

MANAGER, DEVELOPMENT ENGINEERING

City of Thorold
Where Ships Climb The Mountain...

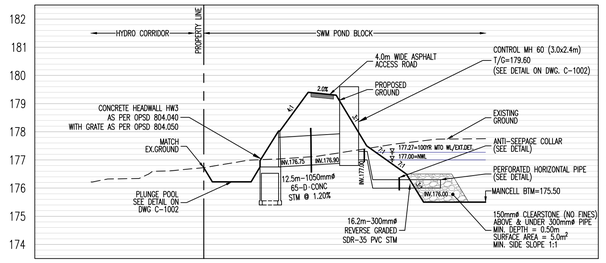
Parkbridge
70 HURON STREET
COLLINGWOOD
ONTARIO, L9Y 3Z1
T: 705 429 6142

UPPER'S GROVE
PROPOSED RESIDENTIAL DEVELOPMENT (PHASE 1)
CITY OF THOROLD

GRADING PLAN 5

SCALE:	1:500	TOWN FILE No.:	DRAWING No.: C-405
DESIGN BY:	J.L.	DRAWN BY:	J.L.
REVIEWED BY:	S.A.		

ORIGINAL SHEET - ARCH D



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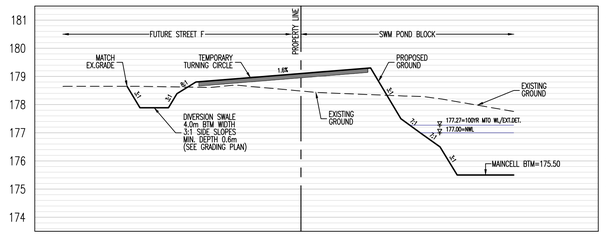
VER 1:100



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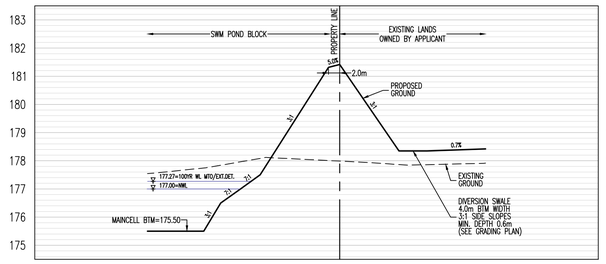

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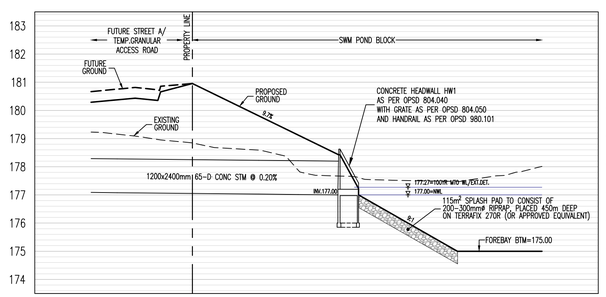

SECTION D
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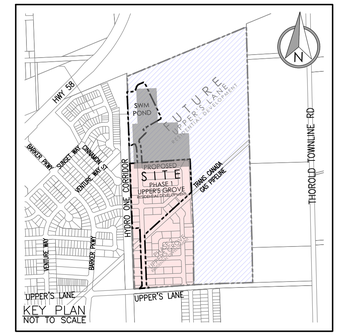

KEY PLAN
NOT TO SCALE

LEGEND

- LIMIT OF SUBDIVISION
- LIMIT OF PHASE 1 CONSTRUCTION
- PROPOSED STORM/SANITARY
- FUTURE STORM/SANITARY
- SINGLE/DOUBLE CATCHBASIN
- HYDRANT & VALVE
- VALVE & BOX/CHAMBER
- WATER SERVICE BOX LOCATION
- MAJOR SYSTEM FLOW DIRECTION
- POND MAINTENANCE ROAD SEE DETAIL ON C-1002

- 184.15 EXISTING SPOT ELEVATION
- 184.15 PROPOSED SPOT ELEVATION
- 184.15 LP PROPOSED LOW POINT
- 184.15 HP PROPOSED HIGH POINT
- 184.15 BVC BEGINNING OF VERTICAL CURVE
- 184.15 EVC END OF VERTICAL CURVE
- 3:1 SLOPE
- 184.0 EXISTING CONTOUR & ELEVATION
- 1.0% SLOPE DIRECTION
- (186.78) SPECIFIED HOUSE GRADE

- TEMP. DEAD-END BARRICADE (AS PER OPSD 973.130)
- CHAINLINK FENCE
- 1.8m PRIVACY FENCE
- PROPOSED INTERCEPTOR SWALE
- 150-300mmø RIPRAP
- VMAX SC250 TURF REINFORCEMENT MAT (OR APPROVED EQUIVALENT) ON 300mm TOPSOIL AND SEED
- 4.0m WIDE MAINTENANCE ACCESS ROAD SEE DETAIL ON DWG. C-1002
- 4.0m WIDE FOREBAY RAMP SEE DETAIL ON DWG. C-1002

No.	DESCRIPTION	DATE	APPROVED
1.	FIRST SUBMISSION TO AGENCIES	JUN 22, 2023	S.A.K.
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4.	ADDED HYDRO ONE NOTES & SHIFTED STREET C ACCESS	MAY 03, 2024	S.A.K.
5.	SITE ALTERATION PERMIT RENEWAL APPLICATION	MAY 09, 2025	S.A.K.
6.	PHASE 1 FIRST SUBMISSION TO AGENCIES	MAY 12, 2025	S.A.K.

BENCHMARK: 00119673595 ELEV. 181.240m
TOWNSHIP: NIAGARA FALLS AREA CONCRETE CYLINDER, 8.1m WEST OF CENTRELINE OF THOROLD TOWN LINE ROAD, OPPOSITE HOUSE No.832, ON EAST SIDE OF ROAD, 1.4m SOUTH OF TELEPHONE POLE No.N.I.6, TABLET IN TOP. ESTABLISHED BY TOPOGRAPHICAL SURVEY.

Permit/Seal

LICENSED PROFESSIONAL ENGINEER
S.A. KHAN
100085491
MAY 12, 2025
PROVINCE OF ONTARIO

Stantec

Stantec Consulting Ltd.
300W-675 Cochrane Drive
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Tel: 905.944.7777
www.stantec.com

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CITY OF THOROLD APPROVED

DATE

MANAGER, DEVELOPMENT ENGINEERING

City of Thorold
Where Ships Climb The Mountain...

Parkbridge
70 HURON STREET
COLLINGWOOD
ONTARIO, L9Y 3Z1
T: 705 429 6142

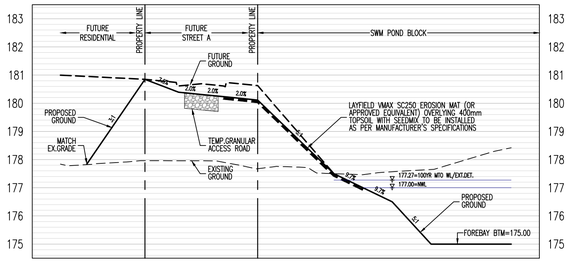
UPPER'S GROVE
PROPOSED RESIDENTIAL DEVELOPMENT (PHASE 1)
CITY OF THOROLD

STORMWATER MANAGEMENT POND PLAN & SECTIONS

SCALE:	1:750	TOWN FILE No.:	DRAWING No.:
DESIGN BY:	J.L.	DRAWN BY: J.L.	C-1001
REVIEWED BY:	S.A.		

ORIGINAL SHEET - ARCH D

File: \\Cd0215-sphis01\1600\Active\160623060\Drawing\sheet_files\160623065_C-1000 SWM Pond.dwg – Revised by <Luk, James> : Mon, May 12, 2025 , 10:47 AM



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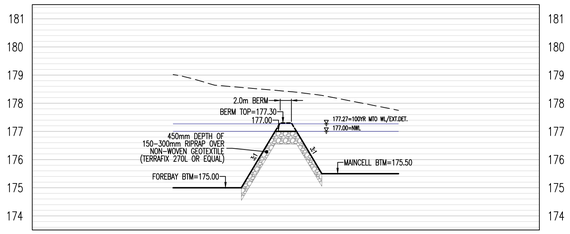

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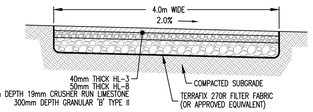
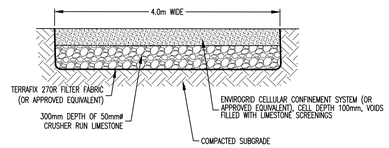
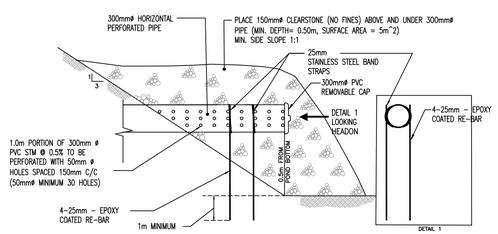


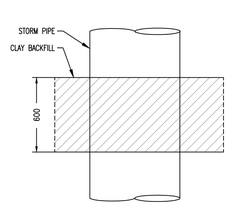
ASPHALT MAINTENANCE ROAD
NOT TO SCALE



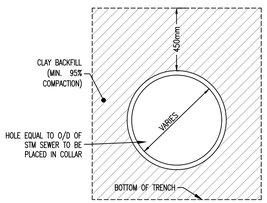
LIMESTONE FOREBAY RAMP
NOT TO SCALE



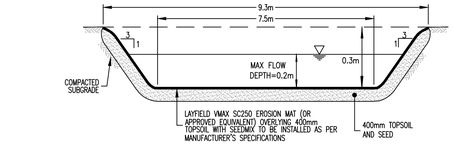
PERFORATED HORIZONTAL PIPE INSTALLATION DETAIL
NOT TO SCALE



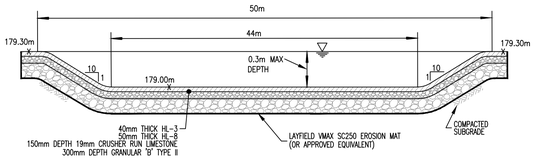
ANTI-SEEPAGE COLLAR PLAN VIEW
NOT TO SCALE



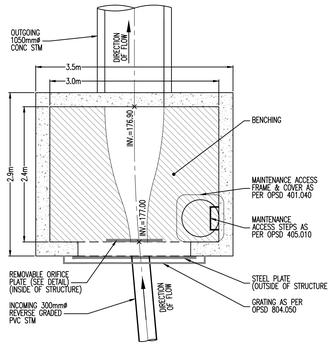
ANTI-SEEPAGE COLLAR FRONT VIEW
NOT TO SCALE



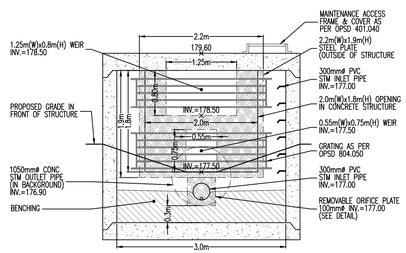
SECTION F
OVERLAND FLOW ROUTE
NOT TO SCALE



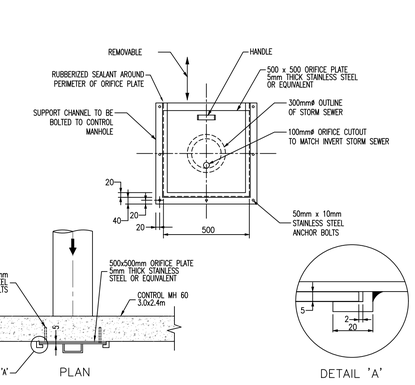
SECTION H
EMERGENCY SPILLWAY
NOT TO SCALE



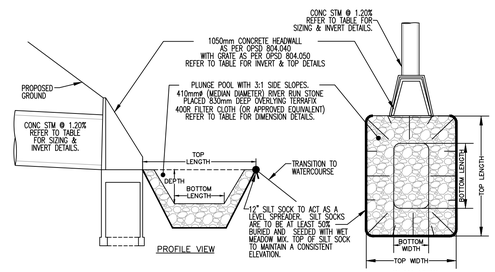
PLAN VIEW: CONTROL MH 60
NOT TO SCALE



FRONT VIEW: CONTROL MH 60
NOT TO SCALE



REMOVABLE ORIFICE PLATE DETAIL
NOT TO SCALE



NOTES:
1. ALL DISTURBED AREAS TO BE SEEDED AND PROTECTED WITH COIR MATTING PER DETAIL ON THIS DRAWING.
2. SOIL AROUND HEADWALL TO BE COMPACTED TO 98% SPD.

HEADWALL INVERT ELEVATION	176.75
PIPE DIAMETER	1050mm
TOP HEADWALL ELEVATION	178.15m
PLUNGE POOL TOP DIMENSIONS	10.0m(L) x 5.25m(W)
PLUNGE POOL BOTTOM DIMENSIONS	6.82m(L) x 2.10m(W)
PLUNGE POOL DEPTH	0.53m

SWM POND OUTFALL DETAIL
NOT TO SCALE

No.	DESCRIPTION	DATE	APPROVED
1.	FIRST SUBMISSION TO AGENCIES	JUN 22, 2023	S.A.K.
2.	FIRST SITE ALTERATION PERMIT APPLICATION	NOV 20, 2023	S.A.K.
3.	ADDED CURB CUT AND FENCE	APR 11, 2024	S.A.K.
4.	ADDED HYDRO ONE NOTES & SHIFTED STREET C ACCESS	MAY 03, 2024	S.A.K.
5.	SITE ALTERATION PERMIT RENEWAL APPLICATION	MAY 09, 2025	S.A.K.
6.	PHASE 1 FIRST SUBMISSION TO AGENCIES	MAY 12, 2025	S.A.K.

BENCHMARK: 00119673595 ELEV. 181.240m
TOWNSHIP, NIAGARA FALLS AREA CONCRETE CYLINDER, 8.1m WEST OF CENTRELINE OF THOROLD TOWN LINE ROAD, OPPOSITE HOUSE No.832, ON EAST SIDE OF ROAD, 1.4m SOUTH OF TELEPHONE POLE No.N.I.6, TABLET IN TOP. ESTABLISHED BY TOPOGRAPHICAL SURVEY.

Permit/Seal

LICENSED PROFESSIONAL ENGINEER
S.A. KHAN
100085491
MAY 12, 2025
PROVINCE OF ONTARIO

Stantec
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www.stantec.com

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CITY OF THOROLD APPROVED

DATE

MANAGER, DEVELOPMENT ENGINEERING

City of Thorold
Where Ships Climb The Mountain...

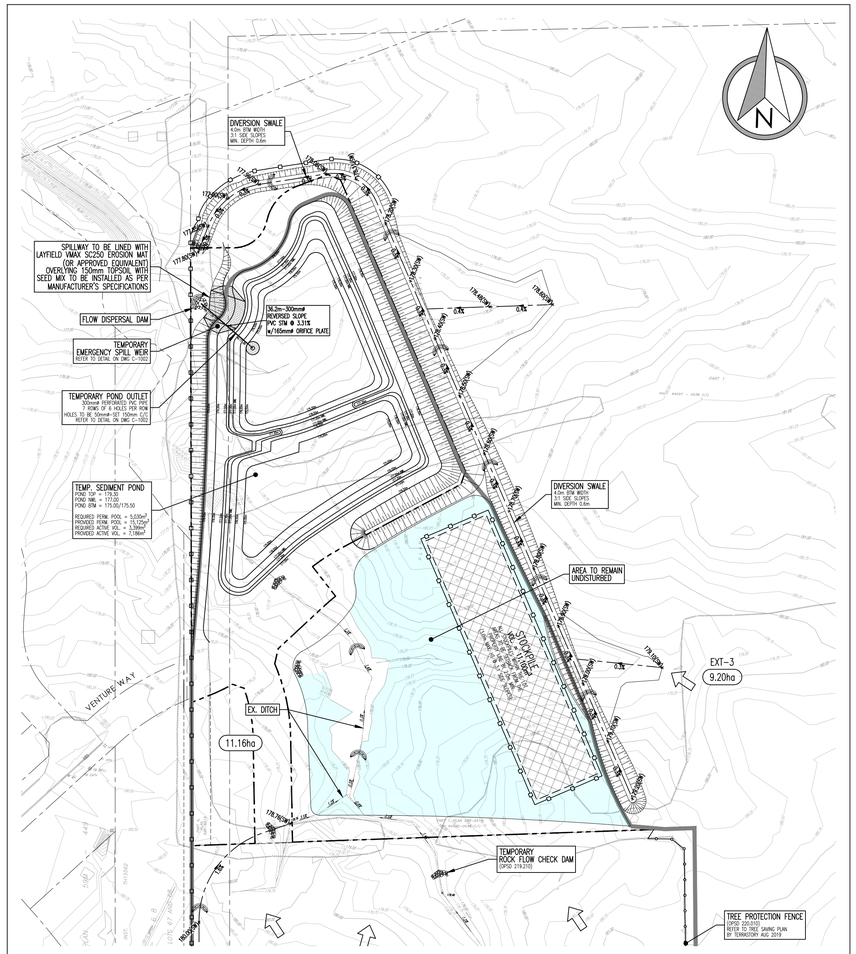
Parkbridge
70 HURON STREET
COLLINGWOOD
ONTARIO, L9Y 3Z1
T: 705 429 6142

UPPER'S GROVE
PROPOSED RESIDENTIAL DEVELOPMENT
(PHASE 1)
CITY OF THOROLD

STORMWATER MANAGEMENT POND
SECTIONS & DETAILS

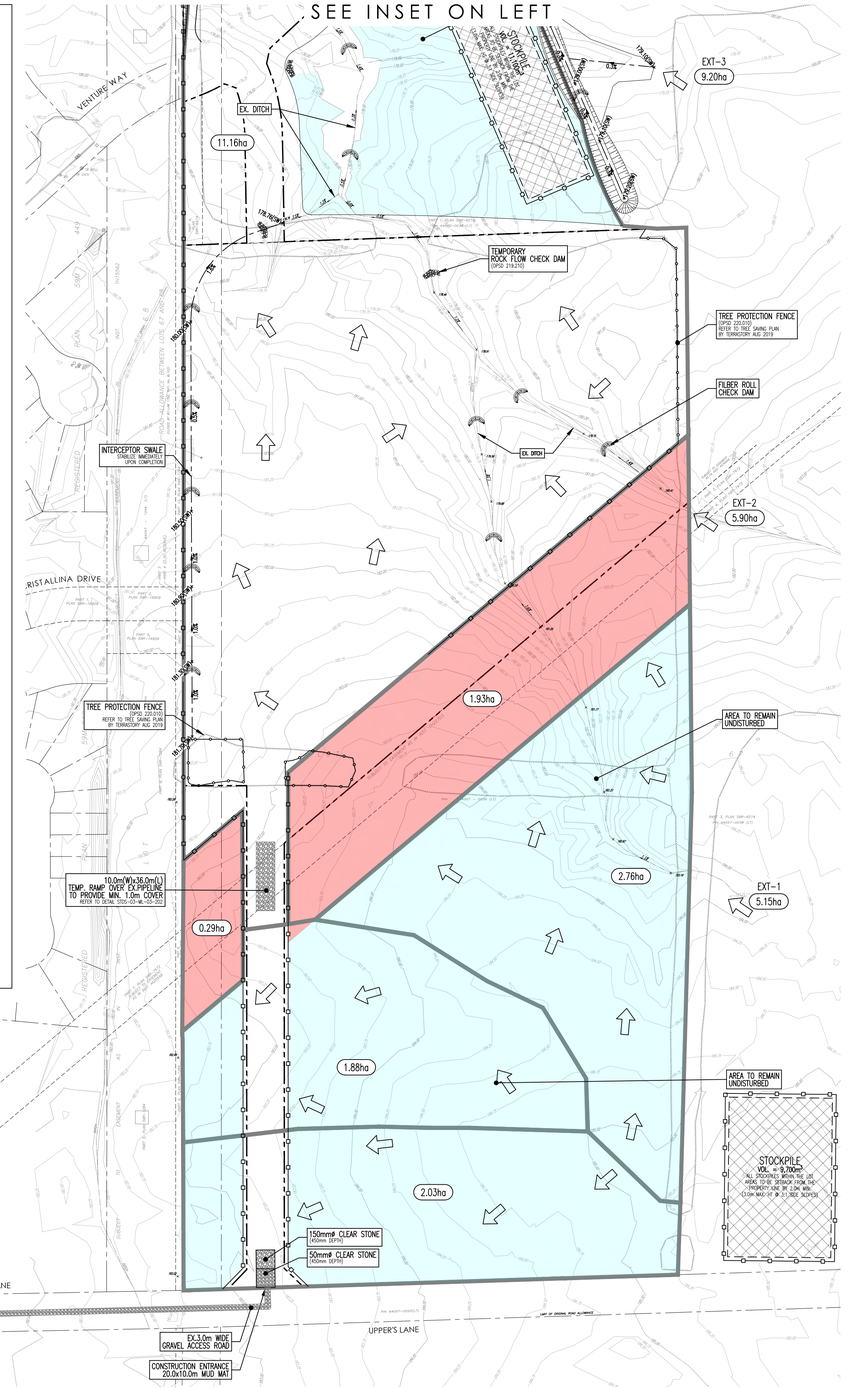
SCALE: AS SHOWN	TOWN FILE No.:	DRAWING No.:	C-1002
DESIGN BY: J.L.	DRAWN BY: J.L.		
REVIEWED BY: S.A.			

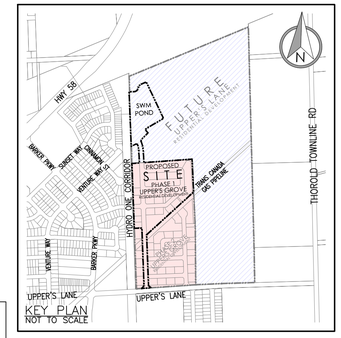
ORIGINAL SHEET - ARCH D



INSET

SEE INSET ON LEFT





KEY PLAN
NOT TO SCALE

SEQUENCE OF CONSTRUCTION

PHASE 1 NORTH LANDS STAGE 1
TOPSOIL STRIPPING

1. ALL TREE CLEARING/PROTECTION FENCING TO BE COMPLETED PER TREE SAVING PLAN – TERRASTORY AUGUST 2019
2. INSTALL PERIMETER SILT FENCE & CONSTRUCTION ENTRANCE MAT
3. STRIP POND LOCATION AND STOCKPILE TOPSOIL
4. EXCAVATE POND AND STORE STOCKPILE AT DESIGNATED LOCATIONS
5. CONSTRUCT TEMPORARY POND OUTFALL AS PER DETAILS
6. CONSTRUCT INTERCEPTOR SWALES & SEDIMENT TRAPS
7. INSTALL FIBER ROLL AND ROCK CHECK DAMS
8. STRIP TOPSOIL FROM REMAINDER OF SITE AND STOCKPILE FOR EXPORT
9. COMPLETE SITE CUT/FILL & SITE FILL IMPORT TO PREGRADE
10. ALL DISTURBED GROUND LEFT INACTIVE FOR 30 DAYS SHALL BE VEGETATED, SUBJECT TO WEATHER CONDITIONS. DISTURBED AREAS ARE TO BE HYDROSEEDED (OR AN APPROVED EQUIVALENT) TO THE SATISFACTION OF THE DIRECTOR OF ENGINEERING.

STANDARD NOTES

1. ALL SEDIMENT CONTROL MEASURES SUCH AS SEDIMENT CONTROL FENCE, TEMPORARY PONDS, CONSTRUCTION ACCESS MATS, SEDIMENT TRAPS, SWALES AND CHECK DAMS MUST BE INSTALLED PRIOR TO THE COMMENCEMENT OF SITE WORKS
2. SEDIMENT CONTROLS TO BE INSPECTED ON A REGULAR BASIS AND AFTER EVERY SIGNIFICANT RAINFALL EVENT. REPAIRS TO ESC MEASURES MUST BE COMPLETED IN A TIMELY MANNER TO PREVENT SEDIMENT MIGRATION
3. ADDITIONAL MATERIALS SUCH AS CLEAR STONE, FILTER FABRIC, PUMPS, HOSES AND SILTSOXX TO BE KEPT ONSITE AT ALL TIMES FOR CONDUCTING REPAIRS TO SEDIMENT CONTROL MEASURES
4. ALL DISTURBED AREAS LEFT INACTIVE FOR MORE THAN THIRTY DAYS ARE TO BE STABILIZED
5. THE STABILIZATION SEED MIXTURE IS TO BE AS SPECIFIED ON THE EROSION AND SEDIMENT CONTROL PLAN
6. THE STABILIZATION SEED MIXTURE IS TO BE APPLIED AT A MINIMUM RATE OF 25kg/ha
7. ENGINEERED CHANGES TO THE ESC MEASURES MAY BE NEEDED AS SITE CONDITIONS CHANGE THROUGHOUT THE CONSTRUCTION PROCESS. THESE UPDATES MUST REFLECT BEST MANAGEMENT PRACTICES TO CONTROL SEDIMENT AND EROSION ONSITE AND SHOULD BE COMPLETED BASED ON DIRECTION FROM THE SITE ENGINEER. ADDITIONAL MEASURES MAY BE REQUIRED AS DIRECTED BY AN ENGINEER THROUGHOUT THE CONSTRUCTION PROCESS
8. CUT-OFF SWALES OR DITCHES ARE TO BE INSTALLED AS SHOWN ON THE ESC PLANS AND AS NECESSARY BASED ON CHANGING SITE CONDITIONS TO DIRECT OVERLAND FLOW TO THE APPROPRIATE SEDIMENT TRAP OF TEMPORARY SEDIMENT POND
9. CHECK DAMS ARE TO BE INSTALLED IN ALL SWALES AND DITCHES AS INDICATED ON THE ESC PLANS
10. TEMPORARY SEDIMENT TRAPS/PONDS ARE TO BE CONSTRUCTED AT THE BEGINNING OF SITE GRADING AND IF THE SITE DRAINAGE CHANGES DURING CONSTRUCTION. IT MAY BE NECESSARY FOR TEMPORARY SWALES TO BE CONSTRUCTED TO DIRECT SITE FLOWS TO THE TEMPORARY SEDIMENT TRAPS DURING ROUGH GRADING AND AS CONSTRUCTION PROGRESSES
11. FIBER ROLL CHECK DAM OR APPROVED EQUIVALENT TO BE INSTALLED DOWNSTREAM FROM SEDIMENT TRAP AND TEMPORARY SEDIMENT POND OUTLETS TO A MINIMUM HEIGHT OF 300mm
12. ANY DEWATERING OCCURRING ONSITE MUST BE IN ACCORDANCE WITH AN APPROVED DEWATERING PLAN. ADDITIONAL DEWATERING REQUIREMENTS MAY BE DEEMED NECESSARY AND SHALL BE IMPLEMENTED AS DIRECTED BY THE ENGINEER, CONTRACT ADMINISTRATOR OR LOCAL MUNICIPALITY
13. SPILL CLEANUP EQUIPMENT SUCH AS ABSORPTIVE MEDIA IS TO BE MAINTAINED ONSITE FOR IMMEDIATE USE IN THE EVENT OF A SPILL
14. THE CONTRACTOR WILL BE RESPONSIBLE FOR CLEAN-UP AND RESTORATION, INCLUDING ALL COSTS, DUE TO THE RELEASE OF SEDIMENT FROM THE SITE
15. LOW IMPACT DEVELOPMENT (LID) MEASURES ARE NOT TO BE USED AS SEDIMENT CONTROL DEVICES
16. ADDITIONAL SEDIMENT CONTROL DEVICES MAY BE DEEMED NECESSARY AND AS SITE CONDITIONS CHANGE AND SHALL BE INSTALLED AS DIRECTED BY THE SITE ENGINEER, CONTRACT ADMINISTRATOR OR LOCAL MUNICIPALITY

DUST CONTROL MEASURES

A DUST CONTROL PLAN WILL INCLUDE:

1. IDENTIFICATION OF ALL POTENTIAL DUST SOURCES;
2. A DESCRIPTION OF THE DUST CONTROL METHOD(S) TO BE USED FOR EACH SOURCE;
3. A SCHEDULE, RATE OF APPLICATION, CALCULATIONS OR SOME OTHER MEANS OF IDENTIFYING HOW OFTEN, HOW MUCH OR WHEN THE CONTROL METHOD IS TO BE USED;
4. PROVISIONS FOR MONITORING AND RECORD KEEPING;
5. A BACKUP PLAN IN CASE THE FIRST CONTROL PLAN DOES NOT WORK OR IS INSUFFICIENT;
6. STANTEC CONSULTING INC. (905-944-7777) WILL BE RESPONSIBLE FOR MAKING SURE THE PLAN IS IMPLEMENTED AND CAN BE CONTACTED IN THE EVENT OF A DUST CONTROL COMPLAINT.

PRE-GRADING PLANNING

1. TOPSOIL STRIPPING AND EARTHWORKS TO BE TIMED TO COINCIDE WITH EACH MUNICIPAL SERVICING AND/OR CONSTRUCTION PHASE; OR
2. STRIP TOPSOIL AND GRADE ENTIRE PROJECT AND APPLY VEGETATION GROUND COVER TO GRADED OR TOPSOIL STRIPPED AREAS WHERE CONSTRUCTION PHASE BEGINS MORE THAN 90 DAYS AFTER GRADING OR TOPSOIL STRIPPING OPERATIONS END.

WATERING (POST-GRADING)

1. WITHIN ACTIVE TOPSOIL STRIPPING, EARTH MOVING OR UNDERGROUND/ABOVEGROUND MUNICIPAL SERVICING AREAS, WATER TO BE APPLIED AT SUFFICIENT FREQUENCY AND QUANTITY TO PREVENT VISIBLE EMISSIONS FROM EXTENDING MORE THAN 30m FROM POINT OF ORIGIN.

TOPSOIL STOCKPILES

1. CONFINE LOAD IN/OUT PROCEDURES TO DOWNWIND SIDE OF THE MATERIAL. TOPSOIL PILE TO BE LOCATED DOWNWIND OF EXISTING RESIDENTIAL AREAS.
2. APPLY WATER TO HAUL ROADS AND STOCKPILE BY WAY OF WATER TRUCK.
3. GRADE AND VEGETATE TOPSOIL STOCKPILE TO PREVENT FUTURE WIND EROSION.

WIND FENCING

1. INSTALL 1.0m TO 1.5m HIGH BARRIERS WITH 50% OR LESS POROSITY LOCATED ADJACENT TO ROADWAYS OR URBAN AREAS TO REDUCE THE AMOUNT OF WINDBLOWN MATERIAL LEAVING THE SITE.

REDUCE VEHICLE SPEED

1. LIMIT VEHICLE SPEED TO 25km/hr MAXIMUM. MAY NEED TO BE USED IN CONJUNCTION WITH WATERING TO PREVENT VISIBLE DUST EMISSIONS.

MINIMIZE DISRUPTED SURFACE AREAS

1. TO DISTURB ONLY THOSE AREAS ABSOLUTELY REQUIRED. VEGETATION LEFT IN PLACE DURING SITE WORK REDUCES THE AREA SUBJECT TO WIND EROSION.

RESTRICT ACTIVITIES DURING HIGH WIND PERIODS

1. RESCHEDULE WORK AROUND WINDY DAYS. THE HIGH VISIBILITY OF CERTAIN WORKS AND THE CLOSE PROXIMITY AND POPULATION IMPACTED SHOULD BE TAKEN INTO CONSIDERATION WHEN SCHEDULING DUST-PRODUCING WORK.

ROAD CLEANING

1. SPILLAGE, EROSION OR MATERIAL "TRACKED OUT" ON A ROAD TO BE CLEANED USING MECHANICAL STREET SWEEPERS OR FLUSHER TRUCK BY AT LEAST THE END OF THE WORK DAY AND IMMEDIATELY IF IT EXTENDS MORE THAN 15 METRES ALONG A PAVED PUBLIC ROADWAY.

ROADSIDE NATIVE GRASS SEED MIX		
Qty %	Botanical Name	Common Name
25	Andropogon gerardi	Big Blue Stem
15	Antennaria neglecta	Pussy-Toes
8	Desmodium canadense	Showy Tick-Trefoil
4	Monarda fistulosa	Wild Bergamot
15	Polygala senega	Seneca Snakeroot
5	Rudbeckia hirta	Black-Eyed Susan
24	Sporobolus cryptandrus	Sand Drop Seed
4	Symphyotrichum novae-angliae	New England Aster

Planting Density
Sow a Nurse Crop: Annual Oats (Avena sativa) and Canada Wild Rye (Elymus canadensis) to be seeded at a rate of 22kg/hectare Sow Roadside Native Grass Seed Mix at a Rate of Application: 35 kg./hectare. Apply an organic 8-32-16 ratio fertilizer at a rate of 38 kg per 1000m² at the time of seeding

LEGEND

- LIMIT OF SUBDIVISION
- LIMIT OF DISTURBANCE
- EX. OVERLAND FLOW DIRECTION
- 1.9ha — DRAINAGE AREA (ha)
- 3:1 SLOPE
- 195.0 — EXISTING CONTOUR & ELEVATION
- EXISTING STRUCTURES TO BE REMOVED
- CONSTRUCTION ENTRANCE MAT
- FIBER ROLL CHECK DAM AS PER OPSD 219.191 200mmØ SPACED @ EVERY 0.2m GRADE DROP
- ROCK CHECK DAM AS PER OPSD 219.210
- HICKEN BOTTOM OUTLET
- 186.78(SW) — INTERCEPTOR SWALE & INVERT
- HEAVY DUTY SILT FENCE
- TREE PROTECTION FENCE
- TCPL 30m OFFSET NO-WORK ZONE

NOTES

1. MACHINERY/EQUIPMENT CANNOT EXCEED 4.15M REACH HEIGHT WHEN CROSSING OR WORKING UNDER HYDRO CONDUCTORS.
2. WHEN WORKING IN CLOSE PROXIMITY TO EXISTING HYDRO ONE TOWERS, THE PROPONENT'S CONTRACTOR IS TO AVOID HAVING PHYSICAL CONTACT WITH THE HYDRO ONE TOWERS. A TEMPORARY WOODEN OR NON-METALLIC BARRIER IS TO BE PLACED AROUND THE TOWER DURING THE PROPONENT'S WORK.
3. AS PER OHSA, THE PROPONENT NEEDS TO ENSURE THAT THE WORKERS PERFORMING THE WORK WEAR THE NECESSARY PERSONAL PROTECTIVE EQUIPMENT INCLUDING ELECTRIC SHOCK PROTECTIVE SAFETY BOOTS.

No.	DESCRIPTION	DATE	APPROVED
1.	FIRST SUBMISSION TO AGENCIES	JUN 22, 2023	S.A.K.
2.	FIRST SITE ALTERATION PERMIT APPLICATION	NOV 20, 2023	S.A.K.
3.	ADDED CURB CUT AND FENCE	APR 11, 2024	S.A.K.
4.	ADDED HYDRO ONE NOTES & SHIFTED STREET C ACCESS	MAY 03, 2024	S.A.K.
5.	SITE ALTERATION PERMIT RENEWAL APPLICATION	MAY 9, 2025	S.A.K.

BENCHMARK: 00119673595 ELEV. 181.240m
TOWNSHIP: NIAGARA FALLS AREA CONCRETE CYLINDER, 8.1m WEST OF CENTRELINE OF THOROLD TOWN LINE ROAD, OPPOSITE HOUSE No.832, ON EAST SIDE OF ROAD, 1.4m SOUTH OF TELEPHONE POLE No.NJ.6, TABLET IN TOP, ESTABLISHED BY TOPOGRAPHICAL SURVEY.

Permit/Seal

LICENSED PROFESSIONAL ENGINEER
S.A. KHAN
100085491
MAY 09, 2025
PROVINCE OF ONTARIO

Stantec

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CITY OF THOROLD APPROVED

_____ DATE

_____ MANAGER, DEVELOPMENT ENGINEERING

City of Thorold — Where Ships Climb The Mountain...

Parkbridge
70 HURON STREET
COLLINGWOOD
ONTARIO, L9Y 3Z1
T: 705 429 6142

UPPER'S GROVE PROPOSED RESIDENTIAL DEVELOPMENT (PHASE 1)
CITY OF THOROLD

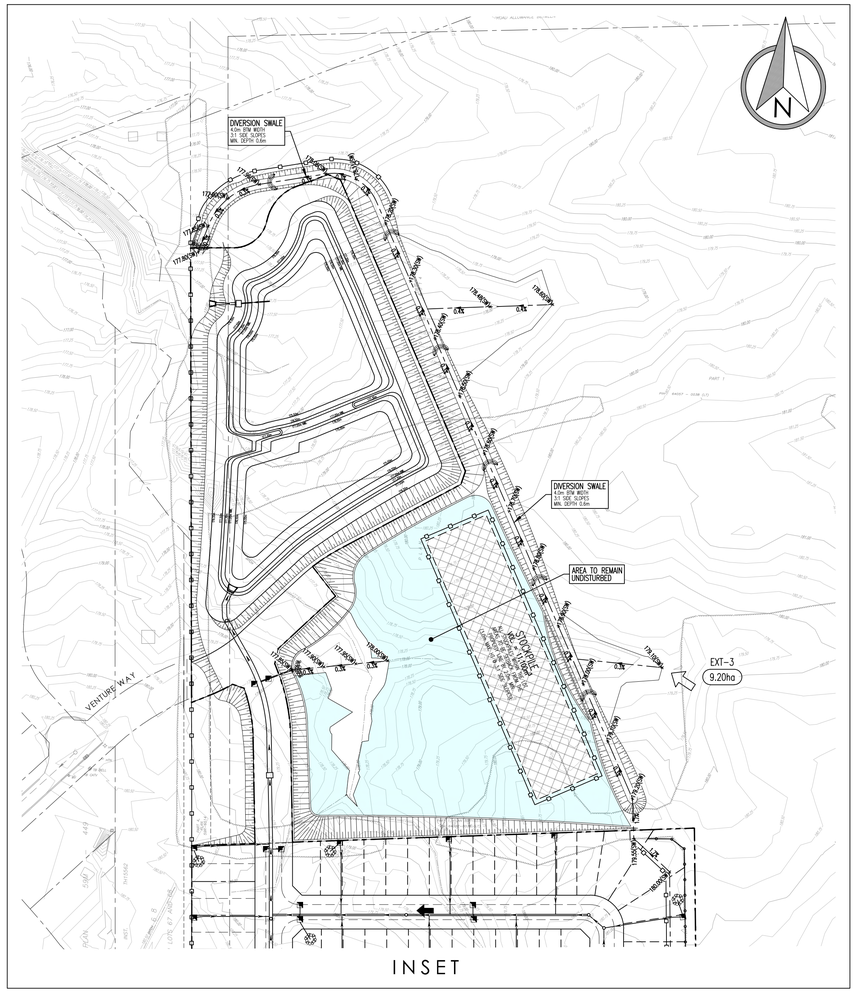
EROSION & SEDIMENT CONTROL PLAN STAGE 1

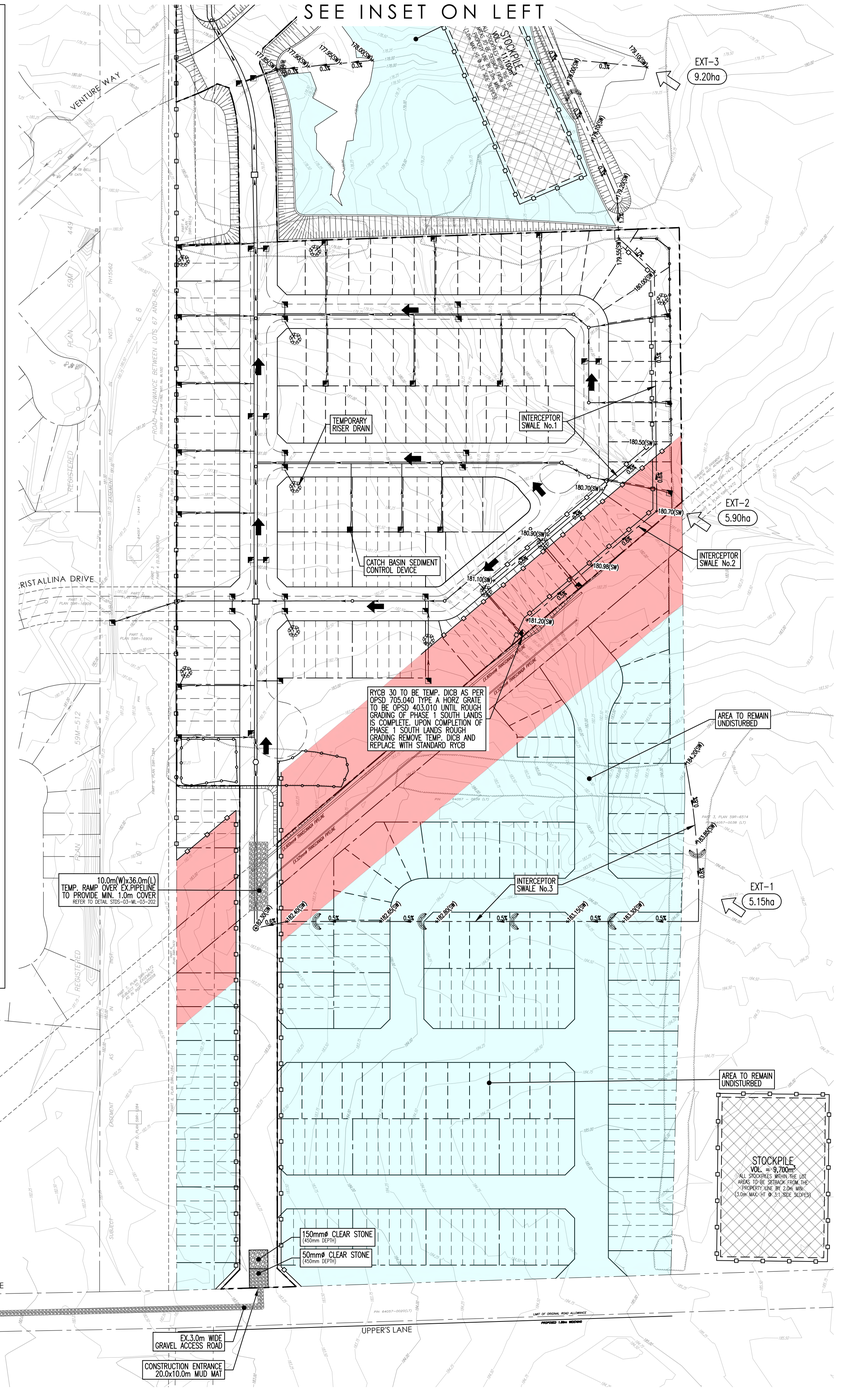
PHASE 1 NORTH LANDS TOPSOIL STRIPPING

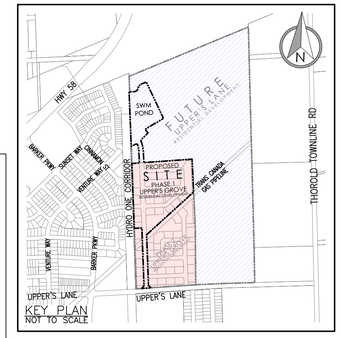
SCALE:	1:1500	TOWN FILE No.: _____	DRAWING No.: C-601
DESIGN BY:	J.L.	DRAWN BY: J.L.	
REVIEWED BY:	S.A.		

ORIGINAL SHEET - ARCH D

File: \\Cd0215-ppfs01\1606\Active\160623065\Drawing\sheet_files\160623065_C-600 Erosion and Sediment Control Plan.dwg – Revised by <Lok, James> : Fri, May 09, 2025 , 4:20 PM







SEQUENCE OF CONSTRUCTION
PHASE 1 NORTH LANDS STAGE 1
ROUGH GRADING & POST SERVICING

1. INSPECT AND MAINTAIN ALL EROSION CONTROL MEASURES INSTALLED IN STAGE 1
2. COMPLETE SITE EARTHWORKS TO PREGRADE
   a. OUTSIDE OF TCPL NO WORK ZONE UNTIL TCPL PERMIT IS ISSUED INCLUDING INTERCEPTOR SWALE 1
   b. ONCE TCPL PERMIT IS ISSUED COMPLETE EARTHWORKS TO TCPL NORTH EASEMENT LIMIT INCLUDING INTERCEPTOR SWALE 2 AND DECOMMISSIONING OF INTERCEPTOR SWALE 1 (EAST-WEST LEG)
   c. ONCE PHASE 1 NORTH LANDS ARE SERVICED, CONSTRUCT INTERCEPTOR SWALE 3 IN THE PHASE 1 SOUTH LANDS, DECOMMISSION INTERCEPTOR SWALES 1 (NORTH-SOUTH LEG) AND 2, AND COMPLETE GRADING TO PHASE 1 NORTH REAR LOTS.
3. CONSTRUCT INTERCEPTOR SWALES & SEDIMENT TRAPS AT TOE OF SLOPES AS REQUIRED
4. INSTALL FIBER ROLL AND ROCK CHECK DAMS AS REQUIRED
5. INSTALL ALL UNDERGROUND SERVICES FOR THE ENTIRE PHASE, FOLLOWED BY ROADS TO BASE ASPHALT. INSTALL TEMPORARY LOT RISER DRAINS AT SERVICE LATERALS AS INDICATED
6. ONCE THE ROADS ARE CONSTRUCTED TO BASE ASPHALT AND SWM FACILITY COMPLETED, RUNOFF FROM THE SITE WILL BE DIRECTED TO THE STORM SEWERS AND INTO THE SWM POND
7. DURING HOME BUILDING OPERATIONS, THE PERIMETER EROSION AND SEDIMENT CONTROL MEASURES & SWM FACILITY WILL BE INSPECTED ON A REGULAR BASIS AND MAINTAINED IF EXCESSIVE AMOUNTS OF SEDIMENT ARE OBSERVED
8. IMMEDIATELY UPON COMPLETION OF THE HOUSES, UNDERTAKE FINE GRADING, TOPSOILING AND SODDING OF THE LOTS AND ADJACENT BOULEVARDS. IT IS ANTICIPATED TO BE COMPLETED IN STAGES AS BLOCKS OF HOUSES ARE COMPLETED AND WEATHER CONDITIONS PERMIT

STANDARD NOTES

1. ALL SEDIMENT CONTROL MEASURES SUCH AS SEDIMENT CONTROL FENCE, TEMPORARY PONDS, CONSTRUCTION ACCESS MATS, SEDIMENT TRAPS, SWALES AND CHECK DAMS MUST BE INSTALLED PRIOR TO THE COMMENCEMENT OF SITE WORKS
2. SEDIMENT CONTROLS TO BE INSPECTED ON A REGULAR BASIS AND AFTER EVERY SIGNIFICANT RAINFALL EVENT. REPAIRS TO ESC MEASURES MUST BE COMPLETED IN A TIMELY MANNER TO PREVENT SEDIMENT MIGRATION
3. ADDITIONAL MATERIALS SUCH AS CLEAR STONE, FILTER FABRIC, PUMPS, HOSES AND SILTSOXX TO BE KEPT ONSITE AT ALL TIMES FOR CONDUCTING REPAIRS TO SEDIMENT CONTROL MEASURES
4. ALL DISTURBED AREAS LEFT INACTIVE FOR MORE THAN THIRTY DAYS ARE TO BE STABILIZED
5. THE STABILIZATION SEED MIXTURE IS TO BE AS SPECIFIED ON THE EROSION AND SEDIMENT CONTROL PLAN
6. THE STABILIZATION SEED MIXTURE IS TO BE APPLIED AT A MINIMUM RATE OF 25kg/ha
7. ENGINEERED CHANGES TO THE ESC MEASURES MAY BE NEEDED AS SITE CONDITIONS CHANGE THROUGHOUT THE CONSTRUCTION PROCESS. THESE UPDATES MUST REFLECT BEST MANAGEMENT PRACTICES TO CONTROL SEDIMENT AND EROSION ONSITE AND SHOULD BE COMPLETED BASED ON DIRECTION FROM THE SITE ENGINEER. ADDITIONAL MEASURES MAY BE REQUIRED AS DIRECTED BY AN ENGINEER THROUGHOUT THE CONSTRUCTION PROCESS
8. CUT-OFF SWALES OR DITCHES ARE TO BE INSTALLED AS SHOWN ON THE ESC PLANS AND AS NECESSARY BASED ON CHANGING SITE CONDITIONS TO DIRECT OVERLAND FLOW TO THE APPROPRIATE SEDIMENT TRAP OF TEMPORARY SEDIMENT POND
9. CHECK DAMS ARE TO BE INSTALLED IN ALL SWALES AND DITCHES AS INDICATED ON THE ESC PLANS
10. TEMPORARY SEDIMENT TRAPS/PONDS ARE TO BE CONSTRUCTED AT THE BEGINNING OF SITE GRADING AND IF THE SITE DRAINAGE CHANGES DURING CONSTRUCTION. IT MAY BE NECESSARY FOR TEMPORARY SWALES TO BE CONSTRUCTED TO DIRECT SITE FLOWS TO THE TEMPORARY SEDIMENT TRAPS DURING ROUGH GRADING AND AS CONSTRUCTION PROGRESSES
11. FIBER ROLL CHECK DAM OR APPROVED EQUIVALENT TO BE INSTALLED DOWNSTREAM FROM SEDIMENT TRAP AND TEMPORARY SEDIMENT POND OUTLETS TO A MINIMUM HEIGHT OF 300mm
12. ANY DEWATERING OCCURRING ONSITE MUST BE IN ACCORDANCE WITH AN APPROVED DEWATERING PLAN. ADDITIONAL DEWATERING REQUIREMENTS MAY BE DEEMED NECESSARY AND SHALL BE IMPLEMENTED AS DIRECTED BY THE ENGINEER, CONTRACT ADMINISTRATOR OR LOCAL MUNICIPALITY
13. SPILL CLEANUP EQUIPMENT SUCH AS ABSORPTIVE MEDIA IS TO BE MAINTAINED ONSITE FOR IMMEDIATE USE IN THE EVENT OF A SPILL
14. THE CONTRACTOR WILL BE RESPONSIBLE FOR CLEAN-UP AND RESTORATION, INCLUDING ALL COSTS, DUE TO THE RELEASE OF SEDIMENT FROM THE SITE
15. LOW IMPACT DEVELOPMENT (LID) MEASURES ARE NOT TO BE USED AS SEDIMENT CONTROL DEVICES
16. ADDITIONAL SEDIMENT CONTROL DEVICES MAY BE DEEMED NECESSARY AND AS SITE CONDITIONS CHANGE AND SHALL BE INSTALLED AS DIRECTED BY THE SITE ENGINEER, CONTRACT ADMINISTRATOR OR LOCAL MUNICIPALITY

DUST CONTROL MEASURES

A DUST CONTROL PLAN WILL INCLUDE:

1. IDENTIFICATION OF ALL POTENTIAL DUST SOURCES;
2. A DESCRIPTION OF THE DUST CONTROL METHOD(S) TO BE USED FOR EACH SOURCE;
3. A SCHEDULE, RATE OF APPLICATION, CALCULATIONS OR SOME OTHER MEANS OF IDENTIFYING HOW OFTEN, HOW MUCH OR WHEN THE CONTROL METHOD IS TO BE USED;
4. PROVISIONS FOR MONITORING AND RECORD KEEPING;
5. A BACKUP PLAN IN CASE THE FIRST CONTROL PLAN DOES NOT WORK OR IS INSUFFICIENT;
6. STANTEC CONSULTING INC. (905-944-7777) WILL BE RESPONSIBLE FOR MAKING SURE THE PLAN IS IMPLEMENTED AND CAN BE CONTACTED IN THE EVENT OF A DUST CONTROL COMPLAINT.

PRE-GRADING PLANNING
1. TOPSOIL STRIPPING AND EARTHWORKS TO BE TIMED TO COINCIDE WITH EACH MUNICIPAL SERVICING AND/OR CONSTRUCTION PHASE; OR
2. STRIP TOPSOIL AND GRADE ENTIRE PROJECT AND APPLY VEGETATION GROUND COVER TO GRADED OR TOPSOIL STRIPPED AREAS WHERE CONSTRUCTION PHASE BEGINS MORE THAN 90 DAYS AFTER GRADING OR TOPSOIL STRIPPING OPERATIONS END.

WATERING (POST-GRADING)
1. WITHIN ACTIVE TOPSOIL STRIPPING, EARTH MOVING OR UNDERGROUND/ABOVEGROUND MUNICIPAL SERVICING AREAS, WATER TO BE APPLIED AT SUFFICIENT FREQUENCY AND QUANTITY TO PREVENT VISIBLE EMISSIONS FROM EXTENDING MORE THAN 30m FROM POINT OF ORIGIN.

TOPSOIL STOCKPILES
1. CONFINE LOAD IN/OUT PROCEDURES TO DOWNWIND SIDE OF THE MATERIAL. TOPSOIL PILE TO BE LOCATED DOWNWIND OF EXISTING RESIDENTIAL AREAS.
2. APPLY WATER TO HAUL ROADS AND STOCKPILE BY WAY OF WATER TRUCK.
3. GRADE AND VEGETATE TOPSOIL STOCKPILE TO PREVENT FUTURE WIND EROSION.

WIND FENCING
1. INSTALL 1.0m TO 1.5m HIGH BARRIERS WITH 50% OR LESS POROSITY LOCATED ADJACENT TO ROADWAYS OR URBAN AREAS TO REDUCE THE AMOUNT OF WINDBLOWN MATERIAL LEAVING THE SITE.

REDUCE VEHICLE SPEED
1. LIMIT VEHICLE SPEED TO 25km/hr MAXIMUM. MAY NEED TO BE USED IN CONJUNCTION WITH WATERING TO PREVENT VISIBLE DUST EMISSIONS.

MINIMIZE DISRUPTED SURFACE AREAS
1. TO DISTURB ONLY THOSE AREAS ABSOLUTELY REQUIRED. VEGETATION LEFT IN PLACE DURING SITE WORK REDUCES THE AREA SUBJECT TO WIND EROSION.

RESTRICT ACTIVITIES DURING HIGH WIND PERIODS
1. RESCHEDULE WORK AROUND WINDY DAYS. THE HIGH VISIBILITY OF CERTAIN WORKS AND THE CLOSE PROXIMITY AND POPULATION IMPACTED SHOULD BE TAKEN INTO CONSIDERATION WHEN SCHEDULING DUST-PRODUCING WORK.

ROAD CLEANING
1. SPILLAGE, EROSION OR MATERIAL "TRACKED OUT" ON A ROAD TO BE CLEANED USING MECHANICAL STREET SWEEPERS OR FLUSHER TRUCK BY AT LEAST THE END OF THE WORK DAY AND IMMEDIATELY IF IT EXTENDS MORE THAN 15 METRES ALONG A PAVED PUBLIC ROADWAY.

ROADSIDE NATIVE GRASS SEED MIX		
Qty %	Botanical Name	Common Name
25	Andropogon gerardi	Big Blue Stem
15	Antennaria neglecta	Pussy-Toes
8	Desmodium canadense	Showy Tick-Trefoil
4	Monarda fistulosa	Wild Bergamot
15	Polygala senega	Seneca Snakeroot
5	Rudbeckia hirta	Black-Eyed Susan
24	Sporobolus cryptandrus	Sand Drop Seed
4	Symphyotrichum novae-angliae	New England Aster

Planting Density

Sow a Nurse Crop: Annual Oats (Avena sativa) and Canada Wild Rye (Elymus canadensis) to be seeded at a rate of 22kg/hectare
Sow Roadside Native Grass Seed Mix at a Rate of Application: 35 kg./hectare. Apply an organic 8-32-16 ratio fertilizer at a rate of 38 kg per 1000m² at the time of seeding

LEGEND

- LIMIT OF SUBDIVISION
- LIMIT OF DISTURBANCE
- OVERLAND FLOW DIRECTION
- 1.9ha — DRAINAGE AREA (ha)
- 3:1 SLOPE
- 185.0 — EXISTING CONTOUR & ELEVATION
- PROPOSED STORM SEWER
- SINGLE/DOUBLE CATCHBASIN
- EXISTING STRUCTURES TO BE REMOVED
- CONSTRUCTION ENTRANCE MAT
- SEDIMENT CONTROL MEASURE AT CB's & MH's
- FIBER ROLL CHECK DAM AS PER OPSD 219.191 200mmø SPACED @ EVERY 0.2m GRADE DROP
- ROCK CHECK DAM AS PER OPSD 219.210
- HICKEN BOTTOM OUTLET
- LOT RISER DRAIN
- 186.78(SW) — INTERCEPTOR SWALE & INVERT
- HEAVY DUTY SILT FENCE
- TREE PROTECTION FENCE
- TCPL 30m OFFSET NO-WORK ZONE

NOTES

1. MACHINERY/EQUIPMENT CANNOT EXCEED 4.15M REACH HEIGHT WHEN CROSSING OR WORKING UNDER HYDRO CONDUCTORS.
2. WHEN WORKING IN CLOSE PROXIMITY TO EXISTING HYDRO ONE TOWERS, THE PROPONENT'S CONTRACTOR IS TO AVOID HAVING PHYSICAL CONTACT WITH THE HYDRO ONE TOWERS. A TEMPORARY WOODEN OR NON-METALLIC BARRIER IS TO BE PLACED AROUND THE TOWER DURING THE PROPONENT'S WORK.
3. AS PER OHSA, THE PROPONENT NEEDS TO ENSURE THAT THE WORKERS PERFORMING THE WORK WEAR THE NECESSARY PERSONAL PROTECTIVE EQUIPMENT INCLUDING ELECTRIC SHOCK PROTECTIVE SAFETY BOOTS.

No.	DESCRIPTION	DATE	APPROVED
1.	FIRST SUBMISSION TO AGENCIES	JUN 22, 2023	S.A.K.
2.	FIRST SITE ALTERATION PERMIT APPLICATION	NOV 20, 2023	S.A.K.
3.	ADDED CURB CUT AND FENCE	APR 11, 2024	S.A.K.
4.	ADDED HYDRO ONE NOTES & SHIFTED STREET C ACCESS	MAY 03, 2024	S.A.K.
5.	SITE ALTERATION PERMIT RENEWAL APPLICATION	MAY 9, 2025	S.A.K.

BENCHMARK: 00119673595 ELEV. 181.240m
TOWNSHIP: NIAGARA FALLS AREA CONCRETE CYLINDER, 8.1m WEST OF CENTRELINE OF THOROLD TOWN LINE ROAD, OPPOSITE HOUSE No.832, ON EAST SIDE OF ROAD, 1.4m SOUTH OF TELEPHONE POLE No.N.I.6, TABLET IN TOP. ESTABLISHED BY TOPOGRAPHICAL SURVEY.

Permit/Seal

LICENSED PROFESSIONAL ENGINEER
S.A. KHAN
100085491
MAY 09, 2025
PROVINCE OF ONTARIO

Stantec
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300W-675 Cochrane Drive
Markham ON
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CITY OF THOROLD APPROVED

DATE

MANAGER, DEVELOPMENT ENGINEERING

City of Thorold — Where Ships Climb The Mountain...

Parkbridge
70 HURON STREET
COLLINGWOOD
ONTARIO, L9Y 3Z1
T: 705 429 6142

UPPER'S GROVE
PROPOSED RESIDENTIAL DEVELOPMENT
(PHASE 1)
CITY OF THOROLD
EROSION & SEDIMENT CONTROL PLAN
STAGE 2

PHASE 1 NORTH LANDS
ROUGH GRADING & POST SERVICING

SCALE: 1:1500	TOWN FILE No.:	DRAWING No.:
DESIGN BY: J.L.	DRAWN BY: J.L.	C-602
REVIEWED BY: S.A.		

ORIGINAL SHEET - ARCH D

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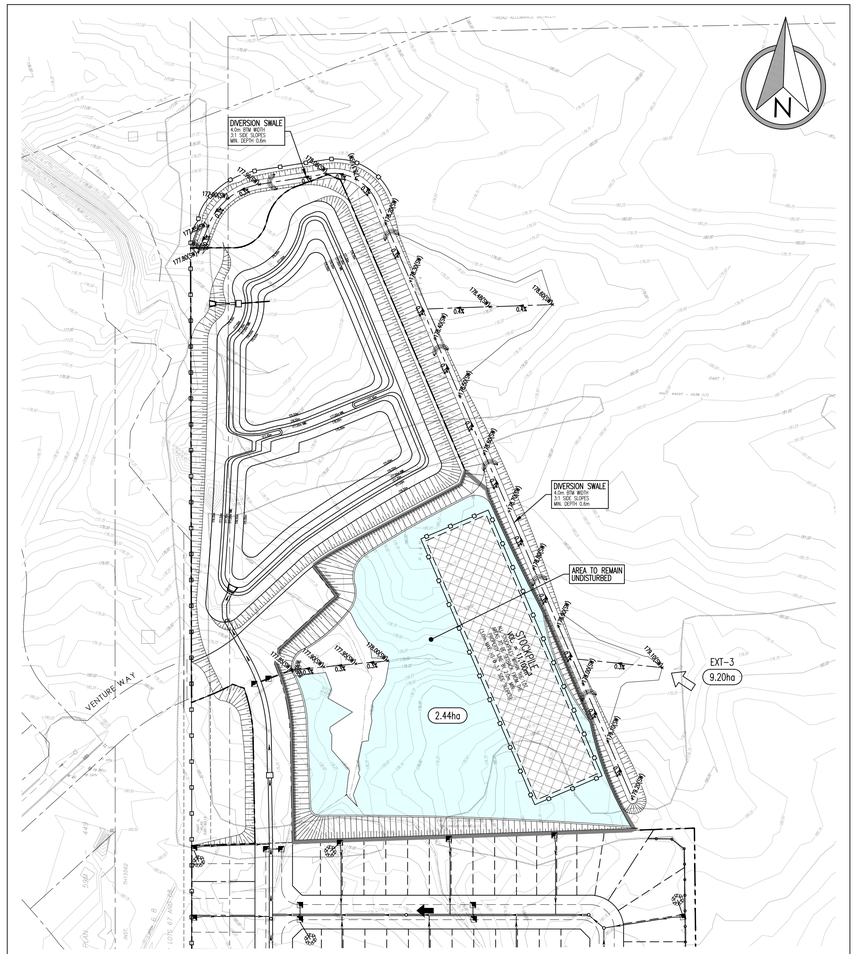

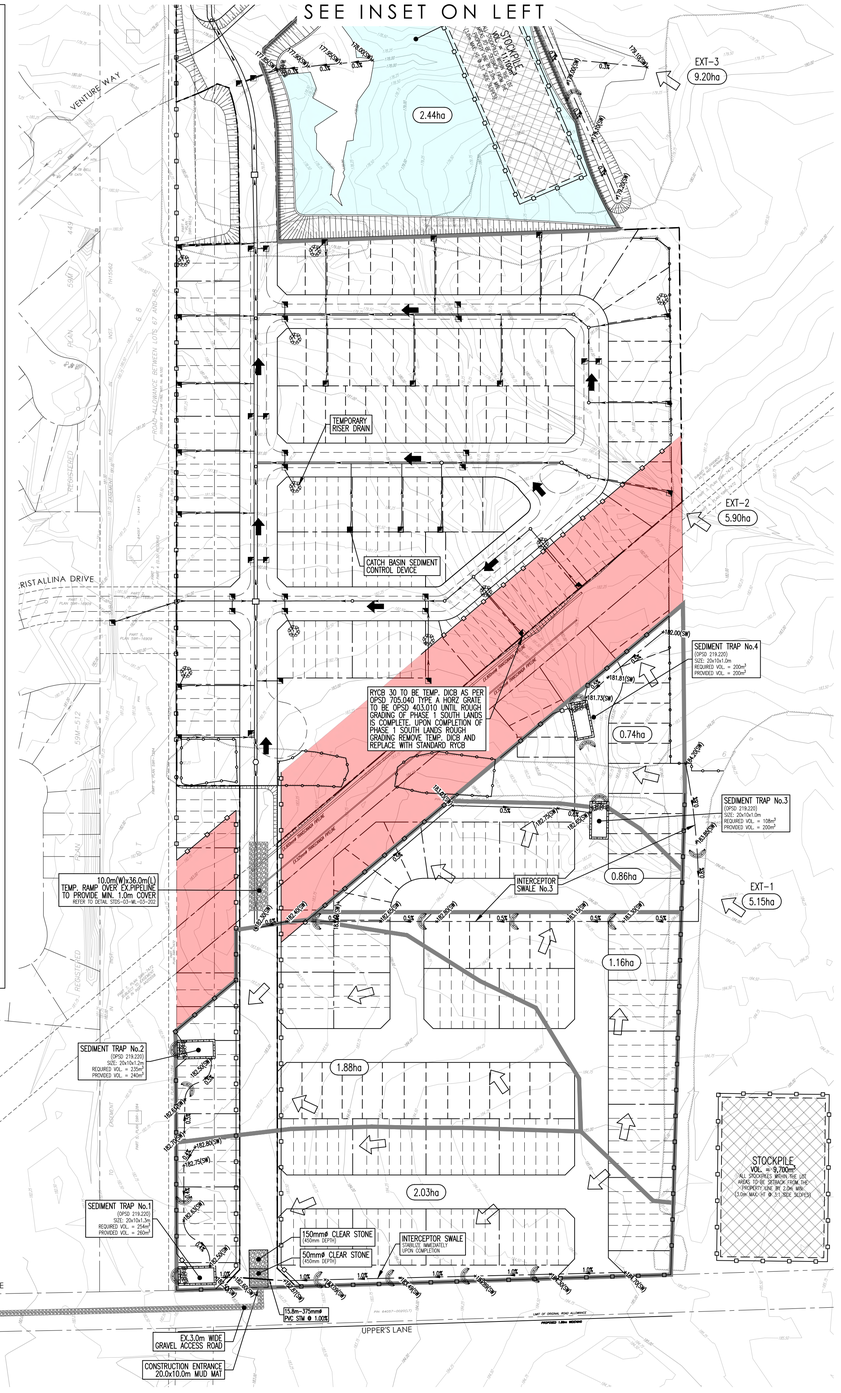

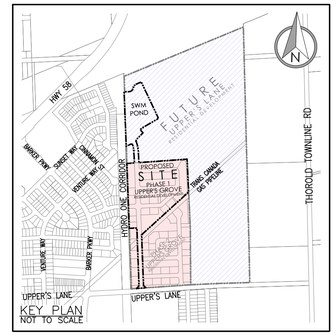

SEQUENCE OF CONSTRUCTION
PHASE 1 SOUTH LANDS STAGE 1A
TOPSOIL STRIPPING

1. ALL TREE CLEARING/PROTECTION FENCING TO BE COMPLETED PER TREE SAVING PLAN – TERRASTORY AUGUST 2019
2. INSTALL PERIMETER SILT FENCE & CONSTRUCTION ENTRANCE MAT
3. CONSTRUCT INTERCEPTOR SWALES & SEDIMENT TRAPS
4. INSTALL FIBER ROLL AND ROCK CHECK DAMS
5. STRIP TOPSOIL FROM REMAINDER OF SITE AND STOCKPILE FOR EXPORT
6. COMPLETE SITE CUT/FILL & SITE FILL IMPORT TO PREGRADE
7. ALL DISTURBED GROUND LEFT INACTIVE FOR 30 DAYS SHALL BE VEGETATED, SUBJECT TO WEATHER CONDITIONS. DISTURBED AREAS ARE TO BE HYDROSEEDED (OR AN APPROVED EQUIVALENT) TO THE SATISFACTION OF THE DIRECTOR OF ENGINEERING.

STANDARD NOTES

1. ALL SEDIMENT CONTROL MEASURES SUCH AS SEDIMENT CONTROL FENCE, TEMPORARY PONDS, CONSTRUCTION ACCESS MATS, SEDIMENT TRAPS, SWALES AND CHECK DAMS MUST BE INSTALLED PRIOR TO THE COMMENCEMENT OF SITE WORKS
2. SEDIMENT CONTROLS TO BE INSPECTED ON A REGULAR BASIS AND AFTER EVERY SIGNIFICANT RAINFALL EVENT. REPAIRS TO ESC MEASURES MUST BE COMPLETED IN A TIMELY MANNER TO PREVENT SEDIMENT MIGRATION
3. ADDITIONAL MATERIALS SUCH AS CLEAR STONE, FILTER FABRIC, PUMPS, HOSES AND SILTSOXX TO BE KEPT ONSITE AT ALL TIMES FOR CONDUCTING REPAIRS TO SEDIMENT CONTROL MEASURES
4. ALL DISTURBED AREAS LEFT INACTIVE FOR MORE THAN THIRTY DAYS ARE TO BE STABILIZED
5. THE STABILIZATION SEED MIXTURE IS TO BE AS SPECIFIED ON THE EROSION AND SEDIMENT CONTROL PLAN
6. THE STABILIZATION SEED MIXTURE IS TO BE APPLIED AT A MINIMUM RATE OF 25kg/ha
7. ENGINEERED CHANGES TO THE ESC MEASURES MAY BE NEEDED AS SITE CONDITIONS CHANGE THROUGHOUT THE CONSTRUCTION PROCESS. THESE UPDATES MUST REFLECT BEST MANAGEMENT PRACTICES TO CONTROL SEDIMENT AND EROSION ONSITE AND SHOULD BE COMPLETED BASED ON DIRECTION FROM THE SITE ENGINEER. ADDITIONAL MEASURES MAY BE REQUIRED AS DIRECTED BY AN ENGINEER THROUGHOUT THE CONSTRUCTION PROCESS
8. CUT-OFF SWALES OR DITCHES ARE TO BE INSTALLED AS SHOWN ON THE ESC PLANS AND AS NECESSARY BASED ON CHANGING SITE CONDITIONS TO DIRECT OVERLAND FLOW TO THE APPROPRIATE SEDIMENT TRAP OF TEMPORARY SEDIMENT POND
9. CHECK DAMS ARE TO BE INSTALLED IN ALL SWALES AND DITCHES AS INDICATED ON THE ESC PLANS
10. TEMPORARY SEDIMENT TRAPS/PONDS ARE TO BE CONSTRUCTED AT THE BEGINNING OF SITE GRADING AND IF THE SITE DRAINAGE CHANGES DURING CONSTRUCTION. IT MAY BE NECESSARY FOR TEMPORARY SWALES TO BE CONSTRUCTED TO DIRECT SITE FLOWS TO THE TEMPORARY SEDIMENT TRAPS DURING ROUGH GRADING AND AS CONSTRUCTION PROGRESSES
11. FIBER ROLL CHECK DAM OR APPROVED EQUIVALENT TO BE INSTALLED DOWNSTREAM FROM SEDIMENT TRAP AND TEMPORARY SEDIMENT POND OUTLETS TO A MINIMUM HEIGHT OF 300mm
12. ANY DEWATERING OCCURRING ONSITE MUST BE IN ACCORDANCE WITH AN APPROVED DEWATERING PLAN. ADDITIONAL DEWATERING REQUIREMENTS MAY BE DEEMED NECESSARY AND SHALL BE IMPLEMENTED AS DIRECTED BY THE ENGINEER, CONTRACT ADMINISTRATOR OR LOCAL MUNICIPALITY
13. SPILL CLEANUP EQUIPMENT SUCH AS ABSORPTIVE MEDIA IS TO BE MAINTAINED ONSITE FOR IMMEDIATE USE IN THE EVENT OF A SPILL
14. THE CONTRACTOR WILL BE RESPONSIBLE FOR CLEAN-UP AND RESTORATION, INCLUDING ALL COSTS, DUE TO THE RELEASE OF SEDIMENT FROM THE SITE
15. LOW IMPACT DEVELOPMENT (LID) MEASURES ARE NOT TO BE USED AS SEDIMENT CONTROL DEVICES
16. ADDITIONAL SEDIMENT CONTROL DEVICES MAY BE DEEMED NECESSARY AND AS SITE CONDITIONS CHANGE AND SHALL BE INSTALLED AS DIRECTED BY THE SITE ENGINEER, CONTRACT ADMINISTRATOR OR LOCAL MUNICIPALITY

DUST CONTROL MEASURES

A DUST CONTROL PLAN WILL INCLUDE:

1. IDENTIFICATION OF ALL POTENTIAL DUST SOURCES;
2. A DESCRIPTION OF THE DUST CONTROL METHOD(S) TO BE USED FOR EACH SOURCE;
3. A SCHEDULE, RATE OF APPLICATION, CALCULATIONS OR SOME OTHER MEANS OF IDENTIFYING HOW OFTEN, HOW MUCH OR WHEN THE CONTROL METHOD IS TO BE USED;
4. PROVISIONS FOR MONITORING AND RECORD KEEPING;
5. A BACKUP PLAN IN CASE THE FIRST CONTROL PLAN DOES NOT WORK OR IS INSUFFICIENT;
6. STANTEC CONSULTING INC. (905-944-7777) WILL BE RESPONSIBLE FOR MAKING SURE THE PLAN IS IMPLEMENTED AND CAN BE CONTACTED IN THE EVENT OF A DUST CONTROL COMPLAINT.

PRE-GRADING PLANNING
1. TOPSOIL STRIPPING AND EARTHWORKS TO BE TIMED TO COINCIDE WITH EACH MUNICIPAL SERVICING AND/OR CONSTRUCTION PHASE; OR
2. STRIP TOPSOIL AND GRADE ENTIRE PROJECT AND APPLY VEGETATION GROUND COVER TO GRADED OR TOPSOIL STRIPPED AREAS WHERE CONSTRUCTION PHASE BEGINS MORE THAN 90 DAYS AFTER GRADING OR TOPSOIL STRIPPING OPERATIONS END.

WATERING (POST-GRADING)
1. WITHIN ACTIVE TOPSOIL STRIPPING, EARTH MOVING OR UNDERGROUND/ABOVEGROUND MUNICIPAL SERVICING AREAS, WATER TO BE APPLIED AT SUFFICIENT FREQUENCY AND QUANTITY TO PREVENT VISIBLE EMISSIONS FROM EXTENDING MORE THAN 30m FROM POINT OF ORIGIN.

TOPSOIL STOCKPILES
1. CONFINE LOAD IN/OUT PROCEDURES TO DOWNWIND SIDE OF THE MATERIAL. TOPSOIL PILE TO BE LOCATED DOWNWIND OF EXISTING RESIDENTIAL AREAS.
2. APPLY WATER TO HAUL ROADS AND STOCKPILE BY WAY OF WATER TRUCK.
3. GRADE AND VEGETATE TOPSOIL STOCKPILE TO PREVENT FUTURE WIND EROSION.

WIND FENCING
1. INSTALL 1.0m TO 1.5m HIGH BARRIERS WITH 50% OR LESS POROSITY LOCATED ADJACENT TO ROADWAYS OR URBAN AREAS TO REDUCE THE AMOUNT OF WINDBLOWN MATERIAL LEAVING THE SITE.

REDUCE VEHICLE SPEED
1. LIMIT VEHICLE SPEED TO 25km/hr MAXIMUM. MAY NEED TO BE USED IN CONJUNCTION WITH WATERING TO PREVENT VISIBLE DUST EMISSIONS.

MINIMIZE DISRUPTED SURFACE AREAS
1. TO DISTURB ONLY THOSE AREAS ABSOLUTELY REQUIRED. VEGETATION LEFT IN PLACE DURING SITE WORK REDUCES THE AREA SUBJECT TO WIND EROSION.

RESTRICT ACTIVITIES DURING HIGH WIND PERIODS
1. RESCHEDULE WORK AROUND WINDY DAYS. THE HIGH VISIBILITY OF CERTAIN WORKS AND THE CLOSE PROXIMITY AND POPULATION IMPACTED SHOULD BE TAKEN INTO CONSIDERATION WHEN SCHEDULING DUST-PRODUCING WORK.

ROAD CLEANING
1. SPILLAGE, EROSION OR MATERIAL "TRACKED OUT" ON A ROAD TO BE CLEANED USING MECHANICAL STREET SWEEPERS OR FLUSHER TRUCK BY AT LEAST THE END OF THE WORK DAY AND IMMEDIATELY IF IT EXTENDS MORE THAN 15 METRES ALONG A PAVED PUBLIC ROADWAY.

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LEGEND

- LIMIT OF SUBDIVISION
- LIMIT OF DISTURBANCE
- OVERLAND FLOW DIRECTION
- 1.9ha DRAINAGE AREA (ha)
- 3:1 SLOPE
- 180.0 EXISTING CONTOUR & ELEVATION
- PROPOSED STORM SEWER
- SINGLE/DOUBLE CATCHBASIN
- EXISTING STRUCTURES TO BE REMOVED
- CONSTRUCTION ENTRANCE MAT
- SEDIMENT CONTROL MEASURE AT CB's & MH's
- FIBER ROLL CHECK DAM AS PER OPSD 219.191 200mm# SPACED @ EVERY 0.2m GRADE DROP
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- HICKEN BOTTOM OUTLET
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- 186.78(SW) INTERCEPTOR SWALE & INVERT
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- TREE PROTECTION FENCE
- TCPL 30m OFFSET NO-WORK ZONE

NOTES

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2.	FIRST SITE ALTERATION PERMIT APPLICATION	NOV 20, 2023	S.A.K.
3.	ADDED CURB CUT AND FENCE	APR 11, 2024	S.A.K.
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5.	SITE ALTERATION PERMIT RENEWAL APPLICATION	MAY 9, 2025	S.A.K.

BENCHMARK: 00119673595 ELEV. 181.240m
TOWNSHIP: NIAGARA FALLS AREA CONCRETE CYLINDER, 8.1m WEST OF CENTRELINE OF THOROLD TOWN LINE ROAD, OPPOSITE HOUSE No.832, ON EAST SIDE OF ROAD, 1.4m SOUTH OF TELEPHONE POLE No.N.I.6, TABLET IN TOP, ESTABLISHED BY TOPOGRAPHICAL SURVEY.

Permit/Seal

LICENSED PROFESSIONAL ENGINEER S.A. KHAN 100085491 MAY 09, 2025 PROVINCE OF ONTARIO

Stantec
Stantec Consulting Ltd.
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Markham ON
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CITY OF THOROLD APPROVED

DATE

MANAGER, DEVELOPMENT ENGINEERING

City of Thorold — Where Ships Climb The Mountain...

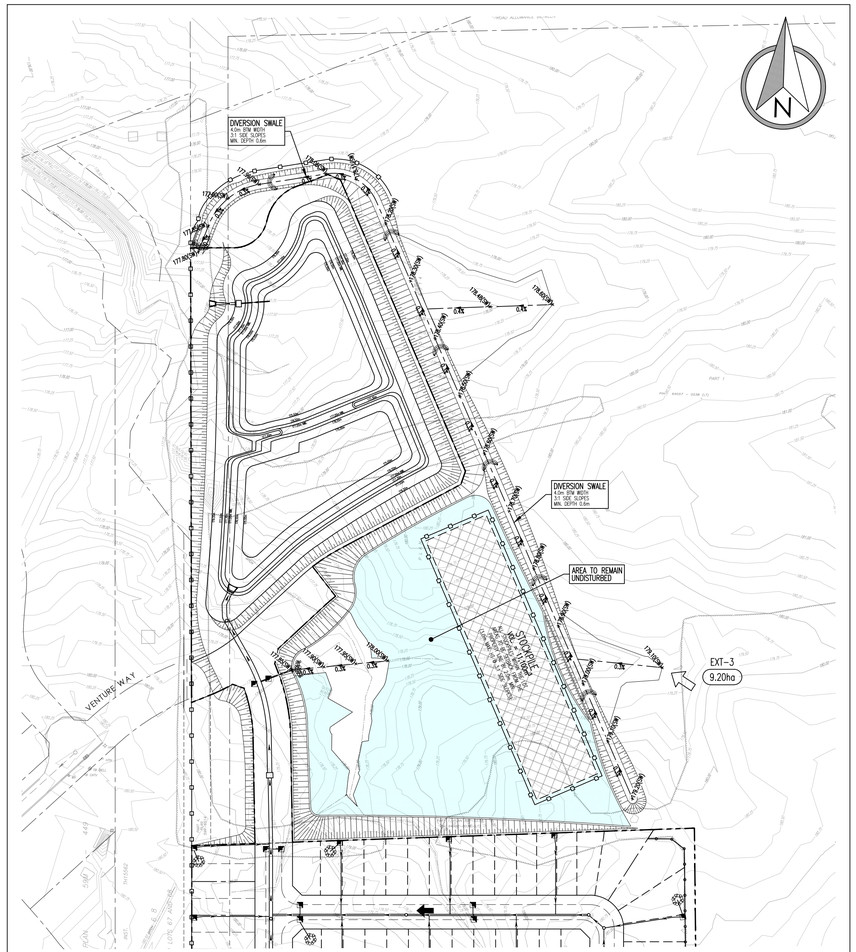
Parkbridge
70 HURON STREET
COLLINGWOOD
ONTARIO, L9Y 3Z1
T: 705 429 6142

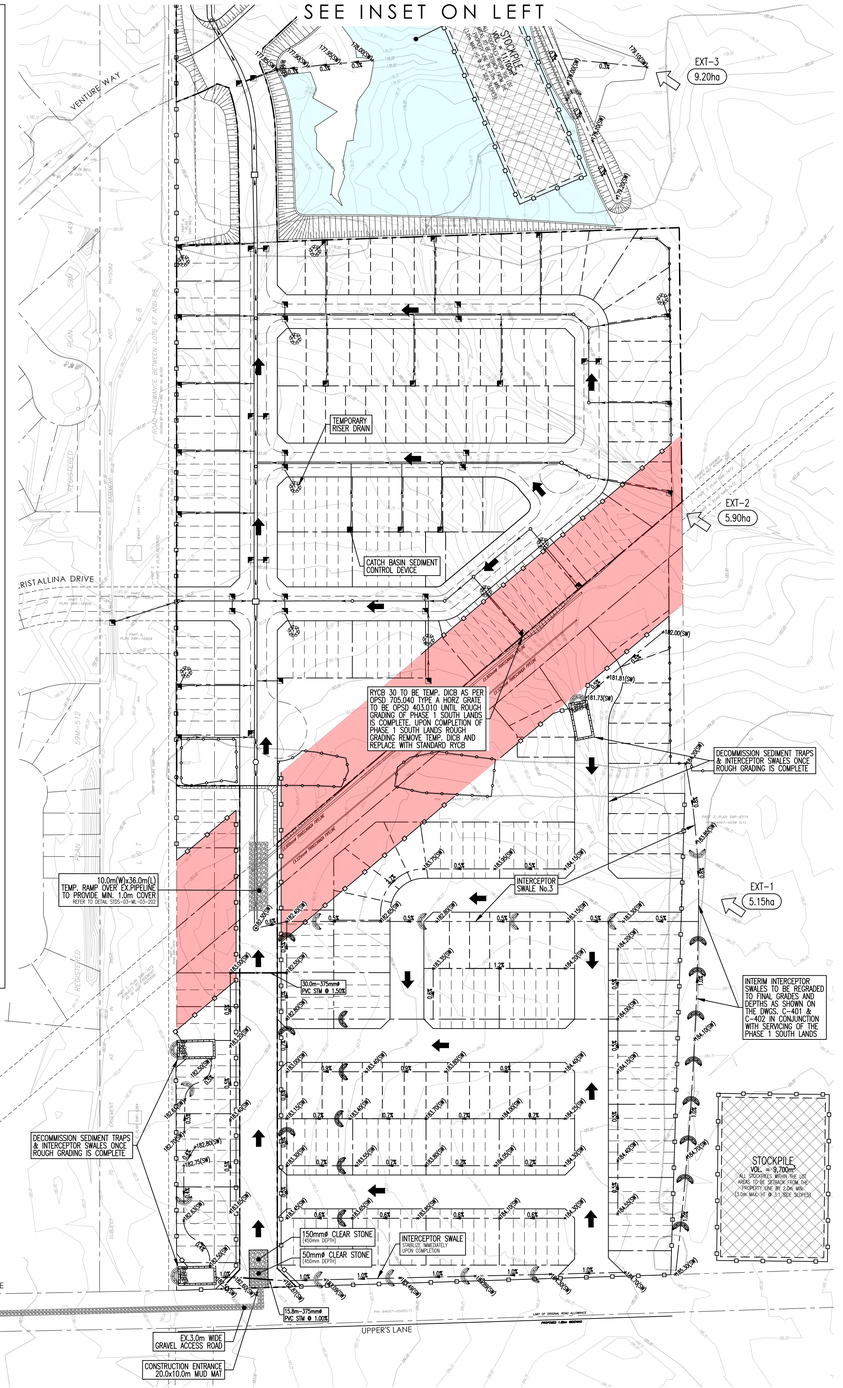
UPPER'S GROVE
PROPOSED RESIDENTIAL DEVELOPMENT
(PHASE 1)
CITY OF THOROLD
EROSION & SEDIMENT CONTROL PLAN
STAGE 1A

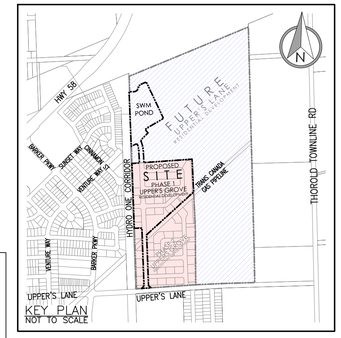
PHASE 1 SOUTH LANDS
TOPSOIL STRIPPING

SCALE: 1:1500	TOWN FILE No.: _____	DRAWING No.:
DESIGN BY: J.L.	DRAWN BY: J.L.	C-603
REVIEWED BY: S.A.		

ORIGINAL SHEET - ARCH D







SEQUENCE OF CONSTRUCTION
PHASE 1 SOUTH LANDS STAGE 2A ROUGH GRADING

1. INSPECT AND MAINTAIN ALL EROSION CONTROL MEASURES INSTALLED IN STAGE 1
2. COMPLETE SITE EARTHWORKS TO PREGRADE, INCLUDING GRADING WITHIN THE TCPL EASEMENT
3. CONSTRUCT INTERCEPTOR SWALES & SEDIMENT TRAPS AT TOE OF SLOPES AS REQUIRED
4. INSTALL FIBER ROLL AND ROCK CHECK DAMS AS REQUIRED
5. INSTALL ALL UNDERGROUND SERVICES FOR THE ENTIRE PHASE, FOLLOWED BY ROADS TO BASE ASPHALT. INSTALL TEMPORARY LOT RISER DRAINS AT SERVICE LATERALS AS INDICATED
6. ONCE THE ROADS ARE CONSTRUCTED TO BASE ASPHALT AND SWM FACILITY COMPLETED, RUNOFF FROM THE SITE WILL BE DIRECTED TO THE STORM SEWERS AND INTO THE SWM POND
7. DURING HOME BUILDING OPERATIONS, THE PERIMETER EROSION AND SEDIMENT CONTROL MEASURES & SWM FACILITY WILL BE INSPECTED ON A REGULAR BASIS AND MAINTAINED IF EXCESSIVE AMOUNTS OF SEDIMENT ARE OBSERVED
8. IMMEDIATELY UPON COMPLETION OF THE HOUSES, UNDERTAKE FINE GRADING, TOPSOILING AND SODDING OF THE LOTS AND ADJACENT BOULEVARDS. IT IS ANTICIPATED TO BE COMPLETED IN STAGES AS BLOCKS OF HOUSES ARE COMPLETED AND WEATHER CONDITIONS PERMIT

STANDARD NOTES

1. ALL SEDIMENT CONTROL MEASURES SUCH AS SEDIMENT CONTROL FENCE, TEMPORARY PONDS, CONSTRUCTION ACCESS MATS, SEDIMENT TRAPS, SWALES AND CHECK DAMS MUST BE INSTALLED PRIOR TO THE COMMENCEMENT OF SITE WORKS
2. SEDIMENT CONTROLS TO BE INSPECTED ON A REGULAR BASIS AND AFTER EVERY SIGNIFICANT RAINFALL EVENT. REPAIRS TO ESC MEASURES MUST BE COMPLETED IN A TIMELY MANNER TO PREVENT SEDIMENT MIGRATION
3. ADDITIONAL MATERIALS SUCH AS CLEAR STONE, FILTER FABRIC, PUMPS, HOSES AND SILTSOXX TO BE KEPT ONSITE AT ALL TIMES FOR CONDUCTING REPAIRS TO SEDIMENT CONTROL MEASURES
4. ALL DISTURBED AREAS LEFT INACTIVE FOR MORE THAN THIRTY DAYS ARE TO BE STABILIZED
5. THE STABILIZATION SEED MIXTURE IS TO BE AS SPECIFIED ON THE EROSION AND SEDIMENT CONTROL PLAN
6. THE STABILIZATION SEED MIXTURE IS TO BE APPLIED AT A MINIMUM RATE OF 25kg/ha
7. ENGINEERED CHANGES TO THE ESC MEASURES MAY BE NEEDED AS SITE CONDITIONS CHANGE THROUGHOUT THE CONSTRUCTION PROCESS. THESE UPDATES MUST REFLECT BEST MANAGEMENT PRACTICES TO CONTROL SEDIMENT AND EROSION ONSITE AND SHOULD BE COMPLETED BASED ON DIRECTION FROM THE SITE ENGINEER. ADDITIONAL MEASURES MAY BE REQUIRED AS DIRECTED BY AN ENGINEER THROUGHOUT THE CONSTRUCTION PROCESS
8. CUT-OFF SWALES OR DITCHES ARE TO BE INSTALLED AS SHOWN ON THE ESC PLANS AND AS NECESSARY BASED ON CHANGING SITE CONDITIONS TO DIRECT OVERLAND FLOW TO THE APPROPRIATE SEDIMENT TRAP OF TEMPORARY SEDIMENT POND
9. CHECK DAMS ARE TO BE INSTALLED IN ALL SWALES AND DITCHES AS INDICATED ON THE ESC PLANS
10. TEMPORARY SEDIMENT TRAPS/PONDS ARE TO BE CONSTRUCTED AT THE BEGINNING OF SITE GRADING AND IF THE SITE DRAINAGE CHANGES DURING CONSTRUCTION. IT MAY BE NECESSARY FOR TEMPORARY SWALES TO BE CONSTRUCTED TO DIRECT SITE FLOWS TO THE TEMPORARY SEDIMENT TRAPS DURING ROUGH GRADING AND AS CONSTRUCTION PROGRESSES
11. FIBER ROLL CHECK DAM OR APPROVED EQUIVALENT TO BE INSTALLED DOWNSTREAM FROM SEDIMENT TRAP AND TEMPORARY SEDIMENT POND OUTLETS TO A MINIMUM HEIGHT OF 300mm
12. ANY DEWATERING OCCURRING ONSITE MUST BE IN ACCORDANCE WITH AN APPROVED DEWATERING PLAN. ADDITIONAL DEWATERING REQUIREMENTS MAY BE DEEMED NECESSARY AND SHALL BE IMPLEMENTED AS DIRECTED BY THE ENGINEER, CONTRACT ADMINISTRATOR OR LOCAL MUNICIPALITY
13. SPILL CLEANUP EQUIPMENT SUCH AS ABSORPTIVE MEDIA IS TO BE MAINTAINED ONSITE FOR IMMEDIATE USE IN THE EVENT OF A SPILL
14. THE CONTRACTOR WILL BE RESPONSIBLE FOR CLEAN-UP AND RESTORATION, INCLUDING ALL COSTS, DUE TO THE RELEASE OF SEDIMENT FROM THE SITE
15. LOW IMPACT DEVELOPMENT (LID) MEASURES ARE NOT TO BE USED AS SEDIMENT CONTROL DEVICES
16. ADDITIONAL SEDIMENT CONTROL DEVICES MAY BE DEEMED NECESSARY AND AS SITE CONDITIONS CHANGE AND SHALL BE INSTALLED AS DIRECTED BY THE SITE ENGINEER, CONTRACT ADMINISTRATOR OR LOCAL MUNICIPALITY

DUST CONTROL MEASURES

A DUST CONTROL PLAN WILL INCLUDE:

1. IDENTIFICATION OF ALL POTENTIAL DUST SOURCES;
2. A DESCRIPTION OF THE DUST CONTROL METHOD(S) TO BE USED FOR EACH SOURCE;
3. A SCHEDULE, RATE OF APPLICATION, CALCULATIONS OR SOME OTHER MEANS OF IDENTIFYING HOW OFTEN, HOW MUCH OR WHEN THE CONTROL METHOD IS TO BE USED;
4. PROVISIONS FOR MONITORING AND RECORD KEEPING;
5. A BACKUP PLAN IN CASE THE FIRST CONTROL PLAN DOES NOT WORK OR IS INSUFFICIENT;
6. STANTEC CONSULTING INC. (905-944-7777) WILL BE RESPONSIBLE FOR MAKING SURE THE PLAN IS IMPLEMENTED AND CAN BE CONTACTED IN THE EVENT OF A DUST CONTROL COMPLAINT.

PRE-GRADING PLANNING
1. TOPSOIL STRIPPING AND EARTHWORKS TO BE TIMED TO COINCIDE WITH EACH MUNICIPAL SERVICING AND/OR CONSTRUCTION PHASE; OR
2. STRIP TOPSOIL AND GRADE ENTIRE PROJECT AND APPLY VEGETATION GROUND COVER TO GRADED OR TOPSOIL STRIPPED AREAS WHERE CONSTRUCTION PHASE BEGINS MORE THAN 90 DAYS AFTER GRADING OR TOPSOIL STRIPPING OPERATIONS END.

WATERING (POST-GRADING)
1. WITHIN ACTIVE TOPSOIL STRIPPING, EARTH MOVING OR UNDERGROUND/ABOVEGROUND MUNICIPAL SERVICING AREAS, WATER TO BE APPLIED AT SUFFICIENT FREQUENCY AND QUANTITY TO PREVENT VISIBLE EMISSIONS FROM EXTENDING MORE THAN 30m FROM POINT OF ORIGIN.

TOPSOIL STOCKPILES
1. CONFINE LOAD IN/OUT PROCEDURES TO DOWNWIND SIDE OF THE MATERIAL. TOPSOIL PILE TO BE LOCATED DOWNWIND OF EXISTING RESIDENTIAL AREAS.
2. APPLY WATER TO HAUL ROADS AND STOCKPILE BY WAY OF WATER TRUCK.
3. GRADE AND VEGETATE TOPSOIL STOCKPILE TO PREVENT FUTURE WIND EROSION.

WIND FENCING
1. INSTALL 1.0m TO 1.5m HIGH BARRIERS WITH 50% OR LESS POROSITY LOCATED ADJACENT TO ROADWAYS OR URBAN AREAS TO REDUCE THE AMOUNT OF WINDBLOWN MATERIAL LEAVING THE SITE.

REDUCE VEHICLE SPEED
1. LIMIT VEHICLE SPEED TO 25km/hr MAXIMUM. MAY NEED TO BE USED IN CONJUNCTION WITH WATERING TO PREVENT VISIBLE DUST EMISSIONS.

MINIMIZE DISRUPTED SURFACE AREAS
1. TO DISTURB ONLY THOSE AREAS ABSOLUTELY REQUIRED. VEGETATION LEFT IN PLACE DURING SITE WORK REDUCES THE AREA SUBJECT TO WIND EROSION.

RESTRICT ACTIVITIES DURING HIGH WIND PERIODS
1. RESCHEDULE WORK AROUND WINDY DAYS. THE HIGH VISIBILITY OF CERTAIN WORKS AND THE CLOSE PROXIMITY AND POPULATION IMPACTED SHOULD BE TAKEN INTO CONSIDERATION WHEN SCHEDULING DUST-PRODUCING WORK.

ROAD CLEANING
1. SPILLAGE, EROSION OR MATERIAL "TRACKED OUT" ON A ROAD TO BE CLEANED USING MECHANICAL STREET SWEEPERS OR FLUSHER TRUCK BY AT LEAST THE END OF THE WORK DAY AND IMMEDIATELY IF IT EXTENDS MORE THAN 15 METRES ALONG A PAVED PUBLIC ROADWAY.

ROADSIDE NATIVE GRASS SEED MIX		
Qty %	Botanical Name	Common Name
25	Andropogon gerardi	Big Blue Stem
15	Antennaria neglecta	Pussy-Toes
8	Desmodium canadense	Showy Tick-Trefoil
4	Monarda fistulosa	Wild Bergamot
15	Polygala senega	Seneca Snakeroot
5	Rudbeckia hirta	Black-Eyed Susan
24	Sporobolus cryptandrus	Sand Drop Seed
4	Symphyotrichum novae-angliae	New England Aster

Planting Density

Sow a Nurse Crop: Annual Oats (Avena sativa) and Canada Wild Rye (Elymus canadensis) to be seeded at a rate of 22kg/hectare
Sow Roadside Native Grass Seed Mix at a Rate of Application: 35 kg./hectare. Apply an organic 8-32-16 ratio fertilizer at a rate of 38 kg per 1000m² at the time of seeding

LEGEND

- LIMIT OF SUBDIVISION
- LIMIT OF DISTURBANCE
- OVERLAND FLOW DIRECTION
- 1.9ha — DRAINAGE AREA (ha)
- 3:1 SLOPE
- 185.0 — EXISTING CONTOUR & ELEVATION
- PROPOSED STORM SEWER
- SINGLE/DOUBLE CATCHBASIN
- EXISTING STRUCTURES TO BE REMOVED
- CONSTRUCTION ENTRANCE MAT
- SEDIMENT CONTROL MEASURE AT CB's & MH's
- FIBER ROLL CHECK DAM AS PER OPSD 219.191 200mm# SPACED @ EVERY 0.2m GRADE DROP
- ROCK CHECK DAM AS PER OPSD 219.210
- HICKEN BOTTOM OUTLET
- LOT RISER DRAIN
- 186.78(SW) — INTERCEPTOR SWALE & INVERT
- HEAVY DUTY SILT FENCE
- TREE PROTECTION FENCE
- TCPL 30m OFFSET NO-WORK ZONE

NOTES

1. MACHINERY/EQUIPMENT CANNOT EXCEED 4.15M REACH HEIGHT WHEN CROSSING OR WORKING UNDER HYDRO CONDUCTORS.
2. WHEN WORKING IN CLOSE PROXIMITY TO EXISTING HYDRO ONE TOWERS, THE PROPONENT'S CONTRACTOR IS TO AVOID HAVING PHYSICAL CONTACT WITH THE HYDRO ONE TOWERS. A TEMPORARY WOODEN OR NON-METALLIC BARRIER IS TO BE PLACED AROUND THE TOWER DURING THE PROPONENT'S WORK.
3. AS PER OHSA, THE PROPONENT NEEDS TO ENSURE THAT THE WORKERS PERFORMING THE WORK WEAR THE NECESSARY PERSONAL PROTECTIVE EQUIPMENT INCLUDING ELECTRIC SHOCK PROTECTIVE SAFETY BOOTS.

No.	DESCRIPTION	DATE	APPROVED
1.	FIRST SUBMISSION TO AGENCIES	JUN 22, 2023	S.A.K.
2.	FIRST SITE ALTERATION PERMIT APPLICATION	NOV 20, 2023	S.A.K.
3.	ADDED CURB CUT AND FENCE	APR 11, 2024	S.A.K.
4.	ADDED HYDRO ONE NOTES & SHIFTED STREET C ACCESS	MAY 03, 2024	S.A.K.
5.	SITE ALTERATION PERMIT RENEWAL APPLICATION	MAY 9, 2025	S.A.K.

BENCHMARK: 00119673595 ELEV. 181.240m
TOWNSHIP: NIAGARA FALLS AREA CONCRETE CYLINDER, 8.1m WEST OF CENTRELINE OF THOROLD TOWN LINE ROAD, OPPOSITE HOUSE No.832, ON EAST SIDE OF ROAD, 1.4m SOUTH OF TELEPHONE POLE No.N.I.6, TABLET IN TOP. ESTABLISHED BY TOPOGRAPHICAL SURVEY.

Permit/Seal

LICENSED PROFESSIONAL ENGINEER — S.A. KHAN — 100085491 — MAY 09, 2025 — PROVINCE OF ONTARIO

Stantec
Stantec Consulting Ltd.
300W-675 Cochrane Drive
Markham ON
Tel: 905.944.7777
www.stantec.com

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CITY OF THOROLD APPROVED

DATE

MANAGER, DEVELOPMENT ENGINEERING

City of Thorold — Where Ships Climb The Mountain...

Parkbridge
70 HURON STREET
COLLINGWOOD
ONTARIO, L9Y 3Z1
T: 705 429 6142

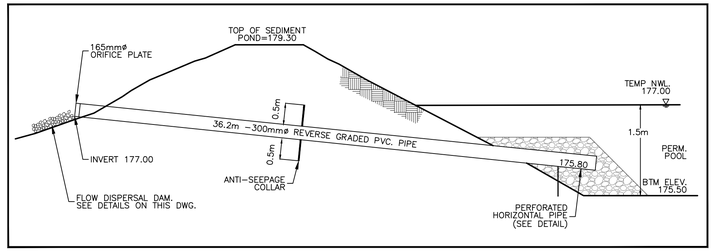
UPPER'S GROVE PROPOSED RESIDENTIAL DEVELOPMENT (PHASE 1)
CITY OF THOROLD

EROSION & SEDIMENT CONTROL PLAN STAGE 2A

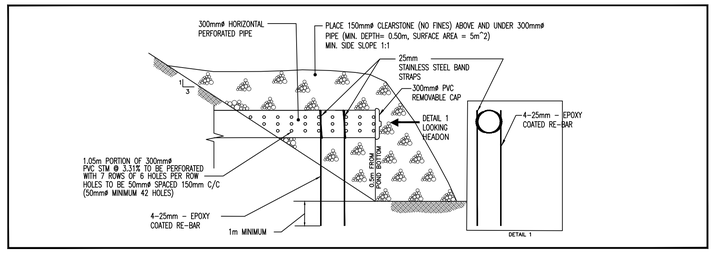
PHASE 1 NORTH ALNDS ROUGH GRADING

SCALE:	1:1500	TOWN FILE No.:	DRAWING No.:
DESIGN BY:	J.L.	DRAWN BY:	J.L.
REVIEWED BY:	S.A.		C-604

File: \\Cd0215-ppfss01\1606\Active\160623065\Drawing\sheet_files\160623065_C-600 Erosion and Sediment Control Plan.dwg – Revised by <Luk, James> : Fri, May 09, 2025 , 4:20 PM



STAGE 1: TEMPORARY SEDIMENT POND OUTLET DETAIL
SCALE: N.T.S.



PERFORATED HORIZONTAL PIPE INSTALLATION DETAIL
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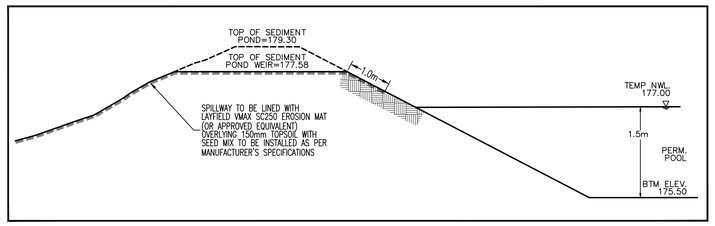
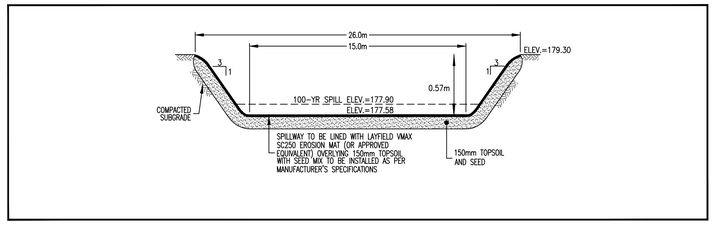
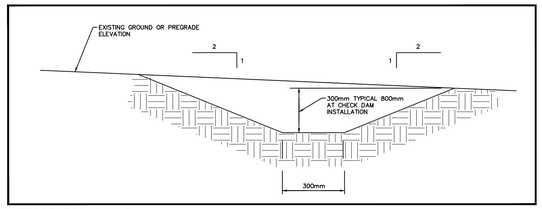


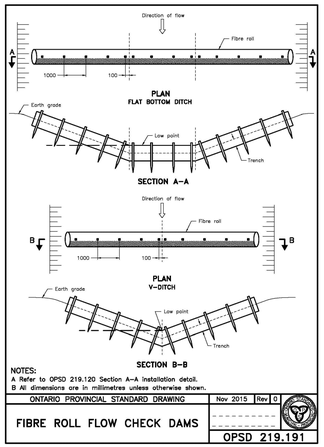
STAGE 1: TEMPORARY EMERGENCY SPILL WEIR SECTION
SCALE: N.T.S.



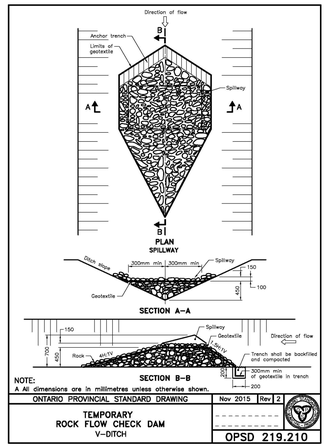
STAGE 1: TEMPORARY EMERGENCY SPILL WEIR DETAIL
SCALE: N.T.S.



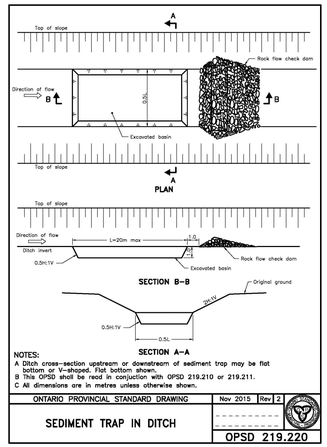
INTERCEPTOR SWALE
SCALE: N.T.S.



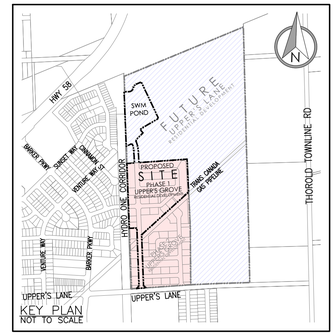
ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2015	Rev 0
FIBRE ROLL FLOW CHECK DAMS	OPSD 219.191	

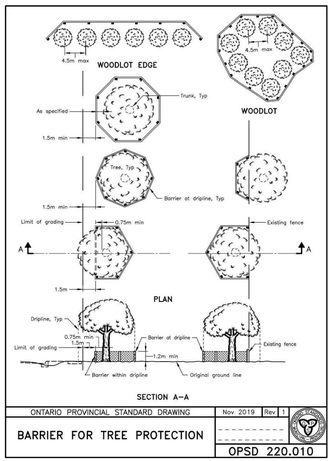


ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2015	Rev 2
TEMPORARY ROCK FLOW CHECK DAM V-DITCH	OPSD 219.210	

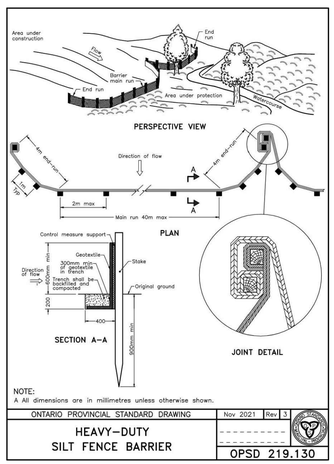


ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2015	Rev 2
SEDIMENT TRAP IN DITCH	OPSD 219.220	

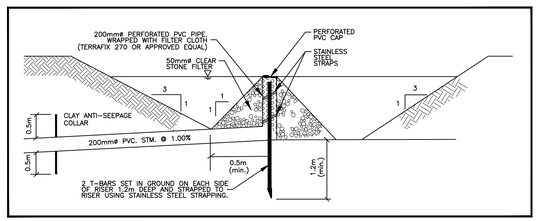




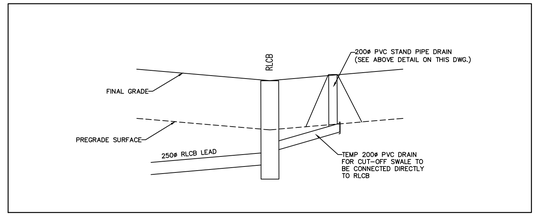
ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2019	Rev 1
BARRIER FOR TREE PROTECTION	OPSD 220.010	



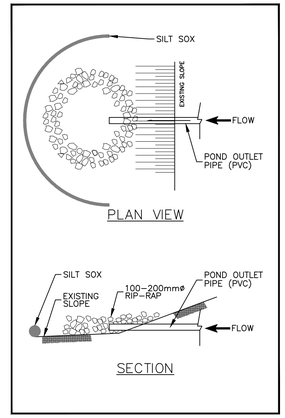
ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2021	Rev 3
HEAVY-DUTY SILT FENCE BARRIER	OPSD 219.130	



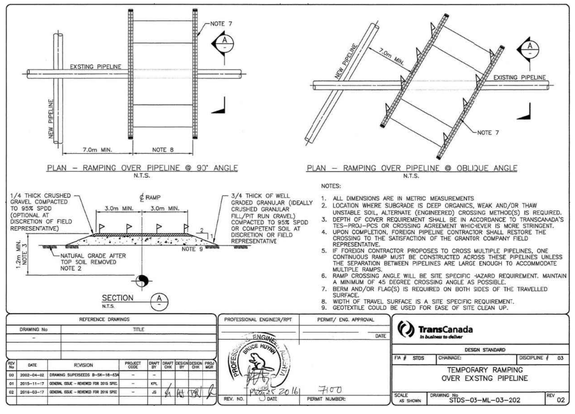
TEMPORARY RISER DRAIN
SCALE: N.T.S.



TYPICAL TEMP. OUTLET CONNECTION TO RLCB
SCALE: N.T.S.



FLOW DISPERSAL DAM
SCALE: N.T.S.



REFERENCE DRAWINGS									
DRAWING No	TITLE								
—	—								
No	DATE	REVISION	PROJECT MGR	DRAFT CHK	DESIGN CHK	DESIGN ENGR	DRAFTER	END
00	2002-04-02	DRAWING SUPERSEDES BI-SK-18-ESK	—	—				
01	2010-11-17	ENGNL ISSUE - REVISED PER 2010 SPEC.	—	KPL				
02	2016-03-17	ENGNL ISSUE - REVISED PER 2016 SPEC.	—	JL	KL	CPK		

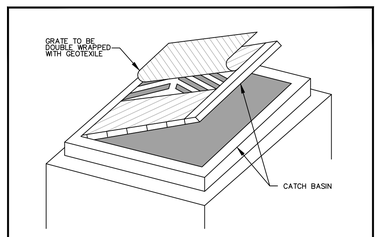
PROFESSIONAL ENGINEER/PEPT — PERMIT/ ENG. APPROVAL

TransCanada — DESIGN STANDARD

FP #	STDS	CHANNEL:	DISCIPLINE #	03

TEMPORARY RAMPING OVER EXSTING PIPELINE

REV. NO.	DATE	PERMIT NUMBER:	SCALE: AS SHOWN	DRAWING No.: STDS-03-ML-03-202	REV. 02



CATCH BASIN SEDIMENT CONTROL DEVICE
SCALE: N.T.S.

No.	DESCRIPTION	DATE	APPROVED
1.	FIRST SUBMISSION TO AGENCIES	JUN 22, 2023	S.A.K.
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BENCHMARK: 00119673595 ELEV. 181.240m
TOWNSHIP: NIAGARA FALLS AREA CONCRETE CYLINDER, 8.1m WEST OF CENTRELINE OF THOROLD TOWN LINE ROAD, OPPOSITE HOUSE No.832, ON EAST SIDE OF ROAD, 1.4m SOUTH OF TELEPHONE POLE No.NJ-6, TABLET IN TOP, ESTABLISHED BY TOPOGRAPHICAL SURVEY.

Permit/Seal

LICENSED PROFESSIONAL ENGINEER — S.A. KHAN 100085491 — MAY 09, 2025 — PROVINCE OF ONTARIO

Stantec

Stantec Consulting Ltd.
300W-675 Cochrane Drive
Markham ON
Tel: 905.944.7777
www.stantec.com

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CITY OF THOROLD APPROVED

DATE

MANAGER, DEVELOPMENT ENGINEERING

City of Thorold — Where Ships Climb The Mountain...

Parkbridge
70 HURON STREET
COLLINGWOOD
ONTARIO, L9Y 3Z1
T: 705 429 6142

UPPER'S GROVE
PROPOSED RESIDENTIAL DEVELOPMENT
(PHASE 1)
CITY OF THOROLD

EROSION & SEDIMENT CONTROL DETAILS

SCALE: NTS	TOWN FILE No.: _____	DRAWING No.: C-605
DESIGN BY: J.L.	DRAWN BY: J.L.	
REVIEWED BY: S.A.		

ORIGINAL SHEET - ARCH D

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Appendix C Stormwater Management Calculations

C.1 Calculation Sheets

Stantec

Project: Uppers Grove & Uppers Lane - Revised Pond Design
Project Number: 1606230965
Project Location: City of Thorold
Designer: KB
Date: Mar-26

INTERIM CONDITION

Development Areas

Catchment	Area (ha)
Upper's Grove Residential Development	14.93
Pond Block	2.33
Interim Road Block	0.34
Total	**17.60**

Draiange Areas Considered

Catchment	Area (ha)
Developed Pond Draiange	17.60
Un-Developed Pond Draiange	14.97
External Draiange Conveyed Through the Site	31.53
Total	**64.10**

Overall Pond Drainage Areas

Catchment	Area (ha)
Developed Pond Draiange	17.60
Un-Developed Pond Draiange	14.97
Total	**32.57**

ULTIMATE CONDITION

Development Areas

Catchment	Area (ha)
Upper's Grove Residential Development	15.38
Pond Block	2.33
Upper’s Lane Residential Development	25.81
Total	**43.52**

Draiange Areas Considered

Catchment	Area (ha)
Developed Pond Draiange	43.52
Un-Developed Pond Draiange	14.16
External Draiange Conveyed Through the Site	13.79
Total	**71.47**

Overall Pond Drainage Areas

Catchment	Area (ha)
Developed Pond Draiange	43.52
Un-Developed Pond Draiange	14.16
Total	**57.68**

Project: Uppers Grove & Uppers Lane - Revised Pond Design
Project Number: 1606230965
Project Location: City of Thorold
Designer: KB
Date: Mar-26

INTERIM CONDITION

Pre-Development Peak Flow at 'Outlet D'

Design Storm - Existing Discharge to Allowable Scenario Discharge Outlet D
Rolling Meadows Phase 17 Preliminary SWM Plan, 2022
Ultimate Condition Drainage Area (ha): 87.51

Proposed Pond Draiange Area (ha): 32.57

Design Storm / Return Period	Peak Flow (m^3/s)	Unit Release Rate ($m^3/s/ha$)	'A31' Allowable (Ls/ha)	Pond Allowable Release Rate (m^3/s)
25mm	0.059	0.0007	0.67	0.022
2 Year	0.220	0.0025	2.51	0.082
5 Year	0.366	0.0042	4.18	0.136
10 Year	0.506	0.0058	5.78	0.188
25 Year	0.763	0.0087	8.72	0.284
50 Year	0.985	0.0113	11.26	0.367
100 Year	1.259	0.0144	14.39	0.469
MTO 100 Year	3.048	0.0348	34.83	1.134

ULTIMATE CONDITION

Design Storm - Existing Discharge to Allowable Scenario Discharge Outlet D
Rolling Meadows Phase 17 Preliminary SWM Plan, 2022
Ultimate Condition Drainage Area (ha): 87.51

Proposed Pond Draiange Area (ha): 57.68

Design Storm / Return Period 0	Peak Flow (m^3/s)	Unit Release Rate ($m^3/s/ha$)	'A31' Allowable (Ls/ha)	Pond Drainage Area Allowable Release Rate (m^3/s)	EXT-1 Conveyance (m^3/s)	Total Pond Allowable Release Rate (m^3/s)
25mm	0.0590	0.0007	0.67	0.039	0.070	0.109
2 Year	0.2200	0.0025	2.51	0.145	0.158	0.303
5 Year	0.3660	0.0042	4.18	0.241	0.223	0.464
10 Year	0.5060	0.0058	5.78	0.334	0.277	0.611
25 Year	0.7630	0.0087	8.72	0.503	0.364	0.867
50 Year	0.9850	0.0113	11.26	0.649	0.434	1.083
100 Year	1.2590	0.0144	14.39	0.830	0.513	1.343
MTO 100 Year	3.0480	0.0348	34.83	2.009	0.907	2.916

Appendix C Stormwater Management Calculations

INTERIM CONDITION POND DETAILS

Stantec

Project: Uppers Grove & Uppers Lane - Revised Pond Design
Project Number: 1606230965
Project Location: City of Thorold
Designer: KB
Date: May-25

Permanent Pool and Extended Detention Sizing Calculations

Landuse	Area (ha)	C (Runoff Coef.)	C (weighted value)	Imperviousness (%)	Imperviousness (Weighted Value)
Phase 1&2 (UG)	14.93	0.59	8.81	60	896
SWM POND	2.33	0.85	1.98	89	207
INT-1 TO HW20	5.15	0.25	1.29	22	114
INT-2 TO HW	2.47	0.25	0.62	22	55
INT-NORTH ROAD	0.34	0.80	0.27	83	28
HYD-1 TO DCB1	1.45	0.25	0.36	22	32
NHS-1 TO RYCB 33	5.90	0.25	1.48	22	131
Total	**32.57**		**0.45**		**45%**

* Assumed percent impervious (I) converted from C values based on Simple Method, C = 0.05 + 0.009(I); (Schueler, 1987)

Protection Level	Normal	Choose Level Enhanced (80%), Normal (70%) or Basic (60%)
Pond Type	Wet Pond	Choose Infiltration, Wet Pond, Wetland, Hybrid, or Dry Pond (Basic Only)
Imperviousness %	44.95	

MOECC 2003 Table 3.2 Volume	99.95	m^3/ha	
	59.95	m^3/ha	Less 40 m^3/ha for active storage

Protection and Pond Type	Permanent Pool	Active Pond *		Est. Release Rate
	Wet Pond (m^3)	MOE Guideline (m^3)	Extended Detention (m^3)	(m^3/s)
Normal Wet Pond	1952	1303	3,542	0.031

Note: *-the greater of the MOE Guideline and the Extended Detention Runoff is used as the Active Pond volume
The extended detention volume has been calculated using Visual Otthymo Modelling Runoff

RV = 10.87 mm >>>> (For minimum of 48 hr extended detention)

Stantec

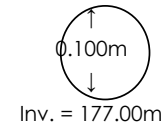
Project: Uppers Grove & Uppers Lane - Revised Pond Design
Project Number: 1606230965
Project Location: City of Thorold
Designer: KB
Date: May-25

Control Structure Design Details

Orifice 1

(Round Only)

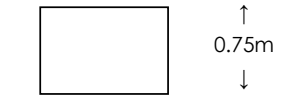
Invert =	177.00	m
Size =	0.100	m
C=	0.62	
Obvert =	177.1	m



Orifice 3

Square

Invert =	177.50	m
Length =	0.55	m
C =	0.62	
Obvert =	178.25	m
Midpoint=	177.88	
Height =	0.75	m
Numbr of Contractions =	2.00	
P=	0.7	m
B=	50	m

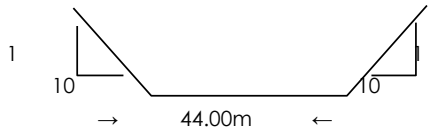


*Note this outlet structure acts as a sharp crested constricted rectangular weir until it is submerged (from the invert to the obvert). Above the obvert the outlet structure acts as an orifice.

Note this is the number of end contractions.
Note P is the distance from the orifice invert to the normal water level.
Note B is the approximate pond block width at the face of the outlet structure.

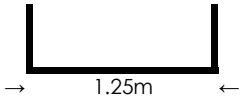
Broad Crested Weir 1

Length =	44.00	m
Elevation =	179.00	m
Side Slp =	10.00	
(0 = vertical, 1 = 1H to 1V, 3 = 3H to 1 v)		
Breadth =	4.5	m



Sharp Crested Weir 2

Length =	1.25	m
Elevation =	178.50	m
Side Slp =	0.00	
Breadth =	0.45	m



Stantec

Project: Uppers Grove & Uppers Lane - Revised Pond Design
Project Number: 1606230965
Project Location: City of Thorold
Designer: KB
Date: May-25

Upstream Elevation (m)	Orifice 1 Outflow (cms)	Control Structure 3 Flow Orifice/Weir Flow (cms)	Weir 1 Outflow (cms)	Weir 2 Outflow (cms)	Total Flow (cms)	Storage (m^3)
177.00	0.000	0.00	0.000	0.000	0.000	0
177.05	0.002	0.00	0.000	0.000	0.002	571
177.10	0.005	0.00	0.000	0.000	0.005	1,151
177.15	0.007	0.00	0.000	0.000	0.007	1,741
177.20	0.008	0.00	0.000	0.000	0.008	2,341
177.25	0.010	0.00	0.000	0.000	0.010	2,951
177.30	0.011	0.00	0.000	0.000	0.011	3,570
177.35	0.012	0.00	0.000	0.000	0.012	4,200
177.40	0.013	0.00	0.000	0.000	0.013	4,838
177.45	0.014	0.00	0.000	0.000	0.014	5,487
177.50	0.014	0.00	0.000	0.000	0.014	6,142
177.55	0.015	0.01	0.000	0.000	0.026	6,802
177.60	0.016	0.03	0.000	0.000	0.047	7,466
177.65	0.017	0.06	0.000	0.000	0.072	8,134
177.70	0.017	0.09	0.000	0.000	0.103	8,806
177.75	0.018	0.12	0.000	0.000	0.138	9,483
177.80	0.019	0.16	0.000	0.000	0.176	10,163
177.85	0.019	0.20	0.000	0.000	0.217	10,848
177.90	0.020	0.24	0.000	0.000	0.261	11,537
177.95	0.020	0.29	0.000	0.000	0.308	12,231
178.00	0.021	0.34	0.000	0.000	0.358	12,928
178.05	0.022	0.39	0.000	0.000	0.410	13,630
178.10	0.022	0.44	0.000	0.000	0.465	14,336
178.15	0.023	0.50	0.000	0.000	0.522	15,047
178.20	0.023	0.56	0.000	0.000	0.581	15,761
178.25	0.024	0.62	0.000	0.000	0.642	16,480
178.30	0.024	0.74	0.000	0.000	0.763	17,204
178.35	0.025	0.78	0.000	0.000	0.805	17,931
178.40	0.025	0.82	0.000	0.000	0.846	18,663
178.45	0.026	0.86	0.000	0.000	0.885	19,400
178.50	0.026	0.90	0.000	0.000	0.922	20,141
178.55	0.026	0.93	0.000	0.026	0.983	20,886
178.60	0.027	0.96	0.000	0.072	1.063	21,636
178.65	0.027	1.00	0.000	0.130	1.155	22,390
178.70	0.028	1.03	0.000	0.199	1.256	23,149
178.75	0.028	1.06	0.000	0.276	1.364	23,913
178.80	0.029	1.09	0.000	0.360	1.478	24,681
178.85	0.029	1.12	0.000	0.450	1.597	25,454
178.90	0.029	1.15	0.000	0.545	1.721	26,231
178.95	0.030	1.17	0.000	0.653	1.858	27,013
179.00	0.030	1.20	0.000	0.765	1.996	27,799
179.05	0.031	1.23	0.741	0.882	2.882	28,590
179.10	0.031	1.25	2.120	1.005	4.410	29,386
179.15	0.031	1.28	3.939	1.132	6.381	30,187
179.20	0.032	1.30	6.130	1.265	8.731	30,992
179.25	0.032	1.33	8.661	1.402	11.423	31,803
179.30	0.032	1.35	11.198	1.545	14.127	32,618

Return Storm (Years)	Actual Outflow (cms)	Target Outlfow (cms)	Storage (m^3)	Elevation (m)
25mm Event	0.010	0.022	3,144	177.27
2	0.026	0.082	6,782	177.55
5	0.044	0.136	7,374	177.59
10	0.084	0.188	8,389	177.67
25	0.153	0.284	9,756	177.77
50	0.215	0.367	10,814	177.85
100	0.290	0.469	11,959	177.93
100 Yr MTO	0.757	1.134	17,170	178.30

Stage Storage Curve for VO6

Discharge (cms)	Storage (ha.m)
0.000	**0.000**
0.008	**0.234**
0.013	**0.484**
0.047	**0.747**
0.176	**1.016**
0.358	**1.293**
0.581	**1.576**
0.846	**1.866**
1.063	**2.164**
1.478	**2.468**
1.996	**2.780**
2.882	**2.859**

Stantec

Project: Uppers Grove & Uppers Lane - Revised Pond Design
Project Number: 1606230965
Project Location: City of Thorold
Designer: KB
Date: May 5, 2025

North Diversion Channel - Uppers Grove Residential Development Buildout

Flows per VO6 Modeling

		0.3% Swale Slope		
Event	Flow (cms)	Flow Depth (m)	Flow Velocity (m/s)	Free Board (m)
100yr 24 MTO	2.22	0.50	0.83	0.10
100yr 4hr Chicago	1.25	0.36	0.69	0.24

Channel Characteristics

Channel Slope (%)	0.30
Total Depth (m)	0.60
Side Slope (H:V)	3
Bottom Width (m)	4.00
Top Width (m)	7.6
Mannins N	0.035
Capacity (cms)	3.18
Velocity (m/s)	0.91

Input

100yr 4hr Chicago Flow Event

Flow Depth (m) =	0.36		**Trapezoidal Channel**	
Side Slope Ratio (H:V) =	3	/1	Top width	6.16 m
Bed Width (m)=	4.00		Hyd. Rad, 'R'	
Area (m^2)=	1.829		0.29	m
Wetted Perimeter (m)=	6.277	m	Friction Slope Sf	
Slope (%) =	0.30		0.003	m/m
Manning 'n' =	0.035		Velocity	
Channel Capacity, Q =	***1.26***	m^3/s	0.69	m/s

100yr 24 MTO Flow Event

Flow Depth (m) =	0.50		**Trapezoidal Channel**	
Side Slope Ratio (H:V) =	3	/1	Top width	7.00 m
Bed Width (m)=	4.00		Hyd. Rad, 'R'	
Area (m^2)=	2.750		0.38	m
Wetted Perimeter (m)=	7.162	m	Friction Slope Sf	
Slope (%) =	0.30		0.003	m/m
Manning 'n' =	0.035		Velocity	
Channel Capacity, Q =	***2.27***	m^3/s	0.83	m/s

Capacity

Flow Depth (m) =	0.60		**Trapezoidal Channel**	
Side Slope Ratio (H:V) =	3	/1	Top width	7.60 m
Bed Width (m)=	4.00		Hyd. Rad, 'R'	
Area (m^2)=	3.480		0.45	m
Wetted Perimeter (m)=	7.795	m	Friction Slope Sf	
Slope (%) =	0.30		0.003	m/m
Manning 'n' =	0.035		Velocity	
Channel Capacity, Q =	***3.18***	m^3/s	0.91	m/s

Project: Uppers Grove & Uppers Lane - Revised Pond Design
Project Number: 1606230965
Project Location: City of Thorold
Designer: KB
Date: Mar-26

Drawdown Calculations

Outlet 1

Normal Water Level =	177.00	m
Orifice Size =	0.100	m
Orifice Level (midpoint of orifice) =	177.050	m
Orifice area (ao)=	0.0079	m^2
Orifice Coefficient =	0.62	

Orifice Discharge Equation = $Q = C_2 * Ao * (2 g h)^{1/2}$

Stage (m)	Head Above Orifice Centre Outlet (m)	Surface Area (m2)	Incremental Volume (m3)	Accumulated Volume (m3)	Calculated Surface Area Ap (m2)	Discharge Q (m3)
177.00	0.000	11,318	0	0	11,844	0.000
177.50	0.450	13,262	6145	6,145	12,901	0.014
178.00	0.950	14,102	6841	12,986	13,958	0.021
178.50	1.450	14,964	7266	20,253	15,015	0.026
179.00	1.950	15,876	7710	27,963	16,073	0.030
179.30	2.251	16,448	4865	32,827	16,709	0.032

Regression Output:

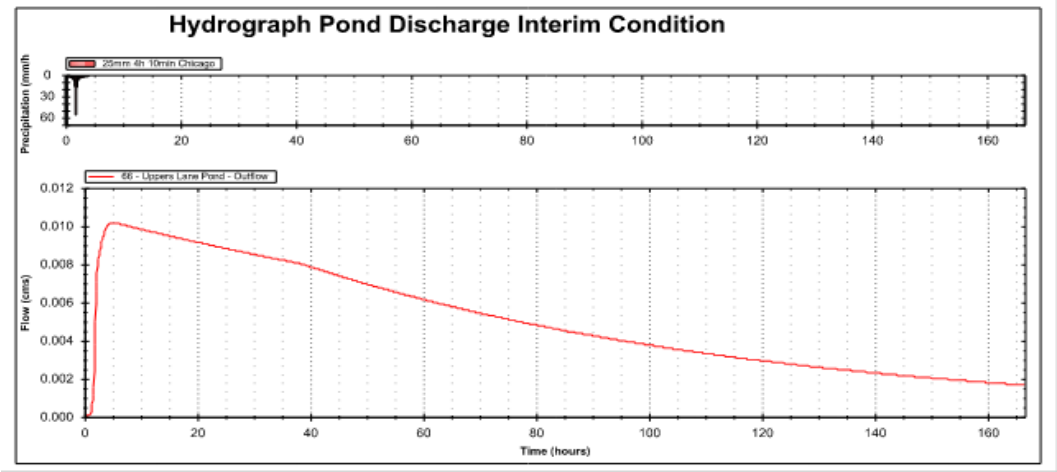
X Coefficient	2114.56	C_2
Constant	11843.5	C_3
R^2	0.9663	

$Ap = C_2*h + C_3$

t = (0.66*c2*h^1.5 + 2*c3*h^0.5)/(2.75 Ao)

Ao = Main Orifice	0.008	m^2
ED Runoff	10.87	mm
Site Area	32.57	ha
Unrouted Extended Detention Volume :	3,542	m^3
Corresponding Head above Midpoint of Orifice:	0.26	m
Corresponding Surface Area (Ap) =	12,392	m^2
Corresponding Stage =	177.31	mASL
Max Orifice Discharge =	0.011	m^3/s
Drain time (s) =	567,043	s
Drain time (hr) =	158	hr > 48 hr
Drain time (days) =	6.56	days

Per Visual Otthymo modeling a large portion of discharge during the 25mm event occurs within 48hrs. After which flow continues to discharge slowly due to the small orifice sized to meet the allowable release rate for erosion control. See the pond discharge hydrograph per VO modeling below



Appendix C Stormwater Management Calculations

ULTIMATE CONDITION POND DETAILS

Stantec

Project: Uppers Grove & Uppers Lane - Revised Pond Design
Project Number: 1606230965
Project Location: City of Thorold
Designer: KB
Date: Mar-26

Permanent Pool and Extended Detention Sizing Calculations

Landuse	Area (ha)	C (Runoff Coef.)	C (weighted value)	Imperviousness (%)	Imperviousness (Weighted Value)
PHASE 1&2 TO HW1	15.38	0.59	9.07	60.00	923
Phase 3N to HW1	1.89	0.59	1.12	60.00	113
FUT(UL)-2	6.54	0.68	4.45	70.00	458
FUT(UL)-3	17.38	0.59	10.25	60.00	1043
Hydro Corridor to CB1	1.45	0.25	0.36	22.22	32
NHS-1 TO RYCB 33	4.01	0.25	1.00	22.22	89
Hydro Corridor to CB2	1.01	0.25	0.25	22.22	22
NHS-2 TO PARK	7.69	0.25	1.92	22.22	171
UL/UG POND	2.33	0.85	1.98	88.89	207
EXT-1 TO PARK	13.79	0.25	3.45	22.22	306
Total	**71.47**		**0.47**		**47%**

*** Assumed percent impervious (I) converted from C values based on Simple Method, C = 0.05 + 0.009(I); (Schueler, 1987)

Protection Level	Normal	Choose Level Enhanced (80%), Normal (70%) or Basic (60%)	
Pond Type	Wet Pond	Choose Infiltration, Wet Pond, Wetland, Hybrid, or Dry Pond (Basic Only)	
Imperviousness %	47.08		
MOECC 2003 Table 3.2 Volume	102.08	m^3/ha	
	62.08	m^3/ha	Less 40 m^3/ha for active storage

Protection and Pond Type	Permanent Pool	Active Pond *		Est. Release
	Wet Pond (m^3)	MOE Guideline (m^3)	Extended Detention (m^3)	**Rate** (m^3/s)
Normal Wet Pond	4437	2859	8,279	0.072

Note: *-the greater of the MOE Guideline and the Extended Detention Runoff is used as the Active Pond volume
The extended detention volume has been calculated using Visual Otthymo Modelling Runoff

RV = 11.584 mm >>>> (For minimum of 48 hr extended detention)

Stantec

Project: Uppers Grove & Uppers Lane - Revised Pond Design
Project Number: 1606230965
Project Location: City of Thorold
Designer: KB
Date: Mar-26

Upstream Elevation (m)	Orifice 1 Outflow (cms)	Orifice 2 Outflow (cms)	Control Structure 3 Flow Orifice/Weir Flow (m^3/s)	Weir 1 Outflow (cms)	Weir 2 Outflow m^3/s	Weir 3 Outflow (cms)	Stage (m)	Total Flow (cms)	Storage (m^3)
177.00	0.000	0.000	0.00	0.000	0.000	0.000	177.00	0.000	0
177.05	0.002	0.000	0.00	0.000	0.000	0.000	177.05	0.002	571
177.10	0.005	0.000	0.00	0.000	0.000	0.000	177.10	0.005	1151
177.15	0.007	0.000	0.00	0.000	0.000	0.000	177.15	0.007	1741
177.20	0.008	0.000	0.00	0.000	0.000	0.000	177.20	0.008	2341
177.25	0.010	0.000	0.00	0.000	0.000	0.000	177.25	0.010	2951
177.30	0.011	0.000	0.00	0.000	0.000	0.000	177.30	0.011	3570
177.35	0.012	0.000	0.00	0.000	0.000	0.000	177.35	0.012	4200
177.40	0.013	0.000	0.00	0.000	0.000	0.000	177.40	0.013	4838
177.45	0.014	0.000	0.00	0.000	0.000	0.000	177.45	0.014	5487
177.50	0.014	0.000	0.00	0.000	0.000	0.000	177.50	0.014	6142
177.55	0.015	0.000	0.01	0.000	0.000	0.000	177.55	0.026	6802
177.60	0.016	0.000	0.03	0.000	0.000	0.000	177.60	0.047	7466
177.65	0.017	0.000	0.06	0.000	0.000	0.000	177.65	0.072	8134
177.70	0.017	0.000	0.09	0.000	0.000	0.000	177.70	0.103	8806
177.75	0.018	0.000	0.12	0.000	0.000	0.000	177.75	0.138	9483
177.80	0.019	0.000	0.16	0.000	0.000	0.000	177.80	0.176	10163
177.85	0.019	0.000	0.20	0.000	0.000	0.000	177.85	0.217	10848
177.90	0.020	0.000	0.24	0.000	0.000	0.000	177.90	0.261	11537
177.95	0.020	0.000	0.29	0.000	0.000	0.000	177.95	0.308	12231
178.00	0.021	0.000	0.34	0.000	0.000	0.000	178.00	0.358	12928
178.05	0.022	0.000	0.39	0.000	0.000	0.000	178.05	0.410	13630
178.10	0.022	0.000	0.44	0.000	0.000	0.000	178.10	0.465	14336
178.15	0.023	0.000	0.50	0.000	0.000	0.000	178.15	0.522	15047
178.20	0.023	0.000	0.56	0.000	0.000	0.000	178.20	0.581	15761
178.25	0.024	0.000	0.62	0.000	0.000	0.000	178.25	0.642	16480
178.30	0.024	0.000	0.74	0.000	0.000	0.000	178.30	0.763	17204
178.35	0.025	0.000	0.78	0.000	0.000	0.000	178.35	0.805	17931
178.40	0.025	0.000	0.82	0.000	0.000	0.000	178.40	0.846	18663
178.45	0.026	0.000	0.86	0.000	0.000	0.000	178.45	0.885	19400
178.50	0.026	0.000	0.90	0.000	0.000	0.000	178.50	0.922	20141
178.55	0.026	0.000	0.93	0.000	0.026	0.000	178.55	0.983	20886
178.60	0.027	0.000	0.96	0.000	0.072	0.000	178.60	1.063	21636
178.65	0.027	0.000	1.00	0.000	0.130	0.000	178.65	1.155	22390
178.70	0.028	0.000	1.03	0.000	0.199	0.000	178.70	1.256	23149
178.75	0.028	0.000	1.06	0.000	0.276	0.000	178.75	1.364	23913
178.80	0.029	0.000	1.09	0.000	0.360	0.000	178.80	1.478	24681
178.85	0.029	0.000	1.12	0.000	0.450	0.000	178.85	1.597	25454
178.90	0.029	0.000	1.15	0.000	0.545	0.000	178.90	1.721	26231
178.95	0.030	0.000	1.17	0.000	0.653	0.000	178.95	1.858	27013
179.00	0.030	0.000	1.20	0.000	0.765	0.000	179.00	1.996	27799
179.05	0.031	0.000	1.23	0.741	0.882	0.000	179.05	2.882	28590
179.10	0.031	0.000	1.25	2.120	1.005	0.000	179.10	4.410	29386
179.15	0.031	0.000	1.28	3.939	1.132	0.000	179.15	6.381	30187
179.20	0.032	0.000	1.30	6.130	1.265	0.000	179.20	8.731	30992
179.25	0.032	0.000	1.33	8.661	1.402	0.000	179.25	11.423	31803
179.30	0.032	0.000	1.35	11.198	1.545	0.000	179.30	14.127	32618

Return Storm (Years)	Actual Outflow (cms)	Target Outlfow (cms)	Storage (m^3)	Elevation (m)
25mm Event	0.060	0.072	7,798	177.62
2-Yr	0.273	0.303	11,703	177.91
5-Yr	0.417	0.464	13,715	178.06
10-Yr	0.539	0.611	15,252	178.16
25-Yr	0.733	0.867	17,027	178.29
50-Yr	0.873	1.083	19,186	178.44
100-Yr	1.008	1.343	21,125	178.57
100 Yr MTO	2.844	2.916	28,556	179.05

Stage Storage Curve for VO

Discharge (cms)	Storage (ha.m)	Elev
0.000	**0.000**	**0.00**
0.008	**0.234**	**177.20**
0.013	**0.484**	**177.40**
0.047	**0.747**	**177.60**
0.176	**1.016**	**177.80**
0.358	**1.293**	**178.00**
0.581	**1.576**	**178.20**
0.846	**1.866**	**178.40**
1.063	**2.164**	**178.60**
1.478	**2.468**	**178.80**
1.996	**2.780**	**179.00**
2.882	**2.859**	**179.05**
4.410	**2.939**	**179.10**
14.127	**3.262**	**179.30**

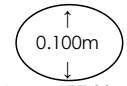
Stantec

Project: Uppers Grove & Uppers Lane - Revised Pond Design
Project Number: 1606230965
Project Location: City of Thorold
Designer: KB
Date: Mar-26

Control Structure Design Details

Orifice 1 (Round Only)

Invert =	177.00	m
Size =	0.100	m
C=	0.62	
Obvert =	177.1	m



Orifice 3 Square

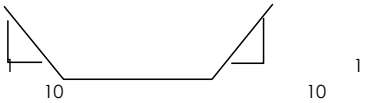
Invert =	177.50	m
Length =	0.55	m
C =	0.62	
Obvert =	178.25	m
Midpoint=	177.88	
Height =	0.75	m
Numbr of Contractions =	2.00	
P=	0.7	m
B=	50	m

*Note this outlet structure acts as a sharp crested constricted rectangular weir until it is submerged (from the invert to the obvert). Above the obvert the outlet structure acts as an orifice.

Note this is the number of end contractions.
Note P is the distance from the orifice invert to the normal water level.
Note B is the approximate pond block width at the face of the outlet structure.

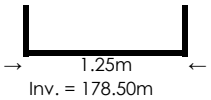
Broad Crested Weir 1

Length =	44.00	m
Elevation =	179.00	m
Side Slp =	10.00	
(0 = vertical, 1 = 1H to 1V, 3 = 3H to 1 v)		
Breadth =	4.5	m
Column index no. =	12	(for lookup value of C)



Sharp Crested Weir 2

Length =	1.25	m
Elevation =	178.50	m
Side Slp =	0.00	
Breadth =	0.45	m
Column index no. =	5	(for lookup value of C)
Numbr of Contractions =	2.00	
P=	0.7	m
B=	50	m



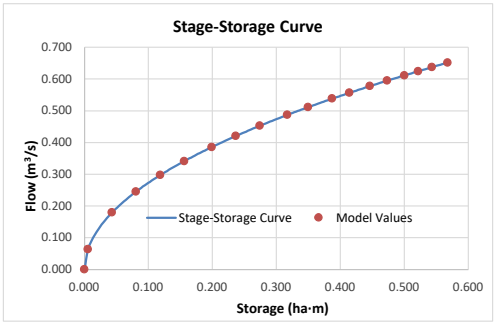
Note this is the number of end contractions.
Note P is the distance from the orifice invert to the normal water level.
Note B is the approximate pond block width at the face of the outlet structure.

Stantec

Project: Uppers Grove & Uppers Lane - Revised Pond Design
Project Number: 1606230965
Project Location: City of Thorold
Designer: KB
Date: Mar-26

PARK STORM TANK

Orifice Control	Tube	
Invert =	178.50	m
Size =	375	mm
C_d =	0.82	C_d: (Plate = 0.62) (Tube =0.82)
Obvert =	178.875	m
Area =	0.110	m^2
Design Flow =	0.185	m^3/s
Control Midpoint=	178.69	m
Water Level	178.9	
Water Height	0.21	
Type of Orifice Control:	tube	



Stage Storage Curve for VO

Flow (m3/s)	Cumulative Storage (ha*m)
0	0
0.063	0.005
0.179	0.043
0.246	0.081
0.298	0.118
0.342	0.156
0.386	0.199
0.421	0.237
0.453	0.274
0.487	0.317
0.511	0.349
0.538	0.387
0.557	0.414
0.578	0.446
0.595	0.473
0.612	0.500
0.625	0.521
0.637	0.543
0.652	0.568

Height of System (mm)	Cumulative Storage (m3)	Elevation (m)	Head (m)	Flow (m3/s)
0	0	178.50	0.000	0.000
25	54	178.53	0.025	0.063
50	108	178.55	0.050	0.090
75	161	178.58	0.075	0.110
100	215	178.60	0.100	0.127
125	269	178.63	0.125	0.142
150	323	178.65	0.150	0.155
175	376	178.68	0.175	0.168
200	430	178.70	0.200	0.179
225	484	178.73	0.225	0.190
250	538	178.75	0.250	0.201
275	591	178.78	0.275	0.210
300	645	178.80	0.300	0.220
325	699	178.83	0.325	0.229
350	753	178.85	0.350	0.237
375	806	178.88	0.375	0.246
400	860	178.90	0.400	0.254
425	914	178.93	0.425	0.262
450	968	178.95	0.450	0.269
475	1021	178.98	0.475	0.276
500	1075	179.00	0.500	0.284
525	1129	179.03	0.525	0.291
550	1183	179.05	0.550	0.298
575	1236	179.08	0.575	0.304
600	1290	179.10	0.600	0.311
625	1344	179.13	0.625	0.317
650	1398	179.15	0.650	0.323
675	1452	179.18	0.675	0.330
700	1505	179.20	0.700	0.336
725	1559	179.23	0.725	0.342
750	1613	179.25	0.750	0.347
775	1667	179.28	0.775	0.353
800	1720	179.30	0.800	0.359
825	1774	179.33	0.825	0.364
850	1828	179.35	0.850	0.370
875	1882	179.38	0.875	0.375
900	1935	179.40	0.900	0.381
925	1989	179.43	0.925	0.386
950	2043	179.45	0.950	0.391
975	2097	179.48	0.975	0.396
1000	2150	179.50	1.000	0.401
1025	2204	179.53	1.025	0.406
1050	2258	179.55	1.050	0.411
1075	2312	179.58	1.075	0.416
1100	2365	179.60	1.100	0.421
1125	2419	179.63	1.125	0.425
1150	2473	179.65	1.150	0.430
1175	2527	179.68	1.175	0.435
1200	2580	179.70	1.200	0.439
1225	2634	179.73	1.225	0.444
1250	2688	179.75	1.250	0.449
1275	2742	179.78	1.275	0.453
1300	2796	179.80	1.300	0.457

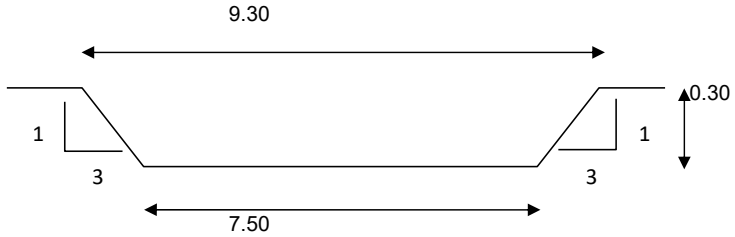
Height of System (mm)	Cumulative Storage (m3)	Elevation (m)	Head (m)	Flow (m3/s)
1325	2849	179.83	1.325	0.462
1350	2903	179.85	1.350	0.466
1375	2957	179.88	1.375	0.470
1400	3011	179.90	1.400	0.475
1425	3064	179.93	1.425	0.479
1450	3118	179.95	1.450	0.483
1475	3172	179.98	1.475	0.487
1500	3226	180.00	1.500	0.491
1525	3279	180.03	1.525	0.495
1550	3333	180.05	1.550	0.499
1575	3387	180.08	1.575	0.503
1600	3441	180.10	1.600	0.507
1625	3494	180.13	1.625	0.511
1650	3548	180.15	1.650	0.515
1675	3602	180.18	1.675	0.519
1700	3656	180.20	1.700	0.523
1725	3709	180.23	1.725	0.527
1750	3763	180.25	1.750	0.531
1775	3817	180.28	1.775	0.534
1800	3871	180.30	1.800	0.538
1825	3924	180.33	1.825	0.542
1850	3978	180.35	1.850	0.546
1875	4032	180.38	1.875	0.549
1900	4086	180.40	1.900	0.553
1925	4140	180.43	1.925	0.557
1950	4193	180.45	1.950	0.560
1975	4247	180.48	1.975	0.564
2000	4301	180.50	2.000	0.567
2025	4355	180.53	2.025	0.571
2050	4408	180.55	2.050	0.574
2075	4462	180.58	2.075	0.578
2100	4516	180.60	2.100	0.581
2125	4570	180.63	2.125	0.585
2150	4623	180.65	2.150	0.588
2175	4677	180.68	2.175	0.592
2200	4731	180.70	2.200	0.595
2225	4785	180.73	2.225	0.598
2250	4838	180.75	2.250	0.602
2275	4892	180.78	2.275	0.605
2300	4946	180.80	2.300	0.608
2325	5000	180.83	2.325	0.612
2350	5053	180.85	2.350	0.615
2375	5107	180.88	2.375	0.618
2400	5161	180.90	2.400	0.621
2425	5215	180.93	2.425	0.625
2450	5268	180.95	2.450	0.628
2475	5322	180.98	2.475	0.631
2500	5376	181.00	2.500	0.634
2525	5430	181.03	2.525	0.637
2550	5484	181.05	2.550	0.641
2575	5537	181.08	2.575	0.644
2600	5591	181.10	2.600	0.647
2640	5677	181.14	2.640	0.652

Stantec

Project:	**Uppers Grove & Uppers Lane - Revised Pond Design**
Project Number:	**1606230965**
Project Location:	**City of Thorold**
Designer:	**KB**
Date:	**May 5, 2025**

Overland Spillway into Pond Block at South End

Total 100yr Flow into Pond Assuming fulld Buildout of UGS & ULRD	5.98	cms
100yr Overland Flow % As Calculated in Pro-rated Calcs:	30%	
Pro-rated flow	1.80	cms
Spillway Side Slopes H:V	3	:1
Roughness Coefficient	0.04	(Vmax SC250)
Spillway Depth	0.3	m
Bottom width	7.50	m
Top Width	9.30	m



Reverse Grade ROW

Flow Depth (m) =	0.200		**Trapezoidal Channel**	
Side Slope Ratio (H:V) =	3.000	/**1**	Top width (m)	8.70
Bed Width (m)=	7.500		Hyd. Rad, 'R'	
Area (m^2)=	1.62		0.18	m
Wetted Perimeter (m)=	8.76	m	Friction Slope Sf	
Slope (%) =	2.000		0.02	m/m
Manning 'n' =	0.040		Velocity	
Channel Capacity, Q =	1.86	m^3/s	1.15	m/s

Use Layfield Vmax SC250 erosion control protection mat

Flow into Pond

Flow Depth (m) =	0.110		**Trapezoidal Channel**	
Side Slope Ratio (H:V) =	3.000	/**1**	Top width (m)	8.16
Bed Width (m)=	7.500		Hyd. Rad, 'R'	
Area (m^2)=	0.86		0.11	m
Wetted Perimeter (m)=	8.20	m	Friction Slope Sf	
Slope (%) =	19.240		0.19	m/m
Manning 'n' =	0.040		Velocity	
Channel Capacity, Q =	2.10	m^3/s	2.44	m/s

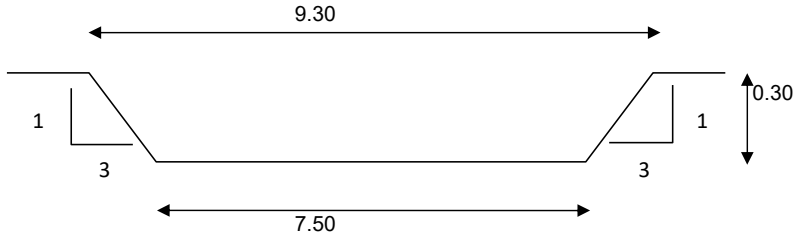
Use Layfield Vmax SC250 erosion control protection mat

Stantec

Project:	**Uppers Grove & Uppers Lane - Revised Pond Design**
Project Number:	**1606230965**
Project Location:	**City of Thorold**
Designer:	**KB**
Date:	**March 24, 2026**

Overland Spillway into Pond Block at East End

Total 100yr Flow into Pond Assuming full of ULRD and UGS	4.08	cms
100yr Overland Flow % As Calculated in Pro-rated Calcs:	30%	
Pro-rated flow	1.22	cms
Spillway Side Slopes H:V	3	:1
Roughness Coefficient	0.04	(Vmax SC250)
Spillway Depth	0.3	m
Bottom width	7.50	m
Top Width	9.30	m



Reverse Grade ROW

Flow Depth (m) =	0.16		**Trapezoidal Channel**	
Side Slope Ratio (H:V) =	3.000	/1	Top width (m)	8.46
Bed Width (m)=	7.500		Hyd. Rad, 'R'	
Area (m^2)=	1.28		0.15	m
Wetted Perimeter (m)=	8.51	m	Friction Slope Sf	
Slope (%) =	2.000		0.02	m/m
Manning 'n' =	0.040		Velocity	
Channel Capacity, Q =	1.27	m^3/s	1.00	m/s

Use Layfield Vmax SC250 erosion control protection mat

Flow into Pond

Flow Depth (m) =	0.07		**Trapezoidal Channel**	
Side Slope Ratio (H:V) =	3.000	/1	Top width (m)	7.92
Bed Width (m)=	7.500		Hyd. Rad, 'R'	
Area (m^2)=	0.53		0.07	m
Wetted Perimeter (m)=	7.94	m	Friction Slope Sf	
Slope (%) =	33.000		0.33	m/m
Manning 'n' =	0.040		Velocity	
Channel Capacity, Q =	1.27	m^3/s	2.38	m/s

Use Layfield Vmax SC250 erosion control protection mat

Stantec

Project:	**Uppers Grove & Uppers Lane - Revised Pond Design**
Project Number:	**1606230965**
Project Location:	**City of Thorold**
Designer:	**KB**
Date:	**March 24, 2026**

Emergency Spillway Design

100yr Chicago Q $_{Spillway}$ =	**10.970**	**m³/s**	Based on anticiapted flows from full buildout of UGS and ULRD
100yr Chicago Q $_{Spillway}$ =	**4.625**	**m³/s**	Based on anticiapted flows from full buildout of UGS

Weir Invert =	179.00	m
Weir bottom Length =	44.00	m
Side Slopes =	10.00	:1
Weir top legnth =	50.00	m

Rectangular Broad Crested Weir

assuming:	H =	0.300	m
	L =	44.00	m
	C =	1.45	
	Q =	10.48	m^3/s
	Area =	13.2	m^2

V Notch Weir

$$Q = CLH^{1.5}$$

where
C = contraction coefficient
L = weir length
H = weir height

assuming:	H =	0.300	m
	Side Slope =	10	:1
	C =	1.45	
Area =		0.90	
	Q =	0.71	m^3/s
	Total Weir Flow =	***11.198***	***m^3/s***
	Velocity =	0.79	m/s

Note:

L = H x SS =	*3*	*m*
F/2 = arctan (L/H)=	*0.00*	*deg*
tan (F/2) = tan 85.24 =	*0*	*m*

$$Q = C(tan\frac{F}{2})H^{2.5}$$

where
C = contraction coefficient
F/2 = arctan(L/H)
H = weir height

Emergency Spillway Manning Equation

Flow Depth (m) =	0.09	
Side Slope Ratio (H:V) =	10.00	/1
Bed Width (m)=	44.00	
Area (m^2)=	4.041	
Wetted Perimeter (m)=	45.809	m
Slope (%) =	33.00	
Manning 'n' =	0.03	
Channel Capacity, Q =	***16.429***	m^3/s

Trapezoidal Channel

Top width	45.80	m
Hyd. Rad, 'R'		
	0.09	m
Friction Slope Sf		
	0.33	m/m
Velocity		
	4.07	m/s

Use Layfield Vmax SC250 erosion control protection mat

Stantec

Project: Uppers Grove & Uppers Lane - Revised Pond Design
Project Number: 1606230965
Project Location: City of Thorold
Designer: KB
Date: Mar-26

FOREBAY SIZING CALCULATION

FOREBAY 1 REQUIREMENTS - HW1 (SOUTHWEST)

INPUT AREA

LENGTH TO WIDTH RATIO (r):	3	3 Typical
PEAK QUALITY STORM RELEASE RATE: m^3/s	0.060	Erosion Control Design Flow
PEAK STORM SEWER DESIGN STORM FLOW INTO POND: m^3/s	2.44	5-Year Pipe Design Flow per Storm Sewer Design Sheet
PARTICLE SETTLING VELOCITY (v_s): m/s	3.00E-04	3.00E-4 for 150um Particles
FOREBAY DEPTH: m	2.00	1.50 Minimum
FOREBAY BERM TARGET VELOCITY: m^3/s	0.5	0.5 Standard

SETTLING LENGTH CALCULATION

FOREBAY LENGTH:	**24**

DISPERSION LENGTH CALCULATION

FOREBAY LENGTH:	**20**

FOREBAY DIMENSIONS

FOREBAY LENGTH:	**24**
FOREBAY WIDTH:	**8**
FOREBAY DEPTH:	**2**

FOREBAY 1 REQUIREMENTS - HW2 (EAST)

INPUT AREA

LENGTH TO WIDTH RATIO (r):	3	
PEAK QUALITY STORM RELEASE RATE: m^3/s	0.060	Erosion Control Design Outflow
PEAK STORM SEWER DESIGN STORM FLOW INTO POND: m^3/s	2.31	5-Year VO design inflow
PARTICLE SETTLING VELOCITY (v_s): m/s	3.00E-04	3.00E-4 FOR 150um PARTICLES
FOREBAY DEPTH: m	2.00	1.50 Minimum
FOREBAY BERM TARGET VELOCITY: m^3/s	0.5	0.5 STANDARD

SETTLING LENGTH CALCULATION

FOREBAY LENGTH:	**24**

DISPERSION LENGTH CALCULATION

FOREBAY LENGTH:	**18**

FOREBAY DIMENSIONS

FOREBAY LENGTH:	**24**
FOREBAY WIDTH:	**8**
FOREBAY DEPTH:	**2**

FOREBAY 1 REQUIREMENTS - HW222 (SOUTH)

INPUT AREA

LENGTH TO WIDTH RATIO (r):	3	
PEAK QUALITY STORM RELEASE RATE: m^3/s	0.060	Erosion Control Design Outflow
PEAK STORM SEWER DESIGN STORM FLOW INTO POND: m^3/s	0.24	5-Year VO design inflow
PARTICLE SETTLING VELOCITY (v_s): m/s	3.00E-04	3.00E-4 FOR 150um PARTICLES
FOREBAY DEPTH: m	2.00	1.50 Minimum
FOREBAY BERM TARGET VELOCITY: m^3/s	0.5	0.5 STANDARD

SETTLING LENGTH CALCULATION

FOREBAY LENGTH:	**24**

DISPERSION LENGTH CALCULATION

FOREBAY LENGTH:	**2**

FOREBAY DIMENSIONS

FOREBAY LENGTH:	**24**
FOREBAY WIDTH:	**8**
FOREBAY DEPTH:	**2**

Stantec

Project:	**Uppers Grove & Uppers Lane**
Project Number:	**1606230965**
Project Location:	**City of Thorold**
Designer:	**KB**
Date:	**Mar-26**

Plunge Pool

Sized for pipe outflow

Outlet Size =	1050	mm
100 year Outflow, Q =	2.844	m^3/s *Based on anticiapted 100yr MTO flows from full buildout of UGS and ULRD
Total Outlet Width, B =	1.05	m
Outlet Height, D =	1.05	m
Tail Water, TW =	0.25	m

	Shallow Basin	
	Formulas	Calculations
Bottom Length (m)	3D	3.15
Bottom Width (m)	2B	2.10
Basin Depth (m)	0.5D	0.53
Top Length (m)	6D	6.30
Top Width (m)	2B + 3D	5.25
Median Stone Diameter (D_{50}) (m)	$\frac{0.028\{D^2\}}{TW} \frac{Q^{1.33}}{BD^{1.5}}$	0.422
Rip Rap Range		350-450mm
Rip Rap Thickness (m)	2D50	0.84
Side and End Slopes	3:1	-

Stantec

Project:	**Uppers Grove & Uppers Lane - Revised Pond Design**
Project Number:	**1606230965**
Project Location:	**City of Thorold**
Designer:	**KB**
Date:	**May 5, 2025**

Perforated Pipe Outlet

The perforated pipe will be sized to ensure that the orifice still controls with 75% blockage of the pipe

Diameter of the Orifice =	**100**	mm
Area of the Orifice = pr^2 =	0.008	m^2
Diameter of Perforated Pipe =	300	mm
Length of Pipe =	1.00	m
Circumference of Pipe =	0.942	m
Using the following:		
Diameter of Holes	50.0	mm
Horizontal Spacing at centre to centre	150.0	mm
Vertical Spacing at centre to centre	150.0	mm
Holes per row (150 mm spacing) =	6	holes/row
Rows per length of pipe (150 mm spacing) =	5	rows
Holes per length of pipe =	30	holes
Area of one 50 mm diameter hole =	0.002	m^2
Total open area of perforated pipe =	0.059	m^2

The perforated pipe should provide an opening area greater than 4 x the orifice area

4x Orifice Area =	**0.031**	**m^2**

Total Open Area of Perforate Pipe = 0.059 m^2 > 0.031 m^2 **TRUE**

Project: Uppers Grove & Uppers Lane - Revised Pond Design
Project Number: 1606230965
Project Location: City of Thorold
Designer: KB
Date: Mar-26

Drawdown Calculations

Outlet 1

Normal Water Level =	177.00	m
Orifice Size =	0.100	m
Orifice Level (midpoint of orifice) =	177.050	m
Orifice area (ao)=	0.0079	m^2
Orifice Coefficient =	0.62	

Orifice Discharge Equation = $Q = C_2 * Ao * (2 g h)^{1/2}$

Stage (m)	Head Above Orifice Centre Outlet (m)	Surface Area (m2)	Incremental Volume (m3)	Accumulated Volume (m3)	Calculated Surface Area Ap (m2)	Discharge Q (m3)
177.00	0.000	11,318	0	0	11,844	0.000
177.50	0.450	13,262	6145	6,145	12,901	0.014
178.00	0.950	14,102	6841	12,986	13,958	0.021
178.50	1.450	14,964	7266	20,253	15,015	0.026
179.00	1.950	15,876	7710	27,963	16,073	0.030
179.30	2.251	16,448	4865	32,827	16,709	0.032

Regression Output:

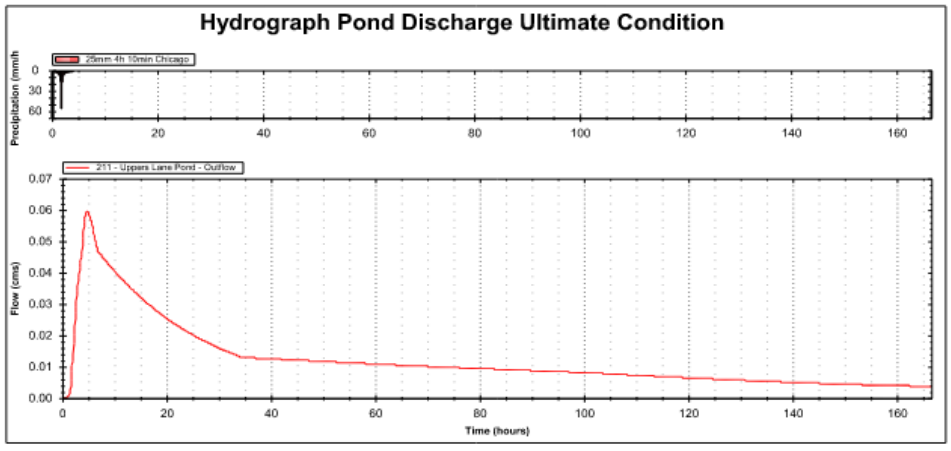
X Coefficient	2114.56	C_2
Constant	11843.5	C_3
R^2	0.9663	

$Ap = C_2*h + C_3$

t = (0.66*c2*h^1.5 + 2*c3*h^0.5)/(2.75 Ao)

Ao = Main Orifice	0.008	m^2
ED Runoff	11.58	mm
Site Area	71.47	ha
Unrouted Extended Detention Volume :	8,279	m^3
Corresponding Head above Midpoint of Orifice:	0.61	m
Corresponding Surface Area (Ap) =	13,125	m^2
Corresponding Stage =	177.66	mASL
Max Orifice Discharge =	0.017	m^3/s
Drain time (s) =	884,190	s
Drain time (hr) =	246	hr > 48 hr
Drain time (days) =	10.23	days

Per Visual Otthymo modeling the majority of discharge during the 25mm event occurs within 48hrs. After which flow continues to discharge slowly due to the small orifice sized to meet the allowable release rate for erosion control. See the pond discharge hydrograph per VO modeling below



Stantec

Project:	**UGS & ULRD**
Project Number:	**1606230965**
Project Location:	**City of Thorold**
Designer:	**KB**
Date:	**Mar-26**

Wet Pond Sediment Removal Frequency Calculations - North Pond

Theory

Clean Out Frequency of SWM pond based on the minimum time calculated for Methods 1 and 2.

Method 1: Time required for sediment accumulation to reduce forebay volume by 50%.
As per "Stormwater Monitoring Guidelines North of Dundas Street - Operation, Maintenance and Monitoring of Stormwater Management

Method 2: Time required for sediment accumulation to cause the TSS removal efficiency to be reduced by 5% (from 70% to 65%).
As per "Stormwater Planning and Design Manual" prepared by the MOE, dated 2003. Refer to Section 6.4; Frequency Removal.

Pond Info:

Drainage Area (Total Area - SWM Pond Area)	71.47	ha (including SWM block)
Level of Imperviousness [1]	47%	[1] Imperviousness is the weighted average of all land uses based on
Actual Starting Permanent Pool Storage	15,125	m^3
Actual Starting Forebay Permanent Pool Storage	7,775	m^3

Calculations

Method 1:

From Table 6.3 MOE Guideline, 2003, the TSS loading based on an imperviousness of 47%

Total TSS loading =	1.4	m^3/ha/year
Total TSS Loading from Drainage Area =	98.1	m^3/year

Assuming all TSS deposition is in the sediment forebay:

50% of forebay volume =	3888	m^3
	98.1	m^3/year
Method 1 Clean Out Frequency=	**39.6**	years

Stantec

Project:	**UGS & ULRD**
Project Number:	**1606230965**
Project Location:	**City of Thorold**
Designer:	**KB**
Date:	**Mar-26**

Wet Pond Sediment Removal Frequency Calculations - North Pond

Method 2:

From Figures 4.2-4.5 of the MOE Guideline, 1994, (note that Figures used were not present in MOE SWMPDM, 2003). The Total Suspended Solids removal effieciency based on a impervious area of 47%.

Actual Permanent Pool Storage per ha =	212	m^3/ha
Extended Detention allowance=	+40	m^3/ha
	252	m^3/ha

% imp	Efficiency
35%	88
55%	83
70%	81
85%	79

TSS removal efficeincy at 252 m/ha = 85 %

The resulting permanent pool volume at a removal efficiency of 65% is:

% imp	storage/ha
35%	33
55%	50
70%	60
85%	80

Permanent pool volume @ 65%=	43	m^3/ha
Drainage Area =	71.47	ha
	3,088	m^3

Sediment accumulation to invoke clean out (difference between actual and 75% removal efficiency)

Actual Permanent Pool Volume	15,125	m^3
Permanent Pool Volume @ 65 % efficiency	3088	m^3
	12,037	m^3

Resultant Clean Out Frequency

Sediment Accumulation to invoke Clean out	12,037	m^3
Total TSS Loading from Drainage Area =	98.1	m^3/year
	122.7	years

Method 2 Clean out Frequency= **122.7** years

Conclusion

Clean out frequency is determined by the minimum result from method 1 and method 2

Method 1 Clean out Frequency=	**39.6**	years
Method 2 Clean out Frequency=	**122.7**	years
Therefore the Clean out frequency is	**39.6**	years

Stantec

Project: Uppers Grove & Uppers Lane - Revised Pond Design
Project Number: 1606230965
Project Location: City of Thorold
Designer: KB
Date: May 5, 2025

Overland Flow Calculations

Note: Areas draining to rear yard catch basins have been assumed to pickup the 100yr flows. Remaining drainage areas will have a dual draining major-minor split. An assessment of two representative catchments seen below has been assessed to determine the appropriate ratio to be applied to 100yr flow analysis as it is anticipated that future phases of development will follow similar drainage regimes. Should this not be the case further investigation may be required to assess if additional 100yr pickup locations are required.

Drainage Area 1 - Southern Portion of Uppers Grove Residential Development

Total Drainage Area	2.47	ha
Drainage Area with Dual Drainage (major/minor split)	1.64	ha
Drainage Area with ready yard catch basins (100yr pickup)	0.83	ha

Drainage Area with Dual Drainage (major/minor split)

Area	1.64	ha
100 yr Flow	0.43	cms
5 yr Flow	0.25	cms
Resultant Overland Flows	0.18	cms

Drainage Area with ready yard catch basins (100yr pickup)

Area	0.83	ha
100 yr Flow	0.22	cms
5 yr Flow	0.13	cms
Resultant Overland Flows	0.00	cms

Drainage Area 1 - Summary

Area	2.47	ha
Total 100yr Flow	0.65	cms
Resultant Overland Flows	0.18	cms
% of Total 100yr flow as Overland Flows	27%	

Drainage Area 2 - Northern Portion of Uppers Grove Residential Development

Total Drainage Area	5.10	ha
Drainage Area with Dual Drainage (major/minor split)	2.90	ha
Drainage Area with ready yard catch basins (100yr pickup)	2.21	ha

Drainage Area with Dual Drainage (major/minor split)

Area	2.90	ha
100 yr Flow	0.74	cms
5 yr Flow	0.43	cms
Resultant Overland Flows	0.31	cms

Drainage Area with ready yard catch basins (100yr pickup)

Area	2.21	ha
100 yr Flow	0.57	cms
5 yr Flow	0.33	cms
Resultant Overland Flows	0.00	cms

Drainage Area 2 - Summary

Area	5.10	ha
Total 100yr Flow	1.32	cms
Resultant Overland Flows	0.31	cms
% of Total 100yr flow as Overland Flows	24%	

Drainage Area Summary

Average % of Total 100yr flow as Overland Flows	26%
Assumed % of Total 100yr flow as Overland Flows	30%

Note: As seen above, the analysis shows that approximately 24-27% of the Total 100yr flows contribute to overland flow. To remain conservative, **overland flow analysis will be assumed as 30% of 100yr flows.**

Stantec

Project: Uppers Grove & Uppers Lane - Revised Pond Design
Project Number:1606230965
Project Location:City of Thorold
Designer:KB
3/25/2026

Overland Flow Section Assessments

ROW Width (m)	ROW Slope %	Full ROW Depth (m)	Full ROW Capacity (cms)	Full Capacity Velocity (m/s)	Depth x Velocity (required under 0.65 m2/s)
20	0.5	0.26	2.36	0.94	0.25
18	0.5	0.25	2.00	0.93	0.23
20m Temp. Granular Access*	0.5	0.30	2.88	1.31	0.39
16m ROW	0.5	0.22	1.45	0.95	0.21

* Note full flow depth has been assessed only within the ROW and boulevard width has not been assessed for flow capacity
Note: See detailed calculations of ROW in flowmaster analysis
To remain conservative, the following analysis of the overland flow cross sections assumes that the contributing drainage areas contribute all their respective flows to downstream cross section instantly. In reality, the flows from upstream catchments would be staggered as overland flow traverses the Site.

Overland Flow Upstream of Proposed Pond - 20m ROW

Assuming Full Buildout of UGS and ULRD

Area	23.82	ha
100yr Flow for Overland Flow into Pond HW1	5.984	cms
% of Total 100yr flow as Overland Flows	30%	
Resultant Overland Flows	1.80	cms
20m ROW Capacity	2.36	cms

Overland Flow at Street F - 18m ROW

Assuming Full Buildout of the UGS and ULRD

Area	11.52	ha
100yr Flow for Overland Flow into Pond HW1	3.161	cms
% of Total 100yr flow as Overland Flows	30%	
Resultant Overland Flows	0.95	cms
20m ROW Capacity	2.00	cms

Overland Flow Upstream of Proposed Pond - 20m Temp. Granular Access Road

Assuming Full Buildout of UGS

Area	15.27	ha
100yr Flow for Overland Flow into Pond HW1	3.615	cms
% of Total 100yr flow as Overland Flows	30%	
Resultant Overland Flows	1.08	cms
Interim Gravel Road ROW Capacity	2.88	cms

Overland Flow at Street D - 16m ROW

Area	17.38	ha
100yr Flow for Overland Flow into Pond HW1	4.028	cms
% of Total 100yr flow as Overland Flows	30%	
Resultant Overland Flows	1.21	cms
16m ROW Capacity	1.45	cms

Worksheet for 20m ROW - Capacity

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.50000	%
Normal Depth	0.261	m

Section Definitions

Station (m)	Elevation (m)
0+00.00	100.00000
0+01.20	99.97600
0+02.70	99.94600
0+05.55	99.88900
0+05.75	99.88900
0+05.75	99.73900
0+10.00	99.82400
0+14.25	99.73900
0+14.25	99.88900
0+14.45	99.88900
0+17.30	99.94600
0+18.80	99.97600
0+20.00	100.00000

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 100.00000)	(0+01.20, 99.97600)	0.025
(0+01.20, 99.97600)	(0+02.70, 99.94600)	0.013
(0+02.70, 99.94600)	(0+05.55, 99.88900)	0.025
(0+05.55, 99.88900)	(0+14.45, 99.88900)	0.013
(0+14.45, 99.88900)	(0+17.30, 99.94600)	0.025
(0+17.30, 99.94600)	(0+18.80, 99.97600)	0.013
(0+18.80, 99.97600)	(0+20.00, 100.00000)	0.025

Worksheet for 20m ROW - Capacity

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Discharge		2.36	m³/s
Elevation Range	99.7390 to 100.0000 m		
Flow Area		2.52	m²
Wetted Perimeter		20.3039	m
Hydraulic Radius		0.124	m
Top Width		20.0000	m
Normal Depth		0.261	m
Critical Depth		0.24	m
Critical Slope		0.00714	m/m
Velocity		0.94	m/s
Velocity Head		0.04	m
Specific Energy		0.31	m
Froude Number		0.84	
Flow Type	Subcritical		

GVF Input Data

Downstream Depth	0.000	m
Length	0.0000	m
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.000	m
Profile Description		
Profile Headloss	0.00	m
Downstream Velocity	Infinity	m/s
Upstream Velocity	Infinity	m/s
Normal Depth	0.261	m
Critical Depth	0.24	m
Channel Slope	0.50000	%
Critical Slope	0.00714	m/m

Cross Section for 20m ROW - Capacity

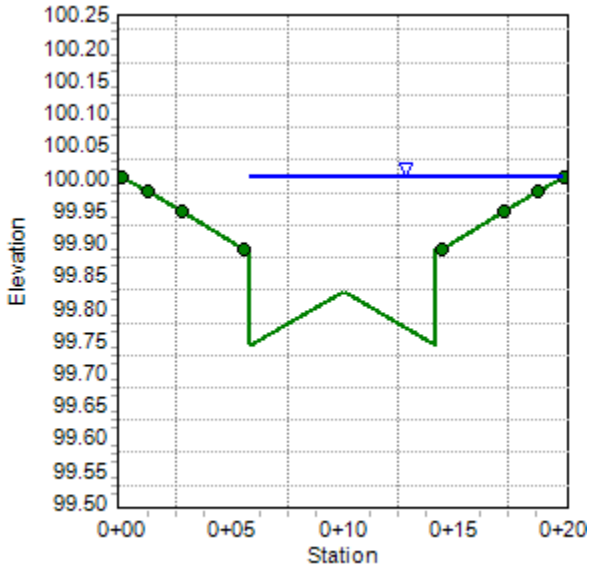
Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.50000	%
Normal Depth	0.261	m
Discharge	2.36	m³/s

Cross Section Image



Worksheet for 18m ROW - Capacity

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.50000	%
Normal Depth	0.245	m

Section Definitions

Station (m)	Elevation (m)
0+00.00	100.00000
0+00.20	99.99600
0+01.70	99.96600
0+04.75	99.90500
0+04.95	99.90500
0+04.95	99.75500
0+09.00	99.83600
0+13.05	99.75500
0+13.05	99.90500
0+13.25	99.90500
0+16.30	99.96600
0+17.80	99.99600
0+18.00	100.00000

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 100.00000)	(0+00.20, 99.99600)	0.025
(0+00.20, 99.99600)	(0+01.70, 99.96600)	0.013
(0+01.70, 99.96600)	(0+04.75, 99.90500)	0.025
(0+04.75, 99.90500)	(0+13.25, 99.90500)	0.013
(0+13.25, 99.90500)	(0+16.30, 99.96600)	0.025
(0+16.30, 99.96600)	(0+17.80, 99.99600)	0.013
(0+17.80, 99.99600)	(0+18.00, 100.00000)	0.025

Worksheet for 18m ROW - Capacity

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Discharge		2.00	m³/s
Elevation Range	99.76 to 100.00 m		
Flow Area		2.15	m²
Wetted Perimeter		18.3035	m
Hydraulic Radius		0.117	m
Top Width		18.0000	m
Normal Depth		0.245	m
Critical Depth		0.23	m
Critical Slope		0.00685	m/m
Velocity		0.93	m/s
Velocity Head		0.04	m
Specific Energy		0.29	m
Froude Number		0.86	
Flow Type	Subcritical		

GVF Input Data

Downstream Depth	0.000	m
Length	0.0000	m
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.000	m
Profile Description		
Profile Headloss	0.00	m
Downstream Velocity	Infinity	m/s
Upstream Velocity	Infinity	m/s
Normal Depth	0.245	m
Critical Depth	0.23	m
Channel Slope	0.50000	%
Critical Slope	0.00685	m/m

Cross Section for 18m ROW - Capacity

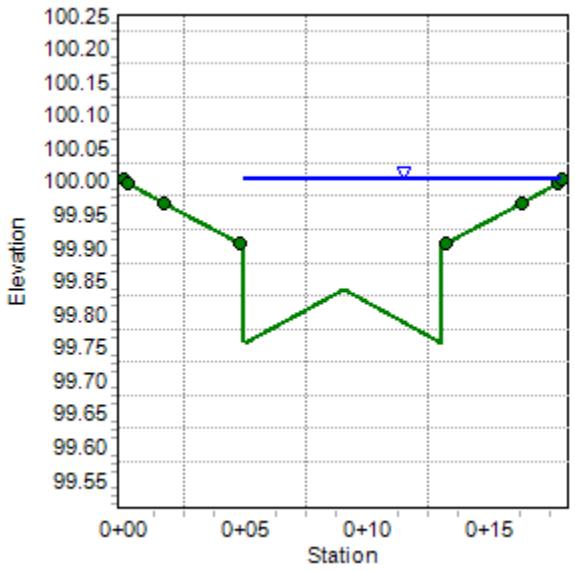
Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.50000	%
Normal Depth	0.245	m
Discharge	2.00	m³/s

Cross Section Image



Worksheet for Temp. Granular Access Road

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.50000	%
Normal Depth	0.300	m

Section Definitions

Station (m)	Elevation (m)
0+00.00	0.41000
0+05.55	0.30000
0+06.05	0.00000
0+07.00	0.02000
0+10.00	0.08000
0+13.00	0.02000
0+13.95	0.00000
0+14.45	0.30000
0+20.00	0.41000

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.41000)	(0+05.55, 0.30000)	0.035
(0+05.55, 0.30000)	(0+07.00, 0.02000)	0.028
(0+07.00, 0.02000)	(0+13.00, 0.02000)	0.016
(0+13.00, 0.02000)	(0+14.45, 0.30000)	0.028
(0+14.45, 0.30000)	(0+20.00, 0.41000)	0.035

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Worksheet for Temp. Granular Access Road

Results

Discharge		2.88	m³/s
Elevation Range	0.00 to 0.41 m		
Flow Area		2.20	m²
Wetted Perimeter		9.0678	m
Hydraulic Radius		0.243	m
Top Width		8.9000	m
Normal Depth		0.300	m
Critical Depth		0.27	m
Critical Slope		0.00732	m/m
Velocity		1.31	m/s
Velocity Head		0.09	m
Specific Energy		0.39	m
Froude Number		0.84	
Flow Type	Subcritical		

GVF Input Data

Downstream Depth	0.000	m
Length	0.0000	m
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.000	m
Profile Description		
Profile Headloss	0.00	m
Downstream Velocity	Infinity	m/s
Upstream Velocity	Infinity	m/s
Normal Depth	0.300	m
Critical Depth	0.27	m
Channel Slope	0.50000	%
Critical Slope	0.00732	m/m

Cross Section for Temp. Granular Access Road

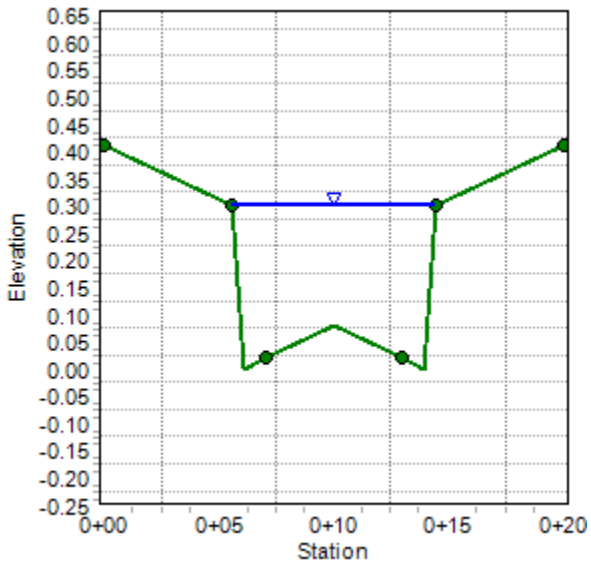
Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.50000	%
Normal Depth	0.300	m
Discharge	2.88	m³/s

Cross Section Image



Worksheet for 16m ROW - Capacity

Project Description	
Friction Method	Manning Formula
Solve For	Discharge

Input Data	
Channel Slope	0.500 %
Normal Depth	0.22 m

Section Definitions

Station (m)	Elevation (m)
0+00.00	100.00
0+00.20	100.00
0+01.70	99.97
0+04.50	99.91
0+04.65	99.91
0+04.70	99.76
0+05.00	99.79
0+08.75	99.87
0+12.50	99.79
0+12.80	99.76
0+12.85	99.91
0+13.00	99.91
0+16.00	99.98

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 100.00)	(0+00.20, 100.00)	0.025
(0+00.20, 100.00)	(0+01.70, 99.97)	0.013
(0+01.70, 99.97)	(0+04.50, 99.91)	0.013
(0+04.50, 99.91)	(0+13.00, 99.91)	0.013
(0+13.00, 99.91)	(0+16.00, 99.98)	0.025

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results	
Discharge	1.45 m³/s
Roughness Coefficient	0.016
Elevation Range	99.76 to 100.00 m
Flow Area	1.5 m²

Worksheet for 16m ROW - Capacity

Results	
Wetted Perimeter	15.22 m
Hydraulic Radius	0.10 m
Top Width	15.00 m
Normal Depth	0.22 m
Critical Depth	0.22 m
Critical Slope	0.557 %
Velocity	0.95 m/s
Velocity Head	0.05 m
Specific Energy	0.27 m
Froude Number	0.950
Flow Type	Subcritical

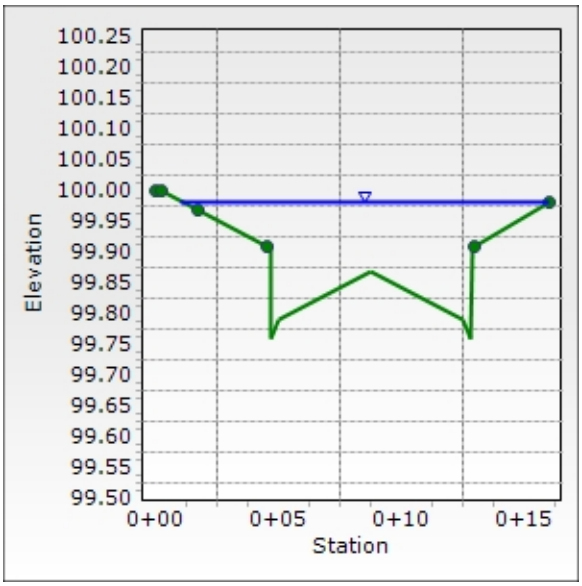
GVF Input Data	
Downstream Depth	0.00 m
Length	0.00 m
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.00 m
Profile Description	
Profile Headloss	0.00 ft
Downstream Velocity	Infinity m/s
Upstream Velocity	Infinity m/s
Normal Depth	0.22 m
Critical Depth	0.22 m
Channel Slope	0.500 %
Critical Slope	0.557 %

Cross Section for 16m ROW - Capacity

Project Description	
Friction Method	Manning Formula
Solve For	Discharge

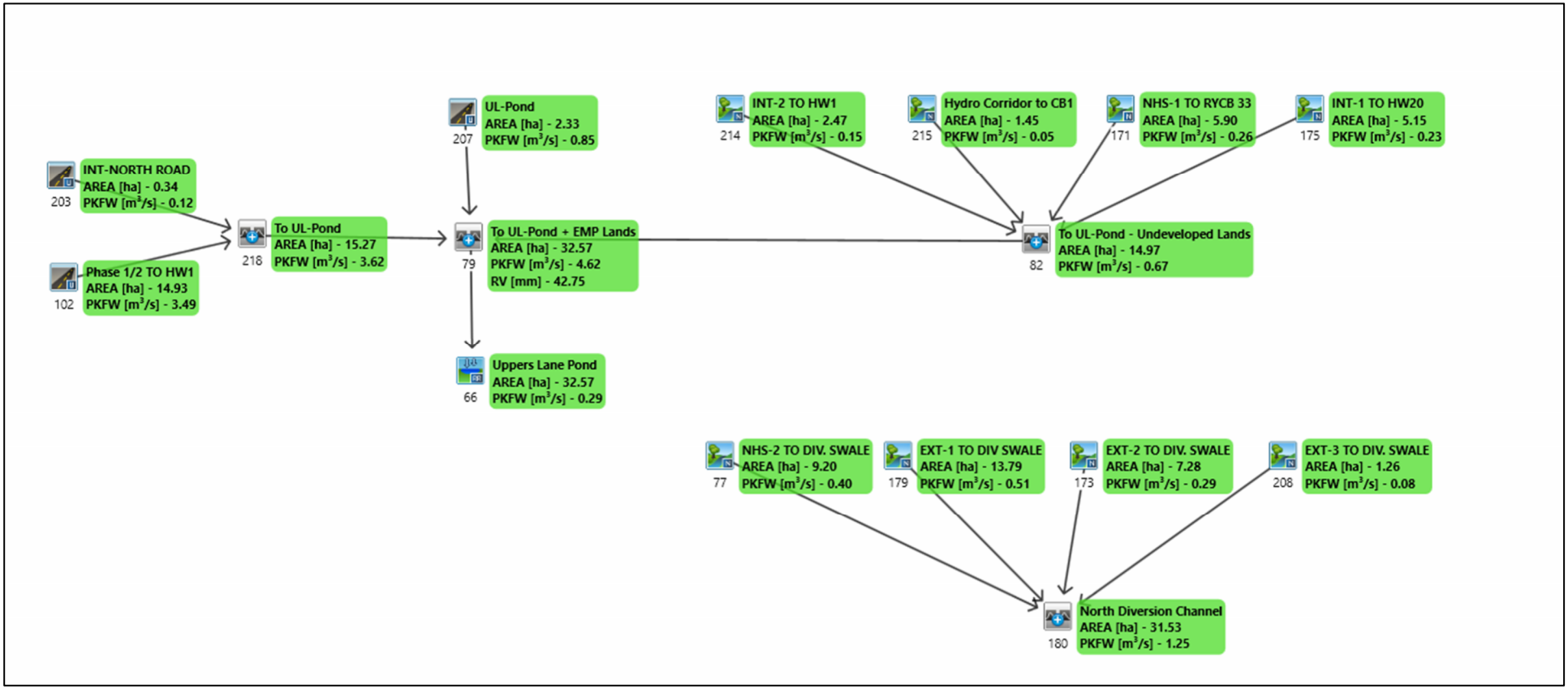
Input Data	
Channel Slope	0.500 %
Normal Depth	0.22 m
Discharge	1.45 m³/s



C.2 VO6 Model Data

Appendix C Stormwater Management Calculations

INTERIM CONDITION MODEL



VISUAL OTTHYMO – UPPERS GROVE RESIDENTIAL DEVELOPMENT MODEL SCHEMATIC

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

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       O   O    T      T    H   H    Y    M   M  O   O
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DATE: 05/05/2025                          TIME: 03:09:20

USER:


COMMENTS: _____________________________________________________________

--------------------------------------------------------------------------------------------------------------
  ************************************************
  ** SIMULATION : A. 25mm 4h 10min Chicago      **
  ************************************************

--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 512.000
| Ptotal= 25.03 mm |                          B=   6.000
--------------------                          C=   0.800
                       used in:   INTENSITY =  A / (t + B)^C

                       Duration of storm  =  4.00 hrs
                       Storm time step    = 10.00 min
                       Time to peak ratio =  0.46

                TIME    RAIN  |  TIME    RAIN  |'  TIME    RAIN  |  TIME    RAIN
                 hrs   mm/hr  |   hrs   mm/hr  |'   hrs   mm/hr  |   hrs   mm/hr
                0.00    1.50  |  1.00    3.48  |   2.00    7.87  |  3.00    2.10
                0.17    1.65  |  1.17    4.61  |   2.17    5.25  |  3.17    1.89
                0.33    1.83  |  1.33    7.00  |   2.33    3.98  |  3.33    1.72
                0.50    2.07  |  1.50   15.31  |   2.50    3.22  |  3.50    1.58
                0.67    2.38  |  1.67   55.72  |   2.67    2.72  |  3.67    1.47
                0.83    2.82  |  1.83   16.30  |   2.83    2.36  |  3.83    1.37


------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0171)|   Area     (ha)=   5.90   Curve Number    (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia       (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.62

        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   1.50  |  1.083   3.48  |   2.083   7.87  |  3.08    2.10
                0.167   1.50  |  1.167   3.48  |   2.167   7.87  |  3.17    2.10
                0.250   1.65  |  1.250   4.61  |   2.250   5.25  |  3.25    1.89
                0.333   1.65  |  1.333   4.61  |   2.333   5.25  |  3.33    1.89
                0.417   1.83  |  1.417   7.00  |   2.417   3.98  |  3.42    1.72
                0.500   1.83  |  1.500   7.00  |   2.500   3.98  |  3.50    1.72
                0.583   2.07  |  1.583  15.31  |   2.583   3.22  |  3.58    1.58
                0.667   2.07  |  1.667  15.31  |   2.667   3.22  |  3.67    1.58
                0.750   2.38  |  1.750  55.72  |   2.750   2.72  |  3.75    1.47
                0.833   2.38  |  1.833  55.72  |   2.833   2.72  |  3.83    1.47
                0.917   2.82  |  1.917  16.30  |   2.917   2.36  |  3.92    1.37
                1.000   2.82  |  2.000  16.30  |   3.000   2.36  |  4.00    1.37

     Unit Hyd Qpeak  (cms)=   0.363

     PEAK FLOW       (cms)=   0.036 (i)
     TIME TO PEAK    (hrs)=   2.583
     RUNOFF VOLUME    (mm)=   3.832
     TOTAL RAINFALL   (mm)=  25.031
     RUNOFF COEFFICIENT   =   0.153

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

------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0175)|   Area     (ha)=   5.15   Curve Number    (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia       (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.62

        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   1.50  |  1.083   3.48  |   2.083   7.87  |  3.08    2.10
                0.167   1.50  |  1.167   3.48  |   2.167   7.87  |  3.17    2.10
                0.250   1.65  |  1.250   4.61  |   2.250   5.25  |  3.25    1.89
                0.333   1.65  |  1.333   4.61  |   2.333   5.25  |  3.33    1.89
                0.417   1.83  |  1.417   7.00  |   2.417   3.98  |  3.42    1.72
                0.500   1.83  |  1.500   7.00  |   2.500   3.98  |  3.50    1.72
                0.583   2.07  |  1.583  15.31  |   2.583   3.22  |  3.58    1.58
                0.667   2.07  |  1.667  15.31  |   2.667   3.22  |  3.67    1.58
                0.750   2.38  |  1.750  55.72  |   2.750   2.72  |  3.75    1.47
                0.833   2.38  |  1.833  55.72  |   2.833   2.72  |  3.83    1.47
                0.917   2.82  |  1.917  16.30  |   2.917   2.36  |  3.92    1.37
                1.000   2.82  |  2.000  16.30  |   3.000   2.36  |  4.00    1.37

     Unit Hyd Qpeak  (cms)=   0.317

     PEAK FLOW       (cms)=   0.031 (i)
     TIME TO PEAK    (hrs)=   2.583
     RUNOFF VOLUME    (mm)=   3.832
     TOTAL RAINFALL   (mm)=  25.031
     RUNOFF COEFFICIENT   =   0.153

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

------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0214)|   Area     (ha)=   2.47   Curve Number    (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia       (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.41

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

                           ---- TRANSFORMED HYETOGRAPH ----
```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	1.50	1.083	3.48	2.083	7.87	3.08	2.10
0.167	1.50	1.167	3.48	2.167	7.87	3.17	2.10
0.250	1.65	1.250	4.61	2.250	5.25	3.25	1.89
0.333	1.65	1.333	4.61	2.333	5.25	3.33	1.89
0.417	1.83	1.417	7.00	2.417	3.98	3.42	1.72
0.500	1.83	1.500	7.00	2.500	3.98	3.50	1.72
0.583	2.07	1.583	15.31	2.583	3.22	3.58	1.58
0.667	2.07	1.667	15.31	2.667	3.22	3.67	1.58
0.750	2.38	1.750	55.72	2.750	2.72	3.75	1.47
0.833	2.38	1.833	55.72	2.833	2.72	3.83	1.47
0.917	2.82	1.917	16.30	2.917	2.36	3.92	1.37
1.000	2.82	2.000	16.30	3.000	2.36	4.00	1.37

Unit Hyd Qpeak (cms)= 0.230

PEAK FLOW (cms)= 0.020 (i)
TIME TO PEAK (hrs)= 2.333
RUNOFF VOLUME (mm)= 3.832
TOTAL RAINFALL (mm)= 25.031
RUNOFF COEFFICIENT = 0.153

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

CALIB
NASHYD (0215)
ID= 1 DT= 5.0 min

Area (ha)= 1.45 Curve Number (CN)= 75.0
Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.82

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	1.50	1.083	3.48	2.083	7.87	3.08	2.10
0.167	1.50	1.167	3.48	2.167	7.87	3.17	2.10
0.250	1.65	1.250	4.61	2.250	5.25	3.25	1.89
0.333	1.65	1.333	4.61	2.333	5.25	3.33	1.89
0.417	1.83	1.417	7.00	2.417	3.98	3.42	1.72
0.500	1.83	1.500	7.00	2.500	3.98	3.50	1.72
0.583	2.07	1.583	15.31	2.583	3.22	3.58	1.58
0.667	2.07	1.667	15.31	2.667	3.22	3.67	1.58
0.750	2.38	1.750	55.72	2.750	2.72	3.75	1.47
0.833	2.38	1.833	55.72	2.833	2.72	3.83	1.47
0.917	2.82	1.917	16.30	2.917	2.36	3.92	1.37
1.000	2.82	2.000	16.30	3.000	2.36	4.00	1.37

Unit Hyd Qpeak (cms)= 0.068

PEAK FLOW (cms)= 0.007 (i)
TIME TO PEAK (hrs)= 2.833
RUNOFF VOLUME (mm)= 3.831
TOTAL RAINFALL (mm)= 25.031
RUNOFF COEFFICIENT = 0.153

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

ADD HYD (0082)
3 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0171):	5.90	0.036	2.58	3.83
+ ID2= 2 (0175):	5.15	0.031	2.58	3.83
ID = 3 (0082):	11.05	0.067	2.58	3.83

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0082)
3 + 2 = 1

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 3 (0082):	11.05	0.067	2.58	3.83
+ ID2= 2 (0214):	2.47	0.020	2.33	3.83
ID = 1 (0082):	13.52	0.084	2.50	3.83

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0082)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0082):	13.52	0.084	2.50	3.83
+ ID2= 2 (0215):	1.45	0.007	2.83	3.83
ID = 3 (0082):	14.97	0.090	2.50	3.83

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB
STANDHYD (0203)
ID= 1 DT= 5.0 min

Area (ha)= 0.34
Total Imp(%)= 83.00 Dir. Conn.(%)= 83.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.28	0.06
Dep. Storage	(mm)=	2.00	1.50
Average Slope	(%)=	1.00	1.00
Length	(m)=	47.61	40.00
Mannings n	=	0.015	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	1.50	1.083	3.48	2.083	7.87	3.08	2.10
0.167	1.50	1.167	3.48	2.167	7.87	3.17	2.10
0.250	1.65	1.250	4.61	2.250	5.25	3.25	1.89
0.333	1.65	1.333	4.61	2.333	5.25	3.33	1.89
0.417	1.83	1.417	7.00	2.417	3.98	3.42	1.72
0.500	1.83	1.500	7.00	2.500	3.98	3.50	1.72
0.583	2.07	1.583	15.31	2.583	3.22	3.58	1.58
0.667	2.07	1.667	15.31	2.667	3.22	3.67	1.58
0.750	2.38	1.750	55.72	2.750	2.72	3.75	1.47
0.833	2.38	1.833	55.72	2.833	2.72	3.83	1.47
0.917	2.82	1.917	16.30	2.917	2.36	3.92	1.37
1.000	2.82	2.000	16.30	3.000	2.36	4.00	1.37

				TOTALS
Max.Eff.Inten.(mm/hr)=	55.72	6.22		
over (min)	5.00	30.00		
Storage Coeff. (min)=	2.25 (ii)	28.65 (ii)		
Unit Hyd. Tpeak (min)=	5.00	30.00		
Unit Hyd. peak (cms)=	0.30	0.04		
PEAK FLOW (cms)=	0.04	0.00	0.043 (iii)	
TIME TO PEAK (hrs)=	1.83	2.25	1.83	
RUNOFF VOLUME (mm)=	23.03	5.12	19.93	
TOTAL RAINFALL (mm)=	25.03	25.03	25.03	
RUNOFF COEFFICIENT =	0.92	0.20	0.80	

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:

```
           CN*  =  75.0    Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB            |
| STANDHYD (  0102)|   Area    (ha)=  14.93
|ID= 1 DT= 5.0 min |   Total Imp(%)=  60.00   Dir. Conn.(%)=  60.00
--------------------
                        IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       8.96         5.97
     Dep. Storage     (mm)=       2.00         1.50
     Average Slope     (%)=       1.00         1.00
     Length            (m)=     315.49        40.00
     Mannings n            =      0.015        0.250

         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    1.50 | 1.083    3.48 | 2.083    7.87 |  3.08    2.10
              0.167    1.50 | 1.167    3.48 | 2.167    7.87 |  3.17    2.10
              0.250    1.65 | 1.250    4.61 | 2.250    5.25 |  3.25    1.89
              0.333    1.65 | 1.333    4.61 | 2.333    5.25 |  3.33    1.89
              0.417    1.83 | 1.417    7.00 | 2.417    3.98 |  3.42    1.72
              0.500    1.83 | 1.500    7.00 | 2.500    3.98 |  3.50    1.72
              0.583    2.07 | 1.583   15.31 | 2.583    3.22 |  3.58    1.58
              0.667    2.07 | 1.667   15.31 | 2.667    3.22 |  3.67    1.58
              0.750    2.38 | 1.750   55.72 | 2.750    2.72 |  3.75    1.47
              0.833    2.38 | 1.833   55.72 | 2.833    2.72 |  3.83    1.47
              0.917    2.82 | 1.917   16.30 | 2.917    2.36 |  3.92    1.37
              1.000    2.82 | 2.000   16.30 | 3.000    2.36 |  4.00    1.37

     Max.Eff.Inten.(mm/hr)=      55.72         6.22
               over (min)        5.00        35.00
     Storage Coeff.  (min)=      7.01 (ii)   33.41 (ii)
     Unit Hyd. Tpeak (min)=      5.00        35.00
     Unit Hyd. peak  (cms)=      0.17         0.03
                                                    *TOTALS*
     PEAK FLOW       (cms)=      1.13         0.06      1.143 (iii)
     TIME TO PEAK    (hrs)=      1.83         2.33       1.83
     RUNOFF VOLUME    (mm)=     23.03         5.12      15.86
     TOTAL RAINFALL   (mm)=     25.03        25.03      25.03
     RUNOFF COEFFICIENT   =      0.92         0.20       0.63


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  75.0    Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| ADD HYD  (  0218)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0102):    14.93    1.143     1.83    15.86
     + ID2= 2 (  0203):     0.34    0.043     1.83    19.93
       ================================================
       ID = 3 (  0218):    15.27    1.187     1.83    15.96

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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--------------------
| CALIB            |
| STANDHYD (  0207)|   Area    (ha)=   2.33
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|ID= 1 DT= 5.0 min |   Total Imp(%)=  88.90   Dir. Conn.(%)=  88.90
--------------------
                        IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.07         0.26
     Dep. Storage     (mm)=       0.00         1.50
     Average Slope     (%)=       1.00         1.00
     Length            (m)=     124.63        25.00
     Mannings n            =      0.015        0.250

         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    1.50 | 1.083    3.48 | 2.083    7.87 |  3.08    2.10
              0.167    1.50 | 1.167    3.48 | 2.167    7.87 |  3.17    2.10
              0.250    1.65 | 1.250    4.61 | 2.250    5.25 |  3.25    1.89
              0.333    1.65 | 1.333    4.61 | 2.333    5.25 |  3.33    1.89
              0.417    1.83 | 1.417    7.00 | 2.417    3.98 |  3.42    1.72
              0.500    1.83 | 1.500    7.00 | 2.500    3.98 |  3.50    1.72
              0.583    2.07 | 1.583   15.31 | 2.583    3.22 |  3.58    1.58
              0.667    2.07 | 1.667   15.31 | 2.667    3.22 |  3.67    1.58
              0.750    2.38 | 1.750   55.72 | 2.750    2.72 |  3.75    1.47
              0.833    2.38 | 1.833   55.72 | 2.833    2.72 |  3.83    1.47
              0.917    2.82 | 1.917   16.30 | 2.917    2.36 |  3.92    1.37
              1.000    2.82 | 2.000   16.30 | 3.000    2.36 |  4.00    1.37

     Max.Eff.Inten.(mm/hr)=      55.72        11.28
               over (min)        5.00        10.00
     Storage Coeff.  (min)=      4.01 (ii)    7.62 (ii)
     Unit Hyd. Tpeak (min)=      5.00        10.00
     Unit Hyd. peak  (cms)=      0.24         0.13
                                                    *TOTALS*
     PEAK FLOW       (cms)=      0.30         0.01       0.306 (iii)
     TIME TO PEAK    (hrs)=      1.83         1.92        1.83
     RUNOFF VOLUME    (mm)=     25.03         5.12       22.82
     TOTAL RAINFALL   (mm)=     25.03        25.03       25.03
     RUNOFF COEFFICIENT   =      1.00         0.20        0.91

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  75.0    Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| ADD HYD  (  0079)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0207):     2.33    0.306     1.83    22.82
     + ID2= 2 (  0218):    15.27    1.187     1.83    15.96
       ================================================
       ID = 3 (  0079):    17.60    1.493     1.83    16.86

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

--------------------
| ADD HYD  (  0079)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0079):    17.60    1.493     1.83    16.86
     + ID2= 2 (  0082):    14.97    0.090     2.50     3.83
       ================================================
       ID = 1 (  0079):    32.57    1.504     1.83    10.87

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

RESERVOIR(0066)	OVERFLOW IS OFF
IN= 2---> OUT= 1	
DT= 5.0 min	

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.5810	1.5760
0.0080	0.2340	0.8460	1.8660
0.0130	0.4840	1.0630	2.1640
0.0470	0.7470	1.4780	2.4680
0.1760	1.0160	1.9960	2.7800
0.3580	1.2930	2.8820	2.8590

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0079)	32.570	1.504	1.83	10.87
OUTFLOW: ID= 1 (0066)	32.570	0.010	5.08	9.39

PEAK FLOW REDUCTION [Qout/Qin](%)= 0.67
TIME SHIFT OF PEAK FLOW (min)=195.00
MAXIMUM STORAGE USED (ha.m.)= 0.3414

CALIB					
NASHYD (0077)	Area (ha)= 9.20	Curve Number (CN)= 75.0			
ID= 1 DT= 5.0 min	Ia (mm)= 5.00	# of Linear Res.(N)= 3.00			
	U.H. Tp(hrs)= 0.64				

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	1.50	1.083	3.48	2.083	7.87	3.08	2.10
0.167	1.50	1.167	3.48	2.167	7.87	3.17	2.10
0.250	1.65	1.250	4.61	2.250	5.25	3.25	1.89
0.333	1.65	1.333	4.61	2.333	5.25	3.33	1.89
0.417	1.83	1.417	7.00	2.417	3.98	3.42	1.72
0.500	1.83	1.500	7.00	2.500	3.98	3.50	1.72
0.583	2.07	1.583	15.31	2.583	3.22	3.58	1.58
0.667	2.07	1.667	15.31	2.667	3.22	3.67	1.58
0.750	2.38	1.750	55.72	2.750	2.72	3.75	1.47
0.833	2.38	1.833	55.72	2.833	2.72	3.83	1.47
0.917	2.82	1.917	16.30	2.917	2.36	3.92	1.37
1.000	2.82	2.000	16.30	3.000	2.36	4.00	1.37

Unit Hyd Qpeak (cms)= 0.549

PEAK FLOW (cms)= 0.054 (i)
TIME TO PEAK (hrs)= 2.583
RUNOFF VOLUME (mm)= 3.832
TOTAL RAINFALL (mm)= 25.031
RUNOFF COEFFICIENT = 0.153

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

CALIB					
NASHYD (0173)	Area (ha)= 7.28	Curve Number (CN)= 75.0			
ID= 1 DT= 5.0 min	Ia (mm)= 5.00	# of Linear Res.(N)= 3.00			
	U.H. Tp(hrs)= 0.72				

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	1.50	1.083	3.48	2.083	7.87	3.08	2.10
0.167	1.50	1.167	3.48	2.167	7.87	3.17	2.10
0.250	1.65	1.250	4.61	2.250	5.25	3.25	1.89
0.333	1.65	1.333	4.61	2.333	5.25	3.33	1.89
0.417	1.83	1.417	7.00	2.417	3.98	3.42	1.72
0.500	1.83	1.500	7.00	2.500	3.98	3.50	1.72
0.583	2.07	1.583	15.31	2.583	3.22	3.58	1.58
0.667	2.07	1.667	15.31	2.667	3.22	3.67	1.58
0.750	2.38	1.750	55.72	2.750	2.72	3.75	1.47
0.833	2.38	1.833	55.72	2.833	2.72	3.83	1.47
0.917	2.82	1.917	16.30	2.917	2.36	3.92	1.37
1.000	2.82	2.000	16.30	3.000	2.36	4.00	1.37

Unit Hyd Qpeak (cms)= 0.386

PEAK FLOW (cms)= 0.040 (i)
TIME TO PEAK (hrs)= 2.750
RUNOFF VOLUME (mm)= 3.832
TOTAL RAINFALL (mm)= 25.031
RUNOFF COEFFICIENT = 0.153

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

CALIB					
NASHYD (0179)	Area (ha)= 13.79	Curve Number (CN)= 75.0			
ID= 1 DT= 5.0 min	Ia (mm)= 5.00	# of Linear Res.(N)= 3.00			
	U.H. Tp(hrs)= 0.80				

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	1.50	1.083	3.48	2.083	7.87	3.08	2.10
0.167	1.50	1.167	3.48	2.167	7.87	3.17	2.10
0.250	1.65	1.250	4.61	2.250	5.25	3.25	1.89
0.333	1.65	1.333	4.61	2.333	5.25	3.33	1.89
0.417	1.83	1.417	7.00	2.417	3.98	3.42	1.72
0.500	1.83	1.500	7.00	2.500	3.98	3.50	1.72
0.583	2.07	1.583	15.31	2.583	3.22	3.58	1.58
0.667	2.07	1.667	15.31	2.667	3.22	3.67	1.58
0.750	2.38	1.750	55.72	2.750	2.72	3.75	1.47
0.833	2.38	1.833	55.72	2.833	2.72	3.83	1.47
0.917	2.82	1.917	16.30	2.917	2.36	3.92	1.37
1.000	2.82	2.000	16.30	3.000	2.36	4.00	1.37

Unit Hyd Qpeak (cms)= 0.658

PEAK FLOW (cms)= 0.070 (i)
TIME TO PEAK (hrs)= 2.833
RUNOFF VOLUME (mm)= 3.832
TOTAL RAINFALL (mm)= 25.031
RUNOFF COEFFICIENT = 0.153

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

CALIB					
NASHYD (0208)	Area (ha)= 1.26	Curve Number (CN)= 75.0			
ID= 1 DT= 5.0 min	Ia (mm)= 5.00	# of Linear Res.(N)= 3.00			
	U.H. Tp(hrs)= 0.38				

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	1.50	1.083	3.48	2.083	7.87	3.08	2.10

0.167	1.50	1.167	3.48	2.167	7.87	3.17	2.10
0.250	1.65	1.250	4.61	2.250	5.25	3.25	1.89
0.333	1.65	1.333	4.61	2.333	5.25	3.33	1.89
0.417	1.83	1.417	7.00	2.417	3.98	3.42	1.72
0.500	1.83	1.500	7.00	2.500	3.98	3.50	1.72
0.583	2.07	1.583	15.31	2.583	3.22	3.58	1.58
0.667	2.07	1.667	15.31	2.667	3.22	3.67	1.58
0.750	2.38	1.750	55.72	2.750	2.72	3.75	1.47
0.833	2.38	1.833	55.72	2.833	2.72	3.83	1.47
0.917	2.82	1.917	16.30	2.917	2.36	3.92	1.37
1.000	2.82	2.000	16.30	3.000	2.36	4.00	1.37

Unit Hyd Qpeak (cms)= 0.127

PEAK FLOW (cms)= 0.011 (i)
TIME TO PEAK (hrs)= 2.250
RUNOFF VOLUME (mm)= 3.831
TOTAL RAINFALL (mm)= 25.031
RUNOFF COEFFICIENT = 0.153

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

ADD HYD (0180)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0173):	7.28	0.040	2.75	3.83
+ ID2= 2 (0179):	13.79	0.070	2.83	3.83
ID = 3 (0180):	21.07	0.109	2.75	3.83

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0180)
3 + 2 = 1

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 3 (0180):	21.07	0.109	2.75	3.83
+ ID2= 2 (0208):	1.26	0.011	2.25	3.83
ID = 1 (0180):	22.33	0.115	2.75	3.83

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0180)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0180):	22.33	0.115	2.75	3.83
+ ID2= 2 (0077):	9.20	0.054	2.58	3.83
ID = 3 (0180):	31.53	0.169	2.67	3.83

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```
      V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
      V    V   I    SS     U   U   A A   L
       V  V    I     SS    U   U  AAAAA  L
       V  V    I      SS   U   U  A   A  L
        VV     I    SSSSS  UUUUU  A   A  LLLLL

       OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
      O   O    T      T    H   H   Y Y   MM MM  O   O
      O   O    T      T    H   H    Y    M   M  O   O
       OOO     T      T    H   H    Y    M   M   OOO
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***** D E T A I L E D O U T P U T *****

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DATE: 05/05/2025 TIME: 03:09:20

USER:

COMMENTS: _____

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  ************************************************
  ** SIMULATION : B. 2yr 4hr 10min Chicago      **
  ************************************************
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CHICAGO STORM
Ptotal= 37.41 mm

IDF curve parameters: A= 567.000
B= 5.200
C= 0.746
used in: INTENSITY = A / (t + B)^C

Duration of storm = 4.00 hrs
Storm time step = 10.00 min
Time to peak ratio = 0.46

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	2.74	1.00	5.82	2.00	12.01	3.00	3.70
0.17	2.98	1.17	7.48	2.17	8.39	3.17	3.36
0.33	3.28	1.33	10.82	2.33	6.55	3.33	3.09
0.50	3.65	1.50	21.80	2.50	5.43	3.50	2.87
0.67	4.14	1.67	74.46	2.67	4.67	3.67	2.68
0.83	4.82	1.83	23.08	2.83	4.12	3.83	2.51

CALIB
NASHYD (0171)
ID= 1 DT= 5.0 min

Area (ha)= 5.90 Curve Number (CN)= 75.0
Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.62

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	2.74	1.083	5.82	2.083	12.01	3.08	3.70
0.167	2.74	1.167	5.82	2.167	12.01	3.17	3.70
0.250	2.98	1.250	7.48	2.250	8.39	3.25	3.36
0.333	2.98	1.333	7.48	2.333	8.39	3.33	3.36
0.417	3.28	1.417	10.82	2.417	6.55	3.42	3.09
0.500	3.28	1.500	10.82	2.500	6.55	3.50	3.09
0.583	3.65	1.583	21.80	2.583	5.43	3.58	2.87
0.667	3.65	1.667	21.80	2.667	5.43	3.67	2.87
0.750	4.14	1.750	74.46	2.750	4.67	3.75	2.68
0.833	4.14	1.833	74.46	2.833	4.67	3.83	2.68
0.917	4.82	1.917	23.08	2.917	4.12	3.92	2.51

1.000	4.82	2.000	23.08	3.000	4.12	4.00	2.51

Unit Hyd Qpeak (cms)= 0.363

PEAK FLOW (cms)= 0.081 (i)
TIME TO PEAK (hrs)= 2.583
RUNOFF VOLUME (mm)= 8.970
TOTAL RAINFALL (mm)= 37.407
RUNOFF COEFFICIENT = 0.240

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

CALIB
NASHYD (0175) | Area (ha)= 5.15 Curve Number (CN)= 75.0
ID= 1 DT= 5.0 min | Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.62

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	2.74	1.083	5.82	2.083	12.01	3.08	3.70
0.167	2.74	1.167	5.82	2.167	12.01	3.17	3.70
0.250	2.98	1.250	7.48	2.250	8.39	3.25	3.36
0.333	2.98	1.333	7.48	2.333	8.39	3.33	3.36
0.417	3.28	1.417	10.82	2.417	6.55	3.42	3.09
0.500	3.28	1.500	10.82	2.500	6.55	3.50	3.09
0.583	3.65	1.583	21.80	2.583	5.43	3.58	2.87
0.667	3.65	1.667	21.80	2.667	5.43	3.67	2.87
0.750	4.14	1.750	74.46	2.750	4.67	3.75	2.68
0.833	4.14	1.833	74.46	2.833	4.67	3.83	2.68
0.917	4.82	1.917	23.08	2.917	4.12	3.92	2.51
1.000	4.82	2.000	23.08	3.000	4.12	4.00	2.51

Unit Hyd Qpeak (cms)= 0.317

PEAK FLOW (cms)= 0.071 (i)
TIME TO PEAK (hrs)= 2.583
RUNOFF VOLUME (mm)= 8.970
TOTAL RAINFALL (mm)= 37.407
RUNOFF COEFFICIENT = 0.240

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

CALIB
NASHYD (0214) | Area (ha)= 2.47 Curve Number (CN)= 75.0
ID= 1 DT= 5.0 min | Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.41

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	2.74	1.083	5.82	2.083	12.01	3.08	3.70
0.167	2.74	1.167	5.82	2.167	12.01	3.17	3.70
0.250	2.98	1.250	7.48	2.250	8.39	3.25	3.36
0.333	2.98	1.333	7.48	2.333	8.39	3.33	3.36
0.417	3.28	1.417	10.82	2.417	6.55	3.42	3.09
0.500	3.28	1.500	10.82	2.500	6.55	3.50	3.09
0.583	3.65	1.583	21.80	2.583	5.43	3.58	2.87
0.667	3.65	1.667	21.80	2.667	5.43	3.67	2.87
0.750	4.14	1.750	74.46	2.750	4.67	3.75	2.68
0.833	4.14	1.833	74.46	2.833	4.67	3.83	2.68
0.917	4.82	1.917	23.08	2.917	4.12	3.92	2.51

1.000	4.82	2.000	23.08	3.000	4.12	4.00	2.51

Unit Hyd Qpeak (cms)= 0.230

PEAK FLOW (cms)= 0.044 (i)
TIME TO PEAK (hrs)= 2.250
RUNOFF VOLUME (mm)= 8.969
TOTAL RAINFALL (mm)= 37.407
RUNOFF COEFFICIENT = 0.240

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

CALIB
NASHYD (0215) | Area (ha)= 1.45 Curve Number (CN)= 75.0
ID= 1 DT= 5.0 min | Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.82

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	2.74	1.083	5.82	2.083	12.01	3.08	3.70
0.167	2.74	1.167	5.82	2.167	12.01	3.17	3.70
0.250	2.98	1.250	7.48	2.250	8.39	3.25	3.36
0.333	2.98	1.333	7.48	2.333	8.39	3.33	3.36
0.417	3.28	1.417	10.82	2.417	6.55	3.42	3.09
0.500	3.28	1.500	10.82	2.500	6.55	3.50	3.09
0.583	3.65	1.583	21.80	2.583	5.43	3.58	2.87
0.667	3.65	1.667	21.80	2.667	5.43	3.67	2.87
0.750	4.14	1.750	74.46	2.750	4.67	3.75	2.68
0.833	4.14	1.833	74.46	2.833	4.67	3.83	2.68
0.917	4.82	1.917	23.08	2.917	4.12	3.92	2.51
1.000	4.82	2.000	23.08	3.000	4.12	4.00	2.51

Unit Hyd Qpeak (cms)= 0.068

PEAK FLOW (cms)= 0.016 (i)
TIME TO PEAK (hrs)= 2.833
RUNOFF VOLUME (mm)= 8.969
TOTAL RAINFALL (mm)= 37.407
RUNOFF COEFFICIENT = 0.240

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

ADD HYD (0082)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0171):	5.90	0.081	2.58	8.97
+ ID2= 2 (0175):	5.15	0.071	2.58	8.97
ID = 3 (0082):	11.05	0.151	2.58	8.97

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0082)
3 + 2 = 1

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 3 (0082):	11.05	0.151	2.58	8.97
+ ID2= 2 (0214):	2.47	0.044	2.25	8.97
ID = 1 (0082):	13.52	0.191	2.50	8.97

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0082)		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
1 + 2 = 3	ID1= 1 (0082):	13.52	0.191	2.50	8.97
	+ ID2= 2 (0215):	1.45	0.016	2.83	8.97
	ID = 3 (0082):	14.97	0.205	2.50	8.97

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB
STANDHYD (0203) | Area (ha)= 0.34
ID= 1 DT= 5.0 min | Total Imp(%)= 83.00 Dir. Conn.(%)= 83.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.28	0.06
Dep. Storage	(mm)=	2.00	1.50
Average Slope	(%)=	1.00	1.00
Length	(m)=	47.61	40.00
Mannings n	=	0.015	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	2.74	1.083	5.82	2.083	12.01	3.08	3.70
0.167	2.74	1.167	5.82	2.167	12.01	3.17	3.70
0.250	2.98	1.250	7.48	2.250	8.39	3.25	3.36
0.333	2.98	1.333	7.48	2.333	8.39	3.33	3.36
0.417	3.28	1.417	10.82	2.417	6.55	3.42	3.09
0.500	3.28	1.500	10.82	2.500	6.55	3.50	3.09
0.583	3.65	1.583	21.80	2.583	5.43	3.58	2.87
0.667	3.65	1.667	21.80	2.667	5.43	3.67	2.87
0.750	4.14	1.750	74.46	2.750	4.67	3.75	2.68
0.833	4.14	1.833	74.46	2.833	4.67	3.83	2.68
0.917	4.82	1.917	23.08	2.917	4.12	3.92	2.51
1.000	4.82	2.000	23.08	3.000	4.12	4.00	2.51

Max.Eff.Inten.(mm/hr)=		74.46	15.32	
over (min)		5.00	25.00	
Storage Coeff. (min)=		2.01 (ii)	20.41 (ii)	
Unit Hyd. Tpeak (min)=		5.00	25.00	
Unit Hyd. peak (cms)=		0.31	0.05	
				TOTALS
PEAK FLOW	(cms)=	0.06	0.00	0.059 (iii)
TIME TO PEAK	(hrs)=	1.83	2.17	1.83
RUNOFF VOLUME	(mm)=	35.41	10.69	31.17
TOTAL RAINFALL	(mm)=	37.41	37.41	37.41
RUNOFF COEFFICIENT	=	0.95	0.29	0.83

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 75.0 Ia = Dep. 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 (0102) | Area (ha)= 14.93
ID= 1 DT= 5.0 min | Total Imp(%)= 60.00 Dir. Conn.(%)= 60.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	8.96	5.97

Dep. Storage	(mm)=	2.00	1.50
Average Slope	(%)=	1.00	1.00
Length	(m)=	315.49	40.00
Mannings n	=	0.015	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	2.74	1.083	5.82	2.083	12.01	3.08	3.70
0.167	2.74	1.167	5.82	2.167	12.01	3.17	3.70
0.250	2.98	1.250	7.48	2.250	8.39	3.25	3.36
0.333	2.98	1.333	7.48	2.333	8.39	3.33	3.36
0.417	3.28	1.417	10.82	2.417	6.55	3.42	3.09
0.500	3.28	1.500	10.82	2.500	6.55	3.50	3.09
0.583	3.65	1.583	21.80	2.583	5.43	3.58	2.87
0.667	3.65	1.667	21.80	2.667	5.43	3.67	2.87
0.750	4.14	1.750	74.46	2.750	4.67	3.75	2.68
0.833	4.14	1.833	74.46	2.833	4.67	3.83	2.68
0.917	4.82	1.917	23.08	2.917	4.12	3.92	2.51
1.000	4.82	2.000	23.08	3.000	4.12	4.00	2.51

Max.Eff.Inten.(mm/hr)=		74.46	15.32	
over (min)		5.00	25.00	
Storage Coeff. (min)=		6.24 (ii)	24.65 (ii)	
Unit Hyd. Tpeak (min)=		5.00	25.00	
Unit Hyd. peak (cms)=		0.19	0.05	
				TOTALS
PEAK FLOW	(cms)=	1.58	0.14	1.623 (iii)
TIME TO PEAK	(hrs)=	1.83	2.17	1.83
RUNOFF VOLUME	(mm)=	35.41	10.69	25.52
TOTAL RAINFALL	(mm)=	37.41	37.41	37.41
RUNOFF COEFFICIENT	=	0.95	0.29	0.68

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 75.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0218)		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
1 + 2 = 3	ID1= 1 (0102):	14.93	1.623	1.83	25.52
	+ ID2= 2 (0203):	0.34	0.059	1.83	31.17
	ID = 3 (0218):	15.27	1.682	1.83	25.65

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB
STANDHYD (0207) | Area (ha)= 2.33
ID= 1 DT= 5.0 min | Total Imp(%)= 88.90 Dir. Conn.(%)= 88.90

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	2.07	0.26
Dep. Storage	(mm)=	0.00	1.50
Average Slope	(%)=	1.00	1.00
Length	(m)=	124.63	25.00
Mannings n	=	0.015	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	2.74	1.083	5.82	2.083	12.01	3.08	3.70
0.167	2.74	1.167	5.82	2.167	12.01	3.17	3.70
0.250	2.98	1.250	7.48	2.250	8.39	3.25	3.36
0.333	2.98	1.333	7.48	2.333	8.39	3.33	3.36
0.417	3.28	1.417	10.82	2.417	6.55	3.42	3.09
0.500	3.28	1.500	10.82	2.500	6.55	3.50	3.09
0.583	3.65	1.583	21.80	2.583	5.43	3.58	2.87
0.667	3.65	1.667	21.80	2.667	5.43	3.67	2.87
0.750	4.14	1.750	74.46	2.750	4.67	3.75	2.68
0.833	4.14	1.833	74.46	2.833	4.67	3.83	2.68
0.917	4.82	1.917	23.08	2.917	4.12	3.92	2.51
1.000	4.82	2.000	23.08	3.000	4.12	4.00	2.51

			TOTALS
Max.Eff.Inten.(mm/hr)=	74.46	21.54	
over (min)	5.00	10.00	
Storage Coeff. (min)=	3.57 (ii)	6.78 (ii)	
Unit Hyd. Tpeak (min)=	5.00	10.00	
Unit Hyd. peak (cms)=	0.26	0.14	
PEAK FLOW (cms)=	0.41	0.01	0.420 (iii)
TIME TO PEAK (hrs)=	1.83	1.92	1.83
RUNOFF VOLUME (mm)=	37.41	10.69	34.44
TOTAL RAINFALL (mm)=	37.41	37.41	37.41
RUNOFF COEFFICIENT =	1.00	0.29	0.92

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 75.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0079)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0207):	2.33	0.420	1.83	34.44
+ ID2= 2 (0218):	15.27	1.682	1.83	25.65
ID = 3 (0079):	17.60	2.101	1.83	26.81

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0079)
3 + 2 = 1

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 3 (0079):	17.60	2.101	1.83	26.81
+ ID2= 2 (0082):	14.97	0.205	2.50	8.97
ID = 1 (0079):	32.57	2.137	1.83	18.61

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0066)
IN= 2---> OUT= 1
DT= 5.0 min

OVERFLOW IS OFF

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.5810	1.5760
0.0080	0.2340	0.8460	1.8660
0.0130	0.4840	1.0630	2.1640
0.0470	0.7470	1.4780	2.4680
0.1760	1.0160	1.9960	2.7800
0.3580	1.2930	2.8820	2.8590

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0079)	32.570	2.137	1.83	18.61
OUTFLOW: ID= 1 (0066)	32.570	0.026	5.00	15.90

PEAK FLOW REDUCTION [Qout/Qin](%)= 1.20
TIME SHIFT OF PEAK FLOW (min)=190.00
MAXIMUM STORAGE USED (ha.m.)= 0.5812

CALIB
NASHYD (0077)
ID= 1 DT= 5.0 min

Area (ha)= 9.20 Curve Number (CN)= 75.0
Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.64

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	2.74	1.083	5.82	2.083	12.01	3.08	3.70
0.167	2.74	1.167	5.82	2.167	12.01	3.17	3.70
0.250	2.98	1.250	7.48	2.250	8.39	3.25	3.36
0.333	2.98	1.333	7.48	2.333	8.39	3.33	3.36
0.417	3.28	1.417	10.82	2.417	6.55	3.42	3.09
0.500	3.28	1.500	10.82	2.500	6.55	3.50	3.09
0.583	3.65	1.583	21.80	2.583	5.43	3.58	2.87
0.667	3.65	1.667	21.80	2.667	5.43	3.67	2.87
0.750	4.14	1.750	74.46	2.750	4.67	3.75	2.68
0.833	4.14	1.833	74.46	2.833	4.67	3.83	2.68
0.917	4.82	1.917	23.08	2.917	4.12	3.92	2.51
1.000	4.82	2.000	23.08	3.000	4.12	4.00	2.51

Unit Hyd Qpeak (cms)= 0.549

PEAK FLOW (cms)= 0.123 (i)
TIME TO PEAK (hrs)= 2.583
RUNOFF VOLUME (mm)= 8.970
TOTAL RAINFALL (mm)= 37.407
RUNOFF COEFFICIENT = 0.240

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

CALIB
NASHYD (0173)
ID= 1 DT= 5.0 min

Area (ha)= 7.28 Curve Number (CN)= 75.0
Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.72

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	2.74	1.083	5.82	2.083	12.01	3.08	3.70
0.167	2.74	1.167	5.82	2.167	12.01	3.17	3.70
0.250	2.98	1.250	7.48	2.250	8.39	3.25	3.36
0.333	2.98	1.333	7.48	2.333	8.39	3.33	3.36
0.417	3.28	1.417	10.82	2.417	6.55	3.42	3.09
0.500	3.28	1.500	10.82	2.500	6.55	3.50	3.09
0.583	3.65	1.583	21.80	2.583	5.43	3.58	2.87
0.667	3.65	1.667	21.80	2.667	5.43	3.67	2.87
0.750	4.14	1.750	74.46	2.750	4.67	3.75	2.68
0.833	4.14	1.833	74.46	2.833	4.67	3.83	2.68
0.917	4.82	1.917	23.08	2.917	4.12	3.92	2.51
1.000	4.82	2.000	23.08	3.000	4.12	4.00	2.51

Unit Hyd Qpeak (cms)= 0.386

```
     PEAK FLOW       (cms)=   0.090 (i)
     TIME TO PEAK    (hrs)=   2.667
     RUNOFF VOLUME    (mm)=   8.970
     TOTAL RAINFALL   (mm)=  37.407
     RUNOFF COEFFICIENT   =   0.240

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

--------------------------------------------------------------------------------
--------------------
| CALIB              |
| NASHYD   (  0179)  |   Area    (ha)=  13.79   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min   |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.80

         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    2.74 | 1.083    5.82 | 2.083   12.01 |  3.08    3.70
 0.167    2.74 | 1.167    5.82 | 2.167   12.01 |  3.17    3.70
 0.250    2.98 | 1.250    7.48 | 2.250    8.39 |  3.25    3.36
 0.333    2.98 | 1.333    7.48 | 2.333    8.39 |  3.33    3.36
 0.417    3.28 | 1.417   10.82 | 2.417    6.55 |  3.42    3.09
 0.500    3.28 | 1.500   10.82 | 2.500    6.55 |  3.50    3.09
 0.583    3.65 | 1.583   21.80 | 2.583    5.43 |  3.58    2.87
 0.667    3.65 | 1.667   21.80 | 2.667    5.43 |  3.67    2.87
 0.750    4.14 | 1.750   74.46 | 2.750    4.67 |  3.75    2.68
 0.833    4.14 | 1.833   74.46 | 2.833    4.67 |  3.83    2.68
 0.917    4.82 | 1.917   23.08 | 2.917    4.12 |  3.92    2.51
 1.000    4.82 | 2.000   23.08 | 3.000    4.12 |  4.00    2.51

     Unit Hyd Qpeak  (cms)=   0.658

     PEAK FLOW       (cms)=   0.158 (i)
     TIME TO PEAK    (hrs)=   2.833
     RUNOFF VOLUME    (mm)=   8.970
     TOTAL RAINFALL   (mm)=  37.407
     RUNOFF COEFFICIENT   =   0.240

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

--------------------------------------------------------------------------------
--------------------
| CALIB              |
| NASHYD   (  0208)  |   Area    (ha)=   1.26   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min   |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.38

         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    2.74 | 1.083    5.82 | 2.083   12.01 |  3.08    3.70
 0.167    2.74 | 1.167    5.82 | 2.167   12.01 |  3.17    3.70
 0.250    2.98 | 1.250    7.48 | 2.250    8.39 |  3.25    3.36
 0.333    2.98 | 1.333    7.48 | 2.333    8.39 |  3.33    3.36
 0.417    3.28 | 1.417   10.82 | 2.417    6.55 |  3.42    3.09
 0.500    3.28 | 1.500   10.82 | 2.500    6.55 |  3.50    3.09
 0.583    3.65 | 1.583   21.80 | 2.583    5.43 |  3.58    2.87
 0.667    3.65 | 1.667   21.80 | 2.667    5.43 |  3.67    2.87
 0.750    4.14 | 1.750   74.46 | 2.750    4.67 |  3.75    2.68
 0.833    4.14 | 1.833   74.46 | 2.833    4.67 |  3.83    2.68
 0.917    4.82 | 1.917   23.08 | 2.917    4.12 |  3.92    2.51
 1.000    4.82 | 2.000   23.08 | 3.000    4.12 |  4.00    2.51

     Unit Hyd Qpeak  (cms)=   0.127
```



```
     PEAK FLOW       (cms)=   0.024 (i)
     TIME TO PEAK    (hrs)=   2.250
     RUNOFF VOLUME    (mm)=   8.968
     TOTAL RAINFALL   (mm)=  37.407
     RUNOFF COEFFICIENT   =   0.240

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

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

--------------------
| ADD HYD  (  0180)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0173):     7.28   0.090     2.67     8.97
     + ID2= 2 (  0179):    13.79   0.158     2.83     8.97
       ==========================================================
       ID = 3 (  0180):    21.07   0.248     2.75     8.97

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

--------------------
| ADD HYD  (  0180)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0180):    21.07   0.248     2.75     8.97
     + ID2= 2 (  0208):     1.26   0.024     2.25     8.97
       ==========================================================
       ID = 1 (  0180):    22.33   0.263     2.75     8.97

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

--------------------
| ADD HYD  (  0180)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0180):    22.33   0.263     2.75     8.97
     + ID2= 2 (  0077):     9.20   0.123     2.58     8.97
       ==========================================================
       ID = 3 (  0180):    31.53   0.385     2.67     8.97

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

      V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
      V    V   I    SS     U   U   A A   L
       V  V    I     SS    U   U  AAAAA  L
       V  V    I      SS   U   U  A   A  L
        VV     I    SSSSS  UUUUU  A   A  LLLLL

       OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
      O   O    T      T    H   H   Y Y   MM MM  O   O
      O   O    T      T    H   H    Y    M M M  O   O
       OOO     T      T    H   H    Y    M   M   OOO
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                  ***** D E T A I L E D   O U T P U T *****


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```

DATE: 05/05/2025 TIME: 03:09:20

USER:

COMMENTS: _____

****
** SIMULATION : C. 5yr 4hr 10min Chicago **
****

CHICAGO STORM
Ptotal= 44.36 mm

IDF curve parameters: A= 664.000
B= 4.700
C= 0.744
used in: INTENSITY = A / (t + B)^C

Duration of storm = 4.00 hrs
Storm time step = 10.00 min
Time to peak ratio = 0.46

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	3.25	1.00	6.86	2.00	14.05	3.00	4.38
0.17	3.53	1.17	8.79	2.17	9.84	3.17	3.99
0.33	3.88	1.33	12.66	2.33	7.71	3.33	3.67
0.50	4.32	1.50	25.44	2.50	6.41	3.50	3.40
0.67	4.90	1.67	89.88	2.67	5.52	3.67	3.18
0.83	5.69	1.83	26.93	2.83	4.87	3.83	2.98

CALIB NASHYD (0171) ID= 1 DT= 5.0 min	Area (ha)= 5.90 Curve Number (CN)= 75.0 Ia (mm)= 5.00 # of Linear Res.(N)= 3.00 U.H. Tp(hrs)= 0.62

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	3.25	1.083	6.86	2.083	14.05	3.08	4.38
0.167	3.25	1.167	6.86	2.167	14.05	3.17	4.38
0.250	3.53	1.250	8.79	2.250	9.84	3.25	3.99
0.333	3.53	1.333	8.79	2.333	9.84	3.33	3.99
0.417	3.88	1.417	12.66	2.417	7.71	3.42	3.67
0.500	3.88	1.500	12.66	2.500	7.71	3.50	3.67
0.583	4.32	1.583	25.44	2.583	6.41	3.58	3.40
0.667	4.32	1.667	25.44	2.667	6.41	3.67	3.40
0.750	4.90	1.750	89.88	2.750	5.52	3.75	3.18
0.833	4.90	1.833	89.88	2.833	5.52	3.83	3.18
0.917	5.69	1.917	26.93	2.917	4.87	3.92	2.98
1.000	5.69	2.000	26.93	3.000	4.87	4.00	2.98

Unit Hyd Qpeak (cms)= 0.363

PEAK FLOW (cms)= 0.114 (i)
TIME TO PEAK (hrs)= 2.583
RUNOFF VOLUME (mm)= 12.490
TOTAL RAINFALL (mm)= 44.358
RUNOFF COEFFICIENT = 0.282

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

CALIB NASHYD (0175) ID= 1 DT= 5.0 min	Area (ha)= 5.15 Curve Number (CN)= 75.0 Ia (mm)= 5.00 # of Linear Res.(N)= 3.00 U.H. Tp(hrs)= 0.62

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	3.25	1.083	6.86	2.083	14.05	3.08	4.38
0.167	3.25	1.167	6.86	2.167	14.05	3.17	4.38
0.250	3.53	1.250	8.79	2.250	9.84	3.25	3.99
0.333	3.53	1.333	8.79	2.333	9.84	3.33	3.99
0.417	3.88	1.417	12.66	2.417	7.71	3.42	3.67
0.500	3.88	1.500	12.66	2.500	7.71	3.50	3.67
0.583	4.32	1.583	25.44	2.583	6.41	3.58	3.40
0.667	4.32	1.667	25.44	2.667	6.41	3.67	3.40
0.750	4.90	1.750	89.88	2.750	5.52	3.75	3.18
0.833	4.90	1.833	89.88	2.833	5.52	3.83	3.18
0.917	5.69	1.917	26.93	2.917	4.87	3.92	2.98
1.000	5.69	2.000	26.93	3.000	4.87	4.00	2.98

Unit Hyd Qpeak (cms)= 0.317

PEAK FLOW (cms)= 0.099 (i)
TIME TO PEAK (hrs)= 2.583
RUNOFF VOLUME (mm)= 12.490
TOTAL RAINFALL (mm)= 44.358
RUNOFF COEFFICIENT = 0.282

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

CALIB NASHYD (0214) ID= 1 DT= 5.0 min	Area (ha)= 2.47 Curve Number (CN)= 75.0 Ia (mm)= 5.00 # of Linear Res.(N)= 3.00 U.H. Tp(hrs)= 0.41

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	3.25	1.083	6.86	2.083	14.05	3.08	4.38
0.167	3.25	1.167	6.86	2.167	14.05	3.17	4.38
0.250	3.53	1.250	8.79	2.250	9.84	3.25	3.99
0.333	3.53	1.333	8.79	2.333	9.84	3.33	3.99
0.417	3.88	1.417	12.66	2.417	7.71	3.42	3.67
0.500	3.88	1.500	12.66	2.500	7.71	3.50	3.67
0.583	4.32	1.583	25.44	2.583	6.41	3.58	3.40
0.667	4.32	1.667	25.44	2.667	6.41	3.67	3.40
0.750	4.90	1.750	89.88	2.750	5.52	3.75	3.18
0.833	4.90	1.833	89.88	2.833	5.52	3.83	3.18
0.917	5.69	1.917	26.93	2.917	4.87	3.92	2.98
1.000	5.69	2.000	26.93	3.000	4.87	4.00	2.98

Unit Hyd Qpeak (cms)= 0.230

PEAK FLOW (cms)= 0.063 (i)
TIME TO PEAK (hrs)= 2.250
RUNOFF VOLUME (mm)= 12.488
TOTAL RAINFALL (mm)= 44.358
RUNOFF COEFFICIENT = 0.282

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

```
--------------------
| CALIB            |
| NASHYD   (  0215)|   Area     (ha)=   1.45   Curve Number    (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia       (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.82
```

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	3.25	1.083	6.86	2.083	14.05	3.08	4.38
0.167	3.25	1.167	6.86	2.167	14.05	3.17	4.38
0.250	3.53	1.250	8.79	2.250	9.84	3.25	3.99
0.333	3.53	1.333	8.79	2.333	9.84	3.33	3.99
0.417	3.88	1.417	12.66	2.417	7.71	3.42	3.67
0.500	3.88	1.500	12.66	2.500	7.71	3.50	3.67
0.583	4.32	1.583	25.44	2.583	6.41	3.58	3.40
0.667	4.32	1.667	25.44	2.667	6.41	3.67	3.40
0.750	4.90	1.750	89.88	2.750	5.52	3.75	3.18
0.833	4.90	1.833	89.88	2.833	5.52	3.83	3.18
0.917	5.69	1.917	26.93	2.917	4.87	3.92	2.98
1.000	5.69	2.000	26.93	3.000	4.87	4.00	2.98

Unit Hyd Qpeak (cms)= 0.068

PEAK FLOW (cms)= 0.023 (i)
TIME TO PEAK (hrs)= 2.833
RUNOFF VOLUME (mm)= 12.489
TOTAL RAINFALL (mm)= 44.358
RUNOFF COEFFICIENT = 0.282

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

```
--------------------
| ADD HYD  (  0082)|
|   1 +  2 =  3    |
--------------------
```

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0171):	5.90	0.114	2.58	12.49
+ ID2= 2 (0175):	5.15	0.099	2.58	12.49
ID = 3 (0082):	11.05	0.213	2.58	12.49

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```
--------------------
| ADD HYD  (  0082)|
|   3 +  2 =  1    |
--------------------
```

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 3 (0082):	11.05	0.213	2.58	12.49
+ ID2= 2 (0214):	2.47	0.063	2.25	12.49
ID = 1 (0082):	13.52	0.269	2.50	12.49

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```
--------------------
| ADD HYD  (  0082)|
|   1 +  2 =  3    |
--------------------
```

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0082):	13.52	0.269	2.50	12.49
+ ID2= 2 (0215):	1.45	0.023	2.83	12.49
ID = 3 (0082):	14.97	0.290	2.50	12.49

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```
--------------------
| CALIB            |
| STANDHYD (  0203)|   Area     (ha)=   0.34
|ID= 1 DT= 5.0 min |   Total Imp(%)=  83.00   Dir. Conn.(%)=  83.00
--------------------
```

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	0.28	0.06
Dep. Storage (mm)=	2.00	1.50
Average Slope (%)=	1.00	1.00
Length (m)=	47.61	40.00
Mannings n =	0.015	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	3.25	1.083	6.86	2.083	14.05	3.08	4.38
0.167	3.25	1.167	6.86	2.167	14.05	3.17	4.38
0.250	3.53	1.250	8.79	2.250	9.84	3.25	3.99
0.333	3.53	1.333	8.79	2.333	9.84	3.33	3.99
0.417	3.88	1.417	12.66	2.417	7.71	3.42	3.67
0.500	3.88	1.500	12.66	2.500	7.71	3.50	3.67
0.583	4.32	1.583	25.44	2.583	6.41	3.58	3.40
0.667	4.32	1.667	25.44	2.667	6.41	3.67	3.40
0.750	4.90	1.750	89.88	2.750	5.52	3.75	3.18
0.833	4.90	1.833	89.88	2.833	5.52	3.83	3.18
0.917	5.69	1.917	26.93	2.917	4.87	3.92	2.98
1.000	5.69	2.000	26.93	3.000	4.87	4.00	2.98

			TOTALS
Max.Eff.Inten.(mm/hr)=	89.88	29.86	
over (min)	5.00	10.00	
Storage Coeff. (min)=	1.86 (ii)	6.67 (ii)	
Unit Hyd. Tpeak (min)=	5.00	10.00	
Unit Hyd. peak (cms)=	0.32	0.14	
PEAK FLOW (cms)=	0.07	0.00	0.073 (iii)
TIME TO PEAK (hrs)=	1.83	1.92	1.83
RUNOFF VOLUME (mm)=	42.36	14.40	37.60
TOTAL RAINFALL (mm)=	44.36	44.36	44.36
RUNOFF COEFFICIENT =	0.95	0.32	0.85

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 75.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB            |
| STANDHYD (  0102)|   Area     (ha)=  14.93
|ID= 1 DT= 5.0 min |   Total Imp(%)=  60.00   Dir. Conn.(%)=  60.00
--------------------
```

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	8.96	5.97
Dep. Storage (mm)=	2.00	1.50
Average Slope (%)=	1.00	1.00
Length (m)=	315.49	40.00
Mannings n =	0.015	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	3.25	1.083	6.86	2.083	14.05	3.08	4.38
0.167	3.25	1.167	6.86	2.167	14.05	3.17	4.38

0.250	3.53	1.250	8.79	2.250	9.84	3.25	3.99
0.333	3.53	1.333	8.79	2.333	9.84	3.33	3.99
0.417	3.88	1.417	12.66	2.417	7.71	3.42	3.67
0.500	3.88	1.500	12.66	2.500	7.71	3.50	3.67
0.583	4.32	1.583	25.44	2.583	6.41	3.58	3.40
0.667	4.32	1.667	25.44	2.667	6.41	3.67	3.40
0.750	4.90	1.750	89.88	2.750	5.52	3.75	3.18
0.833	4.90	1.833	89.88	2.833	5.52	3.83	3.18
0.917	5.69	1.917	26.93	2.917	4.87	3.92	2.98
1.000	5.69	2.000	26.93	3.000	4.87	4.00	2.98

Max.Eff.Inten.(mm/hr)=		89.88	20.92	
over (min)		5.00	25.00	
Storage Coeff. (min)=		5.79 (ii)	22.04 (ii)	
Unit Hyd. Tpeak (min)=		5.00	25.00	
Unit Hyd. peak (cms)=		0.20	0.05	
				TOTALS
PEAK FLOW	(cms)=	1.94	0.20	2.009 (iii)
TIME TO PEAK	(hrs)=	1.83	2.17	1.83
RUNOFF VOLUME	(mm)=	42.36	14.40	31.18
TOTAL RAINFALL	(mm)=	44.36	44.36	44.36
RUNOFF COEFFICIENT	=	0.95	0.32	0.70

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 75.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0218)
1 + 2 = 3

		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0102):		14.93	2.009	1.83	31.18
+ ID2= 2 (0203):		0.34	0.073	1.83	37.60
ID = 3 (0218):		15.27	2.083	1.83	31.32

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB STANDHYD (0207) ID= 1 DT= 5.0 min
Area (ha)= 2.33
Total Imp(%)= 88.90 Dir. Conn.(%)= 88.90

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	2.07	0.26
Dep. Storage	(mm)=	0.00	1.50
Average Slope	(%)=	1.00	1.00
Length	(m)=	124.63	25.00
Mannings n	=	0.015	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	3.25	1.083	6.86	2.083	14.05	3.08	4.38
0.167	3.25	1.167	6.86	2.167	14.05	3.17	4.38
0.250	3.53	1.250	8.79	2.250	9.84	3.25	3.99
0.333	3.53	1.333	8.79	2.333	9.84	3.33	3.99
0.417	3.88	1.417	12.66	2.417	7.71	3.42	3.67
0.500	3.88	1.500	12.66	2.500	7.71	3.50	3.67
0.583	4.32	1.583	25.44	2.583	6.41	3.58	3.40
0.667	4.32	1.667	25.44	2.667	6.41	3.67	3.40
0.750	4.90	1.750	89.88	2.750	5.52	3.75	3.18
0.833	4.90	1.833	89.88	2.833	5.52	3.83	3.18
0.917	5.69	1.917	26.93	2.917	4.87	3.92	2.98

1.000	5.69	2.000	26.93	3.000	4.87	4.00	2.98

Max.Eff.Inten.(mm/hr)=		89.88	29.86	
over (min)		5.00	10.00	
Storage Coeff. (min)=		3.32 (ii)	6.29 (ii)	
Unit Hyd. Tpeak (min)=		5.00	10.00	
Unit Hyd. peak (cms)=		0.26	0.15	
				TOTALS
PEAK FLOW	(cms)=	0.50	0.02	0.513 (iii)
TIME TO PEAK	(hrs)=	1.83	1.92	1.83
RUNOFF VOLUME	(mm)=	44.36	14.40	41.03
TOTAL RAINFALL	(mm)=	44.36	44.36	44.36
RUNOFF COEFFICIENT	=	1.00	0.32	0.93

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 75.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0079)
1 + 2 = 3

		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0207):		2.33	0.513	1.83	41.03
+ ID2= 2 (0218):		15.27	2.083	1.83	31.32
ID = 3 (0079):		17.60	2.596	1.83	32.60

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0079)
3 + 2 = 1

		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 3 (0079):		17.60	2.596	1.83	32.60
+ ID2= 2 (0082):		14.97	0.290	2.50	12.49
ID = 1 (0079):		32.57	2.652	1.83	23.36

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0066) IN= 2---> OUT= 1 DT= 5.0 min
OVERFLOW IS OFF

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.5810	1.5760
0.0080	0.2340	0.8460	1.8660
0.0130	0.4840	1.0630	2.1640
0.0470	0.7470	1.4780	2.4680
0.1760	1.0160	1.9960	2.7800
0.3580	1.2930	2.8820	2.8590

		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (	0079)	32.570	2.652	1.83	23.36
OUTFLOW: ID= 1 (	0066)	32.570	0.044	4.83	20.24

PEAK FLOW REDUCTION [Qout/Qin](%)= 1.64
TIME SHIFT OF PEAK FLOW (min)=180.00
MAXIMUM STORAGE USED (ha.m.)= 0.7203

CALIB NASHYD (0077) Area (ha)= 9.20 Curve Number (CN)= 75.0

ID= 1 DT= 5.0 min	Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.64

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	3.25	1.083	6.86	2.083	14.05	3.08	4.38
0.167	3.25	1.167	6.86	2.167	14.05	3.17	4.38
0.250	3.53	1.250	8.79	2.250	9.84	3.25	3.99
0.333	3.53	1.333	8.79	2.333	9.84	3.33	3.99
0.417	3.88	1.417	12.66	2.417	7.71	3.42	3.67
0.500	3.88	1.500	12.66	2.500	7.71	3.50	3.67
0.583	4.32	1.583	25.44	2.583	6.41	3.58	3.40
0.667	4.32	1.667	25.44	2.667	6.41	3.67	3.40
0.750	4.90	1.750	89.88	2.750	5.52	3.75	3.18
0.833	4.90	1.833	89.88	2.833	5.52	3.83	3.18
0.917	5.69	1.917	26.93	2.917	4.87	3.92	2.98
1.000	5.69	2.000	26.93	3.000	4.87	4.00	2.98

Unit Hyd Qpeak (cms)= 0.549

PEAK FLOW (cms)= 0.174 (i)
TIME TO PEAK (hrs)= 2.583
RUNOFF VOLUME (mm)= 12.490
TOTAL RAINFALL (mm)= 44.358
RUNOFF COEFFICIENT = 0.282

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

CALIB NASHYD (0173)	Area (ha)= 7.28 Curve Number (CN)= 75.0
ID= 1 DT= 5.0 min	Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.72

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	3.25	1.083	6.86	2.083	14.05	3.08	4.38
0.167	3.25	1.167	6.86	2.167	14.05	3.17	4.38
0.250	3.53	1.250	8.79	2.250	9.84	3.25	3.99
0.333	3.53	1.333	8.79	2.333	9.84	3.33	3.99
0.417	3.88	1.417	12.66	2.417	7.71	3.42	3.67
0.500	3.88	1.500	12.66	2.500	7.71	3.50	3.67
0.583	4.32	1.583	25.44	2.583	6.41	3.58	3.40
0.667	4.32	1.667	25.44	2.667	6.41	3.67	3.40
0.750	4.90	1.750	89.88	2.750	5.52	3.75	3.18
0.833	4.90	1.833	89.88	2.833	5.52	3.83	3.18
0.917	5.69	1.917	26.93	2.917	4.87	3.92	2.98
1.000	5.69	2.000	26.93	3.000	4.87	4.00	2.98

Unit Hyd Qpeak (cms)= 0.386

PEAK FLOW (cms)= 0.127 (i)
TIME TO PEAK (hrs)= 2.667
RUNOFF VOLUME (mm)= 12.490
TOTAL RAINFALL (mm)= 44.358
RUNOFF COEFFICIENT = 0.282

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

| CALIB NASHYD (0179) | Area (ha)= 13.79 Curve Number (CN)= 75.0

ID= 1 DT= 5.0 min	Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.80

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	3.25	1.083	6.86	2.083	14.05	3.08	4.38
0.167	3.25	1.167	6.86	2.167	14.05	3.17	4.38
0.250	3.53	1.250	8.79	2.250	9.84	3.25	3.99
0.333	3.53	1.333	8.79	2.333	9.84	3.33	3.99
0.417	3.88	1.417	12.66	2.417	7.71	3.42	3.67
0.500	3.88	1.500	12.66	2.500	7.71	3.50	3.67
0.583	4.32	1.583	25.44	2.583	6.41	3.58	3.40
0.667	4.32	1.667	25.44	2.667	6.41	3.67	3.40
0.750	4.90	1.750	89.88	2.750	5.52	3.75	3.18
0.833	4.90	1.833	89.88	2.833	5.52	3.83	3.18
0.917	5.69	1.917	26.93	2.917	4.87	3.92	2.98
1.000	5.69	2.000	26.93	3.000	4.87	4.00	2.98

Unit Hyd Qpeak (cms)= 0.658

PEAK FLOW (cms)= 0.223 (i)
TIME TO PEAK (hrs)= 2.750
RUNOFF VOLUME (mm)= 12.490
TOTAL RAINFALL (mm)= 44.358
RUNOFF COEFFICIENT = 0.282

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

CALIB NASHYD (0208)	Area (ha)= 1.26 Curve Number (CN)= 75.0
ID= 1 DT= 5.0 min	Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.38

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	3.25	1.083	6.86	2.083	14.05	3.08	4.38
0.167	3.25	1.167	6.86	2.167	14.05	3.17	4.38
0.250	3.53	1.250	8.79	2.250	9.84	3.25	3.99
0.333	3.53	1.333	8.79	2.333	9.84	3.33	3.99
0.417	3.88	1.417	12.66	2.417	7.71	3.42	3.67
0.500	3.88	1.500	12.66	2.500	7.71	3.50	3.67
0.583	4.32	1.583	25.44	2.583	6.41	3.58	3.40
0.667	4.32	1.667	25.44	2.667	6.41	3.67	3.40
0.750	4.90	1.750	89.88	2.750	5.52	3.75	3.18
0.833	4.90	1.833	89.88	2.833	5.52	3.83	3.18
0.917	5.69	1.917	26.93	2.917	4.87	3.92	2.98
1.000	5.69	2.000	26.93	3.000	4.87	4.00	2.98

Unit Hyd Qpeak (cms)= 0.127

PEAK FLOW (cms)= 0.034 (i)
TIME TO PEAK (hrs)= 2.250
RUNOFF VOLUME (mm)= 12.488
TOTAL RAINFALL (mm)= 44.358
RUNOFF COEFFICIENT = 0.282

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

| ADD HYD (0180)|

```
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
-------------------            (ha)    (cms)    (hrs)      (mm)
       ID1= 1 (  0173):     7.28   0.127     2.67    12.49
     + ID2= 2 (  0179):    13.79   0.223     2.75    12.49
       ====================================================
       ID = 3 (  0180):    21.07   0.349     2.75    12.49

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

-------------------
| ADD HYD  (  0180)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
-------------------            (ha)    (cms)    (hrs)      (mm)
       ID1= 3 (  0180):    21.07   0.349     2.75    12.49
     + ID2= 2 (  0208):     1.26   0.034     2.25    12.49
       ====================================================
       ID = 1 (  0180):    22.33   0.370     2.67    12.49

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

-------------------
| ADD HYD  (  0180)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
-------------------            (ha)    (cms)    (hrs)      (mm)
       ID1= 1 (  0180):    22.33   0.370     2.67    12.49
     + ID2= 2 (  0077):     9.20   0.174     2.58    12.49
       ====================================================
       ID = 3 (  0180):    31.53   0.542     2.67    12.49

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

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                  *****  D E T A I L E D   O U T P U T *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
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DATE: 05/05/2025                          TIME: 03:09:20

USER:


COMMENTS: _____________________________________________________


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  ************************************************
  ** SIMULATION : D. 10yr 4hr 10min Chicago     **
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  ************************************************

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| CHICAGO STORM    |     IDF curve parameters: A= 724.000
| Ptotal= 49.78 mm |                           B=   4.300
--------------------                           C=   0.739
                        used in:   INTENSITY =  A / (t + B)^C

                        Duration of storm  =  4.00 hrs
                        Storm time step    = 10.00 min
                        Time to peak ratio =  0.46

     TIME    RAIN  |  TIME    RAIN  |'  TIME    RAIN  |  TIME    RAIN
      hrs   mm/hr  |   hrs   mm/hr  |'   hrs   mm/hr  |   hrs   mm/hr
     0.00    3.70  |  1.00    7.72  |'  2.00   15.63  |  3.00    4.96
     0.17    4.01  |  1.17    9.85  |'  2.17   11.01  |  3.17    4.52
     0.33    4.40  |  1.33   14.11  |'  2.33    8.66  |  3.33    4.16
     0.50    4.89  |  1.50   28.12  |'  2.50    7.21  |  3.50    3.86
     0.67    5.54  |  1.67  101.38  |'  2.67    6.23  |  3.67    3.61
     0.83    6.42  |  1.83   29.75  |'  2.83    5.51  |  3.83    3.40


------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0171)|   Area     (ha)=   5.90   Curve Number    (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia       (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.62

        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    3.70  | 1.083    7.72  | 2.083   15.63  |  3.08    4.96
    0.167    3.70  | 1.167    7.72  | 2.167   15.63  |  3.17    4.96
    0.250    4.01  | 1.250    9.85  | 2.250   11.01  |  3.25    4.52
    0.333    4.01  | 1.333    9.85  | 2.333   11.01  |  3.33    4.52
    0.417    4.40  | 1.417   14.11  | 2.417    8.66  |  3.42    4.16
    0.500    4.40  | 1.500   14.11  | 2.500    8.66  |  3.50    4.16
    0.583    4.89  | 1.583   28.12  | 2.583    7.21  |  3.58    3.86
    0.667    4.89  | 1.667   28.12  | 2.667    7.21  |  3.67    3.86
    0.750    5.54  | 1.750  101.38  | 2.750    6.23  |  3.75    3.61
    0.833    5.54  | 1.833  101.38  | 2.833    6.23  |  3.83    3.61
    0.917    6.42  | 1.917   29.75  | 2.917    5.51  |  3.92    3.40
    1.000    6.42  | 2.000   29.75  | 3.000    5.51  |  4.00    3.40

    Unit Hyd Qpeak  (cms)=   0.363

    PEAK FLOW       (cms)=   0.142 (i)
    TIME TO PEAK    (hrs)=   2.500
    RUNOFF VOLUME    (mm)=  15.488
    TOTAL RAINFALL   (mm)=  49.775
    RUNOFF COEFFICIENT   =   0.311

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

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--------------------
| CALIB            |
| NASHYD   (  0175)|   Area     (ha)=   5.15   Curve Number    (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia       (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.62

        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    3.70  | 1.083    7.72  | 2.083   15.63  |  3.08    4.96
```

0.167	3.70	1.167	7.72	2.167	15.63	3.17	4.96
0.250	4.01	1.250	9.85	2.250	11.01	3.25	4.52
0.333	4.01	1.333	9.85	2.333	11.01	3.33	4.52
0.417	4.40	1.417	14.11	2.417	8.66	3.42	4.16
0.500	4.40	1.500	14.11	2.500	8.66	3.50	4.16
0.583	4.89	1.583	28.12	2.583	7.21	3.58	3.86
0.667	4.89	1.667	28.12	2.667	7.21	3.67	3.86
0.750	5.54	1.750	101.38	2.750	6.23	3.75	3.61
0.833	5.54	1.833	101.38	2.833	6.23	3.83	3.61
0.917	6.42	1.917	29.75	2.917	5.51	3.92	3.40
1.000	6.42	2.000	29.75	3.000	5.51	4.00	3.40

Unit Hyd Qpeak (cms)= 0.317

PEAK FLOW (cms)= 0.124 (i)
TIME TO PEAK (hrs)= 2.500
RUNOFF VOLUME (mm)= 15.488
TOTAL RAINFALL (mm)= 49.775
RUNOFF COEFFICIENT = 0.311

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

CALIB
NASHYD (0214) | Area (ha)= 2.47 | Curve Number (CN)= 75.0
ID= 1 DT= 5.0 min | Ia (mm)= 5.00 | # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.41

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	3.70	1.083	7.72	2.083	15.63	3.08	4.96
0.167	3.70	1.167	7.72	2.167	15.63	3.17	4.96
0.250	4.01	1.250	9.85	2.250	11.01	3.25	4.52
0.333	4.01	1.333	9.85	2.333	11.01	3.33	4.52
0.417	4.40	1.417	14.11	2.417	8.66	3.42	4.16
0.500	4.40	1.500	14.11	2.500	8.66	3.50	4.16
0.583	4.89	1.583	28.12	2.583	7.21	3.58	3.86
0.667	4.89	1.667	28.12	2.667	7.21	3.67	3.86
0.750	5.54	1.750	101.38	2.750	6.23	3.75	3.61
0.833	5.54	1.833	101.38	2.833	6.23	3.83	3.61
0.917	6.42	1.917	29.75	2.917	5.51	3.92	3.40
1.000	6.42	2.000	29.75	3.000	5.51	4.00	3.40

Unit Hyd Qpeak (cms)= 0.230

PEAK FLOW (cms)= 0.079 (i)
TIME TO PEAK (hrs)= 2.250
RUNOFF VOLUME (mm)= 15.486
TOTAL RAINFALL (mm)= 49.775
RUNOFF COEFFICIENT = 0.311

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

CALIB
NASHYD (0215) | Area (ha)= 1.45 | Curve Number (CN)= 75.0
ID= 1 DT= 5.0 min | Ia (mm)= 5.00 | # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.82

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	3.70	1.083	7.72	2.083	15.63	3.08	4.96

0.167	3.70	1.167	7.72	2.167	15.63	3.17	4.96
0.250	4.01	1.250	9.85	2.250	11.01	3.25	4.52
0.333	4.01	1.333	9.85	2.333	11.01	3.33	4.52
0.417	4.40	1.417	14.11	2.417	8.66	3.42	4.16
0.500	4.40	1.500	14.11	2.500	8.66	3.50	4.16
0.583	4.89	1.583	28.12	2.583	7.21	3.58	3.86
0.667	4.89	1.667	28.12	2.667	7.21	3.67	3.86
0.750	5.54	1.750	101.38	2.750	6.23	3.75	3.61
0.833	5.54	1.833	101.38	2.833	6.23	3.83	3.61
0.917	6.42	1.917	29.75	2.917	5.51	3.92	3.40
1.000	6.42	2.000	29.75	3.000	5.51	4.00	3.40

Unit Hyd Qpeak (cms)= 0.068

PEAK FLOW (cms)= 0.029 (i)
TIME TO PEAK (hrs)= 2.833
RUNOFF VOLUME (mm)= 15.487
TOTAL RAINFALL (mm)= 49.775
RUNOFF COEFFICIENT = 0.311

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

ADD HYD (0082)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0171):	5.90	0.142	2.50	15.49
+ ID2= 2 (0175):	5.15	0.124	2.50	15.49
ID = 3 (0082):	11.05	0.265	2.50	15.49

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0082)
3 + 2 = 1

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 3 (0082):	11.05	0.265	2.50	15.49
+ ID2= 2 (0214):	2.47	0.079	2.25	15.49
ID = 1 (0082):	13.52	0.335	2.50	15.49

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0082)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0082):	13.52	0.335	2.50	15.49
+ ID2= 2 (0215):	1.45	0.029	2.83	15.49
ID = 3 (0082):	14.97	0.361	2.50	15.49

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB
STANDHYD (0203) | Area (ha)= 0.34
ID= 1 DT= 5.0 min | Total Imp(%)= 83.00 | Dir. Conn.(%)= 83.00

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	0.28	0.06
Dep. Storage (mm)=	2.00	1.50
Average Slope (%)=	1.00	1.00
Length (m)=	47.61	40.00
Mannings n =	0.015	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	3.70	1.083	7.72	2.083	15.63	3.08	4.96
0.167	3.70	1.167	7.72	2.167	15.63	3.17	4.96
0.250	4.01	1.250	9.85	2.250	11.01	3.25	4.52
0.333	4.01	1.333	9.85	2.333	11.01	3.33	4.52
0.417	4.40	1.417	14.11	2.417	8.66	3.42	4.16
0.500	4.40	1.500	14.11	2.500	8.66	3.50	4.16
0.583	4.89	1.583	28.12	2.583	7.21	3.58	3.86
0.667	4.89	1.667	28.12	2.667	7.21	3.67	3.86
0.750	5.54	1.750	101.38	2.750	6.23	3.75	3.61
0.833	5.54	1.833	101.38	2.833	6.23	3.83	3.61
0.917	6.42	1.917	29.75	2.917	5.51	3.92	3.40
1.000	6.42	2.000	29.75	3.000	5.51	4.00	3.40

Max.Eff.Inten.(mm/hr)=	101.38	36.79	
over (min)	5.00	10.00	
Storage Coeff. (min)=	1.77 (ii)	6.36 (ii)	
Unit Hyd. Tpeak (min)=	5.00	10.00	
Unit Hyd. peak (cms)=	0.32	0.15	
			TOTALS
PEAK FLOW (cms)=	0.08	0.00	0.083 (iii)
TIME TO PEAK (hrs)=	1.83	1.92	1.83
RUNOFF VOLUME (mm)=	47.78	17.53	42.62
TOTAL RAINFALL (mm)=	49.78	49.78	49.78
RUNOFF COEFFICIENT =	0.96	0.35	0.86

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 75.0 Ia = Dep. 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 (0102)
ID= 1 DT= 5.0 min

Area (ha)= 14.93
Total Imp(%)= 60.00 Dir. Conn.(%)= 60.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	8.96	5.97
Dep. Storage	(mm)=	2.00	1.50
Average Slope	(%)=	1.00	1.00
Length	(m)=	315.49	40.00
Mannings n	=	0.015	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	3.70	1.083	7.72	2.083	15.63	3.08	4.96
0.167	3.70	1.167	7.72	2.167	15.63	3.17	4.96
0.250	4.01	1.250	9.85	2.250	11.01	3.25	4.52
0.333	4.01	1.333	9.85	2.333	11.01	3.33	4.52
0.417	4.40	1.417	14.11	2.417	8.66	3.42	4.16
0.500	4.40	1.500	14.11	2.500	8.66	3.50	4.16
0.583	4.89	1.583	28.12	2.583	7.21	3.58	3.86
0.667	4.89	1.667	28.12	2.667	7.21	3.67	3.86
0.750	5.54	1.750	101.38	2.750	6.23	3.75	3.61
0.833	5.54	1.833	101.38	2.833	6.23	3.83	3.61
0.917	6.42	1.917	29.75	2.917	5.51	3.92	3.40
1.000	6.42	2.000	29.75	3.000	5.51	4.00	3.40

Max.Eff.Inten.(mm/hr)=	101.38	29.17	
over (min)	5.00	20.00	

Storage Coeff. (min)=	5.52 (ii)	19.74 (ii)	
Unit Hyd. Tpeak (min)=	5.00	20.00	
Unit Hyd. peak (cms)=	0.20	0.06	
			TOTALS
PEAK FLOW (cms)=	2.22	0.26	2.330 (iii)
TIME TO PEAK (hrs)=	1.83	2.08	1.83
RUNOFF VOLUME (mm)=	47.78	17.53	35.68
TOTAL RAINFALL (mm)=	49.78	49.78	49.78
RUNOFF COEFFICIENT =	0.96	0.35	0.72

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 75.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0218)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0102):	14.93	2.330	1.83	35.68
+ ID2= 2 (0203):	0.34	0.083	1.83	42.62
ID = 3 (0218):	15.27	2.413	1.83	35.83

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB
STANDHYD (0207)
ID= 1 DT= 5.0 min

Area (ha)= 2.33
Total Imp(%)= 88.90 Dir. Conn.(%)= 88.90

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	2.07	0.26
Dep. Storage	(mm)=	0.00	1.50
Average Slope	(%)=	1.00	1.00
Length	(m)=	124.63	25.00
Mannings n	=	0.015	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	3.70	1.083	7.72	2.083	15.63	3.08	4.96
0.167	3.70	1.167	7.72	2.167	15.63	3.17	4.96
0.250	4.01	1.250	9.85	2.250	11.01	3.25	4.52
0.333	4.01	1.333	9.85	2.333	11.01	3.33	4.52
0.417	4.40	1.417	14.11	2.417	8.66	3.42	4.16
0.500	4.40	1.500	14.11	2.500	8.66	3.50	4.16
0.583	4.89	1.583	28.12	2.583	7.21	3.58	3.86
0.667	4.89	1.667	28.12	2.667	7.21	3.67	3.86
0.750	5.54	1.750	101.38	2.750	6.23	3.75	3.61
0.833	5.54	1.833	101.38	2.833	6.23	3.83	3.61
0.917	6.42	1.917	29.75	2.917	5.51	3.92	3.40
1.000	6.42	2.000	29.75	3.000	5.51	4.00	3.40

Max.Eff.Inten.(mm/hr)=	101.38	36.79	
over (min)	5.00	10.00	
Storage Coeff. (min)=	3.16 (ii)	6.00 (ii)	
Unit Hyd. Tpeak (min)=	5.00	10.00	
Unit Hyd. peak (cms)=	0.27	0.15	
			TOTALS
PEAK FLOW (cms)=	0.57	0.02	0.583 (iii)
TIME TO PEAK (hrs)=	1.83	1.92	1.83
RUNOFF VOLUME (mm)=	49.78	17.53	46.20
TOTAL RAINFALL (mm)=	49.78	49.78	49.78
RUNOFF COEFFICIENT =	1.00	0.35	0.93

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 75.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0079)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
	ID1= 1 (0207):	2.33	0.583	1.83	46.20
	+ ID2= 2 (0218):	15.27	2.413	1.83	35.83
	ID = 3 (0079):	17.60	2.997	1.83	37.20

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0079)		AREA	QPEAK	TPEAK	R.V.
3 + 2 = 1		(ha)	(cms)	(hrs)	(mm)
	ID1= 3 (0079):	17.60	2.997	1.83	37.20
	+ ID2= 2 (0082):	14.97	0.361	2.50	15.49
	ID = 1 (0079):	32.57	3.071	1.83	27.22

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0066) OVERFLOW IS OFF
IN= 2---> OUT= 1
DT= 5.0 min

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.5810	1.5760
0.0080	0.2340	0.8460	1.8660
0.0130	0.4840	1.0630	2.1640
0.0470	0.7470	1.4780	2.4680
0.1760	1.0160	1.9960	2.7800
0.3580	1.2930	2.8820	2.8590

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0079)	32.570	3.071	1.83	27.22
OUTFLOW: ID= 1 (0066)	32.570	0.084	4.58	23.92

PEAK FLOW REDUCTION [Qout/Qin](%)= 2.73
TIME SHIFT OF PEAK FLOW (min)=165.00
MAXIMUM STORAGE USED (ha.m.)= 0.8240

CALIB
NASHYD (0077) Area (ha)= 9.20 Curve Number (CN)= 75.0
ID= 1 DT= 5.0 min Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.64

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	3.70	1.083	7.72	2.083	15.63	3.08	4.96
0.167	3.70	1.167	7.72	2.167	15.63	3.17	4.96
0.250	4.01	1.250	9.85	2.250	11.01	3.25	4.52
0.333	4.01	1.333	9.85	2.333	11.01	3.33	4.52

0.417	4.40	1.417	14.11	2.417	8.66	3.42	4.16
0.500	4.40	1.500	14.11	2.500	8.66	3.50	4.16
0.583	4.89	1.583	28.12	2.583	7.21	3.58	3.86
0.667	4.89	1.667	28.12	2.667	7.21	3.67	3.86
0.750	5.54	1.750	101.38	2.750	6.23	3.75	3.61
0.833	5.54	1.833	101.38	2.833	6.23	3.83	3.61
0.917	6.42	1.917	29.75	2.917	5.51	3.92	3.40
1.000	6.42	2.000	29.75	3.000	5.51	4.00	3.40

Unit Hyd Qpeak (cms)= 0.549

PEAK FLOW (cms)= 0.216 (i)
TIME TO PEAK (hrs)= 2.583
RUNOFF VOLUME (mm)= 15.488
TOTAL RAINFALL (mm)= 49.775
RUNOFF COEFFICIENT = 0.311

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

CALIB
NASHYD (0173) Area (ha)= 7.28 Curve Number (CN)= 75.0
ID= 1 DT= 5.0 min Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.72

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	3.70	1.083	7.72	2.083	15.63	3.08	4.96
0.167	3.70	1.167	7.72	2.167	15.63	3.17	4.96
0.250	4.01	1.250	9.85	2.250	11.01	3.25	4.52
0.333	4.01	1.333	9.85	2.333	11.01	3.33	4.52
0.417	4.40	1.417	14.11	2.417	8.66	3.42	4.16
0.500	4.40	1.500	14.11	2.500	8.66	3.50	4.16
0.583	4.89	1.583	28.12	2.583	7.21	3.58	3.86
0.667	4.89	1.667	28.12	2.667	7.21	3.67	3.86
0.750	5.54	1.750	101.38	2.750	6.23	3.75	3.61
0.833	5.54	1.833	101.38	2.833	6.23	3.83	3.61
0.917	6.42	1.917	29.75	2.917	5.51	3.92	3.40
1.000	6.42	2.000	29.75	3.000	5.51	4.00	3.40

Unit Hyd Qpeak (cms)= 0.386

PEAK FLOW (cms)= 0.158 (i)
TIME TO PEAK (hrs)= 2.667
RUNOFF VOLUME (mm)= 15.488
TOTAL RAINFALL (mm)= 49.775
RUNOFF COEFFICIENT = 0.311

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

CALIB
NASHYD (0179) Area (ha)= 13.79 Curve Number (CN)= 75.0
ID= 1 DT= 5.0 min Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.80

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	3.70	1.083	7.72	2.083	15.63	3.08	4.96
0.167	3.70	1.167	7.72	2.167	15.63	3.17	4.96
0.250	4.01	1.250	9.85	2.250	11.01	3.25	4.52
0.333	4.01	1.333	9.85	2.333	11.01	3.33	4.52

0.417	4.40	1.417	14.11	2.417	8.66	3.42	4.16
0.500	4.40	1.500	14.11	2.500	8.66	3.50	4.16
0.583	4.89	1.583	28.12	2.583	7.21	3.58	3.86
0.667	4.89	1.667	28.12	2.667	7.21	3.67	3.86
0.750	5.54	1.750	101.38	2.750	6.23	3.75	3.61
0.833	5.54	1.833	101.38	2.833	6.23	3.83	3.61
0.917	6.42	1.917	29.75	2.917	5.51	3.92	3.40
1.000	6.42	2.000	29.75	3.000	5.51	4.00	3.40

Unit Hyd Qpeak (cms)= 0.658

PEAK FLOW (cms)= 0.277 (i)
TIME TO PEAK (hrs)= 2.750
RUNOFF VOLUME (mm)= 15.488
TOTAL RAINFALL (mm)= 49.775
RUNOFF COEFFICIENT = 0.311

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

CALIB			
NASHYD (0208)	Area (ha)= 1.26	Curve Number (CN)= 75.0	
ID= 1 DT= 5.0 min	Ia (mm)= 5.00	# of Linear Res.(N)= 3.00	
	U.H. Tp(hrs)= 0.38		

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	3.70	1.083	7.72	2.083	15.63	3.08	4.96
0.167	3.70	1.167	7.72	2.167	15.63	3.17	4.96
0.250	4.01	1.250	9.85	2.250	11.01	3.25	4.52
0.333	4.01	1.333	9.85	2.333	11.01	3.33	4.52
0.417	4.40	1.417	14.11	2.417	8.66	3.42	4.16
0.500	4.40	1.500	14.11	2.500	8.66	3.50	4.16
0.583	4.89	1.583	28.12	2.583	7.21	3.58	3.86
0.667	4.89	1.667	28.12	2.667	7.21	3.67	3.86
0.750	5.54	1.750	101.38	2.750	6.23	3.75	3.61
0.833	5.54	1.833	101.38	2.833	6.23	3.83	3.61
0.917	6.42	1.917	29.75	2.917	5.51	3.92	3.40
1.000	6.42	2.000	29.75	3.000	5.51	4.00	3.40

Unit Hyd Qpeak (cms)= 0.127

PEAK FLOW (cms)= 0.042 (i)
TIME TO PEAK (hrs)= 2.250
RUNOFF VOLUME (mm)= 15.485
TOTAL RAINFALL (mm)= 49.775
RUNOFF COEFFICIENT = 0.311

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

ADD HYD (0180)				
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0173):	7.28	0.158	2.67	15.49
+ ID2= 2 (0179):	13.79	0.277	2.75	15.49
ID = 3 (0180):	21.07	0.434	2.75	15.49

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0180)				
3 + 2 = 1	AREA	QPEAK	TPEAK	R.V.

	(ha)	(cms)	(hrs)	(mm)
ID1= 3 (0180):	21.07	0.434	2.75	15.49
+ ID2= 2 (0208):	1.26	0.042	2.25	15.49
ID = 1 (0180):	22.33	0.460	2.67	15.49

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0180)				
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0180):	22.33	0.460	2.67	15.49
+ ID2= 2 (0077):	9.20	0.216	2.58	15.49
ID = 3 (0180):	31.53	0.674	2.67	15.49

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```
 V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
 V    V   I    SS     U   U   A A   L
  V  V    I     SS    U   U  AAAAA  L
  V  V    I      SS   U   U  A   A  L
   VV     I    SSSSS  UUUUU  A   A  LLLLL

  OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
 O   O    T      T    H   H   Y Y   MM MM  O   O
 O   O    T      T    H   H    Y    M   M  O   O
  OOO     T      T    H   H    Y    M   M   OOO
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***** D E T A I L E D O U T P U T *****

Input filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
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DATE: 05/05/2025 TIME: 03:09:21

USER:

COMMENTS: _____

```
**********************************************
** SIMULATION : E. 25yr 4hr 10min Chicago     **
**********************************************
```

CHICAGO STORM	IDF curve parameters: A= 821.000
Ptotal= 57.75 mm	B= 4.000
	C= 0.735

used in: INTENSITY = A / (t + B)^C

Duration of storm = 4.00 hrs
Storm time step = 10.00 min
Time to peak ratio = 0.46

TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN

hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.00	4.33	1.00	8.98	2.00	18.02	3.00	5.79
0.17	4.70	1.17	11.42	2.17	12.75	3.17	5.29
0.33	5.15	1.33	16.29	2.33	10.06	3.33	4.87
0.50	5.72	1.50	32.24	2.50	8.40	3.50	4.53
0.67	6.47	1.67	118.02	2.67	7.26	3.67	4.24
0.83	7.48	1.83	34.10	2.83	6.43	3.83	3.98

CALIB NASHYD (0171) ID= 1 DT= 5.0 min | Area (ha)= 5.90 | Curve Number (CN)= 75.0 | Ia (mm)= 5.00 | # of Linear Res.(N)= 3.00 | U.H. Tp(hrs)= 0.62

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	4.33	1.083	8.98	2.083	18.02	3.08	5.79
0.167	4.33	1.167	8.98	2.167	18.02	3.17	5.79
0.250	4.70	1.250	11.42	2.250	12.75	3.25	5.29
0.333	4.70	1.333	11.42	2.333	12.75	3.33	5.29
0.417	5.15	1.417	16.29	2.417	10.06	3.42	4.87
0.500	5.15	1.500	16.29	2.500	10.06	3.50	4.87
0.583	5.72	1.583	32.24	2.583	8.40	3.58	4.53
0.667	5.72	1.667	32.24	2.667	8.40	3.67	4.53
0.750	6.47	1.750	118.02	2.750	7.26	3.75	4.24
0.833	6.47	1.833	118.02	2.833	7.26	3.83	4.24
0.917	7.48	1.917	34.10	2.917	6.43	3.92	3.98
1.000	7.48	2.000	34.10	3.000	6.43	4.00	3.98

Unit Hyd Qpeak (cms)= 0.363

PEAK FLOW (cms)= 0.187 (i)
TIME TO PEAK (hrs)= 2.500
RUNOFF VOLUME (mm)= 20.249
TOTAL RAINFALL (mm)= 57.751
RUNOFF COEFFICIENT = 0.351

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

CALIB NASHYD (0175) ID= 1 DT= 5.0 min | Area (ha)= 5.15 | Curve Number (CN)= 75.0 | Ia (mm)= 5.00 | # of Linear Res.(N)= 3.00 | U.H. Tp(hrs)= 0.62

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	4.33	1.083	8.98	2.083	18.02	3.08	5.79
0.167	4.33	1.167	8.98	2.167	18.02	3.17	5.79
0.250	4.70	1.250	11.42	2.250	12.75	3.25	5.29
0.333	4.70	1.333	11.42	2.333	12.75	3.33	5.29
0.417	5.15	1.417	16.29	2.417	10.06	3.42	4.87
0.500	5.15	1.500	16.29	2.500	10.06	3.50	4.87
0.583	5.72	1.583	32.24	2.583	8.40	3.58	4.53
0.667	5.72	1.667	32.24	2.667	8.40	3.67	4.53
0.750	6.47	1.750	118.02	2.750	7.26	3.75	4.24
0.833	6.47	1.833	118.02	2.833	7.26	3.83	4.24
0.917	7.48	1.917	34.10	2.917	6.43	3.92	3.98
1.000	7.48	2.000	34.10	3.000	6.43	4.00	3.98

Unit Hyd Qpeak (cms)= 0.317

PEAK FLOW (cms)= 0.163 (i)
TIME TO PEAK (hrs)= 2.500
RUNOFF VOLUME (mm)= 20.249
TOTAL RAINFALL (mm)= 57.751
RUNOFF COEFFICIENT = 0.351

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

CALIB NASHYD (0214) ID= 1 DT= 5.0 min | Area (ha)= 2.47 | Curve Number (CN)= 75.0 | Ia (mm)= 5.00 | # of Linear Res.(N)= 3.00 | U.H. Tp(hrs)= 0.41

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	4.33	1.083	8.98	2.083	18.02	3.08	5.79
0.167	4.33	1.167	8.98	2.167	18.02	3.17	5.79
0.250	4.70	1.250	11.42	2.250	12.75	3.25	5.29
0.333	4.70	1.333	11.42	2.333	12.75	3.33	5.29
0.417	5.15	1.417	16.29	2.417	10.06	3.42	4.87
0.500	5.15	1.500	16.29	2.500	10.06	3.50	4.87
0.583	5.72	1.583	32.24	2.583	8.40	3.58	4.53
0.667	5.72	1.667	32.24	2.667	8.40	3.67	4.53
0.750	6.47	1.750	118.02	2.750	7.26	3.75	4.24
0.833	6.47	1.833	118.02	2.833	7.26	3.83	4.24
0.917	7.48	1.917	34.10	2.917	6.43	3.92	3.98
1.000	7.48	2.000	34.10	3.000	6.43	4.00	3.98

Unit Hyd Qpeak (cms)= 0.230

PEAK FLOW (cms)= 0.104 (i)
TIME TO PEAK (hrs)= 2.250
RUNOFF VOLUME (mm)= 20.247
TOTAL RAINFALL (mm)= 57.751
RUNOFF COEFFICIENT = 0.351

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

CALIB NASHYD (0215) ID= 1 DT= 5.0 min | Area (ha)= 1.45 | Curve Number (CN)= 75.0 | Ia (mm)= 5.00 | # of Linear Res.(N)= 3.00 | U.H. Tp(hrs)= 0.82

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	4.33	1.083	8.98	2.083	18.02	3.08	5.79
0.167	4.33	1.167	8.98	2.167	18.02	3.17	5.79
0.250	4.70	1.250	11.42	2.250	12.75	3.25	5.29
0.333	4.70	1.333	11.42	2.333	12.75	3.33	5.29
0.417	5.15	1.417	16.29	2.417	10.06	3.42	4.87
0.500	5.15	1.500	16.29	2.500	10.06	3.50	4.87
0.583	5.72	1.583	32.24	2.583	8.40	3.58	4.53
0.667	5.72	1.667	32.24	2.667	8.40	3.67	4.53
0.750	6.47	1.750	118.02	2.750	7.26	3.75	4.24
0.833	6.47	1.833	118.02	2.833	7.26	3.83	4.24
0.917	7.48	1.917	34.10	2.917	6.43	3.92	3.98
1.000	7.48	2.000	34.10	3.000	6.43	4.00	3.98

Unit Hyd Qpeak (cms)= 0.068

```
     PEAK FLOW       (cms)=   0.038 (i)
     TIME TO PEAK    (hrs)=   2.750
     RUNOFF VOLUME    (mm)=  20.249
     TOTAL RAINFALL   (mm)=  57.751
     RUNOFF COEFFICIENT   =   0.351

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

```
--------------------
| ADD HYD  (  0082)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)     (cms)    (hrs)     (mm)
       ID1= 1 (  0171):      5.90   0.187     2.50    20.25
     + ID2= 2 (  0175):      5.15   0.163     2.50    20.25
       ====================================================
       ID = 3 (  0082):     11.05   0.349     2.50    20.25

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

```
--------------------
| ADD HYD  (  0082)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)     (cms)    (hrs)     (mm)
       ID1= 3 (  0082):     11.05   0.349     2.50    20.25
     + ID2= 2 (  0214):      2.47   0.104     2.25    20.25
       ====================================================
       ID = 1 (  0082):     13.52   0.441     2.42    20.25

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

```
--------------------
| ADD HYD  (  0082)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)     (cms)    (hrs)     (mm)
       ID1= 1 (  0082):     13.52   0.441     2.42    20.25
     + ID2= 2 (  0215):      1.45   0.038     2.75    20.25
       ====================================================
       ID = 3 (  0082):     14.97   0.474     2.50    20.25

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

```
--------------------
| CALIB            |
| STANDHYD (  0203)|   Area    (ha)=   0.34
|ID= 1 DT= 5.0 min |   Total Imp(%)=  83.00   Dir. Conn.(%)=  83.00
--------------------
                        IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.28         0.06
     Dep. Storage     (mm)=       2.00         1.50
     Average Slope     (%)=       1.00         1.00
     Length            (m)=      47.61        40.00
     Mannings n           =      0.015        0.250

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

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
		---- TRANSFORMED HYETOGRAPH ----					
0.083	4.33	1.083	8.98	2.083	18.02	3.08	5.79
0.167	4.33	1.167	8.98	2.167	18.02	3.17	5.79
0.250	4.70	1.250	11.42	2.250	12.75	3.25	5.29
0.333	4.70	1.333	11.42	2.333	12.75	3.33	5.29
0.417	5.15	1.417	16.29	2.417	10.06	3.42	4.87
0.500	5.15	1.500	16.29	2.500	10.06	3.50	4.87
0.583	5.72	1.583	32.24	2.583	8.40	3.58	4.53
0.667	5.72	1.667	32.24	2.667	8.40	3.67	4.53
0.750	6.47	1.750	118.02	2.750	7.26	3.75	4.24
0.833	6.47	1.833	118.02	2.833	7.26	3.83	4.24
0.917	7.48	1.917	34.10	2.917	6.43	3.92	3.98
1.000	7.48	2.000	34.10	3.000	6.43	4.00	3.98


```
     Max.Eff.Inten.(mm/hr)=     118.02        47.70
               over (min)          5.00        10.00
     Storage Coeff.  (min)=        1.67 (ii)    5.98 (ii)
     Unit Hyd. Tpeak (min)=        5.00        10.00
     Unit Hyd. peak  (cms)=        0.32         0.15
                                                    *TOTALS*
     PEAK FLOW       (cms)=        0.09         0.01          0.098 (iii)
     TIME TO PEAK    (hrs)=        1.83         1.92           1.83
     RUNOFF VOLUME    (mm)=       55.75        22.45          50.08
     TOTAL RAINFALL   (mm)=       57.75        57.75          57.75
     RUNOFF COEFFICIENT   =        0.97         0.39           0.87

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  75.0    Ia = Dep. 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 (  0102)|   Area    (ha)=  14.93
|ID= 1 DT= 5.0 min |   Total Imp(%)=  60.00   Dir. Conn.(%)=  60.00
--------------------
                        IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       8.96         5.97
     Dep. Storage     (mm)=       2.00         1.50
     Average Slope     (%)=       1.00         1.00
     Length            (m)=     315.49        40.00
     Mannings n           =      0.015        0.250

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

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
		---- TRANSFORMED HYETOGRAPH ----					
0.083	4.33	1.083	8.98	2.083	18.02	3.08	5.79
0.167	4.33	1.167	8.98	2.167	18.02	3.17	5.79
0.250	4.70	1.250	11.42	2.250	12.75	3.25	5.29
0.333	4.70	1.333	11.42	2.333	12.75	3.33	5.29
0.417	5.15	1.417	16.29	2.417	10.06	3.42	4.87
0.500	5.15	1.500	16.29	2.500	10.06	3.50	4.87
0.583	5.72	1.583	32.24	2.583	8.40	3.58	4.53
0.667	5.72	1.667	32.24	2.667	8.40	3.67	4.53
0.750	6.47	1.750	118.02	2.750	7.26	3.75	4.24
0.833	6.47	1.833	118.02	2.833	7.26	3.83	4.24
0.917	7.48	1.917	34.10	2.917	6.43	3.92	3.98
1.000	7.48	2.000	34.10	3.000	6.43	4.00	3.98

```
     Max.Eff.Inten.(mm/hr)=     118.02        37.64
               over (min)          5.00        20.00
     Storage Coeff.  (min)=        5.19 (ii)   18.04 (ii)
     Unit Hyd. Tpeak (min)=        5.00        20.00
     Unit Hyd. peak  (cms)=        0.21         0.06
                                                    *TOTALS*
     PEAK FLOW       (cms)=        2.62         0.36          2.775 (iii)
     TIME TO PEAK    (hrs)=        1.83         2.08           1.83
     RUNOFF VOLUME    (mm)=       55.75        22.45          42.43
     TOTAL RAINFALL   (mm)=       57.75        57.75          57.75
     RUNOFF COEFFICIENT   =        0.97         0.39           0.73


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  75.0    Ia = Dep. Storage  (Above)
```

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

ADD HYD (0218)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0102):		14.93	2.775	1.83	42.43
+ ID2= 2 (0203):		0.34	0.098	1.83	50.08
ID = 3 (0218):		15.27	2.873	1.83	42.60

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB		
STANDHYD (0207)	Area	(ha)= 2.33
ID= 1 DT= 5.0 min	Total Imp(%)=	88.90 Dir. Conn.(%)= 88.90

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	2.07	0.26
Dep. Storage	(mm)=	0.00	1.50
Average Slope	(%)=	1.00	1.00
Length	(m)=	124.63	25.00
Mannings n	=	0.015	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	4.33	1.083	8.98	2.083	18.02	3.08	5.79
0.167	4.33	1.167	8.98	2.167	18.02	3.17	5.79
0.250	4.70	1.250	11.42	2.250	12.75	3.25	5.29
0.333	4.70	1.333	11.42	2.333	12.75	3.33	5.29
0.417	5.15	1.417	16.29	2.417	10.06	3.42	4.87
0.500	5.15	1.500	16.29	2.500	10.06	3.50	4.87
0.583	5.72	1.583	32.24	2.583	8.40	3.58	4.53
0.667	5.72	1.667	32.24	2.667	8.40	3.67	4.53
0.750	6.47	1.750	118.02	2.750	7.26	3.75	4.24
0.833	6.47	1.833	118.02	2.833	7.26	3.83	4.24
0.917	7.48	1.917	34.10	2.917	6.43	3.92	3.98
1.000	7.48	2.000	34.10	3.000	6.43	4.00	3.98

Max.Eff.Inten.(mm/hr)=		118.02	47.70	
over (min)		5.00	10.00	
Storage Coeff. (min)=		2.97 (ii)	5.64 (ii)	
Unit Hyd. Tpeak (min)=		5.00	10.00	
Unit Hyd. peak (cms)=		0.28	0.15	
				TOTALS
PEAK FLOW	(cms)=	0.66	0.03	0.686 (iii)
TIME TO PEAK	(hrs)=	1.83	1.92	1.83
RUNOFF VOLUME	(mm)=	57.75	22.45	53.83
TOTAL RAINFALL	(mm)=	57.75	57.75	57.75
RUNOFF COEFFICIENT	=	1.00	0.39	0.93

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 75.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0079)

1 + 2 = 3		AREA	QPEAK	TPEAK	R.V.
		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0207):		2.33	0.686	1.83	53.83
+ ID2= 2 (0218):		15.27	2.873	1.83	42.60
ID = 3 (0079):		17.60	3.559	1.83	44.09

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0079)		AREA	QPEAK	TPEAK	R.V.
3 + 2 = 1		(ha)	(cms)	(hrs)	(mm)
ID1= 3 (0079):		17.60	3.559	1.83	44.09
+ ID2= 2 (0082):		14.97	0.474	2.50	20.25
ID = 1 (0079):		32.57	3.664	1.83	33.13

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0066)	OVERFLOW IS OFF			
IN= 2---> OUT= 1				
DT= 5.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.5810	1.5760
	0.0080	0.2340	0.8460	1.8660
	0.0130	0.4840	1.0630	2.1640
	0.0470	0.7470	1.4780	2.4680
	0.1760	1.0160	1.9960	2.7800
	0.3580	1.2930	2.8820	2.8590

		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (	0079)	32.570	3.664	1.83	33.13
OUTFLOW: ID= 1 (	0066)	32.570	0.153	4.33	29.69

PEAK FLOW REDUCTION [Qout/Qin](%)= 4.19
TIME SHIFT OF PEAK FLOW (min)=150.00
MAXIMUM STORAGE USED (ha.m.)= 0.9690

CALIB		
NASHYD (0077)	Area	(ha)= 9.20 Curve Number (CN)= 75.0
ID= 1 DT= 5.0 min	Ia	(mm)= 5.00 # of Linear Res.(N)= 3.00
	U.H. Tp(hrs)=	0.64

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	4.33	1.083	8.98	2.083	18.02	3.08	5.79
0.167	4.33	1.167	8.98	2.167	18.02	3.17	5.79
0.250	4.70	1.250	11.42	2.250	12.75	3.25	5.29
0.333	4.70	1.333	11.42	2.333	12.75	3.33	5.29
0.417	5.15	1.417	16.29	2.417	10.06	3.42	4.87
0.500	5.15	1.500	16.29	2.500	10.06	3.50	4.87
0.583	5.72	1.583	32.24	2.583	8.40	3.58	4.53
0.667	5.72	1.667	32.24	2.667	8.40	3.67	4.53
0.750	6.47	1.750	118.02	2.750	7.26	3.75	4.24
0.833	6.47	1.833	118.02	2.833	7.26	3.83	4.24
0.917	7.48	1.917	34.10	2.917	6.43	3.92	3.98
1.000	7.48	2.000	34.10	3.000	6.43	4.00	3.98

Unit Hyd Qpeak (cms)= 0.549

PEAK FLOW (cms)= 0.284 (i)
TIME TO PEAK (hrs)= 2.583

RUNOFF VOLUME (mm)= 20.249
TOTAL RAINFALL (mm)= 57.751
RUNOFF COEFFICIENT = 0.351

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

CALIB			
NASHYD (0173)	Area (ha)= 7.28	Curve Number (CN)= 75.0	
ID= 1 DT= 5.0 min	Ia (mm)= 5.00	# of Linear Res.(N)= 3.00	
	U.H. Tp(hrs)= 0.72		

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	4.33	1.083	8.98	2.083	18.02	3.08	5.79
0.167	4.33	1.167	8.98	2.167	18.02	3.17	5.79
0.250	4.70	1.250	11.42	2.250	12.75	3.25	5.29
0.333	4.70	1.333	11.42	2.333	12.75	3.33	5.29
0.417	5.15	1.417	16.29	2.417	10.06	3.42	4.87
0.500	5.15	1.500	16.29	2.500	10.06	3.50	4.87
0.583	5.72	1.583	32.24	2.583	8.40	3.58	4.53
0.667	5.72	1.667	32.24	2.667	8.40	3.67	4.53
0.750	6.47	1.750	118.02	2.750	7.26	3.75	4.24
0.833	6.47	1.833	118.02	2.833	7.26	3.83	4.24
0.917	7.48	1.917	34.10	2.917	6.43	3.92	3.98
1.000	7.48	2.000	34.10	3.000	6.43	4.00	3.98

Unit Hyd Qpeak (cms)= 0.386

PEAK FLOW (cms)= 0.207 (i)
TIME TO PEAK (hrs)= 2.667
RUNOFF VOLUME (mm)= 20.250
TOTAL RAINFALL (mm)= 57.751
RUNOFF COEFFICIENT = 0.351

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

CALIB			
NASHYD (0179)	Area (ha)= 13.79	Curve Number (CN)= 75.0	
ID= 1 DT= 5.0 min	Ia (mm)= 5.00	# of Linear Res.(N)= 3.00	
	U.H. Tp(hrs)= 0.80		

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	4.33	1.083	8.98	2.083	18.02	3.08	5.79
0.167	4.33	1.167	8.98	2.167	18.02	3.17	5.79
0.250	4.70	1.250	11.42	2.250	12.75	3.25	5.29
0.333	4.70	1.333	11.42	2.333	12.75	3.33	5.29
0.417	5.15	1.417	16.29	2.417	10.06	3.42	4.87
0.500	5.15	1.500	16.29	2.500	10.06	3.50	4.87
0.583	5.72	1.583	32.24	2.583	8.40	3.58	4.53
0.667	5.72	1.667	32.24	2.667	8.40	3.67	4.53
0.750	6.47	1.750	118.02	2.750	7.26	3.75	4.24
0.833	6.47	1.833	118.02	2.833	7.26	3.83	4.24
0.917	7.48	1.917	34.10	2.917	6.43	3.92	3.98
1.000	7.48	2.000	34.10	3.000	6.43	4.00	3.98

Unit Hyd Qpeak (cms)= 0.658

PEAK FLOW (cms)= 0.364 (i)
TIME TO PEAK (hrs)= 2.750

RUNOFF VOLUME (mm)= 20.250
TOTAL RAINFALL (mm)= 57.751
RUNOFF COEFFICIENT = 0.351

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

CALIB			
NASHYD (0208)	Area (ha)= 1.26	Curve Number (CN)= 75.0	
ID= 1 DT= 5.0 min	Ia (mm)= 5.00	# of Linear Res.(N)= 3.00	
	U.H. Tp(hrs)= 0.38		

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	4.33	1.083	8.98	2.083	18.02	3.08	5.79
0.167	4.33	1.167	8.98	2.167	18.02	3.17	5.79
0.250	4.70	1.250	11.42	2.250	12.75	3.25	5.29
0.333	4.70	1.333	11.42	2.333	12.75	3.33	5.29
0.417	5.15	1.417	16.29	2.417	10.06	3.42	4.87
0.500	5.15	1.500	16.29	2.500	10.06	3.50	4.87
0.583	5.72	1.583	32.24	2.583	8.40	3.58	4.53
0.667	5.72	1.667	32.24	2.667	8.40	3.67	4.53
0.750	6.47	1.750	118.02	2.750	7.26	3.75	4.24
0.833	6.47	1.833	118.02	2.833	7.26	3.83	4.24
0.917	7.48	1.917	34.10	2.917	6.43	3.92	3.98
1.000	7.48	2.000	34.10	3.000	6.43	4.00	3.98

Unit Hyd Qpeak (cms)= 0.127

PEAK FLOW (cms)= 0.055 (i)
TIME TO PEAK (hrs)= 2.250
RUNOFF VOLUME (mm)= 20.246
TOTAL RAINFALL (mm)= 57.751
RUNOFF COEFFICIENT = 0.351

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

ADD HYD (0180)				
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0173):	7.28	0.207	2.67	20.25
+ ID2= 2 (0179):	13.79	0.364	2.75	20.25
ID = 3 (0180):	21.07	0.570	2.75	20.25

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0180)				
3 + 2 = 1	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 3 (0180):	21.07	0.570	2.75	20.25
+ ID2= 2 (0208):	1.26	0.055	2.25	20.25
ID = 1 (0180):	22.33	0.605	2.67	20.25

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0180)				
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)

```
       ID1= 1 (  0180):    22.33   0.605     2.67    20.25
     + ID2= 2 (  0077):     9.20   0.284     2.58    20.25
       ================================================
       ID = 3 (  0180):    31.53   0.886     2.67    20.25

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

```
       V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
       V    V   I    SS     U   U   A A   L
        V  V    I      SS   U   U  AAAAA  L
        V  V    I       SS  U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                  *****  D E T A I L E D   O U T P U T *****

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DATE: 05/05/2025                          TIME: 03:09:21

USER:


COMMENTS: _____
```

```
  ************************************************
  ** SIMULATION : F. 50yr 4hr 10min Chicago     **
  ************************************************

--------------------
| CHICAGO STORM    |     IDF curve parameters: A= 900.000
| Ptotal= 63.70 mm |                           B=   3.800
--------------------                           C=   0.734
                        used in:   INTENSITY =  A / (t + B)^C

                        Duration of storm  =  4.00 hrs
                        Storm time step    = 10.00 min
                        Time to peak ratio =  0.46
```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	4.78	1.00	9.88	2.00	19.76	3.00	6.39
0.17	5.19	1.17	12.55	2.17	14.01	3.17	5.83
0.33	5.69	1.33	17.87	2.33	11.06	3.33	5.38
0.50	6.31	1.50	35.28	2.50	9.25	3.50	5.00
0.67	7.13	1.67	131.09	2.67	8.00	3.67	4.68
0.83	8.24	1.83	37.31	2.83	7.09	3.83	4.40

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--------------------
| CALIB            |
| NASHYD   (  0171)|   Area    (ha)=   5.90   Curve Number   (CN)= 75.0
```



```
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.62

         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	4.78	1.083	9.88	2.083	19.76	3.08	6.39
0.167	4.78	1.167	9.88	2.167	19.76	3.17	6.39
0.250	5.19	1.250	12.55	2.250	14.01	3.25	5.83
0.333	5.19	1.333	12.55	2.333	14.01	3.33	5.83
0.417	5.69	1.417	17.87	2.417	11.06	3.42	5.38
0.500	5.69	1.500	17.87	2.500	11.06	3.50	5.38
0.583	6.31	1.583	35.28	2.583	9.25	3.58	5.00
0.667	6.31	1.667	35.28	2.667	9.25	3.67	5.00
0.750	7.13	1.750	131.09	2.750	8.00	3.75	4.68
0.833	7.13	1.833	131.09	2.833	8.00	3.83	4.68
0.917	8.24	1.917	37.31	2.917	7.09	3.92	4.40
1.000	8.24	2.000	37.31	3.000	7.09	4.00	4.40

```
     Unit Hyd Qpeak  (cms)=   0.363

     PEAK FLOW       (cms)=   0.223 (i)
     TIME TO PEAK    (hrs)=   2.500
     RUNOFF VOLUME    (mm)=  24.031
     TOTAL RAINFALL   (mm)=  63.696
     RUNOFF COEFFICIENT   =   0.377

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

```
--------------------
| CALIB            |
| NASHYD   (  0175)|   Area    (ha)=   5.15   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.62

         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	4.78	1.083	9.88	2.083	19.76	3.08	6.39
0.167	4.78	1.167	9.88	2.167	19.76	3.17	6.39
0.250	5.19	1.250	12.55	2.250	14.01	3.25	5.83
0.333	5.19	1.333	12.55	2.333	14.01	3.33	5.83
0.417	5.69	1.417	17.87	2.417	11.06	3.42	5.38
0.500	5.69	1.500	17.87	2.500	11.06	3.50	5.38
0.583	6.31	1.583	35.28	2.583	9.25	3.58	5.00
0.667	6.31	1.667	35.28	2.667	9.25	3.67	5.00
0.750	7.13	1.750	131.09	2.750	8.00	3.75	4.68
0.833	7.13	1.833	131.09	2.833	8.00	3.83	4.68
0.917	8.24	1.917	37.31	2.917	7.09	3.92	4.40
1.000	8.24	2.000	37.31	3.000	7.09	4.00	4.40

```
     Unit Hyd Qpeak  (cms)=   0.317

     PEAK FLOW       (cms)=   0.194 (i)
     TIME TO PEAK    (hrs)=   2.500
     RUNOFF VOLUME    (mm)=  24.031
     TOTAL RAINFALL   (mm)=  63.696
     RUNOFF COEFFICIENT   =   0.377

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

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--------------------
| CALIB            |
| NASHYD   (  0214)|   Area    (ha)=   2.47   Curve Number   (CN)= 75.0
```

|ID= 1 DT= 5.0 min | Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.41

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	4.78	1.083	9.88	2.083	19.76	3.08	6.39
0.167	4.78	1.167	9.88	2.167	19.76	3.17	6.39
0.250	5.19	1.250	12.55	2.250	14.01	3.25	5.83
0.333	5.19	1.333	12.55	2.333	14.01	3.33	5.83
0.417	5.69	1.417	17.87	2.417	11.06	3.42	5.38
0.500	5.69	1.500	17.87	2.500	11.06	3.50	5.38
0.583	6.31	1.583	35.28	2.583	9.25	3.58	5.00
0.667	6.31	1.667	35.28	2.667	9.25	3.67	5.00
0.750	7.13	1.750	131.09	2.750	8.00	3.75	4.68
0.833	7.13	1.833	131.09	2.833	8.00	3.83	4.68
0.917	8.24	1.917	37.31	2.917	7.09	3.92	4.40
1.000	8.24	2.000	37.31	3.000	7.09	4.00	4.40

Unit Hyd Qpeak (cms)= 0.230

PEAK FLOW (cms)= 0.124 (i)
TIME TO PEAK (hrs)= 2.250
RUNOFF VOLUME (mm)= 24.028
TOTAL RAINFALL (mm)= 63.696
RUNOFF COEFFICIENT = 0.377

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

CALIB NASHYD (0215) | ID= 1 DT= 5.0 min | Area (ha)= 1.45 Curve Number (CN)= 75.0
Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.82

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	4.78	1.083	9.88	2.083	19.76	3.08	6.39
0.167	4.78	1.167	9.88	2.167	19.76	3.17	6.39
0.250	5.19	1.250	12.55	2.250	14.01	3.25	5.83
0.333	5.19	1.333	12.55	2.333	14.01	3.33	5.83
0.417	5.69	1.417	17.87	2.417	11.06	3.42	5.38
0.500	5.69	1.500	17.87	2.500	11.06	3.50	5.38
0.583	6.31	1.583	35.28	2.583	9.25	3.58	5.00
0.667	6.31	1.667	35.28	2.667	9.25	3.67	5.00
0.750	7.13	1.750	131.09	2.750	8.00	3.75	4.68
0.833	7.13	1.833	131.09	2.833	8.00	3.83	4.68
0.917	8.24	1.917	37.31	2.917	7.09	3.92	4.40
1.000	8.24	2.000	37.31	3.000	7.09	4.00	4.40

Unit Hyd Qpeak (cms)= 0.068

PEAK FLOW (cms)= 0.045 (i)
TIME TO PEAK (hrs)= 2.750
RUNOFF VOLUME (mm)= 24.030
TOTAL RAINFALL (mm)= 63.696
RUNOFF COEFFICIENT = 0.377

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

ADD HYD (0082)

1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0171):	5.90	0.223	2.50	24.03
+ ID2= 2 (0175):	5.15	0.194	2.50	24.03
ID = 3 (0082):	11.05	0.417	2.50	24.03

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0082)

3 + 2 = 1	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 3 (0082):	11.05	0.417	2.50	24.03
+ ID2= 2 (0214):	2.47	0.124	2.25	24.03
ID = 1 (0082):	13.52	0.526	2.42	24.03

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0082)

1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0082):	13.52	0.526	2.42	24.03
+ ID2= 2 (0215):	1.45	0.045	2.75	24.03
ID = 3 (0082):	14.97	0.566	2.50	24.03

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB STANDHYD (0203) | ID= 1 DT= 5.0 min | Area (ha)= 0.34
Total Imp(%)= 83.00 Dir. Conn.(%)= 83.00

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	0.28	0.06
Dep. Storage (mm)=	2.00	1.50
Average Slope (%)=	1.00	1.00
Length (m)=	47.61	40.00
Mannings n =	0.015	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	4.78	1.083	9.88	2.083	19.76	3.08	6.39
0.167	4.78	1.167	9.88	2.167	19.76	3.17	6.39
0.250	5.19	1.250	12.55	2.250	14.01	3.25	5.83
0.333	5.19	1.333	12.55	2.333	14.01	3.33	5.83
0.417	5.69	1.417	17.87	2.417	11.06	3.42	5.38
0.500	5.69	1.500	17.87	2.500	11.06	3.50	5.38
0.583	6.31	1.583	35.28	2.583	9.25	3.58	5.00
0.667	6.31	1.667	35.28	2.667	9.25	3.67	5.00
0.750	7.13	1.750	131.09	2.750	8.00	3.75	4.68
0.833	7.13	1.833	131.09	2.833	8.00	3.83	4.68
0.917	8.24	1.917	37.31	2.917	7.09	3.92	4.40
1.000	8.24	2.000	37.31	3.000	7.09	4.00	4.40

Max.Eff.Inten.(mm/hr)=	131.09	56.69	
over (min)	5.00	10.00	
Storage Coeff. (min)=	1.60 (ii)	5.74 (ii)	
Unit Hyd. Tpeak (min)=	5.00	10.00	
Unit Hyd. peak (cms)=	0.32	0.15	
			TOTALS
PEAK FLOW (cms)=	0.10	0.01	0.109 (iii)
TIME TO PEAK (hrs)=	1.83	1.92	1.83

```
     RUNOFF VOLUME    (mm)=      61.70        26.34          55.68
     TOTAL RAINFALL   (mm)=      63.70        63.70          63.70
     RUNOFF COEFFICIENT   =       0.97         0.41           0.87

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  75.0    Ia = Dep. 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 (  0102)|   Area    (ha)=  14.93
|ID= 1 DT= 5.0 min |   Total Imp(%)=  60.00   Dir. Conn.(%)=  60.00
--------------------
                         IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       8.96         5.97
     Dep. Storage     (mm)=       2.00         1.50
     Average Slope     (%)=       1.00         1.00
     Length            (m)=     315.49        40.00
     Mannings n            =      0.015        0.250

         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    4.78 | 1.083    9.88 | 2.083   19.76 |  3.08    6.39
               0.167    4.78 | 1.167    9.88 | 2.167   19.76 |  3.17    6.39
               0.250    5.19 | 1.250   12.55 | 2.250   14.01 |  3.25    5.83
               0.333    5.19 | 1.333   12.55 | 2.333   14.01 |  3.33    5.83
               0.417    5.69 | 1.417   17.87 | 2.417   11.06 |  3.42    5.38
               0.500    5.69 | 1.500   17.87 | 2.500   11.06 |  3.50    5.38
               0.583    6.31 | 1.583   35.28 | 2.583    9.25 |  3.58    5.00
               0.667    6.31 | 1.667   35.28 | 2.667    9.25 |  3.67    5.00
               0.750    7.13 | 1.750  131.09 | 2.750    8.00 |  3.75    4.68
               0.833    7.13 | 1.833  131.09 | 2.833    8.00 |  3.83    4.68
               0.917    8.24 | 1.917   37.31 | 2.917    7.09 |  3.92    4.40
               1.000    8.24 | 2.000   37.31 | 3.000    7.09 |  4.00    4.40

     Max.Eff.Inten.(mm/hr)=     131.09        44.56
               over (min)         5.00        20.00
     Storage Coeff.  (min)=       4.98 (ii)   16.98 (ii)
     Unit Hyd. Tpeak (min)=       5.00        20.00
     Unit Hyd. peak  (cms)=       0.22         0.06
                                                      *TOTALS*
     PEAK FLOW       (cms)=       2.93         0.43          3.130 (iii)
     TIME TO PEAK    (hrs)=       1.83         2.08           1.83
     RUNOFF VOLUME    (mm)=      61.70        26.34          47.55
     TOTAL RAINFALL   (mm)=      63.70        63.70          63.70
     RUNOFF COEFFICIENT   =       0.97         0.41           0.75

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  75.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| ADD HYD  (  0218)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0102):     14.93    3.130     1.83    47.55
     + ID2= 2 (  0203):      0.34    0.109     1.83    55.68
```



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       ==================================================
       ID = 3 (  0218):    15.27   3.239     1.83    47.73

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0207)|   Area    (ha)=   2.33
|ID= 1 DT= 5.0 min |   Total Imp(%)=  88.90   Dir. Conn.(%)=  88.90
--------------------
                         IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.07         0.26
     Dep. Storage     (mm)=       0.00         1.50
     Average Slope     (%)=       1.00         1.00
     Length            (m)=     124.63        25.00
     Mannings n            =      0.015        0.250

         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    4.78 | 1.083    9.88 | 2.083   19.76 |  3.08    6.39
               0.167    4.78 | 1.167    9.88 | 2.167   19.76 |  3.17    6.39
               0.250    5.19 | 1.250   12.55 | 2.250   14.01 |  3.25    5.83
               0.333    5.19 | 1.333   12.55 | 2.333   14.01 |  3.33    5.83
               0.417    5.69 | 1.417   17.87 | 2.417   11.06 |  3.42    5.38
               0.500    5.69 | 1.500   17.87 | 2.500   11.06 |  3.50    5.38
               0.583    6.31 | 1.583   35.28 | 2.583    9.25 |  3.58    5.00
               0.667    6.31 | 1.667   35.28 | 2.667    9.25 |  3.67    5.00
               0.750    7.13 | 1.750  131.09 | 2.750    8.00 |  3.75    4.68
               0.833    7.13 | 1.833  131.09 | 2.833    8.00 |  3.83    4.68
               0.917    8.24 | 1.917   37.31 | 2.917    7.09 |  3.92    4.40
               1.000    8.24 | 2.000   37.31 | 3.000    7.09 |  4.00    4.40

     Max.Eff.Inten.(mm/hr)=     131.09        56.69
               over (min)         5.00        10.00
     Storage Coeff.  (min)=       2.85 (ii)    5.41 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.28         0.16
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.74         0.03          0.767 (iii)
     TIME TO PEAK    (hrs)=       1.83         1.92           1.83
     RUNOFF VOLUME    (mm)=      63.70        26.34          59.55
     TOTAL RAINFALL   (mm)=      63.70        63.70          63.70
     RUNOFF COEFFICIENT   =       1.00         0.41           0.93

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  75.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| ADD HYD  (  0079)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0207):      2.33    0.767     1.83    59.55
     + ID2= 2 (  0218):     15.27    3.239     1.83    47.73
       ==================================================
       ID = 3 (  0079):     17.60    4.005     1.83    49.30

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

--------------------
| ADD HYD  (  0079)|
```

3 + 2 = 1	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 3 (0079):	17.60	4.005	1.83	49.30
+ ID2= 2 (0082):	14.97	0.566	2.50	24.03
ID = 1 (0079):	32.57	4.136	1.83	37.68

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0066)
IN= 2---> OUT= 1
DT= 5.0 min

OVERFLOW IS OFF

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.5810	1.5760
0.0080	0.2340	0.8460	1.8660
0.0130	0.4840	1.0630	2.1640
0.0470	0.7470	1.4780	2.4680
0.1760	1.0160	1.9960	2.7800
0.3580	1.2930	2.8820	2.8590

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0079)	32.570	4.136	1.83	37.68
OUTFLOW: ID= 1 (0066)	32.570	0.215	4.25	34.18

PEAK FLOW REDUCTION [Qout/Qin](%)= 5.21
TIME SHIFT OF PEAK FLOW (min)=145.00
MAXIMUM STORAGE USED (ha.m.)= 1.0762

CALIB
NASHYD (0077)
ID= 1 DT= 5.0 min

Area (ha)= 9.20 Curve Number (CN)= 75.0
Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.64

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	4.78	1.083	9.88	2.083	19.76	3.08	6.39
0.167	4.78	1.167	9.88	2.167	19.76	3.17	6.39
0.250	5.19	1.250	12.55	2.250	14.01	3.25	5.83
0.333	5.19	1.333	12.55	2.333	14.01	3.33	5.83
0.417	5.69	1.417	17.87	2.417	11.06	3.42	5.38
0.500	5.69	1.500	17.87	2.500	11.06	3.50	5.38
0.583	6.31	1.583	35.28	2.583	9.25	3.58	5.00
0.667	6.31	1.667	35.28	2.667	9.25	3.67	5.00
0.750	7.13	1.750	131.09	2.750	8.00	3.75	4.68
0.833	7.13	1.833	131.09	2.833	8.00	3.83	4.68
0.917	8.24	1.917	37.31	2.917	7.09	3.92	4.40
1.000	8.24	2.000	37.31	3.000	7.09	4.00	4.40

Unit Hyd Qpeak (cms)= 0.549

PEAK FLOW (cms)= 0.339 (i)
TIME TO PEAK (hrs)= 2.583
RUNOFF VOLUME (mm)= 24.031
TOTAL RAINFALL (mm)= 63.696
RUNOFF COEFFICIENT = 0.377

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

CALIB
NASHYD (0173)
ID= 1 DT= 5.0 min

Area (ha)= 7.28 Curve Number (CN)= 75.0
Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.72

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	4.78	1.083	9.88	2.083	19.76	3.08	6.39
0.167	4.78	1.167	9.88	2.167	19.76	3.17	6.39
0.250	5.19	1.250	12.55	2.250	14.01	3.25	5.83
0.333	5.19	1.333	12.55	2.333	14.01	3.33	5.83
0.417	5.69	1.417	17.87	2.417	11.06	3.42	5.38
0.500	5.69	1.500	17.87	2.500	11.06	3.50	5.38
0.583	6.31	1.583	35.28	2.583	9.25	3.58	5.00
0.667	6.31	1.667	35.28	2.667	9.25	3.67	5.00
0.750	7.13	1.750	131.09	2.750	8.00	3.75	4.68
0.833	7.13	1.833	131.09	2.833	8.00	3.83	4.68
0.917	8.24	1.917	37.31	2.917	7.09	3.92	4.40
1.000	8.24	2.000	37.31	3.000	7.09	4.00	4.40

Unit Hyd Qpeak (cms)= 0.386

PEAK FLOW (cms)= 0.247 (i)
TIME TO PEAK (hrs)= 2.667
RUNOFF VOLUME (mm)= 24.031
TOTAL RAINFALL (mm)= 63.696
RUNOFF COEFFICIENT = 0.377

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

CALIB
NASHYD (0179)
ID= 1 DT= 5.0 min

Area (ha)= 13.79 Curve Number (CN)= 75.0
Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.80

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	4.78	1.083	9.88	2.083	19.76	3.08	6.39
0.167	4.78	1.167	9.88	2.167	19.76	3.17	6.39
0.250	5.19	1.250	12.55	2.250	14.01	3.25	5.83
0.333	5.19	1.333	12.55	2.333	14.01	3.33	5.83
0.417	5.69	1.417	17.87	2.417	11.06	3.42	5.38
0.500	5.69	1.500	17.87	2.500	11.06	3.50	5.38
0.583	6.31	1.583	35.28	2.583	9.25	3.58	5.00
0.667	6.31	1.667	35.28	2.667	9.25	3.67	5.00
0.750	7.13	1.750	131.09	2.750	8.00	3.75	4.68
0.833	7.13	1.833	131.09	2.833	8.00	3.83	4.68
0.917	8.24	1.917	37.31	2.917	7.09	3.92	4.40
1.000	8.24	2.000	37.31	3.000	7.09	4.00	4.40

Unit Hyd Qpeak (cms)= 0.658

PEAK FLOW (cms)= 0.434 (i)
TIME TO PEAK (hrs)= 2.750
RUNOFF VOLUME (mm)= 24.031
TOTAL RAINFALL (mm)= 63.696
RUNOFF COEFFICIENT = 0.377

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

CALIB
NASHYD (0208)
ID= 1 DT= 5.0 min

Area (ha)= 1.26 Curve Number (CN)= 75.0
Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.38

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	4.78	1.083	9.88	2.083	19.76	3.08	6.39
0.167	4.78	1.167	9.88	2.167	19.76	3.17	6.39
0.250	5.19	1.250	12.55	2.250	14.01	3.25	5.83
0.333	5.19	1.333	12.55	2.333	14.01	3.33	5.83
0.417	5.69	1.417	17.87	2.417	11.06	3.42	5.38
0.500	5.69	1.500	17.87	2.500	11.06	3.50	5.38
0.583	6.31	1.583	35.28	2.583	9.25	3.58	5.00
0.667	6.31	1.667	35.28	2.667	9.25	3.67	5.00
0.750	7.13	1.750	131.09	2.750	8.00	3.75	4.68
0.833	7.13	1.833	131.09	2.833	8.00	3.83	4.68
0.917	8.24	1.917	37.31	2.917	7.09	3.92	4.40
1.000	8.24	2.000	37.31	3.000	7.09	4.00	4.40

Unit Hyd Qpeak (cms)= 0.127

PEAK FLOW (cms)= 0.066 (i)
TIME TO PEAK (hrs)= 2.167
RUNOFF VOLUME (mm)= 24.027
TOTAL RAINFALL (mm)= 63.696
RUNOFF COEFFICIENT = 0.377

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

ADD HYD (0180)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0173):	7.28	0.247	2.67	24.03
+ ID2= 2 (0179):	13.79	0.434	2.75	24.03
ID = 3 (0180):	21.07	0.679	2.75	24.03

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0180)
3 + 2 = 1

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 3 (0180):	21.07	0.679	2.75	24.03
+ ID2= 2 (0208):	1.26	0.066	2.17	24.03
ID = 1 (0180):	22.33	0.722	2.67	24.03

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0180)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0180):	22.33	0.722	2.67	24.03
+ ID2= 2 (0077):	9.20	0.339	2.58	24.03
ID = 3 (0180):	31.53	1.056	2.58	24.03

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

FINISH


```
      V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
      V    V   I    SS     U   U   A A   L
       V  V    I     SS    U   U  AAAAA  L
       V  V    I      SS   U   U  A   A  L
        VV     I    SSSSS  UUUUU  A   A  LLLLL

       OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
      O   O    T      T    H   H   Y Y   MM MM  O   O
      O   O    T      T    H   H    Y    M   M  O   O
       OOO     T      T    H   H    Y    M   M   OOO
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***** D E T A I L E D O U T P U T *****

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DATE: 05/05/2025 TIME: 03:09:21

USER:

COMMENTS: _____

****
** SIMULATION : G. 100yr 4hr 10min Chicago **
****

CHICAGO STORM
Ptotal= 70.15 mm

IDF curve parameters: A= 980.000
B= 3.700
C= 0.732
used in: INTENSITY = A / (t + B)^C

Duration of storm = 4.00 hrs
Storm time step = 10.00 min
Time to peak ratio = 0.46

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	5.30	1.00	10.91	2.00	21.73	3.00	7.07
0.17	5.75	1.17	13.84	2.17	15.43	3.17	6.45
0.33	6.29	1.33	19.66	2.33	12.20	3.33	5.95
0.50	6.98	1.50	38.68	2.50	10.21	3.50	5.53
0.67	7.88	1.67	144.26	2.67	8.84	3.67	5.18
0.83	9.11	1.83	40.90	2.83	7.84	3.83	4.87

CALIB
NASHYD (0171)
ID= 1 DT= 5.0 min

Area (ha)= 5.90 Curve Number (CN)= 75.0
Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.62

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	5.30	1.083	10.91	2.083	21.73	3.08	7.07
0.167	5.30	1.167	10.91	2.167	21.73	3.17	7.07
0.250	5.75	1.250	13.84	2.250	15.43	3.25	6.45
0.333	5.75	1.333	13.84	2.333	15.43	3.33	6.45
0.417	6.29	1.417	19.66	2.417	12.20	3.42	5.95
0.500	6.29	1.500	19.66	2.500	12.20	3.50	5.95
0.583	6.98	1.583	38.68	2.583	10.21	3.58	5.53
0.667	6.98	1.667	38.68	2.667	10.21	3.67	5.53
0.750	7.88	1.750	144.26	2.750	8.84	3.75	5.18
0.833	7.88	1.833	144.26	2.833	8.84	3.83	5.18
0.917	9.11	1.917	40.90	2.917	7.84	3.92	4.87
1.000	9.11	2.000	40.90	3.000	7.84	4.00	4.87

Unit Hyd Qpeak (cms)= 0.363

PEAK FLOW (cms)= 0.264 (i)
TIME TO PEAK (hrs)= 2.500
RUNOFF VOLUME (mm)= 28.327
TOTAL RAINFALL (mm)= 70.145
RUNOFF COEFFICIENT = 0.404

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

CALIB			
NASHYD (0175)	Area (ha)=	5.15	Curve Number (CN)= 75.0
ID= 1 DT= 5.0 min	Ia (mm)=	5.00	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)=	0.62	

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	5.30	1.083	10.91	2.083	21.73	3.08	7.07
0.167	5.30	1.167	10.91	2.167	21.73	3.17	7.07
0.250	5.75	1.250	13.84	2.250	15.43	3.25	6.45
0.333	5.75	1.333	13.84	2.333	15.43	3.33	6.45
0.417	6.29	1.417	19.66	2.417	12.20	3.42	5.95
0.500	6.29	1.500	19.66	2.500	12.20	3.50	5.95
0.583	6.98	1.583	38.68	2.583	10.21	3.58	5.53
0.667	6.98	1.667	38.68	2.667	10.21	3.67	5.53
0.750	7.88	1.750	144.26	2.750	8.84	3.75	5.18
0.833	7.88	1.833	144.26	2.833	8.84	3.83	5.18
0.917	9.11	1.917	40.90	2.917	7.84	3.92	4.87
1.000	9.11	2.000	40.90	3.000	7.84	4.00	4.87

Unit Hyd Qpeak (cms)= 0.317

PEAK FLOW (cms)= 0.230 (i)
TIME TO PEAK (hrs)= 2.500
RUNOFF VOLUME (mm)= 28.327
TOTAL RAINFALL (mm)= 70.145
RUNOFF COEFFICIENT = 0.404

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

CALIB			
NASHYD (0214)	Area (ha)=	2.47	Curve Number (CN)= 75.0
ID= 1 DT= 5.0 min	Ia (mm)=	5.00	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)=	0.41	

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	5.30	1.083	10.91	2.083	21.73	3.08	7.07
0.167	5.30	1.167	10.91	2.167	21.73	3.17	7.07
0.250	5.75	1.250	13.84	2.250	15.43	3.25	6.45
0.333	5.75	1.333	13.84	2.333	15.43	3.33	6.45
0.417	6.29	1.417	19.66	2.417	12.20	3.42	5.95
0.500	6.29	1.500	19.66	2.500	12.20	3.50	5.95
0.583	6.98	1.583	38.68	2.583	10.21	3.58	5.53
0.667	6.98	1.667	38.68	2.667	10.21	3.67	5.53
0.750	7.88	1.750	144.26	2.750	8.84	3.75	5.18
0.833	7.88	1.833	144.26	2.833	8.84	3.83	5.18
0.917	9.11	1.917	40.90	2.917	7.84	3.92	4.87
1.000	9.11	2.000	40.90	3.000	7.84	4.00	4.87

Unit Hyd Qpeak (cms)= 0.230

PEAK FLOW (cms)= 0.147 (i)
TIME TO PEAK (hrs)= 2.250
RUNOFF VOLUME (mm)= 28.325
TOTAL RAINFALL (mm)= 70.145
RUNOFF COEFFICIENT = 0.404

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

CALIB			
NASHYD (0215)	Area (ha)=	1.45	Curve Number (CN)= 75.0
ID= 1 DT= 5.0 min	Ia (mm)=	5.00	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)=	0.82	

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	5.30	1.083	10.91	2.083	21.73	3.08	7.07
0.167	5.30	1.167	10.91	2.167	21.73	3.17	7.07
0.250	5.75	1.250	13.84	2.250	15.43	3.25	6.45
0.333	5.75	1.333	13.84	2.333	15.43	3.33	6.45
0.417	6.29	1.417	19.66	2.417	12.20	3.42	5.95
0.500	6.29	1.500	19.66	2.500	12.20	3.50	5.95
0.583	6.98	1.583	38.68	2.583	10.21	3.58	5.53
0.667	6.98	1.667	38.68	2.667	10.21	3.67	5.53
0.750	7.88	1.750	144.26	2.750	8.84	3.75	5.18
0.833	7.88	1.833	144.26	2.833	8.84	3.83	5.18
0.917	9.11	1.917	40.90	2.917	7.84	3.92	4.87
1.000	9.11	2.000	40.90	3.000	7.84	4.00	4.87

Unit Hyd Qpeak (cms)= 0.068

PEAK FLOW (cms)= 0.053 (i)
TIME TO PEAK (hrs)= 2.750
RUNOFF VOLUME (mm)= 28.327
TOTAL RAINFALL (mm)= 70.145
RUNOFF COEFFICIENT = 0.404

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

ADD HYD (0082)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
	ID1= 1 (0171):	5.90	0.264	2.50	28.33
	+ ID2= 2 (0175):	5.15	0.230	2.50	28.33
	ID = 3 (0082):	11.05	0.494	2.50	28.33

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0082)		AREA	QPEAK	TPEAK	R.V.
3 + 2 = 1		(ha)	(cms)	(hrs)	(mm)
	ID1= 3 (0082):	11.05	0.494	2.50	28.33
	+ ID2= 2 (0214):	2.47	0.147	2.25	28.32
	ID = 1 (0082):	13.52	0.623	2.42	28.33

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0082)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
	ID1= 1 (0082):	13.52	0.623	2.42	28.33
	+ ID2= 2 (0215):	1.45	0.053	2.75	28.33
	ID = 3 (0082):	14.97	0.669	2.42	28.33

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB
STANDHYD (0203) ID= 1 DT= 5.0 min | Area (ha)= 0.34 | Total Imp(%)= 83.00 | Dir. Conn.(%)= 83.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.28	0.06
Dep. Storage	(mm)=	2.00	1.50
Average Slope	(%)=	1.00	1.00
Length	(m)=	47.61	40.00
Mannings n	=	0.015	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	5.30	1.083	10.91	2.083	21.73	3.08	7.07
0.167	5.30	1.167	10.91	2.167	21.73	3.17	7.07
0.250	5.75	1.250	13.84	2.250	15.43	3.25	6.45
0.333	5.75	1.333	13.84	2.333	15.43	3.33	6.45
0.417	6.29	1.417	19.66	2.417	12.20	3.42	5.95
0.500	6.29	1.500	19.66	2.500	12.20	3.50	5.95
0.583	6.98	1.583	38.68	2.583	10.21	3.58	5.53
0.667	6.98	1.667	38.68	2.667	10.21	3.67	5.53
0.750	7.88	1.750	144.26	2.750	8.84	3.75	5.18
0.833	7.88	1.833	144.26	2.833	8.84	3.83	5.18
0.917	9.11	1.917	40.90	2.917	7.84	3.92	4.87
1.000	9.11	2.000	40.90	3.000	7.84	4.00	4.87

Max.Eff.Inten.(mm/hr)=		144.26	66.47	
over (min)		5.00	10.00	
Storage Coeff. (min)=		1.54 (ii)	5.52 (ii)	
Unit Hyd. Tpeak (min)=		5.00	10.00	
Unit Hyd. peak (cms)=		0.33	0.16	
				TOTALS
PEAK FLOW	(cms)=	0.11	0.01	0.121 (iii)
TIME TO PEAK	(hrs)=	1.83	1.92	1.83
RUNOFF VOLUME	(mm)=	68.15	30.74	61.78
TOTAL RAINFALL	(mm)=	70.15	70.15	70.15
RUNOFF COEFFICIENT	=	0.97	0.44	0.88

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 75.0 Ia = Dep. 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 (0102) ID= 1 DT= 5.0 min | Area (ha)= 14.93 | Total Imp(%)= 60.00 | Dir. Conn.(%)= 60.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	8.96	5.97
Dep. Storage	(mm)=	2.00	1.50
Average Slope	(%)=	1.00	1.00
Length	(m)=	315.49	40.00
Mannings n	=	0.015	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	5.30	1.083	10.91	2.083	21.73	3.08	7.07
0.167	5.30	1.167	10.91	2.167	21.73	3.17	7.07
0.250	5.75	1.250	13.84	2.250	15.43	3.25	6.45
0.333	5.75	1.333	13.84	2.333	15.43	3.33	6.45
0.417	6.29	1.417	19.66	2.417	12.20	3.42	5.95
0.500	6.29	1.500	19.66	2.500	12.20	3.50	5.95
0.583	6.98	1.583	38.68	2.583	10.21	3.58	5.53
0.667	6.98	1.667	38.68	2.667	10.21	3.67	5.53
0.750	7.88	1.750	144.26	2.750	8.84	3.75	5.18
0.833	7.88	1.833	144.26	2.833	8.84	3.83	5.18
0.917	9.11	1.917	40.90	2.917	7.84	3.92	4.87
1.000	9.11	2.000	40.90	3.000	7.84	4.00	4.87

Max.Eff.Inten.(mm/hr)=		144.26	52.13	
over (min)		5.00	20.00	
Storage Coeff. (min)=		4.79 (ii)	16.07 (ii)	
Unit Hyd. Tpeak (min)=		5.00	20.00	
Unit Hyd. peak (cms)=		0.22	0.06	
				TOTALS
PEAK FLOW	(cms)=	3.26	0.52	3.495 (iii)
TIME TO PEAK	(hrs)=	1.83	2.08	1.83
RUNOFF VOLUME	(mm)=	68.15	30.74	53.18
TOTAL RAINFALL	(mm)=	70.15	70.15	70.15
RUNOFF COEFFICIENT	=	0.97	0.44	0.76

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 75.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0218)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
	ID1= 1 (0102):	14.93	3.495	1.83	53.18
	+ ID2= 2 (0203):	0.34	0.121	1.83	61.78
	ID = 3 (0218):	15.27	3.615	1.83	53.37

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB
STANDHYD (0207) | Area (ha)= 2.33

|ID= 1 DT= 5.0 min | Total Imp(%)= 88.90 Dir. Conn.(%)= 88.90

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	2.07	0.26
Dep. Storage (mm)=	0.00	1.50
Average Slope (%)=	1.00	1.00
Length (m)=	124.63	25.00
Mannings n =	0.015	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	5.30	1.083	10.91	2.083	21.73	3.08	7.07
0.167	5.30	1.167	10.91	2.167	21.73	3.17	7.07
0.250	5.75	1.250	13.84	2.250	15.43	3.25	6.45
0.333	5.75	1.333	13.84	2.333	15.43	3.33	6.45
0.417	6.29	1.417	19.66	2.417	12.20	3.42	5.95
0.500	6.29	1.500	19.66	2.500	12.20	3.50	5.95
0.583	6.98	1.583	38.68	2.583	10.21	3.58	5.53
0.667	6.98	1.667	38.68	2.667	10.21	3.67	5.53
0.750	7.88	1.750	144.26	2.750	8.84	3.75	5.18
0.833	7.88	1.833	144.26	2.833	8.84	3.83	5.18
0.917	9.11	1.917	40.90	2.917	7.84	3.92	4.87
1.000	9.11	2.000	40.90	3.000	7.84	4.00	4.87

Max.Eff.Inten.(mm/hr)=	144.26	67.47	
over (min)	5.00	10.00	
Storage Coeff. (min)=	2.74 (ii)	5.21 (ii)	
Unit Hyd. Tpeak (min)=	5.00	10.00	
Unit Hyd. peak (cms)=	0.28	0.16	
			TOTALS
PEAK FLOW (cms)=	0.81	0.04	0.849 (iii)
TIME TO PEAK (hrs)=	1.83	1.92	1.83
RUNOFF VOLUME (mm)=	70.15	30.74	65.77
TOTAL RAINFALL (mm)=	70.15	70.15	70.15
RUNOFF COEFFICIENT =	1.00	0.44	0.94

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 75.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0079) 1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0207):	2.33	0.849	1.83	65.77
+ ID2= 2 (0218):	15.27	3.615	1.83	53.37
ID = 3 (0079):	17.60	4.464	1.83	55.01

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0079) 3 + 2 = 1	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 3 (0079):	17.60	4.464	1.83	55.01
+ ID2= 2 (0082):	14.97	0.669	2.42	28.33
ID = 1 (0079):	32.57	4.625	1.83	42.75

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0066) IN= 2---> OUT= 1 DT= 5.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.5810	1.5760
	0.0080	0.2340	0.8460	1.8660
	0.0130	0.4840	1.0630	2.1640
	0.0470	0.7470	1.4780	2.4680
	0.1760	1.0160	1.9960	2.7800
	0.3580	1.2930	2.8820	2.8590

OVERFLOW IS OFF

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0079)	32.570	4.625	1.83	42.75
OUTFLOW: ID= 1 (0066)	32.570	0.290	4.17	39.19

PEAK FLOW REDUCTION [Qout/Qin](%)= 6.27
TIME SHIFT OF PEAK FLOW (min)=140.00
MAXIMUM STORAGE USED (ha.m.)= 1.1894

CALIB NASHYD (0077) ID= 1 DT= 5.0 min				
	Area (ha)=	9.20	Curve Number (CN)=	75.0
	Ia (mm)=	5.00	# of Linear Res.(N)=	3.00
	U.H. Tp(hrs)=	0.64		

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	5.30	1.083	10.91	2.083	21.73	3.08	7.07
0.167	5.30	1.167	10.91	2.167	21.73	3.17	7.07
0.250	5.75	1.250	13.84	2.250	15.43	3.25	6.45
0.333	5.75	1.333	13.84	2.333	15.43	3.33	6.45
0.417	6.29	1.417	19.66	2.417	12.20	3.42	5.95
0.500	6.29	1.500	19.66	2.500	12.20	3.50	5.95
0.583	6.98	1.583	38.68	2.583	10.21	3.58	5.53
0.667	6.98	1.667	38.68	2.667	10.21	3.67	5.53
0.750	7.88	1.750	144.26	2.750	8.84	3.75	5.18
0.833	7.88	1.833	144.26	2.833	8.84	3.83	5.18
0.917	9.11	1.917	40.90	2.917	7.84	3.92	4.87
1.000	9.11	2.000	40.90	3.000	7.84	4.00	4.87

Unit Hyd Qpeak (cms)=	0.549	
PEAK FLOW (cms)=	0.401 (i)	
TIME TO PEAK (hrs)=	2.500	
RUNOFF VOLUME (mm)=	28.328	
TOTAL RAINFALL (mm)=	70.145	
RUNOFF COEFFICIENT =	0.404	

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

CALIB NASHYD (0173) ID= 1 DT= 5.0 min				
	Area (ha)=	7.28	Curve Number (CN)=	75.0
	Ia (mm)=	5.00	# of Linear Res.(N)=	3.00
	U.H. Tp(hrs)=	0.72		

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	5.30	1.083	10.91	2.083	21.73	3.08	7.07

0.167	5.30	1.167	10.91	2.167	21.73	3.17	7.07
0.250	5.75	1.250	13.84	2.250	15.43	3.25	6.45
0.333	5.75	1.333	13.84	2.333	15.43	3.33	6.45
0.417	6.29	1.417	19.66	2.417	12.20	3.42	5.95
0.500	6.29	1.500	19.66	2.500	12.20	3.50	5.95
0.583	6.98	1.583	38.68	2.583	10.21	3.58	5.53
0.667	6.98	1.667	38.68	2.667	10.21	3.67	5.53
0.750	7.88	1.750	144.26	2.750	8.84	3.75	5.18
0.833	7.88	1.833	144.26	2.833	8.84	3.83	5.18
0.917	9.11	1.917	40.90	2.917	7.84	3.92	4.87
1.000	9.11	2.000	40.90	3.000	7.84	4.00	4.87

Unit Hyd Qpeak (cms)= 0.386

PEAK FLOW (cms)= 0.292 (i)
TIME TO PEAK (hrs)= 2.667
RUNOFF VOLUME (mm)= 28.328
TOTAL RAINFALL (mm)= 70.145
RUNOFF COEFFICIENT = 0.404

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

CALIB					
NASHYD (0179)	Area (ha)= 13.79	Curve Number (CN)= 75.0			
ID= 1 DT= 5.0 min	Ia (mm)= 5.00	# of Linear Res.(N)= 3.00			
	U.H. Tp(hrs)= 0.80				

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	5.30	1.083	10.91	2.083	21.73	3.08	7.07
0.167	5.30	1.167	10.91	2.167	21.73	3.17	7.07
0.250	5.75	1.250	13.84	2.250	15.43	3.25	6.45
0.333	5.75	1.333	13.84	2.333	15.43	3.33	6.45
0.417	6.29	1.417	19.66	2.417	12.20	3.42	5.95
0.500	6.29	1.500	19.66	2.500	12.20	3.50	5.95
0.583	6.98	1.583	38.68	2.583	10.21	3.58	5.53
0.667	6.98	1.667	38.68	2.667	10.21	3.67	5.53
0.750	7.88	1.750	144.26	2.750	8.84	3.75	5.18
0.833	7.88	1.833	144.26	2.833	8.84	3.83	5.18
0.917	9.11	1.917	40.90	2.917	7.84	3.92	4.87
1.000	9.11	2.000	40.90	3.000	7.84	4.00	4.87

Unit Hyd Qpeak (cms)= 0.658

PEAK FLOW (cms)= 0.513 (i)
TIME TO PEAK (hrs)= 2.750
RUNOFF VOLUME (mm)= 28.328
TOTAL RAINFALL (mm)= 70.145
RUNOFF COEFFICIENT = 0.404

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

CALIB					
NASHYD (0208)	Area (ha)= 1.26	Curve Number (CN)= 75.0			
ID= 1 DT= 5.0 min	Ia (mm)= 5.00	# of Linear Res.(N)= 3.00			
	U.H. Tp(hrs)= 0.38				

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	5.30	1.083	10.91	2.083	21.73	3.08	7.07

0.167	5.30	1.167	10.91	2.167	21.73	3.17	7.07
0.250	5.75	1.250	13.84	2.250	15.43	3.25	6.45
0.333	5.75	1.333	13.84	2.333	15.43	3.33	6.45
0.417	6.29	1.417	19.66	2.417	12.20	3.42	5.95
0.500	6.29	1.500	19.66	2.500	12.20	3.50	5.95
0.583	6.98	1.583	38.68	2.583	10.21	3.58	5.53
0.667	6.98	1.667	38.68	2.667	10.21	3.67	5.53
0.750	7.88	1.750	144.26	2.750	8.84	3.75	5.18
0.833	7.88	1.833	144.26	2.833	8.84	3.83	5.18
0.917	9.11	1.917	40.90	2.917	7.84	3.92	4.87
1.000	9.11	2.000	40.90	3.000	7.84	4.00	4.87

Unit Hyd Qpeak (cms)= 0.127

PEAK FLOW (cms)= 0.079 (i)
TIME TO PEAK (hrs)= 2.167
RUNOFF VOLUME (mm)= 28.323
TOTAL RAINFALL (mm)= 70.145
RUNOFF COEFFICIENT = 0.404

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

ADD HYD (0180)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
	ID1= 1 (0173):	7.28	0.292	2.67	28.33
	+ ID2= 2 (0179):	13.79	0.513	2.75	28.33
	ID = 3 (0180):	21.07	0.803	2.67	28.33

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0180)		AREA	QPEAK	TPEAK	R.V.
3 + 2 = 1		(ha)	(cms)	(hrs)	(mm)
	ID1= 3 (0180):	21.07	0.803	2.67	28.33
	+ ID2= 2 (0208):	1.26	0.079	2.17	28.32
	ID = 1 (0180):	22.33	0.853	2.67	28.33

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0180)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
	ID1= 1 (0180):	22.33	0.853	2.67	28.33
	+ ID2= 2 (0077):	9.20	0.401	2.50	28.33
	ID = 3 (0180):	31.53	1.250	2.58	28.33

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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      V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
      V    V   I    SS     U   U   A A   L
       V  V    I     SS    U   U  AAAAA  L
       V  V    I      SS   U   U  A   A  L
        VV     I    SSSSS  UUUUU  A   A  LLLLL

       OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
      O   O    T      T    H   H   Y Y   MM MM  O   O
      O   O    T      T    H   H    Y    M   M  O   O
       OOO     T      T    H   H    Y    M   M   OOO
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***** D E T A I L E D O U T P U T *****

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DATE: 05/05/2025 TIME: 03:09:20

USER:

COMMENTS: _____

****
** SIMULATION : H. 100yr MTO 24hr 10min Chica **
****

CHICAGO STORM
Ptotal=136.18 mm

IDF curve parameters: A= 915.400
B= 0.000
C= 0.699
used in: INTENSITY = A / (t + B)^C

Duration of storm = 24.00 hrs
Storm time step = 10.00 min
Time to peak ratio = 0.46

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	' TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	1.73	6.00	3.05	12.00	9.16	18.00	2.58
0.17	1.75	6.17	3.12	12.17	8.35	18.17	2.54
0.33	1.77	6.33	3.20	12.33	7.69	18.33	2.50
0.50	1.79	6.50	3.29	12.50	7.15	18.50	2.46
0.67	1.81	6.67	3.38	12.67	6.69	18.67	2.43
0.83	1.83	6.83	3.48	12.83	6.29	18.83	2.39
1.00	1.85	7.00	3.58	13.00	5.95	19.00	2.36
1.17	1.88	7.17	3.70	13.17	5.65	19.17	2.32
1.33	1.90	7.33	3.82	13.33	5.39	19.33	2.29
1.50	1.92	7.50	3.95	13.50	5.15	19.50	2.26
1.67	1.95	7.67	4.10	13.67	4.94	19.67	2.23
1.83	1.97	7.83	4.25	13.83	4.74	19.83	2.20
2.00	2.00	8.00	4.43	14.00	4.57	20.00	2.17
2.17	2.02	8.17	4.62	14.17	4.41	20.17	2.15
2.33	2.05	8.33	4.83	14.33	4.26	20.33	2.12
2.50	2.08	8.50	5.07	14.50	4.12	20.50	2.10
2.67	2.11	8.67	5.34	14.67	4.00	20.67	2.07
2.83	2.14	8.83	5.65	14.83	3.88	20.83	2.05
3.00	2.17	9.00	6.01	15.00	3.77	21.00	2.02
3.17	2.21	9.17	6.43	15.17	3.67	21.17	2.00
3.33	2.24	9.33	6.92	15.33	3.57	21.33	1.98
3.50	2.27	9.50	7.52	15.50	3.48	21.50	1.96
3.67	2.31	9.67	8.26	15.67	3.40	21.67	1.94
3.83	2.35	9.83	9.21	15.83	3.32	21.83	1.91
4.00	2.39	10.00	10.48	16.00	3.25	22.00	1.89
4.17	2.43	10.17	12.28	16.17	3.17	22.17	1.88
4.33	2.48	10.33	15.08	16.33	3.11	22.33	1.86
4.50	2.52	10.50	20.27	16.50	3.04	22.50	1.84
4.67	2.57	10.67	35.01	16.67	2.98	22.67	1.82
4.83	2.62	10.83	183.07	16.83	2.92	22.83	1.80
5.00	2.67	11.00	36.66	17.00	2.87	23.00	1.78
5.17	2.72	11.17	22.03	17.17	2.82	23.17	1.77

5.33	2.78	11.33	16.56	17.33	2.76	23.33	1.75
5.50	2.84	11.50	13.54	17.50	2.72	23.50	1.73
5.67	2.91	11.67	11.59	17.67	2.67	23.67	1.72
5.83	2.97	11.83	10.20	17.83	2.63	23.83	1.70

CALIB NASHYD (0171) ID= 1 DT= 5.0 min	Area (ha)= 5.90	Curve Number (CN)= 75.0
	Ia (mm)= 5.00	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 0.62	

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	' TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	1.73	6.083	3.05	12.083	9.16	18.08	2.58
0.167	1.73	6.167	3.05	12.167	9.16	18.17	2.58
0.250	1.75	6.250	3.12	12.250	8.35	18.25	2.54
0.333	1.75	6.333	3.12	12.333	8.35	18.33	2.54
0.417	1.77	6.417	3.20	12.417	7.69	18.42	2.50
0.500	1.77	6.500	3.20	12.500	7.69	18.50	2.50
0.583	1.79	6.583	3.29	12.583	7.15	18.58	2.46
0.667	1.79	6.667	3.29	12.667	7.15	18.67	2.46
0.750	1.81	6.750	3.38	12.750	6.69	18.75	2.43
0.833	1.81	6.833	3.38	12.833	6.69	18.83	2.43
0.917	1.83	6.917	3.48	12.917	6.29	18.92	2.39
1.000	1.83	7.000	3.48	13.000	6.29	19.00	2.39
1.083	1.85	7.083	3.58	13.083	5.95	19.08	2.36
1.167	1.85	7.167	3.58	13.167	5.95	19.17	2.36
1.250	1.88	7.250	3.70	13.250	5.65	19.25	2.32
1.333	1.88	7.333	3.70	13.333	5.65	19.33	2.32
1.417	1.90	7.417	3.82	13.417	5.39	19.42	2.29
1.500	1.90	7.500	3.82	13.500	5.39	19.50	2.29
1.583	1.92	7.583	3.95	13.583	5.15	19.58	2.26
1.667	1.92	7.667	3.95	13.667	5.15	19.67	2.26
1.750	1.95	7.750	4.10	13.750	4.94	19.75	2.23
1.833	1.95	7.833	4.10	13.833	4.94	19.83	2.23
1.917	1.97	7.917	4.25	13.917	4.74	19.92	2.20
2.000	1.97	8.000	4.25	14.000	4.74	20.00	2.20
2.083	2.00	8.083	4.43	14.083	4.57	20.08	2.17
2.167	2.00	8.167	4.43	14.167	4.57	20.17	2.17
2.250	2.02	8.250	4.62	14.250	4.41	20.25	2.15
2.333	2.02	8.333	4.62	14.333	4.41	20.33	2.15
2.417	2.05	8.417	4.83	14.417	4.26	20.42	2.12
2.500	2.05	8.500	4.83	14.500	4.26	20.50	2.12
2.583	2.08	8.583	5.07	14.583	4.12	20.58	2.10
2.667	2.08	8.667	5.07	14.667	4.12	20.67	2.10
2.750	2.11	8.750	5.34	14.750	4.00	20.75	2.07
2.833	2.11	8.833	5.34	14.833	4.00	20.83	2.07
2.917	2.14	8.917	5.65	14.917	3.88	20.92	2.05
3.000	2.14	9.000	5.65	15.000	3.88	21.00	2.05
3.083	2.17	9.083	6.01	15.083	3.77	21.08	2.02
3.167	2.17	9.167	6.01	15.167	3.77	21.17	2.02
3.250	2.21	9.250	6.43	15.250	3.67	21.25	2.00
3.333	2.21	9.333	6.43	15.333	3.67	21.33	2.00
3.417	2.24	9.417	6.92	15.417	3.57	21.42	1.98
3.500	2.24	9.500	6.92	15.500	3.57	21.50	1.98
3.583	2.27	9.583	7.52	15.583	3.48	21.58	1.96
3.667	2.27	9.667	7.52	15.667	3.48	21.67	1.96
3.750	2.31	9.750	8.26	15.750	3.40	21.75	1.94
3.833	2.31	9.833	8.26	15.833	3.40	21.83	1.94
3.917	2.35	9.917	9.21	15.917	3.32	21.92	1.91
4.000	2.35	10.000	9.21	16.000	3.32	22.00	1.91
4.083	2.39	10.083	10.48	16.083	3.25	22.08	1.89
4.167	2.39	10.167	10.48	16.167	3.25	22.17	1.89
4.250	2.43	10.250	12.28	16.250	3.17	22.25	1.88
4.333	2.43	10.333	12.28	16.333	3.17	22.33	1.88
4.417	2.48	10.417	15.08	16.417	3.11	22.42	1.86

4.500	2.48	10.500	15.08	16.500	3.11	22.50	1.86
4.583	2.52	10.583	20.27	16.583	3.04	22.58	1.84
4.667	2.52	10.667	20.27	16.667	3.04	22.67	1.84
4.750	2.57	10.750	35.01	16.750	2.98	22.75	1.82
4.833	2.57	10.833	35.01	16.833	2.98	22.83	1.82
4.917	2.62	10.917	183.06	16.917	2.92	22.92	1.80
5.000	2.62	11.000	183.07	17.000	2.92	23.00	1.80
5.083	2.67	11.083	36.67	17.083	2.87	23.08	1.78
5.167	2.67	11.167	36.66	17.167	2.87	23.17	1.78
5.250	2.72	11.250	22.03	17.250	2.82	23.25	1.77
5.333	2.72	11.333	22.03	17.333	2.82	23.33	1.77
5.417	2.78	11.417	16.56	17.417	2.76	23.42	1.75
5.500	2.78	11.500	16.56	17.500	2.76	23.50	1.75
5.583	2.84	11.583	13.54	17.583	2.72	23.58	1.73
5.667	2.84	11.667	13.54	17.667	2.72	23.67	1.73
5.750	2.91	11.750	11.59	17.750	2.67	23.75	1.72
5.833	2.91	11.833	11.59	17.833	2.67	23.83	1.72
5.917	2.97	11.917	10.20	17.917	2.63	23.92	1.70
6.000	2.97	12.000	10.20	18.000	2.63	24.00	1.70

Unit Hyd Qpeak (cms)= 0.363

PEAK FLOW (cms)= 0.465 (i)
TIME TO PEAK (hrs)= 11.583
RUNOFF VOLUME (mm)= 79.724
TOTAL RAINFALL (mm)= 136.183
RUNOFF COEFFICIENT = 0.585

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

CALIB			
NASHYD (0175)	Area (ha)=	5.15	Curve Number (CN)= 75.0
ID= 1 DT= 5.0 min	Ia (mm)=	5.00	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)=	0.62	

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	1.73	6.083	3.05	12.083	9.16	18.08	2.58
0.167	1.73	6.167	3.05	12.167	9.16	18.17	2.58
0.250	1.75	6.250	3.12	12.250	8.35	18.25	2.54
0.333	1.75	6.333	3.12	12.333	8.35	18.33	2.54
0.417	1.77	6.417	3.20	12.417	7.69	18.42	2.50
0.500	1.77	6.500	3.20	12.500	7.69	18.50	2.50
0.583	1.79	6.583	3.29	12.583	7.15	18.58	2.46
0.667	1.79	6.667	3.29	12.667	7.15	18.67	2.46
0.750	1.81	6.750	3.38	12.750	6.69	18.75	2.43
0.833	1.81	6.833	3.38	12.833	6.69	18.83	2.43
0.917	1.83	6.917	3.48	12.917	6.29	18.92	2.39
1.000	1.83	7.000	3.48	13.000	6.29	19.00	2.39
1.083	1.85	7.083	3.58	13.083	5.95	19.08	2.36
1.167	1.85	7.167	3.58	13.167	5.95	19.17	2.36
1.250	1.88	7.250	3.70	13.250	5.65	19.25	2.32
1.333	1.88	7.333	3.70	13.333	5.65	19.33	2.32
1.417	1.90	7.417	3.82	13.417	5.39	19.42	2.29
1.500	1.90	7.500	3.82	13.500	5.39	19.50	2.29
1.583	1.92	7.583	3.95	13.583	5.15	19.58	2.26
1.667	1.92	7.667	3.95	13.667	5.15	19.67	2.26
1.750	1.95	7.750	4.10	13.750	4.94	19.75	2.23
1.833	1.95	7.833	4.10	13.833	4.94	19.83	2.23
1.917	1.97	7.917	4.25	13.917	4.74	19.92	2.20
2.000	1.97	8.000	4.25	14.000	4.74	20.00	2.20
2.083	2.00	8.083	4.43	14.083	4.57	20.08	2.17
2.167	2.00	8.167	4.43	14.167	4.57	20.17	2.17
2.250	2.02	8.250	4.62	14.250	4.41	20.25	2.15
2.333	2.02	8.333	4.62	14.333	4.41	20.33	2.15
2.417	2.05	8.417	4.83	14.417	4.26	20.42	2.12

2.500	2.05	8.500	4.83	14.500	4.26	20.50	2.12
2.583	2.08	8.583	5.07	14.583	4.12	20.58	2.10
2.667	2.08	8.667	5.07	14.667	4.12	20.67	2.10
2.750	2.11	8.750	5.34	14.750	4.00	20.75	2.07
2.833	2.11	8.833	5.34	14.833	4.00	20.83	2.07
2.917	2.14	8.917	5.65	14.917	3.88	20.92	2.05
3.000	2.14	9.000	5.65	15.000	3.88	21.00	2.05
3.083	2.17	9.083	6.01	15.083	3.77	21.08	2.02
3.167	2.17	9.167	6.01	15.167	3.77	21.17	2.02
3.250	2.21	9.250	6.43	15.250	3.67	21.25	2.00
3.333	2.21	9.333	6.43	15.333	3.67	21.33	2.00
3.417	2.24	9.417	6.92	15.417	3.57	21.42	1.98
3.500	2.24	9.500	6.92	15.500	3.57	21.50	1.98
3.583	2.27	9.583	7.52	15.583	3.48	21.58	1.96
3.667	2.27	9.667	7.52	15.667	3.48	21.67	1.96
3.750	2.31	9.750	8.26	15.750	3.40	21.75	1.94
3.833	2.31	9.833	8.26	15.833	3.40	21.83	1.94
3.917	2.35	9.917	9.21	15.917	3.32	21.92	1.91
4.000	2.35	10.000	9.21	16.000	3.32	22.00	1.91
4.083	2.39	10.083	10.48	16.083	3.25	22.08	1.89
4.167	2.39	10.167	10.48	16.167	3.25	22.17	1.89
4.250	2.43	10.250	12.28	16.250	3.17	22.25	1.88
4.333	2.43	10.333	12.28	16.333	3.17	22.33	1.88
4.417	2.48	10.417	15.08	16.417	3.11	22.42	1.86
4.500	2.48	10.500	15.08	16.500	3.11	22.50	1.86
4.583	2.52	10.583	20.27	16.583	3.04	22.58	1.84
4.667	2.52	10.667	20.27	16.667	3.04	22.67	1.84
4.750	2.57	10.750	35.01	16.750	2.98	22.75	1.82
4.833	2.57	10.833	35.01	16.833	2.98	22.83	1.82
4.917	2.62	10.917	183.06	16.917	2.92	22.92	1.80
5.000	2.62	11.000	183.07	17.000	2.92	23.00	1.80
5.083	2.67	11.083	36.67	17.083	2.87	23.08	1.78
5.167	2.67	11.167	36.66	17.167	2.87	23.17	1.78
5.250	2.72	11.250	22.03	17.250	2.82	23.25	1.77
5.333	2.72	11.333	22.03	17.333	2.82	23.33	1.77
5.417	2.78	11.417	16.56	17.417	2.76	23.42	1.75
5.500	2.78	11.500	16.56	17.500	2.76	23.50	1.75
5.583	2.84	11.583	13.54	17.583	2.72	23.58	1.73
5.667	2.84	11.667	13.54	17.667	2.72	23.67	1.73
5.750	2.91	11.750	11.59	17.750	2.67	23.75	1.72
5.833	2.91	11.833	11.59	17.833	2.67	23.83	1.72
5.917	2.97	11.917	10.20	17.917	2.63	23.92	1.70
6.000	2.97	12.000	10.20	18.000	2.63	24.00	1.70

Unit Hyd Qpeak (cms)= 0.317

PEAK FLOW (cms)= 0.406 (i)
TIME TO PEAK (hrs)= 11.583
RUNOFF VOLUME (mm)= 79.724
TOTAL RAINFALL (mm)= 136.183
RUNOFF COEFFICIENT = 0.585

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

CALIB			
NASHYD (0214)	Area (ha)=	2.47	Curve Number (CN)= 75.0
ID= 1 DT= 5.0 min	Ia (mm)=	5.00	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)=	0.41	

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	1.73	6.083	3.05	12.083	9.16	18.08	2.58
0.167	1.73	6.167	3.05	12.167	9.16	18.17	2.58
0.250	1.75	6.250	3.12	12.250	8.35	18.25	2.54
0.333	1.75	6.333	3.12	12.333	8.35	18.33	2.54
0.417	1.77	6.417	3.20	12.417	7.69	18.42	2.50

0.500	1.77	6.500	3.20	12.500	7.69	18.50	2.50
0.583	1.79	6.583	3.29	12.583	7.15	18.58	2.46
0.667	1.79	6.667	3.29	12.667	7.15	18.67	2.46
0.750	1.81	6.750	3.38	12.750	6.69	18.75	2.43
0.833	1.81	6.833	3.38	12.833	6.69	18.83	2.43
0.917	1.83	6.917	3.48	12.917	6.29	18.92	2.39
1.000	1.83	7.000	3.48	13.000	6.29	19.00	2.39
1.083	1.85	7.083	3.58	13.083	5.95	19.08	2.36
1.167	1.85	7.167	3.58	13.167	5.95	19.17	2.36
1.250	1.88	7.250	3.70	13.250	5.65	19.25	2.32
1.333	1.88	7.333	3.70	13.333	5.65	19.33	2.32
1.417	1.90	7.417	3.82	13.417	5.39	19.42	2.29
1.500	1.90	7.500	3.82	13.500	5.39	19.50	2.29
1.583	1.92	7.583	3.95	13.583	5.15	19.58	2.26
1.667	1.92	7.667	3.95	13.667	5.15	19.67	2.26
1.750	1.95	7.750	4.10	13.750	4.94	19.75	2.23
1.833	1.95	7.833	4.10	13.833	4.94	19.83	2.23
1.917	1.97	7.917	4.25	13.917	4.74	19.92	2.20
2.000	1.97	8.000	4.25	14.000	4.74	20.00	2.20
2.083	2.00	8.083	4.43	14.083	4.57	20.08	2.17
2.167	2.00	8.167	4.43	14.167	4.57	20.17	2.17
2.250	2.02	8.250	4.62	14.250	4.41	20.25	2.15
2.333	2.02	8.333	4.62	14.333	4.41	20.33	2.15
2.417	2.05	8.417	4.83	14.417	4.26	20.42	2.12
2.500	2.05	8.500	4.83	14.500	4.26	20.50	2.12
2.583	2.08	8.583	5.07	14.583	4.12	20.58	2.10
2.667	2.08	8.667	5.07	14.667	4.12	20.67	2.10
2.750	2.11	8.750	5.34	14.750	4.00	20.75	2.07
2.833	2.11	8.833	5.34	14.833	4.00	20.83	2.07
2.917	2.14	8.917	5.65	14.917	3.88	20.92	2.05
3.000	2.14	9.000	5.65	15.000	3.88	21.00	2.05
3.083	2.17	9.083	6.01	15.083	3.77	21.08	2.02
3.167	2.17	9.167	6.01	15.167	3.77	21.17	2.02
3.250	2.21	9.250	6.43	15.250	3.67	21.25	2.00
3.333	2.21	9.333	6.43	15.333	3.67	21.33	2.00
3.417	2.24	9.417	6.92	15.417	3.57	21.42	1.98
3.500	2.24	9.500	6.92	15.500	3.57	21.50	1.98
3.583	2.27	9.583	7.52	15.583	3.48	21.58	1.96
3.667	2.27	9.667	7.52	15.667	3.48	21.67	1.96
3.750	2.31	9.750	8.26	15.750	3.40	21.75	1.94
3.833	2.31	9.833	8.26	15.833	3.40	21.83	1.94
3.917	2.35	9.917	9.21	15.917	3.32	21.92	1.91
4.000	2.35	10.000	9.21	16.000	3.32	22.00	1.91
4.083	2.39	10.083	10.48	16.083	3.25	22.08	1.89
4.167	2.39	10.167	10.48	16.167	3.25	22.17	1.89
4.250	2.43	10.250	12.28	16.250	3.17	22.25	1.88
4.333	2.43	10.333	12.28	16.333	3.17	22.33	1.88
4.417	2.48	10.417	15.08	16.417	3.11	22.42	1.86
4.500	2.48	10.500	15.08	16.500	3.11	22.50	1.86
4.583	2.52	10.583	20.27	16.583	3.04	22.58	1.84
4.667	2.52	10.667	20.27	16.667	3.04	22.67	1.84
4.750	2.57	10.750	35.01	16.750	2.98	22.75	1.82
4.833	2.57	10.833	35.01	16.833	2.98	22.83	1.82
4.917	2.62	10.917	183.06	16.917	2.92	22.92	1.80
5.000	2.62	11.000	183.07	17.000	2.92	23.00	1.80
5.083	2.67	11.083	36.67	17.083	2.87	23.08	1.78
5.167	2.67	11.167	36.66	17.167	2.87	23.17	1.78
5.250	2.72	11.250	22.03	17.250	2.82	23.25	1.77
5.333	2.72	11.333	22.03	17.333	2.82	23.33	1.77
5.417	2.78	11.417	16.56	17.417	2.76	23.42	1.75
5.500	2.78	11.500	16.56	17.500	2.76	23.50	1.75
5.583	2.84	11.583	13.54	17.583	2.72	23.58	1.73
5.667	2.84	11.667	13.54	17.667	2.72	23.67	1.73
5.750	2.91	11.750	11.59	17.750	2.67	23.75	1.72
5.833	2.91	11.833	11.59	17.833	2.67	23.83	1.72
5.917	2.97	11.917	10.20	17.917	2.63	23.92	1.70
6.000	2.97	12.000	10.20	18.000	2.63	24.00	1.70

Unit Hyd Qpeak (cms)= 0.230

PEAK FLOW (cms)= 0.260 (i)
TIME TO PEAK (hrs)= 11.333

RUNOFF VOLUME (mm)= 79.717
TOTAL RAINFALL (mm)= 136.183
RUNOFF COEFFICIENT = 0.585

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

CALIB					
NASHYD (0215)	Area	(ha)=	1.45	Curve Number	(CN)= 75.0
ID= 1 DT= 5.0 min	Ia	(mm)=	5.00	# of Linear Res.	(N)= 3.00
	U.H. Tp	(hrs)=	0.82		

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	1.73	6.083	3.05	12.083	9.16	18.08	2.58
0.167	1.73	6.167	3.05	12.167	9.16	18.17	2.58
0.250	1.75	6.250	3.12	12.250	8.35	18.25	2.54
0.333	1.75	6.333	3.12	12.333	8.35	18.33	2.54
0.417	1.77	6.417	3.20	12.417	7.69	18.42	2.50
0.500	1.77	6.500	3.20	12.500	7.69	18.50	2.50
0.583	1.79	6.583	3.29	12.583	7.15	18.58	2.46
0.667	1.79	6.667	3.29	12.667	7.15	18.67	2.46
0.750	1.81	6.750	3.38	12.750	6.69	18.75	2.43
0.833	1.81	6.833	3.38	12.833	6.69	18.83	2.43
0.917	1.83	6.917	3.48	12.917	6.29	18.92	2.39
1.000	1.83	7.000	3.48	13.000	6.29	19.00	2.39
1.083	1.85	7.083	3.58	13.083	5.95	19.08	2.36
1.167	1.85	7.167	3.58	13.167	5.95	19.17	2.36
1.250	1.88	7.250	3.70	13.250	5.65	19.25	2.32
1.333	1.88	7.333	3.70	13.333	5.65	19.33	2.32
1.417	1.90	7.417	3.82	13.417	5.39	19.42	2.29
1.500	1.90	7.500	3.82	13.500	5.39	19.50	2.29
1.583	1.92	7.583	3.95	13.583	5.15	19.58	2.26
1.667	1.92	7.667	3.95	13.667	5.15	19.67	2.26
1.750	1.95	7.750	4.10	13.750	4.94	19.75	2.23
1.833	1.95	7.833	4.10	13.833	4.94	19.83	2.23
1.917	1.97	7.917	4.25	13.917	4.74	19.92	2.20
2.000	1.97	8.000	4.25	14.000	4.74	20.00	2.20
2.083	2.00	8.083	4.43	14.083	4.57	20.08	2.17
2.167	2.00	8.167	4.43	14.167	4.57	20.17	2.17
2.250	2.02	8.250	4.62	14.250	4.41	20.25	2.15
2.333	2.02	8.333	4.62	14.333	4.41	20.33	2.15
2.417	2.05	8.417	4.83	14.417	4.26	20.42	2.12
2.500	2.05	8.500	4.83	14.500	4.26	20.50	2.12
2.583	2.08	8.583	5.07	14.583	4.12	20.58	2.10
2.667	2.08	8.667	5.07	14.667	4.12	20.67	2.10
2.750	2.11	8.750	5.34	14.750	4.00	20.75	2.07
2.833	2.11	8.833	5.34	14.833	4.00	20.83	2.07
2.917	2.14	8.917	5.65	14.917	3.88	20.92	2.05
3.000	2.14	9.000	5.65	15.000	3.88	21.00	2.05
3.083	2.17	9.083	6.01	15.083	3.77	21.08	2.02
3.167	2.17	9.167	6.01	15.167	3.77	21.17	2.02
3.250	2.21	9.250	6.43	15.250	3.67	21.25	2.00
3.333	2.21	9.333	6.43	15.333	3.67	21.33	2.00
3.417	2.24	9.417	6.92	15.417	3.57	21.42	1.98
3.500	2.24	9.500	6.92	15.500	3.57	21.50	1.98
3.583	2.27	9.583	7.52	15.583	3.48	21.58	1.96
3.667	2.27	9.667	7.52	15.667	3.48	21.67	1.96
3.750	2.31	9.750	8.26	15.750	3.40	21.75	1.94
3.833	2.31	9.833	8.26	15.833	3.40	21.83	1.94
3.917	2.35	9.917	9.21	15.917	3.32	21.92	1.91
4.000	2.35	10.000	9.21	16.000	3.32	22.00	1.91
4.083	2.39	10.083	10.48	16.083	3.25	22.08	1.89
4.167	2.39	10.167	10.48	16.167	3.25	22.17	1.89
4.250	2.43	10.250	12.28	16.250	3.17	22.25	1.88
4.333	2.43	10.333	12.28	16.333	3.17	22.33	1.88
4.417	2.48	10.417	15.08	16.417	3.11	22.42	1.86

4.500	2.48	10.500	15.08	16.500	3.11	22.50	1.86
4.583	2.52	10.583	20.27	16.583	3.04	22.58	1.84
4.667	2.52	10.667	20.27	16.667	3.04	22.67	1.84
4.750	2.57	10.750	35.01	16.750	2.98	22.75	1.82
4.833	2.57	10.833	35.01	16.833	2.98	22.83	1.82
4.917	2.62	10.917	183.06	16.917	2.92	22.92	1.80
5.000	2.62	11.000	183.07	17.000	2.92	23.00	1.80
5.083	2.67	11.083	36.67	17.083	2.87	23.08	1.78
5.167	2.67	11.167	36.66	17.167	2.87	23.17	1.78
5.250	2.72	11.250	22.03	17.250	2.82	23.25	1.77
5.333	2.72	11.333	22.03	17.333	2.82	23.33	1.77
5.417	2.78	11.417	16.56	17.417	2.76	23.42	1.75
5.500	2.78	11.500	16.56	17.500	2.76	23.50	1.75
5.583	2.84	11.583	13.54	17.583	2.72	23.58	1.73
5.667	2.84	11.667	13.54	17.667	2.72	23.67	1.73
5.750	2.91	11.750	11.59	17.750	2.67	23.75	1.72
5.833	2.91	11.833	11.59	17.833	2.67	23.83	1.72
5.917	2.97	11.917	10.20	17.917	2.63	23.92	1.70
6.000	2.97	12.000	10.20	18.000	2.63	24.00	1.70

Unit Hyd Qpeak (cms)= 0.068

PEAK FLOW (cms)= 0.094 (i)
TIME TO PEAK (hrs)= 11.833
RUNOFF VOLUME (mm)= 79.724
TOTAL RAINFALL (mm)= 136.183
RUNOFF COEFFICIENT = 0.585

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

ADD HYD (0082)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0171):	5.90	0.465	11.58	79.72
+ ID2= 2 (0175):	5.15	0.406	11.58	79.72
ID = 3 (0082):	11.05	0.872	11.58	79.72

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0082)
3 + 2 = 1

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 3 (0082):	11.05	0.872	11.58	79.72
+ ID2= 2 (0214):	2.47	0.260	11.33	79.72
ID = 1 (0082):	13.52	1.104	11.50	79.72

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0082)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0082):	13.52	1.104	11.50	79.72
+ ID2= 2 (0215):	1.45	0.094	11.83	79.72
ID = 3 (0082):	14.97	1.187	11.50	79.72

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB
STANDHYD (0203)
ID= 1 DT= 5.0 min

Area (ha)= 0.34
Total Imp(%)= 83.00 Dir. Conn.(%)= 83.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.28	0.06
Dep. Storage	(mm)=	2.00	1.50
Average Slope	(%)=	1.00	1.00
Length	(m)=	47.61	40.00
Mannings n	=	0.015	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	1.73	6.083	3.05	12.083	9.16	18.08	2.58
0.167	1.73	6.167	3.05	12.167	9.16	18.17	2.58
0.250	1.75	6.250	3.12	12.250	8.35	18.25	2.54
0.333	1.75	6.333	3.12	12.333	8.35	18.33	2.54
0.417	1.77	6.417	3.20	12.417	7.69	18.42	2.50
0.500	1.77	6.500	3.20	12.500	7.69	18.50	2.50
0.583	1.79	6.583	3.29	12.583	7.15	18.58	2.46
0.667	1.79	6.667	3.29	12.667	7.15	18.67	2.46
0.750	1.81	6.750	3.38	12.750	6.69	18.75	2.43
0.833	1.81	6.833	3.38	12.833	6.69	18.83	2.43
0.917	1.83	6.917	3.48	12.917	6.29	18.92	2.39
1.000	1.83	7.000	3.48	13.000	6.29	19.00	2.39
1.083	1.85	7.083	3.58	13.083	5.95	19.08	2.36
1.167	1.85	7.167	3.58	13.167	5.95	19.17	2.36
1.250	1.88	7.250	3.70	13.250	5.65	19.25	2.32
1.333	1.88	7.333	3.70	13.333	5.65	19.33	2.32
1.417	1.90	7.417	3.82	13.417	5.39	19.42	2.29
1.500	1.90	7.500	3.82	13.500	5.39	19.50	2.29
1.583	1.92	7.583	3.95	13.583	5.15	19.58	2.26
1.667	1.92	7.667	3.95	13.667	5.15	19.67	2.26
1.750	1.95	7.750	4.10	13.750	4.94	19.75	2.23
1.833	1.95	7.833	4.10	13.833	4.94	19.83	2.23
1.917	1.97	7.917	4.25	13.917	4.74	19.92	2.20
2.000	1.97	8.000	4.25	14.000	4.74	20.00	2.20
2.083	2.00	8.083	4.43	14.083	4.57	20.08	2.17
2.167	2.00	8.167	4.43	14.167	4.57	20.17	2.17
2.250	2.02	8.250	4.62	14.250	4.41	20.25	2.15
2.333	2.02	8.333	4.62	14.333	4.41	20.33	2.15
2.417	2.05	8.417	4.83	14.417	4.26	20.42	2.12
2.500	2.05	8.500	4.83	14.500	4.26	20.50	2.12
2.583	2.08	8.583	5.07	14.583	4.12	20.58	2.10
2.667	2.08	8.667	5.07	14.667	4.12	20.67	2.10
2.750	2.11	8.750	5.34	14.750	4.00	20.75	2.07
2.833	2.11	8.833	5.34	14.833	4.00	20.83	2.07
2.917	2.14	8.917	5.65	14.917	3.88	20.92	2.05
3.000	2.14	9.000	5.65	15.000	3.88	21.00	2.05
3.083	2.17	9.083	6.01	15.083	3.77	21.08	2.02
3.167	2.17	9.167	6.01	15.167	3.77	21.17	2.02
3.250	2.21	9.250	6.43	15.250	3.67	21.25	2.00
3.333	2.21	9.333	6.43	15.333	3.67	21.33	2.00
3.417	2.24	9.417	6.92	15.417	3.57	21.42	1.98
3.500	2.24	9.500	6.92	15.500	3.57	21.50	1.98
3.583	2.27	9.583	7.52	15.583	3.48	21.58	1.96
3.667	2.27	9.667	7.52	15.667	3.48	21.67	1.96
3.750	2.31	9.750	8.26	15.750	3.40	21.75	1.94
3.833	2.31	9.833	8.26	15.833	3.40	21.83	1.94
3.917	2.35	9.917	9.21	15.917	3.32	21.92	1.91
4.000	2.35	10.000	9.21	16.000	3.32	22.00	1.91
4.083	2.39	10.083	10.48	16.083	3.25	22.08	1.89
4.167	2.39	10.167	10.48	16.167	3.25	22.17	1.89
4.250	2.43	10.250	12.28	16.250	3.17	22.25	1.88
4.333	2.43	10.333	12.28	16.333	3.17	22.33	1.88
4.417	2.48	10.417	15.08	16.417	3.11	22.42	1.86
4.500	2.48	10.500	15.08	16.500	3.11	22.50	1.86
4.583	2.52	10.583	20.27	16.583	3.04	22.58	1.84
4.667	2.52	10.667	20.27	16.667	3.04	22.67	1.84
4.750	2.57	10.750	35.01	16.750	2.98	22.75	1.82
4.833	2.57	10.833	35.01	16.833	2.98	22.83	1.82
4.917	2.62	10.917	183.06	16.917	2.92	22.92	1.80

5.000	2.62	11.000	183.07	17.000	2.92	23.00	1.80
5.083	2.67	11.083	36.67	17.083	2.87	23.08	1.78
5.167	2.67	11.167	36.66	17.167	2.87	23.17	1.78
5.250	2.72	11.250	22.03	17.250	2.82	23.25	1.77
5.333	2.72	11.333	22.03	17.333	2.82	23.33	1.77
5.417	2.78	11.417	16.56	17.417	2.76	23.42	1.75
5.500	2.78	11.500	16.56	17.500	2.76	23.50	1.75
5.583	2.84	11.583	13.54	17.583	2.72	23.58	1.73
5.667	2.84	11.667	13.54	17.667	2.72	23.67	1.73
5.750	2.91	11.750	11.59	17.750	2.67	23.75	1.72
5.833	2.91	11.833	11.59	17.833	2.67	23.83	1.72
5.917	2.97	11.917	10.20	17.917	2.63	23.92	1.70
6.000	2.97	12.000	10.20	18.000	2.63	24.00	1.70

Max.Eff.Inten.(mm/hr)=		183.07	121.51	
over (min)		5.00	10.00	
Storage Coeff. (min)=		1.40 (ii)	5.02 (ii)	
Unit Hyd. Tpeak (min)=		5.00	10.00	
Unit Hyd. peak (cms)=		0.33	0.16	
				TOTALS
PEAK FLOW	(cms)=	0.14	0.01	0.158 (iii)
TIME TO PEAK	(hrs)=	11.00	11.00	11.00
RUNOFF VOLUME	(mm)=	134.18	82.70	125.42
TOTAL RAINFALL	(mm)=	136.18	136.18	136.18
RUNOFF COEFFICIENT	=	0.99	0.61	0.92

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 75.0 Ia = Dep. 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 (0102) Area (ha)= 14.93
ID= 1 DT= 5.0 min Total Imp(%)= 60.00 Dir. Conn.(%)= 60.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	8.96	5.97
Dep. Storage	(mm)=	2.00	1.50
Average Slope	(%)=	1.00	1.00
Length	(m)=	315.49	40.00
Mannings n	=	0.015	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	1.73	6.083	3.05	12.083	9.16	18.08	2.58
0.167	1.73	6.167	3.05	12.167	9.16	18.17	2.58
0.250	1.75	6.250	3.12	12.250	8.35	18.25	2.54
0.333	1.75	6.333	3.12	12.333	8.35	18.33	2.54
0.417	1.77	6.417	3.20	12.417	7.69	18.42	2.50
0.500	1.77	6.500	3.20	12.500	7.69	18.50	2.50
0.583	1.79	6.583	3.29	12.583	7.15	18.58	2.46
0.667	1.79	6.667	3.29	12.667	7.15	18.67	2.46
0.750	1.81	6.750	3.38	12.750	6.69	18.75	2.43
0.833	1.81	6.833	3.38	12.833	6.69	18.83	2.43
0.917	1.83	6.917	3.48	12.917	6.29	18.92	2.39
1.000	1.83	7.000	3.48	13.000	6.29	19.00	2.39
1.083	1.85	7.083	3.58	13.083	5.95	19.08	2.36
1.167	1.85	7.167	3.58	13.167	5.95	19.17	2.36
1.250	1.88	7.250	3.70	13.250	5.65	19.25	2.32
1.333	1.88	7.333	3.70	13.333	5.65	19.33	2.32
1.417	1.90	7.417	3.82	13.417	5.39	19.42	2.29
1.500	1.90	7.500	3.82	13.500	5.39	19.50	2.29
1.583	1.92	7.583	3.95	13.583	5.15	19.58	2.26

1.667	1.92	7.667	3.95	13.667	5.15	19.67	2.26
1.750	1.95	7.750	4.10	13.750	4.94	19.75	2.23
1.833	1.95	7.833	4.10	13.833	4.94	19.83	2.23
1.917	1.97	7.917	4.25	13.917	4.74	19.92	2.20
2.000	1.97	8.000	4.25	14.000	4.74	20.00	2.20
2.083	2.00	8.083	4.43	14.083	4.57	20.08	2.17
2.167	2.00	8.167	4.43	14.167	4.57	20.17	2.17
2.250	2.02	8.250	4.62	14.250	4.41	20.25	2.15
2.333	2.02	8.333	4.62	14.333	4.41	20.33	2.15
2.417	2.05	8.417	4.83	14.417	4.26	20.42	2.12
2.500	2.05	8.500	4.83	14.500	4.26	20.50	2.12
2.583	2.08	8.583	5.07	14.583	4.12	20.58	2.10
2.667	2.08	8.667	5.07	14.667	4.12	20.67	2.10
2.750	2.11	8.750	5.34	14.750	4.00	20.75	2.07
2.833	2.11	8.833	5.34	14.833	4.00	20.83	2.07
2.917	2.14	8.917	5.65	14.917	3.88	20.92	2.05
3.000	2.14	9.000	5.65	15.000	3.88	21.00	2.05
3.083	2.17	9.083	6.01	15.083	3.77	21.08	2.02
3.167	2.17	9.167	6.01	15.167	3.77	21.17	2.02
3.250	2.21	9.250	6.43	15.250	3.67	21.25	2.00
3.333	2.21	9.333	6.43	15.333	3.67	21.33	2.00
3.417	2.24	9.417	6.92	15.417	3.57	21.42	1.98
3.500	2.24	9.500	6.92	15.500	3.57	21.50	1.98
3.583	2.27	9.583	7.52	15.583	3.48	21.58	1.96
3.667	2.27	9.667	7.52	15.667	3.48	21.67	1.96
3.750	2.31	9.750	8.26	15.750	3.40	21.75	1.94
3.833	2.31	9.833	8.26	15.833	3.40	21.83	1.94
3.917	2.35	9.917	9.21	15.917	3.32	21.92	1.91
4.000	2.35	10.000	9.21	16.000	3.32	22.00	1.91
4.083	2.39	10.083	10.48	16.083	3.25	22.08	1.89
4.167	2.39	10.167	10.48	16.167	3.25	22.17	1.89
4.250	2.43	10.250	12.28	16.250	3.17	22.25	1.88
4.333	2.43	10.333	12.28	16.333	3.17	22.33	1.88
4.417	2.48	10.417	15.08	16.417	3.11	22.42	1.86
4.500	2.48	10.500	15.08	16.500	3.11	22.50	1.86
4.583	2.52	10.583	20.27	16.583	3.04	22.58	1.84
4.667	2.52	10.667	20.27	16.667	3.04	22.67	1.84
4.750	2.57	10.750	35.01	16.750	2.98	22.75	1.82
4.833	2.57	10.833	35.01	16.833	2.98	22.83	1.82
4.917	2.62	10.917	183.06	16.917	2.92	22.92	1.80
5.000	2.62	11.000	183.07	17.000	2.92	23.00	1.80
5.083	2.67	11.083	36.67	17.083	2.87	23.08	1.78
5.167	2.67	11.167	36.66	17.167	2.87	23.17	1.78
5.250	2.72	11.250	22.03	17.250	2.82	23.25	1.77
5.333	2.72	11.333	22.03	17.333	2.82	23.33	1.77
5.417	2.78	11.417	16.56	17.417	2.76	23.42	1.75
5.500	2.78	11.500	16.56	17.500	2.76	23.50	1.75
5.583	2.84	11.583	13.54	17.583	2.72	23.58	1.73
5.667	2.84	11.667	13.54	17.667	2.72	23.67	1.73
5.750	2.91	11.750	11.59	17.750	2.67	23.75	1.72
5.833	2.91	11.833	11.59	17.833	2.67	23.83	1.72
5.917	2.97	11.917	10.20	17.917	2.63	23.92	1.70
6.000	2.97	12.000	10.20	18.000	2.63	24.00	1.70

Max.Eff.Inten.(mm/hr)=		183.07	121.51	
over (min)		5.00	15.00	
Storage Coeff. (min)=		4.35 (ii)	12.39 (ii)	
Unit Hyd. Tpeak (min)=		5.00	15.00	
Unit Hyd. peak (cms)=		0.23	0.08	
				TOTALS
PEAK FLOW	(cms)=	4.18	1.04	4.862 (iii)
TIME TO PEAK	(hrs)=	11.00	11.17	11.00
RUNOFF VOLUME	(mm)=	134.18	82.70	113.59
TOTAL RAINFALL	(mm)=	136.18	136.18	136.18
RUNOFF COEFFICIENT	=	0.99	0.61	0.83

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 75.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.

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

ADD HYD (0218) 1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0102):	14.93	4.862	11.00	113.59
+ ID2= 2 (0203):	0.34	0.158	11.00	125.42
ID = 3 (0218):	15.27	5.020	11.00	113.85

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB
STANDHYD (0207) ID= 1 DT= 5.0 min

Area (ha)= 2.33
Total Imp(%)= 88.90 Dir. Conn.(%)= 88.90

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	2.07	0.26
Dep. Storage	(mm)=	0.00	1.50
Average Slope	(%)=	1.00	1.00
Length	(m)=	124.63	25.00
Mannings n	=	0.015	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	1.73	6.083	3.05	12.083	9.16	18.08	2.58
0.167	1.73	6.167	3.05	12.167	9.16	18.17	2.58
0.250	1.75	6.250	3.12	12.250	8.35	18.25	2.54
0.333	1.75	6.333	3.12	12.333	8.35	18.33	2.54
0.417	1.77	6.417	3.20	12.417	7.69	18.42	2.50
0.500	1.77	6.500	3.20	12.500	7.69	18.50	2.50
0.583	1.79	6.583	3.29	12.583	7.15	18.58	2.46
0.667	1.79	6.667	3.29	12.667	7.15	18.67	2.46
0.750	1.81	6.750	3.38	12.750	6.69	18.75	2.43
0.833	1.81	6.833	3.38	12.833	6.69	18.83	2.43
0.917	1.83	6.917	3.48	12.917	6.29	18.92	2.39
1.000	1.83	7.000	3.48	13.000	6.29	19.00	2.39
1.083	1.85	7.083	3.58	13.083	5.95	19.08	2.36
1.167	1.85	7.167	3.58	13.167	5.95	19.17	2.36
1.250	1.88	7.250	3.70	13.250	5.65	19.25	2.32
1.333	1.88	7.333	3.70	13.333	5.65	19.33	2.32
1.417	1.90	7.417	3.82	13.417	5.39	19.42	2.29
1.500	1.90	7.500	3.82	13.500	5.39	19.50	2.29
1.583	1.92	7.583	3.95	13.583	5.15	19.58	2.26
1.667	1.92	7.667	3.95	13.667	5.15	19.67	2.26
1.750	1.95	7.750	4.10	13.750	4.94	19.75	2.23
1.833	1.95	7.833	4.10	13.833	4.94	19.83	2.23
1.917	1.97	7.917	4.25	13.917	4.74	19.92	2.20
2.000	1.97	8.000	4.25	14.000	4.74	20.00	2.20
2.083	2.00	8.083	4.43	14.083	4.57	20.08	2.17
2.167	2.00	8.167	4.43	14.167	4.57	20.17	2.17
2.250	2.02	8.250	4.62	14.250	4.41	20.25	2.15
2.333	2.02	8.333	4.62	14.333	4.41	20.33	2.15
2.417	2.05	8.417	4.83	14.417	4.26	20.42	2.12
2.500	2.05	8.500	4.83	14.500	4.26	20.50	2.12
2.583	2.08	8.583	5.07	14.583	4.12	20.58	2.10
2.667	2.08	8.667	5.07	14.667	4.12	20.67	2.10
2.750	2.11	8.750	5.34	14.750	4.00	20.75	2.07
2.833	2.11	8.833	5.34	14.833	4.00	20.83	2.07
2.917	2.14	8.917	5.65	14.917	3.88	20.92	2.05
3.000	2.14	9.000	5.65	15.000	3.88	21.00	2.05
3.083	2.17	9.083	6.01	15.083	3.77	21.08	2.02
3.167	2.17	9.167	6.01	15.167	3.77	21.17	2.02
3.250	2.21	9.250	6.43	15.250	3.67	21.25	2.00

3.333	2.21	9.333	6.43	15.333	3.67	21.33	2.00
3.417	2.24	9.417	6.92	15.417	3.57	21.42	1.98
3.500	2.24	9.500	6.92	15.500	3.57	21.50	1.98
3.583	2.27	9.583	7.52	15.583	3.48	21.58	1.96
3.667	2.27	9.667	7.52	15.667	3.48	21.67	1.96
3.750	2.31	9.750	8.26	15.750	3.40	21.75	1.94
3.833	2.31	9.833	8.26	15.833	3.40	21.83	1.94
3.917	2.35	9.917	9.21	15.917	3.32	21.92	1.91
4.000	2.35	10.000	9.21	16.000	3.32	22.00	1.91
4.083	2.39	10.083	10.48	16.083	3.25	22.08	1.89
4.167	2.39	10.167	10.48	16.167	3.25	22.17	1.89
4.250	2.43	10.250	12.28	16.250	3.17	22.25	1.88
4.333	2.43	10.333	12.28	16.333	3.17	22.33	1.88
4.417	2.48	10.417	15.08	16.417	3.11	22.42	1.86
4.500	2.48	10.500	15.08	16.500	3.11	22.50	1.86
4.583	2.52	10.583	20.27	16.583	3.04	22.58	1.84
4.667	2.52	10.667	20.27	16.667	3.04	22.67	1.84
4.750	2.57	10.750	35.01	16.750	2.98	22.75	1.82
4.833	2.57	10.833	35.01	16.833	2.98	22.83	1.82
4.917	2.62	10.917	183.06	16.917	2.92	22.92	1.80
5.000	2.62	11.000	183.07	17.000	2.92	23.00	1.80
5.083	2.67	11.083	36.67	17.083	2.87	23.08	1.78
5.167	2.67	11.167	36.66	17.167	2.87	23.17	1.78
5.250	2.72	11.250	22.03	17.250	2.82	23.25	1.77
5.333	2.72	11.333	22.03	17.333	2.82	23.33	1.77
5.417	2.78	11.417	16.56	17.417	2.76	23.42	1.75
5.500	2.78	11.500	16.56	17.500	2.76	23.50	1.75
5.583	2.84	11.583	13.54	17.583	2.72	23.58	1.73
5.667	2.84	11.667	13.54	17.667	2.72	23.67	1.73
5.750	2.91	11.750	11.59	17.750	2.67	23.75	1.72
5.833	2.91	11.833	11.59	17.833	2.67	23.83	1.72
5.917	2.97	11.917	10.20	17.917	2.63	23.92	1.70
6.000	2.97	12.000	10.20	18.000	2.63	24.00	1.70

				TOTALS
Max.Eff.Inten.(mm/hr)=		183.07	121.51	
over (min)		5.00	5.00	
Storage Coeff. (min)=		2.49 (ii)	4.73 (ii)	
Unit Hyd. Tpeak (min)=		5.00	5.00	
Unit Hyd. peak (cms)=		0.29	0.22	
PEAK FLOW	(cms)=	1.04	0.08	1.118 (iii)
TIME TO PEAK	(hrs)=	11.00	11.00	11.00
RUNOFF VOLUME	(mm)=	136.18	82.70	130.24
TOTAL RAINFALL	(mm)=	136.18	136.18	136.18
RUNOFF COEFFICIENT	=	1.00	0.61	0.96

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 75.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0079) 1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0207):	2.33	1.118	11.00	130.24
+ ID2= 2 (0218):	15.27	5.020	11.00	113.85
ID = 3 (0079):	17.60	6.138	11.00	116.02

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0079) 3 + 2 = 1	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)

ID1= 3 (0079):	17.60	6.138	11.00	116.02
+ ID2= 2 (0082):	14.97	1.187	11.50	79.72
ID = 1 (0079):	32.57	6.596	11.00	99.34

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0066)
IN= 2---> OUT= 1
DT= 5.0 min

OVERFLOW IS OFF

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.5810	1.5760
0.0080	0.2340	0.8460	1.8660
0.0130	0.4840	1.0630	2.1640
0.0470	0.7470	1.4780	2.4680
0.1760	1.0160	1.9960	2.7800
0.3580	1.2930	2.8820	2.8590

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0079)	32.570	6.596	11.00	99.34
OUTFLOW: ID= 1 (0066)	32.570	0.757	12.83	94.87

PEAK FLOW REDUCTION [Qout/Qin](%)= 11.47
TIME SHIFT OF PEAK FLOW (min)=110.00
MAXIMUM STORAGE USED (ha.m.)= 1.7684

CALIB
NASHYD (0077)
ID= 1 DT= 5.0 min

Area (ha)= 9.20 Curve Number (CN)= 75.0
Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.64

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	1.73	6.083	3.05	12.083	9.16	18.08	2.58
0.167	1.73	6.167	3.05	12.167	9.16	18.17	2.58
0.250	1.75	6.250	3.12	12.250	8.35	18.25	2.54
0.333	1.75	6.333	3.12	12.333	8.35	18.33	2.54
0.417	1.77	6.417	3.20	12.417	7.69	18.42	2.50
0.500	1.77	6.500	3.20	12.500	7.69	18.50	2.50
0.583	1.79	6.583	3.29	12.583	7.15	18.58	2.46
0.667	1.79	6.667	3.29	12.667	7.15	18.67	2.46
0.750	1.81	6.750	3.38	12.750	6.69	18.75	2.43
0.833	1.81	6.833	3.38	12.833	6.69	18.83	2.43
0.917	1.83	6.917	3.48	12.917	6.29	18.92	2.39
1.000	1.83	7.000	3.48	13.000	6.29	19.00	2.39
1.083	1.85	7.083	3.58	13.083	5.95	19.08	2.36
1.167	1.85	7.167	3.58	13.167	5.95	19.17	2.36
1.250	1.88	7.250	3.70	13.250	5.65	19.25	2.32
1.333	1.88	7.333	3.70	13.333	5.65	19.33	2.32
1.417	1.90	7.417	3.82	13.417	5.39	19.42	2.29
1.500	1.90	7.500	3.82	13.500	5.39	19.50	2.29
1.583	1.92	7.583	3.95	13.583	5.15	19.58	2.26
1.667	1.92	7.667	3.95	13.667	5.15	19.67	2.26
1.750	1.95	7.750	4.10	13.750	4.94	19.75	2.23
1.833	1.95	7.833	4.10	13.833	4.94	19.83	2.23
1.917	1.97	7.917	4.25	13.917	4.74	19.92	2.20
2.000	1.97	8.000	4.25	14.000	4.74	20.00	2.20
2.083	2.00	8.083	4.43	14.083	4.57	20.08	2.17
2.167	2.00	8.167	4.43	14.167	4.57	20.17	2.17
2.250	2.02	8.250	4.62	14.250	4.41	20.25	2.15
2.333	2.02	8.333	4.62	14.333	4.41	20.33	2.15
2.417	2.05	8.417	4.83	14.417	4.26	20.42	2.12
2.500	2.05	8.500	4.83	14.500	4.26	20.50	2.12
2.583	2.08	8.583	5.07	14.583	4.12	20.58	2.10

2.667	2.08	8.667	5.07	14.667	4.12	20.67	2.10
2.750	2.11	8.750	5.34	14.750	4.00	20.75	2.07
2.833	2.11	8.833	5.34	14.833	4.00	20.83	2.07
2.917	2.14	8.917	5.65	14.917	3.88	20.92	2.05
3.000	2.14	9.000	5.65	15.000	3.88	21.00	2.05
3.083	2.17	9.083	6.01	15.083	3.77	21.08	2.02
3.167	2.17	9.167	6.01	15.167	3.77	21.17	2.02
3.250	2.21	9.250	6.43	15.250	3.67	21.25	2.00
3.333	2.21	9.333	6.43	15.333	3.67	21.33	2.00
3.417	2.24	9.417	6.92	15.417	3.57	21.42	1.98
3.500	2.24	9.500	6.92	15.500	3.57	21.50	1.98
3.583	2.27	9.583	7.52	15.583	3.48	21.58	1.96
3.667	2.27	9.667	7.52	15.667	3.48	21.67	1.96
3.750	2.31	9.750	8.26	15.750	3.40	21.75	1.94
3.833	2.31	9.833	8.26	15.833	3.40	21.83	1.94
3.917	2.35	9.917	9.21	15.917	3.32	21.92	1.91
4.000	2.35	10.000	9.21	16.000	3.32	22.00	1.91
4.083	2.39	10.083	10.48	16.083	3.25	22.08	1.89
4.167	2.39	10.167	10.48	16.167	3.25	22.17	1.89
4.250	2.43	10.250	12.28	16.250	3.17	22.25	1.88
4.333	2.43	10.333	12.28	16.333	3.17	22.33	1.88
4.417	2.48	10.417	15.08	16.417	3.11	22.42	1.86
4.500	2.48	10.500	15.08	16.500	3.11	22.50	1.86
4.583	2.52	10.583	20.27	16.583	3.04	22.58	1.84
4.667	2.52	10.667	20.27	16.667	3.04	22.67	1.84
4.750	2.57	10.750	35.01	16.750	2.98	22.75	1.82
4.833	2.57	10.833	35.01	16.833	2.98	22.83	1.82
4.917	2.62	10.917	183.06	16.917	2.92	22.92	1.80
5.000	2.62	11.000	183.07	17.000	2.92	23.00	1.80
5.083	2.67	11.083	36.67	17.083	2.87	23.08	1.78
5.167	2.67	11.167	36.66	17.167	2.87	23.17	1.78
5.250	2.72	11.250	22.03	17.250	2.82	23.25	1.77
5.333	2.72	11.333	22.03	17.333	2.82	23.33	1.77
5.417	2.78	11.417	16.56	17.417	2.76	23.42	1.75
5.500	2.78	11.500	16.56	17.500	2.76	23.50	1.75
5.583	2.84	11.583	13.54	17.583	2.72	23.58	1.73
5.667	2.84	11.667	13.54	17.667	2.72	23.67	1.73
5.750	2.91	11.750	11.59	17.750	2.67	23.75	1.72
5.833	2.91	11.833	11.59	17.833	2.67	23.83	1.72
5.917	2.97	11.917	10.20	17.917	2.63	23.92	1.70
6.000	2.97	12.000	10.20	18.000	2.63	24.00	1.70

Unit Hyd Qpeak (cms)= 0.549

PEAK FLOW (cms)= 0.709 (i)
TIME TO PEAK (hrs)= 11.583
RUNOFF VOLUME (mm)= 79.725
TOTAL RAINFALL (mm)= 136.183
RUNOFF COEFFICIENT = 0.585

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

CALIB
NASHYD (0173)
ID= 1 DT= 5.0 min

Area (ha)= 7.28 Curve Number (CN)= 75.0
Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.72

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	1.73	6.083	3.05	12.083	9.16	18.08	2.58
0.167	1.73	6.167	3.05	12.167	9.16	18.17	2.58
0.250	1.75	6.250	3.12	12.250	8.35	18.25	2.54
0.333	1.75	6.333	3.12	12.333	8.35	18.33	2.54
0.417	1.77	6.417	3.20	12.417	7.69	18.42	2.50
0.500	1.77	6.500	3.20	12.500	7.69	18.50	2.50
0.583	1.79	6.583	3.29	12.583	7.15	18.58	2.46

0.667	1.79	6.667	3.29	12.667	7.15	18.67	2.46
0.750	1.81	6.750	3.38	12.750	6.69	18.75	2.43
0.833	1.81	6.833	3.38	12.833	6.69	18.83	2.43
0.917	1.83	6.917	3.48	12.917	6.29	18.92	2.39
1.000	1.83	7.000	3.48	13.000	6.29	19.00	2.39
1.083	1.85	7.083	3.58	13.083	5.95	19.08	2.36
1.167	1.85	7.167	3.58	13.167	5.95	19.17	2.36
1.250	1.88	7.250	3.70	13.250	5.65	19.25	2.32
1.333	1.88	7.333	3.70	13.333	5.65	19.33	2.32
1.417	1.90	7.417	3.82	13.417	5.39	19.42	2.29
1.500	1.90	7.500	3.82	13.500	5.39	19.50	2.29
1.583	1.92	7.583	3.95	13.583	5.15	19.58	2.26
1.667	1.92	7.667	3.95	13.667	5.15	19.67	2.26
1.750	1.95	7.750	4.10	13.750	4.94	19.75	2.23
1.833	1.95	7.833	4.10	13.833	4.94	19.83	2.23
1.917	1.97	7.917	4.25	13.917	4.74	19.92	2.20
2.000	1.97	8.000	4.25	14.000	4.74	20.00	2.20
2.083	2.00	8.083	4.43	14.083	4.57	20.08	2.17
2.167	2.00	8.167	4.43	14.167	4.57	20.17	2.17
2.250	2.02	8.250	4.62	14.250	4.41	20.25	2.15
2.333	2.02	8.333	4.62	14.333	4.41	20.33	2.15
2.417	2.05	8.417	4.83	14.417	4.26	20.42	2.12
2.500	2.05	8.500	4.83	14.500	4.26	20.50	2.12
2.583	2.08	8.583	5.07	14.583	4.12	20.58	2.10
2.667	2.08	8.667	5.07	14.667	4.12	20.67	2.10
2.750	2.11	8.750	5.34	14.750	4.00	20.75	2.07
2.833	2.11	8.833	5.34	14.833	4.00	20.83	2.07
2.917	2.14	8.917	5.65	14.917	3.88	20.92	2.05
3.000	2.14	9.000	5.65	15.000	3.88	21.00	2.05
3.083	2.17	9.083	6.01	15.083	3.77	21.08	2.02
3.167	2.17	9.167	6.01	15.167	3.77	21.17	2.02
3.250	2.21	9.250	6.43	15.250	3.67	21.25	2.00
3.333	2.21	9.333	6.43	15.333	3.67	21.33	2.00
3.417	2.24	9.417	6.92	15.417	3.57	21.42	1.98
3.500	2.24	9.500	6.92	15.500	3.57	21.50	1.98
3.583	2.27	9.583	7.52	15.583	3.48	21.58	1.96
3.667	2.27	9.667	7.52	15.667	3.48	21.67	1.96
3.750	2.31	9.750	8.26	15.750	3.40	21.75	1.94
3.833	2.31	9.833	8.26	15.833	3.40	21.83	1.94
3.917	2.35	9.917	9.21	15.917	3.32	21.92	1.91
4.000	2.35	10.000	9.21	16.000	3.32	22.00	1.91
4.083	2.39	10.083	10.48	16.083	3.25	22.08	1.89
4.167	2.39	10.167	10.48	16.167	3.25	22.17	1.89
4.250	2.43	10.250	12.28	16.250	3.17	22.25	1.88
4.333	2.43	10.333	12.28	16.333	3.17	22.33	1.88
4.417	2.48	10.417	15.08	16.417	3.11	22.42	1.86
4.500	2.48	10.500	15.08	16.500	3.11	22.50	1.86
4.583	2.52	10.583	20.27	16.583	3.04	22.58	1.84
4.667	2.52	10.667	20.27	16.667	3.04	22.67	1.84
4.750	2.57	10.750	35.01	16.750	2.98	22.75	1.82
4.833	2.57	10.833	35.01	16.833	2.98	22.83	1.82
4.917	2.62	10.917	183.06	16.917	2.92	22.92	1.80
5.000	2.62	11.000	183.07	17.000	2.92	23.00	1.80
5.083	2.67	11.083	36.67	17.083	2.87	23.08	1.78
5.167	2.67	11.167	36.66	17.167	2.87	23.17	1.78
5.250	2.72	11.250	22.03	17.250	2.82	23.25	1.77
5.333	2.72	11.333	22.03	17.333	2.82	23.33	1.77
5.417	2.78	11.417	16.56	17.417	2.76	23.42	1.75
5.500	2.78	11.500	16.56	17.500	2.76	23.50	1.75
5.583	2.84	11.583	13.54	17.583	2.72	23.58	1.73
5.667	2.84	11.667	13.54	17.667	2.72	23.67	1.73
5.750	2.91	11.750	11.59	17.750	2.67	23.75	1.72
5.833	2.91	11.833	11.59	17.833	2.67	23.83	1.72
5.917	2.97	11.917	10.20	17.917	2.63	23.92	1.70
6.000	2.97	12.000	10.20	18.000	2.63	24.00	1.70

Unit Hyd Qpeak (cms)= 0.386

PEAK FLOW (cms)= 0.516 (i)
TIME TO PEAK (hrs)= 11.667
RUNOFF VOLUME (mm)= 79.725
TOTAL RAINFALL (mm)= 136.183

RUNOFF COEFFICIENT = 0.585

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

CALIB		
NASHYD (0179)	Area (ha)= 13.79	Curve Number (CN)= 75.0
ID= 1 DT= 5.0 min	Ia (mm)= 5.00	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 0.80	

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	1.73	6.083	3.05	12.083	9.16	18.08	2.58
0.167	1.73	6.167	3.05	12.167	9.16	18.17	2.58
0.250	1.75	6.250	3.12	12.250	8.35	18.25	2.54
0.333	1.75	6.333	3.12	12.333	8.35	18.33	2.54
0.417	1.77	6.417	3.20	12.417	7.69	18.42	2.50
0.500	1.77	6.500	3.20	12.500	7.69	18.50	2.50
0.583	1.79	6.583	3.29	12.583	7.15	18.58	2.46
0.667	1.79	6.667	3.29	12.667	7.15	18.67	2.46
0.750	1.81	6.750	3.38	12.750	6.69	18.75	2.43
0.833	1.81	6.833	3.38	12.833	6.69	18.83	2.43
0.917	1.83	6.917	3.48	12.917	6.29	18.92	2.39
1.000	1.83	7.000	3.48	13.000	6.29	19.00	2.39
1.083	1.85	7.083	3.58	13.083	5.95	19.08	2.36
1.167	1.85	7.167	3.58	13.167	5.95	19.17	2.36
1.250	1.88	7.250	3.70	13.250	5.65	19.25	2.32
1.333	1.88	7.333	3.70	13.333	5.65	19.33	2.32
1.417	1.90	7.417	3.82	13.417	5.39	19.42	2.29
1.500	1.90	7.500	3.82	13.500	5.39	19.50	2.29
1.583	1.92	7.583	3.95	13.583	5.15	19.58	2.26
1.667	1.92	7.667	3.95	13.667	5.15	19.67	2.26
1.750	1.95	7.750	4.10	13.750	4.94	19.75	2.23
1.833	1.95	7.833	4.10	13.833	4.94	19.83	2.23
1.917	1.97	7.917	4.25	13.917	4.74	19.92	2.20
2.000	1.97	8.000	4.25	14.000	4.74	20.00	2.20
2.083	2.00	8.083	4.43	14.083	4.57	20.08	2.17
2.167	2.00	8.167	4.43	14.167	4.57	20.17	2.17
2.250	2.02	8.250	4.62	14.250	4.41	20.25	2.15
2.333	2.02	8.333	4.62	14.333	4.41	20.33	2.15
2.417	2.05	8.417	4.83	14.417	4.26	20.42	2.12
2.500	2.05	8.500	4.83	14.500	4.26	20.50	2.12
2.583	2.08	8.583	5.07	14.583	4.12	20.58	2.10
2.667	2.08	8.667	5.07	14.667	4.12	20.67	2.10
2.750	2.11	8.750	5.34	14.750	4.00	20.75	2.07
2.833	2.11	8.833	5.34	14.833	4.00	20.83	2.07
2.917	2.14	8.917	5.65	14.917	3.88	20.92	2.05
3.000	2.14	9.000	5.65	15.000	3.88	21.00	2.05
3.083	2.17	9.083	6.01	15.083	3.77	21.08	2.02
3.167	2.17	9.167	6.01	15.167	3.77	21.17	2.02
3.250	2.21	9.250	6.43	15.250	3.67	21.25	2.00
3.333	2.21	9.333	6.43	15.333	3.67	21.33	2.00
3.417	2.24	9.417	6.92	15.417	3.57	21.42	1.98
3.500	2.24	9.500	6.92	15.500	3.57	21.50	1.98
3.583	2.27	9.583	7.52	15.583	3.48	21.58	1.96
3.667	2.27	9.667	7.52	15.667	3.48	21.67	1.96
3.750	2.31	9.750	8.26	15.750	3.40	21.75	1.94
3.833	2.31	9.833	8.26	15.833	3.40	21.83	1.94
3.917	2.35	9.917	9.21	15.917	3.32	21.92	1.91
4.000	2.35	10.000	9.21	16.000	3.32	22.00	1.91
4.083	2.39	10.083	10.48	16.083	3.25	22.08	1.89
4.167	2.39	10.167	10.48	16.167	3.25	22.17	1.89
4.250	2.43	10.250	12.28	16.250	3.17	22.25	1.88
4.333	2.43	10.333	12.28	16.333	3.17	22.33	1.88
4.417	2.48	10.417	15.08	16.417	3.11	22.42	1.86
4.500	2.48	10.500	15.08	16.500	3.11	22.50	1.86
4.583	2.52	10.583	20.27	16.583	3.04	22.58	1.84

4.667	2.52	10.667	20.27	16.667	3.04	22.67	1.84
4.750	2.57	10.750	35.01	16.750	2.98	22.75	1.82
4.833	2.57	10.833	35.01	16.833	2.98	22.83	1.82
4.917	2.62	10.917	183.06	16.917	2.92	22.92	1.80
5.000	2.62	11.000	183.07	17.000	2.92	23.00	1.80
5.083	2.67	11.083	36.67	17.083	2.87	23.08	1.78
5.167	2.67	11.167	36.66	17.167	2.87	23.17	1.78
5.250	2.72	11.250	22.03	17.250	2.82	23.25	1.77
5.333	2.72	11.333	22.03	17.333	2.82	23.33	1.77
5.417	2.78	11.417	16.56	17.417	2.76	23.42	1.75
5.500	2.78	11.500	16.56	17.500	2.76	23.50	1.75
5.583	2.84	11.583	13.54	17.583	2.72	23.58	1.73
5.667	2.84	11.667	13.54	17.667	2.72	23.67	1.73
5.750	2.91	11.750	11.59	17.750	2.67	23.75	1.72
5.833	2.91	11.833	11.59	17.833	2.67	23.83	1.72
5.917	2.97	11.917	10.20	17.917	2.63	23.92	1.70
6.000	2.97	12.000	10.20	18.000	2.63	24.00	1.70

Unit Hyd Qpeak (cms)= 0.658

PEAK FLOW (cms)= 0.907 (i)
TIME TO PEAK (hrs)= 11.750
RUNOFF VOLUME (mm)= 79.725
TOTAL RAINFALL (mm)= 136.183
RUNOFF COEFFICIENT = 0.585

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

CALIB			
NASHYD (0208)	Area (ha)= 1.26	Curve Number (CN)= 75.0	
ID= 1 DT= 5.0 min	Ia (mm)= 5.00	# of Linear Res.(N)= 3.00	
	U.H. Tp(hrs)= 0.38		

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	1.73	6.083	3.05	12.083	9.16	18.08	2.58
0.167	1.73	6.167	3.05	12.167	9.16	18.17	2.58
0.250	1.75	6.250	3.12	12.250	8.35	18.25	2.54
0.333	1.75	6.333	3.12	12.333	8.35	18.33	2.54
0.417	1.77	6.417	3.20	12.417	7.69	18.42	2.50
0.500	1.77	6.500	3.20	12.500	7.69	18.50	2.50
0.583	1.79	6.583	3.29	12.583	7.15	18.58	2.46
0.667	1.79	6.667	3.29	12.667	7.15	18.67	2.46
0.750	1.81	6.750	3.38	12.750	6.69	18.75	2.43
0.833	1.81	6.833	3.38	12.833	6.69	18.83	2.43
0.917	1.83	6.917	3.48	12.917	6.29	18.92	2.39
1.000	1.83	7.000	3.48	13.000	6.29	19.00	2.39
1.083	1.85	7.083	3.58	13.083	5.95	19.08	2.36
1.167	1.85	7.167	3.58	13.167	5.95	19.17	2.36
1.250	1.88	7.250	3.70	13.250	5.65	19.25	2.32
1.333	1.88	7.333	3.70	13.333	5.65	19.33	2.32
1.417	1.90	7.417	3.82	13.417	5.39	19.42	2.29
1.500	1.90	7.500	3.82	13.500	5.39	19.50	2.29
1.583	1.92	7.583	3.95	13.583	5.15	19.58	2.26
1.667	1.92	7.667	3.95	13.667	5.15	19.67	2.26
1.750	1.95	7.750	4.10	13.750	4.94	19.75	2.23
1.833	1.95	7.833	4.10	13.833	4.94	19.83	2.23
1.917	1.97	7.917	4.25	13.917	4.74	19.92	2.20
2.000	1.97	8.000	4.25	14.000	4.74	20.00	2.20
2.083	2.00	8.083	4.43	14.083	4.57	20.08	2.17
2.167	2.00	8.167	4.43	14.167	4.57	20.17	2.17
2.250	2.02	8.250	4.62	14.250	4.41	20.25	2.15
2.333	2.02	8.333	4.62	14.333	4.41	20.33	2.15
2.417	2.05	8.417	4.83	14.417	4.26	20.42	2.12
2.500	2.05	8.500	4.83	14.500	4.26	20.50	2.12
2.583	2.08	8.583	5.07	14.583	4.12	20.58	2.10

2.667	2.08	8.667	5.07	14.667	4.12	20.67	2.10
2.750	2.11	8.750	5.34	14.750	4.00	20.75	2.07
2.833	2.11	8.833	5.34	14.833	4.00	20.83	2.07
2.917	2.14	8.917	5.65	14.917	3.88	20.92	2.05
3.000	2.14	9.000	5.65	15.000	3.88	21.00	2.05
3.083	2.17	9.083	6.01	15.083	3.77	21.08	2.02
3.167	2.17	9.167	6.01	15.167	3.77	21.17	2.02
3.250	2.21	9.250	6.43	15.250	3.67	21.25	2.00
3.333	2.21	9.333	6.43	15.333	3.67	21.33	2.00
3.417	2.24	9.417	6.92	15.417	3.57	21.42	1.98
3.500	2.24	9.500	6.92	15.500	3.57	21.50	1.98
3.583	2.27	9.583	7.52	15.583	3.48	21.58	1.96
3.667	2.27	9.667	7.52	15.667	3.48	21.67	1.96
3.750	2.31	9.750	8.26	15.750	3.40	21.75	1.94
3.833	2.31	9.833	8.26	15.833	3.40	21.83	1.94
3.917	2.35	9.917	9.21	15.917	3.32	21.92	1.91
4.000	2.35	10.000	9.21	16.000	3.32	22.00	1.91
4.083	2.39	10.083	10.48	16.083	3.25	22.08	1.89
4.167	2.39	10.167	10.48	16.167	3.25	22.17	1.89
4.250	2.43	10.250	12.28	16.250	3.17	22.25	1.88
4.333	2.43	10.333	12.28	16.333	3.17	22.33	1.88
4.417	2.48	10.417	15.08	16.417	3.11	22.42	1.86
4.500	2.48	10.500	15.08	16.500	3.11	22.50	1.86
4.583	2.52	10.583	20.27	16.583	3.04	22.58	1.84
4.667	2.52	10.667	20.27	16.667	3.04	22.67	1.84
4.750	2.57	10.750	35.01	16.750	2.98	22.75	1.82
4.833	2.57	10.833	35.01	16.833	2.98	22.83	1.82
4.917	2.62	10.917	183.06	16.917	2.92	22.92	1.80
5.000	2.62	11.000	183.07	17.000	2.92	23.00	1.80
5.083	2.67	11.083	36.67	17.083	2.87	23.08	1.78
5.167	2.67	11.167	36.66	17.167	2.87	23.17	1.78
5.250	2.72	11.250	22.03	17.250	2.82	23.25	1.77
5.333	2.72	11.333	22.03	17.333	2.82	23.33	1.77
5.417	2.78	11.417	16.56	17.417	2.76	23.42	1.75
5.500	2.78	11.500	16.56	17.500	2.76	23.50	1.75
5.583	2.84	11.583	13.54	17.583	2.72	23.58	1.73
5.667	2.84	11.667	13.54	17.667	2.72	23.67	1.73
5.750	2.91	11.750	11.59	17.750	2.67	23.75	1.72
5.833	2.91	11.833	11.59	17.833	2.67	23.83	1.72
5.917	2.97	11.917	10.20	17.917	2.63	23.92	1.70
6.000	2.97	12.000	10.20	18.000	2.63	24.00	1.70

Unit Hyd Qpeak (cms)= 0.127

PEAK FLOW (cms)= 0.140 (i)
TIME TO PEAK (hrs)= 11.333
RUNOFF VOLUME (mm)= 79.714
TOTAL RAINFALL (mm)= 136.183
RUNOFF COEFFICIENT = 0.585

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

ADD HYD (0180)				
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0173):	7.28	0.516	11.67	79.73
+ ID2= 2 (0179):	13.79	0.907	11.75	79.73
ID = 3 (0180):	21.07	1.422	11.75	79.73

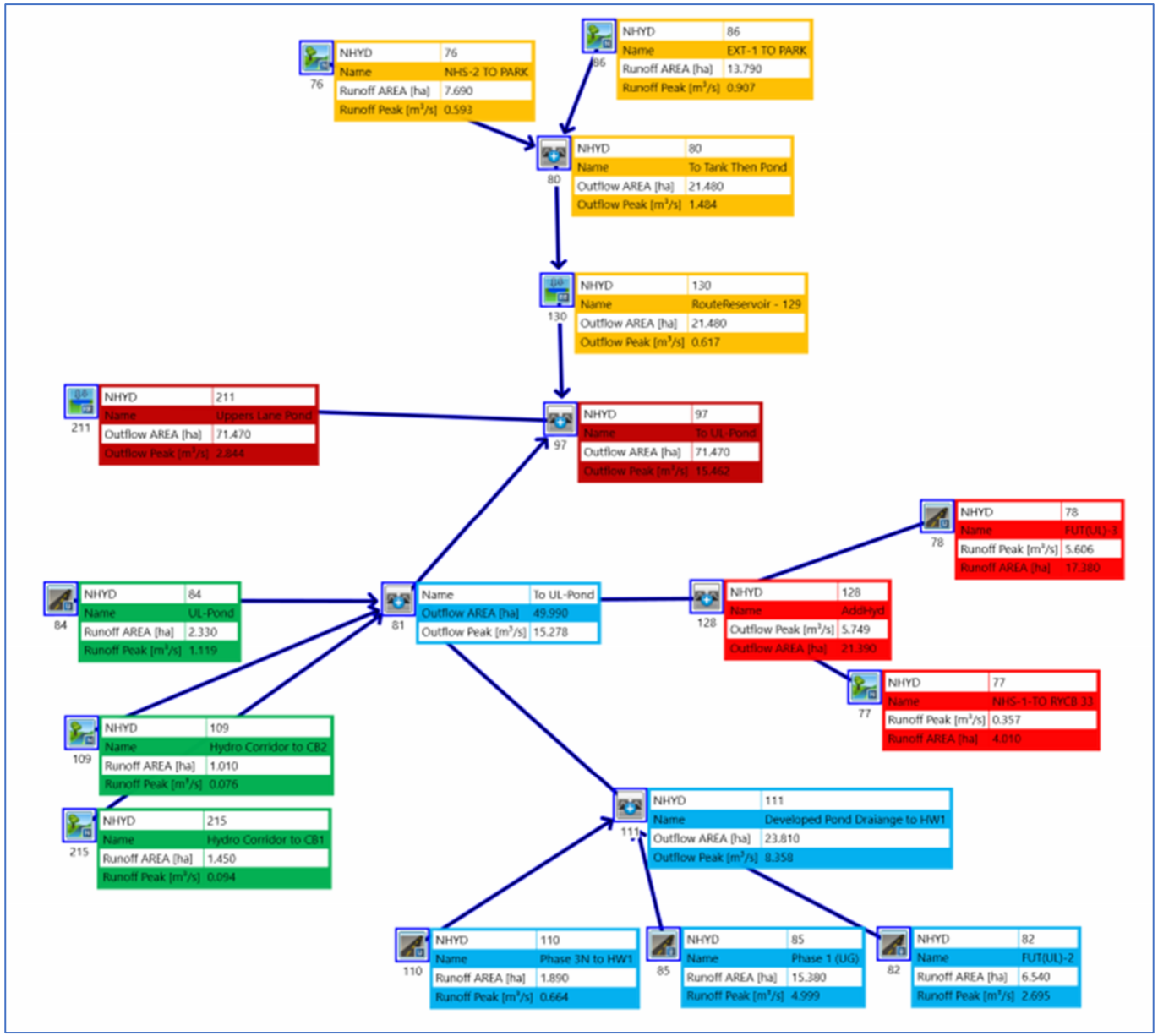
NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0180)				
3 + 2 = 1	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 3 (0180):	21.07	1.422	11.75	79.73
+ ID2= 2 (0208):	1.26	0.140	11.33	79.71

```
       ================================================
       ID = 1 (  0180):    22.33   1.510    11.67    79.72

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

--------------------
| ADD HYD  (  0180)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)      (mm)
       ID1= 1 (  0180):    22.33   1.510    11.67    79.72
     + ID2= 2 (  0077):     9.20   0.709    11.58    79.72
       ================================================
       ID = 3 (  0180):    31.53   2.215    11.67    79.72

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

Appendix C Stormwater Management Calculations

ULTIMATE CONDITION MODEL



VISUAL OTTHYMO – ULTIMATE CONDITON MODEL SCHEMATIC

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

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

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                    *****  D E T A I L E D   O U T P U T *****


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DATE: 03/24/2026                          TIME: 01:22:18

USER:


COMMENTS: _____________________________________________________________

----------------------------------------------------------------------------------------------------------------
  ************************************************
  ** SIMULATION : A. 25mm 4h 10min Chicago      **
  ************************************************

--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 512.000
| Ptotal= 25.03 mm |                          B=   6.000
--------------------                          C=   0.800
                       used in:   INTENSITY =  A / (t + B)^C

                       Duration of storm  =  4.00 hrs
                       Storm time step    = 10.00 min
                       Time to peak ratio =  0.46

                TIME    RAIN  |  TIME    RAIN  |'  TIME    RAIN  |  TIME    RAIN
                 hrs   mm/hr  |   hrs   mm/hr  |'   hrs   mm/hr  |   hrs   mm/hr
                0.00    1.50  |  1.00    3.48  |   2.00    7.87  |  3.00    2.10
                0.17    1.65  |  1.17    4.61  |   2.17    5.25  |  3.17    1.89
                0.33    1.83  |  1.33    7.00  |   2.33    3.98  |  3.33    1.72
                0.50    2.07  |  1.50   15.31  |   2.50    3.22  |  3.50    1.58
                0.67    2.38  |  1.67   55.72  |   2.67    2.72  |  3.67    1.47
                0.83    2.82  |  1.83   16.30  |   2.83    2.36  |  3.83    1.37


--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0076)|   Area     (ha)=   7.69   Curve Number    (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia       (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.64

        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    1.50  | 1.083    3.48  |  2.083    7.87  |  3.08    2.10
               0.167    1.50  | 1.167    3.48  |  2.167    7.87  |  3.17    2.10
               0.250    1.65  | 1.250    4.61  |  2.250    5.25  |  3.25    1.89
               0.333    1.65  | 1.333    4.61  |  2.333    5.25  |  3.33    1.89
               0.417    1.83  | 1.417    7.00  |  2.417    3.98  |  3.42    1.72
               0.500    1.83  | 1.500    7.00  |  2.500    3.98  |  3.50    1.72
               0.583    2.07  | 1.583   15.31  |  2.583    3.22  |  3.58    1.58
               0.667    2.07  | 1.667   15.31  |  2.667    3.22  |  3.67    1.58
               0.750    2.38  | 1.750   55.72  |  2.750    2.72  |  3.75    1.47
               0.833    2.38  | 1.833   55.72  |  2.833    2.72  |  3.83    1.47
               0.917    2.82  | 1.917   16.30  |  2.917    2.36  |  3.92    1.37
               1.000    2.82  | 2.000   16.30  |  3.000    2.36  |  4.00    1.37

     Unit Hyd Qpeak  (cms)=   0.459

     PEAK FLOW       (cms)=   0.045 (i)
     TIME TO PEAK    (hrs)=   2.583
     RUNOFF VOLUME    (mm)=   3.832
     TOTAL RAINFALL   (mm)=  25.031
     RUNOFF COEFFICIENT   =   0.153

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0086)|   Area     (ha)=  13.79   Curve Number    (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia       (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.80

        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    1.50  | 1.083    3.48  |  2.083    7.87  |  3.08    2.10
               0.167    1.50  | 1.167    3.48  |  2.167    7.87  |  3.17    2.10
               0.250    1.65  | 1.250    4.61  |  2.250    5.25  |  3.25    1.89
               0.333    1.65  | 1.333    4.61  |  2.333    5.25  |  3.33    1.89
               0.417    1.83  | 1.417    7.00  |  2.417    3.98  |  3.42    1.72
               0.500    1.83  | 1.500    7.00  |  2.500    3.98  |  3.50    1.72
               0.583    2.07  | 1.583   15.31  |  2.583    3.22  |  3.58    1.58
               0.667    2.07  | 1.667   15.31  |  2.667    3.22  |  3.67    1.58
               0.750    2.38  | 1.750   55.72  |  2.750    2.72  |  3.75    1.47
               0.833    2.38  | 1.833   55.72  |  2.833    2.72  |  3.83    1.47
               0.917    2.82  | 1.917   16.30  |  2.917    2.36  |  3.92    1.37
               1.000    2.82  | 2.000   16.30  |  3.000    2.36  |  4.00    1.37

     Unit Hyd Qpeak  (cms)=   0.658

     PEAK FLOW       (cms)=   0.070 (i)
     TIME TO PEAK    (hrs)=   2.833
     RUNOFF VOLUME    (mm)=   3.832
     TOTAL RAINFALL   (mm)=  25.031
     RUNOFF COEFFICIENT   =   0.153

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

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

--------------------
| ADD HYD  (  0080)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
-------------------           (ha)     (cms)    (hrs)      (mm)
       ID1= 1 (  0076):      7.69    0.045     2.58      3.83
     + ID2= 2 (  0086):     13.79    0.070     2.83      3.83
       ================================================
       ID = 3 (  0080):     21.48    0.114     2.75      3.83
```

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0130) IN= 2---> OUT= 1 DT= 5.0 min	OVERFLOW IS OFF			
	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.5114	0.3494
	0.0634	0.0054	0.5382	0.3871
	0.1794	0.0430	0.5566	0.4140
	0.2457	0.0806	0.5779	0.4462
	0.2975	0.1183	0.5950	0.4731
	0.3416	0.1559	0.6117	0.5000
	0.3858	0.1989	0.6247	0.5215
	0.4207	0.2365	0.6375	0.5430
	0.4530	0.2742	0.6518	0.5677
	0.4872	0.3172	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0080)	21.480	0.114	2.75	3.83
OUTFLOW: ID= 1 (0130)	21.480	0.090	3.33	3.83

PEAK FLOW REDUCTION [Qout/Qin](%)= 79.60
TIME SHIFT OF PEAK FLOW (min)= 35.00
MAXIMUM STORAGE USED (ha.m.)= 0.0141

CALIB NASHYD (0077) ID= 1 DT= 5.0 min	Area (ha)= 4.01	Curve Number (CN)= 75.0
	Ia (mm)= 5.00	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 0.52	

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

---- TRANSFORMED HYETOGRAPH ----							
TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	1.50	1.083	3.48	2.083	7.87	3.08	2.10
0.167	1.50	1.167	3.48	2.167	7.87	3.17	2.10
0.250	1.65	1.250	4.61	2.250	5.25	3.25	1.89
0.333	1.65	1.333	4.61	2.333	5.25	3.33	1.89
0.417	1.83	1.417	7.00	2.417	3.98	3.42	1.72
0.500	1.83	1.500	7.00	2.500	3.98	3.50	1.72
0.583	2.07	1.583	15.31	2.583	3.22	3.58	1.58
0.667	2.07	1.667	15.31	2.667	3.22	3.67	1.58
0.750	2.38	1.750	55.72	2.750	2.72	3.75	1.47
0.833	2.38	1.833	55.72	2.833	2.72	3.83	1.47
0.917	2.82	1.917	16.30	2.917	2.36	3.92	1.37
1.000	2.82	2.000	16.30	3.000	2.36	4.00	1.37

Unit Hyd Qpeak (cms)= 0.295

PEAK FLOW (cms)= 0.027 (i)
TIME TO PEAK (hrs)= 2.417
RUNOFF VOLUME (mm)= 3.832
TOTAL RAINFALL (mm)= 25.031
RUNOFF COEFFICIENT = 0.153

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

CALIB STANDHYD (0078) ID= 1 DT= 5.0 min	Area (ha)= 17.38	
	Total Imp(%)= 60.00	Dir. Conn.(%)= 60.00

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	10.43	6.95
Dep. Storage (mm)=	2.00	1.50

Average Slope	(%)=	1.00	1.00
Length	(m)=	340.39	40.00
Mannings n	=	0.015	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	1.50	1.083	3.48	2.083	7.87	3.08	2.10
0.167	1.50	1.167	3.48	2.167	7.87	3.17	2.10
0.250	1.65	1.250	4.61	2.250	5.25	3.25	1.89
0.333	1.65	1.333	4.61	2.333	5.25	3.33	1.89
0.417	1.83	1.417	7.00	2.417	3.98	3.42	1.72
0.500	1.83	1.500	7.00	2.500	3.98	3.50	1.72
0.583	2.07	1.583	15.31	2.583	3.22	3.58	1.58
0.667	2.07	1.667	15.31	2.667	3.22	3.67	1.58
0.750	2.38	1.750	55.72	2.750	2.72	3.75	1.47
0.833	2.38	1.833	55.72	2.833	2.72	3.83	1.47
0.917	2.82	1.917	16.30	2.917	2.36	3.92	1.37
1.000	2.82	2.000	16.30	3.000	2.36	4.00	1.37

				TOTALS
Max.Eff.Inten.(mm/hr)=	55.72	6.22		
over (min)	5.00	35.00		
Storage Coeff. (min)=	7.34 (ii)	33.73 (ii)		
Unit Hyd. Tpeak (min)=	5.00	35.00		
Unit Hyd. peak (cms)=	0.17	0.03		
PEAK FLOW (cms)=	1.30	0.07		1.310 (iii)
TIME TO PEAK (hrs)=	1.83	2.33		1.83
RUNOFF VOLUME (mm)=	23.03	5.12		15.86
TOTAL RAINFALL (mm)=	25.03	25.03		25.03
RUNOFF COEFFICIENT =	0.92	0.20		0.63

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 75.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0128) 1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0077):	4.01	0.027	2.42	3.83
+ ID2= 2 (0078):	17.38	1.310	1.83	15.86
ID = 3 (0128):	21.39	1.314	1.83	13.61

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB NASHYD (0215) ID= 1 DT= 5.0 min	Area (ha)= 1.45	Curve Number (CN)= 75.0
	Ia (mm)= 5.00	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 0.82	

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

---- TRANSFORMED HYETOGRAPH ----							
TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	1.50	1.083	3.48	2.083	7.87	3.08	2.10
0.167	1.50	1.167	3.48	2.167	7.87	3.17	2.10
0.250	1.65	1.250	4.61	2.250	5.25	3.25	1.89
0.333	1.65	1.333	4.61	2.333	5.25	3.33	1.89
0.417	1.83	1.417	7.00	2.417	3.98	3.42	1.72

0.500	1.83	1.500	7.00	2.500	3.98	3.50	1.72
0.583	2.07	1.583	15.31	2.583	3.22	3.58	1.58
0.667	2.07	1.667	15.31	2.667	3.22	3.67	1.58
0.750	2.38	1.750	55.72	2.750	2.72	3.75	1.47
0.833	2.38	1.833	55.72	2.833	2.72	3.83	1.47
0.917	2.82	1.917	16.30	2.917	2.36	3.92	1.37
1.000	2.82	2.000	16.30	3.000	2.36	4.00	1.37

Unit Hyd Qpeak (cms)= 0.068

PEAK FLOW (cms)= 0.007 (i)
TIME TO PEAK (hrs)= 2.833
RUNOFF VOLUME (mm)= 3.831
TOTAL RAINFALL (mm)= 25.031
RUNOFF COEFFICIENT = 0.153

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

CALIB
NASHYD (0109) | Area (ha)= 1.01 Curve Number (CN)= 75.0
ID= 1 DT= 5.0 min | Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.66

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	1.50	1.083	3.48	2.083	7.87	3.08	2.10
0.167	1.50	1.167	3.48	2.167	7.87	3.17	2.10
0.250	1.65	1.250	4.61	2.250	5.25	3.25	1.89
0.333	1.65	1.333	4.61	2.333	5.25	3.33	1.89
0.417	1.83	1.417	7.00	2.417	3.98	3.42	1.72
0.500	1.83	1.500	7.00	2.500	3.98	3.50	1.72
0.583	2.07	1.583	15.31	2.583	3.22	3.58	1.58
0.667	2.07	1.667	15.31	2.667	3.22	3.67	1.58
0.750	2.38	1.750	55.72	2.750	2.72	3.75	1.47
0.833	2.38	1.833	55.72	2.833	2.72	3.83	1.47
0.917	2.82	1.917	16.30	2.917	2.36	3.92	1.37
1.000	2.82	2.000	16.30	3.000	2.36	4.00	1.37

Unit Hyd Qpeak (cms)= 0.058

PEAK FLOW (cms)= 0.006 (i)
TIME TO PEAK (hrs)= 2.667
RUNOFF VOLUME (mm)= 3.831
TOTAL RAINFALL (mm)= 25.031
RUNOFF COEFFICIENT = 0.153

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

CALIB
STANDHYD (0082) | Area (ha)= 6.54
ID= 1 DT= 5.0 min | Total Imp(%)= 70.00 Dir. Conn.(%)= 70.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	4.58	1.96
Dep. Storage	(mm)=	1.50	1.50
Average Slope	(%)=	2.00	1.00
Length	(m)=	208.81	40.00
Mannings n	=	0.015	0.250

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

---- TRANSFORMED HYETOGRAPH ----

TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN

0.083	1.50	1.083	3.48	2.083	7.87	3.08	2.10
0.167	1.50	1.167	3.48	2.167	7.87	3.17	2.10
0.250	1.65	1.250	4.61	2.250	5.25	3.25	1.89
0.333	1.65	1.333	4.61	2.333	5.25	3.33	1.89
0.417	1.83	1.417	7.00	2.417	3.98	3.42	1.72
0.500	1.83	1.500	7.00	2.500	3.98	3.50	1.72
0.583	2.07	1.583	15.31	2.583	3.22	3.58	1.58
0.667	2.07	1.667	15.31	2.667	3.22	3.67	1.58
0.750	2.38	1.750	55.72	2.750	2.72	3.75	1.47
0.833	2.38	1.833	55.72	2.833	2.72	3.83	1.47
0.917	2.82	1.917	16.30	2.917	2.36	3.92	1.37
1.000	2.82	2.000	16.30	3.000	2.36	4.00	1.37

Max.Eff.Inten.(mm/hr)= 55.72 6.22
over (min) 5.00 35.00
Storage Coeff. (min)= 4.44 (ii) 30.84 (ii)
Unit Hyd. Tpeak (min)= 5.00 35.00
Unit Hyd. peak (cms)= 0.23 0.04

				TOTALS
PEAK FLOW	(cms)=	0.65	0.02	0.657 (iii)
TIME TO PEAK	(hrs)=	1.83	2.33	1.83
RUNOFF VOLUME	(mm)=	23.53	5.12	18.00
TOTAL RAINFALL	(mm)=	25.03	25.03	25.03
RUNOFF COEFFICIENT	=	0.94	0.20	0.72

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 75.0 Ia = Dep. 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 (0085) | Area (ha)= 15.38
ID= 1 DT= 5.0 min | Total Imp(%)= 60.00 Dir. Conn.(%)= 60.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	9.23	6.15
Dep. Storage	(mm)=	2.00	1.50
Average Slope	(%)=	1.00	1.00
Length	(m)=	320.21	40.00
Mannings n	=	0.015	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	1.50	1.083	3.48	2.083	7.87	3.08	2.10
0.167	1.50	1.167	3.48	2.167	7.87	3.17	2.10
0.250	1.65	1.250	4.61	2.250	5.25	3.25	1.89
0.333	1.65	1.333	4.61	2.333	5.25	3.33	1.89
0.417	1.83	1.417	7.00	2.417	3.98	3.42	1.72
0.500	1.83	1.500	7.00	2.500	3.98	3.50	1.72
0.583	2.07	1.583	15.31	2.583	3.22	3.58	1.58
0.667	2.07	1.667	15.31	2.667	3.22	3.67	1.58
0.750	2.38	1.750	55.72	2.750	2.72	3.75	1.47
0.833	2.38	1.833	55.72	2.833	2.72	3.83	1.47
0.917	2.82	1.917	16.30	2.917	2.36	3.92	1.37
1.000	2.82	2.000	16.30	3.000	2.36	4.00	1.37

Max.Eff.Inten.(mm/hr)= 55.72 6.22
over (min) 5.00 35.00
Storage Coeff. (min)= 7.07 (ii) 33.47 (ii)
Unit Hyd. Tpeak (min)= 5.00 35.00
Unit Hyd. peak (cms)= 0.17 0.03

TOTALS

PEAK FLOW	(cms)=	1.16	0.06	1.174 (iii)
TIME TO PEAK	(hrs)=	1.83	2.33	1.83
RUNOFF VOLUME	(mm)=	23.03	5.12	15.86
TOTAL RAINFALL	(mm)=	25.03	25.03	25.03
RUNOFF COEFFICIENT	=	0.92	0.20	0.63

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 75.0 Ia = Dep. 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 (0110) | Area (ha)= 1.89
ID= 1 DT= 5.0 min | Total Imp(%)= 60.00 Dir. Conn.(%)= 60.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	1.13	0.76
Dep. Storage	(mm)=	2.00	1.50
Average Slope	(%)=	1.00	1.00
Length	(m)=	112.25	40.00
Mannings n	=	0.015	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	1.50	1.083	3.48	2.083	7.87	3.08	2.10
0.167	1.50	1.167	3.48	2.167	7.87	3.17	2.10
0.250	1.65	1.250	4.61	2.250	5.25	3.25	1.89
0.333	1.65	1.333	4.61	2.333	5.25	3.33	1.89
0.417	1.83	1.417	7.00	2.417	3.98	3.42	1.72
0.500	1.83	1.500	7.00	2.500	3.98	3.50	1.72
0.583	2.07	1.583	15.31	2.583	3.22	3.58	1.58
0.667	2.07	1.667	15.31	2.667	3.22	3.67	1.58
0.750	2.38	1.750	55.72	2.750	2.72	3.75	1.47
0.833	2.38	1.833	55.72	2.833	2.72	3.83	1.47
0.917	2.82	1.917	16.30	2.917	2.36	3.92	1.37
1.000	2.82	2.000	16.30	3.000	2.36	4.00	1.37

Max.Eff.Inten.	(mm/hr)=	55.72	6.22	
	over (min)	5.00	35.00	
Storage Coeff.	(min)=	3.77 (ii)	30.17 (ii)	
Unit Hyd. Tpeak	(min)=	5.00	35.00	
Unit Hyd. peak	(cms)=	0.25	0.04	
				TOTALS
PEAK FLOW	(cms)=	0.17	0.01	0.168 (iii)
TIME TO PEAK	(hrs)=	1.83	2.33	1.83
RUNOFF VOLUME	(mm)=	23.03	5.12	15.86
TOTAL RAINFALL	(mm)=	25.03	25.03	25.03
RUNOFF COEFFICIENT	=	0.92	0.20	0.63

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 75.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0111)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0110):	1.89	0.168	1.83	15.86
+ ID2= 2 (0082):	6.54	0.657	1.83	18.00
ID = 3 (0111):	8.43	0.825	1.83	17.52

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0111)
3 + 2 = 1

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 3 (0111):	8.43	0.825	1.83	17.52
+ ID2= 2 (0085):	15.38	1.174	1.83	15.86
ID = 1 (0111):	23.81	1.999	1.83	16.45

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB
STANDHYD (0084) | Area (ha)= 2.33
ID= 1 DT= 5.0 min | Total Imp(%)= 89.00 Dir. Conn.(%)= 89.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	2.07	0.26
Dep. Storage	(mm)=	0.00	1.50
Average Slope	(%)=	1.00	1.00
Length	(m)=	124.63	25.00
Mannings n	=	0.015	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	1.50	1.083	3.48	2.083	7.87	3.08	2.10
0.167	1.50	1.167	3.48	2.167	7.87	3.17	2.10
0.250	1.65	1.250	4.61	2.250	5.25	3.25	1.89
0.333	1.65	1.333	4.61	2.333	5.25	3.33	1.89
0.417	1.83	1.417	7.00	2.417	3.98	3.42	1.72
0.500	1.83	1.500	7.00	2.500	3.98	3.50	1.72
0.583	2.07	1.583	15.31	2.583	3.22	3.58	1.58
0.667	2.07	1.667	15.31	2.667	3.22	3.67	1.58
0.750	2.38	1.750	55.72	2.750	2.72	3.75	1.47
0.833	2.38	1.833	55.72	2.833	2.72	3.83	1.47
0.917	2.82	1.917	16.30	2.917	2.36	3.92	1.37
1.000	2.82	2.000	16.30	3.000	2.36	4.00	1.37

Max.Eff.Inten.	(mm/hr)=	55.72	11.28	
	over (min)	5.00	10.00	
Storage Coeff.	(min)=	4.01 (ii)	7.60 (ii)	
Unit Hyd. Tpeak	(min)=	5.00	10.00	
Unit Hyd. peak	(cms)=	0.24	0.13	
				TOTALS
PEAK FLOW	(cms)=	0.30	0.01	0.306 (iii)
TIME TO PEAK	(hrs)=	1.83	1.92	1.83
RUNOFF VOLUME	(mm)=	25.03	5.12	22.84
TOTAL RAINFALL	(mm)=	25.03	25.03	25.03
RUNOFF COEFFICIENT	=	1.00	0.20	0.91

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 75.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0081)					
1 + 2 = 3	AREA	QPEAK	TPEAK	R.V.	
	(ha)	(cms)	(hrs)	(mm)	
ID1= 1 (0109):	1.01	0.006	2.67	3.83	
+ ID2= 2 (0111):	23.81	1.999	1.83	16.45	
ID = 3 (0081):	24.82	2.000	1.83	15.94	

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0081)					
3 + 2 = 1	AREA	QPEAK	TPEAK	R.V.	
	(ha)	(cms)	(hrs)	(mm)	
ID1= 3 (0081):	24.82	2.000	1.83	15.94	
+ ID2= 2 (0128):	21.39	1.314	1.83	13.61	
ID = 1 (0081):	46.21	3.314	1.83	14.86	

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0081)					
1 + 2 = 3	AREA	QPEAK	TPEAK	R.V.	
	(ha)	(cms)	(hrs)	(mm)	
ID1= 1 (0081):	46.21	3.314	1.83	14.86	
+ ID2= 2 (0215):	1.45	0.007	2.83	3.83	
ID = 3 (0081):	47.66	3.315	1.83	14.52	

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0081)					
3 + 2 = 1	AREA	QPEAK	TPEAK	R.V.	
	(ha)	(cms)	(hrs)	(mm)	
ID1= 3 (0081):	47.66	3.315	1.83	14.52	
+ ID2= 2 (0084):	2.33	0.306	1.83	22.84	
ID = 1 (0081):	49.99	3.621	1.83	14.91	

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0097)					
1 + 2 = 3	AREA	QPEAK	TPEAK	R.V.	
	(ha)	(cms)	(hrs)	(mm)	
ID1= 1 (0130):	21.48	0.090	3.33	3.83	
+ ID2= 2 (0081):	49.99	3.621	1.83	14.91	
ID = 3 (0097):	71.47	3.623	1.83	11.58	

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0211)	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	0.8460	1.8660
	0.0080	0.2340	1.0630	2.1640
	0.0130	0.4840	1.4780	2.4680
	0.0470	0.7470	1.9960	2.7800
	0.1760	1.0160	2.8820	2.8590
	0.3580	1.2930	4.4100	2.9390
	0.5810	1.5760	14.1270	3.2620

AREA	QPEAK	TPEAK	R.V.

	(ha)	(cms)	(hrs)	(mm)
INFLOW : ID= 2 (0097)	71.470	3.623	1.83	11.58
OUTFLOW: ID= 1 (0211)	71.470	0.060	4.83	10.11

PEAK FLOW REDUCTION [Qout/Qin](%)= 1.64
TIME SHIFT OF PEAK FLOW (min)=180.00
MAXIMUM STORAGE USED (ha.m.)= 0.7731

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       V    V   I    SSSSS  U   U    A    L              (v 6.2.2022)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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***** D E T A I L E D O U T P U T *****

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DATE: 03/24/2026 TIME: 01:22:19

USER:

COMMENTS: _____

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**********************************************
** SIMULATION : B. 2yr 4hr 10min Chicago     **
**********************************************
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CHICAGO STORM	IDF curve parameters: A= 567.000
Ptotal= 37.41 mm	B= 5.200
	C= 0.746

used in: INTENSITY = A / (t + B)^C

Duration of storm = 4.00 hrs
Storm time step = 10.00 min
Time to peak ratio = 0.46

TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.00	2.74	1.00	5.82	2.00	12.01	3.00	3.70
0.17	2.98	1.17	7.48	2.17	8.39	3.17	3.36
0.33	3.28	1.33	10.82	2.33	6.55	3.33	3.09
0.50	3.65	1.50	21.80	2.50	5.43	3.50	2.87
0.67	4.14	1.67	74.46	2.67	4.67	3.67	2.68
0.83	4.82	1.83	23.08	2.83	4.12	3.83	2.51

CALIB			
NASHYD (0076)	Area	(ha)= 7.69	Curve Number (CN)= 75.0
ID= 1 DT= 5.0 min	Ia	(mm)= 5.00	# of Linear Res.(N)= 3.00
	U.H. Tp	(hrs)= 0.64	

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	2.74	1.083	5.82	2.083	12.01	3.08	3.70
0.167	2.74	1.167	5.82	2.167	12.01	3.17	3.70
0.250	2.98	1.250	7.48	2.250	8.39	3.25	3.36
0.333	2.98	1.333	7.48	2.333	8.39	3.33	3.36
0.417	3.28	1.417	10.82	2.417	6.55	3.42	3.09
0.500	3.28	1.500	10.82	2.500	6.55	3.50	3.09
0.583	3.65	1.583	21.80	2.583	5.43	3.58	2.87
0.667	3.65	1.667	21.80	2.667	5.43	3.67	2.87
0.750	4.14	1.750	74.46	2.750	4.67	3.75	2.68
0.833	4.14	1.833	74.46	2.833	4.67	3.83	2.68
0.917	4.82	1.917	23.08	2.917	4.12	3.92	2.51
1.000	4.82	2.000	23.08	3.000	4.12	4.00	2.51

Unit Hyd Qpeak (cms)= 0.459

PEAK FLOW (cms)= 0.103 (i)
TIME TO PEAK (hrs)= 2.583
RUNOFF VOLUME (mm)= 8.970
TOTAL RAINFALL (mm)= 37.407
RUNOFF COEFFICIENT = 0.240

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

CALIB			
NASHYD (0086)	Area	(ha)= 13.79	Curve Number (CN)= 75.0
ID= 1 DT= 5.0 min	Ia	(mm)= 5.00	# of Linear Res.(N)= 3.00
	U.H. Tp	(hrs)= 0.80	

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	2.74	1.083	5.82	2.083	12.01	3.08	3.70
0.167	2.74	1.167	5.82	2.167	12.01	3.17	3.70
0.250	2.98	1.250	7.48	2.250	8.39	3.25	3.36
0.333	2.98	1.333	7.48	2.333	8.39	3.33	3.36
0.417	3.28	1.417	10.82	2.417	6.55	3.42	3.09
0.500	3.28	1.500	10.82	2.500	6.55	3.50	3.09
0.583	3.65	1.583	21.80	2.583	5.43	3.58	2.87
0.667	3.65	1.667	21.80	2.667	5.43	3.67	2.87
0.750	4.14	1.750	74.46	2.750	4.67	3.75	2.68
0.833	4.14	1.833	74.46	2.833	4.67	3.83	2.68
0.917	4.82	1.917	23.08	2.917	4.12	3.92	2.51
1.000	4.82	2.000	23.08	3.000	4.12	4.00	2.51

Unit Hyd Qpeak (cms)= 0.658

PEAK FLOW (cms)= 0.158 (i)
TIME TO PEAK (hrs)= 2.833
RUNOFF VOLUME (mm)= 8.970
TOTAL RAINFALL (mm)= 37.407
RUNOFF COEFFICIENT = 0.240

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

ADD HYD (0080)		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
1 + 2 = 3	ID1= 1 (0076):	7.69	0.103	2.58	8.97
	+ ID2= 2 (0086):	13.79	0.158	2.83	8.97
	ID = 3 (0080):	21.48	0.258	2.75	8.97

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0130)	OVERFLOW IS OFF			
IN= 2---> OUT= 1				
DT= 5.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.5114	0.3494
	0.0634	0.0054	0.5382	0.3871
	0.1794	0.0430	0.5566	0.4140
	0.2457	0.0806	0.5779	0.4462
	0.2975	0.1183	0.5950	0.4731
	0.3416	0.1559	0.6117	0.5000
	0.3858	0.1989	0.6247	0.5215
	0.4207	0.2365	0.6375	0.5430
	0.4530	0.2742	0.6518	0.5677
	0.4872	0.3172	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0080)	21.480	0.258	2.75	8.97
OUTFLOW: ID= 1 (0130)	21.480	0.186	3.50	8.97

PEAK FLOW REDUCTION [Qout/Qin](%)= 72.14
TIME SHIFT OF PEAK FLOW (min)= 45.00
MAXIMUM STORAGE USED (ha.m.)= 0.0470

CALIB			
NASHYD (0077)	Area	(ha)= 4.01	Curve Number (CN)= 75.0
ID= 1 DT= 5.0 min	Ia	(mm)= 5.00	# of Linear Res.(N)= 3.00
	U.H. Tp	(hrs)= 0.52	

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	2.74	1.083	5.82	2.083	12.01	3.08	3.70
0.167	2.74	1.167	5.82	2.167	12.01	3.17	3.70
0.250	2.98	1.250	7.48	2.250	8.39	3.25	3.36
0.333	2.98	1.333	7.48	2.333	8.39	3.33	3.36
0.417	3.28	1.417	10.82	2.417	6.55	3.42	3.09
0.500	3.28	1.500	10.82	2.500	6.55	3.50	3.09
0.583	3.65	1.583	21.80	2.583	5.43	3.58	2.87
0.667	3.65	1.667	21.80	2.667	5.43	3.67	2.87
0.750	4.14	1.750	74.46	2.750	4.67	3.75	2.68
0.833	4.14	1.833	74.46	2.833	4.67	3.83	2.68
0.917	4.82	1.917	23.08	2.917	4.12	3.92	2.51
1.000	4.82	2.000	23.08	3.000	4.12	4.00	2.51

Unit Hyd Qpeak (cms)= 0.295

PEAK FLOW (cms)= 0.062 (i)
TIME TO PEAK (hrs)= 2.417
RUNOFF VOLUME (mm)= 8.970
TOTAL RAINFALL (mm)= 37.407
RUNOFF COEFFICIENT = 0.240

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

CALIB					
STANDHYD (0078)	Area (ha)= 17.38				
ID= 1 DT= 5.0 min	Total Imp(%)= 60.00	Dir. Conn.(%)= 60.00			

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	10.43	6.95
Dep. Storage	(mm)=	2.00	1.50
Average Slope	(%)=	1.00	1.00
Length	(m)=	340.39	40.00
Mannings n	=	0.015	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	2.74	1.083	5.82	2.083	12.01	3.08	3.70
0.167	2.74	1.167	5.82	2.167	12.01	3.17	3.70
0.250	2.98	1.250	7.48	2.250	8.39	3.25	3.36
0.333	2.98	1.333	7.48	2.333	8.39	3.33	3.36
0.417	3.28	1.417	10.82	2.417	6.55	3.42	3.09
0.500	3.28	1.500	10.82	2.500	6.55	3.50	3.09
0.583	3.65	1.583	21.80	2.583	5.43	3.58	2.87
0.667	3.65	1.667	21.80	2.667	5.43	3.67	2.87
0.750	4.14	1.750	74.46	2.750	4.67	3.75	2.68
0.833	4.14	1.833	74.46	2.833	4.67	3.83	2.68
0.917	4.82	1.917	23.08	2.917	4.12	3.92	2.51
1.000	4.82	2.000	23.08	3.000	4.12	4.00	2.51

				TOTALS
Max.Eff.Inten.	(mm/hr)=	74.46	15.32	
over	(min)	5.00	25.00	
Storage Coeff.	(min)=	6.53 (ii)	24.94 (ii)	
Unit Hyd. Tpeak	(min)=	5.00	25.00	
Unit Hyd. peak	(cms)=	0.18	0.05	
PEAK FLOW	(cms)=	1.81	0.16	1.864 (iii)
TIME TO PEAK	(hrs)=	1.83	2.17	1.83
RUNOFF VOLUME	(mm)=	35.41	10.69	25.52
TOTAL RAINFALL	(mm)=	37.41	37.41	37.41
RUNOFF COEFFICIENT	=	0.95	0.29	0.68

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 75.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0128)		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
1 + 2 = 3	ID1= 1 (0077):	4.01	0.062	2.42	8.97
	+ ID2= 2 (0078):	17.38	1.864	1.83	25.52
	ID = 3 (0128):	21.39	1.876	1.83	22.42

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB					
NASHYD (0215)	Area (ha)= 1.45	Curve Number (CN)= 75.0			
ID= 1 DT= 5.0 min	Ia (mm)= 5.00	# of Linear Res.(N)= 3.00			
	U.H. Tp(hrs)= 0.82				

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	2.74	1.083	5.82	2.083	12.01	3.08	3.70
0.167	2.74	1.167	5.82	2.167	12.01	3.17	3.70
0.250	2.98	1.250	7.48	2.250	8.39	3.25	3.36
0.333	2.98	1.333	7.48	2.333	8.39	3.33	3.36
0.417	3.28	1.417	10.82	2.417	6.55	3.42	3.09
0.500	3.28	1.500	10.82	2.500	6.55	3.50	3.09
0.583	3.65	1.583	21.80	2.583	5.43	3.58	2.87
0.667	3.65	1.667	21.80	2.667	5.43	3.67	2.87
0.750	4.14	1.750	74.46	2.750	4.67	3.75	2.68
0.833	4.14	1.833	74.46	2.833	4.67	3.83	2.68
0.917	4.82	1.917	23.08	2.917	4.12	3.92	2.51
1.000	4.82	2.000	23.08	3.000	4.12	4.00	2.51

Unit Hyd Qpeak (cms)= 0.068

PEAK FLOW (cms)= 0.016 (i)
TIME TO PEAK (hrs)= 2.833
RUNOFF VOLUME (mm)= 8.969
TOTAL RAINFALL (mm)= 37.407
RUNOFF COEFFICIENT = 0.240

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

CALIB					
NASHYD (0109)	Area (ha)= 1.01	Curve Number (CN)= 75.0			
ID= 1 DT= 5.0 min	Ia (mm)= 5.00	# of Linear Res.(N)= 3.00			
	U.H. Tp(hrs)= 0.66				

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	2.74	1.083	5.82	2.083	12.01	3.08	3.70
0.167	2.74	1.167	5.82	2.167	12.01	3.17	3.70
0.250	2.98	1.250	7.48	2.250	8.39	3.25	3.36
0.333	2.98	1.333	7.48	2.333	8.39	3.33	3.36
0.417	3.28	1.417	10.82	2.417	6.55	3.42	3.09
0.500	3.28	1.500	10.82	2.500	6.55	3.50	3.09
0.583	3.65	1.583	21.80	2.583	5.43	3.58	2.87
0.667	3.65	1.667	21.80	2.667	5.43	3.67	2.87
0.750	4.14	1.750	74.46	2.750	4.67	3.75	2.68
0.833	4.14	1.833	74.46	2.833	4.67	3.83	2.68
0.917	4.82	1.917	23.08	2.917	4.12	3.92	2.51
1.000	4.82	2.000	23.08	3.000	4.12	4.00	2.51

Unit Hyd Qpeak (cms)= 0.058

PEAK FLOW (cms)= 0.013 (i)
TIME TO PEAK (hrs)= 2.583
RUNOFF VOLUME (mm)= 8.969
TOTAL RAINFALL (mm)= 37.407
RUNOFF COEFFICIENT = 0.240

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

CALIB					
STANDHYD (0082)	Area (ha)= 6.54				
ID= 1 DT= 5.0 min	Total Imp(%)= 70.00	Dir. Conn.(%)= 70.00			

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	4.58	1.96
Dep. Storage	(mm)=	1.50	1.50

Average Slope	(%)=	2.00	1.00
Length	(m)=	208.81	40.00
Mannings n	=	0.015	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	2.74	1.083	5.82	2.083	12.01	3.08	3.70
0.167	2.74	1.167	5.82	2.167	12.01	3.17	3.70
0.250	2.98	1.250	7.48	2.250	8.39	3.25	3.36
0.333	2.98	1.333	7.48	2.333	8.39	3.33	3.36
0.417	3.28	1.417	10.82	2.417	6.55	3.42	3.09
0.500	3.28	1.500	10.82	2.500	6.55	3.50	3.09
0.583	3.65	1.583	21.80	2.583	5.43	3.58	2.87
0.667	3.65	1.667	21.80	2.667	5.43	3.67	2.87
0.750	4.14	1.750	74.46	2.750	4.67	3.75	2.68
0.833	4.14	1.833	74.46	2.833	4.67	3.83	2.68
0.917	4.82	1.917	23.08	2.917	4.12	3.92	2.51
1.000	4.82	2.000	23.08	3.000	4.12	4.00	2.51

Max.Eff.Inten.	(mm/hr)=	74.46	15.32	
over	(min)	5.00	25.00	
Storage Coeff.	(min)=	3.96 (ii)	22.36 (ii)	
Unit Hyd. Tpeak	(min)=	5.00	25.00	
Unit Hyd. peak	(cms)=	0.24	0.05	
				TOTALS
PEAK FLOW	(cms)=	0.89	0.05	0.908 (iii)
TIME TO PEAK	(hrs)=	1.83	2.17	1.83
RUNOFF VOLUME	(mm)=	35.91	10.69	28.34
TOTAL RAINFALL	(mm)=	37.41	37.41	37.41
RUNOFF COEFFICIENT	=	0.96	0.29	0.76

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 75.0 Ia = Dep. 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 (0085)	Area	(ha)= 15.38	
ID= 1 DT= 5.0 min	Total Imp	(%)= 60.00	Dir. Conn.(%)= 60.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	9.23	6.15
Dep. Storage	(mm)=	2.00	1.50
Average Slope	(%)=	1.00	1.00
Length	(m)=	320.21	40.00
Mannings n	=	0.015	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	2.74	1.083	5.82	2.083	12.01	3.08	3.70
0.167	2.74	1.167	5.82	2.167	12.01	3.17	3.70
0.250	2.98	1.250	7.48	2.250	8.39	3.25	3.36
0.333	2.98	1.333	7.48	2.333	8.39	3.33	3.36
0.417	3.28	1.417	10.82	2.417	6.55	3.42	3.09
0.500	3.28	1.500	10.82	2.500	6.55	3.50	3.09
0.583	3.65	1.583	21.80	2.583	5.43	3.58	2.87
0.667	3.65	1.667	21.80	2.667	5.43	3.67	2.87
0.750	4.14	1.750	74.46	2.750	4.67	3.75	2.68
0.833	4.14	1.833	74.46	2.833	4.67	3.83	2.68

0.917	4.82	1.917	23.08	2.917	4.12	3.92	2.51
1.000	4.82	2.000	23.08	3.000	4.12	4.00	2.51

Max.Eff.Inten.	(mm/hr)=	74.46	15.32	
over	(min)	5.00	25.00	
Storage Coeff.	(min)=	6.30 (ii)	24.70 (ii)	
Unit Hyd. Tpeak	(min)=	5.00	25.00	
Unit Hyd. peak	(cms)=	0.19	0.05	
				TOTALS
PEAK FLOW	(cms)=	1.62	0.14	1.668 (iii)
TIME TO PEAK	(hrs)=	1.83	2.17	1.83
RUNOFF VOLUME	(mm)=	35.41	10.69	25.52
TOTAL RAINFALL	(mm)=	37.41	37.41	37.41
RUNOFF COEFFICIENT	=	0.95	0.29	0.68

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 75.0 Ia = Dep. 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 (0110)	Area	(ha)= 1.89	
ID= 1 DT= 5.0 min	Total Imp	(%)= 60.00	Dir. Conn.(%)= 60.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	1.13	0.76
Dep. Storage	(mm)=	2.00	1.50
Average Slope	(%)=	1.00	1.00
Length	(m)=	112.25	40.00
Mannings n	=	0.015	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	2.74	1.083	5.82	2.083	12.01	3.08	3.70
0.167	2.74	1.167	5.82	2.167	12.01	3.17	3.70
0.250	2.98	1.250	7.48	2.250	8.39	3.25	3.36
0.333	2.98	1.333	7.48	2.333	8.39	3.33	3.36
0.417	3.28	1.417	10.82	2.417	6.55	3.42	3.09
0.500	3.28	1.500	10.82	2.500	6.55	3.50	3.09
0.583	3.65	1.583	21.80	2.583	5.43	3.58	2.87
0.667	3.65	1.667	21.80	2.667	5.43	3.67	2.87
0.750	4.14	1.750	74.46	2.750	4.67	3.75	2.68
0.833	4.14	1.833	74.46	2.833	4.67	3.83	2.68
0.917	4.12	1.917	74.46	2.917	4.12	3.92	2.51
1.000	4.12	2.000	74.46	3.000	4.12	4.00	2.51

Max.Eff.Inten.	(mm/hr)=	74.46	15.32	
over	(min)	5.00	25.00	
Storage Coeff.	(min)=	3.36 (ii)	21.76 (ii)	
Unit Hyd. Tpeak	(min)=	5.00	25.00	
Unit Hyd. peak	(cms)=	0.26	0.05	
				TOTALS
PEAK FLOW	(cms)=	0.23	0.02	0.232 (iii)
TIME TO PEAK	(hrs)=	1.83	2.17	1.83
RUNOFF VOLUME	(mm)=	35.41	10.69	25.51
TOTAL RAINFALL	(mm)=	37.41	37.41	37.41
RUNOFF COEFFICIENT	=	0.95	0.29	0.68

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 75.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.

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

ADD HYD (0111) 1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0110):	1.89	0.232	1.83	25.51
+ ID2= 2 (0082):	6.54	0.908	1.83	28.34
ID = 3 (0111):	8.43	1.141	1.83	27.71

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0111) 3 + 2 = 1	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 3 (0111):	8.43	1.141	1.83	27.71
+ ID2= 2 (0085):	15.38	1.668	1.83	25.52
ID = 1 (0111):	23.81	2.808	1.83	26.29

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB
STANDHYD (0084) ID= 1 DT= 5.0 min | Area (ha)= 2.33 | Total Imp(%)= 89.00 | Dir. Conn.(%)= 89.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	2.07	0.26
Dep. Storage	(mm)=	0.00	1.50
Average Slope	(%)=	1.00	1.00
Length	(m)=	124.63	25.00
Mannings n	=	0.015	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	2.74	1.083	5.82	2.083	12.01	3.08	3.70
0.167	2.74	1.167	5.82	2.167	12.01	3.17	3.70
0.250	2.98	1.250	7.48	2.250	8.39	3.25	3.36
0.333	2.98	1.333	7.48	2.333	8.39	3.33	3.36
0.417	3.28	1.417	10.82	2.417	6.55	3.42	3.09
0.500	3.28	1.500	10.82	2.500	6.55	3.50	3.09
0.583	3.65	1.583	21.80	2.583	5.43	3.58	2.87
0.667	3.65	1.667	21.80	2.667	5.43	3.67	2.87
0.750	4.14	1.750	74.46	2.750	4.67	3.75	2.68
0.833	4.14	1.833	74.46	2.833	4.67	3.83	2.68
0.917	4.82	1.917	23.08	2.917	4.12	3.92	2.51
1.000	4.82	2.000	23.08	3.000	4.12	4.00	2.51

Max.Eff.Inten.(mm/hr)=		74.46	21.54	
over (min)		5.00	10.00	
Storage Coeff. (min)=		3.57 (ii)	6.77 (ii)	
Unit Hyd. Tpeak (min)=		5.00	10.00	
Unit Hyd. peak (cms)=		0.26	0.14	
				TOTALS
PEAK FLOW	(cms)=	0.41	0.01	0.420 (iii)
TIME TO PEAK	(hrs)=	1.83	1.92	1.83
RUNOFF VOLUME	(mm)=	37.41	10.69	34.47
TOTAL RAINFALL	(mm)=	37.41	37.41	37.41
RUNOFF COEFFICIENT	=	1.00	0.29	0.92

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 75.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0081) 1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0109):	1.01	0.013	2.58	8.97
+ ID2= 2 (0111):	23.81	2.808	1.83	26.29
ID = 3 (0081):	24.82	2.810	1.83	25.59

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0081) 3 + 2 = 1	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 3 (0081):	24.82	2.810	1.83	25.59
+ ID2= 2 (0128):	21.39	1.876	1.83	22.42
ID = 1 (0081):	46.21	4.686	1.83	24.12

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0081) 1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0081):	46.21	4.686	1.83	24.12
+ ID2= 2 (0215):	1.45	0.016	2.83	8.97
ID = 3 (0081):	47.66	4.688	1.83	23.66

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0081) 3 + 2 = 1	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 3 (0081):	47.66	4.688	1.83	23.66
+ ID2= 2 (0084):	2.33	0.420	1.83	34.47
ID = 1 (0081):	49.99	5.108	1.83	24.16

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0097) 1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0130):	21.48	0.186	3.50	8.97
+ ID2= 2 (0081):	49.99	5.108	1.83	24.16
ID = 3 (0097):	71.47	5.116	1.83	19.60

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0211) IN= 2---> OUT= 1 | DT= 5.0 min | OVERFLOW IS OFF

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)

	0.0000	0.0000	0.8460	1.8660
	0.0080	0.2340	1.0630	2.1640
	0.0130	0.4840	1.4780	2.4680
	0.0470	0.7470	1.9960	2.7800
	0.1760	1.0160	2.8820	2.8590
	0.3580	1.2930	4.4100	2.9390
	0.5810	1.5760	14.1270	3.2620

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0097)	71.470	5.116	1.83	19.60
OUTFLOW: ID= 1 (0211)	71.470	0.273	4.25	17.97

PEAK FLOW REDUCTION [Qout/Qin](%)= 5.33
TIME SHIFT OF PEAK FLOW (min)=145.00
MAXIMUM STORAGE USED (ha.m.)= 1.1631

```
       V    V   I    SSSSS  U   U    A    L              (v 6.2.2022)
       V    V   I    SS     U   U   A A   L
        V  V    I      SS   U   U  AAAAA  L
         V V    I       SS  U   U  A   A  L
          VV    I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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***** D E T A I L E D O U T P U T *****

Input filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
Output filename: C:\Users\kbobinac\AppData\Local\Civica\VH5\c6a42fd8-e61d-467c-b3ff-9063ee9e534e\bbb20832-9925-444a-b48b-52f4e11d15ce\sce
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DATE: 03/24/2026 TIME: 01:22:19

USER:

COMMENTS: _____

```
  ************************************************
  ** SIMULATION : C. 5yr 4hr 10min Chicago      **
  ************************************************
```

CHICAGO STORM	IDF curve parameters: A= 664.000
Ptotal= 44.36 mm	B= 4.700
	C= 0.744

used in: INTENSITY = A / (t + B)^C

Duration of storm = 4.00 hrs
Storm time step = 10.00 min
Time to peak ratio = 0.46

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	3.25	1.00	6.86	2.00	14.05	3.00	4.38

0.17	3.53	1.17	8.79	2.17	9.84	3.17	3.99
0.33	3.88	1.33	12.66	2.33	7.71	3.33	3.67
0.50	4.32	1.50	25.44	2.50	6.41	3.50	3.40
0.67	4.90	1.67	89.88	2.67	5.52	3.67	3.18
0.83	5.69	1.83	26.93	2.83	4.87	3.83	2.98

CALIB			
NASHYD (0076)	Area (ha)= 7.69	Curve Number (CN)= 75.0	
ID= 1 DT= 5.0 min	Ia (mm)= 5.00	# of Linear Res.(N)= 3.00	
	U.H. Tp(hrs)= 0.64		

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	3.25	1.083	6.86	2.083	14.05	3.08	4.38
0.167	3.25	1.167	6.86	2.167	14.05	3.17	4.38
0.250	3.53	1.250	8.79	2.250	9.84	3.25	3.99
0.333	3.53	1.333	8.79	2.333	9.84	3.33	3.99
0.417	3.88	1.417	12.66	2.417	7.71	3.42	3.67
0.500	3.88	1.500	12.66	2.500	7.71	3.50	3.67
0.583	4.32	1.583	25.44	2.583	6.41	3.58	3.40
0.667	4.32	1.667	25.44	2.667	6.41	3.67	3.40
0.750	4.90	1.750	89.88	2.750	5.52	3.75	3.18
0.833	4.90	1.833	89.88	2.833	5.52	3.83	3.18
0.917	5.69	1.917	26.93	2.917	4.87	3.92	2.98
1.000	5.69	2.000	26.93	3.000	4.87	4.00	2.98

Unit Hyd Qpeak (cms)= 0.459

PEAK FLOW (cms)= 0.145 (i)
TIME TO PEAK (hrs)= 2.583
RUNOFF VOLUME (mm)= 12.490
TOTAL RAINFALL (mm)= 44.358
RUNOFF COEFFICIENT = 0.282

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

CALIB			
NASHYD (0086)	Area (ha)= 13.79	Curve Number (CN)= 75.0	
ID= 1 DT= 5.0 min	Ia (mm)= 5.00	# of Linear Res.(N)= 3.00	
	U.H. Tp(hrs)= 0.80		

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	3.25	1.083	6.86	2.083	14.05	3.08	4.38
0.167	3.25	1.167	6.86	2.167	14.05	3.17	4.38
0.250	3.53	1.250	8.79	2.250	9.84	3.25	3.99
0.333	3.53	1.333	8.79	2.333	9.84	3.33	3.99
0.417	3.88	1.417	12.66	2.417	7.71	3.42	3.67
0.500	3.88	1.500	12.66	2.500	7.71	3.50	3.67
0.583	4.32	1.583	25.44	2.583	6.41	3.58	3.40
0.667	4.32	1.667	25.44	2.667	6.41	3.67	3.40
0.750	4.90	1.750	89.88	2.750	5.52	3.75	3.18
0.833	4.90	1.833	89.88	2.833	5.52	3.83	3.18
0.917	5.69	1.917	26.93	2.917	4.87	3.92	2.98
1.000	5.69	2.000	26.93	3.000	4.87	4.00	2.98

Unit Hyd Qpeak (cms)= 0.658

PEAK FLOW (cms)= 0.223 (i)

```
     TIME TO PEAK     (hrs)=   2.750
     RUNOFF VOLUME     (mm)=  12.490
     TOTAL RAINFALL    (mm)=  44.358
     RUNOFF COEFFICIENT    =   0.282

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

ADD HYD (0080)		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
1 + 2 = 3	ID1= 1 (0076):	7.69	0.145	2.58	12.49
	+ ID2= 2 (0086):	13.79	0.223	2.75	12.49
	ID = 3 (0080):	21.48	0.364	2.67	12.49

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0130) | IN= 2---> OUT= 1 | DT= 5.0 min — OVERFLOW IS OFF

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.5114	0.3494
0.0634	0.0054	0.5382	0.3871
0.1794	0.0430	0.5566	0.4140
0.2457	0.0806	0.5779	0.4462
0.2975	0.1183	0.5950	0.4731
0.3416	0.1559	0.6117	0.5000
0.3858	0.1989	0.6247	0.5215
0.4207	0.2365	0.6375	0.5430
0.4530	0.2742	0.6518	0.5677
0.4872	0.3172	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0080)	21.480	0.364	2.67	12.49
OUTFLOW: ID= 1 (0130)	21.480	0.239	3.58	12.49

```
     PEAK   FLOW   REDUCTION [Qout/Qin](%)= 65.55
     TIME SHIFT OF PEAK FLOW         (min)= 55.00
     MAXIMUM  STORAGE   USED       (ha.m.)=  0.0767
```

CALIB | NASHYD (0077) | ID= 1 DT= 5.0 min

```
     Area     (ha)=   4.01   Curve Number   (CN)= 75.0
     Ia       (mm)=   5.00   # of Linear Res.(N)= 3.00
     U.H. Tp(hrs)=   0.52
```

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	3.25	1.083	6.86	2.083	14.05	3.08	4.38
0.167	3.25	1.167	6.86	2.167	14.05	3.17	4.38
0.250	3.53	1.250	8.79	2.250	9.84	3.25	3.99
0.333	3.53	1.333	8.79	2.333	9.84	3.33	3.99
0.417	3.88	1.417	12.66	2.417	7.71	3.42	3.67
0.500	3.88	1.500	12.66	2.500	7.71	3.50	3.67
0.583	4.32	1.583	25.44	2.583	6.41	3.58	3.40
0.667	4.32	1.667	25.44	2.667	6.41	3.67	3.40
0.750	4.90	1.750	89.88	2.750	5.52	3.75	3.18
0.833	4.90	1.833	89.88	2.833	5.52	3.83	3.18
0.917	5.69	1.917	26.93	2.917	4.87	3.92	2.98
1.000	5.69	2.000	26.93	3.000	4.87	4.00	2.98

```
     Unit Hyd Qpeak  (cms)=   0.295
```



```
     PEAK FLOW       (cms)=   0.087 (i)
     TIME TO PEAK    (hrs)=   2.417
     RUNOFF VOLUME    (mm)=  12.489
     TOTAL RAINFALL   (mm)=  44.358
     RUNOFF COEFFICIENT   =   0.282

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

CALIB | STANDHYD (0078) | ID= 1 DT= 5.0 min

```
     Area     (ha)=  17.38
     Total Imp(%)=  60.00   Dir. Conn.(%)=  60.00
```

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	10.43	6.95
Dep. Storage	(mm)=	2.00	1.50
Average Slope	(%)=	1.00	1.00
Length	(m)=	340.39	40.00
Mannings n	=	0.015	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	3.25	1.083	6.86	2.083	14.05	3.08	4.38
0.167	3.25	1.167	6.86	2.167	14.05	3.17	4.38
0.250	3.53	1.250	8.79	2.250	9.84	3.25	3.99
0.333	3.53	1.333	8.79	2.333	9.84	3.33	3.99
0.417	3.88	1.417	12.66	2.417	7.71	3.42	3.67
0.500	3.88	1.500	12.66	2.500	7.71	3.50	3.67
0.583	4.32	1.583	25.44	2.583	6.41	3.58	3.40
0.667	4.32	1.667	25.44	2.667	6.41	3.67	3.40
0.750	4.90	1.750	89.88	2.750	5.52	3.75	3.18
0.833	4.90	1.833	89.88	2.833	5.52	3.83	3.18
0.917	5.69	1.917	26.93	2.917	4.87	3.92	2.98
1.000	5.69	2.000	26.93	3.000	4.87	4.00	2.98

				TOTALS
Max.Eff.Inten.(mm/hr)=	89.88	20.92		
over (min)	5.00	25.00		
Storage Coeff. (min)=	6.06 (ii)	22.31 (ii)		
Unit Hyd. Tpeak (min)=	5.00	25.00		
Unit Hyd. peak (cms)=	0.19	0.05		
PEAK FLOW (cms)=	2.23	0.23	2.310 (iii)	
TIME TO PEAK (hrs)=	1.83	2.17	1.83	
RUNOFF VOLUME (mm)=	42.36	14.40	31.18	
TOTAL RAINFALL (mm)=	44.36	44.36	44.36	
RUNOFF COEFFICIENT =	0.95	0.32	0.70	

```
     (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
         CN* =  75.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
```

ADD HYD (0128)		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
1 + 2 = 3	ID1= 1 (0077):	4.01	0.087	2.42	12.49
	+ ID2= 2 (0078):	17.38	2.310	1.83	31.18
	ID = 3 (0128):	21.39	2.329	1.83	27.67

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB							
NASHYD (0215)	Area (ha)= 1.45	Curve Number (CN)= 75.0					
ID= 1 DT= 5.0 min	Ia (mm)= 5.00	# of Linear Res.(N)= 3.00					
	U.H. Tp(hrs)= 0.82						

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	3.25	1.083	6.86	2.083	14.05	3.08	4.38
0.167	3.25	1.167	6.86	2.167	14.05	3.17	4.38
0.250	3.53	1.250	8.79	2.250	9.84	3.25	3.99
0.333	3.53	1.333	8.79	2.333	9.84	3.33	3.99
0.417	3.88	1.417	12.66	2.417	7.71	3.42	3.67
0.500	3.88	1.500	12.66	2.500	7.71	3.50	3.67
0.583	4.32	1.583	25.44	2.583	6.41	3.58	3.40
0.667	4.32	1.667	25.44	2.667	6.41	3.67	3.40
0.750	4.90	1.750	89.88	2.750	5.52	3.75	3.18
0.833	4.90	1.833	89.88	2.833	5.52	3.83	3.18
0.917	5.69	1.917	26.93	2.917	4.87	3.92	2.98
1.000	5.69	2.000	26.93	3.000	4.87	4.00	2.98

Unit Hyd Qpeak (cms)= 0.068

PEAK FLOW (cms)= 0.023 (i)
TIME TO PEAK (hrs)= 2.833
RUNOFF VOLUME (mm)= 12.489
TOTAL RAINFALL (mm)= 44.358
RUNOFF COEFFICIENT = 0.282

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

CALIB							
NASHYD (0109)	Area (ha)= 1.01	Curve Number (CN)= 75.0					
ID= 1 DT= 5.0 min	Ia (mm)= 5.00	# of Linear Res.(N)= 3.00					
	U.H. Tp(hrs)= 0.66						

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	3.25	1.083	6.86	2.083	14.05	3.08	4.38
0.167	3.25	1.167	6.86	2.167	14.05	3.17	4.38
0.250	3.53	1.250	8.79	2.250	9.84	3.25	3.99
0.333	3.53	1.333	8.79	2.333	9.84	3.33	3.99
0.417	3.88	1.417	12.66	2.417	7.71	3.42	3.67
0.500	3.88	1.500	12.66	2.500	7.71	3.50	3.67
0.583	4.32	1.583	25.44	2.583	6.41	3.58	3.40
0.667	4.32	1.667	25.44	2.667	6.41	3.67	3.40
0.750	4.90	1.750	89.88	2.750	5.52	3.75	3.18
0.833	4.90	1.833	89.88	2.833	5.52	3.83	3.18
0.917	5.69	1.917	26.93	2.917	4.87	3.92	2.98
1.000	5.69	2.000	26.93	3.000	4.87	4.00	2.98

Unit Hyd Qpeak (cms)= 0.058

PEAK FLOW (cms)= 0.019 (i)
TIME TO PEAK (hrs)= 2.583
RUNOFF VOLUME (mm)= 12.488
TOTAL RAINFALL (mm)= 44.358
RUNOFF COEFFICIENT = 0.282

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

CALIB			
STANDHYD (0082)	Area (ha)= 6.54		
ID= 1 DT= 5.0 min	Total Imp(%)= 70.00	Dir. Conn.(%)= 70.00	

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	4.58	1.96
Dep. Storage	(mm)=	1.50	1.50
Average Slope	(%)=	2.00	1.00
Length	(m)=	208.81	40.00
Mannings n	=	0.015	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	3.25	1.083	6.86	2.083	14.05	3.08	4.38
0.167	3.25	1.167	6.86	2.167	14.05	3.17	4.38
0.250	3.53	1.250	8.79	2.250	9.84	3.25	3.99
0.333	3.53	1.333	8.79	2.333	9.84	3.33	3.99
0.417	3.88	1.417	12.66	2.417	7.71	3.42	3.67
0.500	3.88	1.500	12.66	2.500	7.71	3.50	3.67
0.583	4.32	1.583	25.44	2.583	6.41	3.58	3.40
0.667	4.32	1.667	25.44	2.667	6.41	3.67	3.40
0.750	4.90	1.750	89.88	2.750	5.52	3.75	3.18
0.833	4.90	1.833	89.88	2.833	5.52	3.83	3.18
0.917	5.69	1.917	26.93	2.917	4.87	3.92	2.98
1.000	5.69	2.000	26.93	3.000	4.87	4.00	2.98

Max.Eff.Inten.(mm/hr)=	89.88	20.92		
over (min)	5.00	20.00		
Storage Coeff. (min)=	3.67 (ii)	19.92 (ii)		
Unit Hyd. Tpeak (min)=	5.00	20.00		
Unit Hyd. peak (cms)=	0.25	0.06		
			TOTALS	
PEAK FLOW (cms)=	1.09	0.07	1.119 (iii)	
TIME TO PEAK (hrs)=	1.83	2.08	1.83	
RUNOFF VOLUME (mm)=	42.86	14.40	34.32	
TOTAL RAINFALL (mm)=	44.36	44.36	44.36	
RUNOFF COEFFICIENT =	0.97	0.32	0.77	

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 75.0 Ia = Dep. 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 (0085)	Area (ha)= 15.38		
ID= 1 DT= 5.0 min	Total Imp(%)= 60.00	Dir. Conn.(%)= 60.00	

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	9.23	6.15
Dep. Storage	(mm)=	2.00	1.50
Average Slope	(%)=	1.00	1.00
Length	(m)=	320.21	40.00
Mannings n	=	0.015	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	3.25	1.083	6.86	2.083	14.05	3.08	4.38

0.167	3.25	1.167	6.86	2.167	14.05	3.17	4.38
0.250	3.53	1.250	8.79	2.250	9.84	3.25	3.99
0.333	3.53	1.333	8.79	2.333	9.84	3.33	3.99
0.417	3.88	1.417	12.66	2.417	7.71	3.42	3.67
0.500	3.88	1.500	12.66	2.500	7.71	3.50	3.67
0.583	4.32	1.583	25.44	2.583	6.41	3.58	3.40
0.667	4.32	1.667	25.44	2.667	6.41	3.67	3.40
0.750	4.90	1.750	89.88	2.750	5.52	3.75	3.18
0.833	4.90	1.833	89.88	2.833	5.52	3.83	3.18
0.917	5.69	1.917	26.93	2.917	4.87	3.92	2.98
1.000	5.69	2.000	26.93	3.000	4.87	4.00	2.98

Max.Eff.Inten.(mm/hr)=		89.88	20.92	
over (min)		5.00	25.00	
Storage Coeff. (min)=		5.84 (ii)	22.09 (ii)	
Unit Hyd. Tpeak (min)=		5.00	25.00	
Unit Hyd. peak (cms)=		0.20	0.05	
			TOTALS	
PEAK FLOW	(cms)=	1.99	0.20	2.065 (iii)
TIME TO PEAK	(hrs)=	1.83	2.17	1.83
RUNOFF VOLUME	(mm)=	42.36	14.40	31.18
TOTAL RAINFALL	(mm)=	44.36	44.36	44.36
RUNOFF COEFFICIENT	=	0.95	0.32	0.70

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 75.0 Ia = Dep. 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 (0110)	Area (ha)= 1.89		
ID= 1 DT= 5.0 min	Total Imp(%)= 60.00	Dir. Conn.(%)= 60.00	
	IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)= 1.13	0.76	
Dep. Storage	(mm)= 2.00	1.50	
Average Slope	(%)= 1.00	1.00	
Length	(m)= 112.25	40.00	
Mannings n	= 0.015	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	3.25	1.083	6.86	2.083	14.05	3.08	4.38
0.167	3.25	1.167	6.86	2.167	14.05	3.17	4.38
0.250	3.53	1.250	8.79	2.250	9.84	3.25	3.99
0.333	3.53	1.333	8.79	2.333	9.84	3.33	3.99
0.417	3.88	1.417	12.66	2.417	7.71	3.42	3.67
0.500	3.88	1.500	12.66	2.500	7.71	3.50	3.67
0.583	4.32	1.583	25.44	2.583	6.41	3.58	3.40
0.667	4.32	1.667	25.44	2.667	6.41	3.67	3.40
0.750	4.90	1.750	89.88	2.750	5.52	3.75	3.18
0.833	4.90	1.833	89.88	2.833	5.52	3.83	3.18
0.917	5.69	1.917	26.93	2.917	4.87	3.92	2.98
1.000	5.69	2.000	26.93	3.000	4.87	4.00	2.98

Max.Eff.Inten.(mm/hr)=		89.88	20.92	
over (min)		5.00	20.00	
Storage Coeff. (min)=		3.11 (ii)	19.36 (ii)	
Unit Hyd. Tpeak (min)=		5.00	20.00	
Unit Hyd. peak (cms)=		0.27	0.06	
			TOTALS	
PEAK FLOW	(cms)=	0.27	0.03	0.287 (iii)
TIME TO PEAK	(hrs)=	1.83	2.08	1.83
RUNOFF VOLUME	(mm)=	42.36	14.40	31.17

TOTAL RAINFALL (mm)=	44.36	44.36	44.36
RUNOFF COEFFICIENT =	0.95	0.32	0.70

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 75.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0111)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
	ID1= 1 (0110):	1.89	0.287	1.83	31.17
	+ ID2= 2 (0082):	6.54	1.119	1.83	34.32
	ID = 3 (0111):	8.43	1.406	1.83	33.61

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0111)		AREA	QPEAK	TPEAK	R.V.
3 + 2 = 1		(ha)	(cms)	(hrs)	(mm)
	ID1= 3 (0111):	8.43	1.406	1.83	33.61
	+ ID2= 2 (0085):	15.38	2.065	1.83	31.18
	ID = 1 (0111):	23.81	3.471	1.83	32.04

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB			
STANDHYD (0084)	Area (ha)= 2.33		
ID= 1 DT= 5.0 min	Total Imp(%)= 89.00	Dir. Conn.(%)= 89.00	
	IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)= 2.07	0.26	
Dep. Storage	(mm)= 0.00	1.50	
Average Slope	(%)= 1.00	1.00	
Length	(m)= 124.63	25.00	
Mannings n	= 0.015	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	3.25	1.083	6.86	2.083	14.05	3.08	4.38
0.167	3.25	1.167	6.86	2.167	14.05	3.17	4.38
0.250	3.53	1.250	8.79	2.250	9.84	3.25	3.99
0.333	3.53	1.333	8.79	2.333	9.84	3.33	3.99
0.417	3.88	1.417	12.66	2.417	7.71	3.42	3.67
0.500	3.88	1.500	12.66	2.500	7.71	3.50	3.67
0.583	4.32	1.583	25.44	2.583	6.41	3.58	3.40
0.667	4.32	1.667	25.44	2.667	6.41	3.67	3.40
0.750	4.90	1.750	89.88	2.750	5.52	3.75	3.18
0.833	4.90	1.833	89.88	2.833	5.52	3.83	3.18
0.917	5.69	1.917	26.93	2.917	4.87	3.92	2.98
1.000	5.69	2.000	26.93	3.000	4.87	4.00	2.98

Max.Eff.Inten.(mm/hr)=		89.88	29.86	
over (min)		5.00	10.00	
Storage Coeff. (min)=		3.32 (ii)	6.28 (ii)	
Unit Hyd. Tpeak (min)=		5.00	10.00	
Unit Hyd. peak (cms)=		0.26	0.15	

				TOTALS
PEAK FLOW	(cms)=	0.50	0.02	0.514 (iii)
TIME TO PEAK	(hrs)=	1.83	1.92	1.83
RUNOFF VOLUME	(mm)=	44.36	14.40	41.06
TOTAL RAINFALL	(mm)=	44.36	44.36	44.36
RUNOFF COEFFICIENT	=	1.00	0.32	0.93

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 75.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0081)
1 + 2 = 3

		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (	0109):	1.01	0.019	2.58	12.49
+ ID2= 2 (	0111):	23.81	3.471	1.83	32.04
ID = 3 (	0081):	24.82	3.473	1.83	31.24

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0081)
3 + 2 = 1

		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 3 (	0081):	24.82	3.473	1.83	31.24
+ ID2= 2 (	0128):	21.39	2.329	1.83	27.67
ID = 1 (	0081):	46.21	5.802	1.83	29.59

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0081)
1 + 2 = 3

		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (	0081):	46.21	5.802	1.83	29.59
+ ID2= 2 (	0215):	1.45	0.023	2.83	12.49
ID = 3 (	0081):	47.66	5.804	1.83	29.07

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0081)
3 + 2 = 1

		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 3 (	0081):	47.66	5.804	1.83	29.07
+ ID2= 2 (	0084):	2.33	0.514	1.83	41.06
ID = 1 (	0081):	49.99	6.318	1.83	29.63

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0097)
1 + 2 = 3

		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (	0130):	21.48	0.239	3.58	12.49
+ ID2= 2 (	0081):	49.99	6.318	1.83	29.63

ID = 3 (0097): 71.47 6.332 1.83 24.48

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0211)
IN= 2---> OUT= 1
DT= 5.0 min

OVERFLOW IS OFF

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.8460	1.8660
0.0080	0.2340	1.0630	2.1640
0.0130	0.4840	1.4780	2.4680
0.0470	0.7470	1.9960	2.7800
0.1760	1.0160	2.8820	2.8590
0.3580	1.2930	4.4100	2.9390
0.5810	1.5760	14.1270	3.2620

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0097)	71.470	6.332	1.83	24.48
OUTFLOW: ID= 1 (0211)	71.470	0.417	4.08	22.82

PEAK FLOW REDUCTION [Qout/Qin](%)= 6.58
TIME SHIFT OF PEAK FLOW (min)=135.00
MAXIMUM STORAGE USED (ha.m.)= 1.3683

V V I SSSSS U U A L (v 6.2.2022)
V V I SS U U A A L
V V I SS U U AAAAA L
V V I SS U U A A L
VV I SSSSS UUUUU A A LLLLL

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

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

Input filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
Output filename: C:\Users\kbobinac\AppData\Local\Civica\VH5\c6a42fd8-e61d-467c-b3ff-9063ee9e534e\bbb8a847-e4ce-4caf-ac08-f3be147bc517\sce
Summary filename: C:\Users\kbobinac\AppData\Local\Civica\VH5\c6a42fd8-e61d-467c-b3ff-9063ee9e534e\bbb8a847-e4ce-4caf-ac08-f3be147bc517\sce

DATE: 03/24/2026 TIME: 01:22:19

USER:

COMMENTS: _____

** SIMULATION : D. 10yr 4hr 10min Chicago **

CHICAGO STORM
Ptotal= 49.78 mm

IDF curve parameters: A= 724.000
B= 4.300
C= 0.739

used in: INTENSITY = A / (t + B)^C

Duration of storm = 4.00 hrs
Storm time step = 10.00 min
Time to peak ratio = 0.46

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	3.70	1.00	7.72	2.00	15.63	3.00	4.96
0.17	4.01	1.17	9.85	2.17	11.01	3.17	4.52
0.33	4.40	1.33	14.11	2.33	8.66	3.33	4.16
0.50	4.89	1.50	28.12	2.50	7.21	3.50	3.86
0.67	5.54	1.67	101.38	2.67	6.23	3.67	3.61
0.83	6.42	1.83	29.75	2.83	5.51	3.83	3.40

CALIB			
NASHYD (0076)	Area	(ha)= 7.69	Curve Number (CN)= 75.0
ID= 1 DT= 5.0 min	Ia	(mm)= 5.00	# of Linear Res.(N)= 3.00
	U.H. Tp	(hrs)= 0.64	

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	3.70	1.083	7.72	2.083	15.63	3.08	4.96
0.167	3.70	1.167	7.72	2.167	15.63	3.17	4.96
0.250	4.01	1.250	9.85	2.250	11.01	3.25	4.52
0.333	4.01	1.333	9.85	2.333	11.01	3.33	4.52
0.417	4.40	1.417	14.11	2.417	8.66	3.42	4.16
0.500	4.40	1.500	14.11	2.500	8.66	3.50	4.16
0.583	4.89	1.583	28.12	2.583	7.21	3.58	3.86
0.667	4.89	1.667	28.12	2.667	7.21	3.67	3.86
0.750	5.54	1.750	101.38	2.750	6.23	3.75	3.61
0.833	5.54	1.833	101.38	2.833	6.23	3.83	3.61
0.917	6.42	1.917	29.75	2.917	5.51	3.92	3.40
1.000	6.42	2.000	29.75	3.000	5.51	4.00	3.40

Unit Hyd Qpeak (cms)= 0.459

PEAK FLOW (cms)= 0.181 (i)
TIME TO PEAK (hrs)= 2.583
RUNOFF VOLUME (mm)= 15.488
TOTAL RAINFALL (mm)= 49.775
RUNOFF COEFFICIENT = 0.311

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

CALIB			
NASHYD (0086)	Area	(ha)= 13.79	Curve Number (CN)= 75.0
ID= 1 DT= 5.0 min	Ia	(mm)= 5.00	# of Linear Res.(N)= 3.00
	U.H. Tp	(hrs)= 0.80	

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	3.70	1.083	7.72	2.083	15.63	3.08	4.96
0.167	3.70	1.167	7.72	2.167	15.63	3.17	4.96
0.250	4.01	1.250	9.85	2.250	11.01	3.25	4.52
0.333	4.01	1.333	9.85	2.333	11.01	3.33	4.52
0.417	4.40	1.417	14.11	2.417	8.66	3.42	4.16
0.500	4.40	1.500	14.11	2.500	8.66	3.50	4.16
0.583	4.89	1.583	28.12	2.583	7.21	3.58	3.86

0.667	4.89	1.667	28.12	2.667	7.21	3.67	3.86
0.750	5.54	1.750	101.38	2.750	6.23	3.75	3.61
0.833	5.54	1.833	101.38	2.833	6.23	3.83	3.61
0.917	6.42	1.917	29.75	2.917	5.51	3.92	3.40
1.000	6.42	2.000	29.75	3.000	5.51	4.00	3.40

Unit Hyd Qpeak (cms)= 0.658

PEAK FLOW (cms)= 0.277 (i)
TIME TO PEAK (hrs)= 2.750
RUNOFF VOLUME (mm)= 15.488
TOTAL RAINFALL (mm)= 49.775
RUNOFF COEFFICIENT = 0.311

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

ADD HYD (0080)		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
1 + 2 = 3	ID1= 1 (0076):	7.69	0.181	2.58	15.49
	+ ID2= 2 (0086):	13.79	0.277	2.75	15.49
	ID = 3 (0080):	21.48	0.453	2.67	15.49

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0130)	OVERFLOW IS OFF			
IN= 2---> OUT= 1				
DT= 5.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.5114	0.3494
	0.0634	0.0054	0.5382	0.3871
	0.1794	0.0430	0.5566	0.4140
	0.2457	0.0806	0.5779	0.4462
	0.2975	0.1183	0.5950	0.4731
	0.3416	0.1559	0.6117	0.5000
	0.3858	0.1989	0.6247	0.5215
	0.4207	0.2365	0.6375	0.5430
	0.4530	0.2742	0.6518	0.5677
	0.4872	0.3172	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0080)	21.480	0.453	2.67	15.49
OUTFLOW: ID= 1 (0130)	21.480	0.278	3.67	15.49

PEAK FLOW REDUCTION [Qout/Qin](%)= 61.42
TIME SHIFT OF PEAK FLOW (min)= 60.00
MAXIMUM STORAGE USED (ha.m.)= 0.1043

CALIB			
NASHYD (0077)	Area	(ha)= 4.01	Curve Number (CN)= 75.0
ID= 1 DT= 5.0 min	Ia	(mm)= 5.00	# of Linear Res.(N)= 3.00
	U.H. Tp	(hrs)= 0.52	

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	3.70	1.083	7.72	2.083	15.63	3.08	4.96
0.167	3.70	1.167	7.72	2.167	15.63	3.17	4.96
0.250	4.01	1.250	9.85	2.250	11.01	3.25	4.52
0.333	4.01	1.333	9.85	2.333	11.01	3.33	4.52
0.417	4.40	1.417	14.11	2.417	8.66	3.42	4.16

0.500	4.40	1.500	14.11	2.500	8.66	3.50	4.16
0.583	4.89	1.583	28.12	2.583	7.21	3.58	3.86
0.667	4.89	1.667	28.12	2.667	7.21	3.67	3.86
0.750	5.54	1.750	101.38	2.750	6.23	3.75	3.61
0.833	5.54	1.833	101.38	2.833	6.23	3.83	3.61
0.917	6.42	1.917	29.75	2.917	5.51	3.92	3.40
1.000	6.42	2.000	29.75	3.000	5.51	4.00	3.40

Unit Hyd Qpeak (cms)= 0.295

PEAK FLOW (cms)= 0.109 (i)
TIME TO PEAK (hrs)= 2.417
RUNOFF VOLUME (mm)= 15.487
TOTAL RAINFALL (mm)= 49.775
RUNOFF COEFFICIENT = 0.311

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

CALIB STANDHYD (0078) ID= 1 DT= 5.0 min	Area (ha)= 17.38 Total Imp(%)= 60.00 Dir. Conn.(%)= 60.00

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	10.43	6.95
Dep. Storage (mm)=	2.00	1.50
Average Slope (%)=	1.00	1.00
Length (m)=	340.39	40.00
Mannings n =	0.015	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	3.70	1.083	7.72	2.083	15.63	3.08	4.96
0.167	3.70	1.167	7.72	2.167	15.63	3.17	4.96
0.250	4.01	1.250	9.85	2.250	11.01	3.25	4.52
0.333	4.01	1.333	9.85	2.333	11.01	3.33	4.52
0.417	4.40	1.417	14.11	2.417	8.66	3.42	4.16
0.500	4.40	1.500	14.11	2.500	8.66	3.50	4.16
0.583	4.89	1.583	28.12	2.583	7.21	3.58	3.86
0.667	4.89	1.667	28.12	2.667	7.21	3.67	3.86
0.750	5.54	1.750	101.38	2.750	6.23	3.75	3.61
0.833	5.54	1.833	101.38	2.833	6.23	3.83	3.61
0.917	6.42	1.917	29.75	2.917	5.51	3.92	3.40
1.000	6.42	2.000	29.75	3.000	5.51	4.00	3.40

			TOTALS
Max.Eff.Inten.(mm/hr)=	101.38	29.17	
over (min)	5.00	20.00	
Storage Coeff. (min)=	5.77 (ii)	20.00 (ii)	
Unit Hyd. Tpeak (min)=	5.00	20.00	
Unit Hyd. peak (cms)=	0.20	0.06	
PEAK FLOW (cms)=	2.55	0.30	2.680 (iii)
TIME TO PEAK (hrs)=	1.83	2.08	1.83
RUNOFF VOLUME (mm)=	47.78	17.53	35.68
TOTAL RAINFALL (mm)=	49.78	49.78	49.78
RUNOFF COEFFICIENT =	0.96	0.35	0.72

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 75.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0128) 1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0077):	4.01	0.109	2.42	15.49
+ ID2= 2 (0078):	17.38	2.680	1.83	35.68
ID = 3 (0128):	21.39	2.705	1.83	31.89

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB NASHYD (0215) ID= 1 DT= 5.0 min	Area (ha)= 1.45 Curve Number (CN)= 75.0 Ia (mm)= 5.00 # of Linear Res.(N)= 3.00 U.H. Tp(hrs)= 0.82

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	3.70	1.083	7.72	2.083	15.63	3.08	4.96
0.167	3.70	1.167	7.72	2.167	15.63	3.17	4.96
0.250	4.01	1.250	9.85	2.250	11.01	3.25	4.52
0.333	4.01	1.333	9.85	2.333	11.01	3.33	4.52
0.417	4.40	1.417	14.11	2.417	8.66	3.42	4.16
0.500	4.40	1.500	14.11	2.500	8.66	3.50	4.16
0.583	4.89	1.583	28.12	2.583	7.21	3.58	3.86
0.667	4.89	1.667	28.12	2.667	7.21	3.67	3.86
0.750	5.54	1.750	101.38	2.750	6.23	3.75	3.61
0.833	5.54	1.833	101.38	2.833	6.23	3.83	3.61
0.917	6.42	1.917	29.75	2.917	5.51	3.92	3.40
1.000	6.42	2.000	29.75	3.000	5.51	4.00	3.40

Unit Hyd Qpeak (cms)= 0.068

PEAK FLOW (cms)= 0.029 (i)
TIME TO PEAK (hrs)= 2.833
RUNOFF VOLUME (mm)= 15.487
TOTAL RAINFALL (mm)= 49.775
RUNOFF COEFFICIENT = 0.311

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

CALIB NASHYD (0109) ID= 1 DT= 5.0 min	Area (ha)= 1.01 Curve Number (CN)= 75.0 Ia (mm)= 5.00 # of Linear Res.(N)= 3.00 U.H. Tp(hrs)= 0.66

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	3.70	1.083	7.72	2.083	15.63	3.08	4.96
0.167	3.70	1.167	7.72	2.167	15.63	3.17	4.96
0.250	4.01	1.250	9.85	2.250	11.01	3.25	4.52
0.333	4.01	1.333	9.85	2.333	11.01	3.33	4.52
0.417	4.40	1.417	14.11	2.417	8.66	3.42	4.16
0.500	4.40	1.500	14.11	2.500	8.66	3.50	4.16
0.583	4.89	1.583	28.12	2.583	7.21	3.58	3.86
0.667	4.89	1.667	28.12	2.667	7.21	3.67	3.86
0.750	5.54	1.750	101.38	2.750	6.23	3.75	3.61
0.833	5.54	1.833	101.38	2.833	6.23	3.83	3.61
0.917	6.42	1.917	29.75	2.917	5.51	3.92	3.40
1.000	6.42	2.000	29.75	3.000	5.51	4.00	3.40

Unit Hyd Qpeak (cms)= 0.058

```
     PEAK FLOW       (cms)=   0.023 (i)
     TIME TO PEAK    (hrs)=   2.583
     RUNOFF VOLUME    (mm)=  15.487
     TOTAL RAINFALL   (mm)=  49.775
     RUNOFF COEFFICIENT   =   0.311

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0082)|   Area    (ha)=   6.54
|ID= 1 DT= 5.0 min |   Total Imp(%)=  70.00   Dir. Conn.(%)=  70.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       4.58         1.96
     Dep. Storage     (mm)=       1.50         1.50
     Average Slope     (%)=       2.00         1.00
     Length            (m)=     208.81        40.00
     Mannings n            =      0.015        0.250

         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    3.70 | 1.083    7.72 | 2.083   15.63 |  3.08    4.96
              0.167    3.70 | 1.167    7.72 | 2.167   15.63 |  3.17    4.96
              0.250    4.01 | 1.250    9.85 | 2.250   11.01 |  3.25    4.52
              0.333    4.01 | 1.333    9.85 | 2.333   11.01 |  3.33    4.52
              0.417    4.40 | 1.417   14.11 | 2.417    8.66 |  3.42    4.16
              0.500    4.40 | 1.500   14.11 | 2.500    8.66 |  3.50    4.16
              0.583    4.89 | 1.583   28.12 | 2.583    7.21 |  3.58    3.86
              0.667    4.89 | 1.667   28.12 | 2.667    7.21 |  3.67    3.86
              0.750    5.54 | 1.750  101.38 | 2.750    6.23 |  3.75    3.61
              0.833    5.54 | 1.833  101.38 | 2.833    6.23 |  3.83    3.61
              0.917    6.42 | 1.917   29.75 | 2.917    5.51 |  3.92    3.40
              1.000    6.42 | 2.000   29.75 | 3.000    5.51 |  4.00    3.40

     Max.Eff.Inten.(mm/hr)=     101.38        29.17
               over (min)        5.00        20.00
     Storage Coeff.  (min)=       3.50 (ii)   17.72 (ii)
     Unit Hyd. Tpeak (min)=       5.00        20.00
     Unit Hyd. peak  (cms)=       0.26         0.06
                                                    *TOTALS*
     PEAK FLOW       (cms)=       1.24         0.09          1.275 (iii)
     TIME TO PEAK    (hrs)=       1.83         2.08           1.83
     RUNOFF VOLUME    (mm)=      48.28        17.53          39.05
     TOTAL RAINFALL   (mm)=      49.78        49.78          49.78
     RUNOFF COEFFICIENT   =       0.97         0.35           0.78

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =  75.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB            |
| STANDHYD (  0085)|   Area    (ha)=  15.38
|ID= 1 DT= 5.0 min |   Total Imp(%)=  60.00   Dir. Conn.(%)=  60.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       9.23         6.15
     Dep. Storage     (mm)=       2.00         1.50
     Average Slope     (%)=       1.00         1.00
     Length            (m)=     320.21        40.00
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```
     Mannings n            =      0.015        0.250

         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    3.70 | 1.083    7.72 | 2.083   15.63 |  3.08    4.96
              0.167    3.70 | 1.167    7.72 | 2.167   15.63 |  3.17    4.96
              0.250    4.01 | 1.250    9.85 | 2.250   11.01 |  3.25    4.52
              0.333    4.01 | 1.333    9.85 | 2.333   11.01 |  3.33    4.52
              0.417    4.40 | 1.417   14.11 | 2.417    8.66 |  3.42    4.16
              0.500    4.40 | 1.500   14.11 | 2.500    8.66 |  3.50    4.16
              0.583    4.89 | 1.583   28.12 | 2.583    7.21 |  3.58    3.86
              0.667    4.89 | 1.667   28.12 | 2.667    7.21 |  3.67    3.86
              0.750    5.54 | 1.750  101.38 | 2.750    6.23 |  3.75    3.61
              0.833    5.54 | 1.833  101.38 | 2.833    6.23 |  3.83    3.61
              0.917    6.42 | 1.917   29.75 | 2.917    5.51 |  3.92    3.40
              1.000    6.42 | 2.000   29.75 | 3.000    5.51 |  4.00    3.40

     Max.Eff.Inten.(mm/hr)=     101.38        29.17
               over (min)        5.00        20.00
     Storage Coeff.  (min)=       5.57 (ii)   19.79 (ii)
     Unit Hyd. Tpeak (min)=       5.00        20.00
     Unit Hyd. peak  (cms)=       0.20         0.06
                                                    *TOTALS*
     PEAK FLOW       (cms)=       2.28         0.27          2.395 (iii)
     TIME TO PEAK    (hrs)=       1.83         2.08           1.83
     RUNOFF VOLUME    (mm)=      47.78        17.53          35.68
     TOTAL RAINFALL   (mm)=      49.78        49.78          49.78
     RUNOFF COEFFICIENT   =       0.96         0.35           0.72


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =  75.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB            |
| STANDHYD (  0110)|   Area    (ha)=   1.89
|ID= 1 DT= 5.0 min |   Total Imp(%)=  60.00   Dir. Conn.(%)=  60.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.13         0.76
     Dep. Storage     (mm)=       2.00         1.50
     Average Slope     (%)=       1.00         1.00
     Length            (m)=     112.25        40.00
     Mannings n            =      0.015        0.250

         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    3.70 | 1.083    7.72 | 2.083   15.63 |  3.08    4.96
              0.167    3.70 | 1.167    7.72 | 2.167   15.63 |  3.17    4.96
              0.250    4.01 | 1.250    9.85 | 2.250   11.01 |  3.25    4.52
              0.333    4.01 | 1.333    9.85 | 2.333   11.01 |  3.33    4.52
              0.417    4.40 | 1.417   14.11 | 2.417    8.66 |  3.42    4.16
              0.500    4.40 | 1.500   14.11 | 2.500    8.66 |  3.50    4.16
              0.583    4.89 | 1.583   28.12 | 2.583    7.21 |  3.58    3.86
              0.667    4.89 | 1.667   28.12 | 2.667    7.21 |  3.67    3.86
              0.750    5.54 | 1.750  101.38 | 2.750    6.23 |  3.75    3.61
              0.833    5.54 | 1.833  101.38 | 2.833    6.23 |  3.83    3.61
              0.917    6.42 | 1.917   29.75 | 2.917    5.51 |  3.92    3.40
              1.000    6.42 | 2.000   29.75 | 3.000    5.51 |  4.00    3.40
```

```
     Max.Eff.Inten.(mm/hr)=     101.38        29.17
               over (min)         5.00        20.00
     Storage Coeff.  (min)=       2.97 (ii)   17.19 (ii)
     Unit Hyd. Tpeak (min)=       5.00        20.00
     Unit Hyd. peak  (cms)=       0.28         0.06
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.31         0.04          0.327 (iii)
     TIME TO PEAK    (hrs)=       1.83         2.08          1.83
     RUNOFF VOLUME    (mm)=      47.78        17.53         35.67
     TOTAL RAINFALL   (mm)=      49.78        49.78         49.78
     RUNOFF COEFFICIENT   =       0.96         0.35          0.72

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  75.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
```

ADD HYD (0111)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0110):		1.89	0.327	1.83	35.67
+ ID2= 2 (0082):		6.54	1.275	1.83	39.05
ID = 3 (0111):		8.43	1.602	1.83	38.29

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0111)		AREA	QPEAK	TPEAK	R.V.
3 + 2 = 1		(ha)	(cms)	(hrs)	(mm)
ID1= 3 (0111):		8.43	1.602	1.83	38.29
+ ID2= 2 (0085):		15.38	2.395	1.83	35.68
ID = 1 (0111):		23.81	3.997	1.83	36.60

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB			
STANDHYD (0084)	Area (ha)=	2.33	
ID= 1 DT= 5.0 min	Total Imp(%)=	89.00	Dir. Conn.(%)= 89.00

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	2.07	0.26
Dep. Storage (mm)=	0.00	1.50
Average Slope (%)=	1.00	1.00
Length (m)=	124.63	25.00
Mannings n =	0.015	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	3.70	1.083	7.72	2.083	15.63	3.08	4.96
0.167	3.70	1.167	7.72	2.167	15.63	3.17	4.96
0.250	4.01	1.250	9.85	2.250	11.01	3.25	4.52
0.333	4.01	1.333	9.85	2.333	11.01	3.33	4.52
0.417	4.40	1.417	14.11	2.417	8.66	3.42	4.16
0.500	4.40	1.500	14.11	2.500	8.66	3.50	4.16
0.583	4.89	1.583	28.12	2.583	7.21	3.58	3.86
0.667	4.89	1.667	28.12	2.667	7.21	3.67	3.86
0.750	5.54	1.750	101.38	2.750	6.23	3.75	3.61
0.833	5.54	1.833	101.38	2.833	6.23	3.83	3.61
0.917	6.42	1.917	29.75	2.917	5.51	3.92	3.40
1.000	6.42	2.000	29.75	3.000	5.51	4.00	3.40


```
     Max.Eff.Inten.(mm/hr)=     101.38        36.79
               over (min)         5.00        10.00
     Storage Coeff.  (min)=       3.16 (ii)    5.98 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.27         0.15
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.57         0.02          0.584 (iii)
     TIME TO PEAK    (hrs)=       1.83         1.92          1.83
     RUNOFF VOLUME    (mm)=      49.78        17.53         46.23
     TOTAL RAINFALL   (mm)=      49.78        49.78         49.78
     RUNOFF COEFFICIENT   =       1.00         0.35          0.93

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  75.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
```

ADD HYD (0081)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0109):		1.01	0.023	2.58	15.49
+ ID2= 2 (0111):		23.81	3.997	1.83	36.60
ID = 3 (0081):		24.82	4.001	1.83	35.74

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0081)		AREA	QPEAK	TPEAK	R.V.
3 + 2 = 1		(ha)	(cms)	(hrs)	(mm)
ID1= 3 (0081):		24.82	4.001	1.83	35.74
+ ID2= 2 (0128):		21.39	2.705	1.83	31.89
ID = 1 (0081):		46.21	6.706	1.83	33.96

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0081)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0081):		46.21	6.706	1.83	33.96
+ ID2= 2 (0215):		1.45	0.029	2.83	15.49
ID = 3 (0081):		47.66	6.709	1.83	33.40

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0081)		AREA	QPEAK	TPEAK	R.V.
3 + 2 = 1		(ha)	(cms)	(hrs)	(mm)
ID1= 3 (0081):		47.66	6.709	1.83	33.40
+ ID2= 2 (0084):		2.33	0.584	1.83	46.23
ID = 1 (0081):		49.99	7.293	1.83	34.00

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0097)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
	ID1= 1 (0130):	21.48	0.278	3.67	15.49
	+ ID2= 2 (0081):	49.99	7.293	1.83	34.00
	ID = 3 (0097):	71.47	7.313	1.83	28.43

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0211)	OVERFLOW IS OFF			
IN= 2---> OUT= 1				
DT= 5.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.8460	1.8660
	0.0080	0.2340	1.0630	2.1640
	0.0130	0.4840	1.4780	2.4680
	0.0470	0.7470	1.9960	2.7800
	0.1760	1.0160	2.8820	2.8590
	0.3580	1.2930	4.4100	2.9390
	0.5810	1.5760	14.1270	3.2620

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0097)	71.470	7.313	1.83	28.43
OUTFLOW: ID= 1 (0211)	71.470	0.539	4.08	26.76

PEAK FLOW REDUCTION [Qout/Qin](%)= 7.37
TIME SHIFT OF PEAK FLOW (min)=135.00
MAXIMUM STORAGE USED (ha.m.)= 1.5226

```
       V    V   I    SSSSS  U   U    A    L              (v 6.2.2022)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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***** D E T A I L E D O U T P U T *****

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DATE: 03/24/2026 TIME: 01:22:18

USER:

COMMENTS: _____

```
  ************************************************
  ** SIMULATION : E. 25yr 4hr 10min Chicago     **
  ************************************************
```

CHICAGO STORM	IDF curve parameters: A= 821.000
Ptotal= 57.75 mm	B= 4.000
	C= 0.735
	used in: INTENSITY = A / (t + B)^C

Duration of storm = 4.00 hrs
Storm time step = 10.00 min
Time to peak ratio = 0.46

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	4.33	1.00	8.98	2.00	18.02	3.00	5.79
0.17	4.70	1.17	11.42	2.17	12.75	3.17	5.29
0.33	5.15	1.33	16.29	2.33	10.06	3.33	4.87
0.50	5.72	1.50	32.24	2.50	8.40	3.50	4.53
0.67	6.47	1.67	118.02	2.67	7.26	3.67	4.24
0.83	7.48	1.83	34.10	2.83	6.43	3.83	3.98

CALIB					
NASHYD (0076)	Area	(ha)=	7.69	Curve Number	(CN)= 75.0
ID= 1 DT= 5.0 min	Ia	(mm)=	5.00	# of Linear Res.(N)=	3.00
	U.H. Tp(hrs)=		0.64		

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	4.33	1.083	8.98	2.083	18.02	3.08	5.79
0.167	4.33	1.167	8.98	2.167	18.02	3.17	5.79
0.250	4.70	1.250	11.42	2.250	12.75	3.25	5.29
0.333	4.70	1.333	11.42	2.333	12.75	3.33	5.29
0.417	5.15	1.417	16.29	2.417	10.06	3.42	4.87
0.500	5.15	1.500	16.29	2.500	10.06	3.50	4.87
0.583	5.72	1.583	32.24	2.583	8.40	3.58	4.53
0.667	5.72	1.667	32.24	2.667	8.40	3.67	4.53
0.750	6.47	1.750	118.02	2.750	7.26	3.75	4.24
0.833	6.47	1.833	118.02	2.833	7.26	3.83	4.24
0.917	7.48	1.917	34.10	2.917	6.43	3.92	3.98
1.000	7.48	2.000	34.10	3.000	6.43	4.00	3.98

Unit Hyd Qpeak (cms)= 0.459

PEAK FLOW (cms)= 0.238 (i)
TIME TO PEAK (hrs)= 2.583
RUNOFF VOLUME (mm)= 20.249
TOTAL RAINFALL (mm)= 57.751
RUNOFF COEFFICIENT = 0.351

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

CALIB					
NASHYD (0086)	Area	(ha)=	13.79	Curve Number	(CN)= 75.0
ID= 1 DT= 5.0 min	Ia	(mm)=	5.00	# of Linear Res.(N)=	3.00
	U.H. Tp(hrs)=		0.80		

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	4.33	1.083	8.98	2.083	18.02	3.08	5.79
0.167	4.33	1.167	8.98	2.167	18.02	3.17	5.79
0.250	4.70	1.250	11.42	2.250	12.75	3.25	5.29
0.333	4.70	1.333	11.42	2.333	12.75	3.33	5.29
0.417	5.15	1.417	16.29	2.417	10.06	3.42	4.87
0.500	5.15	1.500	16.29	2.500	10.06	3.50	4.87
0.583	5.72	1.583	32.24	2.583	8.40	3.58	4.53
0.667	5.72	1.667	32.24	2.667	8.40	3.67	4.53
0.750	6.47	1.750	118.02	2.750	7.26	3.75	4.24
0.833	6.47	1.833	118.02	2.833	7.26	3.83	4.24
0.917	7.48	1.917	34.10	2.917	6.43	3.92	3.98
1.000	7.48	2.000	34.10	3.000	6.43	4.00	3.98

Unit Hyd Qpeak (cms)= 0.658

PEAK FLOW (cms)= 0.364 (i)
TIME TO PEAK (hrs)= 2.750
RUNOFF VOLUME (mm)= 20.250
TOTAL RAINFALL (mm)= 57.751
RUNOFF COEFFICIENT = 0.351

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

ADD HYD (0080)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0076):	7.69	0.238	2.58	20.25
+ ID2= 2 (0086):	13.79	0.364	2.75	20.25
ID = 3 (0080):	21.48	0.596	2.67	20.25

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0130)
IN= 2---> OUT= 1
DT= 5.0 min

OVERFLOW IS OFF

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.5114	0.3494
0.0634	0.0054	0.5382	0.3871
0.1794	0.0430	0.5566	0.4140
0.2457	0.0806	0.5779	0.4462
0.2975	0.1183	0.5950	0.4731
0.3416	0.1559	0.6117	0.5000
0.3858	0.1989	0.6247	0.5215
0.4207	0.2365	0.6375	0.5430
0.4530	0.2742	0.6518	0.5677
0.4872	0.3172	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0080)	21.480	0.596	2.67	20.25
OUTFLOW: ID= 1 (0130)	21.480	0.337	3.75	20.25

PEAK FLOW REDUCTION [Qout/Qin](%)= 56.63
TIME SHIFT OF PEAK FLOW (min)= 65.00
MAXIMUM STORAGE USED (ha.m.)= 0.1523

CALIB
NASHYD (0077)
ID= 1 DT= 5.0 min

Area (ha)= 4.01 Curve Number (CN)= 75.0
Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.52

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	4.33	1.083	8.98	2.083	18.02	3.08	5.79
0.167	4.33	1.167	8.98	2.167	18.02	3.17	5.79
0.250	4.70	1.250	11.42	2.250	12.75	3.25	5.29
0.333	4.70	1.333	11.42	2.333	12.75	3.33	5.29
0.417	5.15	1.417	16.29	2.417	10.06	3.42	4.87
0.500	5.15	1.500	16.29	2.500	10.06	3.50	4.87
0.583	5.72	1.583	32.24	2.583	8.40	3.58	4.53
0.667	5.72	1.667	32.24	2.667	8.40	3.67	4.53
0.750	6.47	1.750	118.02	2.750	7.26	3.75	4.24
0.833	6.47	1.833	118.02	2.833	7.26	3.83	4.24
0.917	7.48	1.917	34.10	2.917	6.43	3.92	3.98
1.000	7.48	2.000	34.10	3.000	6.43	4.00	3.98

Unit Hyd Qpeak (cms)= 0.295

PEAK FLOW (cms)= 0.143 (i)
TIME TO PEAK (hrs)= 2.417
RUNOFF VOLUME (mm)= 20.249
TOTAL RAINFALL (mm)= 57.751
RUNOFF COEFFICIENT = 0.351

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

CALIB
STANDHYD (0078)
ID= 1 DT= 5.0 min

Area (ha)= 17.38
Total Imp(%)= 60.00 Dir. Conn.(%)= 60.00

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	10.43	6.95
Dep. Storage (mm)=	2.00	1.50
Average Slope (%)=	1.00	1.00
Length (m)=	340.39	40.00
Mannings n =	0.015	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	4.33	1.083	8.98	2.083	18.02	3.08	5.79
0.167	4.33	1.167	8.98	2.167	18.02	3.17	5.79
0.250	4.70	1.250	11.42	2.250	12.75	3.25	5.29
0.333	4.70	1.333	11.42	2.333	12.75	3.33	5.29
0.417	5.15	1.417	16.29	2.417	10.06	3.42	4.87
0.500	5.15	1.500	16.29	2.500	10.06	3.50	4.87
0.583	5.72	1.583	32.24	2.583	8.40	3.58	4.53
0.667	5.72	1.667	32.24	2.667	8.40	3.67	4.53
0.750	6.47	1.750	118.02	2.750	7.26	3.75	4.24
0.833	6.47	1.833	118.02	2.833	7.26	3.83	4.24
0.917	7.48	1.917	34.10	2.917	6.43	3.92	3.98
1.000	7.48	2.000	34.10	3.000	6.43	4.00	3.98

			TOTALS
Max.Eff.Inten.(mm/hr)=	118.02	37.64	
over (min)	5.00	20.00	
Storage Coeff. (min)=	5.43 (ii)	18.28 (ii)	
Unit Hyd. Tpeak (min)=	5.00	20.00	
Unit Hyd. peak (cms)=	0.20	0.06	
PEAK FLOW (cms)=	3.01	0.41	3.195 (iii)
TIME TO PEAK (hrs)=	1.83	2.08	1.83
RUNOFF VOLUME (mm)=	55.75	22.45	42.43
TOTAL RAINFALL (mm)=	57.75	57.75	57.75
RUNOFF COEFFICIENT =	0.97	0.39	0.73

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 75.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0128)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
	ID1= 1 (0077):	4.01	0.143	2.42	20.25
	+ ID2= 2 (0078):	17.38	3.195	1.83	42.43
	ID = 3 (0128):	21.39	3.230	1.83	38.27

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB NASHYD (0215) ID= 1 DT= 5.0 min	Area (ha)= 1.45 Curve Number (CN)= 75.0 Ia (mm)= 5.00 # of Linear Res.(N)= 3.00 U.H. Tp(hrs)= 0.82

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

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	4.33	1.083	8.98	2.083	18.02	3.08	5.79
0.167	4.33	1.167	8.98	2.167	18.02	3.17	5.79
0.250	4.70	1.250	11.42	2.250	12.75	3.25	5.29
0.333	4.70	1.333	11.42	2.333	12.75	3.33	5.29
0.417	5.15	1.417	16.29	2.417	10.06	3.42	4.87
0.500	5.15	1.500	16.29	2.500	10.06	3.50	4.87
0.583	5.72	1.583	32.24	2.583	8.40	3.58	4.53
0.667	5.72	1.667	32.24	2.667	8.40	3.67	4.53
0.750	6.47	1.750	118.02	2.750	7.26	3.75	4.24
0.833	6.47	1.833	118.02	2.833	7.26	3.83	4.24
0.917	7.48	1.917	34.10	2.917	6.43	3.92	3.98
1.000	7.48	2.000	34.10	3.000	6.43	4.00	3.98

Unit Hyd Qpeak (cms)= 0.068

PEAK FLOW (cms)= 0.038 (i)
TIME TO PEAK (hrs)= 2.750
RUNOFF VOLUME (mm)= 20.249
TOTAL RAINFALL (mm)= 57.751
RUNOFF COEFFICIENT = 0.351

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

CALIB NASHYD (0109) ID= 1 DT= 5.0 min	Area (ha)= 1.01 Curve Number (CN)= 75.0 Ia (mm)= 5.00 # of Linear Res.(N)= 3.00 U.H. Tp(hrs)= 0.66

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

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	4.33	1.083	8.98	2.083	18.02	3.08	5.79
0.167	4.33	1.167	8.98	2.167	18.02	3.17	5.79
0.250	4.70	1.250	11.42	2.250	12.75	3.25	5.29
0.333	4.70	1.333	11.42	2.333	12.75	3.33	5.29
0.417	5.15	1.417	16.29	2.417	10.06	3.42	4.87

0.500	5.15	1.500	16.29	2.500	10.06	3.50	4.87
0.583	5.72	1.583	32.24	2.583	8.40	3.58	4.53
0.667	5.72	1.667	32.24	2.667	8.40	3.67	4.53
0.750	6.47	1.750	118.02	2.750	7.26	3.75	4.24
0.833	6.47	1.833	118.02	2.833	7.26	3.83	4.24
0.917	7.48	1.917	34.10	2.917	6.43	3.92	3.98
1.000	7.48	2.000	34.10	3.000	6.43	4.00	3.98

Unit Hyd Qpeak (cms)= 0.058

PEAK FLOW (cms)= 0.031 (i)
TIME TO PEAK (hrs)= 2.583
RUNOFF VOLUME (mm)= 20.248
TOTAL RAINFALL (mm)= 57.751
RUNOFF COEFFICIENT = 0.351

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

CALIB STANDHYD (0082) ID= 1 DT= 5.0 min	Area (ha)= 6.54 Total Imp(%)= 70.00 Dir. Conn.(%)= 70.00

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	4.58	1.96
Dep. Storage (mm)=	1.50	1.50
Average Slope (%)=	2.00	1.00
Length (m)=	208.81	40.00
Mannings n =	0.015	0.250

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

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	4.33	1.083	8.98	2.083	18.02	3.08	5.79
0.167	4.33	1.167	8.98	2.167	18.02	3.17	5.79
0.250	4.70	1.250	11.42	2.250	12.75	3.25	5.29
0.333	4.70	1.333	11.42	2.333	12.75	3.33	5.29
0.417	5.15	1.417	16.29	2.417	10.06	3.42	4.87
0.500	5.15	1.500	16.29	2.500	10.06	3.50	4.87
0.583	5.72	1.583	32.24	2.583	8.40	3.58	4.53
0.667	5.72	1.667	32.24	2.667	8.40	3.67	4.53
0.750	6.47	1.750	118.02	2.750	7.26	3.75	4.24
0.833	6.47	1.833	118.02	2.833	7.26	3.83	4.24
0.917	7.48	1.917	34.10	2.917	6.43	3.92	3.98
1.000	7.48	2.000	34.10	3.000	6.43	4.00	3.98

Max.Eff.Inten.(mm/hr)=	118.02	37.64	
over (min)	5.00	20.00	
Storage Coeff. (min)=	3.29 (ii)	16.14 (ii)	
Unit Hyd. Tpeak (min)=	5.00	20.00	
Unit Hyd. peak (cms)=	0.27	0.06	
			TOTALS
PEAK FLOW (cms)=	1.45	0.12	1.503 (iii)
TIME TO PEAK (hrs)=	1.83	2.08	1.83
RUNOFF VOLUME (mm)=	56.25	22.45	46.11
TOTAL RAINFALL (mm)=	57.75	57.75	57.75
RUNOFF COEFFICIENT =	0.97	0.39	0.80

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 75.0 Ia = Dep. 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 (  0085)  |   Area    (ha)=  15.38
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  60.00   Dir. Conn.(%)=  60.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       9.23         6.15
     Dep. Storage     (mm)=       2.00         1.50
     Average Slope     (%)=       1.00         1.00
     Length            (m)=     320.21        40.00
     Mannings n           =      0.015        0.250

         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    4.33 | 1.083    8.98 | 2.083   18.02 |  3.08    5.79
              0.167    4.33 | 1.167    8.98 | 2.167   18.02 |  3.17    5.79
              0.250    4.70 | 1.250   11.42 | 2.250   12.75 |  3.25    5.29
              0.333    4.70 | 1.333   11.42 | 2.333   12.75 |  3.33    5.29
              0.417    5.15 | 1.417   16.29 | 2.417   10.06 |  3.42    4.87
              0.500    5.15 | 1.500   16.29 | 2.500   10.06 |  3.50    4.87
              0.583    5.72 | 1.583   32.24 | 2.583    8.40 |  3.58    4.53
              0.667    5.72 | 1.667   32.24 | 2.667    8.40 |  3.67    4.53
              0.750    6.47 | 1.750  118.02 | 2.750    7.26 |  3.75    4.24
              0.833    6.47 | 1.833  118.02 | 2.833    7.26 |  3.83    4.24
              0.917    7.48 | 1.917   34.10 | 2.917    6.43 |  3.92    3.98
              1.000    7.48 | 2.000   34.10 | 3.000    6.43 |  4.00    3.98

     Max.Eff.Inten.(mm/hr)=     118.02        37.64
               over (min)        5.00        20.00
     Storage Coeff.  (min)=       5.24 (ii)   18.08 (ii)
     Unit Hyd. Tpeak (min)=       5.00        20.00
     Unit Hyd. peak  (cms)=       0.21         0.06
                                                    *TOTALS*
     PEAK FLOW       (cms)=       2.69         0.37          2.853 (iii)
     TIME TO PEAK    (hrs)=       1.83         2.08           1.83
     RUNOFF VOLUME    (mm)=      55.75        22.45          42.43
     TOTAL RAINFALL   (mm)=      57.75        57.75          57.75
     RUNOFF COEFFICIENT   =       0.97         0.39           0.73


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  75.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD (  0110)  |   Area    (ha)=   1.89
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  60.00   Dir. Conn.(%)=  60.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.13         0.76
     Dep. Storage     (mm)=       2.00         1.50
     Average Slope     (%)=       1.00         1.00
     Length            (m)=     112.25        40.00
     Mannings n           =      0.015        0.250

         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    4.33 | 1.083    8.98 | 2.083   18.02 |  3.08    5.79
              0.167    4.33 | 1.167    8.98 | 2.167   18.02 |  3.17    5.79
              0.250    4.70 | 1.250   11.42 | 2.250   12.75 |  3.25    5.29
              0.333    4.70 | 1.333   11.42 | 2.333   12.75 |  3.33    5.29
```



```
              0.417    5.15 | 1.417   16.29 | 2.417   10.06 |  3.42    4.87
              0.500    5.15 | 1.500   16.29 | 2.500   10.06 |  3.50    4.87
              0.583    5.72 | 1.583   32.24 | 2.583    8.40 |  3.58    4.53
              0.667    5.72 | 1.667   32.24 | 2.667    8.40 |  3.67    4.53
              0.750    6.47 | 1.750  118.02 | 2.750    7.26 |  3.75    4.24
              0.833    6.47 | 1.833  118.02 | 2.833    7.26 |  3.83    4.24
              0.917    7.48 | 1.917   34.10 | 2.917    6.43 |  3.92    3.98
              1.000    7.48 | 2.000   34.10 | 3.000    6.43 |  4.00    3.98

     Max.Eff.Inten.(mm/hr)=     118.02        37.64
               over (min)        5.00        20.00
     Storage Coeff.  (min)=       2.79 (ii)   15.64 (ii)
     Unit Hyd. Tpeak (min)=       5.00        20.00
     Unit Hyd. peak  (cms)=       0.28         0.07
                                                    *TOTALS*
     PEAK FLOW       (cms)=       0.36         0.05          0.386 (iii)
     TIME TO PEAK    (hrs)=       1.83         2.08           1.83
     RUNOFF VOLUME    (mm)=      55.75        22.45          42.43
     TOTAL RAINFALL   (mm)=      57.75        57.75          57.75
     RUNOFF COEFFICIENT   =       0.97         0.39           0.73

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  75.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| ADD HYD  (  0111)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0110):     1.89   0.386     1.83    42.43
     + ID2= 2 (  0082):     6.54   1.503     1.83    46.11
       ==========================================================
       ID = 3 (  0111):     8.43   1.889     1.83    45.29

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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--------------------
| ADD HYD  (  0111)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0111):     8.43   1.889     1.83    45.29
     + ID2= 2 (  0085):    15.38   2.853     1.83    42.43
       ==========================================================
       ID = 1 (  0111):    23.81   4.742     1.83    43.44

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0084)  |   Area    (ha)=   2.33
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  89.00   Dir. Conn.(%)=  89.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.07         0.26
     Dep. Storage     (mm)=       0.00         1.50
     Average Slope     (%)=       1.00         1.00
     Length            (m)=     124.63        25.00
     Mannings n           =      0.015        0.250

         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	4.33	1.083	8.98	2.083	18.02	3.08	5.79
0.167	4.33	1.167	8.98	2.167	18.02	3.17	5.79
0.250	4.70	1.250	11.42	2.250	12.75	3.25	5.29
0.333	4.70	1.333	11.42	2.333	12.75	3.33	5.29
0.417	5.15	1.417	16.29	2.417	10.06	3.42	4.87
0.500	5.15	1.500	16.29	2.500	10.06	3.50	4.87
0.583	5.72	1.583	32.24	2.583	8.40	3.58	4.53
0.667	5.72	1.667	32.24	2.667	8.40	3.67	4.53
0.750	6.47	1.750	118.02	2.750	7.26	3.75	4.24
0.833	6.47	1.833	118.02	2.833	7.26	3.83	4.24
0.917	7.48	1.917	34.10	2.917	6.43	3.92	3.98
1.000	7.48	2.000	34.10	3.000	6.43	4.00	3.98

Max.Eff.Inten.(mm/hr)=	118.02	47.70	
over (min)	5.00	10.00	
Storage Coeff. (min)=	2.97 (ii)	5.63 (ii)	
Unit Hyd. Tpeak (min)=	5.00	10.00	
Unit Hyd. peak (cms)=	0.28	0.15	
			TOTALS
PEAK FLOW (cms)=	0.66	0.03	0.686 (iii)
TIME TO PEAK (hrs)=	1.83	1.92	1.83
RUNOFF VOLUME (mm)=	57.75	22.45	53.87
TOTAL RAINFALL (mm)=	57.75	57.75	57.75
RUNOFF COEFFICIENT =	1.00	0.39	0.93

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 75.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0081)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0109):		1.01	0.031	2.58	20.25
+ ID2= 2 (0111):		23.81	4.742	1.83	43.44
ID = 3 (0081):		24.82	4.748	1.83	42.50

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0081)		AREA	QPEAK	TPEAK	R.V.
3 + 2 = 1		(ha)	(cms)	(hrs)	(mm)
ID1= 3 (0081):		24.82	4.748	1.83	42.50
+ ID2= 2 (0128):		21.39	3.230	1.83	38.27
ID = 1 (0081):		46.21	7.977	1.83	40.54

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0081)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0081):		46.21	7.977	1.83	40.54
+ ID2= 2 (0215):		1.45	0.038	2.75	20.25
ID = 3 (0081):		47.66	7.982	1.83	39.93

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0081)		AREA	QPEAK	TPEAK	R.V.
3 + 2 = 1		(ha)	(cms)	(hrs)	(mm)
ID1= 3 (0081):		47.66	7.982	1.83	39.93
+ ID2= 2 (0084):		2.33	0.686	1.83	53.87
ID = 1 (0081):		49.99	8.669	1.83	40.58

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0097)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0130):		21.48	0.337	3.75	20.25
+ ID2= 2 (0081):		49.99	8.669	1.83	40.58
ID = 3 (0097):		71.47	8.699	1.83	34.47

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0211)	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	0.8460	1.8660
	0.0080	0.2340	1.0630	2.1640
	0.0130	0.4840	1.4780	2.4680
	0.0470	0.7470	1.9960	2.7800
	0.1760	1.0160	2.8820	2.8590
	0.3580	1.2930	4.4100	2.9390
	0.5810	1.5760	14.1270	3.2620

		AREA	QPEAK	TPEAK	R.V.
		(ha)	(cms)	(hrs)	(mm)
INFLOW : ID= 2 (0097)		71.470	8.699	1.83	34.47
OUTFLOW: ID= 1 (0211)		71.470	0.733	4.08	32.77

PEAK FLOW REDUCTION [Qout/Qin](%)= 8.43
TIME SHIFT OF PEAK FLOW (min)=135.00
MAXIMUM STORAGE USED (ha.m.)= 1.7440

V V I SSSSS U U A L (v 6.2.2022)
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
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***** D E T A I L E D O U T P U T *****

Input filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
Output filename: C:\Users\kbobinac\AppData\Local\Civica\VH5\c6a42fd8-e61d-467c-b3ff-9063ee9e534e\8d761a1c-dde8-4dfe-856c-102a204aa08c\sce
Summary filename: C:\Users\kbobinac\AppData\Local\Civica\VH5\c6a42fd8-e61d-467c-b3ff-9063ee9e534e\8d761a1c-dde8-4dfe-856c-102a204aa08c\sce

DATE: 03/24/2026 TIME: 01:22:19

USER:

COMMENTS: _____

****
** SIMULATION : F. 50yr 4hr 10min Chicago **
****

| CHICAGO STORM | IDF curve parameters: A= 900.000
| Ptotal= 63.70 mm | B= 3.800
| | C= 0.734

used in: INTENSITY = A / (t + B)^C

Duration of storm = 4.00 hrs
Storm time step = 10.00 min
Time to peak ratio = 0.46

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	4.78	1.00	9.88	2.00	19.76	3.00	6.39
0.17	5.19	1.17	12.55	2.17	14.01	3.17	5.83
0.33	5.69	1.33	17.87	2.33	11.06	3.33	5.38
0.50	6.31	1.50	35.28	2.50	9.25	3.50	5.00
0.67	7.13	1.67	131.09	2.67	8.00	3.67	4.68
0.83	8.24	1.83	37.31	2.83	7.09	3.83	4.40

| CALIB | Area (ha)= 7.69 Curve Number (CN)= 75.0
| NASHYD (0076) | Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
|ID= 1 DT= 5.0 min | U.H. Tp(hrs)= 0.64

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	4.78	1.083	9.88	2.083	19.76	3.08	6.39
0.167	4.78	1.167	9.88	2.167	19.76	3.17	6.39
0.250	5.19	1.250	12.55	2.250	14.01	3.25	5.83
0.333	5.19	1.333	12.55	2.333	14.01	3.33	5.83
0.417	5.69	1.417	17.87	2.417	11.06	3.42	5.38
0.500	5.69	1.500	17.87	2.500	11.06	3.50	5.38
0.583	6.31	1.583	35.28	2.583	9.25	3.58	5.00
0.667	6.31	1.667	35.28	2.667	9.25	3.67	5.00
0.750	7.13	1.750	131.09	2.750	8.00	3.75	4.68
0.833	7.13	1.833	131.09	2.833	8.00	3.83	4.68
0.917	8.24	1.917	37.31	2.917	7.09	3.92	4.40
1.000	8.24	2.000	37.31	3.000	7.09	4.00	4.40

Unit Hyd Qpeak (cms)= 0.459

PEAK FLOW (cms)= 0.283 (i)
TIME TO PEAK (hrs)= 2.583
RUNOFF VOLUME (mm)= 24.031
TOTAL RAINFALL (mm)= 63.696
RUNOFF COEFFICIENT = 0.377

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

| CALIB | Area (ha)= 13.79 Curve Number (CN)= 75.0
| NASHYD (0086) | Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
|ID= 1 DT= 5.0 min | U.H. Tp(hrs)= 0.80

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	4.78	1.083	9.88	2.083	19.76	3.08	6.39
0.167	4.78	1.167	9.88	2.167	19.76	3.17	6.39
0.250	5.19	1.250	12.55	2.250	14.01	3.25	5.83
0.333	5.19	1.333	12.55	2.333	14.01	3.33	5.83
0.417	5.69	1.417	17.87	2.417	11.06	3.42	5.38
0.500	5.69	1.500	17.87	2.500	11.06	3.50	5.38
0.583	6.31	1.583	35.28	2.583	9.25	3.58	5.00
0.667	6.31	1.667	35.28	2.667	9.25	3.67	5.00
0.750	7.13	1.750	131.09	2.750	8.00	3.75	4.68
0.833	7.13	1.833	131.09	2.833	8.00	3.83	4.68
0.917	8.24	1.917	37.31	2.917	7.09	3.92	4.40
1.000	8.24	2.000	37.31	3.000	7.09	4.00	4.40

Unit Hyd Qpeak (cms)= 0.658

PEAK FLOW (cms)= 0.434 (i)
TIME TO PEAK (hrs)= 2.750
RUNOFF VOLUME (mm)= 24.031
TOTAL RAINFALL (mm)= 63.696
RUNOFF COEFFICIENT = 0.377

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

ADD HYD (0080)		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
1 + 2 = 3	ID1= 1 (0076):	7.69	0.283	2.58	24.03
	+ ID2= 2 (0086):	13.79	0.434	2.75	24.03
	ID = 3 (0080):	21.48	0.710	2.67	24.03

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

| RESERVOIR(0130) | OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 5.0 min |

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.5114	0.3494
0.0634	0.0054	0.5382	0.3871
0.1794	0.0430	0.5566	0.4140
0.2457	0.0806	0.5779	0.4462
0.2975	0.1183	0.5950	0.4731
0.3416	0.1559	0.6117	0.5000
0.3858	0.1989	0.6247	0.5215
0.4207	0.2365	0.6375	0.5430
0.4530	0.2742	0.6518	0.5677
0.4872	0.3172	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0080)	21.480	0.710	2.67	24.03
OUTFLOW: ID= 1 (0130)	21.480	0.380	3.83	24.03

PEAK FLOW REDUCTION [Qout/Qin](%)= 53.51
TIME SHIFT OF PEAK FLOW (min)= 70.00
MAXIMUM STORAGE USED (ha.m.)= 0.1934

CALIB					
NASHYD (0077)	Area (ha)= 4.01	Curve Number (CN)= 75.0			
ID= 1 DT= 5.0 min	Ia (mm)= 5.00	# of Linear Res.(N)= 3.00			
	U.H. Tp(hrs)= 0.52				

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	4.78	1.083	9.88	2.083	19.76	3.08	6.39
0.167	4.78	1.167	9.88	2.167	19.76	3.17	6.39
0.250	5.19	1.250	12.55	2.250	14.01	3.25	5.83
0.333	5.19	1.333	12.55	2.333	14.01	3.33	5.83
0.417	5.69	1.417	17.87	2.417	11.06	3.42	5.38
0.500	5.69	1.500	17.87	2.500	11.06	3.50	5.38
0.583	6.31	1.583	35.28	2.583	9.25	3.58	5.00
0.667	6.31	1.667	35.28	2.667	9.25	3.67	5.00
0.750	7.13	1.750	131.09	2.750	8.00	3.75	4.68
0.833	7.13	1.833	131.09	2.833	8.00	3.83	4.68
0.917	8.24	1.917	37.31	2.917	7.09	3.92	4.40
1.000	8.24	2.000	37.31	3.000	7.09	4.00	4.40

Unit Hyd Qpeak (cms)= 0.295

PEAK FLOW (cms)= 0.171 (i)
TIME TO PEAK (hrs)= 2.417
RUNOFF VOLUME (mm)= 24.030
TOTAL RAINFALL (mm)= 63.696
RUNOFF COEFFICIENT = 0.377

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

CALIB			
STANDHYD (0078)	Area (ha)= 17.38		
ID= 1 DT= 5.0 min	Total Imp(%)= 60.00	Dir. Conn.(%)= 60.00	

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	10.43	6.95
Dep. Storage	(mm)=	2.00	1.50
Average Slope	(%)=	1.00	1.00
Length	(m)=	340.39	40.00
Mannings n	=	0.015	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	4.78	1.083	9.88	2.083	19.76	3.08	6.39
0.167	4.78	1.167	9.88	2.167	19.76	3.17	6.39
0.250	5.19	1.250	12.55	2.250	14.01	3.25	5.83
0.333	5.19	1.333	12.55	2.333	14.01	3.33	5.83
0.417	5.69	1.417	17.87	2.417	11.06	3.42	5.38
0.500	5.69	1.500	17.87	2.500	11.06	3.50	5.38
0.583	6.31	1.583	35.28	2.583	9.25	3.58	5.00
0.667	6.31	1.667	35.28	2.667	9.25	3.67	5.00
0.750	7.13	1.750	131.09	2.750	8.00	3.75	4.68
0.833	7.13	1.833	131.09	2.833	8.00	3.83	4.68
0.917	8.24	1.917	37.31	2.917	7.09	3.92	4.40
1.000	8.24	2.000	37.31	3.000	7.09	4.00	4.40

Max.Eff.Inten.(mm/hr)=		131.09	44.56
over (min)		5.00	20.00
Storage Coeff. (min)=		5.21 (ii)	17.22 (ii)
Unit Hyd. Tpeak (min)=		5.00	20.00

			TOTALS
Unit Hyd. peak (cms)=	0.21	0.06	
PEAK FLOW (cms)=	3.38	0.50	3.605 (iii)
TIME TO PEAK (hrs)=	1.83	2.08	1.83
RUNOFF VOLUME (mm)=	61.70	26.34	47.55
TOTAL RAINFALL (mm)=	63.70	63.70	63.70
RUNOFF COEFFICIENT =	0.97	0.41	0.75

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 75.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0128)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
	ID1= 1 (0077):	4.01	0.171	2.42	24.03
	+ ID2= 2 (0078):	17.38	3.605	1.83	47.55
	ID = 3 (0128):	21.39	3.648	1.83	43.14

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB					
NASHYD (0215)	Area (ha)= 1.45	Curve Number (CN)= 75.0			
ID= 1 DT= 5.0 min	Ia (mm)= 5.00	# of Linear Res.(N)= 3.00			
	U.H. Tp(hrs)= 0.82				

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	4.78	1.083	9.88	2.083	19.76	3.08	6.39
0.167	4.78	1.167	9.88	2.167	19.76	3.17	6.39
0.250	5.19	1.250	12.55	2.250	14.01	3.25	5.83
0.333	5.19	1.333	12.55	2.333	14.01	3.33	5.83
0.417	5.69	1.417	17.87	2.417	11.06	3.42	5.38
0.500	5.69	1.500	17.87	2.500	11.06	3.50	5.38
0.583	6.31	1.583	35.28	2.583	9.25	3.58	5.00
0.667	6.31	1.667	35.28	2.667	9.25	3.67	5.00
0.750	7.13	1.750	131.09	2.750	8.00	3.75	4.68
0.833	7.13	1.833	131.09	2.833	8.00	3.83	4.68
0.917	8.24	1.917	37.31	2.917	7.09	3.92	4.40
1.000	8.24	2.000	37.31	3.000	7.09	4.00	4.40

Unit Hyd Qpeak (cms)= 0.068

PEAK FLOW (cms)= 0.045 (i)
TIME TO PEAK (hrs)= 2.750
RUNOFF VOLUME (mm)= 24.030
TOTAL RAINFALL (mm)= 63.696
RUNOFF COEFFICIENT = 0.377

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

CALIB					
NASHYD (0109)	Area (ha)= 1.01	Curve Number (CN)= 75.0			
ID= 1 DT= 5.0 min	Ia (mm)= 5.00	# of Linear Res.(N)= 3.00			
	U.H. Tp(hrs)= 0.66				

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	4.78	1.083	9.88	2.083	19.76	3.08	6.39
0.167	4.78	1.167	9.88	2.167	19.76	3.17	6.39
0.250	5.19	1.250	12.55	2.250	14.01	3.25	5.83
0.333	5.19	1.333	12.55	2.333	14.01	3.33	5.83
0.417	5.69	1.417	17.87	2.417	11.06	3.42	5.38
0.500	5.69	1.500	17.87	2.500	11.06	3.50	5.38
0.583	6.31	1.583	35.28	2.583	9.25	3.58	5.00
0.667	6.31	1.667	35.28	2.667	9.25	3.67	5.00
0.750	7.13	1.750	131.09	2.750	8.00	3.75	4.68
0.833	7.13	1.833	131.09	2.833	8.00	3.83	4.68
0.917	8.24	1.917	37.31	2.917	7.09	3.92	4.40
1.000	8.24	2.000	37.31	3.000	7.09	4.00	4.40

Unit Hyd Qpeak (cms)= 0.058

PEAK FLOW (cms)= 0.036 (i)
TIME TO PEAK (hrs)= 2.583
RUNOFF VOLUME (mm)= 24.030
TOTAL RAINFALL (mm)= 63.696
RUNOFF COEFFICIENT = 0.377

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

CALIB
STANDHYD (0082)
ID= 1 DT= 5.0 min

Area (ha)= 6.54
Total Imp(%)= 70.00 Dir. Conn.(%)= 70.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	4.58	1.96
Dep. Storage	(mm)=	1.50	1.50
Average Slope	(%)=	2.00	1.00
Length	(m)=	208.81	40.00
Mannings n	=	0.015	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	4.78	1.083	9.88	2.083	19.76	3.08	6.39
0.167	4.78	1.167	9.88	2.167	19.76	3.17	6.39
0.250	5.19	1.250	12.55	2.250	14.01	3.25	5.83
0.333	5.19	1.333	12.55	2.333	14.01	3.33	5.83
0.417	5.69	1.417	17.87	2.417	11.06	3.42	5.38
0.500	5.69	1.500	17.87	2.500	11.06	3.50	5.38
0.583	6.31	1.583	35.28	2.583	9.25	3.58	5.00
0.667	6.31	1.667	35.28	2.667	9.25	3.67	5.00
0.750	7.13	1.750	131.09	2.750	8.00	3.75	4.68
0.833	7.13	1.833	131.09	2.833	8.00	3.83	4.68
0.917	8.24	1.917	37.31	2.917	7.09	3.92	4.40
1.000	8.24	2.000	37.31	3.000	7.09	4.00	4.40

Max.Eff.Inten.	(mm/hr)=	131.09	44.56	
	over (min)	5.00	20.00	
Storage Coeff.	(min)=	3.16 (ii)	15.16 (ii)	
Unit Hyd. Tpeak	(min)=	5.00	20.00	
Unit Hyd. peak	(cms)=	0.27	0.07	
				TOTALS
PEAK FLOW	(cms)=	1.62	0.15	1.684 (iii)
TIME TO PEAK	(hrs)=	1.83	2.08	1.83
RUNOFF VOLUME	(mm)=	62.20	26.34	51.44
TOTAL RAINFALL	(mm)=	63.70	63.70	63.70
RUNOFF COEFFICIENT	=	0.98	0.41	0.81

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 75.0 Ia = Dep. 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 (0085)
ID= 1 DT= 5.0 min

Area (ha)= 15.38
Total Imp(%)= 60.00 Dir. Conn.(%)= 60.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	9.23	6.15
Dep. Storage	(mm)=	2.00	1.50
Average Slope	(%)=	1.00	1.00
Length	(m)=	320.21	40.00
Mannings n	=	0.015	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	4.78	1.083	9.88	2.083	19.76	3.08	6.39
0.167	4.78	1.167	9.88	2.167	19.76	3.17	6.39
0.250	5.19	1.250	12.55	2.250	14.01	3.25	5.83
0.333	5.19	1.333	12.55	2.333	14.01	3.33	5.83
0.417	5.69	1.417	17.87	2.417	11.06	3.42	5.38
0.500	5.69	1.500	17.87	2.500	11.06	3.50	5.38
0.583	6.31	1.583	35.28	2.583	9.25	3.58	5.00
0.667	6.31	1.667	35.28	2.667	9.25	3.67	5.00
0.750	7.13	1.750	131.09	2.750	8.00	3.75	4.68
0.833	7.13	1.833	131.09	2.833	8.00	3.83	4.68
0.917	8.24	1.917	37.31	2.917	7.09	3.92	4.40
1.000	8.24	2.000	37.31	3.000	7.09	4.00	4.40

Max.Eff.Inten.	(mm/hr)=	131.09	44.56	
	over (min)	5.00	20.00	
Storage Coeff.	(min)=	5.02 (ii)	17.03 (ii)	
Unit Hyd. Tpeak	(min)=	5.00	20.00	
Unit Hyd. peak	(cms)=	0.21	0.06	
				TOTALS
PEAK FLOW	(cms)=	3.02	0.45	3.218 (iii)
TIME TO PEAK	(hrs)=	1.83	2.08	1.83
RUNOFF VOLUME	(mm)=	61.70	26.34	47.55
TOTAL RAINFALL	(mm)=	63.70	63.70	63.70
RUNOFF COEFFICIENT	=	0.97	0.41	0.75

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 75.0 Ia = Dep. 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 (0110)
ID= 1 DT= 5.0 min

Area (ha)= 1.89
Total Imp(%)= 60.00 Dir. Conn.(%)= 60.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	1.13	0.76
Dep. Storage	(mm)=	2.00	1.50
Average Slope	(%)=	1.00	1.00
Length	(m)=	112.25	40.00
Mannings n	=	0.015	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	4.78	1.083	9.88	2.083	19.76	3.08	6.39
0.167	4.78	1.167	9.88	2.167	19.76	3.17	6.39
0.250	5.19	1.250	12.55	2.250	14.01	3.25	5.83
0.333	5.19	1.333	12.55	2.333	14.01	3.33	5.83
0.417	5.69	1.417	17.87	2.417	11.06	3.42	5.38
0.500	5.69	1.500	17.87	2.500	11.06	3.50	5.38
0.583	6.31	1.583	35.28	2.583	9.25	3.58	5.00
0.667	6.31	1.667	35.28	2.667	9.25	3.67	5.00
0.750	7.13	1.750	131.09	2.750	8.00	3.75	4.68
0.833	7.13	1.833	131.09	2.833	8.00	3.83	4.68
0.917	8.24	1.917	37.31	2.917	7.09	3.92	4.40
1.000	8.24	2.000	37.31	3.000	7.09	4.00	4.40

Max.Eff.Inten.(mm/hr)=	131.09	44.56	
over (min)	5.00	15.00	
Storage Coeff. (min)=	2.68 (ii)	14.68 (ii)	
Unit Hyd. Tpeak (min)=	5.00	15.00	
Unit Hyd. peak (cms)=	0.29	0.08	
			TOTALS
PEAK FLOW (cms)=	0.41	0.06	0.441 (iii)
TIME TO PEAK (hrs)=	1.83	2.00	1.83
RUNOFF VOLUME (mm)=	61.70	26.34	47.55
TOTAL RAINFALL (mm)=	63.70	63.70	63.70
RUNOFF COEFFICIENT =	0.97	0.41	0.75

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 75.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0111)
1 + 2 = 3

		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0110):		1.89	0.441	1.83	47.55
+ ID2= 2 (0082):		6.54	1.684	1.83	51.44
ID = 3 (0111):		8.43	2.125	1.83	50.57

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0111)
3 + 2 = 1

		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 3 (0111):		8.43	2.125	1.83	50.57
+ ID2= 2 (0085):		15.38	3.218	1.83	47.55
ID = 1 (0111):		23.81	5.342	1.83	48.62

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB
STANDHYD (0084) Area (ha)= 2.33
ID= 1 DT= 5.0 min Total Imp(%)= 89.00 Dir. Conn.(%)= 89.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	2.07	0.26
Dep. Storage	(mm)=	0.00	1.50
Average Slope	(%)=	1.00	1.00

Length (m)=	124.63	25.00	
Mannings n =	0.015	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	4.78	1.083	9.88	2.083	19.76	3.08	6.39
0.167	4.78	1.167	9.88	2.167	19.76	3.17	6.39
0.250	5.19	1.250	12.55	2.250	14.01	3.25	5.83
0.333	5.19	1.333	12.55	2.333	14.01	3.33	5.83
0.417	5.69	1.417	17.87	2.417	11.06	3.42	5.38
0.500	5.69	1.500	17.87	2.500	11.06	3.50	5.38
0.583	6.31	1.583	35.28	2.583	9.25	3.58	5.00
0.667	6.31	1.667	35.28	2.667	9.25	3.67	5.00
0.750	7.13	1.750	131.09	2.750	8.00	3.75	4.68
0.833	7.13	1.833	131.09	2.833	8.00	3.83	4.68
0.917	8.24	1.917	37.31	2.917	7.09	3.92	4.40
1.000	8.24	2.000	37.31	3.000	7.09	4.00	4.40

Max.Eff.Inten.(mm/hr)=	131.09	56.69	
over (min)	5.00	10.00	
Storage Coeff. (min)=	2.85 (ii)	5.40 (ii)	
Unit Hyd. Tpeak (min)=	5.00	10.00	
Unit Hyd. peak (cms)=	0.28	0.16	
			TOTALS
PEAK FLOW (cms)=	0.74	0.03	0.767 (iii)
TIME TO PEAK (hrs)=	1.83	1.92	1.83
RUNOFF VOLUME (mm)=	63.70	26.34	59.59
TOTAL RAINFALL (mm)=	63.70	63.70	63.70
RUNOFF COEFFICIENT =	1.00	0.41	0.94

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 75.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0081)
1 + 2 = 3

		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0109):		1.01	0.036	2.58	24.03
+ ID2= 2 (0111):		23.81	5.342	1.83	48.62
ID = 3 (0081):		24.82	5.349	1.83	47.62

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0081)
3 + 2 = 1

		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 3 (0081):		24.82	5.349	1.83	47.62
+ ID2= 2 (0128):		21.39	3.648	1.83	43.14
ID = 1 (0081):		46.21	8.997	1.83	45.55

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0081)
1 + 2 = 3

		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)

```
       ID1= 1 (  0081):    46.21   8.997     1.83    45.55
     + ID2= 2 (  0215):     1.45   0.045     2.75    24.03
       ====================================================
       ID = 3 (  0081):    47.66   9.003     1.83    44.89

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

--------------------
| ADD HYD  (  0081)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)      (mm)
       ID1= 3 (  0081):    47.66   9.003     1.83    44.89
     + ID2= 2 (  0084):     2.33   0.767     1.83    59.59
       ====================================================
       ID = 1 (  0081):    49.99   9.770     1.83    45.58

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

--------------------
| ADD HYD  (  0097)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)      (mm)
       ID1= 1 (  0130):    21.48   0.380     3.83    24.03
     + ID2= 2 (  0081):    49.99   9.770     1.83    45.58
       ====================================================
       ID = 3 (  0097):    71.47   9.809     1.83    39.10

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0211)|     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    |    0.8460      1.8660
                           0.0080      0.2340    |    1.0630      2.1640
                           0.0130      0.4840    |    1.4780      2.4680
                           0.0470      0.7470    |    1.9960      2.7800
                           0.1760      1.0160    |    2.8820      2.8590
                           0.3580      1.2930    |    4.4100      2.9390
                           0.5810      1.5760    |   14.1270      3.2620

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0097)     71.470     9.809     1.83      39.10
   OUTFLOW: ID= 1 (  0211)     71.470     0.873     4.00      37.39

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  8.90
                  TIME SHIFT OF PEAK FLOW         (min)=130.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  1.9048

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

       V    V   I    SSSSS  U   U    A    L             (v 6.2.2022)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                  ***** D E T A I L E D   O U T P U T *****
```



```
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0722-4660-bcd3-268aad0fbe12\sce

DATE: 03/24/2026                          TIME: 01:22:18

USER:


COMMENTS: _____

------------------------------------------------------------------------------------------------------------------
  ************************************************
  ** SIMULATION : G. 100yr 4hr 10min Chicago    **
  ************************************************

--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 980.000
| Ptotal= 70.15 mm |                          B=   3.700
--------------------                          C=   0.732
                         used in:   INTENSITY =  A / (t + B)^C

                         Duration of storm  =  4.00 hrs
                         Storm time step    = 10.00 min
                         Time to peak ratio =  0.46

              TIME    RAIN  |  TIME    RAIN  |'  TIME    RAIN  |  TIME    RAIN
               hrs   mm/hr  |   hrs   mm/hr  |'   hrs   mm/hr  |   hrs   mm/hr
              0.00    5.30  |  1.00   10.91  |'  2.00   21.73  |  3.00    7.07
              0.17    5.75  |  1.17   13.84  |'  2.17   15.43  |  3.17    6.45
              0.33    6.29  |  1.33   19.66  |'  2.33   12.20  |  3.33    5.95
              0.50    6.98  |  1.50   38.68  |'  2.50   10.21  |  3.50    5.53
              0.67    7.88  |  1.67  144.26  |'  2.67    8.84  |  3.67    5.18
              0.83    9.11  |  1.83   40.90  |'  2.83    7.84  |  3.83    4.87


------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0076)|   Area     (ha)=   7.69   Curve Number    (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia       (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.64

        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    5.30  | 1.083   10.91  | 2.083   21.73  |  3.08    7.07
             0.167    5.30  | 1.167   10.91  | 2.167   21.73  |  3.17    7.07
             0.250    5.75  | 1.250   13.84  | 2.250   15.43  |  3.25    6.45
             0.333    5.75  | 1.333   13.84  | 2.333   15.43  |  3.33    6.45
             0.417    6.29  | 1.417   19.66  | 2.417   12.20  |  3.42    5.95
             0.500    6.29  | 1.500   19.66  | 2.500   12.20  |  3.50    5.95
             0.583    6.98  | 1.583   38.68  | 2.583   10.21  |  3.58    5.53
             0.667    6.98  | 1.667   38.68  | 2.667   10.21  |  3.67    5.53
             0.750    7.88  | 1.750  144.26  | 2.750    8.84  |  3.75    5.18
             0.833    7.88  | 1.833  144.26  | 2.833    8.84  |  3.83    5.18
             0.917    9.11  | 1.917   40.90  | 2.917    7.84  |  3.92    4.87
             1.000    9.11  | 2.000   40.90  | 3.000    7.84  |  4.00    4.87

     Unit Hyd Qpeak  (cms)=   0.459

     PEAK FLOW       (cms)=   0.335 (i)
```

TIME TO PEAK (hrs)= 2.500
RUNOFF VOLUME (mm)= 28.328
TOTAL RAINFALL (mm)= 70.145
RUNOFF COEFFICIENT = 0.404

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

CALIB
NASHYD (0086) | Area (ha)= 13.79 Curve Number (CN)= 75.0
ID= 1 DT= 5.0 min | Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.80

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	5.30	1.083	10.91	2.083	21.73	3.08	7.07
0.167	5.30	1.167	10.91	2.167	21.73	3.17	7.07
0.250	5.75	1.250	13.84	2.250	15.43	3.25	6.45
0.333	5.75	1.333	13.84	2.333	15.43	3.33	6.45
0.417	6.29	1.417	19.66	2.417	12.20	3.42	5.95
0.500	6.29	1.500	19.66	2.500	12.20	3.50	5.95
0.583	6.98	1.583	38.68	2.583	10.21	3.58	5.53
0.667	6.98	1.667	38.68	2.667	10.21	3.67	5.53
0.750	7.88	1.750	144.26	2.750	8.84	3.75	5.18
0.833	7.88	1.833	144.26	2.833	8.84	3.83	5.18
0.917	9.11	1.917	40.90	2.917	7.84	3.92	4.87
1.000	9.11	2.000	40.90	3.000	7.84	4.00	4.87

Unit Hyd Qpeak (cms)= 0.658

PEAK FLOW (cms)= 0.513 (i)
TIME TO PEAK (hrs)= 2.750
RUNOFF VOLUME (mm)= 28.328
TOTAL RAINFALL (mm)= 70.145
RUNOFF COEFFICIENT = 0.404

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

ADD HYD (0080)
1 + 2 = 3

		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0076):		7.69	0.335	2.50	28.33
+ ID2= 2 (0086):		13.79	0.513	2.75	28.33
ID = 3 (0080):		21.48	0.840	2.67	28.33

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0130)
IN= 2---> OUT= 1
DT= 5.0 min

OVERFLOW IS OFF

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.5114	0.3494
0.0634	0.0054	0.5382	0.3871
0.1794	0.0430	0.5566	0.4140
0.2457	0.0806	0.5779	0.4462
0.2975	0.1183	0.5950	0.4731
0.3416	0.1559	0.6117	0.5000
0.3858	0.1989	0.6247	0.5215
0.4207	0.2365	0.6375	0.5430
0.4530	0.2742	0.6518	0.5677
0.4872	0.3172	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0080)	21.480	0.840	2.67	28.33
OUTFLOW: ID= 1 (0130)	21.480	0.425	3.92	28.33

PEAK FLOW REDUCTION [Qout/Qin](%)= 50.67
TIME SHIFT OF PEAK FLOW (min)= 75.00
MAXIMUM STORAGE USED (ha.m.)= 0.2422

CALIB
NASHYD (0077) | Area (ha)= 4.01 Curve Number (CN)= 75.0
ID= 1 DT= 5.0 min | Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.52

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	5.30	1.083	10.91	2.083	21.73	3.08	7.07
0.167	5.30	1.167	10.91	2.167	21.73	3.17	7.07
0.250	5.75	1.250	13.84	2.250	15.43	3.25	6.45
0.333	5.75	1.333	13.84	2.333	15.43	3.33	6.45
0.417	6.29	1.417	19.66	2.417	12.20	3.42	5.95
0.500	6.29	1.500	19.66	2.500	12.20	3.50	5.95
0.583	6.98	1.583	38.68	2.583	10.21	3.58	5.53
0.667	6.98	1.667	38.68	2.667	10.21	3.67	5.53
0.750	7.88	1.750	144.26	2.750	8.84	3.75	5.18
0.833	7.88	1.833	144.26	2.833	8.84	3.83	5.18
0.917	9.11	1.917	40.90	2.917	7.84	3.92	4.87
1.000	9.11	2.000	40.90	3.000	7.84	4.00	4.87

Unit Hyd Qpeak (cms)= 0.295

PEAK FLOW (cms)= 0.202 (i)
TIME TO PEAK (hrs)= 2.417
RUNOFF VOLUME (mm)= 28.327
TOTAL RAINFALL (mm)= 70.145
RUNOFF COEFFICIENT = 0.404

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

CALIB
STANDHYD (0078) | Area (ha)= 17.38
ID= 1 DT= 5.0 min | Total Imp(%)= 60.00 Dir. Conn.(%)= 60.00

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	10.43	6.95
Dep. Storage (mm)=	2.00	1.50
Average Slope (%)=	1.00	1.00
Length (m)=	340.39	40.00
Mannings n =	0.015	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	5.30	1.083	10.91	2.083	21.73	3.08	7.07
0.167	5.30	1.167	10.91	2.167	21.73	3.17	7.07
0.250	5.75	1.250	13.84	2.250	15.43	3.25	6.45
0.333	5.75	1.333	13.84	2.333	15.43	3.33	6.45
0.417	6.29	1.417	19.66	2.417	12.20	3.42	5.95
0.500	6.29	1.500	19.66	2.500	12.20	3.50	5.95
0.583	6.98	1.583	38.68	2.583	10.21	3.58	5.53
0.667	6.98	1.667	38.68	2.667	10.21	3.67	5.53

0.750	7.88	1.750	144.26	2.750	8.84	3.75	5.18
0.833	7.88	1.833	144.26	2.833	8.84	3.83	5.18
0.917	9.11	1.917	40.90	2.917	7.84	3.92	4.87
1.000	9.11	2.000	40.90	3.000	7.84	4.00	4.87

Max.Eff.Inten.(mm/hr)=	144.26	52.13	
over (min)	5.00	20.00	
Storage Coeff. (min)=	5.01 (ii)	16.29 (ii)	
Unit Hyd. Tpeak (min)=	5.00	20.00	
Unit Hyd. peak (cms)=	0.21	0.06	
			TOTALS
PEAK FLOW (cms)=	3.75	0.60	4.028 (iii)
TIME TO PEAK (hrs)=	1.83	2.08	1.83
RUNOFF VOLUME (mm)=	68.15	30.74	53.18
TOTAL RAINFALL (mm)=	70.15	70.15	70.15
RUNOFF COEFFICIENT =	0.97	0.44	0.76

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 75.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0128)
1 + 2 = 3

		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0077):		4.01	0.202	2.42	28.33
+ ID2= 2 (0078):		17.38	4.028	1.83	53.18
ID = 3 (0128):		21.39	4.080	1.83	48.52

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB
NASHYD (0215)
ID= 1 DT= 5.0 min

Area (ha)= 1.45 Curve Number (CN)= 75.0
Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.82

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	5.30	1.083	10.91	2.083	21.73	3.08	7.07
0.167	5.30	1.167	10.91	2.167	21.73	3.17	7.07
0.250	5.75	1.250	13.84	2.250	15.43	3.25	6.45
0.333	5.75	1.333	13.84	2.333	15.43	3.33	6.45
0.417	6.29	1.417	19.66	2.417	12.20	3.42	5.95
0.500	6.29	1.500	19.66	2.500	12.20	3.50	5.95
0.583	6.98	1.583	38.68	2.583	10.21	3.58	5.53
0.667	6.98	1.667	38.68	2.667	10.21	3.67	5.53
0.750	7.88	1.750	144.26	2.750	8.84	3.75	5.18
0.833	7.88	1.833	144.26	2.833	8.84	3.83	5.18
0.917	9.11	1.917	40.90	2.917	7.84	3.92	4.87
1.000	9.11	2.000	40.90	3.000	7.84	4.00	4.87

Unit Hyd Qpeak (cms)= 0.068

PEAK FLOW (cms)= 0.053 (i)
TIME TO PEAK (hrs)= 2.750
RUNOFF VOLUME (mm)= 28.327
TOTAL RAINFALL (mm)= 70.145
RUNOFF COEFFICIENT = 0.404

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

CALIB
NASHYD (0109)
ID= 1 DT= 5.0 min

Area (ha)= 1.01 Curve Number (CN)= 75.0
Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.66

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	5.30	1.083	10.91	2.083	21.73	3.08	7.07
0.167	5.30	1.167	10.91	2.167	21.73	3.17	7.07
0.250	5.75	1.250	13.84	2.250	15.43	3.25	6.45
0.333	5.75	1.333	13.84	2.333	15.43	3.33	6.45
0.417	6.29	1.417	19.66	2.417	12.20	3.42	5.95
0.500	6.29	1.500	19.66	2.500	12.20	3.50	5.95
0.583	6.98	1.583	38.68	2.583	10.21	3.58	5.53
0.667	6.98	1.667	38.68	2.667	10.21	3.67	5.53
0.750	7.88	1.750	144.26	2.750	8.84	3.75	5.18
0.833	7.88	1.833	144.26	2.833	8.84	3.83	5.18
0.917	9.11	1.917	40.90	2.917	7.84	3.92	4.87
1.000	9.11	2.000	40.90	3.000	7.84	4.00	4.87

Unit Hyd Qpeak (cms)= 0.058

PEAK FLOW (cms)= 0.043 (i)
TIME TO PEAK (hrs)= 2.583
RUNOFF VOLUME (mm)= 28.326
TOTAL RAINFALL (mm)= 70.145
RUNOFF COEFFICIENT = 0.404

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

CALIB
STANDHYD (0082)
ID= 1 DT= 5.0 min

Area (ha)= 6.54
Total Imp(%)= 70.00 Dir. Conn.(%)= 70.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	4.58	1.96
Dep. Storage	(mm)=	1.50	1.50
Average Slope	(%)=	2.00	1.00
Length	(m)=	208.81	40.00
Mannings n	=	0.015	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	5.30	1.083	10.91	2.083	21.73	3.08	7.07
0.167	5.30	1.167	10.91	2.167	21.73	3.17	7.07
0.250	5.75	1.250	13.84	2.250	15.43	3.25	6.45
0.333	5.75	1.333	13.84	2.333	15.43	3.33	6.45
0.417	6.29	1.417	19.66	2.417	12.20	3.42	5.95
0.500	6.29	1.500	19.66	2.500	12.20	3.50	5.95
0.583	6.98	1.583	38.68	2.583	10.21	3.58	5.53
0.667	6.98	1.667	38.68	2.667	10.21	3.67	5.53
0.750	7.88	1.750	144.26	2.750	8.84	3.75	5.18
0.833	7.88	1.833	144.26	2.833	8.84	3.83	5.18
0.917	9.11	1.917	40.90	2.917	7.84	3.92	4.87
1.000	9.11	2.000	40.90	3.000	7.84	4.00	4.87

Max.Eff.Inten.(mm/hr)=	144.26	52.13	
over (min)	5.00	15.00	
Storage Coeff. (min)=	3.04 (ii)	14.31 (ii)	
Unit Hyd. Tpeak (min)=	5.00	15.00	

```
     Unit Hyd. peak  (cms)=       0.27         0.08
                                                      *TOTALS*
     PEAK FLOW       (cms)=       1.78         0.19          1.894 (iii)
     TIME TO PEAK    (hrs)=       1.83         2.00           1.83
     RUNOFF VOLUME    (mm)=      68.65        30.74          57.27
     TOTAL RAINFALL   (mm)=      70.15        70.15          70.15
     RUNOFF COEFFICIENT   =       0.98         0.44           0.82

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  75.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB            |
| STANDHYD (  0085)|   Area    (ha)=  15.38
|ID= 1 DT= 5.0 min |   Total Imp(%)=  60.00   Dir. Conn.(%)=  60.00
--------------------
                         IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       9.23         6.15
     Dep. Storage     (mm)=       2.00         1.50
     Average Slope     (%)=       1.00         1.00
     Length            (m)=     320.21        40.00
     Mannings n            =      0.015        0.250

        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    5.30 | 1.083   10.91 | 2.083   21.73 |  3.08    7.07
    0.167    5.30 | 1.167   10.91 | 2.167   21.73 |  3.17    7.07
    0.250    5.75 | 1.250   13.84 | 2.250   15.43 |  3.25    6.45
    0.333    5.75 | 1.333   13.84 | 2.333   15.43 |  3.33    6.45
    0.417    6.29 | 1.417   19.66 | 2.417   12.20 |  3.42    5.95
    0.500    6.29 | 1.500   19.66 | 2.500   12.20 |  3.50    5.95
    0.583    6.98 | 1.583   38.68 | 2.583   10.21 |  3.58    5.53
    0.667    6.98 | 1.667   38.68 | 2.667   10.21 |  3.67    5.53
    0.750    7.88 | 1.750  144.26 | 2.750    8.84 |  3.75    5.18
    0.833    7.88 | 1.833  144.26 | 2.833    8.84 |  3.83    5.18
    0.917    9.11 | 1.917   40.90 | 2.917    7.84 |  3.92    4.87
    1.000    9.11 | 2.000   40.90 | 3.000    7.84 |  4.00    4.87

     Max.Eff.Inten.(mm/hr)=     144.26        52.13
               over (min)        5.00        20.00
     Storage Coeff.  (min)=       4.83 (ii)   16.11 (ii)
     Unit Hyd. Tpeak (min)=       5.00        20.00
     Unit Hyd. peak  (cms)=       0.22         0.06
                                                      *TOTALS*
     PEAK FLOW       (cms)=       3.35         0.53          3.593 (iii)
     TIME TO PEAK    (hrs)=       1.83         2.08           1.83
     RUNOFF VOLUME    (mm)=      68.15        30.74          53.18
     TOTAL RAINFALL   (mm)=      70.15        70.15          70.15
     RUNOFF COEFFICIENT   =       0.97         0.44           0.76

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  75.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB            |
| STANDHYD (  0110)|   Area    (ha)=   1.89
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|ID= 1 DT= 5.0 min |   Total Imp(%)=  60.00   Dir. Conn.(%)=  60.00
--------------------
                         IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.13         0.76
     Dep. Storage     (mm)=       2.00         1.50
     Average Slope     (%)=       1.00         1.00
     Length            (m)=     112.25        40.00
     Mannings n            =      0.015        0.250

        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    5.30 | 1.083   10.91 | 2.083   21.73 |  3.08    7.07
    0.167    5.30 | 1.167   10.91 | 2.167   21.73 |  3.17    7.07
    0.250    5.75 | 1.250   13.84 | 2.250   15.43 |  3.25    6.45
    0.333    5.75 | 1.333   13.84 | 2.333   15.43 |  3.33    6.45
    0.417    6.29 | 1.417   19.66 | 2.417   12.20 |  3.42    5.95
    0.500    6.29 | 1.500   19.66 | 2.500   12.20 |  3.50    5.95
    0.583    6.98 | 1.583   38.68 | 2.583   10.21 |  3.58    5.53
    0.667    6.98 | 1.667   38.68 | 2.667   10.21 |  3.67    5.53
    0.750    7.88 | 1.750  144.26 | 2.750    8.84 |  3.75    5.18
    0.833    7.88 | 1.833  144.26 | 2.833    8.84 |  3.83    5.18
    0.917    9.11 | 1.917   40.90 | 2.917    7.84 |  3.92    4.87
    1.000    9.11 | 2.000   40.90 | 3.000    7.84 |  4.00    4.87

     Max.Eff.Inten.(mm/hr)=     144.26        52.13
               over (min)        5.00        15.00
     Storage Coeff.  (min)=       2.58 (ii)   13.85 (ii)
     Unit Hyd. Tpeak (min)=       5.00        15.00
     Unit Hyd. peak  (cms)=       0.29         0.08
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.45         0.07          0.491 (iii)
     TIME TO PEAK    (hrs)=       1.83         2.00           1.83
     RUNOFF VOLUME    (mm)=      68.15        30.74          53.18
     TOTAL RAINFALL   (mm)=      70.15        70.15          70.15
     RUNOFF COEFFICIENT   =       0.97         0.44           0.76

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  75.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| ADD HYD  (  0111)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)     (cms)    (hrs)     (mm)
       ID1= 1 (  0110):     1.89   0.491    1.83     53.18
     + ID2= 2 (  0082):     6.54   1.894    1.83     57.27
       ==========================================================
       ID = 3 (  0111):     8.43   2.385    1.83     56.35

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

--------------------
| ADD HYD  (  0111)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)     (cms)    (hrs)     (mm)
       ID1= 3 (  0111):     8.43   2.385    1.83     56.35
     + ID2= 2 (  0085):    15.38   3.593    1.83     53.18
       ==========================================================
       ID = 1 (  0111):    23.81   5.978    1.83     54.30

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

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--------------------
| CALIB            |
| STANDHYD (  0084)|   Area    (ha)=   2.33
|ID= 1 DT= 5.0 min |   Total Imp(%)=  89.00   Dir. Conn.(%)=  89.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.07         0.26
     Dep. Storage     (mm)=       0.00         1.50
     Average Slope     (%)=       1.00         1.00
     Length            (m)=     124.63        25.00
     Mannings n           =      0.015        0.250

         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    5.30 | 1.083   10.91 | 2.083   21.73 |  3.08    7.07
              0.167    5.30 | 1.167   10.91 | 2.167   21.73 |  3.17    7.07
              0.250    5.75 | 1.250   13.84 | 2.250   15.43 |  3.25    6.45
              0.333    5.75 | 1.333   13.84 | 2.333   15.43 |  3.33    6.45
              0.417    6.29 | 1.417   19.66 | 2.417   12.20 |  3.42    5.95
              0.500    6.29 | 1.500   19.66 | 2.500   12.20 |  3.50    5.95
              0.583    6.98 | 1.583   38.68 | 2.583   10.21 |  3.58    5.53
              0.667    6.98 | 1.667   38.68 | 2.667   10.21 |  3.67    5.53
              0.750    7.88 | 1.750  144.26 | 2.750    8.84 |  3.75    5.18
              0.833    7.88 | 1.833  144.26 | 2.833    8.84 |  3.83    5.18
              0.917    9.11 | 1.917   40.90 | 2.917    7.84 |  3.92    4.87
              1.000    9.11 | 2.000   40.90 | 3.000    7.84 |  4.00    4.87

     Max.Eff.Inten.(mm/hr)=     144.26        66.47
           over (min)        5.00         10.00
     Storage Coeff.  (min)=    2.74 (ii)    5.20 (ii)
     Unit Hyd. Tpeak (min)=    5.00         10.00
     Unit Hyd. peak  (cms)=    0.28          0.16
                                                    *TOTALS*
     PEAK FLOW       (cms)=    0.82          0.04          0.849 (iii)
     TIME TO PEAK    (hrs)=    1.83          1.92           1.83
     RUNOFF VOLUME    (mm)=   70.15         30.74          65.81
     TOTAL RAINFALL   (mm)=   70.15         70.15          70.15
     RUNOFF COEFFICIENT   =    1.00          0.44           0.94

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  75.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

--------------------
| ADD HYD  (  0081)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)      (mm)
       ID1= 1 (  0109):     1.01   0.043     2.58    28.33
     + ID2= 2 (  0111):    23.81   5.978     1.83    54.30
       ================================================
       ID = 3 (  0081):    24.82   5.986     1.83    53.25

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

--------------------
| ADD HYD  (  0081)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)      (mm)
       ID1= 3 (  0081):    24.82   5.986     1.83    53.25
     + ID2= 2 (  0128):    21.39   4.080     1.83    48.52
```



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       ================================================
       ID = 1 (  0081):    46.21  10.067     1.83    51.06

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

--------------------
| ADD HYD  (  0081)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)      (mm)
       ID1= 1 (  0081):    46.21  10.067     1.83    51.06
     + ID2= 2 (  0215):     1.45   0.053     2.75    28.33
       ================================================
       ID = 3 (  0081):    47.66  10.074     1.83    50.37

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

--------------------
| ADD HYD  (  0081)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)      (mm)
       ID1= 3 (  0081):    47.66  10.074     1.83    50.37
     + ID2= 2 (  0084):     2.33   0.849     1.83    65.81
       ================================================
       ID = 1 (  0081):    49.99  10.923     1.83    51.09

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

--------------------
| ADD HYD  (  0097)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)      (mm)
       ID1= 1 (  0130):    21.48   0.425     3.92    28.33
     + ID2= 2 (  0081):    49.99  10.923     1.83    51.09
       ================================================
       ID = 3 (  0097):    71.47  10.974     1.83    44.25

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0211)|     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   |    0.8460      1.8660
                           0.0080      0.2340   |    1.0630      2.1640
                           0.0130      0.4840   |    1.4780      2.4680
                           0.0470      0.7470   |    1.9960      2.7800
                           0.1760      1.0160   |    2.8820      2.8590
                           0.3580      1.2930   |    4.4100      2.9390
                           0.5810      1.5760   |   14.1270      3.2620

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0097)     71.470    10.974     1.83       44.25
   OUTFLOW: ID= 1 (  0211)     71.470     1.008     4.00       42.52

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  9.19
                  TIME SHIFT OF PEAK FLOW          (min)=130.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  2.0899

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

      V    V   I    SSSSS  U   U    A    L              (v 6.2.2022)
      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
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       OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
      O   O    T      T    H   H   Y Y   MM MM  O   O
      O   O    T      T    H   H    Y    M M M  O   O
       OOO     T      T    H   H    Y    M   M   OOO
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                  ***** D E T A I L E D   O U T P U T *****

  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\kbobinac\AppData\Local\Civica\VH5\c6a42fd8-e61d-467c-b3ff-9063ee9e534e\cd094612-
0591-414e-8d7b-63f90d90d028\sce
  Summary filename: C:\Users\kbobinac\AppData\Local\Civica\VH5\c6a42fd8-e61d-467c-b3ff-9063ee9e534e\cd094612-
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DATE: 03/24/2026                          TIME: 01:22:19

USER:


COMMENTS: _____
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  ************************************************
  ** SIMULATION : H. 100yr MTO 24hr 10min Chica **
  ************************************************

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| CHICAGO STORM    |     IDF curve parameters: A= 915.400
| Ptotal=136.18 mm |                           B=   0.000
--------------------                           C=   0.699
                        used in:   INTENSITY =  A / (t + B)^C

                        Duration of storm  = 24.00 hrs
                        Storm time step    = 10.00 min
                        Time to peak ratio =  0.46
```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	' TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	1.73	6.00	3.05	12.00	9.16	18.00	2.58
0.17	1.75	6.17	3.12	12.17	8.35	18.17	2.54
0.33	1.77	6.33	3.20	12.33	7.69	18.33	2.50
0.50	1.79	6.50	3.29	12.50	7.15	18.50	2.46
0.67	1.81	6.67	3.38	12.67	6.69	18.67	2.43
0.83	1.83	6.83	3.48	12.83	6.29	18.83	2.39
1.00	1.85	7.00	3.58	13.00	5.95	19.00	2.36
1.17	1.88	7.17	3.70	13.17	5.65	19.17	2.32
1.33	1.90	7.33	3.82	13.33	5.39	19.33	2.29
1.50	1.92	7.50	3.95	13.50	5.15	19.50	2.26
1.67	1.95	7.67	4.10	13.67	4.94	19.67	2.23
1.83	1.97	7.83	4.25	13.83	4.74	19.83	2.20
2.00	2.00	8.00	4.43	14.00	4.57	20.00	2.17
2.17	2.02	8.17	4.62	14.17	4.41	20.17	2.15
2.33	2.05	8.33	4.83	14.33	4.26	20.33	2.12
2.50	2.08	8.50	5.07	14.50	4.12	20.50	2.10
2.67	2.11	8.67	5.34	14.67	4.00	20.67	2.07
2.83	2.14	8.83	5.65	14.83	3.88	20.83	2.05
3.00	2.17	9.00	6.01	15.00	3.77	21.00	2.02
3.17	2.21	9.17	6.43	15.17	3.67	21.17	2.00
3.33	2.24	9.33	6.92	15.33	3.57	21.33	1.98
3.50	2.27	9.50	7.52	15.50	3.48	21.50	1.96
3.67	2.31	9.67	8.26	15.67	3.40	21.67	1.94
3.83	2.35	9.83	9.21	15.83	3.32	21.83	1.91
4.00	2.39	10.00	10.48	16.00	3.25	22.00	1.89
4.17	2.43	10.17	12.28	16.17	3.17	22.17	1.88
4.33	2.48	10.33	15.08	16.33	3.11	22.33	1.86

4.50	2.52	10.50	20.27	16.50	3.04	22.50	1.84
4.67	2.57	10.67	35.01	16.67	2.98	22.67	1.82
4.83	2.62	10.83	183.07	16.83	2.92	22.83	1.80
5.00	2.67	11.00	36.66	17.00	2.87	23.00	1.78
5.17	2.72	11.17	22.03	17.17	2.82	23.17	1.77
5.33	2.78	11.33	16.56	17.33	2.76	23.33	1.75
5.50	2.84	11.50	13.54	17.50	2.72	23.50	1.73
5.67	2.91	11.67	11.59	17.67	2.67	23.67	1.72
5.83	2.97	11.83	10.20	17.83	2.63	23.83	1.70

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| CALIB            |
| NASHYD  (  0076) |   Area     (ha)=   7.69   Curve Number    (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia       (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.64

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

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	' TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	1.73	6.083	3.05	12.083	9.16	18.08	2.58
0.167	1.73	6.167	3.05	12.167	9.16	18.17	2.58
0.250	1.75	6.250	3.12	12.250	8.35	18.25	2.54
0.333	1.75	6.333	3.12	12.333	8.35	18.33	2.54
0.417	1.77	6.417	3.20	12.417	7.69	18.42	2.50
0.500	1.77	6.500	3.20	12.500	7.69	18.50	2.50
0.583	1.79	6.583	3.29	12.583	7.15	18.58	2.46
0.667	1.79	6.667	3.29	12.667	7.15	18.67	2.46
0.750	1.81	6.750	3.38	12.750	6.69	18.75	2.43
0.833	1.81	6.833	3.38	12.833	6.69	18.83	2.43
0.917	1.83	6.917	3.48	12.917	6.29	18.92	2.39
1.000	1.83	7.000	3.48	13.000	6.29	19.00	2.39
1.083	1.85	7.083	3.58	13.083	5.95	19.08	2.36
1.167	1.85	7.167	3.58	13.167	5.95	19.17	2.36
1.250	1.88	7.250	3.70	13.250	5.65	19.25	2.32
1.333	1.88	7.333	3.70	13.333	5.65	19.33	2.32
1.417	1.90	7.417	3.82	13.417	5.39	19.42	2.29
1.500	1.90	7.500	3.82	13.500	5.39	19.50	2.29
1.583	1.92	7.583	3.95	13.583	5.15	19.58	2.26
1.667	1.92	7.667	3.95	13.667	5.15	19.67	2.26
1.750	1.95	7.750	4.10	13.750	4.94	19.75	2.23
1.833	1.95	7.833	4.10	13.833	4.94	19.83	2.23
1.917	1.97	7.917	4.25	13.917	4.74	19.92	2.20
2.000	1.97	8.000	4.25	14.000	4.74	20.00	2.20
2.083	2.00	8.083	4.43	14.083	4.57	20.08	2.17
2.167	2.00	8.167	4.43	14.167	4.57	20.17	2.17
2.250	2.02	8.250	4.62	14.250	4.41	20.25	2.15
2.333	2.02	8.333	4.62	14.333	4.41	20.33	2.15
2.417	2.05	8.417	4.83	14.417	4.26	20.42	2.12
2.500	2.05	8.500	4.83	14.500	4.26	20.50	2.12
2.583	2.08	8.583	5.07	14.583	4.12	20.58	2.10
2.667	2.08	8.667	5.07	14.667	4.12	20.67	2.10
2.750	2.11	8.750	5.34	14.750	4.00	20.75	2.07
2.833	2.11	8.833	5.34	14.833	4.00	20.83	2.07
2.917	2.14	8.917	5.65	14.917	3.88	20.92	2.05
3.000	2.14	9.000	5.65	15.000	3.88	21.00	2.05
3.083	2.17	9.083	6.01	15.083	3.77	21.08	2.02
3.167	2.17	9.167	6.01	15.167	3.77	21.17	2.02
3.250	2.21	9.250	6.43	15.250	3.67	21.25	2.00
3.333	2.21	9.333	6.43	15.333	3.67	21.33	2.00
3.417	2.24	9.417	6.92	15.417	3.57	21.42	1.98
3.500	2.24	9.500	6.92	15.500	3.57	21.50	1.98
3.583	2.27	9.583	7.52	15.583	3.48	21.58	1.96
3.667	2.27	9.667	7.52	15.667	3.48	21.67	1.96
3.750	2.31	9.750	8.26	15.750	3.40	21.75	1.94
3.833	2.31	9.833	8.26	15.833	3.40	21.83	1.94
3.917	2.35	9.917	9.21	15.917	3.32	21.92	1.91
4.000	2.35	10.000	9.21	16.000	3.32	22.00	1.91

4.083	2.39	10.083	10.48	16.083	3.25	22.08	1.89
4.167	2.39	10.167	10.48	16.167	3.25	22.17	1.89
4.250	2.43	10.250	12.28	16.250	3.17	22.25	1.88
4.333	2.43	10.333	12.28	16.333	3.17	22.33	1.88
4.417	2.48	10.417	15.08	16.417	3.11	22.42	1.86
4.500	2.48	10.500	15.08	16.500	3.11	22.50	1.86
4.583	2.52	10.583	20.27	16.583	3.04	22.58	1.84
4.667	2.52	10.667	20.27	16.667	3.04	22.67	1.84
4.750	2.57	10.750	35.01	16.750	2.98	22.75	1.82
4.833	2.57	10.833	35.01	16.833	2.98	22.83	1.82
4.917	2.62	10.917	183.06	16.917	2.92	22.92	1.80
5.000	2.62	11.000	183.07	17.000	2.92	23.00	1.80
5.083	2.67	11.083	36.67	17.083	2.87	23.08	1.78
5.167	2.67	11.167	36.66	17.167	2.87	23.17	1.78
5.250	2.72	11.250	22.03	17.250	2.82	23.25	1.77
5.333	2.72	11.333	22.03	17.333	2.82	23.33	1.77
5.417	2.78	11.417	16.56	17.417	2.76	23.42	1.75
5.500	2.78	11.500	16.56	17.500	2.76	23.50	1.75
5.583	2.84	11.583	13.54	17.583	2.72	23.58	1.73
5.667	2.84	11.667	13.54	17.667	2.72	23.67	1.73
5.750	2.91	11.750	11.59	17.750	2.67	23.75	1.72
5.833	2.91	11.833	11.59	17.833	2.67	23.83	1.72
5.917	2.97	11.917	10.20	17.917	2.63	23.92	1.70
6.000	2.97	12.000	10.20	18.000	2.63	24.00	1.70

Unit Hyd Qpeak (cms)= 0.459

PEAK FLOW (cms)= 0.593 (i)
TIME TO PEAK (hrs)= 11.583
RUNOFF VOLUME (mm)= 79.725
TOTAL RAINFALL (mm)= 136.183
RUNOFF COEFFICIENT = 0.585

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

CALIB			
NASHYD (0086)	Area (ha)= 13.79	Curve Number (CN)= 75.0	
ID= 1 DT= 5.0 min	Ia (mm)= 5.00	# of Linear Res.(N)= 3.00	
	U.H. Tp(hrs)= 0.80		

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	1.73	6.083	3.05	12.083	9.16	18.08	2.58
0.167	1.73	6.167	3.05	12.167	9.16	18.17	2.58
0.250	1.75	6.250	3.12	12.250	8.35	18.25	2.54
0.333	1.75	6.333	3.12	12.333	8.35	18.33	2.54
0.417	1.77	6.417	3.20	12.417	7.69	18.42	2.50
0.500	1.77	6.500	3.20	12.500	7.69	18.50	2.50
0.583	1.79	6.583	3.29	12.583	7.15	18.58	2.46
0.667	1.79	6.667	3.29	12.667	7.15	18.67	2.46
0.750	1.81	6.750	3.38	12.750	6.69	18.75	2.43
0.833	1.81	6.833	3.38	12.833	6.69	18.83	2.43
0.917	1.83	6.917	3.48	12.917	6.29	18.92	2.39
1.000	1.83	7.000	3.48	13.000	6.29	19.00	2.39
1.083	1.85	7.083	3.58	13.083	5.95	19.08	2.36
1.167	1.85	7.167	3.58	13.167	5.95	19.17	2.36
1.250	1.88	7.250	3.70	13.250	5.65	19.25	2.32
1.333	1.88	7.333	3.70	13.333	5.65	19.33	2.32
1.417	1.90	7.417	3.82	13.417	5.39	19.42	2.29
1.500	1.90	7.500	3.82	13.500	5.39	19.50	2.29
1.583	1.92	7.583	3.95	13.583	5.15	19.58	2.26
1.667	1.92	7.667	3.95	13.667	5.15	19.67	2.26
1.750	1.95	7.750	4.10	13.750	4.94	19.75	2.23
1.833	1.95	7.833	4.10	13.833	4.94	19.83	2.23
1.917	1.97	7.917	4.25	13.917	4.74	19.92	2.20
2.000	1.97	8.000	4.25	14.000	4.74	20.00	2.20

2.083	2.00	8.083	4.43	14.083	4.57	20.08	2.17
2.167	2.00	8.167	4.43	14.167	4.57	20.17	2.17
2.250	2.02	8.250	4.62	14.250	4.41	20.25	2.15
2.333	2.02	8.333	4.62	14.333	4.41	20.33	2.15
2.417	2.05	8.417	4.83	14.417	4.26	20.42	2.12
2.500	2.05	8.500	4.83	14.500	4.26	20.50	2.12
2.583	2.08	8.583	5.07	14.583	4.12	20.58	2.10
2.667	2.08	8.667	5.07	14.667	4.12	20.67	2.10
2.750	2.11	8.750	5.34	14.750	4.00	20.75	2.07
2.833	2.11	8.833	5.34	14.833	4.00	20.83	2.07
2.917	2.14	8.917	5.65	14.917	3.88	20.92	2.05
3.000	2.14	9.000	5.65	15.000	3.88	21.00	2.05
3.083	2.17	9.083	6.01	15.083	3.77	21.08	2.02
3.167	2.17	9.167	6.01	15.167	3.77	21.17	2.02
3.250	2.21	9.250	6.43	15.250	3.67	21.25	2.00
3.333	2.21	9.333	6.43	15.333	3.67	21.33	2.00
3.417	2.24	9.417	6.92	15.417	3.57	21.42	1.98
3.500	2.24	9.500	6.92	15.500	3.57	21.50	1.98
3.583	2.27	9.583	7.52	15.583	3.48	21.58	1.96
3.667	2.27	9.667	7.52	15.667	3.48	21.67	1.96
3.750	2.31	9.750	8.26	15.750	3.40	21.75	1.94
3.833	2.31	9.833	8.26	15.833	3.40	21.83	1.94
3.917	2.35	9.917	9.21	15.917	3.32	21.92	1.91
4.000	2.35	10.000	9.21	16.000	3.32	22.00	1.91
4.083	2.39	10.083	10.48	16.083	3.25	22.08	1.89
4.167	2.39	10.167	10.48	16.167	3.25	22.17	1.89
4.250	2.43	10.250	12.28	16.250	3.17	22.25	1.88
4.333	2.43	10.333	12.28	16.333	3.17	22.33	1.88
4.417	2.48	10.417	15.08	16.417	3.11	22.42	1.86
4.500	2.48	10.500	15.08	16.500	3.11	22.50	1.86
4.583	2.52	10.583	20.27	16.583	3.04	22.58	1.84
4.667	2.52	10.667	20.27	16.667	3.04	22.67	1.84
4.750	2.57	10.750	35.01	16.750	2.98	22.75	1.82
4.833	2.57	10.833	35.01	16.833	2.98	22.83	1.82
4.917	2.62	10.917	183.06	16.917	2.92	22.92	1.80
5.000	2.62	11.000	183.07	17.000	2.92	23.00	1.80
5.083	2.67	11.083	36.67	17.083	2.87	23.08	1.78
5.167	2.67	11.167	36.66	17.167	2.87	23.17	1.78
5.250	2.72	11.250	22.03	17.250	2.82	23.25	1.77
5.333	2.72	11.333	22.03	17.333	2.82	23.33	1.77
5.417	2.78	11.417	16.56	17.417	2.76	23.42	1.75
5.500	2.78	11.500	16.56	17.500	2.76	23.50	1.75
5.583	2.84	11.583	13.54	17.583	2.72	23.58	1.73
5.667	2.84	11.667	13.54	17.667	2.72	23.67	1.73
5.750	2.91	11.750	11.59	17.750	2.67	23.75	1.72
5.833	2.91	11.833	11.59	17.833	2.67	23.83	1.72
5.917	2.97	11.917	10.20	17.917	2.63	23.92	1.70
6.000	2.97	12.000	10.20	18.000	2.63	24.00	1.70

Unit Hyd Qpeak (cms)= 0.658

PEAK FLOW (cms)= 0.907 (i)
TIME TO PEAK (hrs)= 11.750
RUNOFF VOLUME (mm)= 79.725
TOTAL RAINFALL (mm)= 136.183
RUNOFF COEFFICIENT = 0.585

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

ADD HYD (0080)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
	ID1= 1 (0076):	7.69	0.593	11.58	79.72
	+ ID2= 2 (0086):	13.79	0.907	11.75	79.73
	ID = 3 (0080):	21.48	1.484	11.67	79.73

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0130) IN= 2---> OUT= 1 DT= 5.0 min	OVERFLOW IS OFF			
	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.5114	0.3494
	0.0634	0.0054	0.5382	0.3871
	0.1794	0.0430	0.5566	0.4140
	0.2457	0.0806	0.5779	0.4462
	0.2975	0.1183	0.5950	0.4731
	0.3416	0.1559	0.6117	0.5000
	0.3858	0.1989	0.6247	0.5215
	0.4207	0.2365	0.6375	0.5430
	0.4530	0.2742	0.6518	0.5677
	0.4872	0.3172	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0080)	21.480	1.484	11.67	79.73
OUTFLOW: ID= 1 (0130)	21.480	0.617	13.08	79.73

PEAK FLOW REDUCTION [Qout/Qin](%)= 41.59
TIME SHIFT OF PEAK FLOW (min)= 85.00
MAXIMUM STORAGE USED (ha.m.)= 0.5092

CALIB NASHYD (0077) ID= 1 DT= 5.0 min	Area (ha)= 4.01	Curve Number (CN)= 75.0
	Ia (mm)= 5.00	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 0.52	

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	1.73	6.083	3.05	12.083	9.16	18.08	2.58
0.167	1.73	6.167	3.05	12.167	9.16	18.17	2.58
0.250	1.75	6.250	3.12	12.250	8.35	18.25	2.54
0.333	1.75	6.333	3.12	12.333	8.35	18.33	2.54
0.417	1.77	6.417	3.20	12.417	7.69	18.42	2.50
0.500	1.77	6.500	3.20	12.500	7.69	18.50	2.50
0.583	1.79	6.583	3.29	12.583	7.15	18.58	2.46
0.667	1.79	6.667	3.29	12.667	7.15	18.67	2.46
0.750	1.81	6.750	3.38	12.750	6.69	18.75	2.43
0.833	1.81	6.833	3.38	12.833	6.69	18.83	2.43
0.917	1.83	6.917	3.48	12.917	6.29	18.92	2.39
1.000	1.83	7.000	3.48	13.000	6.29	19.00	2.39
1.083	1.85	7.083	3.58	13.083	5.95	19.08	2.36
1.167	1.85	7.167	3.58	13.167	5.95	19.17	2.36
1.250	1.88	7.250	3.70	13.250	5.65	19.25	2.32
1.333	1.88	7.333	3.70	13.333	5.65	19.33	2.32
1.417	1.90	7.417	3.82	13.417	5.39	19.42	2.29
1.500	1.90	7.500	3.82	13.500	5.39	19.50	2.29
1.583	1.92	7.583	3.95	13.583	5.15	19.58	2.26
1.667	1.92	7.667	3.95	13.667	5.15	19.67	2.26
1.750	1.95	7.750	4.10	13.750	4.94	19.75	2.23
1.833	1.95	7.833	4.10	13.833	4.94	19.83	2.23
1.917	1.97	7.917	4.25	13.917	4.74	19.92	2.20
2.000	1.97	8.000	4.25	14.000	4.74	20.00	2.20
2.083	2.00	8.083	4.43	14.083	4.57	20.08	2.17
2.167	2.00	8.167	4.43	14.167	4.57	20.17	2.17
2.250	2.02	8.250	4.62	14.250	4.41	20.25	2.15
2.333	2.02	8.333	4.62	14.333	4.41	20.33	2.15
2.417	2.05	8.417	4.83	14.417	4.26	20.42	2.12
2.500	2.05	8.500	4.83	14.500	4.26	20.50	2.12
2.583	2.08	8.583	5.07	14.583	4.12	20.58	2.10
2.667	2.08	8.667	5.07	14.667	4.12	20.67	2.10
2.750	2.11	8.750	5.34	14.750	4.00	20.75	2.07
2.833	2.11	8.833	5.34	14.833	4.00	20.83	2.07

2.917	2.14	8.917	5.65	14.917	3.88	20.92	2.05
3.000	2.14	9.000	5.65	15.000	3.88	21.00	2.05
3.083	2.17	9.083	6.01	15.083	3.77	21.08	2.02
3.167	2.17	9.167	6.01	15.167	3.77	21.17	2.02
3.250	2.21	9.250	6.43	15.250	3.67	21.25	2.00
3.333	2.21	9.333	6.43	15.333	3.67	21.33	2.00
3.417	2.24	9.417	6.92	15.417	3.57	21.42	1.98
3.500	2.24	9.500	6.92	15.500	3.57	21.50	1.98
3.583	2.27	9.583	7.52	15.583	3.48	21.58	1.96
3.667	2.27	9.667	7.52	15.667	3.48	21.67	1.96
3.750	2.31	9.750	8.26	15.750	3.40	21.75	1.94
3.833	2.31	9.833	8.26	15.833	3.40	21.83	1.94
3.917	2.35	9.917	9.21	15.917	3.32	21.92	1.91
4.000	2.35	10.000	9.21	16.000	3.32	22.00	1.91
4.083	2.39	10.083	10.48	16.083	3.25	22.08	1.89
4.167	2.39	10.167	10.48	16.167	3.25	22.17	1.89
4.250	2.43	10.250	12.28	16.250	3.17	22.25	1.88
4.333	2.43	10.333	12.28	16.333	3.17	22.33	1.88
4.417	2.48	10.417	15.08	16.417	3.11	22.42	1.86
4.500	2.48	10.500	15.08	16.500	3.11	22.50	1.86
4.583	2.52	10.583	20.27	16.583	3.04	22.58	1.84
4.667	2.52	10.667	20.27	16.667	3.04	22.67	1.84
4.750	2.57	10.750	35.01	16.750	2.98	22.75	1.82
4.833	2.57	10.833	35.01	16.833	2.98	22.83	1.82
4.917	2.62	10.917	183.06	16.917	2.92	22.92	1.80
5.000	2.62	11.000	183.07	17.000	2.92	23.00	1.80
5.083	2.67	11.083	36.67	17.083	2.87	23.08	1.78
5.167	2.67	11.167	36.66	17.167	2.87	23.17	1.78
5.250	2.72	11.250	22.03	17.250	2.82	23.25	1.77
5.333	2.72	11.333	22.03	17.333	2.82	23.33	1.77
5.417	2.78	11.417	16.56	17.417	2.76	23.42	1.75
5.500	2.78	11.500	16.56	17.500	2.76	23.50	1.75
5.583	2.84	11.583	13.54	17.583	2.72	23.58	1.73
5.667	2.84	11.667	13.54	17.667	2.72	23.67	1.73
5.750	2.91	11.750	11.59	17.750	2.67	23.75	1.72
5.833	2.91	11.833	11.59	17.833	2.67	23.83	1.72
5.917	2.97	11.917	10.20	17.917	2.63	23.92	1.70
6.000	2.97	12.000	10.20	18.000	2.63	24.00	1.70

Unit Hyd Qpeak (cms)= 0.295

PEAK FLOW (cms)= 0.357 (i)
TIME TO PEAK (hrs)= 11.500
RUNOFF VOLUME (mm)= 79.722
TOTAL RAINFALL (mm)= 136.183
RUNOFF COEFFICIENT = 0.585

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

CALIB STANDHYD (0078) ID= 1 DT= 5.0 min	Area (ha)= 17.38	
	Total Imp(%)= 60.00	Dir. Conn.(%)= 60.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	10.43	6.95
Dep. Storage	(mm)=	2.00	1.50
Average Slope	(%)=	1.00	1.00
Length	(m)=	340.39	40.00
Mannings n	=	0.015	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	1.73	6.083	3.05	12.083	9.16	18.08	2.58
0.167	1.73	6.167	3.05	12.167	9.16	18.17	2.58
0.250	1.75	6.250	3.12	12.250	8.35	18.25	2.54
0.333	1.75	6.333	3.12	12.333	8.35	18.33	2.54

0.417	1.77	6.417	3.20	12.417	7.69	18.42	2.50
0.500	1.77	6.500	3.20	12.500	7.69	18.50	2.50
0.583	1.79	6.583	3.29	12.583	7.15	18.58	2.46
0.667	1.79	6.667	3.29	12.667	7.15	18.67	2.46
0.750	1.81	6.750	3.38	12.750	6.69	18.75	2.43
0.833	1.81	6.833	3.38	12.833	6.69	18.83	2.43
0.917	1.83	6.917	3.48	12.917	6.29	18.92	2.39
1.000	1.83	7.000	3.48	13.000	6.29	19.00	2.39
1.083	1.85	7.083	3.58	13.083	5.95	19.08	2.36
1.167	1.85	7.167	3.58	13.167	5.95	19.17	2.36
1.250	1.88	7.250	3.70	13.250	5.65	19.25	2.32
1.333	1.88	7.333	3.70	13.333	5.65	19.33	2.32
1.417	1.90	7.417	3.82	13.417	5.39	19.42	2.29
1.500	1.90	7.500	3.82	13.500	5.39	19.50	2.29
1.583	1.92	7.583	3.95	13.583	5.15	19.58	2.26
1.667	1.92	7.667	3.95	13.667	5.15	19.67	2.26
1.750	1.95	7.750	4.10	13.750	4.94	19.75	2.23
1.833	1.95	7.833	4.10	13.833	4.94	19.83	2.23
1.917	1.97	7.917	4.25	13.917	4.74	19.92	2.20
2.000	1.97	8.000	4.25	14.000	4.74	20.00	2.20
2.083	2.00	8.083	4.43	14.083	4.57	20.08	2.17
2.167	2.00	8.167	4.43	14.167	4.57	20.17	2.17
2.250	2.02	8.250	4.62	14.250	4.41	20.25	2.15
2.333	2.02	8.333	4.62	14.333	4.41	20.33	2.15
2.417	2.05	8.417	4.83	14.417	4.26	20.42	2.12
2.500	2.05	8.500	4.83	14.500	4.26	20.50	2.12
2.583	2.08	8.583	5.07	14.583	4.12	20.58	2.10
2.667	2.08	8.667	5.07	14.667	4.12	20.67	2.10
2.750	2.11	8.750	5.34	14.750	4.00	20.75	2.07
2.833	2.11	8.833	5.34	14.833	4.00	20.83	2.07
2.917	2.14	8.917	5.65	14.917	3.88	20.92	2.05
3.000	2.14	9.000	5.65	15.000	3.88	21.00	2.05
3.083	2.17	9.083	6.01	15.083	3.77	21.08	2.02
3.167	2.17	9.167	6.01	15.167	3.77	21.17	2.02
3.250	2.21	9.250	6.43	15.250	3.67	21.25	2.00
3.333	2.21	9.333	6.43	15.333	3.67	21.33	2.00
3.417	2.24	9.417	6.92	15.417	3.57	21.42	1.98
3.500	2.24	9.500	6.92	15.500	3.57	21.50	1.98
3.583	2.27	9.583	7.52	15.583	3.48	21.58	1.96
3.667	2.27	9.667	7.52	15.667	3.48	21.67	1.96
3.750	2.31	9.750	8.26	15.750	3.40	21.75	1.94
3.833	2.31	9.833	8.26	15.833	3.40	21.83	1.94
3.917	2.35	9.917	9.21	15.917	3.32	21.92	1.91
4.000	2.35	10.000	9.21	16.000	3.32	22.00	1.91
4.083	2.39	10.083	10.48	16.083	3.25	22.08	1.89
4.167	2.39	10.167	10.48	16.167	3.25	22.17	1.89
4.250	2.43	10.250	12.28	16.250	3.17	22.25	1.88
4.333	2.43	10.333	12.28	16.333	3.17	22.33	1.88
4.417	2.48	10.417	15.08	16.417	3.11	22.42	1.86
4.500	2.48	10.500	15.08	16.500	3.11	22.50	1.86
4.583	2.52	10.583	20.27	16.583	3.04	22.58	1.84
4.667	2.52	10.667	20.27	16.667	3.04	22.67	1.84
4.750	2.57	10.750	35.01	16.750	2.98	22.75	1.82
4.833	2.57	10.833	35.01	16.833	2.98	22.83	1.82
4.917	2.62	10.917	183.06	16.917	2.92	22.92	1.80
5.000	2.62	11.000	183.07	17.000	2.92	23.00	1.80
5.083	2.67	11.083	36.67	17.083	2.87	23.08	1.78
5.167	2.67	11.167	36.66	17.167	2.87	23.17	1.78
5.250	2.72	11.250	22.03	17.250	2.82	23.25	1.77
5.333	2.72	11.333	22.03	17.333	2.82	23.33	1.77
5.417	2.78	11.417	16.56	17.417	2.76	23.42	1.75
5.500	2.78	11.500	16.56	17.500	2.76	23.50	1.75
5.583	2.84	11.583	13.54	17.583	2.72	23.58	1.73
5.667	2.84	11.667	13.54	17.667	2.72	23.67	1.73
5.750	2.91	11.750	11.59	17.750	2.67	23.75	1.72
5.833	2.91	11.833	11.59	17.833	2.67	23.83	1.72
5.917	2.97	11.917	10.20	17.917	2.63	23.92	1.70
6.000	2.97	12.000	10.20	18.000	2.63	24.00	1.70

Max.Eff.Inten.(mm/hr)=	183.07	121.51	
over (min)	5.00	15.00	
Storage Coeff. (min)=	4.56 (ii)	12.60 (ii)	

Unit Hyd. Tpeak (min)=	5.00	15.00	
Unit Hyd. peak (cms)=	0.23	0.08	
			TOTALS
PEAK FLOW (cms)=	4.82	1.21	5.606 (iii)
TIME TO PEAK (hrs)=	11.00	11.17	11.00
RUNOFF VOLUME (mm)=	134.18	82.70	113.59
TOTAL RAINFALL (mm)=	136.18	136.18	136.18
RUNOFF COEFFICIENT =	0.99	0.61	0.83

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 75.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0128)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0077):	4.01	0.357	11.50	79.72
+ ID2= 2 (0078):	17.38	5.606	11.00	113.59
ID = 3 (0128):	21.39	5.749	11.00	107.24

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB
NASHYD (0215)
ID= 1 DT= 5.0 min

Area (ha)= 1.45 Curve Number (CN)= 75.0
Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.82

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	1.73	6.083	3.05	12.083	9.16	18.08	2.58
0.167	1.73	6.167	3.05	12.167	9.16	18.17	2.58
0.250	1.75	6.250	3.12	12.250	8.35	18.25	2.54
0.333	1.75	6.333	3.12	12.333	8.35	18.33	2.54
0.417	1.77	6.417	3.20	12.417	7.69	18.42	2.50
0.500	1.77	6.500	3.20	12.500	7.69	18.50	2.50
0.583	1.79	6.583	3.29	12.583	7.15	18.58	2.46
0.667	1.79	6.667	3.29	12.667	7.15	18.67	2.46
0.750	1.81	6.750	3.38	12.750	6.69	18.75	2.43
0.833	1.81	6.833	3.38	12.833	6.69	18.83	2.43
0.917	1.83	6.917	3.48	12.917	6.29	18.92	2.39
1.000	1.83	7.000	3.48	13.000	6.29	19.00	2.39
1.083	1.85	7.083	3.58	13.083	5.95	19.08	2.36
1.167	1.85	7.167	3.58	13.167	5.95	19.17	2.36
1.250	1.88	7.250	3.70	13.250	5.65	19.25	2.32
1.333	1.88	7.333	3.70	13.333	5.65	19.33	2.32
1.417	1.90	7.417	3.82	13.417	5.39	19.42	2.29
1.500	1.90	7.500	3.82	13.500	5.39	19.50	2.29
1.583	1.92	7.583	3.95	13.583	5.15	19.58	2.26
1.667	1.92	7.667	3.95	13.667	5.15	19.67	2.26
1.750	1.95	7.750	4.10	13.750	4.94	19.75	2.23
1.833	1.95	7.833	4.10	13.833	4.94	19.83	2.23
1.917	1.97	7.917	4.25	13.917	4.74	19.92	2.20
2.000	1.97	8.000	4.25	14.000	4.74	20.00	2.20
2.083	2.00	8.083	4.43	14.083	4.57	20.08	2.17
2.167	2.00	8.167	4.43	14.167	4.57	20.17	2.17
2.250	2.02	8.250	4.62	14.250	4.41	20.25	2.15
2.333	2.02	8.333	4.62	14.333	4.41	20.33	2.15
2.417	2.05	8.417	4.83	14.417	4.26	20.42	2.12
2.500	2.05	8.500	4.83	14.500	4.26	20.50	2.12

2.583	2.08	8.583	5.07	14.583	4.12	20.58	2.10
2.667	2.08	8.667	5.07	14.667	4.12	20.67	2.10
2.750	2.11	8.750	5.34	14.750	4.00	20.75	2.07
2.833	2.11	8.833	5.34	14.833	4.00	20.83	2.07
2.917	2.14	8.917	5.65	14.917	3.88	20.92	2.05
3.000	2.14	9.000	5.65	15.000	3.88	21.00	2.05
3.083	2.17	9.083	6.01	15.083	3.77	21.08	2.02
3.167	2.17	9.167	6.01	15.167	3.77	21.17	2.02
3.250	2.21	9.250	6.43	15.250	3.67	21.25	2.00
3.333	2.21	9.333	6.43	15.333	3.67	21.33	2.00
3.417	2.24	9.417	6.92	15.417	3.57	21.42	1.98
3.500	2.24	9.500	6.92	15.500	3.57	21.50	1.98
3.583	2.27	9.583	7.52	15.583	3.48	21.58	1.96
3.667	2.27	9.667	7.52	15.667	3.48	21.67	1.96
3.750	2.31	9.750	8.26	15.750	3.40	21.75	1.94
3.833	2.31	9.833	8.26	15.833	3.40	21.83	1.94
3.917	2.35	9.917	9.21	15.917	3.32	21.92	1.91
4.000	2.35	10.000	9.21	16.000	3.32	22.00	1.91
4.083	2.39	10.083	10.48	16.083	3.25	22.08	1.89
4.167	2.39	10.167	10.48	16.167	3.25	22.17	1.89
4.250	2.43	10.250	12.28	16.250	3.17	22.25	1.88
4.333	2.43	10.333	12.28	16.333	3.17	22.33	1.88
4.417	2.48	10.417	15.08	16.417	3.11	22.42	1.86
4.500	2.48	10.500	15.08	16.500	3.11	22.50	1.86
4.583	2.52	10.583	20.27	16.583	3.04	22.58	1.84
4.667	2.52	10.667	20.27	16.667	3.04	22.67	1.84
4.750	2.57	10.750	35.01	16.750	2.98	22.75	1.82
4.833	2.57	10.833	35.01	16.833	2.98	22.83	1.82
4.917	2.62	10.917	183.06	16.917	2.92	22.92	1.80
5.000	2.62	11.000	183.07	17.000	2.92	23.00	1.80
5.083	2.67	11.083	36.67	17.083	2.87	23.08	1.78
5.167	2.67	11.167	36.66	17.167	2.87	23.17	1.78
5.250	2.72	11.250	22.03	17.250	2.82	23.25	1.77
5.333	2.72	11.333	22.03	17.333	2.82	23.33	1.77
5.417	2.78	11.417	16.56	17.417	2.76	23.42	1.75
5.500	2.78	11.500	16.56	17.500	2.76	23.50	1.75
5.583	2.84	11.583	13.54	17.583	2.72	23.58	1.73
5.667	2.84	11.667	13.54	17.667	2.72	23.67	1.73
5.750	2.91	11.750	11.59	17.750	2.67	23.75	1.72
5.833	2.91	11.833	11.59	17.833	2.67	23.83	1.72
5.917	2.97	11.917	10.20	17.917	2.63	23.92	1.70
6.000	2.97	12.000	10.20	18.000	2.63	24.00	1.70

Unit Hyd Qpeak (cms)= 0.068

PEAK FLOW (cms)= 0.094 (i)
TIME TO PEAK (hrs)= 11.833
RUNOFF VOLUME (mm)= 79.724
TOTAL RAINFALL (mm)= 136.183
RUNOFF COEFFICIENT = 0.585

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

CALIB NASHYD (0109) ID= 1 DT= 5.0 min	Area (ha)= 1.01	Curve Number (CN)= 75.0
	Ia (mm)= 5.00	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 0.66	

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	1.73	6.083	3.05	12.083	9.16	18.08	2.58
0.167	1.73	6.167	3.05	12.167	9.16	18.17	2.58
0.250	1.75	6.250	3.12	12.250	8.35	18.25	2.54
0.333	1.75	6.333	3.12	12.333	8.35	18.33	2.54
0.417	1.77	6.417	3.20	12.417	7.69	18.42	2.50
0.500	1.77	6.500	3.20	12.500	7.69	18.50	2.50

0.583	1.79	6.583	3.29	12.583	7.15	18.58	2.46
0.667	1.79	6.667	3.29	12.667	7.15	18.67	2.46
0.750	1.81	6.750	3.38	12.750	6.69	18.75	2.43
0.833	1.81	6.833	3.38	12.833	6.69	18.83	2.43
0.917	1.83	6.917	3.48	12.917	6.29	18.92	2.39
1.000	1.83	7.000	3.48	13.000	6.29	19.00	2.39
1.083	1.85	7.083	3.58	13.083	5.95	19.08	2.36
1.167	1.85	7.167	3.58	13.167	5.95	19.17	2.36
1.250	1.88	7.250	3.70	13.250	5.65	19.25	2.32
1.333	1.88	7.333	3.70	13.333	5.65	19.33	2.32
1.417	1.90	7.417	3.82	13.417	5.39	19.42	2.29
1.500	1.90	7.500	3.82	13.500	5.39	19.50	2.29
1.583	1.92	7.583	3.95	13.583	5.15	19.58	2.26
1.667	1.92	7.667	3.95	13.667	5.15	19.67	2.26
1.750	1.95	7.750	4.10	13.750	4.94	19.75	2.23
1.833	1.95	7.833	4.10	13.833	4.94	19.83	2.23
1.917	1.97	7.917	4.25	13.917	4.74	19.92	2.20
2.000	1.97	8.000	4.25	14.000	4.74	20.00	2.20
2.083	2.00	8.083	4.43	14.083	4.57	20.08	2.17
2.167	2.00	8.167	4.43	14.167	4.57	20.17	2.17
2.250	2.02	8.250	4.62	14.250	4.41	20.25	2.15
2.333	2.02	8.333	4.62	14.333	4.41	20.33	2.15
2.417	2.05	8.417	4.83	14.417	4.26	20.42	2.12
2.500	2.05	8.500	4.83	14.500	4.26	20.50	2.12
2.583	2.08	8.583	5.07	14.583	4.12	20.58	2.10
2.667	2.08	8.667	5.07	14.667	4.12	20.67	2.10
2.750	2.11	8.750	5.34	14.750	4.00	20.75	2.07
2.833	2.11	8.833	5.34	14.833	4.00	20.83	2.07
2.917	2.14	8.917	5.65	14.917	3.88	20.92	2.05
3.000	2.14	9.000	5.65	15.000	3.88	21.00	2.05
3.083	2.17	9.083	6.01	15.083	3.77	21.08	2.02
3.167	2.17	9.167	6.01	15.167	3.77	21.17	2.02
3.250	2.21	9.250	6.43	15.250	3.67	21.25	2.00
3.333	2.21	9.333	6.43	15.333	3.67	21.33	2.00
3.417	2.24	9.417	6.92	15.417	3.57	21.42	1.98
3.500	2.24	9.500	6.92	15.500	3.57	21.50	1.98
3.583	2.27	9.583	7.52	15.583	3.48	21.58	1.96
3.667	2.27	9.667	7.52	15.667	3.48	21.67	1.96
3.750	2.31	9.750	8.26	15.750	3.40	21.75	1.94
3.833	2.31	9.833	8.26	15.833	3.40	21.83	1.94
3.917	2.35	9.917	9.21	15.917	3.32	21.92	1.91
4.000	2.35	10.000	9.21	16.000	3.32	22.00	1.91
4.083	2.39	10.083	10.48	16.083	3.25	22.08	1.89
4.167	2.39	10.167	10.48	16.167	3.25	22.17	1.89
4.250	2.43	10.250	12.28	16.250	3.17	22.25	1.88
4.333	2.43	10.333	12.28	16.333	3.17	22.33	1.88
4.417	2.48	10.417	15.08	16.417	3.11	22.42	1.86
4.500	2.48	10.500	15.08	16.500	3.11	22.50	1.86
4.583	2.52	10.583	20.27	16.583	3.04	22.58	1.84
4.667	2.52	10.667	20.27	16.667	3.04	22.67	1.84
4.750	2.57	10.750	35.01	16.750	2.98	22.75	1.82
4.833	2.57	10.833	35.01	16.833	2.98	22.83	1.82
4.917	2.62	10.917	183.06	16.917	2.92	22.92	1.80
5.000	2.62	11.000	183.07	17.000	2.92	23.00	1.80
5.083	2.67	11.083	36.67	17.083	2.87	23.08	1.78
5.167	2.67	11.167	36.66	17.167	2.87	23.17	1.78
5.250	2.72	11.250	22.03	17.250	2.82	23.25	1.77
5.333	2.72	11.333	22.03	17.333	2.82	23.33	1.77
5.417	2.78	11.417	16.56	17.417	2.76	23.42	1.75
5.500	2.78	11.500	16.56	17.500	2.76	23.50	1.75
5.583	2.84	11.583	13.54	17.583	2.72	23.58	1.73
5.667	2.84	11.667	13.54	17.667	2.72	23.67	1.73
5.750	2.91	11.750	11.59	17.750	2.67	23.75	1.72
5.833	2.91	11.833	11.59	17.833	2.67	23.83	1.72
5.917	2.97	11.917	10.20	17.917	2.63	23.92	1.70
6.000	2.97	12.000	10.20	18.000	2.63	24.00	1.70

Unit Hyd Qpeak (cms)= 0.058

PEAK FLOW (cms)= 0.076 (i)
TIME TO PEAK (hrs)= 11.667
RUNOFF VOLUME (mm)= 79.723

TOTAL RAINFALL (mm)= 136.183
RUNOFF COEFFICIENT = 0.585

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

CALIB
STANDHYD (0082) | Area (ha)= 6.54
ID= 1 DT= 5.0 min | Total Imp(%)= 70.00 Dir. Conn.(%)= 70.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	4.58	1.96
Dep. Storage	(mm)=	1.50	1.50
Average Slope	(%)=	2.00	1.00
Length	(m)=	208.81	40.00
Mannings n	=	0.015	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	1.73	6.083	3.05	12.083	9.16	18.08	2.58
0.167	1.73	6.167	3.05	12.167	9.16	18.17	2.58
0.250	1.75	6.250	3.12	12.250	8.35	18.25	2.54
0.333	1.75	6.333	3.12	12.333	8.35	18.33	2.54
0.417	1.77	6.417	3.20	12.417	7.69	18.42	2.50
0.500	1.77	6.500	3.20	12.500	7.69	18.50	2.50
0.583	1.79	6.583	3.29	12.583	7.15	18.58	2.46
0.667	1.79	6.667	3.29	12.667	7.15	18.67	2.46
0.750	1.81	6.750	3.38	12.750	6.69	18.75	2.43
0.833	1.81	6.833	3.38	12.833	6.69	18.83	2.43
0.917	1.83	6.917	3.48	12.917	6.29	18.92	2.39
1.000	1.83	7.000	3.48	13.000	6.29	19.00	2.39
1.083	1.85	7.083	3.58	13.083	5.95	19.08	2.36
1.167	1.85	7.167	3.58	13.167	5.95	19.17	2.36
1.250	1.88	7.250	3.70	13.250	5.65	19.25	2.32
1.333	1.88	7.333	3.70	13.333	5.65	19.33	2.32
1.417	1.90	7.417	3.82	13.417	5.39	19.42	2.29
1.500	1.90	7.500	3.82	13.500	5.39	19.50	2.29
1.583	1.92	7.583	3.95	13.583	5.15	19.58	2.26
1.667	1.92	7.667	3.95	13.667	5.15	19.67	2.26
1.750	1.95	7.750	4.10	13.750	4.94	19.75	2.23
1.833	1.95	7.833	4.10	13.833	4.94	19.83	2.23
1.917	1.97	7.917	4.25	13.917	4.74	19.92	2.20
2.000	1.97	8.000	4.25	14.000	4.74	20.00	2.20
2.083	2.00	8.083	4.43	14.083	4.57	20.08	2.17
2.167	2.00	8.167	4.43	14.167	4.57	20.17	2.17
2.250	2.02	8.250	4.62	14.250	4.41	20.25	2.15
2.333	2.02	8.333	4.62	14.333	4.41	20.33	2.15
2.417	2.05	8.417	4.83	14.417	4.26	20.42	2.12
2.500	2.05	8.500	4.83	14.500	4.26	20.50	2.12
2.583	2.08	8.583	5.07	14.583	4.12	20.58	2.10
2.667	2.08	8.667	5.07	14.667	4.12	20.67	2.10
2.750	2.11	8.750	5.34	14.750	4.00	20.75	2.07
2.833	2.11	8.833	5.34	14.833	4.00	20.83	2.07
2.917	2.14	8.917	5.65	14.917	3.88	20.92	2.05
3.000	2.14	9.000	5.65	15.000	3.88	21.00	2.05
3.083	2.17	9.083	6.01	15.083	3.77	21.08	2.02
3.167	2.17	9.167	6.01	15.167	3.77	21.17	2.02
3.250	2.21	9.250	6.43	15.250	3.67	21.25	2.00
3.333	2.21	9.333	6.43	15.333	3.67	21.33	2.00
3.417	2.24	9.417	6.92	15.417	3.57	21.42	1.98
3.500	2.24	9.500	6.92	15.500	3.57	21.50	1.98
3.583	2.27	9.583	7.52	15.583	3.48	21.58	1.96
3.667	2.27	9.667	7.52	15.667	3.48	21.67	1.96
3.750	2.31	9.750	8.26	15.750	3.40	21.75	1.94
3.833	2.31	9.833	8.26	15.833	3.40	21.83	1.94
3.917	2.35	9.917	9.21	15.917	3.32	21.92	1.91
4.000	2.35	10.000	9.21	16.000	3.32	22.00	1.91

4.083	2.39	10.083	10.48	16.083	3.25	22.08	1.89
4.167	2.39	10.167	10.48	16.167	3.25	22.17	1.89
4.250	2.43	10.250	12.28	16.250	3.17	22.25	1.88
4.333	2.43	10.333	12.28	16.333	3.17	22.33	1.88
4.417	2.48	10.417	15.08	16.417	3.11	22.42	1.86
4.500	2.48	10.500	15.08	16.500	3.11	22.50	1.86
4.583	2.52	10.583	20.27	16.583	3.04	22.58	1.84
4.667	2.52	10.667	20.27	16.667	3.04	22.67	1.84
4.750	2.57	10.750	35.01	16.750	2.98	22.75	1.82
4.833	2.57	10.833	35.01	16.833	2.98	22.83	1.82
4.917	2.62	10.917	183.06	16.917	2.92	22.92	1.80
5.000	2.62	11.000	183.07	17.000	2.92	23.00	1.80
5.083	2.67	11.083	36.67	17.083	2.87	23.08	1.78
5.167	2.67	11.167	36.66	17.167	2.87	23.17	1.78
5.250	2.72	11.250	22.03	17.250	2.82	23.25	1.77
5.333	2.72	11.333	22.03	17.333	2.82	23.33	1.77
5.417	2.78	11.417	16.56	17.417	2.76	23.42	1.75
5.500	2.78	11.500	16.56	17.500	2.76	23.50	1.75
5.583	2.84	11.583	13.54	17.583	2.72	23.58	1.73
5.667	2.84	11.667	13.54	17.667	2.72	23.67	1.73
5.750	2.91	11.750	11.59	17.750	2.67	23.75	1.72
5.833	2.91	11.833	11.59	17.833	2.67	23.83	1.72
5.917	2.97	11.917	10.20	17.917	2.63	23.92	1.70
6.000	2.97	12.000	10.20	18.000	2.63	24.00	1.70

				TOTALS
Max.Eff.Inten.(mm/hr)=		183.07	121.51	
over (min)		5.00	10.00	
Storage Coeff. (min)=		2.76 (ii)	7.62 (ii)	
Unit Hyd. Tpeak (min)=		5.00	10.00	
Unit Hyd. peak (cms)=		0.28	0.13	
PEAK FLOW	(cms)=	2.28	0.45	2.695 (iii)
TIME TO PEAK	(hrs)=	11.00	11.08	11.00
RUNOFF VOLUME	(mm)=	134.68	82.70	119.09
TOTAL RAINFALL	(mm)=	136.18	136.18	136.18
RUNOFF COEFFICIENT	=	0.99	0.61	0.87

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 75.0 Ia = Dep. 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 (0085) | Area (ha)= 15.38
ID= 1 DT= 5.0 min | Total Imp(%)= 60.00 Dir. Conn.(%)= 60.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	9.23	6.15
Dep. Storage	(mm)=	2.00	1.50
Average Slope	(%)=	1.00	1.00
Length	(m)=	320.21	40.00
Mannings n	=	0.015	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	1.73	6.083	3.05	12.083	9.16	18.08	2.58
0.167	1.73	6.167	3.05	12.167	9.16	18.17	2.58
0.250	1.75	6.250	3.12	12.250	8.35	18.25	2.54
0.333	1.75	6.333	3.12	12.333	8.35	18.33	2.54
0.417	1.77	6.417	3.20	12.417	7.69	18.42	2.50
0.500	1.77	6.500	3.20	12.500	7.69	18.50	2.50
0.583	1.79	6.583	3.29	12.583	7.15	18.58	2.46
0.667	1.79	6.667	3.29	12.667	7.15	18.67	2.46

0.750	1.81	6.750	3.38	12.750	6.69	18.75	2.43
0.833	1.81	6.833	3.38	12.833	6.69	18.83	2.43
0.917	1.83	6.917	3.48	12.917	6.29	18.92	2.39
1.000	1.83	7.000	3.48	13.000	6.29	19.00	2.39
1.083	1.85	7.083	3.58	13.083	5.95	19.08	2.36
1.167	1.85	7.167	3.58	13.167	5.95	19.17	2.36
1.250	1.88	7.250	3.70	13.250	5.65	19.25	2.32
1.333	1.88	7.333	3.70	13.333	5.65	19.33	2.32
1.417	1.90	7.417	3.82	13.417	5.39	19.42	2.29
1.500	1.90	7.500	3.82	13.500	5.39	19.50	2.29
1.583	1.92	7.583	3.95	13.583	5.15	19.58	2.26
1.667	1.92	7.667	3.95	13.667	5.15	19.67	2.26
1.750	1.95	7.750	4.10	13.750	4.94	19.75	2.23
1.833	1.95	7.833	4.10	13.833	4.94	19.83	2.23
1.917	1.97	7.917	4.25	13.917	4.74	19.92	2.20
2.000	1.97	8.000	4.25	14.000	4.74	20.00	2.20
2.083	2.00	8.083	4.43	14.083	4.57	20.08	2.17
2.167	2.00	8.167	4.43	14.167	4.57	20.17	2.17
2.250	2.02	8.250	4.62	14.250	4.41	20.25	2.15
2.333	2.02	8.333	4.62	14.333	4.41	20.33	2.15
2.417	2.05	8.417	4.83	14.417	4.26	20.42	2.12
2.500	2.05	8.500	4.83	14.500	4.26	20.50	2.12
2.583	2.08	8.583	5.07	14.583	4.12	20.58	2.10
2.667	2.08	8.667	5.07	14.667	4.12	20.67	2.10
2.750	2.11	8.750	5.34	14.750	4.00	20.75	2.07
2.833	2.11	8.833	5.34	14.833	4.00	20.83	2.07
2.917	2.14	8.917	5.65	14.917	3.88	20.92	2.05
3.000	2.14	9.000	5.65	15.000	3.88	21.00	2.05
3.083	2.17	9.083	6.01	15.083	3.77	21.08	2.02
3.167	2.17	9.167	6.01	15.167	3.77	21.17	2.02
3.250	2.21	9.250	6.43	15.250	3.67	21.25	2.00
3.333	2.21	9.333	6.43	15.333	3.67	21.33	2.00
3.417	2.24	9.417	6.92	15.417	3.57	21.42	1.98
3.500	2.24	9.500	6.92	15.500	3.57	21.50	1.98
3.583	2.27	9.583	7.52	15.583	3.48	21.58	1.96
3.667	2.27	9.667	7.52	15.667	3.48	21.67	1.96
3.750	2.31	9.750	8.26	15.750	3.40	21.75	1.94
3.833	2.31	9.833	8.26	15.833	3.40	21.83	1.94
3.917	2.35	9.917	9.21	15.917	3.32	21.92	1.91
4.000	2.35	10.000	9.21	16.000	3.32	22.00	1.91
4.083	2.39	10.083	10.48	16.083	3.25	22.08	1.89
4.167	2.39	10.167	10.48	16.167	3.25	22.17	1.89
4.250	2.43	10.250	12.28	16.250	3.17	22.25	1.88
4.333	2.43	10.333	12.28	16.333	3.17	22.33	1.88
4.417	2.48	10.417	15.08	16.417	3.11	22.42	1.86
4.500	2.48	10.500	15.08	16.500	3.11	22.50	1.86
4.583	2.52	10.583	20.27	16.583	3.04	22.58	1.84
4.667	2.52	10.667	20.27	16.667	3.04	22.67	1.84
4.750	2.57	10.750	35.01	16.750	2.98	22.75	1.82
4.833	2.57	10.833	35.01	16.833	2.98	22.83	1.82
4.917	2.62	10.917	183.06	16.917	2.92	22.92	1.80
5.000	2.62	11.000	183.07	17.000	2.92	23.00	1.80
5.083	2.67	11.083	36.67	17.083	2.87	23.08	1.78
5.167	2.67	11.167	36.66	17.167	2.87	23.17	1.78
5.250	2.72	11.250	22.03	17.250	2.82	23.25	1.77
5.333	2.72	11.333	22.03	17.333	2.82	23.33	1.77
5.417	2.78	11.417	16.56	17.417	2.76	23.42	1.75
5.500	2.78	11.500	16.56	17.500	2.76	23.50	1.75
5.583	2.84	11.583	13.54	17.583	2.72	23.58	1.73
5.667	2.84	11.667	13.54	17.667	2.72	23.67	1.73
5.750	2.91	11.750	11.59	17.750	2.67	23.75	1.72
5.833	2.91	11.833	11.59	17.833	2.67	23.83	1.72
5.917	2.97	11.917	10.20	17.917	2.63	23.92	1.70
6.000	2.97	12.000	10.20	18.000	2.63	24.00	1.70

Max.Eff.Inten.(mm/hr)=		183.07	121.51
over (min)		5.00	15.00
Storage Coeff. (min)=		4.39 (ii)	12.43 (ii)
Unit Hyd. Tpeak (min)=		5.00	15.00
Unit Hyd. peak (cms)=		0.23	0.08
			TOTALS
PEAK FLOW	(cms)=	4.30	1.07	4.999 (iii)

TIME TO PEAK	(hrs)=	11.00	11.17	11.00
RUNOFF VOLUME	(mm)=	134.18	82.70	113.59
TOTAL RAINFALL	(mm)=	136.18	136.18	136.18
RUNOFF COEFFICIENT	=	0.99	0.61	0.83

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 75.0 Ia = Dep. 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 (0110)	Area	(ha)= 1.89	
ID= 1 DT= 5.0 min	Total Imp(%)=	60.00	Dir. Conn.(%)= 60.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	1.13	0.76
Dep. Storage	(mm)=	2.00	1.50
Average Slope	(%)=	1.00	1.00
Length	(m)=	112.25	40.00
Mannings n	=	0.015	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	1.73	6.083	3.05	12.083	9.16	18.08	2.58
0.167	1.73	6.167	3.05	12.167	9.16	18.17	2.58
0.250	1.75	6.250	3.12	12.250	8.35	18.25	2.54
0.333	1.75	6.333	3.12	12.333	8.35	18.33	2.54
0.417	1.77	6.417	3.20	12.417	7.69	18.42	2.50
0.500	1.77	6.500	3.20	12.500	7.69	18.50	2.50
0.583	1.79	6.583	3.29	12.583	7.15	18.58	2.46
0.667	1.79	6.667	3.29	12.667	7.15	18.67	2.46
0.750	1.81	6.750	3.38	12.750	6.69	18.75	2.43
0.833	1.81	6.833	3.38	12.833	6.69	18.83	2.43
0.917	1.83	6.917	3.48	12.917	6.29	18.92	2.39
1.000	1.83	7.000	3.48	13.000	6.29	19.00	2.39
1.083	1.85	7.083	3.58	13.083	5.95	19.08	2.36
1.167	1.85	7.167	3.58	13.167	5.95	19.17	2.36
1.250	1.88	7.250	3.70	13.250	5.65	19.25	2.32
1.333	1.88	7.333	3.70	13.333	5.65	19.33	2.32
1.417	1.90	7.417	3.82	13.417	5.39	19.42	2.29
1.500	1.90	7.500	3.82	13.500	5.39	19.50	2.29
1.583	1.92	7.583	3.95	13.583	5.15	19.58	2.26
1.667	1.92	7.667	3.95	13.667	5.15	19.67	2.26
1.750	1.95	7.750	4.10	13.750	4.94	19.75	2.23
1.833	1.95	7.833	4.10	13.833	4.94	19.83	2.23
1.917	1.97	7.917	4.25	13.917	4.74	19.92	2.20
2.000	1.97	8.000	4.25	14.000	4.74	20.00	2.20
2.083	2.00	8.083	4.43	14.083	4.57	20.08	2.17
2.167	2.00	8.167	4.43	14.167	4.57	20.17	2.17
2.250	2.02	8.250	4.62	14.250	4.41	20.25	2.15
2.333	2.02	8.333	4.62	14.333	4.41	20.33	2.15
2.417	2.05	8.417	4.83	14.417	4.26	20.42	2.12
2.500	2.05	8.500	4.83	14.500	4.26	20.50	2.12
2.583	2.08	8.583	5.07	14.583	4.12	20.58	2.10
2.667	2.08	8.667	5.07	14.667	4.12	20.67	2.10
2.750	2.11	8.750	5.34	14.750	4.00	20.75	2.07
2.833	2.11	8.833	5.34	14.833	4.00	20.83	2.07
2.917	2.14	8.917	5.65	14.917	3.88	20.92	2.05
3.000	2.14	9.000	5.65	15.000	3.88	21.00	2.05
3.083	2.17	9.083	6.01	15.083	3.77	21.08	2.02
3.167	2.17	9.167	6.01	15.167	3.77	21.17	2.02
3.250	2.21	9.250	6.43	15.250	3.67	21.25	2.00
3.333	2.21	9.333	6.43	15.333	3.67	21.33	2.00

3.417	2.24	9.417	6.92	15.417	3.57	21.42	1.98
3.500	2.24	9.500	6.92	15.500	3.57	21.50	1.98
3.583	2.27	9.583	7.52	15.583	3.48	21.58	1.96
3.667	2.27	9.667	7.52	15.667	3.48	21.67	1.96
3.750	2.31	9.750	8.26	15.750	3.40	21.75	1.94
3.833	2.31	9.833	8.26	15.833	3.40	21.83	1.94
3.917	2.35	9.917	9.21	15.917	3.32	21.92	1.91
4.000	2.35	10.000	9.21	16.000	3.32	22.00	1.91
4.083	2.39	10.083	10.48	16.083	3.25	22.08	1.89
4.167	2.39	10.167	10.48	16.167	3.25	22.17	1.89
4.250	2.43	10.250	12.28	16.250	3.17	22.25	1.88
4.333	2.43	10.333	12.28	16.333	3.17	22.33	1.88
4.417	2.48	10.417	15.08	16.417	3.11	22.42	1.86
4.500	2.48	10.500	15.08	16.500	3.11	22.50	1.86
4.583	2.52	10.583	20.27	16.583	3.04	22.58	1.84
4.667	2.52	10.667	20.27	16.667	3.04	22.67	1.84
4.750	2.57	10.750	35.01	16.750	2.98	22.75	1.82
4.833	2.57	10.833	35.01	16.833	2.98	22.83	1.82
4.917	2.62	10.917	183.06	16.917	2.92	22.92	1.80
5.000	2.62	11.000	183.07	17.000	2.92	23.00	1.80
5.083	2.67	11.083	36.67	17.083	2.87	23.08	1.78
5.167	2.67	11.167	36.66	17.167	2.87	23.17	1.78
5.250	2.72	11.250	22.03	17.250	2.82	23.25	1.77
5.333	2.72	11.333	22.03	17.333	2.82	23.33	1.77
5.417	2.78	11.417	16.56	17.417	2.76	23.42	1.75
5.500	2.78	11.500	16.56	17.500	2.76	23.50	1.75
5.583	2.84	11.583	13.54	17.583	2.72	23.58	1.73
5.667	2.84	11.667	13.54	17.667	2.72	23.67	1.73
5.750	2.91	11.750	11.59	17.750	2.67	23.75	1.72
5.833	2.91	11.833	11.59	17.833	2.67	23.83	1.72
5.917	2.97	11.917	10.20	17.917	2.63	23.92	1.70
6.000	2.97	12.000	10.20	18.000	2.63	24.00	1.70

Max.Eff.Inten.(mm/hr)=		183.07	121.51	
over (min)		5.00	15.00	
Storage Coeff. (min)=		2.34 (ii)	10.38 (ii)	
Unit Hyd. Tpeak (min)=		5.00	15.00	
Unit Hyd. peak (cms)=		0.30	0.09	
				TOTALS
PEAK FLOW	(cms)=	0.57	0.14	0.664 (iii)
TIME TO PEAK	(hrs)=	11.00	11.17	11.00
RUNOFF VOLUME	(mm)=	134.18	82.70	113.58
TOTAL RAINFALL	(mm)=	136.18	136.18	136.18
RUNOFF COEFFICIENT	=	0.99	0.61	0.83

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 75.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0111) 1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0110):	1.89	0.664	11.00	113.58
+ ID2= 2 (0082):	6.54	2.695	11.00	119.09
ID = 3 (0111):	8.43	3.359	11.00	117.85

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0111) 3 + 2 = 1	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 3 (0111):	8.43	3.359	11.00	117.85

+ ID2= 2 (0085):	15.38	4.999	11.00	113.59
ID = 1 (0111):	23.81	8.358	11.00	115.10

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB STANDHYD (0084) ID= 1 DT= 5.0 min	Area (ha)= 2.33	Total Imp(%)= 89.00	Dir. Conn.(%)= 89.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	2.07	0.26
Dep. Storage	(mm)=	0.00	1.50
Average Slope	(%)=	1.00	1.00
Length	(m)=	124.63	25.00
Mannings n	=	0.015	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	1.73	6.083	3.05	12.083	9.16	18.08	2.58
0.167	1.73	6.167	3.05	12.167	9.16	18.17	2.58
0.250	1.75	6.250	3.12	12.250	8.35	18.25	2.54
0.333	1.75	6.333	3.12	12.333	8.35	18.33	2.54
0.417	1.77	6.417	3.20	12.417	7.69	18.42	2.50
0.500	1.77	6.500	3.20	12.500	7.69	18.50	2.50
0.583	1.79	6.583	3.29	12.583	7.15	18.58	2.46
0.667	1.79	6.667	3.29	12.667	7.15	18.67	2.46
0.750	1.81	6.750	3.38	12.750	6.69	18.75	2.43
0.833	1.81	6.833	3.38	12.833	6.69	18.83	2.43
0.917	1.83	6.917	3.48	12.917	6.29	18.92	2.39
1.000	1.83	7.000	3.48	13.000	6.29	19.00	2.39
1.083	1.85	7.083	3.58	13.083	5.95	19.08	2.36
1.167	1.85	7.167	3.58	13.167	5.95	19.17	2.36
1.250	1.88	7.250	3.70	13.250	5.65	19.25	2.32
1.333	1.88	7.333	3.70	13.333	5.65	19.33	2.32
1.417	1.90	7.417	3.82	13.417	5.39	19.42	2.29
1.500	1.90	7.500	3.82	13.500	5.39	19.50	2.29
1.583	1.92	7.583	3.95	13.583	5.15	19.58	2.26
1.667	1.92	7.667	3.95	13.667	5.15	19.67	2.26
1.750	1.95	7.750	4.10	13.750	4.94	19.75	2.23
1.833	1.95	7.833	4.10	13.833	4.94	19.83	2.23
1.917	1.97	7.917	4.25	13.917	4.74	19.92	2.20
2.000	1.97	8.000	4.25	14.000	4.74	20.00	2.20
2.083	2.00	8.083	4.43	14.083	4.57	20.08	2.17
2.167	2.00	8.167	4.43	14.167	4.57	20.17	2.17
2.250	2.02	8.250	4.62	14.250	4.41	20.25	2.15
2.333	2.02	8.333	4.62	14.333	4.41	20.33	2.15
2.417	2.05	8.417	4.83	14.417	4.26	20.42	2.12
2.500	2.05	8.500	4.83	14.500	4.26	20.50	2.12
2.583	2.08	8.583	5.07	14.583	4.12	20.58	2.10
2.667	2.08	8.667	5.07	14.667	4.12	20.67	2.10
2.750	2.11	8.750	5.34	14.750	4.00	20.75	2.07
2.833	2.11	8.833	5.34	14.833	4.00	20.83	2.07
2.917	2.14	8.917	5.65	14.917	3.88	20.92	2.05
3.000	2.14	9.000	5.65	15.000	3.88	21.00	2.05
3.083	2.17	9.083	6.01	15.083	3.77	21.08	2.02
3.167	2.17	9.167	6.01	15.167	3.77	21.17	2.02
3.250	2.21	9.250	6.43	15.250	3.67	21.25	2.00
3.333	2.21	9.333	6.43	15.333	3.67	21.33	2.00
3.417	2.24	9.417	6.92	15.417	3.57	21.42	1.98
3.500	2.24	9.500	6.92	15.500	3.57	21.50	1.98
3.583	2.27	9.583	7.52	15.583	3.48	21.58	1.96
3.667	2.27	9.667	7.52	15.667	3.48	21.67	1.96
3.750	2.31	9.750	8.26	15.750	3.40	21.75	1.94
3.833	2.31	9.833	8.26	15.833	3.40	21.83	1.94
3.917	2.35	9.917	9.21	15.917	3.32	21.92	1.91
4.000	2.35	10.000	9.21	16.000	3.32	22.00	1.91

4.083	2.39	10.083	10.48	16.083	3.25	22.08	1.89
4.167	2.39	10.167	10.48	16.167	3.25	22.17	1.89
4.250	2.43	10.250	12.28	16.250	3.17	22.25	1.88
4.333	2.43	10.333	12.28	16.333	3.17	22.33	1.88
4.417	2.48	10.417	15.08	16.417	3.11	22.42	1.86
4.500	2.48	10.500	15.08	16.500	3.11	22.50	1.86
4.583	2.52	10.583	20.27	16.583	3.04	22.58	1.84
4.667	2.52	10.667	20.27	16.667	3.04	22.67	1.84
4.750	2.57	10.750	35.01	16.750	2.98	22.75	1.82
4.833	2.57	10.833	35.01	16.833	2.98	22.83	1.82
4.917	2.62	10.917	183.06	16.917	2.92	22.92	1.80
5.000	2.62	11.000	183.07	17.000	2.92	23.00	1.80
5.083	2.67	11.083	36.67	17.083	2.87	23.08	1.78
5.167	2.67	11.167	36.66	17.167	2.87	23.17	1.78
5.250	2.72	11.250	22.03	17.250	2.82	23.25	1.77
5.333	2.72	11.333	22.03	17.333	2.82	23.33	1.77
5.417	2.78	11.417	16.56	17.417	2.76	23.42	1.75
5.500	2.78	11.500	16.56	17.500	2.76	23.50	1.75
5.583	2.84	11.583	13.54	17.583	2.72	23.58	1.73
5.667	2.84	11.667	13.54	17.667	2.72	23.67	1.73
5.750	2.91	11.750	11.59	17.750	2.67	23.75	1.72
5.833	2.91	11.833	11.59	17.833	2.67	23.83	1.72
5.917	2.97	11.917	10.20	17.917	2.63	23.92	1.70
6.000	2.97	12.000	10.20	18.000	2.63	24.00	1.70

Max.Eff.Inten.(mm/hr)=	183.07	121.51	
over (min)	5.00	5.00	
Storage Coeff. (min)=	2.49 (ii)	4.72 (ii)	
Unit Hyd. Tpeak (min)=	5.00	5.00	
Unit Hyd. peak (cms)=	0.29	0.22	
		TOTALS	
PEAK FLOW (cms)=	1.04	0.08	1.119 (iii)
TIME TO PEAK (hrs)=	11.00	11.00	11.00
RUNOFF VOLUME (mm)=	136.18	82.70	130.30
TOTAL RAINFALL (mm)=	136.18	136.18	136.18
RUNOFF COEFFICIENT =	1.00	0.61	0.96

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 75.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0081)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0109):	1.01	0.076	11.67	79.72
+ ID2= 2 (0111):	23.81	8.358	11.00	115.10
ID = 3 (0081):	24.82	8.383	11.00	113.66

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0081)
3 + 2 = 1

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 3 (0081):	24.82	8.383	11.00	113.66
+ ID2= 2 (0128):	21.39	5.749	11.00	107.24
ID = 1 (0081):	46.21	14.132	11.00	110.69

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0081)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0081):	46.21	14.132	11.00	110.69
+ ID2= 2 (0215):	1.45	0.094	11.83	79.72
ID = 3 (0081):	47.66	14.159	11.00	109.74

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0081)
3 + 2 = 1

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 3 (0081):	47.66	14.159	11.00	109.74
+ ID2= 2 (0084):	2.33	1.119	11.00	130.30
ID = 1 (0081):	49.99	15.278	11.00	110.70

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0097)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0130):	21.48	0.617	13.08	79.73
+ ID2= 2 (0081):	49.99	15.278	11.00	110.70
ID = 3 (0097):	71.47	15.462	11.00	101.39

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0211) OVERFLOW IS OFF
IN= 2---> OUT= 1
DT= 5.0 min

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.8460	1.8660
0.0080	0.2340	1.0630	2.1640
0.0130	0.4840	1.4780	2.4680
0.0470	0.7470	1.9960	2.7800
0.1760	1.0160	2.8820	2.8590
0.3580	1.2930	4.4100	2.9390
0.5810	1.5760	14.1270	3.2620

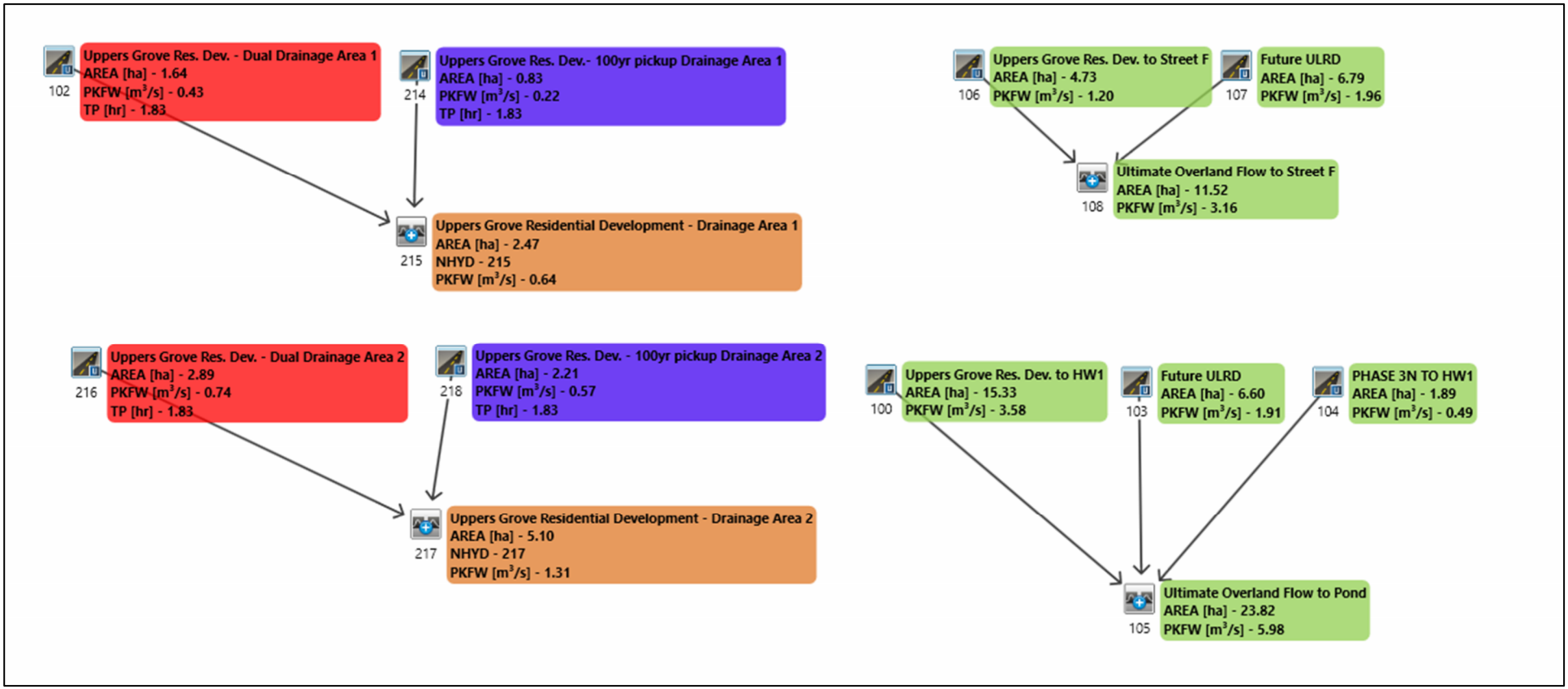
	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0097)	71.470	15.462	11.00	101.39
OUTFLOW: ID= 1 (0211)	71.470	2.844	11.67	99.27

PEAK FLOW REDUCTION [Qout/Qin](%)= 18.39
TIME SHIFT OF PEAK FLOW (min)= 40.00
MAXIMUM STORAGE USED (ha.m.)= 2.8569

FINISH

Appendix C Stormwater Management Calculations

OVERLAND FLOW MODEL



VISUAL OTTHYMO – OVERLAND FLOW MODEL SCHEMATC

0.583	6.98	1.583	38.68	2.583	10.21	3.58	5.53
0.667	6.98	1.667	38.68	2.667	10.21	3.67	5.53
0.750	7.88	1.750	144.26	2.750	8.84	3.75	5.18
0.833	7.88	1.833	144.26	2.833	8.84	3.83	5.18
0.917	9.11	1.917	40.90	2.917	7.84	3.92	4.87
1.000	9.11	2.000	40.90	3.000	7.84	4.00	4.87

Max.Eff.Inten.(mm/hr)=	144.26	52.13	
over (min)	5.00	15.00	
Storage Coeff. (min)=	2.01 (ii)	13.29 (ii)	
Unit Hyd. Tpeak (min)=	5.00	15.00	
Unit Hyd. peak (cms)=	0.31	0.08	
			TOTALS
PEAK FLOW (cms)=	0.20	0.03	0.218 (iii)
TIME TO PEAK (hrs)=	1.83	2.00	1.83
RUNOFF VOLUME (mm)=	68.15	30.74	53.17
TOTAL RAINFALL (mm)=	70.15	70.15	70.15
RUNOFF COEFFICIENT =	0.97	0.44	0.76

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 75.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0215)

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0102):	1.64	0.427	1.83	53.18
+ ID2= 2 (0214):	0.83	0.218	1.83	53.17
ID = 3 (0215):	2.47	0.645	1.83	53.17

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB
STANDHYD (0216)
ID= 1 DT= 5.0 min

Area (ha)= 2.89
Total Imp(%)= 60.00 Dir. Conn.(%)= 60.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	1.73	1.16
Dep. Storage	(mm)=	2.00	1.50
Average Slope	(%)=	1.00	1.00
Length	(m)=	138.80	40.00
Mannings n	=	0.015	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	5.30	1.083	10.91	2.083	21.73	3.08	7.07
0.167	5.30	1.167	10.91	2.167	21.73	3.17	7.07
0.250	5.75	1.250	13.84	2.250	15.43	3.25	6.45
0.333	5.75	1.333	13.84	2.333	15.43	3.33	6.45
0.417	6.29	1.417	19.66	2.417	12.20	3.42	5.95
0.500	6.29	1.500	19.66	2.500	12.20	3.50	5.95
0.583	6.98	1.583	38.68	2.583	10.21	3.58	5.53
0.667	6.98	1.667	38.68	2.667	10.21	3.67	5.53
0.750	7.88	1.750	144.26	2.750	8.84	3.75	5.18
0.833	7.88	1.833	144.26	2.833	8.84	3.83	5.18
0.917	9.11	1.917	40.90	2.917	7.84	3.92	4.87
1.000	9.11	2.000	40.90	3.000	7.84	4.00	4.87

Max.Eff.Inten.(mm/hr)=	144.26	52.13	
over (min)	5.00	15.00	
Storage Coeff. (min)=	2.93 (ii)	14.20 (ii)	
Unit Hyd. Tpeak (min)=	5.00	15.00	
Unit Hyd. peak (cms)=	0.28	0.08	
			TOTALS
PEAK FLOW (cms)=	0.68	0.11	0.743 (iii)
TIME TO PEAK (hrs)=	1.83	2.00	1.83
RUNOFF VOLUME (mm)=	68.15	30.74	53.18
TOTAL RAINFALL (mm)=	70.15	70.15	70.15
RUNOFF COEFFICIENT =	0.97	0.44	0.76

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 75.0 Ia = Dep. 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 (0218)
ID= 1 DT= 5.0 min

Area (ha)= 2.21
Total Imp(%)= 60.00 Dir. Conn.(%)= 60.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	1.33	0.88
Dep. Storage	(mm)=	2.00	1.50
Average Slope	(%)=	1.00	1.00
Length	(m)=	121.38	40.00
Mannings n	=	0.015	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	5.30	1.083	10.91	2.083	21.73	3.08	7.07
0.167	5.30	1.167	10.91	2.167	21.73	3.17	7.07
0.250	5.75	1.250	13.84	2.250	15.43	3.25	6.45
0.333	5.75	1.333	13.84	2.333	15.43	3.33	6.45
0.417	6.29	1.417	19.66	2.417	12.20	3.42	5.95
0.500	6.29	1.500	19.66	2.500	12.20	3.50	5.95
0.583	6.98	1.583	38.68	2.583	10.21	3.58	5.53
0.667	6.98	1.667	38.68	2.667	10.21	3.67	5.53
0.750	7.88	1.750	144.26	2.750	8.84	3.75	5.18
0.833	7.88	1.833	144.26	2.833	8.84	3.83	5.18
0.917	9.11	1.917	40.90	2.917	7.84	3.92	4.87
1.000	9.11	2.000	40.90	3.000	7.84	4.00	4.87

Max.Eff.Inten.(mm/hr)=	144.26	52.13	
over (min)	5.00	15.00	
Storage Coeff. (min)=	2.70 (ii)	13.98 (ii)	
Unit Hyd. Tpeak (min)=	5.00	15.00	
Unit Hyd. peak (cms)=	0.29	0.08	
			TOTALS
PEAK FLOW (cms)=	0.52	0.09	0.572 (iii)
TIME TO PEAK (hrs)=	1.83	2.00	1.83
RUNOFF VOLUME (mm)=	68.15	30.74	53.18
TOTAL RAINFALL (mm)=	70.15	70.15	70.15
RUNOFF COEFFICIENT =	0.97	0.44	0.76

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 75.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| ADD HYD  (  0217)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0216):     2.89    0.743     1.83    53.18
     + ID2= 2 (  0218):     2.21    0.572     1.83    53.18
       ================================================
       ID = 3 (  0217):     5.10    1.315     1.83    53.18

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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--------------------
| CALIB            |
| STANDHYD (  0106)|   Area    (ha)=   4.73
|ID= 1 DT= 5.0 min |   Total Imp(%)=  60.00   Dir. Conn.(%)=  60.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.84         1.89
     Dep. Storage     (mm)=       2.00         1.50
     Average Slope     (%)=       1.00         1.00
     Length            (m)=     177.54        40.00
     Mannings n             =     0.015        0.250

        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    5.30 | 1.083   10.91 | 2.083   21.73 |  3.08    7.07
               0.167    5.30 | 1.167   10.91 | 2.167   21.73 |  3.17    7.07
               0.250    5.75 | 1.250   13.84 | 2.250   15.43 |  3.25    6.45
               0.333    5.75 | 1.333   13.84 | 2.333   15.43 |  3.33    6.45
               0.417    6.29 | 1.417   19.66 | 2.417   12.20 |  3.42    5.95
               0.500    6.29 | 1.500   19.66 | 2.500   12.20 |  3.50    5.95
               0.583    6.98 | 1.583   38.68 | 2.583   10.21 |  3.58    5.53
               0.667    6.98 | 1.667   38.68 | 2.667   10.21 |  3.67    5.53
               0.750    7.88 | 1.750  144.26 | 2.750    8.84 |  3.75    5.18
               0.833    7.88 | 1.833  144.26 | 2.833    8.84 |  3.83    5.18
               0.917    9.11 | 1.917   40.90 | 2.917    7.84 |  3.92    4.87
               1.000    9.11 | 2.000   40.90 | 3.000    7.84 |  4.00    4.87

     Max.Eff.Inten.(mm/hr)=     144.26        52.13
               over (min)        5.00        15.00
     Storage Coeff.  (min)=       3.39 (ii)   14.67 (ii)
     Unit Hyd. Tpeak (min)=       5.00        15.00
     Unit Hyd. peak  (cms)=       0.26         0.08
                                                    *TOTALS*
     PEAK FLOW       (cms)=       1.09         0.18          1.197 (iii)
     TIME TO PEAK    (hrs)=       1.83         2.00           1.83
     RUNOFF VOLUME    (mm)=      68.15        30.74          53.18
     TOTAL RAINFALL   (mm)=      70.15        70.15          70.15
     RUNOFF COEFFICIENT   =       0.97         0.44           0.76

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  75.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB            |
| STANDHYD (  0107)|   Area    (ha)=   6.79
|ID= 1 DT= 5.0 min |   Total Imp(%)=  70.00   Dir. Conn.(%)=  70.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       4.75         2.04
     Dep. Storage     (mm)=       1.50         1.50
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     Average Slope     (%)=       2.00         1.00
     Length            (m)=     212.76        40.00
     Mannings n             =     0.015        0.250

        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    5.30 | 1.083   10.91 | 2.083   21.73 |  3.08    7.07
               0.167    5.30 | 1.167   10.91 | 2.167   21.73 |  3.17    7.07
               0.250    5.75 | 1.250   13.84 | 2.250   15.43 |  3.25    6.45
               0.333    5.75 | 1.333   13.84 | 2.333   15.43 |  3.33    6.45
               0.417    6.29 | 1.417   19.66 | 2.417   12.20 |  3.42    5.95
               0.500    6.29 | 1.500   19.66 | 2.500   12.20 |  3.50    5.95
               0.583    6.98 | 1.583   38.68 | 2.583   10.21 |  3.58    5.53
               0.667    6.98 | 1.667   38.68 | 2.667   10.21 |  3.67    5.53
               0.750    7.88 | 1.750  144.26 | 2.750    8.84 |  3.75    5.18
               0.833    7.88 | 1.833  144.26 | 2.833    8.84 |  3.83    5.18
               0.917    9.11 | 1.917   40.90 | 2.917    7.84 |  3.92    4.87
               1.000    9.11 | 2.000   40.90 | 3.000    7.84 |  4.00    4.87

     Max.Eff.Inten.(mm/hr)=     144.26        52.13
               over (min)        5.00        15.00
     Storage Coeff.  (min)=       3.07 (ii)   14.35 (ii)
     Unit Hyd. Tpeak (min)=       5.00        15.00
     Unit Hyd. peak  (cms)=       0.27         0.08
                                                    *TOTALS*
     PEAK FLOW       (cms)=       1.85         0.20          1.964 (iii)
     TIME TO PEAK    (hrs)=       1.83         2.00           1.83
     RUNOFF VOLUME    (mm)=      68.65        30.74          57.27
     TOTAL RAINFALL   (mm)=      70.15        70.15          70.15
     RUNOFF COEFFICIENT   =       0.98         0.44           0.82

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  75.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| ADD HYD  (  0108)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0106):     4.73    1.197     1.83    53.18
     + ID2= 2 (  0107):     6.79    1.964     1.83    57.27
       ================================================
       ID = 3 (  0108):    11.52    3.161     1.83    55.59

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0104)|   Area    (ha)=   1.89
|ID= 1 DT= 5.0 min |   Total Imp(%)=  60.00   Dir. Conn.(%)=  60.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.13         0.76
     Dep. Storage     (mm)=       2.00         1.50
     Average Slope     (%)=       1.00         1.00
     Length            (m)=     112.25        40.00
     Mannings n             =     0.015        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	5.30	1.083	10.91	2.083	21.73	3.08	7.07
0.167	5.30	1.167	10.91	2.167	21.73	3.17	7.07
0.250	5.75	1.250	13.84	2.250	15.43	3.25	6.45
0.333	5.75	1.333	13.84	2.333	15.43	3.33	6.45
0.417	6.29	1.417	19.66	2.417	12.20	3.42	5.95
0.500	6.29	1.500	19.66	2.500	12.20	3.50	5.95
0.583	6.98	1.583	38.68	2.583	10.21	3.58	5.53
0.667	6.98	1.667	38.68	2.667	10.21	3.67	5.53
0.750	7.88	1.750	144.26	2.750	8.84	3.75	5.18
0.833	7.88	1.833	144.26	2.833	8.84	3.83	5.18
0.917	9.11	1.917	40.90	2.917	7.84	3.92	4.87
1.000	9.11	2.000	40.90	3.000	7.84	4.00	4.87

Max.Eff.Inten.(mm/hr)=		144.26	52.13	
over (min)		5.00	15.00	
Storage Coeff. (min)=		2.58 (ii)	13.85 (ii)	
Unit Hyd. Tpeak (min)=		5.00	15.00	
Unit Hyd. peak (cms)=		0.29	0.08	
				TOTALS
PEAK FLOW	(cms)=	0.45	0.07	0.491 (iii)
TIME TO PEAK	(hrs)=	1.83	2.00	1.83
RUNOFF VOLUME	(mm)=	68.15	30.74	53.18
TOTAL RAINFALL	(mm)=	70.15	70.15	70.15
RUNOFF COEFFICIENT	=	0.97	0.44	0.76

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 75.0 Ia = Dep. 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 (0100)
ID= 1 DT= 5.0 min

Area (ha)= 15.33
Total Imp(%)= 60.00 Dir. Conn.(%)= 60.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	9.20	6.13
Dep. Storage	(mm)=	2.00	1.50
Average Slope	(%)=	1.00	1.00
Length	(m)=	319.69	40.00
Mannings n	=	0.015	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	5.30	1.083	10.91	2.083	21.73	3.08	7.07
0.167	5.30	1.167	10.91	2.167	21.73	3.17	7.07
0.250	5.75	1.250	13.84	2.250	15.43	3.25	6.45
0.333	5.75	1.333	13.84	2.333	15.43	3.33	6.45
0.417	6.29	1.417	19.66	2.417	12.20	3.42	5.95
0.500	6.29	1.500	19.66	2.500	12.20	3.50	5.95
0.583	6.98	1.583	38.68	2.583	10.21	3.58	5.53
0.667	6.98	1.667	38.68	2.667	10.21	3.67	5.53
0.750	7.88	1.750	144.26	2.750	8.84	3.75	5.18
0.833	7.88	1.833	144.26	2.833	8.84	3.83	5.18
0.917	9.11	1.917	40.90	2.917	7.84	3.92	4.87
1.000	9.11	2.000	40.90	3.000	7.84	4.00	4.87

Max.Eff.Inten.(mm/hr)=	144.26	52.13	
over (min)	5.00	20.00	
Storage Coeff. (min)=	4.83 (ii)	16.10 (ii)	
Unit Hyd. Tpeak (min)=	5.00	20.00	
Unit Hyd. peak (cms)=	0.22	0.06	

				TOTALS
PEAK FLOW	(cms)=	3.34	0.53	3.582 (iii)
TIME TO PEAK	(hrs)=	1.83	2.08	1.83
RUNOFF VOLUME	(mm)=	68.15	30.74	53.18
TOTAL RAINFALL	(mm)=	70.15	70.15	70.15
RUNOFF COEFFICIENT	=	0.97	0.44	0.76

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 75.0 Ia = Dep. 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)= 6.60
Total Imp(%)= 70.00 Dir. Conn.(%)= 70.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	4.62	1.98
Dep. Storage	(mm)=	1.50	1.50
Average Slope	(%)=	2.00	1.00
Length	(m)=	209.76	40.00
Mannings n	=	0.015	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	5.30	1.083	10.91	2.083	21.73	3.08	7.07
0.167	5.30	1.167	10.91	2.167	21.73	3.17	7.07
0.250	5.75	1.250	13.84	2.250	15.43	3.25	6.45
0.333	5.75	1.333	13.84	2.333	15.43	3.33	6.45
0.417	6.29	1.417	19.66	2.417	12.20	3.42	5.95
0.500	6.29	1.500	19.66	2.500	12.20	3.50	5.95
0.583	6.98	1.583	38.68	2.583	10.21	3.58	5.53
0.667	6.98	1.667	38.68	2.667	10.21	3.67	5.53
0.750	7.88	1.750	144.26	2.750	8.84	3.75	5.18
0.833	7.88	1.833	144.26	2.833	8.84	3.83	5.18
0.917	9.11	1.917	40.90	2.917	7.84	3.92	4.87
1.000	9.11	2.000	40.90	3.000	7.84	4.00	4.87

Max.Eff.Inten.(mm/hr)=		144.26	52.13	
over (min)		5.00	15.00	
Storage Coeff. (min)=		3.05 (ii)	14.32 (ii)	
Unit Hyd. Tpeak (min)=		5.00	15.00	
Unit Hyd. peak (cms)=		0.27	0.08	
				TOTALS
PEAK FLOW	(cms)=	1.80	0.19	1.911 (iii)
TIME TO PEAK	(hrs)=	1.83	2.00	1.83
RUNOFF VOLUME	(mm)=	68.65	30.74	57.27
TOTAL RAINFALL	(mm)=	70.15	70.15	70.15
RUNOFF COEFFICIENT	=	0.98	0.44	0.82

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 75.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0105)
1 + 2 = 3

AREA	QPEAK	TPEAK	R.V.

```
--------------------          (ha)     (cms)     (hrs)      (mm)
        ID1= 1 (  0100):    15.33    3.582     1.83     53.18
      + ID2= 2 (  0103):     6.60    1.911     1.83     57.27
        ====================================================
        ID = 3 (  0105):    21.93    5.493     1.83     54.41

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

--------------------
| ADD HYD  (  0105)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)     (cms)     (hrs)      (mm)
        ID1= 3 (  0105):    21.93    5.493     1.83     54.41
      + ID2= 2 (  0104):     1.89    0.491     1.83     53.18
        ====================================================
        ID = 1 (  0105):    23.82    5.984     1.83     54.31

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

 FINISH
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       V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

       OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                  *****  D E T A I L E D   O U T P U T *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\kbobinac\AppData\Local\Civica\VH5\c6a42fd8-e61d-467c-b3ff-9063ee9e534e\7ffb0b4c-
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DATE: 05/05/2025                          TIME: 03:22:52

USER:


COMMENTS: _____

--------------------------------------------------------------------------------------------------------------------
  **************************************************
  ** SIMULATION : 5yr 4hr 10min Chicago         **
  **************************************************

--------------------
| CHICAGO STORM    |     IDF curve parameters: A= 664.000
| Ptotal= 44.36 mm |                           B=   4.700
--------------------                           C=   0.744
                        used in:   INTENSITY =  A / (t + B)^C

                        Duration of storm  =  4.00 hrs
```



```
                        Storm time step    = 10.00 min
                        Time to peak ratio =  0.46

     TIME    RAIN  |  TIME    RAIN  |'  TIME    RAIN  |  TIME    RAIN
      hrs   mm/hr  |   hrs   mm/hr  |'   hrs   mm/hr  |   hrs   mm/hr
     0.00    3.25  |  1.00    6.86  |'  2.00   14.05  |  3.00    4.38
     0.17    3.53  |  1.17    8.79  |'  2.17    9.84  |  3.17    3.99
     0.33    3.88  |  1.33   12.66  |'  2.33    7.71  |  3.33    3.67
     0.50    4.32  |  1.50   25.44  |'  2.50    6.41  |  3.50    3.40
     0.67    4.90  |  1.67   89.88  |'  2.67    5.52  |  3.67    3.18
     0.83    5.69  |  1.83   26.93  |'  2.83    4.87  |  3.83    2.98


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--------------------
| CALIB            |
| STANDHYD (  0102)|   Area    (ha)=   1.64
|ID= 1 DT= 5.0 min |   Total Imp(%)=  60.00   Dir. Conn.(%)=  60.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.98          0.66
     Dep. Storage     (mm)=       2.00          1.50
     Average Slope     (%)=       1.00          1.00
     Length            (m)=     104.56         40.00
     Mannings n           =      0.015         0.250

         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    3.25  | 1.083    6.86  | 2.083   14.05  |  3.08    4.38
    0.167    3.25  | 1.167    6.86  | 2.167   14.05  |  3.17    4.38
    0.250    3.53  | 1.250    8.79  | 2.250    9.84  |  3.25    3.99
    0.333    3.53  | 1.333    8.79  | 2.333    9.84  |  3.33    3.99
    0.417    3.88  | 1.417   12.66  | 2.417    7.71  |  3.42    3.67
    0.500    3.88  | 1.500   12.66  | 2.500    7.71  |  3.50    3.67
    0.583    4.32  | 1.583   25.44  | 2.583    6.41  |  3.58    3.40
    0.667    4.32  | 1.667   25.44  | 2.667    6.41  |  3.67    3.40
    0.750    4.90  | 1.750   89.88  | 2.750    5.52  |  3.75    3.18
    0.833    4.90  | 1.833   89.88  | 2.833    5.52  |  3.83    3.18
    0.917    5.69  | 1.917   26.93  | 2.917    4.87  |  3.92    2.98
    1.000    5.69  | 2.000   26.93  | 3.000    4.87  |  4.00    2.98

     Max.Eff.Inten.(mm/hr)=      89.88         20.92
               over (min)        5.00         20.00
     Storage Coeff.  (min)=      2.98 (ii)    19.23 (ii)
     Unit Hyd. Tpeak (min)=      5.00         20.00
     Unit Hyd. peak  (cms)=      0.28          0.06
                                                      *TOTALS*
     PEAK FLOW       (cms)=      0.24          0.02          0.250 (iii)
     TIME TO PEAK    (hrs)=      1.83          2.08           1.83
     RUNOFF VOLUME    (mm)=     42.36         14.40          31.17
     TOTAL RAINFALL   (mm)=     44.36         44.36          44.36
     RUNOFF COEFFICIENT   =      0.95          0.32           0.70

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  75.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB            |
| STANDHYD (  0214)|   Area    (ha)=   0.83
|ID= 1 DT= 5.0 min |   Total Imp(%)=  60.00   Dir. Conn.(%)=  60.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
```

Surface Area	(ha)=	0.50	0.33
Dep. Storage	(mm)=	2.00	1.50
Average Slope	(%)=	1.00	1.00
Length	(m)=	74.39	40.00
Mannings n	=	0.015	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	3.25	1.083	6.86	2.083	14.05	3.08	4.38
0.167	3.25	1.167	6.86	2.167	14.05	3.17	4.38
0.250	3.53	1.250	8.79	2.250	9.84	3.25	3.99
0.333	3.53	1.333	8.79	2.333	9.84	3.33	3.99
0.417	3.88	1.417	12.66	2.417	7.71	3.42	3.67
0.500	3.88	1.500	12.66	2.500	7.71	3.50	3.67
0.583	4.32	1.583	25.44	2.583	6.41	3.58	3.40
0.667	4.32	1.667	25.44	2.667	6.41	3.67	3.40
0.750	4.90	1.750	89.88	2.750	5.52	3.75	3.18
0.833	4.90	1.833	89.88	2.833	5.52	3.83	3.18
0.917	5.69	1.917	26.93	2.917	4.87	3.92	2.98
1.000	5.69	2.000	26.93	3.000	4.87	4.00	2.98

Max.Eff.Inten.(mm/hr)=		89.88	20.92	
over (min)		5.00	20.00	
Storage Coeff. (min)=		2.43 (ii)	18.68 (ii)	
Unit Hyd. Tpeak (min)=		5.00	20.00	
Unit Hyd. peak (cms)=		0.30	0.06	
				TOTALS
PEAK FLOW	(cms)=	0.12	0.01	0.128 (iii)
TIME TO PEAK	(hrs)=	1.83	2.08	1.83
RUNOFF VOLUME	(mm)=	42.36	14.40	31.16
TOTAL RAINFALL	(mm)=	44.36	44.36	44.36
RUNOFF COEFFICIENT	=	0.95	0.32	0.70

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 75.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0215)
1 + 2 = 3

		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0102):		1.64	0.250	1.83	31.17
+ ID2= 2 (0214):		0.83	0.128	1.83	31.16
ID = 3 (0215):		2.47	0.378	1.83	31.17

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB
STANDHYD (0216)
ID= 1 DT= 5.0 min

Area (ha)= 2.89
Total Imp(%)= 60.00 Dir. Conn.(%)= 60.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	1.73	1.16
Dep. Storage	(mm)=	2.00	1.50
Average Slope	(%)=	1.00	1.00
Length	(m)=	138.80	40.00
Mannings n	=	0.015	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	3.25	1.083	6.86	2.083	14.05	3.08	4.38
0.167	3.25	1.167	6.86	2.167	14.05	3.17	4.38
0.250	3.53	1.250	8.79	2.250	9.84	3.25	3.99
0.333	3.53	1.333	8.79	2.333	9.84	3.33	3.99
0.417	3.88	1.417	12.66	2.417	7.71	3.42	3.67
0.500	3.88	1.500	12.66	2.500	7.71	3.50	3.67
0.583	4.32	1.583	25.44	2.583	6.41	3.58	3.40
0.667	4.32	1.667	25.44	2.667	6.41	3.67	3.40
0.750	4.90	1.750	89.88	2.750	5.52	3.75	3.18
0.833	4.90	1.833	89.88	2.833	5.52	3.83	3.18
0.917	5.69	1.917	26.93	2.917	4.87	3.92	2.98
1.000	5.69	2.000	26.93	3.000	4.87	4.00	2.98

Max.Eff.Inten.(mm/hr)=		89.88	20.92	
over (min)		5.00	20.00	
Storage Coeff. (min)=		3.54 (ii)	19.78 (ii)	
Unit Hyd. Tpeak (min)=		5.00	20.00	
Unit Hyd. peak (cms)=		0.26	0.06	
				TOTALS
PEAK FLOW	(cms)=	0.41	0.04	0.432 (iii)
TIME TO PEAK	(hrs)=	1.83	2.08	1.83
RUNOFF VOLUME	(mm)=	42.36	14.40	31.17
TOTAL RAINFALL	(mm)=	44.36	44.36	44.36
RUNOFF COEFFICIENT	=	0.95	0.32	0.70

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 75.0 Ia = Dep. 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 (0218)
ID= 1 DT= 5.0 min

Area (ha)= 2.21
Total Imp(%)= 60.00 Dir. Conn.(%)= 60.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	1.33	0.88
Dep. Storage	(mm)=	2.00	1.50
Average Slope	(%)=	1.00	1.00
Length	(m)=	121.38	40.00
Mannings n	=	0.015	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	3.25	1.083	6.86	2.083	14.05	3.08	4.38
0.167	3.25	1.167	6.86	2.167	14.05	3.17	4.38
0.250	3.53	1.250	8.79	2.250	9.84	3.25	3.99
0.333	3.53	1.333	8.79	2.333	9.84	3.33	3.99
0.417	3.88	1.417	12.66	2.417	7.71	3.42	3.67
0.500	3.88	1.500	12.66	2.500	7.71	3.50	3.67
0.583	4.32	1.583	25.44	2.583	6.41	3.58	3.40
0.667	4.32	1.667	25.44	2.667	6.41	3.67	3.40
0.750	4.90	1.750	89.88	2.750	5.52	3.75	3.18
0.833	4.90	1.833	89.88	2.833	5.52	3.83	3.18
0.917	5.69	1.917	26.93	2.917	4.87	3.92	2.98
1.000	5.69	2.000	26.93	3.000	4.87	4.00	2.98

Max.Eff.Inten.(mm/hr)=	89.88	20.92	
over (min)	5.00	20.00	
Storage Coeff. (min)=	3.26 (ii)	19.51 (ii)	

Unit Hyd. Tpeak	(min)=	5.00	20.00	
Unit Hyd. peak	(cms)=	0.27	0.06	
				TOTALS
PEAK FLOW	(cms)=	0.32	0.03	0.334 (iii)
TIME TO PEAK	(hrs)=	1.83	2.08	1.83
RUNOFF VOLUME	(mm)=	42.36	14.40	31.17
TOTAL RAINFALL	(mm)=	44.36	44.36	44.36
RUNOFF COEFFICIENT	=	0.95	0.32	0.70

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 75.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0217)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0216):	2.89	0.432	1.83	31.17
+ ID2= 2 (0218):	2.21	0.334	1.83	31.17
ID = 3 (0217):	5.10	0.766	1.83	31.17

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB
STANDHYD (0106)
ID= 1 DT= 5.0 min

Area (ha)= 4.73
Total Imp(%)= 60.00 Dir. Conn.(%)= 60.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	2.84	1.89
Dep. Storage	(mm)=	2.00	1.50
Average Slope	(%)=	1.00	1.00
Length	(m)=	177.54	40.00
Mannings n	=	0.015	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	3.25	1.083	6.86	2.083	14.05	3.08	4.38
0.167	3.25	1.167	6.86	2.167	14.05	3.17	4.38
0.250	3.53	1.250	8.79	2.250	9.84	3.25	3.99
0.333	3.53	1.333	8.79	2.333	9.84	3.33	3.99
0.417	3.88	1.417	12.66	2.417	7.71	3.42	3.67
0.500	3.88	1.500	12.66	2.500	7.71	3.50	3.67
0.583	4.32	1.583	25.44	2.583	6.41	3.58	3.40
0.667	4.32	1.667	25.44	2.667	6.41	3.67	3.40
0.750	4.90	1.750	89.88	2.750	5.52	3.75	3.18
0.833	4.90	1.833	89.88	2.833	5.52	3.83	3.18
0.917	5.69	1.917	26.93	2.917	4.87	3.92	2.98
1.000	5.69	2.000	26.93	3.000	4.87	4.00	2.98

Max.Eff.Inten.	(mm/hr)=	89.88	20.92	
	over (min)	5.00	25.00	
Storage Coeff.	(min)=	4.10 (ii)	20.35 (ii)	
Unit Hyd. Tpeak	(min)=	5.00	25.00	
Unit Hyd. peak	(cms)=	0.24	0.05	
				TOTALS
PEAK FLOW	(cms)=	0.66	0.07	0.686 (iii)
TIME TO PEAK	(hrs)=	1.83	2.17	1.83
RUNOFF VOLUME	(mm)=	42.36	14.40	31.17
TOTAL RAINFALL	(mm)=	44.36	44.36	44.36
RUNOFF COEFFICIENT	=	0.95	0.32	0.70

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 75.0 Ia = Dep. 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 (0107)
ID= 1 DT= 5.0 min

Area (ha)= 6.79
Total Imp(%)= 70.00 Dir. Conn.(%)= 70.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	4.75	2.04
Dep. Storage	(mm)=	1.50	1.50
Average Slope	(%)=	2.00	1.00
Length	(m)=	212.76	40.00
Mannings n	=	0.015	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	3.25	1.083	6.86	2.083	14.05	3.08	4.38
0.167	3.25	1.167	6.86	2.167	14.05	3.17	4.38
0.250	3.53	1.250	8.79	2.250	9.84	3.25	3.99
0.333	3.53	1.333	8.79	2.333	9.84	3.33	3.99
0.417	3.88	1.417	12.66	2.417	7.71	3.42	3.67
0.500	3.88	1.500	12.66	2.500	7.71	3.50	3.67
0.583	4.32	1.583	25.44	2.583	6.41	3.58	3.40
0.667	4.32	1.667	25.44	2.667	6.41	3.67	3.40
0.750	4.90	1.750	89.88	2.750	5.52	3.75	3.18
0.833	4.90	1.833	89.88	2.833	5.52	3.83	3.18
0.917	5.69	1.917	26.93	2.917	4.87	3.92	2.98
1.000	5.69	2.000	26.93	3.000	4.87	4.00	2.98

Max.Eff.Inten.	(mm/hr)=	89.88	20.92	
	over (min)	5.00	20.00	
Storage Coeff.	(min)=	3.71 (ii)	19.96 (ii)	
Unit Hyd. Tpeak	(min)=	5.00	20.00	
Unit Hyd. peak	(cms)=	0.25	0.06	
				TOTALS
PEAK FLOW	(cms)=	1.13	0.07	1.160 (iii)
TIME TO PEAK	(hrs)=	1.83	2.08	1.83
RUNOFF VOLUME	(mm)=	42.86	14.40	34.32
TOTAL RAINFALL	(mm)=	44.36	44.36	44.36
RUNOFF COEFFICIENT	=	0.97	0.32	0.77

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 75.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0108)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0106):	4.73	0.686	1.83	31.17
+ ID2= 2 (0107):	6.79	1.160	1.83	34.32
ID = 3 (0108):	11.52	1.846	1.83	33.03

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB
STANDHYD (0104) Area (ha)= 1.89
ID= 1 DT= 5.0 min Total Imp(%)= 60.00 Dir. Conn.(%)= 60.00

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	1.13	0.76
Dep. Storage (mm)=	2.00	1.50
Average Slope (%)=	1.00	1.00
Length (m)=	112.25	40.00
Mannings n =	0.015	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	3.25	1.083	6.86	2.083	14.05	3.08	4.38
0.167	3.25	1.167	6.86	2.167	14.05	3.17	4.38
0.250	3.53	1.250	8.79	2.250	9.84	3.25	3.99
0.333	3.53	1.333	8.79	2.333	9.84	3.33	3.99
0.417	3.88	1.417	12.66	2.417	7.71	3.42	3.67
0.500	3.88	1.500	12.66	2.500	7.71	3.50	3.67
0.583	4.32	1.583	25.44	2.583	6.41	3.58	3.40
0.667	4.32	1.667	25.44	2.667	6.41	3.67	3.40
0.750	4.90	1.750	89.88	2.750	5.52	3.75	3.18
0.833	4.90	1.833	89.88	2.833	5.52	3.83	3.18
0.917	5.69	1.917	26.93	2.917	4.87	3.92	2.98
1.000	5.69	2.000	26.93	3.000	4.87	4.00	2.98

Max.Eff.Inten.(mm/hr)=	89.88	20.92	
over (min)	5.00	20.00	
Storage Coeff. (min)=	3.11 (ii)	19.36 (ii)	
Unit Hyd. Tpeak (min)=	5.00	20.00	
Unit Hyd. peak (cms)=	0.27	0.06	
			TOTALS
PEAK FLOW (cms)=	0.27	0.03	0.287 (iii)
TIME TO PEAK (hrs)=	1.83	2.08	1.83
RUNOFF VOLUME (mm)=	42.36	14.40	31.17
TOTAL RAINFALL (mm)=	44.36	44.36	44.36
RUNOFF COEFFICIENT =	0.95	0.32	0.70

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 75.0 Ia = Dep. 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 (0100) Area (ha)= 15.33
ID= 1 DT= 5.0 min Total Imp(%)= 60.00 Dir. Conn.(%)= 60.00

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	9.20	6.13
Dep. Storage (mm)=	2.00	1.50
Average Slope (%)=	1.00	1.00
Length (m)=	319.69	40.00
Mannings n =	0.015	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	3.25	1.083	6.86	2.083	14.05	3.08	4.38
0.167	3.25	1.167	6.86	2.167	14.05	3.17	4.38
0.250	3.53	1.250	8.79	2.250	9.84	3.25	3.99
0.333	3.53	1.333	8.79	2.333	9.84	3.33	3.99
0.417	3.88	1.417	12.66	2.417	7.71	3.42	3.67
0.500	3.88	1.500	12.66	2.500	7.71	3.50	3.67
0.583	4.32	1.583	25.44	2.583	6.41	3.58	3.40
0.667	4.32	1.667	25.44	2.667	6.41	3.67	3.40
0.750	4.90	1.750	89.88	2.750	5.52	3.75	3.18
0.833	4.90	1.833	89.88	2.833	5.52	3.83	3.18
0.917	5.69	1.917	26.93	2.917	4.87	3.92	2.98
1.000	5.69	2.000	26.93	3.000	4.87	4.00	2.98

Max.Eff.Inten.(mm/hr)=	89.88	20.92	
over (min)	5.00	25.00	
Storage Coeff. (min)=	5.83 (ii)	22.08 (ii)	
Unit Hyd. Tpeak (min)=	5.00	25.00	
Unit Hyd. peak (cms)=	0.20	0.05	
			TOTALS
PEAK FLOW (cms)=	1.99	0.20	2.059 (iii)
TIME TO PEAK (hrs)=	1.83	2.17	1.83
RUNOFF VOLUME (mm)=	42.36	14.40	31.18
TOTAL RAINFALL (mm)=	44.36	44.36	44.36
RUNOFF COEFFICIENT =	0.95	0.32	0.70

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 75.0 Ia = Dep. 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)= 6.60
ID= 1 DT= 5.0 min Total Imp(%)= 70.00 Dir. Conn.(%)= 70.00

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	4.62	1.98
Dep. Storage (mm)=	1.50	1.50
Average Slope (%)=	2.00	1.00
Length (m)=	209.76	40.00
Mannings n =	0.015	0.250

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

---- TRANSFORMED HYETOGRAPH ----

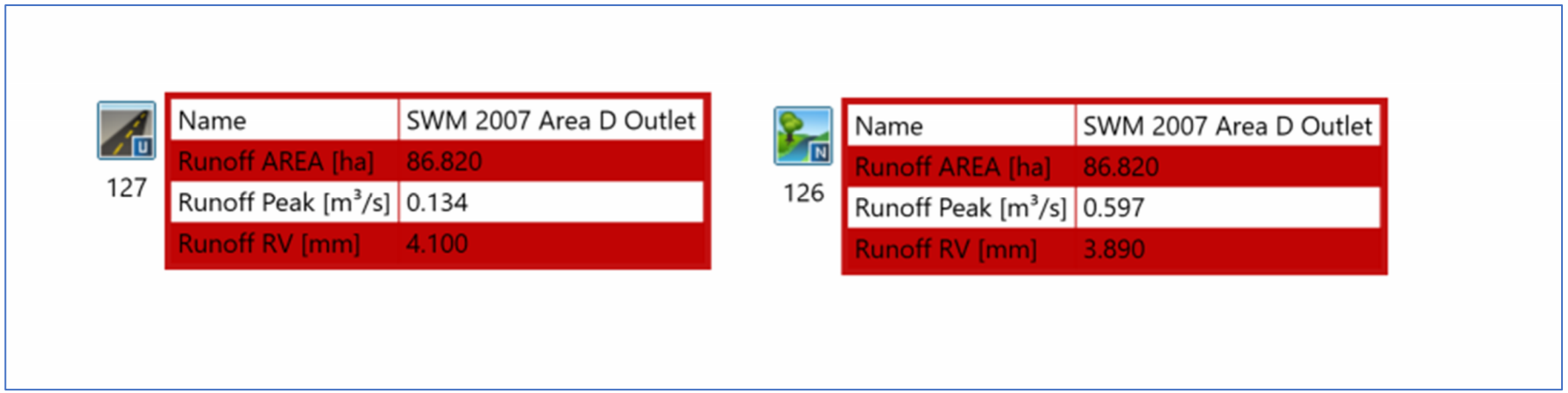
TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	3.25	1.083	6.86	2.083	14.05	3.08	4.38
0.167	3.25	1.167	6.86	2.167	14.05	3.17	4.38
0.250	3.53	1.250	8.79	2.250	9.84	3.25	3.99
0.333	3.53	1.333	8.79	2.333	9.84	3.33	3.99
0.417	3.88	1.417	12.66	2.417	7.71	3.42	3.67
0.500	3.88	1.500	12.66	2.500	7.71	3.50	3.67
0.583	4.32	1.583	25.44	2.583	6.41	3.58	3.40
0.667	4.32	1.667	25.44	2.667	6.41	3.67	3.40
0.750	4.90	1.750	89.88	2.750	5.52	3.75	3.18
0.833	4.90	1.833	89.88	2.833	5.52	3.83	3.18
0.917	5.69	1.917	26.93	2.917	4.87	3.92	2.98
1.000	5.69	2.000	26.93	3.000	4.87	4.00	2.98

Max.Eff.Inten.(mm/hr)=	89.88	20.92	
over (min)	5.00	20.00	
Storage Coeff. (min)=	3.68 (ii)	19.93 (ii)	
Unit Hyd. Tpeak (min)=	5.00	20.00	
Unit Hyd. peak (cms)=	0.25	0.06	
			TOTALS
PEAK FLOW (cms)=	1.10	0.07	1.129 (iii)
TIME TO PEAK (hrs)=	1.83	2.08	1.83

```
     RUNOFF VOLUME    (mm)=      42.86        14.40          34.32
     TOTAL RAINFALL   (mm)=      44.36        44.36          44.36
     RUNOFF COEFFICIENT   =       0.97         0.32           0.77

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  75.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

--------------------
| ADD HYD  (  0105)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0100):    15.33   2.059     1.83    31.18
      + ID2= 2 (  0103):     6.60   1.129     1.83    34.32
        ================================================
        ID = 3 (  0105):    21.93   3.188     1.83    32.12

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

--------------------
| ADD HYD  (  0105)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0105):    21.93   3.188     1.83    32.12
      + ID2= 2 (  0104):     1.89   0.287     1.83    31.17
        ================================================
        ID = 1 (  0105):    23.82   3.474     1.83    32.05

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

Appendix C Stormwater Management Calculations

2007 MODEL COMPARISON



VISUAL OTTHYMO - 2007 MODEL COMPARISON SCHEMATIC

Project: Uppers Grove & Uppers Lane - Revised Pond Design
Project Number: 1606230965
Project Location: City of Thorold
Designer: KB
Date: March 24, 2026

Per the 2007 SWM Report

Area 86.82 ha

Design Storm / Return Period	Peak Flow (m^3/s)	Unit Rate $m^3/s/ha$
25mm	0.023	0.00026
2 Year	0.033	0.00038
5 Year	0.080	0.00092
10 Year	-	-
25 Year	0.205	0.00236
50 Year	-	-
100 Year	0.362	0.00417
MTO 100 Year	2.983	0.03436

Stantec Modeling Reproduction

Notes:

1. As seen below, the NASHYD Catchments result in larger flows than the STANDHYD cathcment, therefore the more conservative (lesser) flows have been used for comparison.

2. ABC IDF parameters have been modeled per the 2007 SWM Report

3. The 2007 hydrologic model reports a total drainage area of 86.82 ha. For the purposes of this analysis, the modeled area (86.82 ha) was used, as it aligns with the values documented in the 2007

Design Storm / Return Period	STANDHYD PK FLOW (m^3/s)	NASHHYD PK FLOW (m^3/s)	Governing Flow (m^3/s)	Unit Rate $m^3/s/ha$
25mm	0.134	0.597	0.134	0.0015
2 Year	0.268	0.988	0.268	0.0031
5 Year	0.542	1.713	0.542	0.0062
10 Year	-	-	-	-
25 Year	1.122	3.031	1.122	0.0129
50 Year	-	-	-	-
100 Year	2.354	5.538	2.354	0.0271
MTO 100 Year	3.237	7.071	3.237	0.0373

	2007 SWM	Stantec 2026	
Design Storm / Return Period	Peak Flow (m^3/s)	Peak Flow (m^3/s)	% Increase
25mm	0.023	0.134	483%
2 Year	0.033	0.268	712%
5 Year	0.080	0.542	578%
10 Year	-	-	-
25 Year	0.205	1.122	447%
50 Year	-	-	-
100 Year	0.362	2.354	550%
MTO 100 Year	2.983	3.237	9%

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

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

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       O   O    T      T    H   H    Y    M M M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                  *****  D E T A I L E D   O U T P U T *****


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DATE: 03/24/2026                          TIME: 03:19:38

USER:


COMMENTS: _____________________________________________________

----------------------------------------------------------------------------------------------------------
  ************************************************
  ** SIMULATION : A. 2007 25mm Event 10min CHic **
  ************************************************

--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 512.000
| Ptotal= 25.03 mm |                          B=   6.000
--------------------                          C=   0.800
                       used in:   INTENSITY =  A / (t + B)^C

                       Duration of storm  =  4.00 hrs
                       Storm time step    = 10.00 min
                       Time to peak ratio =  0.45

                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.00    1.48 |  1.00    3.42 |   2.00    7.98 |  3.00    2.13
                0.17    1.62 |  1.17    4.53 |   2.17    5.33 |  3.17    1.92
                0.33    1.80 |  1.33    6.88 |   2.33    4.04 |  3.33    1.75
                0.50    2.03 |  1.50   15.18 |   2.50    3.27 |  3.50    1.61
                0.67    2.34 |  1.67   55.72 |   2.67    2.76 |  3.67    1.49
                0.83    2.77 |  1.83   16.41 |   2.83    2.40 |  3.83    1.39


----------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0127)|   Area    (ha)=  86.82
|ID= 1 DT= 5.0 min |   Total Imp(%)=   1.00   Dir. Conn.(%)=   1.00
--------------------
                                IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        0.87         85.95
     Dep. Storage     (mm)=        0.00          4.84
     Average Slope     (%)=        0.70          0.70
     Length            (m)=      760.00        760.00
```



```
     Mannings n           =      0.015       0.250

         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    1.48 | 1.083    3.42 | 2.083    7.98 | 3.08    2.13
               0.167    1.48 | 1.167    3.42 | 2.167    7.98 | 3.17    2.13
               0.250    1.62 | 1.250    4.53 | 2.250    5.33 | 3.25    1.92
               0.333    1.62 | 1.333    4.53 | 2.333    5.33 | 3.33    1.92
               0.417    1.80 | 1.417    6.88 | 2.417    4.04 | 3.42    1.75
               0.500    1.80 | 1.500    6.88 | 2.500    4.04 | 3.50    1.75
               0.583    2.03 | 1.583   15.18 | 2.583    3.27 | 3.58    1.61
               0.667    2.03 | 1.667   15.18 | 2.667    3.27 | 3.67    1.61
               0.750    2.34 | 1.750   55.72 | 2.750    2.76 | 3.75    1.49
               0.833    2.34 | 1.833   55.72 | 2.833    2.76 | 3.83    1.49
               0.917    2.77 | 1.917   16.41 | 2.917    2.40 | 3.92    1.39
               1.000    2.77 | 2.000   16.41 | 3.000    2.40 | 4.00    1.39

     Max.Eff.Inten.(mm/hr)=      42.61         2.98
           over (min)     =      15.00       250.00
     Storage Coeff.  (min)=      14.72 (ii)  245.32 (ii)
     Unit Hyd. Tpeak (min)=      15.00       250.00
     Unit Hyd. peak  (cms)=       0.08         0.00
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.07         0.13      0.134 (iii)
     TIME TO PEAK    (hrs)=       2.00         6.08       6.08
     RUNOFF VOLUME    (mm)=      25.03         3.89       4.10
     TOTAL RAINFALL   (mm)=      25.03        25.03      25.03
     RUNOFF COEFFICIENT   =       1.00         0.16       0.16

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  75.0    Ia = Dep. 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            |
| NASHYD   (  0126)|   Area    (ha)=  86.82   Curve Number    (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   4.84   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.52

         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    1.48 | 1.083    3.42 | 2.083    7.98 | 3.08    2.13
               0.167    1.48 | 1.167    3.42 | 2.167    7.98 | 3.17    2.13
               0.250    1.62 | 1.250    4.53 | 2.250    5.33 | 3.25    1.92
               0.333    1.62 | 1.333    4.53 | 2.333    5.33 | 3.33    1.92
               0.417    1.80 | 1.417    6.88 | 2.417    4.04 | 3.42    1.75
               0.500    1.80 | 1.500    6.88 | 2.500    4.04 | 3.50    1.75
               0.583    2.03 | 1.583   15.18 | 2.583    3.27 | 3.58    1.61
               0.667    2.03 | 1.667   15.18 | 2.667    3.27 | 3.67    1.61
               0.750    2.34 | 1.750   55.72 | 2.750    2.76 | 3.75    1.49
               0.833    2.34 | 1.833   55.72 | 2.833    2.76 | 3.83    1.49
               0.917    2.77 | 1.917   16.41 | 2.917    2.40 | 3.92    1.39
               1.000    2.77 | 2.000   16.41 | 3.000    2.40 | 4.00    1.39

     Unit Hyd Qpeak  (cms)=   6.377

     PEAK FLOW       (cms)=   0.597 (i)
     TIME TO PEAK    (hrs)=   2.417
```

```
     RUNOFF VOLUME     (mm)=   3.890
     TOTAL RAINFALL    (mm)=  25.035
     RUNOFF COEFFICIENT   =   0.155

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

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

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2022)
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        V  V    I      SS   U   U  AAAAA  L
        V  V    I       SS  U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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DATE: 03/24/2026                          TIME: 03:19:38

USER:


COMMENTS: _____________________________________________________________


-------------------------------------------------------------------------------------------------------------
  ************************************************
  ** SIMULATION : B. 2007 2yr 4hr 10min Chicago **
  ************************************************

--------------------
| CHICAGO STORM    |     IDF curve parameters: A= 521.970
| Ptotal= 32.06 mm |                           B=   5.280
--------------------                           C=   0.759
                        used in:   INTENSITY =  A / (t + B)^C

                        Duration of storm  =  4.00 hrs
                        Storm time step    = 10.00 min
                        Time to peak ratio =  0.45

                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.00    2.20 |  1.00    4.77 |   2.00   10.34 |  3.00    3.09
                0.17    2.40 |  1.17    6.17 |   2.17    7.15 |  3.17    2.81
                0.33    2.65 |  1.33    9.03 |   2.33    5.55 |  3.33    2.57
                0.50    2.96 |  1.50   18.68 |   2.50    4.58 |  3.50    2.38
                0.67    3.37 |  1.67   65.90 |   2.67    3.93 |  3.67    2.22
                0.83    3.93 |  1.83   20.10 |   2.83    3.45 |  3.83    2.08


-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0127)|   Area    (ha)=  86.82
```



```
|ID= 1 DT= 5.0 min |   Total Imp(%)=   1.00   Dir. Conn.(%)=   1.00
--------------------
                                IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.87        85.95
     Dep. Storage     (mm)=       0.00         4.84
     Average Slope     (%)=       0.70         0.70
     Length            (m)=     760.00       760.00
     Mannings n           =      0.015        0.250

        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    2.20 | 1.083    4.77 | 2.083   10.34 |  3.08    3.09
               0.167    2.20 | 1.167    4.77 | 2.167   10.34 |  3.17    3.09
               0.250    2.40 | 1.250    6.17 | 2.250    7.15 |  3.25    2.81
               0.333    2.40 | 1.333    6.17 | 2.333    7.15 |  3.33    2.81
               0.417    2.65 | 1.417    9.03 | 2.417    5.55 |  3.42    2.57
               0.500    2.65 | 1.500    9.03 | 2.500    5.55 |  3.50    2.57
               0.583    2.96 | 1.583   18.68 | 2.583    4.58 |  3.58    2.38
               0.667    2.96 | 1.667   18.68 | 2.667    4.58 |  3.67    2.38
               0.750    3.37 | 1.750   65.90 | 2.750    3.93 |  3.75    2.22
               0.833    3.37 | 1.833   65.90 | 2.833    3.93 |  3.83    2.22
               0.917    3.93 | 1.917   20.10 | 2.917    3.45 |  3.92    2.08
               1.000    3.93 | 2.000   20.10 | 3.000    3.45 |  4.00    2.08

     Max.Eff.Inten.(mm/hr)=      50.63          4.86
               over (min)        15.00        205.00
     Storage Coeff.  (min)=      13.73 (ii)   203.40 (ii)
     Unit Hyd. Tpeak (min)=      15.00        205.00
     Unit Hyd. peak  (cms)=       0.08          0.01
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.09          0.27     0.268 (iii)
     TIME TO PEAK    (hrs)=       2.00          5.33      5.33
     RUNOFF VOLUME    (mm)=      32.06          6.62      6.87
     TOTAL RAINFALL   (mm)=      32.06         32.06     32.06
     RUNOFF COEFFICIENT   =       1.00          0.21      0.21

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =  75.0    Ia = Dep. 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            |
| NASHYD   (  0126)|   Area    (ha)=  86.82   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   4.84   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.52

        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    2.20 | 1.083    4.77 | 2.083   10.34 |  3.08    3.09
               0.167    2.20 | 1.167    4.77 | 2.167   10.34 |  3.17    3.09
               0.250    2.40 | 1.250    6.17 | 2.250    7.15 |  3.25    2.81
               0.333    2.40 | 1.333    6.17 | 2.333    7.15 |  3.33    2.81
               0.417    2.65 | 1.417    9.03 | 2.417    5.55 |  3.42    2.57
               0.500    2.65 | 1.500    9.03 | 2.500    5.55 |  3.50    2.57
               0.583    2.96 | 1.583   18.68 | 2.583    4.58 |  3.58    2.38
               0.667    2.96 | 1.667   18.68 | 2.667    4.58 |  3.67    2.38
               0.750    3.37 | 1.750   65.90 | 2.750    3.93 |  3.75    2.22
               0.833    3.37 | 1.833   65.90 | 2.833    3.93 |  3.83    2.22
```

0.917	3.93	1.917	20.10	2.917	3.45	3.92	2.08
1.000	3.93	2.000	20.10	3.000	3.45	4.00	2.08

Unit Hyd Qpeak (cms)= 6.377

PEAK FLOW (cms)= 0.988 (i)
TIME TO PEAK (hrs)= 2.417
RUNOFF VOLUME (mm)= 6.621
TOTAL RAINFALL (mm)= 32.056
RUNOFF COEFFICIENT = 0.207

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

```
       V    V   I    SSSSS  U   U    A    L              (v 6.2.2022)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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DATE: 03/24/2026 TIME: 03:19:38

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COMMENTS: _____

```
  ************************************************
  ** SIMULATION : C. 2007 5yr 4hr 10min Chicago **
  ************************************************
```

CHICAGO STORM
Ptotal= 41.68 mm

IDF curve parameters: A= 719.500
B= 6.340
C= 0.769
used in: INTENSITY = A / (t + B)^C

Duration of storm = 4.00 hrs
Storm time step = 10.00 min
Time to peak ratio = 0.45

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	2.80	1.00	6.21	2.00	13.78	3.00	3.96
0.17	3.06	1.17	8.10	2.17	9.43	3.17	3.59
0.33	3.38	1.33	12.00	2.33	7.26	3.33	3.28
0.50	3.79	1.50	25.12	2.50	5.95	3.50	3.03
0.67	4.33	1.67	83.95	2.67	5.07	3.67	2.82

0.83	5.08	1.83	27.04	2.83	4.44	3.83	2.64

CALIB
STANDHYD (0127)
ID= 1 DT= 5.0 min

Area (ha)= 86.82
Total Imp(%)= 1.00 Dir. Conn.(%)= 1.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.87	85.95
Dep. Storage	(mm)=	0.00	4.84
Average Slope	(%)=	0.70	0.70
Length	(m)=	760.00	760.00
Mannings n	=	0.015	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	2.80	1.083	6.21	2.083	13.78	3.08	3.96
0.167	2.80	1.167	6.21	2.167	13.78	3.17	3.96
0.250	3.06	1.250	8.10	2.250	9.43	3.25	3.59
0.333	3.06	1.333	8.10	2.333	9.43	3.33	3.59
0.417	3.38	1.417	12.00	2.417	7.26	3.42	3.28
0.500	3.38	1.500	12.00	2.500	7.26	3.50	3.28
0.583	3.79	1.583	25.12	2.583	5.95	3.58	3.03
0.667	3.79	1.667	25.12	2.667	5.95	3.67	3.03
0.750	4.33	1.750	83.95	2.750	5.07	3.75	2.82
0.833	4.33	1.833	83.95	2.833	5.07	3.83	2.82
0.917	5.08	1.917	27.04	2.917	4.44	3.92	2.64
1.000	5.08	2.000	27.04	3.000	4.44	4.00	2.64

Max.Eff.Inten.(mm/hr)=		83.95	8.24	
over (min)		10.00	165.00	
Storage Coeff. (min)=		11.22 (ii)	164.79 (ii)	
Unit Hyd. Tpeak (min)=		10.00	165.00	
Unit Hyd. peak (cms)=		0.10	0.01	
				TOTALS
PEAK FLOW	(cms)=	0.13	0.54	0.542 (iii)
TIME TO PEAK	(hrs)=	1.92	4.67	4.67
RUNOFF VOLUME	(mm)=	41.68	11.17	11.48
TOTAL RAINFALL	(mm)=	41.68	41.68	41.68
RUNOFF COEFFICIENT	=	1.00	0.27	0.28

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 75.0 Ia = Dep. 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
NASHYD (0126)
ID= 1 DT= 5.0 min

Area (ha)= 86.82 Curve Number (CN)= 75.0
Ia (mm)= 4.84 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.52

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	2.80	1.083	6.21	2.083	13.78	3.08	3.96
0.167	2.80	1.167	6.21	2.167	13.78	3.17	3.96
0.250	3.06	1.250	8.10	2.250	9.43	3.25	3.59

0.333	3.06	1.333	8.10	2.333	9.43	3.33	3.59
0.417	3.38	1.417	12.00	2.417	7.26	3.42	3.28
0.500	3.38	1.500	12.00	2.500	7.26	3.50	3.28
0.583	3.79	1.583	25.12	2.583	5.95	3.58	3.03
0.667	3.79	1.667	25.12	2.667	5.95	3.67	3.03
0.750	4.33	1.750	83.95	2.750	5.07	3.75	2.82
0.833	4.33	1.833	83.95	2.833	5.07	3.83	2.82
0.917	5.08	1.917	27.04	2.917	4.44	3.92	2.64
1.000	5.08	2.000	27.04	3.000	4.44	4.00	2.64

Unit Hyd Qpeak (cms)= 6.377

PEAK FLOW (cms)= 1.713 (i)
TIME TO PEAK (hrs)= 2.417
RUNOFF VOLUME (mm)= 11.172
TOTAL RAINFALL (mm)= 41.683
RUNOFF COEFFICIENT = 0.268

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

V V I SSSSS U U A L (v 6.2.2022)
V V I SS U U A A L
V V I SS U U AAAAA L
V V I SS U U A A L
VV I SSSSS UUUUU A A LLLLL

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

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DATE: 03/24/2026 TIME: 03:19:38

USER:

COMMENTS: _____

** SIMULATION : E. 2007 25yr 4hr 10min Chicag **

CHICAGO STORM
Ptotal= 56.11 mm

IDF curve parameters: A=1020.700
B= 7.290
C= 0.778
used in: INTENSITY = A / (t + B)^C

Duration of storm = 4.00 hrs
Storm time step = 10.00 min
Time to peak ratio = 0.45

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	3.69	1.00	8.35	2.00	18.94	3.00	5.26
0.17	4.04	1.17	10.98	2.17	12.85	3.17	4.75
0.33	4.47	1.33	16.44	2.33	9.82	3.33	4.34
0.50	5.03	1.50	34.71	2.50	8.00	3.50	4.00
0.67	5.76	1.67	111.15	2.67	6.79	3.67	3.71
0.83	6.80	1.83	37.37	2.83	5.92	3.83	3.47

CALIB
STANDHYD (0127)
ID= 1 DT= 5.0 min
Area (ha)= 86.82
Total Imp(%)= 1.00 Dir. Conn.(%)= 1.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.87	85.95
Dep. Storage	(mm)=	0.00	4.84
Average Slope	(%)=	0.70	0.70
Length	(m)=	760.00	760.00
Mannings n	=	0.015	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	3.69	1.083	8.35	2.083	18.94	3.08	5.27
0.167	3.69	1.167	8.35	2.167	18.94	3.17	5.26
0.250	4.04	1.250	10.98	2.250	12.85	3.25	4.75
0.333	4.04	1.333	10.98	2.333	12.85	3.33	4.75
0.417	4.47	1.417	16.44	2.417	9.82	3.42	4.34
0.500	4.47	1.500	16.44	2.500	9.82	3.50	4.34
0.583	5.03	1.583	34.71	2.583	8.00	3.58	4.00
0.667	5.03	1.667	34.71	2.667	8.00	3.67	4.00
0.750	5.76	1.750	111.15	2.750	6.79	3.75	3.71
0.833	5.76	1.833	111.15	2.833	6.79	3.83	3.71
0.917	6.80	1.917	37.37	2.917	5.92	3.92	3.47
1.000	6.80	2.000	37.37	3.000	5.92	4.00	3.47

Max.Eff.Inten.(mm/hr)=		111.15	14.39	
over (min)		10.00	135.00	
Storage Coeff. (min)=		10.03 (ii)	132.91 (ii)	
Unit Hyd. Tpeak (min)=		10.00	135.00	
Unit Hyd. peak (cms)=		0.11	0.01	
				TOTALS
PEAK FLOW	(cms)=	0.18	1.12	1.122 (iii)
TIME TO PEAK	(hrs)=	1.92	4.17	4.08
RUNOFF VOLUME	(mm)=	56.11	19.34	19.70
TOTAL RAINFALL	(mm)=	56.11	56.11	56.11
RUNOFF COEFFICIENT	=	1.00	0.34	0.35

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 75.0 Ia = Dep. 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
NASHYD (0126)
ID= 1 DT= 5.0 min
Area (ha)= 86.82 Curve Number (CN)= 75.0
Ia (mm)= 4.84 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.52

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	3.69	1.083	8.35	2.083	18.94	3.08	5.27
0.167	3.69	1.167	8.35	2.167	18.94	3.17	5.26
0.250	4.04	1.250	10.98	2.250	12.85	3.25	4.75
0.333	4.04	1.333	10.98	2.333	12.85	3.33	4.75
0.417	4.47	1.417	16.44	2.417	9.82	3.42	4.34
0.500	4.47	1.500	16.44	2.500	9.82	3.50	4.34
0.583	5.03	1.583	34.71	2.583	8.00	3.58	4.00
0.667	5.03	1.667	34.71	2.667	8.00	3.67	4.00
0.750	5.76	1.750	111.15	2.750	6.79	3.75	3.71
0.833	5.76	1.833	111.15	2.833	6.79	3.83	3.71
0.917	6.80	1.917	37.37	2.917	5.92	3.92	3.47
1.000	6.80	2.000	37.37	3.000	5.92	4.00	3.47

Unit Hyd Qpeak (cms)= 6.377

PEAK FLOW (cms)= 3.031 (i)
TIME TO PEAK (hrs)= 2.417
RUNOFF VOLUME (mm)= 19.335
TOTAL RAINFALL (mm)= 56.105
RUNOFF COEFFICIENT = 0.345

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

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       V    V   I    SSSSS  U   U    A    L              (v 6.2.2022)
       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

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       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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***** D E T A I L E D O U T P U T *****

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DATE: 03/24/2026 TIME: 03:19:38

USER:

COMMENTS: _____

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  ************************************************
  ** SIMULATION : G. 2007 100yr 4hr 10min Chica **
  ************************************************
```

CHICAGO STORM	IDF curve parameters: A=1798.680
Ptotal= 76.90 mm	B= 8.300

C= 0.823
used in: INTENSITY = A / (t + B)^C

Duration of storm = 4.00 hrs
Storm time step = 10.00 min
Time to peak ratio = 0.45

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	4.25	1.00	10.48	2.00	25.92	3.00	6.29
0.17	4.69	1.17	14.20	2.17	16.89	3.17	5.61
0.33	5.25	1.33	22.19	2.33	12.54	3.33	5.08
0.50	5.97	1.50	49.94	2.50	9.99	3.50	4.64
0.67	6.95	1.67	164.42	2.67	8.33	3.67	4.28
0.83	8.34	1.83	54.01	2.83	7.16	3.83	3.98

CALIB	
STANDHYD (0127)	Area (ha)= 86.82
ID= 1 DT= 5.0 min	Total Imp(%)= 1.00 Dir. Conn.(%)= 1.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.87	85.95
Dep. Storage	(mm)=	0.00	4.84
Average Slope	(%)=	0.70	0.70
Length	(m)=	760.00	760.00
Mannings n	=	0.015	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	4.25	1.083	10.48	2.083	25.92	3.08	6.29
0.167	4.25	1.167	10.48	2.167	25.92	3.17	6.29
0.250	4.69	1.250	14.20	2.250	16.89	3.25	5.61
0.333	4.69	1.333	14.20	2.333	16.89	3.33	5.61
0.417	5.25	1.417	22.19	2.417	12.54	3.42	5.08
0.500	5.25	1.500	22.19	2.500	12.54	3.50	5.08
0.583	5.97	1.583	49.94	2.583	9.99	3.58	4.64
0.667	5.97	1.667	49.94	2.667	9.99	3.67	4.64
0.750	6.95	1.750	164.42	2.750	8.33	3.75	4.28
0.833	6.95	1.833	164.42	2.833	8.33	3.83	4.28
0.917	8.34	1.917	54.01	2.917	7.16	3.92	3.98
1.000	8.34	2.000	54.01	3.000	7.16	4.00	3.98

Max.Eff.Inten.(mm/hr)=		164.42	25.92	
over (min)		10.00	110.00	
Storage Coeff. (min)=		8.57 (ii)	105.67 (ii)	
Unit Hyd. Tpeak (min)=		10.00	110.00	
Unit Hyd. peak (cms)=		0.12	0.01	
				TOTALS
PEAK FLOW	(cms)=	0.27	2.34	2.354 (iii)
TIME TO PEAK	(hrs)=	1.92	3.67	3.67
RUNOFF VOLUME	(mm)=	76.90	33.13	33.57
TOTAL RAINFALL	(mm)=	76.90	76.90	76.90
RUNOFF COEFFICIENT	=	1.00	0.43	0.44

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 75.0 Ia = Dep. 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                |
| NASHYD   (  0126)    |   Area    (ha)=  86.82   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min     |   Ia      (mm)=   4.84   # of Linear Res.(N)= 3.00
-----------------------   U.H. Tp(hrs)=   0.52
```

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	4.25	1.083	10.48	2.083	25.92	3.08	6.29
0.167	4.25	1.167	10.48	2.167	25.92	3.17	6.29
0.250	4.69	1.250	14.20	2.250	16.89	3.25	5.61
0.333	4.69	1.333	14.20	2.333	16.89	3.33	5.61
0.417	5.25	1.417	22.19	2.417	12.54	3.42	5.08
0.500	5.25	1.500	22.19	2.500	12.54	3.50	5.08
0.583	5.97	1.583	49.94	2.583	9.99	3.58	4.64
0.667	5.97	1.667	49.94	2.667	9.99	3.67	4.64
0.750	6.95	1.750	164.42	2.750	8.33	3.75	4.28
0.833	6.95	1.833	164.42	2.833	8.33	3.83	4.28
0.917	8.34	1.917	54.01	2.917	7.16	3.92	3.98
1.000	8.34	2.000	54.01	3.000	7.16	4.00	3.98

```
     Unit Hyd Qpeak  (cms)=   6.377

     PEAK FLOW       (cms)=   5.538 (i)
     TIME TO PEAK    (hrs)=   2.417
     RUNOFF VOLUME    (mm)=  33.130
     TOTAL RAINFALL   (mm)=  76.898
     RUNOFF COEFFICIENT   =   0.431

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

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       V    V   I    SSSSS  U   U    A    L              (v 6.2.2022)
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        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
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        OOO     T      T    H   H    Y    M   M   OOO
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```
  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\kbobinac\AppData\Local\Civica\VH5\c6a42fd8-e61d-467c-b3ff-9063ee9e534e\13c60f48-
2915-486e-875d-a2b4f104cb56\sce
  Summary filename: C:\Users\kbobinac\AppData\Local\Civica\VH5\c6a42fd8-e61d-467c-b3ff-9063ee9e534e\13c60f48-
2915-486e-875d-a2b4f104cb56\sce

DATE: 03/24/2026                          TIME: 03:19:38

USER:


COMMENTS: _____
```

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  **********************************************
  ** SIMULATION : H. 2007 MTO 100yr 24hr       **
  **********************************************

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| CHICAGO STORM    |    IDF curve parameters: A=1798.680
| Ptotal=108.09 mm |                          B=   8.300
--------------------                          C=   0.823
                       used in:   INTENSITY =  A / (t + B)^C

                       Duration of storm  = 24.00 hrs
                       Storm time step    = 10.00 min
                       Time to peak ratio =  0.45
```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	0.83	6.00	1.68	12.00	6.29	18.00	1.35
0.17	0.84	6.17	1.73	12.17	5.61	18.17	1.32
0.33	0.85	6.33	1.79	12.33	5.08	18.33	1.30
0.50	0.86	6.50	1.85	12.50	4.64	18.50	1.27
0.67	0.87	6.67	1.92	12.67	4.28	18.67	1.25
0.83	0.89	6.83	2.00	12.83	3.98	18.83	1.23
1.00	0.90	7.00	2.08	13.00	3.71	19.00	1.21
1.17	0.91	7.17	2.16	13.17	3.49	19.17	1.19
1.33	0.93	7.33	2.26	13.33	3.29	19.33	1.17
1.50	0.94	7.50	2.36	13.50	3.11	19.50	1.15
1.67	0.96	7.67	2.48	13.67	2.95	19.67	1.13
1.83	0.97	7.83	2.61	13.83	2.81	19.83	1.11
2.00	0.99	8.00	2.76	14.00	2.69	20.00	1.10
2.17	1.00	8.17	2.92	14.17	2.57	20.17	1.08
2.33	1.02	8.33	3.11	14.33	2.47	20.33	1.06
2.50	1.04	8.50	3.33	14.50	2.37	20.50	1.05
2.67	1.06	8.67	3.58	14.67	2.29	20.67	1.03
2.83	1.08	8.83	3.88	14.83	2.20	20.83	1.02
3.00	1.10	9.00	4.25	15.00	2.13	21.00	1.01
3.17	1.12	9.17	4.69	15.17	2.06	21.17	0.99
3.33	1.14	9.33	5.25	15.33	2.00	21.33	0.98
3.50	1.16	9.50	5.97	15.50	1.94	21.50	0.97
3.67	1.18	9.67	6.95	15.67	1.88	21.67	0.95
3.83	1.21	9.83	8.34	15.83	1.83	21.83	0.94
4.00	1.23	10.00	10.48	16.00	1.78	22.00	0.93
4.17	1.26	10.17	14.20	16.17	1.73	22.17	0.92
4.33	1.29	10.33	22.19	16.33	1.68	22.33	0.91
4.50	1.32	10.50	49.94	16.50	1.64	22.50	0.90
4.67	1.35	10.67	164.42	16.67	1.60	22.67	0.89
4.83	1.38	10.83	54.01	16.83	1.57	22.83	0.88
5.00	1.42	11.00	25.92	17.00	1.53	23.00	0.87
5.17	1.46	11.17	16.89	17.17	1.50	23.17	0.86
5.33	1.50	11.33	12.54	17.33	1.46	23.33	0.85
5.50	1.54	11.50	9.99	17.50	1.43	23.50	0.84
5.67	1.58	11.67	8.33	17.67	1.40	23.67	0.83
5.83	1.63	11.83	7.16	17.83	1.38	23.83	0.82

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| CALIB              |
| STANDHYD (  0127)  |   Area    (ha)=  86.82
|ID= 1 DT= 5.0 min   |   Total Imp(%)=   1.00   Dir. Conn.(%)=   1.00
--------------------

                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.87         85.95
     Dep. Storage     (mm)=       0.00          4.84
     Average Slope     (%)=       0.70          0.70
     Length            (m)=     760.00        760.00
     Mannings n           =      0.015         0.250

         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	0.83	6.083	1.68	12.083	6.29	18.08	1.35
0.167	0.83	6.167	1.68	12.167	6.29	18.17	1.35
0.250	0.84	6.250	1.73	12.250	5.61	18.25	1.32
0.333	0.84	6.333	1.73	12.333	5.61	18.33	1.32
0.417	0.85	6.417	1.79	12.417	5.08	18.42	1.30
0.500	0.85	6.500	1.79	12.500	5.08	18.50	1.30
0.583	0.86	6.583	1.85	12.583	4.64	18.58	1.27
0.667	0.86	6.667	1.85	12.667	4.64	18.67	1.27
0.750	0.87	6.750	1.92	12.750	4.28	18.75	1.25
0.833	0.87	6.833	1.92	12.833	4.28	18.83	1.25
0.917	0.89	6.917	2.00	12.917	3.98	18.92	1.23
1.000	0.89	7.000	2.00	13.000	3.98	19.00	1.23
1.083	0.90	7.083	2.08	13.083	3.71	19.08	1.21
1.167	0.90	7.167	2.08	13.167	3.71	19.17	1.21
1.250	0.91	7.250	2.16	13.250	3.49	19.25	1.19
1.333	0.91	7.333	2.16	13.333	3.49	19.33	1.19
1.417	0.93	7.417	2.26	13.417	3.29	19.42	1.17
1.500	0.93	7.500	2.26	13.500	3.29	19.50	1.17
1.583	0.94	7.583	2.36	13.583	3.11	19.58	1.15
1.667	0.94	7.667	2.36	13.667	3.11	19.67	1.15
1.750	0.96	7.750	2.48	13.750	2.95	19.75	1.13
1.833	0.96	7.833	2.48	13.833	2.95	19.83	1.13
1.917	0.97	7.917	2.61	13.917	2.81	19.92	1.11
2.000	0.97	8.000	2.61	14.000	2.81	20.00	1.11
2.083	0.99	8.083	2.76	14.083	2.69	20.08	1.10
2.167	0.99	8.167	2.76	14.167	2.69	20.17	1.10
2.250	1.00	8.250	2.92	14.250	2.57	20.25	1.08
2.333	1.00	8.333	2.92	14.333	2.57	20.33	1.08
2.417	1.02	8.417	3.11	14.417	2.47	20.42	1.06
2.500	1.02	8.500	3.11	14.500	2.47	20.50	1.06
2.583	1.04	8.583	3.33	14.583	2.37	20.58	1.05
2.667	1.04	8.667	3.33	14.667	2.37	20.67	1.05
2.750	1.06	8.750	3.58	14.750	2.29	20.75	1.03
2.833	1.06	8.833	3.58	14.833	2.29	20.83	1.03
2.917	1.08	8.917	3.88	14.917	2.20	20.92	1.02
3.000	1.08	9.000	3.88	15.000	2.20	21.00	1.02
3.083	1.10	9.083	4.25	15.083	2.13	21.08	1.01
3.167	1.10	9.167	4.25	15.167	2.13	21.17	1.01
3.250	1.12	9.250	4.69	15.250	2.06	21.25	0.99
3.333	1.12	9.333	4.69	15.333	2.06	21.33	0.99
3.417	1.14	9.417	5.25	15.417	2.00	21.42	0.98
3.500	1.14	9.500	5.25	15.500	2.00	21.50	0.98
3.583	1.16	9.583	5.97	15.583	1.94	21.58	0.97
3.667	1.16	9.667	5.97	15.667	1.94	21.67	0.97
3.750	1.18	9.750	6.95	15.750	1.88	21.75	0.95
3.833	1.18	9.833	6.95	15.833	1.88	21.83	0.95
3.917	1.21	9.917	8.34	15.917	1.83	21.92	0.94
4.000	1.21	10.000	8.34	16.000	1.83	22.00	0.94
4.083	1.23	10.083	10.48	16.083	1.78	22.08	0.93
4.167	1.23	10.167	10.48	16.167	1.78	22.17	0.93
4.250	1.26	10.250	14.20	16.250	1.73	22.25	0.92
4.333	1.26	10.333	14.20	16.333	1.73	22.33	0.92
4.417	1.29	10.417	22.19	16.417	1.68	22.42	0.91
4.500	1.29	10.500	22.19	16.500	1.68	22.50	0.91
4.583	1.32	10.583	49.94	16.583	1.64	22.58	0.90
4.667	1.32	10.667	49.94	16.667	1.64	22.67	0.90
4.750	1.35	10.750	164.41	16.750	1.60	22.75	0.89
4.833	1.35	10.833	164.42	16.833	1.60	22.83	0.89
4.917	1.38	10.917	54.02	16.917	1.57	22.92	0.88
5.000	1.38	11.000	54.01	17.000	1.57	23.00	0.88
5.083	1.42	11.083	25.92	17.083	1.53	23.08	0.87
5.167	1.42	11.167	25.92	17.167	1.53	23.17	0.87
5.250	1.46	11.250	16.89	17.250	1.50	23.25	0.86
5.333	1.46	11.333	16.89	17.333	1.50	23.33	0.86
5.417	1.50	11.417	12.54	17.417	1.46	23.42	0.85
5.500	1.50	11.500	12.54	17.500	1.46	23.50	0.85
5.583	1.54	11.583	9.99	17.583	1.43	23.58	0.84
5.667	1.54	11.667	9.99	17.667	1.43	23.67	0.84
5.750	1.58	11.750	8.33	17.750	1.40	23.75	0.83
5.833	1.58	11.833	8.33	17.833	1.40	23.83	0.83
5.917	1.63	11.917	7.16	17.917	1.38	23.92	0.82

	6.000	1.63	12.000	7.16	18.000	1.38	24.00	0.82

Max.Eff.Inten.(mm/hr)=		164.42	31.76	
over (min)		10.00	100.00	
Storage Coeff. (min)=		8.57 (ii)	98.10 (ii)	
Unit Hyd. Tpeak (min)=		10.00	100.00	
Unit Hyd. peak (cms)=		0.12	0.01	
				TOTALS
PEAK FLOW	(cms)=	0.27	3.22	3.237 (iii)
TIME TO PEAK	(hrs)=	10.92	12.42	12.42
RUNOFF VOLUME	(mm)=	108.09	56.73	57.24
TOTAL RAINFALL	(mm)=	108.09	108.09	108.09
RUNOFF COEFFICIENT	=	1.00	0.52	0.53

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 75.0 Ia = Dep. 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
NASHYD (0126) | ID= 1 DT= 5.0 min

Area (ha)= 86.82 Curve Number (CN)= 75.0
Ia (mm)= 4.84 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.52

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	0.83	6.083	1.68	12.083	6.29	18.08	1.35
0.167	0.83	6.167	1.68	12.167	6.29	18.17	1.35
0.250	0.84	6.250	1.73	12.250	5.61	18.25	1.32
0.333	0.84	6.333	1.73	12.333	5.61	18.33	1.32
0.417	0.85	6.417	1.79	12.417	5.08	18.42	1.30
0.500	0.85	6.500	1.79	12.500	5.08	18.50	1.30
0.583	0.86	6.583	1.85	12.583	4.64	18.58	1.27
0.667	0.86	6.667	1.85	12.667	4.64	18.67	1.27
0.750	0.87	6.750	1.92	12.750	4.28	18.75	1.25
0.833	0.87	6.833	1.92	12.833	4.28	18.83	1.25
0.917	0.89	6.917	2.00	12.917	3.98	18.92	1.23
1.000	0.89	7.000	2.00	13.000	3.98	19.00	1.23
1.083	0.90	7.083	2.08	13.083	3.71	19.08	1.21
1.167	0.90	7.167	2.08	13.167	3.71	19.17	1.21
1.250	0.91	7.250	2.16	13.250	3.49	19.25	1.19
1.333	0.91	7.333	2.16	13.333	3.49	19.33	1.19
1.417	0.93	7.417	2.26	13.417	3.29	19.42	1.17
1.500	0.93	7.500	2.26	13.500	3.29	19.50	1.17
1.583	0.94	7.583	2.36	13.583	3.11	19.58	1.15
1.667	0.94	7.667	2.36	13.667	3.11	19.67	1.15
1.750	0.96	7.750	2.48	13.750	2.95	19.75	1.13
1.833	0.96	7.833	2.48	13.833	2.95	19.83	1.13
1.917	0.97	7.917	2.61	13.917	2.81	19.92	1.11
2.000	0.97	8.000	2.61	14.000	2.81	20.00	1.11
2.083	0.99	8.083	2.76	14.083	2.69	20.08	1.10
2.167	0.99	8.167	2.76	14.167	2.69	20.17	1.10
2.250	1.00	8.250	2.92	14.250	2.57	20.25	1.08
2.333	1.00	8.333	2.92	14.333	2.57	20.33	1.08
2.417	1.02	8.417	3.11	14.417	2.47	20.42	1.06
2.500	1.02	8.500	3.11	14.500	2.47	20.50	1.06
2.583	1.04	8.583	3.33	14.583	2.37	20.58	1.05
2.667	1.04	8.667	3.33	14.667	2.37	20.67	1.05
2.750	1.06	8.750	3.58	14.750	2.29	20.75	1.03
2.833	1.06	8.833	3.58	14.833	2.29	20.83	1.03
2.917	1.08	8.917	3.88	14.917	2.20	20.92	1.02
3.000	1.08	9.000	3.88	15.000	2.20	21.00	1.02

3.083	1.10	9.083	4.25	15.083	2.13	21.08	1.01
3.167	1.10	9.167	4.25	15.167	2.13	21.17	1.01
3.250	1.12	9.250	4.69	15.250	2.06	21.25	0.99
3.333	1.12	9.333	4.69	15.333	2.06	21.33	0.99
3.417	1.14	9.417	5.25	15.417	2.00	21.42	0.98
3.500	1.14	9.500	5.25	15.500	2.00	21.50	0.98
3.583	1.16	9.583	5.97	15.583	1.94	21.58	0.97
3.667	1.16	9.667	5.97	15.667	1.94	21.67	0.97
3.750	1.18	9.750	6.95	15.750	1.88	21.75	0.95
3.833	1.18	9.833	6.95	15.833	1.88	21.83	0.95
3.917	1.21	9.917	8.34	15.917	1.83	21.92	0.94
4.000	1.21	10.000	8.34	16.000	1.83	22.00	0.94
4.083	1.23	10.083	10.48	16.083	1.78	22.08	0.93
4.167	1.23	10.167	10.48	16.167	1.78	22.17	0.93
4.250	1.26	10.250	14.20	16.250	1.73	22.25	0.92
4.333	1.26	10.333	14.20	16.333	1.73	22.33	0.92
4.417	1.29	10.417	22.19	16.417	1.68	22.42	0.91
4.500	1.29	10.500	22.19	16.500	1.68	22.50	0.91
4.583	1.32	10.583	49.94	16.583	1.64	22.58	0.90
4.667	1.32	10.667	49.94	16.667	1.64	22.67	0.90
4.750	1.35	10.750	164.41	16.750	1.60	22.75	0.89
4.833	1.35	10.833	164.42	16.833	1.60	22.83	0.89
4.917	1.38	10.917	54.02	16.917	1.57	22.92	0.88
5.000	1.38	11.000	54.01	17.000	1.57	23.00	0.88
5.083	1.42	11.083	25.92	17.083	1.53	23.08	0.87
5.167	1.42	11.167	25.92	17.167	1.53	23.17	0.87
5.250	1.46	11.250	16.89	17.250	1.50	23.25	0.86
5.333	1.46	11.333	16.89	17.333	1.50	23.33	0.86
5.417	1.50	11.417	12.54	17.417	1.46	23.42	0.85
5.500	1.50	11.500	12.54	17.500	1.46	23.50	0.85
5.583	1.54	11.583	9.99	17.583	1.43	23.58	0.84
5.667	1.54	11.667	9.99	17.667	1.43	23.67	0.84
5.750	1.58	11.750	8.33	17.750	1.40	23.75	0.83
5.833	1.58	11.833	8.33	17.833	1.40	23.83	0.83
5.917	1.63	11.917	7.16	17.917	1.38	23.92	0.82
6.000	1.63	12.000	7.16	18.000	1.38	24.00	0.82

Unit Hyd Qpeak (cms)= 6.377

PEAK FLOW (cms)= 7.071 (i)
TIME TO PEAK (hrs)= 11.333
RUNOFF VOLUME (mm)= 56.728
TOTAL RAINFALL (mm)= 108.088
RUNOFF COEFFICIENT = 0.525

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

FINISH

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