Preliminary Stormwater Management Report

Rosco Avenue Subdivision – McDonald Homes

Campbellford, ON

For Submission

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Revision Summary

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1 Introduction and Background

McDonald Homes (the Owner) is proposing to develop 2.41 ha of land located in Campbellford, ON. The proposed development will be a new low-density residential subdivision. The Owner is pursuing Draft Plan of Subdivision approval for the development (Figure 1-1).

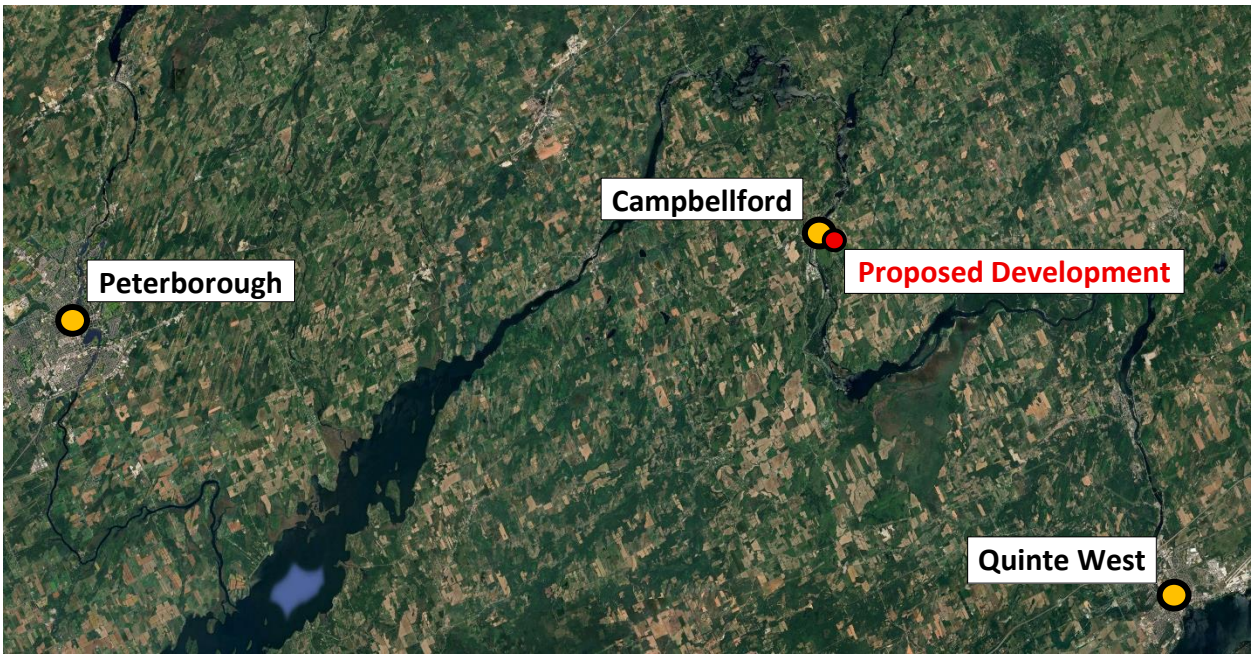


Figure 1-1: Development site location (Google, Maxar Tech 2025)

The development site is located in the southeast of Campbellford. Approximately (~)0.80 ha of the site is located immediately west of Rosco Ave (Rosco Ave W), while the remaining ~1.61 ha is located to its immediate east (Rosco Ave E). It should be noted that road allowances for First St and an unnamed street extend along the northern and eastern boundaries of Rosco Ave E respectively. Burnbrae Rd E is located to the south of both portions of the development. A residential dwelling is located north of Rosco Ave W, and a cemetery is located to its west. Residential dwellings are located south of Rosco Ave E, residential dwellings and agricultural lands are located to its north, and a long-term care facility is located to its east (Figure 1-2).

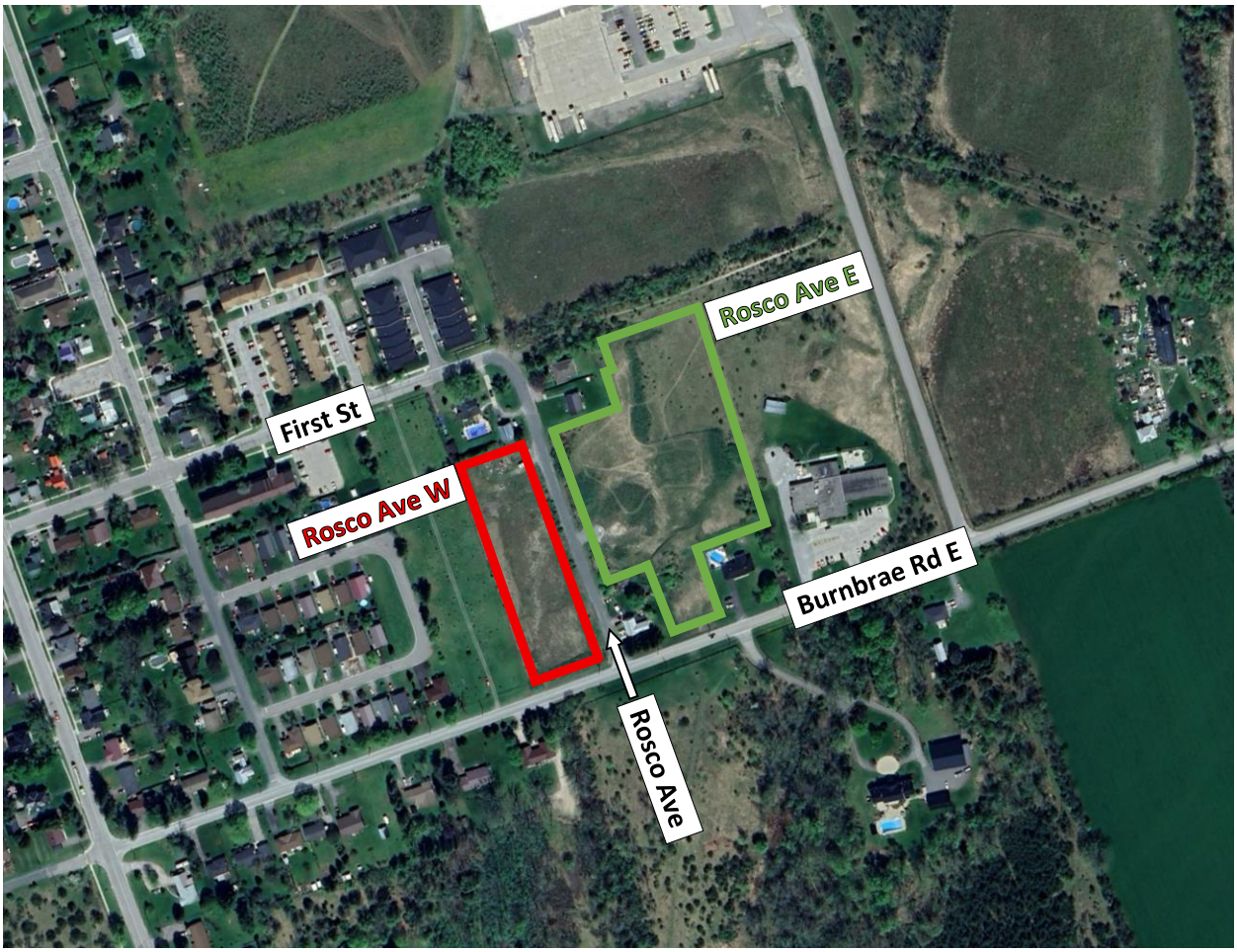


Figure 1-2: Proposed development site in relation to surrounding area (Google, Maxar Tech 2025)

2 Site Conditions

2.1 Existing Conditions

The development site is currently vacant and undeveloped. A small area in the northwest of Rosco Ave W is sloped to the northwest. Rosco Ave E and the remainder of Rosco Ave W is sloped to the southeast at a low (<5%) slope. Runoff from both portions of the site is captured by the municipal ditch along the north side of Burnbrae Rd E and conveyed eastward. A 900 mm CSP culvert at the location of the long-term care facility then conveys flows beneath the roadway, discharging to a small, unnamed tributary of the Trent River.

2.1.1 Soils, Groundwater, and Bedrock

Soils were reviewed from the Soils of Northumberland County (Ontario Ministry of Agriculture and Food, 1974) and National Soil Database (Government of Ontario, 2019). The development lands are entirely comprised of Otonabee Loam, classified as hydrologic soil group (HSG) B. These soils are naturally well drained, and the material is comprised primarily of sand (≥52%) and silt (≥30%) (Figure 2-1) (Figure 2-2).

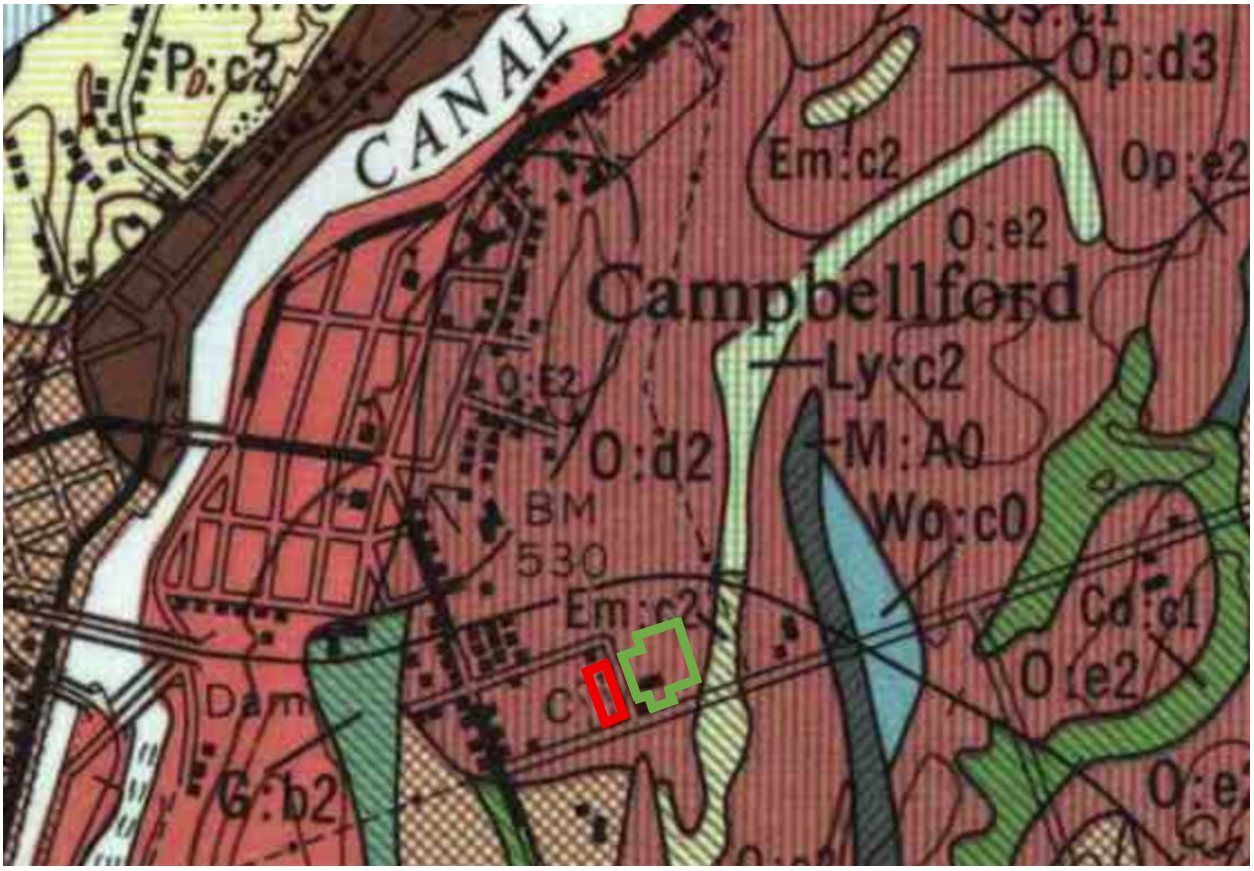


Figure 2-1: Proposed development site hydrologic soil group (Ontario Ministry of Agriculture, 1974)

Hydrologic Soil Group

The hydrologic soil group is used to classify soils into groups of various runoff potential.

The Soil Conservation Service (SCS) classifies bare thoroughly wet soils into four hydrologic soil groups (A, B, C and D). SCS descriptions of the four groups, modified slightly to suit Ontario conditions, are as follows: (Design Chart 1.09)

A: High infiltration and transmission rates when thoroughly wet, eg. deep, well drained to excessively-drained sands and gravels. These soils have a low runoff potential.

B: Moderate infiltration and transmission rates when thoroughly wet, such as moderately deep to deep open textured loam.

C: Slow infiltration and transmission rates when thoroughly wet, eg. fine to moderately fine-textured soils such as silty clay loam.

D: Very slow infiltration and transmission rates when thoroughly wet, eg. clay loams with a high swelling potential. These soils have the highest runoff potential.

In Ontario, soils have been found to lie between the main groups given above, and have therefore been interpolated as AB, BC, CD as appropriate, such as Guelph loam, which is classified as BC.

Figure 2-2: MTO Drainage Management Manual – Description of Hydrologic Soils Groups

Bedrock and groundwater conditions were analyzed based on local well records. Well 4504733 is located on the development site boundary and was drilled in June 1977. Loam soil was observed to extend to a depth of 15 ft (4.57 m), below which limestone bedrock was encountered. Water was encountered at a depth of 20 ft (6.10 m), while the depth of the static water level was observed to be 12 ft (3.66 m) during testing. The rise in water level indicates the potential presence of a confined aquifer beneath the site. The water level is also subject to seasonal fluctuation, with higher elevations expected during spring (Figure 2-3).

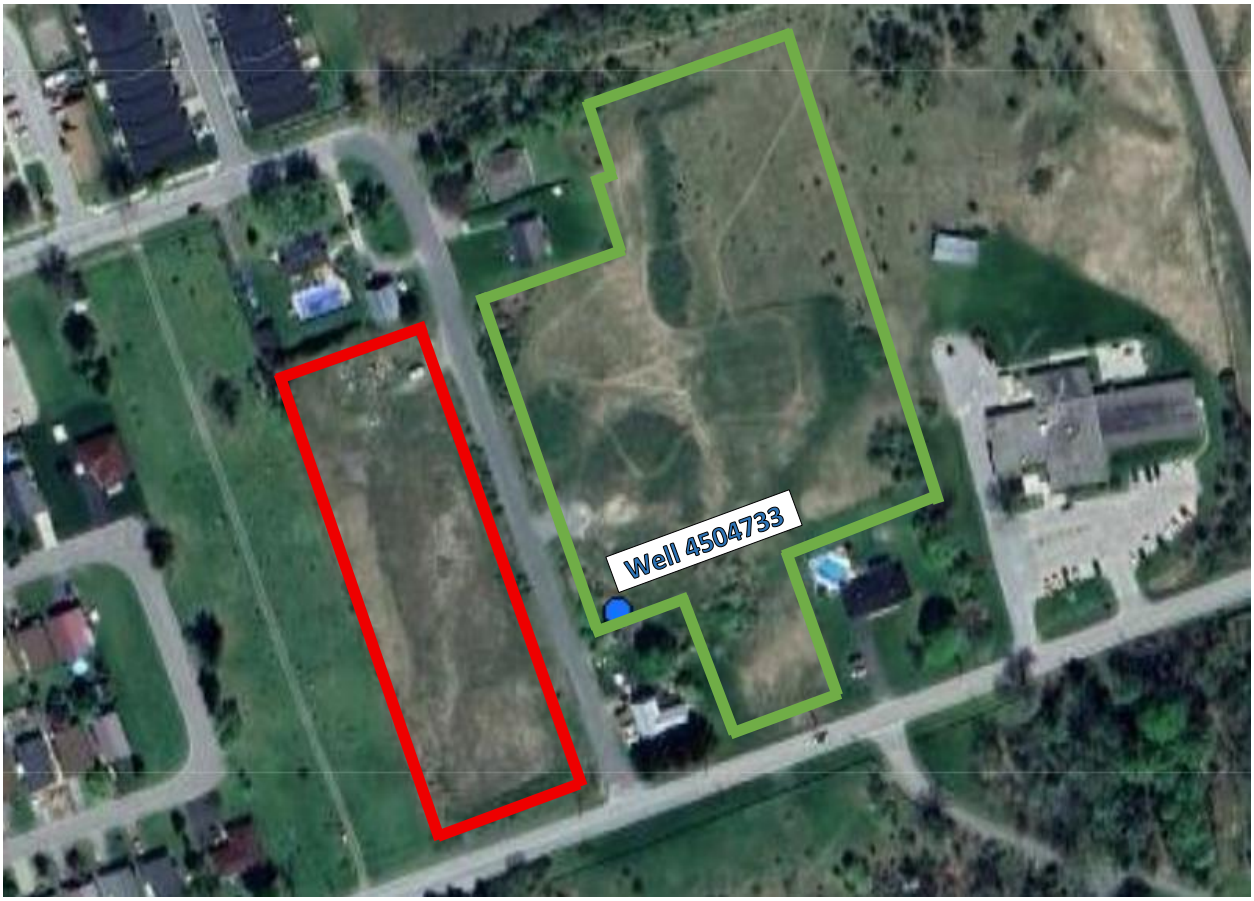


Figure 2-3: Well locations near proposed development (Government of Ontario Map: Well Records, 2024)

Most agencies require 1 m of separation between the bottom of infiltration technologies and the bedrock surface or water table (per Table 3.4.1 of the LID Design Manual, 2010).

The site is suitable for infiltration based on soil, groundwater, and bedrock conditions.

2.2 Proposed Conditions

The proposed development is a low-density residential subdivision. Rosco Ave W is proposed to comprise 19 freehold bungalow townhomes, with access via private driveways along Rosco Ave. Rosco Ave E is proposed to comprise 10 fourplex bungalow condominiums and associated parking facilities, with access via a proposed street. In total, 59 units are proposed.

The current concept plan for the development is included in Appendix A.

2.3 Stormwater Management Targets

The stormwater management (SWM) plan focuses on three environmental objectives when considering the treatment and conveyance of stormwater runoff: mitigating flooding, water quality impairment, and erosion impacts to the receiving system. The MTO Drainage Management Manual (1997) outlines potential negative impacts resulting from development, including water quality degradation, increased surface runoff, soil erosion, and higher downstream flow velocities. The stated objectives are intended to address those impacts.

These objectives, such as preventing increase in flood risk and protecting water quality, comply with the environmental guidelines set out by the Lower Trent Conservation Authority (LTCA) Stormwater Management Technical Guidelines (2020), the Municipality of Trent Hills (the Municipality) Municipal Servicing Guidelines (2026), and the Ministry of the Environment, Conservation and Parks (MECP) Stormwater Management Planning and Design Manual (2003).

Based on the guidance above, Jewell proposed a SWM methodology to achieve the following targets:

Quantity Control

- Ensure no increase in flooding risk between pre- and post-development conditions for all events up to the 100-yr event.

Quality Control

- Treat stormwater runoff to **Enhanced** quality control objectives, corresponding to an 80% removal of total suspended solids (TSS).

Erosion and Sediment Control

- Minimize the potential for erosion of soils,
- Mitigate the release of sediment offsite.

Measures to achieve design targets are discussed in the following sections.

3 Hydrologic Modelling

An OTTHYMO model was prepared to review the hydrologic conditions of the existing lands and compare with the post development conditions to determine the mitigation measures needed. The OTTHYMO model is provided in Appendix D.

OTTHYMO is a single event hydrologic model that allows a user to generate a runoff hydrograph from simulated catchments using limited input data. The program will add, route, divert, store and delay hydrographs generating several runoff data parameters such as peak flow, time to peak, volume and runoff coefficient.

The user may simulate a catchment by selecting from an urban (Standhyd) or a rural (Nashyd, Wilhyd or SCShyd) unit hydrograph depending on the degree of development measured as imperviousness. The modelling software allows users to simulate catchments using parameters such as:

- Catchment area
- Imperviousness, total and directly connected
- Runoff coefficient or curve number
- Length and slope of impervious area
- Length and slope of pervious area
- Time to peak of the catchment
- Manning's roughness coefficient
- Storage coefficient

Precipitation inputs may be provided using precipitation gauge statistics from Intensity Duration Frequency (IDF) curves, or it may be an historic storm read in from an external file. The hydrologic model estimates how much of the precipitation input is translated to output (runoff) using data supplied about the catchment. The volume of water, measured as depth of water in mm, is conserved throughout the model as per the equation below.

$$Rainfall\ depth = Runoff\ depth + Losses$$

Losses include those through interception depression storage (Initial Abstraction) and infiltration determined using one of three infiltration methods; SCS curve number (CN), proportional loss coefficient (C), or Horton's Infiltration equation. Diversions are another means of subtracting volume from the model output (a loss). These can be imposed by the user with the DUHYD or Divert HYD command. Evaporative losses are ignored.

Peak flows are generated in the Nash unit hydrograph method assuming the runoff is routed through a series of linear reservoirs (the number of which is selected by the user). In the Standard unit hydrograph method, the impervious areas are separated from the pervious and hydrographs are derived for each and added to develop a catchment-wide hydrograph.

Storage, lags or routing through channels do not subtract from the runoff volume, but result in delays of the times to peak and can lead to changes in the peak flow, typically by reducing the peaks.

3.1 Model Inputs

The initial inputs to the OTTHYMO model are summarized in Table 3-1 and Table 3-2. Detailed input calculations are provided in Appendix D, and pre-development and post-development catchment area drawings are provided in Appendix B.

Table 3-1: Nashyd catchment area inputs

Catchment	Area (ha)	CN	T_P (2,5,10 Yr) (hr)	T_P (25,50,100 Yr) (hr)
100	71.63	71.4	1.28	1.27
202	67.51	71.6	1.28	1.27

Table 3-2: Stanhyd catchment area inputs

Catchment	Area (ha)	CN	XIMP (%)	TIMP (%)	Length (m)	Slope (%)
200	1.79	65.0	24	29	109.2	4
201	2.38	65.9	40	45	126.0	4

3.1.1 Precipitation

The Municipality requires that rainfall data used in design be from the closest to the subject site of Peterborough or Trenton. The Municipality also requires designs be based on modelling of multiple storm distributions and durations. LTCA recommends 1 hr and 4 hr Chicago distributions, 12 hr and 24 hr SCS Type 2 distributions, and the regional (Timmins 12 hr event) for modelling.

Precipitation records from Environment Canada were used for Trenton station 6158875. The most recent V3.4 IDF curves were released December 2025, and contain data from 1965-2017. These IDF curves are included in Appendix C.

Jewell completed modelling for the 2 Yr through 100 Yr storm events for the 2 hr and 4 hr Chicago distribution and the 12 hr and 24 hr SCS Type 2 distribution, as well as the Timmins and 90th percentile (27 mm, 4 hr Chicago distribution) storm events. The 2 hr Chicago distribution was selected in place of the 1 hr Chicago distribution, as Catchments 100 and 202 have times to peak greater than 1 hr.

3.1.2 Area

The areas of the development site, each catchment, and each land use/surface were calculated using the assistance of AutoCAD.

3.1.3 Imperviousness

Composite imperviousness was calculated for Catchments 200 and 201 by assigning an imperviousness of 100% to paved surfaces and 0% to grassed surfaces. It should be noted that the 0.14 ha area of Catchment 201 with an indeterminate land use has been assumed as a park block, based on comment by the Municipality. However, as the land use is indeterminate, an imperviousness of 50% was assumed for this area, standard for low-density residential subdivisions.

Directly connected imperviousness was set as 5% lower than the total to account for runoff which flows over grassed surfaces and is collected by swales.

3.1.4 Curve Number

The SCS Curve Number method was used to calculate losses. A composite curve number was calculated for all catchments, based on the most applicable values for each surface for HSG B soils, as prescribed by Design Chart 1.09 of the MTO Drainage Management Manual. A curve number of 74, corresponding to improved land, was assumed for the 0.14 ha area of Catchment 201 with an indeterminate land use.

3.1.5 Storage

A standard depression storage depth was assumed at 5 mm for pervious areas and 2 mm for impervious areas.

3.1.6 Manning's Number

For all catchment areas, the impervious Manning's Number was set as 0.013 for smooth textured asphalt pavement, and the pervious Manning's Number was set as 0.25 for sheet flow.

3.1.7 Length

The pervious and impervious lengths of Catchments 200 and 201 were calculated using the following formula:

Equation 1: Length Approximation Formula

$$L = \sqrt{\frac{10{,}000 * A}{1.5}}$$

Where:

L = Watershed length (m)

A = Watershed area (ha)

3.1.8 Slope

The pervious and impervious area slopes of Catchments 200 and 201 were set as 4% to align with the preliminary grading of the site.

3.1.9 Time to Peak

To calculate time to peak, the slopes of Catchments 100 and 202 were first calculated using the 85/10 Average Slope Method, included as Equation 2. Elevations and lengths were obtained from LiDAR data and AutoCAD.

Equation 2: 85/10 Average Slope Method

$$S_W = \frac{E_{85} - E_{10}}{0.75 * L} * 100$$

Where:

S_W = Watershed slope (%)
L = Watershed length (m)
E_{85} = Elevation at the 85% upstream point of the watershed (m)
E_{10} = Elevation at the 10% upstream point of the watershed (m)

Composite runoff coefficients of each catchment were then calculating for the 2-Yr through 10-Yr events using the values prescribed by Design Chart 1.07 of the MTO Drainage Management Manual. The coefficients for the 25-Yr, 50-Yr, and 100-Yr events were calculated by increasing the values for urban land uses by 10%, 20%, and 25% respectively (to a maximum of 0.98).

The times of concentration were calculated for Catchments 100 and 202 using the Airport Method, and included as Equation 3, and for Catchments 200 and 201 using the Bransby-Williams Method, included as Equation 4.

Equation 3: Airport Method

$$T_C = \frac{3.26 * (1.1 - C) * L^{0.5}}{{S_W}^{0.33}}$$

Where:

T_C = Time of concentration (min)
L = Watershed length (m)
C = Runoff Coefficient
S_W = Watershed slope (%)

Equation 4: Bransby-Williams Method

$$T_C = \frac{0.057 * L}{{S_W}^{0.2} * A^{0.1}}$$

Where:

T_C = Time of concentration (min)
L = Watershed length (m)
A = Watershed area (m^2)
S_W = Watershed slope (%)

The times to peak of each catchment were then calculated using Equation 5.

Equation 5: Time to Peak Formula

$$T_P = \frac{2}{3} * \frac{T_c}{60}$$

Where:

T_P = Time to peak (hr)
T_C = Time of concentration (min)

3.2 Model Input Adjustments

Toronto and Region Conservation Authority (TRCA) prepared the 2013 Evaluation of Residential Lot level Stormwater Management Practices to supplement the 2010 Low Impact Development (LID) Stormwater Management Planning and Design Guide. The study evaluated the hydrologic benefits of two lot-level LID practices, one of which being increased topsoil depth.

The benefits of increased topsoil depth were evaluated based on a 2.5 Yr period of simultaneous monitoring of a control catchment (10-15 cm typical topsoil depth) and a catchment with the topsoil depth increased (30 cm typical topsoil depth). Both catchments were similar in area, slope, soil type, and imperviousness.

The study determined that the increased topsoil depth catchment experienced a 20-40% reduction in total runoff per unit area during large and intense, infrequent storm events. Additionally, several elements of the study, such as an assumed 15 mm initial abstraction and no increase in topsoil depth along front yards, lead to reduced benefits. If topsoil depth was increased over all pervious areas as intended, and a typical initial abstraction of 5 mm was used, benefits would be greater.

In a best-efforts approach to maintain hydrologic conditions, Jewell has implemented the increased topsoil depth practice as part of the stormwater management design of the site. Typical topsoil depth is to be 30 cm over all pervious areas. Based on the guidance referenced above, Jewell attributed a 25% runoff volume reduction to this practice.

By definition, stormwater management design storms (e.g. 2-Yr, 100-Yr) are infrequent events. In order to reflect implementation of this practice in the model, Jewell calibrated pervious area depression storage and curve number adjustments. For Catchments 200 and 201, the depression storage was respectively increased by 2.5 mm and 10 mm, and the curve numbers were reduced by 5. This was determined to result in a runoff volume reduction ranging from 23.5% to 17.0% for the area of Rosco Ave E, and between 22.8% and 15.2 % for the area of Rosco Ave W. Further calibration was found to be impractical and the modelling results are conservative.

4 Stormwater Management Design

4.1 Quality Control

Alterations to the preliminary quality control design may be made as development progresses. The quality control design will be finalized in the detailed design phase.

4.1.1 Quality Control Technologies

4.1.1.1 OGS Units

Jewell contacted Echelon Environmental (Echelon) to completed sizing calculations for the OGS units proposed for Catchments 200 and 201. The sizing calculations are provided in Appendix E.

The unit proposed for Rosco Ave W (Catchment 200) is a RWM DM-1200-OS, sized to achieve a 60% TSS removal of an ETV particle size distribution for the 1.79 ha catchment area. The unit proposed for Rosco Ave E (Catchment 201) is a RWM DM-1800-OS, sized to achieve an 80% TSS removal of a Fine particle size distribution for the 2.38 ha catchment area. However, as municipalities and conservation authorities typically only credit OGS units a sediment removal effectiveness up to 60%, the TSS removal effectiveness of the unit was discounted to this value.

The OGS units are attributed a sediment removal effectiveness of 60%.

4.1.1.2 Vegetated Filter Strips & Enhanced Grassed Swales

Rear yards and rooftops will be directed to drain across vegetated filter strips, to be collected and conveyed by enhanced grassed swales. Per the 2010 LID Stormwater Management Planning and Design Guide, enhanced grassed swales are attributed a TSS removal effectiveness of 76%. The Manual also attributes a TSS removal effectiveness of 20-80% to vegetated filter strips; this technology was attributed a removal effectiveness of 20% for conservatism.

Vegetated filter strips and enhanced grassed swales implemented in series are attributed a sediment removal effectiveness of 80.8%. The calculation of this value is shown below.

$$\left(\mathbf{0.20} * \mathbf{1} + \mathbf{0.76} * (\mathbf{1} - \mathbf{0.2})\right) * \mathbf{100} = \mathbf{80.8}\%$$

4.1.1.3 Increased Topsoil Depth

The increased topsoil depth BMP proposed to be applied to the Rosco Ave E and Rosco Ave W sites is attributed a runoff volume reduction of 25%. Per the MECP 2022 LID Stormwater Management Guidance Manual, BMP's which control a portion of runoff from by the 90th percentile event can be attributed the equivalent portion of an 80% TSS removal effectiveness.

The increased topsoil depth BMP is attributed a sediment removal effectiveness of 20%. The calculation of this value is shown below.

$$(\mathbf{0.25} * \mathbf{0.80}) * \mathbf{100} = \mathbf{20}\%$$

4.1.2 Quality Control Approach

Enhanced quality control requires an 80% TSS removal be achieved for the development site, with required treatment areas of 0.80 ha for Rosco Ave W and 1.61 ha for Rosco Ave E. However, due to the large external drainage areas contributing to both portions of the development, treatment will be provided to much large overall catchments (1.79 ha and 2.38 ha for Catchments 200 and 201 respectively).

Treatment will be provided to much larger areas than the development site; *Enhanced* quality control for Rosco Ave W and Rosco Ave E will be achieved using an area-weighted approach.

4.1.2.1 Rosco Ave W

Catchment 200 has a total imperviousness of 29%, corresponding to a total of 0.50 impervious-hectares (i.ha). This calculation is shown below.

$$1.79\ ha * 0.29 = 0.50\ i.ha$$

Based on an imperviousness of 100% for buildings and paved surfaces, and 0% for grassed surfaces, Rosco Ave W has a total of 0.30 i.ha. *Enhanced* quality control thus requires treatment of 0.24 i.ha. This calculation is shown below.

$$0.30\ ha * 1 + 0.50\ ha * 0 = 0.30\ i.ha$$

$$0.30\ i.ha * 0.80 = 0.24\ i.ha$$

Treatment of 0.24 impervious-hectares of Catchment 200 is required to achieve *Enhanced* quality control of Rosco Ave W.

4.1.2.2 Rosco Ave E

Catchment 201 has a total imperviousness of 45%, corresponding to a total of 1.07 i.ha. This calculation is shown below.

$$2.38\ ha * 0.45 = 1.07\ i.ha$$

Based on an imperviousness of 100% for buildings and paved surfaces, 0% for grassed surfaces, and 50% for the area with an indeterminate land use, Rosco Ave E has a total of 0.92 i.ha. *Enhanced* quality control thus requires treatment of 0.74 i.ha. This calculation is shown below.

$$0.85\ ha * 1 + 0.62\ ha * 0 + 0.14\ ha * 0.5 = 0.74\ i.ha$$

$$0.92\ i.ha * 0.80 = 0.74\ i.ha$$

Treatment of 0.74 impervious-hectares of Catchment 201 is required to achieve *Enhanced* quality control of Rosco Ave E.

4.1.3 Quality Control Effectiveness

4.1.3.1 Rosco Ave W

Treatment of 0.30 impervious-hectares of Catchment 200 is provided via an OGS unit. This calculation is shown below.

$$0.50\ i.ha * 0.60 = 0.30\ i.ha$$

The treatment target of 0.24 impervious-hectares is exceeded; *Enhanced* treatment for Rosco Ave W is achieved.

It should be noted that the quality control design is conservative. The treatment provided via the proposed OGS unit is equivalent to 100% TSS removal for the Rosco Ave W site. Additionally, the treatment provided by the vegetated filter strips, enhanced grassed swales, and increased topsoil depth was not accounted for.

4.1.3.2 Rosco Ave E

Treatment of 0.78 impervious-hectares of Catchment 201 is provided via vegetated filter strips, enhanced grassed swales, and an OGS unit in a combination-of-technologies approach. This calculation is shown below.

$$0.44\ i.ha * 0.808 + 0.44\ i.ha * (1 - 0.808) * 0.60 + (1.07 - 0.44) i.ha * 0.60 = 0.78\ i.ha$$

The treatment target of 0.74 impervious-hectares is exceeded; *Enhanced* treatment for Rosco Ave E is achieved.

It should be noted that the quality control design is conservative. The proposed combination-of-technologies approach achieves treatment equivalent to 85% TSS removal for the Rosco Ave E site. Additionally, the treatment provided by the increased topsoil depth BMP was not accounted for.

4.2 Quantity Control

Alterations to the preliminary quantity control design may be made as development progresses. The quantity control design will be finalized in the detailed design phase.

4.2.1 Quantity Control Approach

Typically, quantity control requires post-development peak flows from the development site be restricted to pre-development rates. However, in cases where runoff from a development site reaches a point of interest (POI) – typically the receiving watercourse – in advance of larger runoff volumes generated by an external catchment, this can be detrimental. As quantity control systems retain development-generated runoff and discharge it over a longer period, this can lead to a superposition effect with runoff generated by the greater watershed. This results in peak flows at the POI increasing, increasing flood risk in the receiving watercourse.

As the Rosco Ave development catchments have extremely low areas (<2.50 ha) and times of concentration (<10 min) relative to the external catchment (71.63 ha, ~115 min), Jewell investigated a systems approach to quantity control. The OTTHYMO model was completed to analyze peak flows at a culvert located south of the adjacent long-term care facility, which conveys flows from the municipal ditch along Burnbrae Rd E to the receiving watercourse (an unnamed tributary of the Trent River). This culvert is the POI for the quantity control analysis.

Jewell first analyzed the system with no quantity controls. This was used to determine whether typical quantity control or a systems approach (also known as Beat-the-Peak) would better achieve the target: restricting post-development peak flows in the receiving watercourse to pre-development rates.

4.2.1.1 Initial Modelling Results

The pre-development and uncontrolled post-development peak flows at the POI are summarized in Table 4-1.

Table 4-1: Pre-development and uncontrolled post-development peak flows at the POI

Event	Pre-Development Peak Flow (cms)				Post-Development Peak Flow (cms)			
	Chicago		SCS Type II		Chicago		SCS Type II	
	2-Hr	4-Hr	12-Hr	24-Hr	2-Hr	4-Hr	12-Hr	24-Hr
2-Yr	0.23	0.31	0.53	0.59	**0.30**	0.31	**0.54**	**0.60**
5-Yr	0.48	0.58	0.91	0.98	0.47	0.58	0.91	0.98
10-Yr	0.68	0.81	1.20	1.27	0.66	0.80	1.20	1.26
25-Yr	0.97	1.12	1.61	1.67	0.94	1.11	1.60	1.66
50-Yr	1.19	1.37	1.92	1.98	1.16	1.36	1.91	1.96
100-Yr	1.44	1.64	2.25	2.30	1.39	1.62	2.23	2.28
Timmins	3.82				3.81			

** **Red** text indicates target flows are exceeded.*

The uncontrolled post-development peak flows at the POI were determined to be less than or equal to the pre-development peak flows for all distributions and durations of the 5-Yr through 100-Yr events, the 2-Yr 4-Hr Chicago event, and the Timmins event.

However, the uncontrolled post-development peak flows at the POI were determined to be greater than in pre-development conditions for the 2-Hr Chicago, 12-Hr SCS Type II, and 24-Hr SCS Type II distributions of the 2-Yr event.

This means that if no stormwater management controls were provided, the peak flows at the road crossing would not increase except in the 2-yr events. Quantity control measures were thus required in these events.

4.2.2 Quantity Control Technologies

Jewell found that infiltration of a small portion of the 2-yr event would help the site achieve target discharge for all flows.

Thus, Jewell calibrated a storage-infiltration system to accommodate (and remove) the required magnitude of peak flows from Rosco Ave E to achieve pre-development peak flows at the POI. The quantity control system was incorporated into the OTTHYMO model for the 2-Yr events only, as pre-development peak flows are already achieved for the remaining events.

4.2.2.1 Revised Modelling Results

The 2-Yr pre-development and controlled post-development peak flows at the POI are summarized in Table 4-2.

Table 4-2: 2-Yr pre-development and controlled post-development peak flows at the POI

Event	Pre-Development Peak Flow (cms)				Post-Development Peak Flow (cms)			
	Chicago		SCS Type II		Chicago		SCS Type II	
	2-Hr	4-Hr	12-Hr	24-Hr	2-Hr	4-Hr	12-Hr	24-Hr
2-Yr	0.23	0.31	0.53	0.59	0.23	0.31	0.53	0.59

The 12-Hr SCS Type II event was found to govern. Up to 0.15 cms was required to be removed from the peak flows. **The required storage volume was determined as 171 m^3**, conservatively assuming no discharge from the storage via infiltration.

Post-development peak flows in the receiving watercourse are restricted to pre-development rates; the quantity control target is achieved.

4.2.3 Implementation

It should be noted that the storage-infiltration system was designed for the most conservative 2-Yr design storm; the system will reduce peak flows by up to 0.15 cms for the remaining 2-Yr design storms, but will infiltrate a lower volume of runoff. Additionally, the system will continue to operate for the lower-frequency events, reducing runoff volumes by up to 171 m^3 and peak flows by up to 0.15 cms until the storage is filled.

To construct the storage-infiltration system adhering to the model, a system of structures as detailed in the simplified flow diagram below will be required. Detailed sizing should be completed in detailed design.

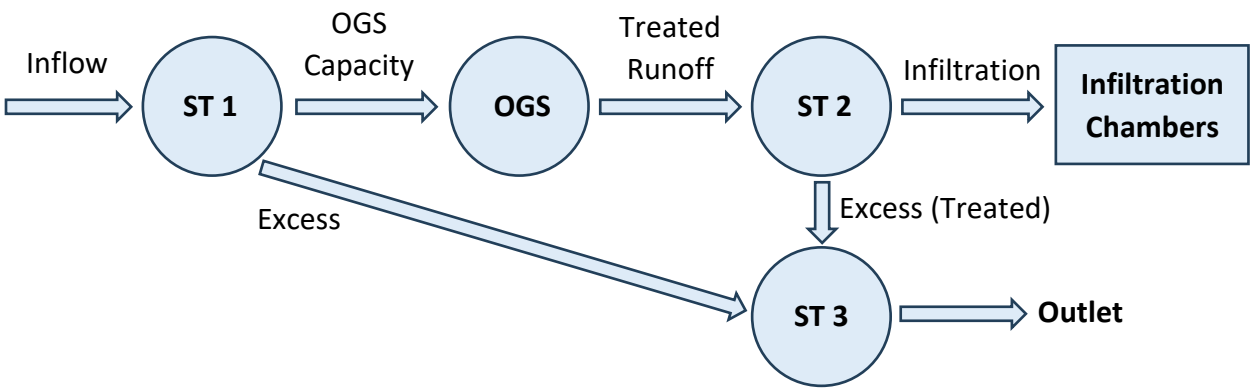


Figure 4-1: Simplified Flow Diagram for SWM

The diversion within ST1 can be accomplished using an overflow weir. The invert of the weir should be set at the elevation where the capacity of the OGS (0.165 cms) is reached. The OGS will refuse flows exceeding it's capacity, causing them to bypass.

The diversion within ST2 can be accomplished using an orifice and an overflow weir. The orifice plate should be placed on the pipe leading to ST3, sized to accommodate the portion of the OGS capacity which is not required to infiltrate (0.015 cms); this flow will bypass. An overflow weir leading to the storage should be constructed with the invert set at the elevation where the bypass capacity is reached; flows exceeding the allowable discharge will be diverted to storage.

For events with lower frequency than the 2-Yr event (i.e. 5-yr to 100-yr), the storage will fill, and flows will begin surcharging the system back through the OGS. Once surcharged to ST1, excess flows will bypass to ST3 and the outlet via the overflow weir.

The infiltration storage can be constructed using several technologies that will be selected during detailed design. Based on Jewell's prior projects, a volume of 171 m^3 can be provided using ~422 NextStorm EZ Storm units, providing 0.406 m^3 of storage/unit. To achieve this, a surface area of ~135 m^2 would be required. Each unit measures 0.66m x 0.80m x 0.80 m and can be stacked up to 2 layers high. Detailed sizing of these units, or an alternative storage system, should be completed in detailed design.

There are two possible locations where the quantity control system (OGS unit and infiltration chambers) could be installed;

- **Option A:** Within the assumed park block. In this case, the system would be assumed by the Municipality.
- **Option B:** Beneath the condo parking areas. In this case, the system would be assumed by the condo corporation.

Preliminary layouts of the quantity control system for each location are provided in Appendix G. The location of the quantity control system should be finalized in detailed design, along with the major-minor conveyance system.

4.3 Conveyance

The site will follow a major-minor conveyance system, to be finalized in detailed design. The minor system will be designed to convey the 5-Yr design event, and comprises storm sewers and design elements which direct runoff to them (catch basins, enhanced grassed swales, etc.). The major system will be designed to convey the 100-Yr design event, and comprises the site roadways and swales. In practice, during the major event the minor system will still collect 5-Yr flows, reducing major system overland flows.

It should be noted that Rosco Ave is assumed to be upgraded to an urbanized cross-section (including storm sewers), based on direction from the Municipality. In this case, the major flows will contained within the ROW on the road surface and to a lesser extent in the boulevard.

4.4 Water Balance

In a best-efforts approach to maintain hydrologic conditions, Jewell has incorporated multiple infiltration technologies in the stormwater management design. The increased topsoil depth BMP applied to the development is expected to reduce runoff volumes by 25% via infiltration. The storage-infiltration system developed to achieve quantity control will also infiltrate up to 171 m^3 of runoff, with 117 m^3 expected to infiltrate during the 90^{th} percentile event. Additionally, grassed swales enhanced with clear stone bottoms have been selected as part of the major-minor conveyance system, providing additional infiltration.

5 LID

Low Impact Development is a requirement of the 2024 Provincial Planning Statement. This requires that all developments consider LID strategies to reduce the impact of development on the hydrologic regime.

The Low Impact Development Guidelines (Toronto and Region Conservation Authority, 2010) states that "increases in the quantity, rate, and frequency of runoff can be linked to two root causes:

- the conversion of undeveloped or agricultural land cover to urban uses, and
- the application of storm sewer systems."

The goal of LID site design strategies is to minimize these two sources of hydrologic impacts (Toronto and Region Conservation Authority, 2010, p. 3.3). Large urban areas are negatively impacted by flash flooding associated with extensive hardening. The LID design techniques seek to mitigate flooding and erosion associated with urbanization. While water quality improvements are associated with the recommended techniques, quantity control remains the focus of LID.

The guidelines provide some site design strategies for reducing the hydrologic impact postulating 4 major groupings or "themes":

1) Preserving important hydrologic features and functions;
2) siting and layout of development;
3) reducing impervious area; and
4) using natural drainage systems.

LID has been considered throughout the design to incorporate these themes where feasible. Further LID measures may be implemented as development progresses to detailed design. However, implementation of some strategies is limited due to municipal requirements for techniques such as setbacks, road design, parking, and drainage design. The LID guidelines provide a hierarchy of applying the LID techniques by first invoking the use of natural hydrologic areas and then development of green infrastructure.

Discussion of the LID practices used in the stormwater management design is provided below.

5.1 Theme 1 – Preserving Important Hydrologic Features

This theme focuses on preservation. Site design is adjusted to preserve natural features that benefit hydrology.

Preserve stream buffers, including along intermittent and ephemeral channels

- Preserve areas of undisturbed soil and vegetation cover
- Avoid development on permeable soils
- Preserve existing trees and, where possible, tree clusters

Important hydrologic features include:

- Highly permeable soils
- Pocket wetlands
- Significant small (headwater) drainage features
- Riparian buffers
- Floodplains
- Undisturbed natural vegetation
- Tree clusters

5.2 Theme 2 – Application of Siting and Layout Techniques

Siting and layout techniques aim to reduce the environmental impacts of the development by fitting the development within the framework of the natural heritage features.

- Fit the design to the terrain
- Use open space or clustered development
- Use innovative street network designs
- Reduce roadway setbacks and lot frontages

The development site generally follows existing grading. Clustered development has been incorporated for Rosco Ave W, with townhouses situated along the roadway and large rear yards. A loop street pattern and parking areas similar to cul-de-sacs have been incorporated for Rosco Ave E.

5.3 Theme 3 – Reducing the Impervious Area

Imperviousness can be reduced by minimizing unnecessary surface hardening. Some strategies include:

- Reducing street width
- Reducing building footprints
- Reducing parking footprints
- Considering alternatives to cul-de-sacs
- Eliminating unnecessary sidewalks and driveways

The street network for Rosco Ave E been designed with the typical minimum right-of-way.

5.4 Theme 4 – Using Natural Drainage Systems

These strategies focus on the use of existing natural drainage systems where available "to take advantage of undisturbed vegetated areas and natural drainage patterns".

- "Disconnect" impervious areas
- Preserve or create micro-topography
- Extend drainage flow paths

Rooftop areas will be disconnected from the street by discharging runoff to rear yards and enhanced grassed swales. Where suitable, site grading will slow and lengthen slow paths, and flows will be encouraged to drain across grassed surfaces prior to collection.

5.5 Additional LID Measures

Jewell has also incorporated the increased topsoil depth BMP recommended by the TRCA 2013 Evaluation of Residential Lot level Stormwater Management Practices as part of the stormwater management design. TRCA has supported widespread implementation of this measure to enhance infiltration and reduce runoff.

5.6 LID Summary

The Rosco Avenue Subdivision preliminary design follows the LID strategies provided in the Low Impact Development Guide. Where feasible, techniques to preserve hydrologic features, adjust the siting and layout, reduce impervious areas, and utilize natural drainage systems have been incorporated. Further LID measures may be implemented as development progresses.

6 Maintenance

The stormwater management technologies proposed in this report include:

1) Vegetated Filter Strips
2) Grassed Swales
3) OGS Units
4) Infiltration Storage

Maintenance inspections should be conducted at least once per year for each technology. However, more frequent inspection is recommended during the first few years of operation to gain experience with site-specific performance and maintenance requirements. This is typically recommended to be after every significant storm within the first 2 years.

Preliminary maintenance requirements for the proposed technologies are detailed below, and will be further developed in the detailed design phase.

6.1 Vegetated Filter Strips

Grass cutting and weed control should be completed with respect to local requirements. A minimum grass height of 75 mm is recommended to improve filtration, and clippings should be removed from the flow path. Weed control should be by hand to prevent contamination. Recommended care practices should be followed for any larger vegetation planted on the strip.

Accumulated sediment should be removed based on visual inspection, triggered by impact to its intended function (e.g. sediment conveyance downstream) or desired aesthetics. Sediment removal may be completed by hand or with excavating equipment, and the original state of the strip should then be restored. Accumulated trash or debris should be removed as required.

6.2 Enhanced Grassed Swales

Grass cutting and weed control should be completed with respect to local requirements, with the same considerations detailed above for vegetated filter strips.

Removal of accumulated sediment should be based on visual inspection, triggered by risk of overtopping due to loss of volume, conveyance of sediment to downstream facilities, inducement of ponding, and other impacts to its intended function. Sediment removal may be completed by hand or with excavating equipment, and the swale should then be restored to its original state. Any accumulated trash and debris should be removed as required.

It should be noted that, as the enhanced grassed swales incorporate a clear stone bottom, sediment will first accumulate within the void spaces between the stones. This will reduce the infiltration benefits of the swales, while still providing acceptable conveyance. Excavation of small segments of the clear stone to determine whether infiltration is being impaired by sediment is recommended when determining maintenance requirements.

6.3 OGS Units

OGS units will require routine sediment removal. It is a good standard of practice to remove sediment every year as part of routine maintenance. Sediment cleanout should be performed using a vacuum truck.

Echelon, as part of the OGS unit sizing calculations, completed grit loading calculations to determine expected sediment accumulation. For the Rosco Ave W OGS unit, 1067 L of sediment storage is provided, and annual sediment loading was estimated as 212 L. For the Rosco Ave E OGS unit, 2780 L of sediment storage is provided, and annual sediment loading was estimated as 509 L. This results in a projected cleanout frequency of ~5 years for each unit.

The Operations and Maintenance Manual for RWM-DM OGS units has been included in Appendix F. The manual should be referenced for detailed operation and maintenance requirements.

6.4 Infiltration Storage

While pre-treatment of runoff to the infiltration storage will be provided via an OGS unit, sediment accumulation will still occur within the storage. As such, EZ Storm units or other maintenance-friendly storage technologies (sediment rows, etc.) are recommended. Alternative infiltration storage measures, such as a clear stone infiltration basin, can require intensive maintenance including excavation of the storage.

EZ Storm units and comparable technologies will require routine sediment removal. As a good standard of practice, this should be completed every year as part of routine maintenance. Sediment cleanout should be completed using a vacuum truck.

7 Erosion and Sediment Control

Erosion and sediment control is one of the three targets identified in Section 2.3. The following measures are proposed to prevent the negative erosion and sediment impacts of development.

Typical site development requires removal of some vegetated cover. While it is the intention to reduce vegetation removal, exposed soils from the work will be at risk of eroding into the receiving drainage system. Measures will need to be put in place to reduce erosion during construction, and for a period of up to one year after construction is completed. Typical erosion and sediment control measures include:

- Siltation fencing.
- Rip-rap check dams.
- Filter sock inserts in catch basins.

Controls are to be placed downstream of all active work areas and upstream of protected receivers. Controls should also be placed around stockpiles of topsoil and fill materials.

Typical OPSDs provide good instruction on the correct placement and construction of the controls. The controls provide some protection if they are properly maintained, but they should be considered last-resort measures. The most effective means of control are those which prevent or reduce erosion at the source. This would include diligent stabilization of exposed areas immediately after grading is completed. Stabilization measures include sod, erosion blankets, or rip-rap and filter cloth on steep slopes, as well as topsoil and hydroseed on gently sloped areas (with slope 10% or less).

A silt fence should be located along the upland perimeter of all sensitive features during the construction process, and maintained until the lands have stabilized or as directed by the Municipality. There would be benefit in maintaining the fence for up to two growing seasons.

The 90th percentile (27 mm 4-hr Chicago distribution) storm event was modelled to determine potential erosion impacts of the development. Through implementation of the infiltration storage system developed for the hybrid “Beat the Peak” quantity control approach, post-development peak flows in the receiving watercourse are limited to pre-development rates (0.24 cms). There is little risk of erosion in the receiving watercourse and downstream system.

Runoff from Rosco Ave E and Rosco Ave W will be conveyed to the receiving watercourse via a municipal ditch. Discharge at sharp angles to the ditch (e.g. 90°) should be avoided in design of the major-minor conveyance system. Rip rap may also be installed in the municipal ditch at the point of discharge, if the flow velocities determined during detailed design are of concern.

The site developer and contractor should actively maintain the new drainage works to remove accumulations of sediment.

8 Conclusions

McDonald Homes is proposing to develop 2.33 ha of land along Rosco Ave in Campbellford, ON. The western site is 0.80 ha, proposed to comprise 19 freehold bungalow townhomes, while the eastern site is 1.53 ha, proposed to comprise 10 fourplex bungalow condominiums.

Quality Control

***Enhanced* quality control of the development site is achieved.** An area-weighted quality control approach was implemented, as treatment is provided to a much larger catchment than the development. The quality control technologies proposed are OGS units, vegetated filter strips, enhanced grassed swales, and increased topsoil depth.

Quantity Control

Quantity control is achieved as summarized in Table 8-1. Post-development peak flows in the receiving watercourse are restricted to pre-development rates. A storage-infiltration system has been incorporated in the quantity control approach.

Table 8-1: Pre-development and post-development peak flows at the POI under the hybrid "Beat the Peak" approach

Event	Pre-Development Peak Flow (cms)				Post-Development Peak Flow (cms)			
	Chicago		SCS Type II		Chicago		SCS Type II	
	2-Hr	4-Hr	12-Hr	24-Hr	2-Hr	4-Hr	12-Hr	24-Hr
2-Yr	0.23	0.31	0.53	0.59	0.23	0.31	0.53	0.59
5-Yr	0.48	0.58	0.91	0.98	0.47	0.58	0.91	0.98
10-Yr	0.68	0.81	1.20	1.27	0.66	0.80	1.20	1.26
25-Yr	0.97	1.12	1.61	1.67	0.94	1.11	1.60	1.66
50-Yr	1.19	1.37	1.92	1.98	1.16	1.36	1.91	1.96
100-Yr	1.44	1.64	2.25	2.30	1.39	1.62	2.23	2.28
Timmins	3.82				3.81			

There are two feasible locations for the quantity control system: within the park block, and underneath the condo parking areas. The location should be finalized in detailed design.

Water Balance

In a best-efforts approach to maintain hydrologic conditions, Jewell has implemented increased topsoil depth, a storage-infiltration system, and enhanced grassed swales to benefit infiltration.

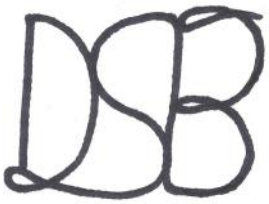
Conveyance

The site follows a major-minor conveyance system, which will be finalized in detailed design.

The quality and quantity control targets are demonstrated to be achieved.

The preliminary stormwater management plan demonstrates the stormwater management strategy can be implemented within the property constraints and therefore supports the Draft Plan of Subdivision application of the Rosco Avenue Subdivision development.

Prepared by



Duncan Burgess, BASc
Jewell Engineering Inc.

Reviewed by



Bryon Keene, P.Eng.
Jewell Engineering Inc.

9 References

Government of Ontario. (2024*). National Soil Database.*

Lower Trent Conservation Authority. (2020). *Stormwater Management Technical Guidelines.*

Ministry of the Environment, Conservation and Parks. (2003). *Stormwater Management Planning and Design Manual.*

Ministry of the Environment, Conservation and Parks. (2022). *Low Impact Development Stormwater Management Guidance Manual.*

Ministry of Transportation of Ontario. (2008). *Highway Drainage Design Standards.*

Municipality of Trent Hills. (2026). *Municipal Servicing Guidelines.*

Ontario Ministry of Agriculture and Food. (1974). *Soil Survey of Hastings County.*

Ontario Ministry of Municipal Affairs and Housing. (2020). *Provincial Policy Statement.*

Toronto and Region Conservation Authority. (2013). *Evaluation of Residential Lot Level Stormwater Management Practices.*

Toronto and Region Conservation Authority. (2010). *Low Impact Development Stormwater Management Planning and Design Guide, Version 1.0.*

APPENDIX A

Development Concept Plan

DEVELOPMENT SITE PLAN

ROSCOE STREET

PART OF LOT 4, BLOCK U
PART OF LOTS 5 & 6, BLOCK V

REGISTERED PLAN No. 112

TOWN OF CAMPBELLFORD

COUNTY OF NORTHUMBERLAND

SCALE = 1:400

0 2.5 5 10 15 20 25 30 35 40m

No.	REVISION	DATE	APPR'D

DRAWN BY: JH | CHECKED BY: BK | DATE: 07/28/2026

N W E S

EXISTING RESIDENTIAL

PART 1 PLAN 38R–2558

VACANT LAND

FIRST STREET

PART 1
PLAN 38R–2781

EXISTING RESIDENTIAL

EXISTING RESIDENTIAL

EXISTING RESIDENTIAL

212.36' N70°28'00"E

N19°26'30"W 75.15'

N19°26'00"W 74.83'

110.00' N70°28'00"E

PART 1 PLAN 38R–4017

N70°29'20"E 170.68'

PART 2
PLAN 38R–4017

20.1m

BLOCK 4
(1639.4 sq.m)

BLOCK 3
(2098.7 sq.m)

BLOCK 2
(2152.1 sq.m)

BLOCK 1
(2077.4 sq.m)

3.0m DRAINAGE EASEMENT

510.90'

N19°24'40"W

N20°01'20"W 510.35'

SAINT MARY'S CEMETERY

BLOCK U
LOT 3 LOT 4

ROSCOE STREET

N19°24'40"W

BLOCK 5
(14690.1 sq.m)

46.

REGISTERED PLAN

BLOCK V
LOT 5 LOT 6

376.00'

112

N18°46'20"W

525.00'

UNNAMED STREET
(NOT OPEN)

BLOCK W LOT 7

NURSING HOME
BERNBRAE GARDENS

111.54' N70°18'30"E

110.00' N70°18'30"E

EXISTING RESIDENTIAL

PART 1
PLAN 38R–3863

N18°46'20"W 137.00'

BLOCK 6
(1399.9 sq.m)

N18°46'20"W 137.00'

EXISTING RESIDENTIAL

165.23' N70°18'30"E

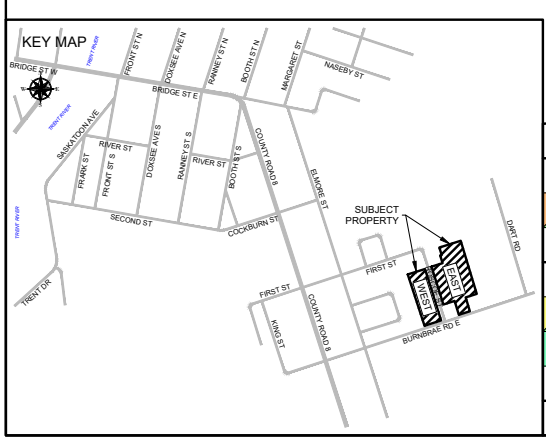
110.00' N70°18'30"E

20.1m

ROAD ALLOWANCE BETWEEN CONCESSIONS 5 AND 6
BURNBRAE ROAD

EXISTING RESIDENTIAL

KEY MAP



GENERAL NOTES:

BEARINGS SHOWN ON THIS PLAN ARE ASTRONOMIC.

DISTANCES SHOWN ON THIS PLAN ARE IN FEET AND CAN BE CONVERTED TO METRES BY MULTIPLYING BY 0.3048.

TOPOGRAPHIC LIDAR ELEVATIONS ARE IN CGVD2013 AND CAN BE CONVERTED TO CGVD28 BY ADDING 0.34m.

LAND USE SCHEDULE		
LAND USE (WEST)	**AREA (ha)**	
BLOCKS 1–4 7.4m (180m²) MIN. FREEHOLD TOWNHOMES	0.80	19
WEST SUB-TOTAL	**0.80 ha**	**19**
LAND USE (EAST)	**AREA (ha)**	**UNITS**
BLOCK 5 CONDOMINIUM	1.47	40
BLOCK 6 – PARK LAND (TO BE DEEDED TO MUNICIPALITY)	0.14	
EAST SUB-TOTAL	**1.61 ha**	**40**
SITE TOTAL	**2.41 ha**	**59**

ZONING BY-LAW No. 2010-105				
DWELLING TYPE	**ROW TOWNHOUSE**		**APARTMENT**	
ZONING PROVISION – TABLE 2	**R2 ZONE**	**PROPOSED**	**R3 ZONE**	**PROPOSED**
MINIMUM LOT AREA	INT – 180m² EXT – 216m²	INT – 180m² EXT – 216m²	74units/ha	74units/ha
MINIMUM LOT FRONTAGE	INT – 6.0m EXT – 10.0m	INT – 6.0m EXT – 10.0m	24.0m	24.0m
MINIMUM FRONT YARD	6.0m	6.0m	7.5m	6.0m
MINIMUM EXTERIOR SIDE YARD	3.0m	3.0m	7.5m	4.0m
MINIMUM INTERIOR SIDE YARD	1.2m	1.2m	4.5m	4.0m
MINIMUM REAR YARD	6.0m	6.0m	10.0m	4.0m
MAXIMUM LOT COVERAGE	40.0%	40.0%	40.0%	40.0%
CENTRELINE SETBACK – TOWNSHIP	17.5m	15.0m	17.5m	17.5m
MINIMUM LANDSCAPED OPEN SPACE	30.0%	30.0%	30.0%	30.0%
MAXIMUM HEIGHT OF BUILDINGS	11.0m	11.0m	12.5m	12.5m
PARKING SPACES	1.25/unit	2.0/unit	1.25/unit	1.5/unit

JEWELL ENGINEERING

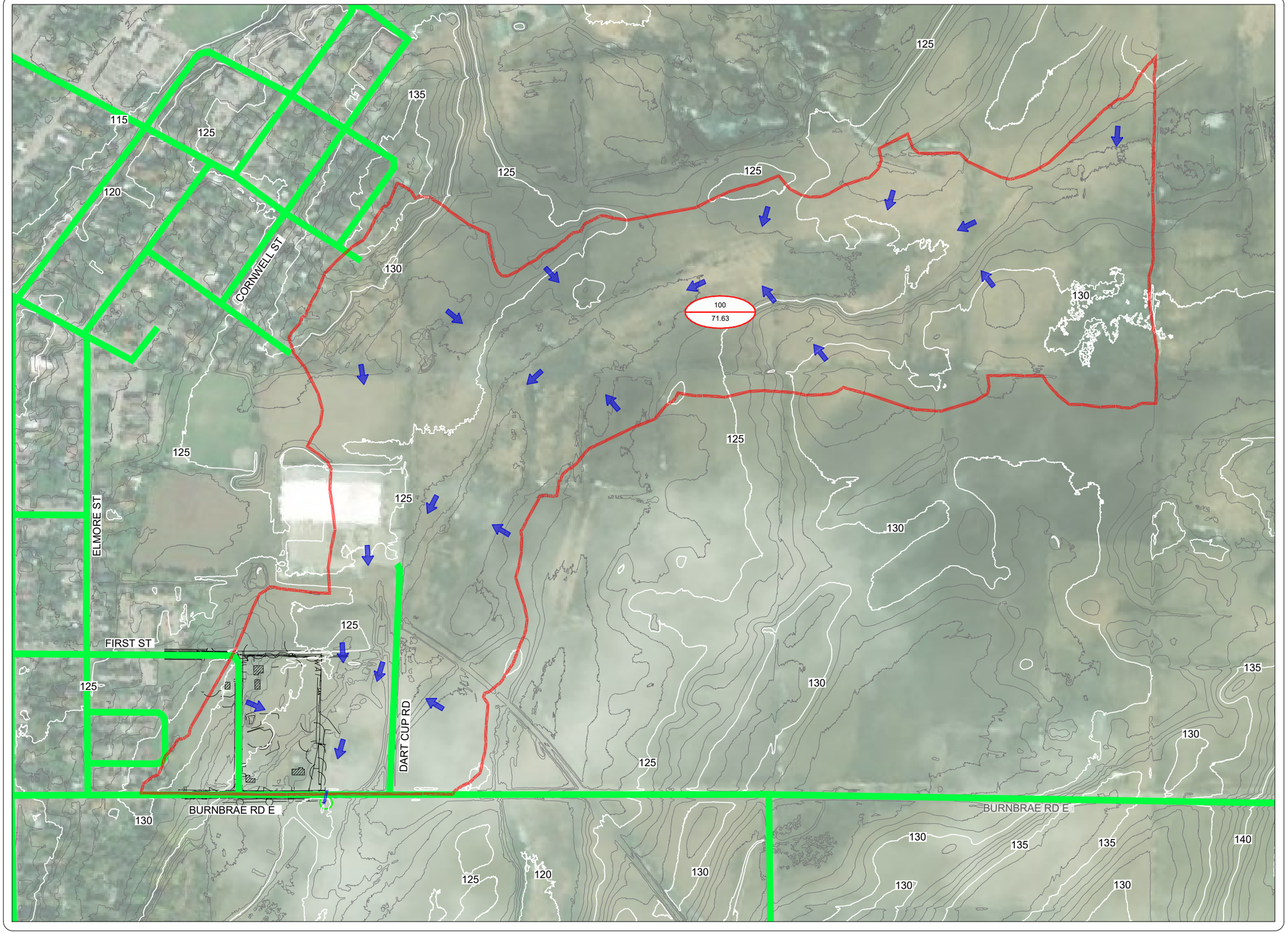
JOB No. 260-6041

APPENDIX B

Catchment Area Drawings

08/07/2026

F:\FTP\PROJECT FILES\MCDONALD, DAVE\CAMPBELLFORD SUBD 260-6041\DRAWINGS\3 SHEETS\6041 - CATCHMENT PLAN - EXISTING



GENERAL NOTES:

- ALL INFORMATION TO BE VERIFIED ON SITE PRIOR TO COMMENCING ANY WORK. ANY DISCREPANCIES ARE TO BE REPORTED TO THE CONSULTANT IMMEDIATELY.
- ALL UTILITY LOCATIONS SHOWN ON THE DRAWINGS ARE APPROXIMATE. THE CONTRACTOR SHALL CONFIRM THE LOCATION ON SITE AND ASSUME ALL LIABILITY FOR DAMAGE TO ALL UTILITIES.
- EXCLUDING THE BENCHMARK AND DESCRIPTION PROVIDED FOR THIS PROJECT, NO OTHER ELEVATIONS ARE TO BE USED AS A REFERENCE ELEVATION FOR ANY PURPOSE.

METRIC NOTE:

- ALL DIMENSIONS SHOWN ARE IN METRES OR MILLIMETRES, UNLESS OTHERWISE NOTED.

GEOMETRIC NOTE:

- ALL SURVEY DATA SHOWN ON THIS DRAWING WAS RECORDED USING REAL-TIME KINETIC (RTK) GPS OBSERVATIONS IN REFERENCE TO UTM 18 NORTH COORDINATE SYSTEM.
- ALL ELEVATIONS ARE IN REFERENCE TO LOCAL DATUM NAD83 - GEODETIC MODEL HT2_0, UNLESS DESCRIBED OTHERWISE.

* * DRAWINGS ARE NOT TO BE SCALED * *

REVISIONS

NO.	DATE	DESCRIPTION	BY

100 / 46.6 — CATCHMENTS AREA ID / DRAINAGE AREA (ha)

STORMWATER CATCHMENT BOUNDARY

STORM CULVERT

ROADS

EXISTING DRAINAGE CONDITIONS

N W E S

JEWELL ENGINEERING

McDONALD HOMES CAMPBELLFORD SUBDIVISION

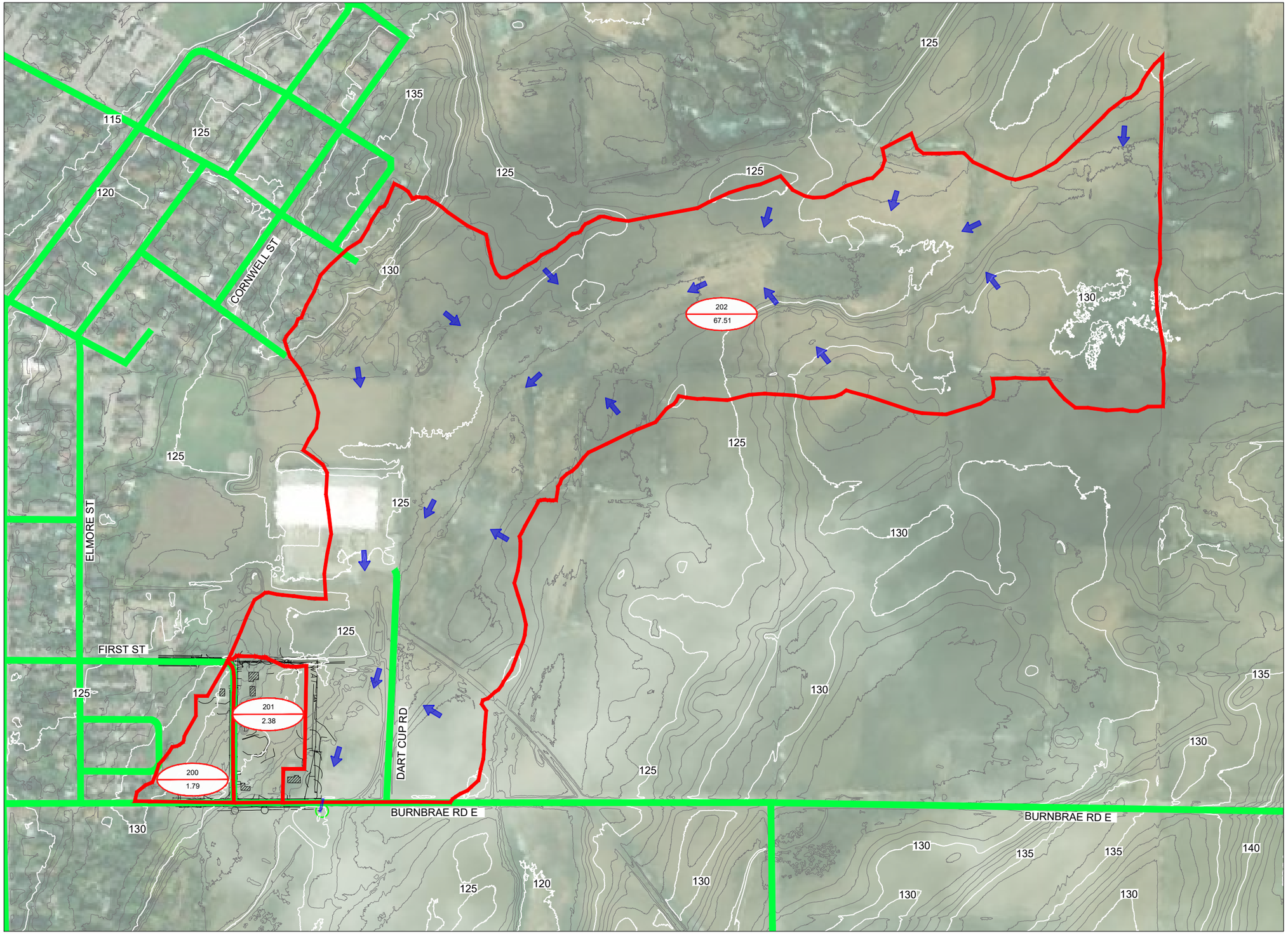
MUNICIPALLITY OF TRENT HILLS

PRE CONSTRUCTION CATCHMENT DRAWING

DRAWN BY: ASG	PROJECT NO: 260-6041	
DESIGNED BY: ASG	DATE: August 2026	
CHECKED BY: DB	SCALE: HORIZONTAL -1:5000 VERTICAL -NA	
APPROVED BY: BK	CONTRACT NO:	DRAWING NO: PRE

08/07/2026

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GENERAL NOTES:

- ALL INFORMATION TO BE VERIFIED ON SITE PRIOR TO COMMENCING ANY WORK. ANY DISCREPANCIES ARE TO BE REPORTED TO THE CONSULTANT IMMEDIATELY.
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- EXCLUDING THE BENCHMARK AND DESCRIPTION PROVIDED FOR THIS PROJECT, NO OTHER ELEVATIONS ARE TO BE USED AS A REFERENCE ELEVATION FOR ANY PURPOSE.

METRIC NOTE:

- ALL DIMENSIONS SHOWN ARE IN METRES OR MILLIMETRES, UNLESS OTHERWISE NOTED.

GEOMETRIC NOTE:

- ALL SURVEY DATA SHOWN ON THIS DRAWING WAS RECORDED USING REAL-TIME KINETIC (RTK) GPS OBSERVATIONS IN REFERENCE TO UTM 18 NORTH COORDINATE SYSTEM.
- ALL ELEVATIONS ARE IN REFERENCE TO LOCAL DATUM NAD83 - GEODETIC MODEL HT2_0, UNLESS DESCRIBED OTHERWISE.

* * DRAWINGS ARE NOT TO BE SCALED * *

REVISIONS

NO.	DATE	DESCRIPTION	BY

100 / 46.6 — CATCHMENTS AREA ID / DRAINAGE AREA (ha)

STORMWATER CATCHMENT BOUNDARY

STORM CULVERT

ROADS

EXISTING DRAINAGE CONDITIONS

N W E S

JEWELL ENGINEERING

McDONALD HOMES CAMPBELLFORD SUBDIVISION

MUNICIPALLITY OF TRENT HILLS

POST CONSTRUCTION CATCHMENT DRAWING

DRAWN BY: ASG	PROJECT NO: 260-6041	
DESIGNED BY: ASG	DATE: August 2026	
CHECKED BY: DB	SCALE: HORIZONTAL -1:5000 VERTICAL -NA	
APPROVED BY: BK	CONTRACT NO:	DRAWING NO: PO

APPENDIX C

Environment Canada IDF Curves

Environment Canada/Environnement Canada

Short Duration Rainfall Intensity-Duration-Frequency Data
Données sur l'intensité, la durée et la fréquence des chutes
de pluie de courte durée

Gumbel - Method of moments/Méthode des moments

2025/12/5

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TRENTON A ON 6158875

Latitude: 44 7'N Longitude: 77 31'W Elevation/Altitude: 86 m

Years/Années : 1965 - 2017 # Years/Années : 46

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****

Table 1 : Annual Maximum (mm)/Maximum annuel (mm)

****

Year / Année	5 min	10 min	15 min	30 min	1 h	2 h	6 h	12 h	24 h
1965	7.4	10.9	14.7	17.3	18.3	19.0	26.9	29.5	43.9
1966	8.1	10.9	11.7	16.5	20.1	22.4	35.8	44.7	45.7
1967	9.1	10.9	11.7	14.2	15.5	16.3	29.7	47.2	69.6
1968	4.1	6.1	7.4	9.7	13.5	16.5	33.0	40.1	40.9
1969	5.8	9.7	13.5	18.8	21.6	24.6	34.0	39.1	54.9
1970	6.1	7.9	10.2	13.7	15.0	20.6	28.2	40.4	48.0
1971	7.1	10.9	11.2	12.2	12.7	17.5	22.1	29.0	35.1
1972	11.2	13.2	13.7	15.5	16.0	20.8	27.7	31.5	47.2
1973	6.6	10.4	10.4	15.0	15.5	22.4	43.2	52.1	53.6
1975	6.9	7.6	10.7	13.7	15.5	25.4	32.3	33.5	34.3
1976	6.9	11.2	11.7	12.7	14.0	14.5	27.9	29.2	30.2
1977	6.9	11.2	11.7	21.8	37.1	45.5	67.3	72.1	72.1
1978	7.1	9.9	11.2	15.0	15.9	19.9	31.7	34.1	36.6
1979	6.5	9.3	11.5	11.5	11.5	17.0	37.7	54.8	55.8
1980	9.3	14.0	16.3	22.9	31.1	37.6	46.6	46.6	60.0
1981	11.4	20.2	25.0	25.0	25.0	25.0	32.9	46.8	48.2
1982	14.2	18.4	22.2	22.4	23.2	30.7	39.0	39.0	39.0
1983	5.9	10.3	14.0	15.0	21.8	34.0	36.4	42.0	63.3

1984	4.4	7.2	7.8	10.1	11.8	13.0	27.7	41.7	42.2
1985	12.2	15.2	18.3	24.3	24.4	37.1	37.1	39.3	39.7
1986	24.3	24.8	26.0	27.1	27.1	32.8	63.2	65.0	65.6
1987	12.2	13.6	14.7	17.3	18.3	20.3	30.4	39.1	42.4
1988	4.7	8.1	8.8	9.9	15.1	15.2	20.2	28.0	28.0
1989	7.3	10.5	10.5	16.8	25.3	25.3	29.8	29.8	34.7
1990	6.6	7.5	9.0	11.0	12.7	16.7	32.9	46.1	50.0
1991	10.6	11.6	12.6	12.8	14.0	15.8	25.7	26.2	32.8
1992	4.7	8.1	9.6	12.1	14.9	20.2	30.1	38.0	42.8
1993	4.2	6.8	9.3	11.7	21.1	23.6	25.5	41.7	56.0
1994	5.6	8.8	10.5	14.6	17.8	19.6	31.3	32.5	34.8
1995	10.6	14.6	18.0	22.2	28.3	41.4	50.4	56.8	64.9
1996	3.4	6.2	7.3	9.5	14.2	19.8	30.0	33.8	42.8
1997	5.0	9.1	11.7	19.8	34.8	43.1	48.7	48.7	53.9
2000	11.4	17.6	22.3	33.5	59.6	68.2	69.8	69.8	71.6
2001	4.7	5.2	7.0	9.2	17.4	19.5	22.3	32.9	40.4
2002	-99.9	-99.9	-99.9	-99.9	-99.9	-99.9	-99.9	78.8	78.8
2003	6.1	11.8	14.0	21.3	26.8	34.0	42.1	45.1	50.2
2004	7.1	10.0	14.9	18.9	31.7	48.9	88.9	109.6	123.7
2005	5.0	7.0	7.2	7.9	13.6	19.1	40.8	50.3	54.1
2006	5.0	8.1	9.6	15.6	20.4	25.0	42.9	55.1	69.9
2007	10.3	11.4	14.2	21.2	26.3	30.5	44.3	60.9	62.1
2008	6.1	12.1	14.0	21.2	23.1	32.5	32.7	40.4	47.6
2009	4.6	8.6	9.0	11.8	12.6	18.7	-99.9	58.0	75.8
2010	5.0	5.3	6.9	8.4	9.6	11.8	24.7	48.3	59.1
2012	5.5	8.0	10.5	21.1	35.7	44.5	60.5	79.9	80.6
2013	5.4	9.5	13.8	20.5	20.8	25.0	30.7	33.5	42.8
2014	7.8	10.7	11.3	13.7	23.9	33.6	43.3	47.1	79.4
2016	7.1	10.9	16.1	23.7	24.8	27.2	34.9	46.2	46.2
2017	5.5	10.3	12.6	13.8	20.3	27.8	33.8	52.0	66.3
# Yrs. / Années	47	47	47	47	47	47	46	48	48
Mean / Moyenne	7.5	10.7	12.7	16.5	21.1	26.4	37.5	46.4	53.3
Std. Dev. / Écart-type	3.6	3.8	4.5	5.6	8.9	11.2	13.8	16.0	17.5
Skew. / Dissymétrie	2.55	1.57	1.32	0.70	1.99	1.50	1.80	1.71	1.49
Kurtosis	12.61	6.57	4.92	3.48	9.40	6.09	6.82	7.30	7.19

*-99.9 Indicates Missing Data/Données manquantes

Warning: annual maximum amount greater than 100-yr return period amount
Avertissement : la quantité maximale annuelle excède la quantité pour une période de retour de 100 ans

Year/Année	Duration/Durée	Data/Données	100-yr/ans
1986	5 min	24.3	18.7
1986	10 min	24.8	22.7
2000	1 h	59.6	49.0

2000	2 h	68.2	61.4
2004	6 h	88.9	80.8
2004	12 h	109.6	96.5
2004	24 h	123.7	108.1

****
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Table 2a : Return Period Rainfall Amounts (mm)
Quantité de pluie (mm) par période de retour

****
***

Duration/Durée	2	5	10	25	50	100	200	#Years
	yr/ans	yr/ans	yr/ans	yr/ans	yr/ans	yr/ans	yr/ans	Années
5 min	6.9	10.1	12.2	14.8	16.8	18.7	20.6	47
10 min	10.0	13.4	15.7	18.5	20.6	22.7	24.8	47
15 min	12.0	15.9	18.5	21.8	24.2	26.7	29.1	47
30 min	15.5	20.5	23.8	27.9	31.0	34.0	37.0	47
1 h	19.6	27.5	32.7	39.3	44.2	49.0	53.9	47
2 h	24.5	34.4	41.0	49.2	55.4	61.4	67.5	47
6 h	35.3	47.5	55.5	65.7	73.3	80.8	88.3	46
12 h	43.8	57.9	67.2	79.1	87.8	96.5	105.2	48
24 h	50.4	65.9	76.1	89.0	98.6	108.1	117.6	48

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Table 2b :

Return Period Rainfall Rates (mm/h) - 95% Confidence limits
Intensité de la pluie (mm/h) par période de retour - Limites de confiance de 95%

****
***

Duration/Durée	2	5	10	25	50	100	200	#Years

	yr/ans	yr/ans	yr/ans	yr/ans	yr/ans	yr/ans	yr/ans	Années
5 min	83.1	120.9	146.0	177.7	201.2	224.5	247.7	47
	+/- 11.2	+/- 18.9	+/- 25.6	+/- 34.5	+/- 41.3	+/- 48.1	+/- 54.9	47
10 min	60.3	80.6	94.0	111.0	123.7	136.2	148.6	47
	+/- 6.0	+/- 10.2	+/- 13.7	+/- 18.5	+/- 22.1	+/- 25.8	+/- 29.5	47
15 min	47.8	63.6	74.0	87.1	96.9	106.6	116.3	47
	+/- 4.7	+/- 7.9	+/- 10.6	+/- 14.3	+/- 17.1	+/- 20.0	+/- 22.8	47
30 min	31.1	41.0	47.5	55.8	61.9	68.0	74.1	47
	+/- 2.9	+/- 4.9	+/- 6.7	+/- 9.0	+/- 10.8	+/- 12.5	+/- 14.3	47
1 h	19.6	27.5	32.7	39.3	44.2	49.0	53.9	47
	+/- 2.3	+/- 3.9	+/- 5.3	+/- 7.2	+/- 8.6	+/- 10.0	+/- 11.4	47
2 h	12.3	17.2	20.5	24.6	27.7	30.7	33.7	47
	+/- 1.5	+/- 2.5	+/- 3.3	+/- 4.5	+/- 5.4	+/- 6.3	+/- 7.2	47
6 h	5.9	7.9	9.3	11.0	12.2	13.5	14.7	46
	+/- 0.6	+/- 1.0	+/- 1.4	+/- 1.9	+/- 2.2	+/- 2.6	+/- 3.0	46
12 h	3.6	4.8	5.6	6.6	7.3	8.0	8.8	48
	+/- 0.3	+/- 0.6	+/- 0.8	+/- 1.1	+/- 1.3	+/- 1.5	+/- 1.7	48
24 h	2.1	2.7	3.2	3.7	4.1	4.5	4.9	48
	+/- 0.2	+/- 0.3	+/- 0.4	+/- 0.6	+/- 0.7	+/- 0.8	+/- 0.9	48

****

Table 3 : Interpolation Equation / Équation d'interpolation: R = A*T^B

R = Interpolated Rainfall rate (mm/h)/Intensity interpolée de la pluie (mm/h)
RR = Rainfall rate (mm/h) / Intensité de la pluie (mm/h)
T = Rainfall duration (h) / Durée de la pluie (h)

****

Statistics/Statistiques	2 yr/ans	5 yr/ans	10 yr/ans	25 yr/ans	50 yr/ans	100 yr/ans	200 yr/ans
Mean of RR/Moyenne de RR	29.5	40.7	48.1	57.4	64.4	71.2	78.1
Std. Dev. /Écart-type (RR)	28.6	40.4	48.3	58.4	65.8	73.2	80.6
Std. Error/Erreur-type	4.5	4.2	4.2	4.5	4.9	5.3	5.9
Coefficient (A)	18.6	25.2	29.6	35.2	39.3	43.4	47.5
Exponent/Exposant (B)	-0.656	-0.664	-0.668	-0.671	-0.673	-0.674	-0.676
Mean % Error/% erreur moyenne	5.1	5.0	5.2	5.6	6.0	6.2	6.5

APPENDIX D

OTTHYMO Model

OTTHYMO MODEL INPUTS - PRE-DEVELOPMENT SITE

Project: Rosco Ave Subdivision
Designer: Duncan Burgess, BASc
Date: July 13, 2026

Catchment	MTO Land Use	Area (ha)	Curve Number (HSG B)	Composite Curve Number (HSG B)
100	Crop / Improved Land	39.41	74	**71.4**
	Pasture / Unimproved Land	21.52	65	
	Woodlots and Forest	6.28	58	
	Impervious Areas	4.42	98	

Catchment	MTO Land Use	Area (ha)	Runoff Coefficient (2, 5, 10 yr)	Composite Runoff Coefficient (2, 5, 10 yr)
100	Cultivated (Loam, Flat)	39.41	0.35	**0.35**
	Pasture (Loam, Flat)	16.81	0.28	
	Woodland or Cutover (Loam, Flat)	6.28	0.25	
	Lawns (Sandy Soil, Average)*	4.71	0.15	
	Pavement / Roofs*	4.42	0.90	

**Increased for the 25 yr, 50 yr, and 100 yr events by 10%, 20%, and 25% respectively (to a maximum of 0.98).*

OTTHYMO MODEL INPUTS - POST-DEVELOPMENT SITE

Project: Rosco Ave Subdivision
Designer: Duncan Burgess, BASc
Date: July 14, 2026

Catchment	Land Use	Area (ha)	Imperviousness	Composite Imperviousness
200	Grassed Areas	1.26	0.00	**0.29**
	Impervious Areas	0.52	1.00	
201	Grassed Areas	1.23	0.00	**0.45**
	Impervious Areas	1.01	1.00	
	Indeterminate*	0.14	0.50	

**The land use of 0.14 ha of Rosco Ave E is not set. An imperviousness of 50%, typical for low-density residential, was assumed.*

Catchment	MTO Land Use	Area (ha)	Curve Number (HSG B)	Composite Curve Number (HSG B)
200	Pasture / Unimproved Land	1.26	65	**65.0**
	Impervious Areas**	0.52	0	
201	Pasture / Unimproved Land	1.23	65	**65.9**
	Impervious Areas**	1.01	0	
	Crop / Improved Land*	0.14	74	
202	Crop / Improved Land	39.41	74	**71.6**
	Pasture / Unimproved Land	17.76	65	
	Woodlots and Forest	6.28	58	
	Impervious Areas	4.05	98	

**The land use of 0.14 ha of Rosco Ave E is not set. The curve number was assumed as 74, corresponding to improved land.*
***OTTHYMO Standhyd only calculates non-impervious area runoff using the curve number. All impervious area rainfall becomes runoff.*

Catchment	MTO Land Use	Area (ha)	Runoff Coefficient (2, 5, 10 yr)	Composite Runoff Coefficient (2, 5, 10 yr)
200	Lawns (Sandy Soil, Average)***	1.26	0.15	**0.37**
	Pavement / Roofs***	0.52	0.90	
201	Lawns (Sandy Soil, Average)***	1.13	0.15	**0.50**
	Pavement / Roofs***	1.01	0.90	
	Indeterminate*	0.14	0.60	
	Pasture (Loam, Flat	0.11	0.28	
202	Cultivated (Loam, Flat)	39.41	0.35	**0.35**
	Pasture (Loam, Flat)	14.37	0.28	
	Woodland or Cutover (Loam, Flat)	6.28	0.25	
	Pavement / Roofs***	4.05	0.9	
	Lawns (Sandy Soil, Average)***	3.39	0.15	

**The land use of 0.14 ha of Rosco Ave E is not set. A runoff coefficient of 0.60, corresponding to mutliple-attached residential, was assumed.*
****Increased for the 25 yr, 50 yr, and 100 yr events by 10%, 20%, and 25% respectively (to a maximum of 0.98).*

OTTHYMO MODEL INPUTS - TIME OF CONCENTRATION / TIME TO PEAK

Project: Rosco Ave Subdivision
Designer: Duncan Burgess, BASc
Date: July 14, 2026

Time of Concentration / Time to Peak					
Catchment		**100**	**200**	**201**	**202**
Area (ha)		71.63	1.78	2.38	67.50
Runoff Coefficient (2, 5, 10 yr)		0.35	0.37	0.50	0.35
Runoff Coefficient (25 yr)		0.35	0.40	0.65	0.35
Runoff Coefficient (50 yr)		0.35	0.41	0.67	0.36
Runoff Coefficient (100 yr)		0.35	0.42	0.68	0.36
Watershed Length (m)		1,825.3	205.5	225.2	1825.3
Elevation at 85% (m)		166.25	165.00	162.25	166.25
Elevation at 10% (m)		156.00	159.25	156.25	156.00
Watershed Slope (%)		0.7	4.0	4.0	0.7
Tc (2, 5, 10 yr) (min)	**Bransby-Williams**	-	8.4	8.9	-
	Airport	115.6	-	-	115.1
Tp (2, 5, 10 yr) (hr)	**Bransby-Williams**	-	0.09	0.10	-
	Airport	1.28	-	-	1.28
Tc (25 yr) (min)	**Bransby-Williams**	-	8.4	8.9	-
	Airport	114.7	-	-	114.3
Tp (25 yr) (hr)	**Bransby-Williams**	-	0.09	0.10	-
	Airport	1.27	-	-	1.27
Tc (50 yr) (min)	**Bransby-Williams**	-	8.4	8.9	-
	Airport	114.5	-	-	114.2
Tp (50 yr) (hr)	**Bransby-Williams**	-	0.09	0.10	-
	Airport	1.27	-	-	1.27
Tc (100 yr) (min)	**Bransby-Williams**	-	8.4	8.9	-
	Airport	114.5	-	-	114.1
Tp (100 yr) (hr)	**Bransby-Williams**	-	0.09	0.10	-
	Airport	1.27	-	-	1.27

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

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    I N T E R H Y M O
       O   O    T      T    H   H   Y Y   MM MM  O   O   * * * 1989a * * *
       O   O    T      T    HHHHH    Y    M M M  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO              01636
```

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```
  Input   filename: ROSCOHBP.DAT
  Output  filename: ROSCOHBP.OUT
  Summary filename: ROSCOHBP.SUM



DATE: 08-06-2026                      TIME: 14:12:55


COMMENTS: _____________________________________________________________

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

*
*                   McDonald Homes - Rosco Ave Subdivision
*
*                   Using Environment Canada IDF V3.4
*                   Trenton, Station 6158875, 1965-2017
*
*                   Original Model Prepared: July 13, 2026
*                   Date of Last Revision: August 6, 2026
*                   Duncan Burgess, BASc
*
*                   Check whether "Beat the Peak" is applicable
*                   Calculation of Pre & Post Dev. Event Peak Flows
*                   2-100 yr: 2 hr & 4 hr Chicago, 12 hr & 24 hr SCS II

*                   Regulatory Event (Timmins, 12 hr)

*
*                   Includes adjustment to CN, DPSP for CA 200,201
*                   Accounts for topsoil enhancement runoff volume reduction
*                   25% target over overall Dev. site
```

```
*                    Calibrated reduction from Dev. Area / Catchment Area
*
*                    LGI, LGP (m) from L=SQRT(A/1.5)*100
*
*                    Includes 5 min lag for dev. catchments
*                    Accounts for ditch routing to discharge point
*
*                    Includes CA 201 storage system for 2yr events and below
*                    No storage applied for larger events - conservative

************************************************************************
*                    Chicago 2-hr Events
************************************************************************
*                    2 yr Event - Uncontrolled
************************************************************************
--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 404.288
| Ptotal= 24.44 mm |                          B=   3.844
--------------------                          C=    .726
                         used in:   INTENSITY =  A / (t + B)^C

                         Duration of storm  =  2.00 hrs
                         Storm time step    =  5.00 min
                         Time to peak ratio =   .33

                    The CORRELATION coefficient is = 1.0000

                     TIME       INPUT INT.           TAB. INT.
                    (min)        (mm/hr)              (mm/hr)
                       5.          83.10                83.07
                      10.          60.30                60.00
                      15.          47.80                47.96
                      30.          31.10                31.35
                      60.          19.60                19.78
                     120.          12.30                12.23


                TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
                 .08    4.10 |   .58   26.21 |  1.08    9.03 |  1.58    4.81
                 .17    4.65 |   .67   83.07 |  1.17    7.79 |  1.67    4.50
                 .25    5.40 |   .75   33.27 |  1.25    6.88 |  1.75    4.22
                 .33    6.53 |   .83   19.18 |  1.33    6.19 |  1.83    3.99
                 .42    8.40 |   .92   13.74 |  1.42    5.64 |  1.92    3.78
                 .50   12.28 |  1.00   10.84 |  1.50    5.19 |  2.00    3.60


------------------------------------------------------------------------
*                    Pre-Dev: Calibrate CA 100
--------------------
```

```
| CALIB            |
| NASHYD    (0001) |   Area    (ha)=  71.63   Curve Number   (CN)= 71.4
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
-------------------   U.H. Tp(hrs)=   1.28

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

     Unit Hyd Qpeak  (cms)=   2.14

     PEAK FLOW       (cms)=    .23 (i)
     TIME TO PEAK    (hrs)=   2.42
     RUNOFF VOLUME    (mm)=   3.03
     TOTAL RAINFALL   (mm)=  24.44
     RUNOFF COEFFICIENT   =    .12

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

--------------------------------------------------------------------------------
--------------------
| SAVE HYD  (0001) |   AREA       (ha)=  71.63
| ID= 1   PCYC= 98 |   QPEAK     (cms)=    .23 (i)
| DT= 5.0 min      |   TPEAK     (hrs)=   2.42
--------------------   VOLUME     (mm)=   3.03
  Filename: PRE2Y2H.HYD
  Comments:

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

--------------------------------------------------------------------------------
*                   Post-Dev: Calibrate Catchment 200
--------------------
| CALIB            |
| STANDHYD  (0001) |   Area    (ha)=   1.79
|ID= 2 DT= 5.0 min |   Total Imp(%)=  29.00   Dir. Conn.(%)=  24.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .52          1.27
     Dep. Storage     (mm)=       2.00          7.50
     Average Slope     (%)=       4.00          4.00
     Length            (m)=     109.20        109.20
     Mannings n           =       .013          .250

     Max.eff.Inten.(mm/hr)=      58.17          1.59
               over (min)        10.00         55.00
     Storage Coeff.  (min)=       2.21 (ii)    57.13 (ii)
     Unit Hyd. Tpeak (min)=       5.00         60.00
     Unit Hyd. peak  (cms)=        .30           .02
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .09           .00            .09 (iii)
     TIME TO PEAK    (hrs)=        .75          2.08            .75
```

```
     RUNOFF VOLUME    (mm)=      22.14         1.67           6.41
     TOTAL RAINFALL   (mm)=      24.44        24.44          24.44
     RUNOFF COEFFICIENT   =        .91          .07            .26

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

       (i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
            CN*  =  60.0    Ia = Dep. Storage  (Above)
      (ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
*                   Post-Dev: Calibrate Catchment 201
--------------------
| CALIB            |
| STANDHYD  (0001) |   Area    (ha)=   2.38
|ID= 3 DT= 5.0 min |   Total Imp(%)=  45.00   Dir. Conn.(%)=  40.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.07         1.31
     Dep. Storage     (mm)=       2.00        15.00
     Average Slope     (%)=       4.00         4.00
     Length            (m)=     126.00       126.00
     Mannings n             =       .013         .250

     Max.eff.Inten.(mm/hr)=      58.17          .32
               over (min)        10.00       115.00
     Storage Coeff.  (min)=       2.40 (ii)  116.46 (ii)
     Unit Hyd. Tpeak (min)=       5.00       120.00
     Unit Hyd. peak  (cms)=        .30          .01
                                                        *TOTALS*
     PEAK FLOW       (cms)=        .20          .00            .20 (iii)
     TIME TO PEAK    (hrs)=        .75         3.33            .75
     RUNOFF VOLUME    (mm)=      22.14          .56           8.88
     TOTAL RAINFALL   (mm)=      24.44        24.44          24.44
     RUNOFF COEFFICIENT   =        .91          .02            .36

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

       (i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
            CN*  =  55.9    Ia = Dep. Storage  (Above)
      (ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
*                   Post-Dev: Calibrate Catchment 202
--------------------
| CALIB            |
```

```
| NASHYD    (0001) |   Area    (ha)=  67.51   Curve Number   (CN)= 71.6
|ID= 4 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
-------------------   U.H. Tp(hrs)=   1.28

     Unit Hyd Qpeak  (cms)=   2.01

     PEAK FLOW       (cms)=    .22 (i)
     TIME TO PEAK    (hrs)=   2.42
     RUNOFF VOLUME    (mm)=   3.05
     TOTAL RAINFALL   (mm)=  24.44
     RUNOFF COEFFICIENT   =    .12

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

--------------------------------------------------------------------------------
*                   Add post-dev site hydrographs

--------------------
| ADD HYD   (0001) |
|   2 +  3 =  5    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
          ID1= 2 (0001):     1.79      .09      .75     6.41
        + ID2= 3 (0001):     2.38      .20      .75     8.88
          ================================================
          ID = 5 (0001):     4.17      .29      .75     7.83

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
*                   Shift site hydrograph to account for ditch flow to outlet
*                   Path ~150 m (CA 200) and ~75 m (CA 201)
*                   Assume 5 min lag (assumes <0.5 m/s flow velocity)
--------------------
| SHIFT HYD (0001) |
| IN= 5---> OUT= 6 |
| SHIFT=  5.0 min  |      AREA     QPEAK     TPEAK      R.V.
--------------------      (ha)     (cms)     (hrs)      (mm)
          ID= 5 (0001):    4.17      .29       .75      7.83
    SHIFT ID= 6 (0001):    4.17      .29       .83      7.83

--------------------------------------------------------------------------------
*                   Add lagged post-dev site, external hydrographs

--------------------
| ADD HYD   (0001) |
|   6 +  4 =  7    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
          ID1= 6 (0001):     4.17      .29      .83     7.83
        + ID2= 4 (0001):    67.51      .22     2.42     3.05
          ================================================
```

ID = 7 (0001): 71.68 .30 .83 3.33

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

SAVE HYD (0001)	AREA (ha)= 71.68
ID= 7 PCYC= 97	QPEAK (cms)= .30 (i)
DT= 5.0 min	TPEAK (hrs)= .83
	VOLUME (mm)= 3.33

Filename: PST2Y2H.HYD
Comments:

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

---

* 2 yr Event - Controlled

****

CHICAGO STORM	IDF curve parameters: A= 404.288
Ptotal= 24.44 mm	B= 3.844
	C= .726

used in: INTENSITY = A / (t + B)^C

Duration of storm = 2.00 hrs
Storm time step = 5.00 min
Time to peak ratio = .33

The CORRELATION coefficient is = 1.0000

TIME (min)	INPUT INT. (mm/hr)	TAB. INT. (mm/hr)
5.	83.10	83.07
10.	60.30	60.00
15.	47.80	47.96
30.	31.10	31.35
60.	19.60	19.78
120.	12.30	12.23

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.08	4.10	.58	26.21	1.08	9.03	1.58	4.81
.17	4.65	.67	83.07	1.17	7.79	1.67	4.50
.25	5.40	.75	33.27	1.25	6.88	1.75	4.22
.33	6.53	.83	19.18	1.33	6.19	1.83	3.99
.42	8.40	.92	13.74	1.42	5.64	1.92	3.78
.50	12.28	1.00	10.84	1.50	5.19	2.00	3.60

```
--------------------------------------------------------------------------------
*                   Pre-Dev: Calibrate CA 100
--------------------
| CALIB            |
| NASHYD    (0001) |   Area    (ha)=  71.63   Curve Number   (CN)= 71.4
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   1.28

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

     Unit Hyd Qpeak  (cms)=   2.14

     PEAK FLOW       (cms)=    .23 (i)
     TIME TO PEAK    (hrs)=   2.42
     RUNOFF VOLUME    (mm)=   3.03
     TOTAL RAINFALL   (mm)=  24.44
     RUNOFF COEFFICIENT   =    .12

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

--------------------------------------------------------------------------------
--------------------
| SAVE HYD  (0001) |   AREA       (ha)=  71.63
| ID= 1   PCYC= 98 |   QPEAK     (cms)=    .23 (i)
| DT= 5.0 min      |   TPEAK     (hrs)=   2.42
--------------------   VOLUME     (mm)=   3.03
  Filename: PRE2Y2H.HYD
  Comments:

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

--------------------------------------------------------------------------------
*                   Post-Dev: Calibrate Catchment 200
--------------------
| CALIB            |
| STANDHYD  (0001) |   Area    (ha)=   1.79
|ID= 2 DT= 5.0 min |   Total Imp(%)=  29.00   Dir. Conn.(%)=  24.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .52          1.27
     Dep. Storage     (mm)=       2.00          7.50
     Average Slope     (%)=       4.00          4.00
     Length            (m)=     109.20        109.20
     Mannings n           =       .013          .250

     Max.eff.Inten.(mm/hr)=      58.17          1.59
               over (min)        10.00         55.00
     Storage Coeff.  (min)=       2.21 (ii)    57.13 (ii)
     Unit Hyd. Tpeak (min)=       5.00         60.00
     Unit Hyd. peak  (cms)=        .30           .02
```

```
                                                              *TOTALS*
     PEAK FLOW       (cms)=        .09          .00            .09 (iii)
     TIME TO PEAK    (hrs)=        .75         2.08            .75
     RUNOFF VOLUME    (mm)=      22.14         1.67           6.41
     TOTAL RAINFALL   (mm)=      24.44        24.44          24.44
     RUNOFF COEFFICIENT   =        .91          .07            .26

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

       (i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
            CN*  =  60.0    Ia = Dep. Storage  (Above)
      (ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
*                   Post-Dev: Calibrate Catchment 201
--------------------
| CALIB            |
| STANDHYD  (0001) |   Area    (ha)=   2.38
|ID= 3 DT= 5.0 min |   Total Imp(%)=  45.00   Dir. Conn.(%)=  40.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.07         1.31
     Dep. Storage     (mm)=       2.00        15.00
     Average Slope     (%)=       4.00         4.00
     Length            (m)=     126.00       126.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      58.17          .32
               over (min)        10.00       115.00
     Storage Coeff.  (min)=       2.40 (ii)  116.46 (ii)
     Unit Hyd. Tpeak (min)=       5.00       120.00
     Unit Hyd. peak  (cms)=        .30          .01
                                                              *TOTALS*
     PEAK FLOW       (cms)=        .20          .00            .20 (iii)
     TIME TO PEAK    (hrs)=        .75         3.33            .75
     RUNOFF VOLUME    (mm)=      22.14          .56           8.88
     TOTAL RAINFALL   (mm)=      24.44        24.44          24.44
     RUNOFF COEFFICIENT   =        .91          .02            .36

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

       (i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
            CN*  =  55.9    Ia = Dep. Storage  (Above)
      (ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

```
*                   Split off 0.165 cms - capacity of CA 201 OGS

*                   Remainder direct discharge to outlet

--------------------
| DUHYD     (0001) |
| Inlet Cap.= .165 |
| #of Inlets=    1 |
| Total(cms)=   .2 |      AREA     QPEAK     TPEAK    R.V.
--------------------      (ha)     (cms)     (hrs)    (mm)
     TOTAL HYD.(ID= 3):   2.38       .20       .75    8.88
     ================================================
     MAJOR SYS.(ID= 4):    .12       .04       .75    8.88
     MINOR SYS.(ID= 5):   2.26       .17       .75    8.88

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
*                   Split off 0.015 cms from OGS - direct discharge to outlet

*                   Direct remainder to infiltration - 2yr quantity control

*                   Runoff directed to infiltration removed - no discharge
--------------------
| DUHYD     (0001) |
| Inlet Cap.= .015 |
| #of Inlets=    1 |
| Total(cms)=   .0 |      AREA     QPEAK     TPEAK    R.V.
--------------------      (ha)     (cms)     (hrs)    (mm)
     TOTAL HYD.(ID= 5):   2.26       .17       .75    8.88
     ================================================
     MAJOR SYS.(ID= 6):   1.36       .15       .75    8.88
     MINOR SYS.(ID= 7):    .90       .02       .58    8.88

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
*                   Determine required infiltration storage volume

*                   Based on the volume of the infiltration hydrograph

--------------------
| COMPUTE VOLUME   |
| ID= 6   (0001)   |             DISCHARGE      TIME
--------------------               (cms)       (hrs)
           START CONTROLLING AT      .00         .50
           INFLOW HYD. PEAKS AT      .15         .75
           STOP  CONTROLLING AT      .00        1.58

           REQUIRED STORAGE VOLUME (ha.m.)=    .0121
```

```
           TOTAL HYDROGRAPH VOLUME (ha.m.)=    .0121
           % OF HYDROGRAPH TO STORE       =  99.9997

           NOTE:  Storage was computed to reduce the Inflow

--------------------------------------------------------------------------------
*                  Add hydrographs for non-infiltrated CA 201 runoff

--------------------
| ADD HYD   (0001) |
|   4 +  7 =  8    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
          ID1= 4 (0001):      .12      .04      .75     8.88
        + ID2= 7 (0001):      .90      .02      .58     8.88
          ================================================
          ID = 8 (0001):     1.02      .05      .75     8.88

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
*                  Post-Dev: Calibrate Catchment 202
--------------------
| CALIB            |
| NASHYD    (0001) |   Area    (ha)=  67.51   Curve Number   (CN)= 71.6
|ID= 4 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   1.28

     Unit Hyd Qpeak  (cms)=   2.01

     PEAK FLOW       (cms)=    .22 (i)
     TIME TO PEAK    (hrs)=   2.42
     RUNOFF VOLUME    (mm)=   3.05
     TOTAL RAINFALL   (mm)=  24.44
     RUNOFF COEFFICIENT   =    .12

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

--------------------------------------------------------------------------------
*                  Add post-dev site hydrographs

--------------------
| ADD HYD   (0001) |
|   2 +  8 =  5    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
          ID1= 2 (0001):     1.79      .09      .75     6.41
        + ID2= 8 (0001):     1.02      .05      .75     8.88
          ================================================
          ID = 5 (0001):     2.81      .14      .75     7.31

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

```
--------------------------------------------------------------------------------
*                   Shift site hydrograph to account for ditch flow to outlet
*                   Path ~150 m (CA 200) and ~75 m (CA 201)
*                   Assume 5 min lag (assumes <=0.5 m/s flow velocity)
--------------------
| SHIFT HYD (0001) |
| IN= 5---> OUT= 6 |
| SHIFT=  5.0 min  |      AREA     QPEAK     TPEAK      R.V.
--------------------      (ha)     (cms)     (hrs)      (mm)
          ID= 5 (0001):    2.81      .14       .75      7.31
    SHIFT ID= 6 (0001):    2.81      .14       .83      7.31

--------------------------------------------------------------------------------
*                   Add lagged post-dev site, external hydrographs

--------------------
| ADD HYD   (0001) |
|   6 +  4 =  7    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
          ID1= 6 (0001):     2.81      .14      .83     7.31
        + ID2= 4 (0001):    67.51      .22     2.42     3.05
          ================================================
          ID = 7 (0001):    70.32      .23     2.08     3.22

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| SAVE HYD  (0001) |   AREA       (ha)=  70.32
| ID= 7   PCYC= 97 |   QPEAK     (cms)=    .23 (i)
| DT= 5.0 min      |   TPEAK     (hrs)=   2.08
--------------------   VOLUME     (mm)=   3.22
  Filename: PST2Y2H.HYD
  Comments:

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

--------------------------------------------------------------------------------
*                   5 yr Event - Uncontrolled
********************************************************************************
--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 408.141
| Ptotal= 34.34 mm |                          B=   1.508
--------------------                          C=    .660
                         used in:   INTENSITY =  A / (t + B)^C

                         Duration of storm  =  2.00 hrs
                         Storm time step    =  5.00 min
                         Time to peak ratio =   .33
```

The CORRELATION coefficient is = .9997

TIME (min)	INPUT INT. (mm/hr)	TAB. INT. (mm/hr)
5.	120.90	118.56
10.	80.60	81.39
15.	63.60	64.14
30.	41.00	41.87
60.	27.50	26.92
120.	17.20	17.18

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.08	6.66	.58	32.29	1.08	13.02	1.58	7.64
.17	7.41	.67	118.56	1.17	11.50	1.67	7.20
.25	8.43	.75	40.10	1.25	10.36	1.75	6.83
.33	9.90	.83	24.50	1.33	9.46	1.83	6.50
.42	12.25	.92	18.48	1.42	8.74	1.92	6.20
.50	16.81	1.00	15.16	1.50	8.14	2.00	5.94

---

* Pre-Dev: Calibrate CA 100

CALIB			
NASHYD (0001)	Area (ha)= 71.63	Curve Number (CN)= 71.4	
ID= 1 DT= 5.0 min	Ia (mm)= 5.00	# of Linear Res.(N)= 3.00	
	U.H. Tp(hrs)= 1.28		

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

Unit Hyd Qpeak (cms)= 2.14

PEAK FLOW (cms)= .48 (i)
TIME TO PEAK (hrs)= 2.42
RUNOFF VOLUME (mm)= 6.37
TOTAL RAINFALL (mm)= 34.34
RUNOFF COEFFICIENT = .19

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

SAVE HYD (0001)	AREA (ha)= 71.63
ID= 1 PCYC=105	QPEAK (cms)= .48 (i)
DT= 5.0 min	TPEAK (hrs)= 2.42
	VOLUME (mm)= 6.37

Filename: PRE5Y2H.HYD

Comments:

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

```
*                   Post-Dev: Calibrate Catchment 200
--------------------
| CALIB            |
| STANDHYD  (0001) |   Area    (ha)=   1.79
|ID= 2 DT= 5.0 min |   Total Imp(%)=  29.00   Dir. Conn.(%)=  24.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .52         1.27
     Dep. Storage     (mm)=       2.00         7.50
     Average Slope     (%)=       4.00         4.00
     Length            (m)=     109.20       109.20
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      79.33         4.23
               over (min)        10.00        40.00
     Storage Coeff.  (min)=       1.95 (ii)   39.08 (ii)
     Unit Hyd. Tpeak (min)=       5.00        40.00
     Unit Hyd. peak  (cms)=        .31          .03
                                                      *TOTALS*
     PEAK FLOW       (cms)=        .13          .01          .13 (iii)
     TIME TO PEAK    (hrs)=        .75         1.75          .75
     RUNOFF VOLUME    (mm)=      31.85         3.89        10.48
     TOTAL RAINFALL   (mm)=      34.34        34.34        34.34
     RUNOFF COEFFICIENT   =        .93          .11          .31

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

       (i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
            CN*  =  60.0    Ia = Dep. Storage  (Above)
      (ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
```

```
*                   Post-Dev: Calibrate Catchment 201
--------------------
| CALIB            |
| STANDHYD  (0001) |   Area    (ha)=   2.38
|ID= 3 DT= 5.0 min |   Total Imp(%)=  45.00   Dir. Conn.(%)=  40.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.07         1.31
     Dep. Storage     (mm)=       2.00        15.00
     Average Slope     (%)=       4.00         4.00
     Length            (m)=     126.00       126.00
```

```
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      79.33         1.75
               over (min)        10.00        60.00
     Storage Coeff.  (min)=       2.12 (ii)   59.68 (ii)
     Unit Hyd. Tpeak (min)=       5.00        60.00
     Unit Hyd. peak  (cms)=        .31          .02
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .29          .00           .29 (iii)
     TIME TO PEAK    (hrs)=        .75         2.33           .75
     RUNOFF VOLUME    (mm)=      31.85         1.98         13.78
     TOTAL RAINFALL   (mm)=      34.34        34.34         34.34
     RUNOFF COEFFICIENT   =        .93          .06           .40

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

       (i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
            CN*  =  55.9    Ia = Dep. Storage  (Above)
      (ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
*                   Post-Dev: Calibrate Catchment 202
--------------------
| CALIB             |
| NASHYD    (0001) |   Area    (ha)=  67.51   Curve Number   (CN)= 71.6
|ID= 4 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   1.28

     Unit Hyd Qpeak  (cms)=   2.01

     PEAK FLOW       (cms)=    .46 (i)
     TIME TO PEAK    (hrs)=   2.42
     RUNOFF VOLUME    (mm)=   6.42
     TOTAL RAINFALL   (mm)=  34.34
     RUNOFF COEFFICIENT   =    .19

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

--------------------------------------------------------------------------------
*                   Add post-dev site hydrographs

--------------------
| ADD HYD   (0001) |
|   2 +  3 =  5    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
          ID1= 2 (0001):     1.79      .13      .75    10.48
        + ID2= 3 (0001):     2.38      .29      .75    13.78
          ================================================
```

```
          ID = 5 (0001):     4.17      .43      .75    12.38

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
*                   Shift site hydrograph to account for ditch flow to outlet
*                   Path ~150 m (CA 200) and ~75 m (CA 201)
*                   Assume 5 min lag (assumes <=0.5 m/s flow velocity)
--------------------
| SHIFT HYD (0001) |
| IN= 5---> OUT= 6 |
| SHIFT=  5.0 min  |      AREA     QPEAK     TPEAK      R.V.
--------------------      (ha)     (cms)     (hrs)      (mm)
          ID= 5 (0001):    4.17      .43       .75     12.38
    SHIFT ID= 6 (0001):    4.17      .43       .83     12.38

--------------------------------------------------------------------------------
*                   Add lagged post-dev site, external hydrographs

--------------------
| ADD HYD   (0001) |
|   6 +  4 =  7    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
          ID1= 6 (0001):     4.17      .43      .83    12.38
        + ID2= 4 (0001):    67.51      .46     2.42     6.42
          ================================================
          ID = 7 (0001):    71.68      .47     2.08     6.76

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| SAVE HYD  (0001) |   AREA       (ha)=  71.68
| ID= 7   PCYC=104 |   QPEAK     (cms)=    .47 (i)
| DT= 5.0 min      |   TPEAK     (hrs)=   2.08
--------------------   VOLUME     (mm)=   6.76
  Filename: PST5Y2H.HYD
  Comments:

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

--------------------------------------------------------------------------------
*                   10 yr Event - Uncontrolled
********************************************************************************
--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 480.238
| Ptotal= 40.60 mm |                          B=   1.501
--------------------                          C=    .659
                        used in:   INTENSITY =  A / (t + B)^C
```

Duration of storm = 2.00 hrs
Storm time step = 5.00 min
Time to peak ratio = .33

The CORRELATION coefficient is = .9990

TIME (min)	INPUT INT. (mm/hr)	TAB. INT. (mm/hr)
5.	146.00	139.86
10.	94.00	96.04
15.	74.00	75.70
30.	47.50	49.44
60.	32.70	31.81
120.	20.50	20.31

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.08	7.89	.58	38.15	1.08	15.41	1.58	9.05
.17	8.79	.67	139.86	1.17	13.62	1.67	8.54
.25	9.99	.75	47.36	1.25	12.27	1.75	8.09
.33	11.73	.83	28.97	1.33	11.21	1.83	7.70
.42	14.50	.92	21.87	1.42	10.36	1.92	7.36
.50	19.89	1.00	17.95	1.50	9.65	2.00	7.05

---

* Pre-Dev: Calibrate CA 100

CALIB			
NASHYD (0001)	Area (ha)= 71.63	Curve Number (CN)= 71.4
ID= 1 DT= 5.0 min	Ia (mm)= 5.00	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 1.28	

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

Unit Hyd Qpeak (cms)= 2.14

PEAK FLOW (cms)= .68 (i)
TIME TO PEAK (hrs)= 2.33
RUNOFF VOLUME (mm)= 8.96
TOTAL RAINFALL (mm)= 40.60
RUNOFF COEFFICIENT = .22

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

SAVE HYD (0001)	AREA (ha)= 71.63
ID= 1 PCYC=108	QPEAK (cms)= .68 (i)

```
| DT= 5.0 min      |   TPEAK     (hrs)=   2.33
--------------------   VOLUME     (mm)=   8.96
  Filename: PRE10Y2H.HYD
  Comments:

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

--------------------------------------------------------------------------------
*                   Post-Dev: Calibrate Catchment 200
--------------------
| CALIB            |
| STANDHYD  (0001) |   Area    (ha)=   1.79
|ID= 2 DT= 5.0 min |   Total Imp(%)=  29.00   Dir. Conn.(%)=  24.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .52          1.27
     Dep. Storage     (mm)=       2.00          7.50
     Average Slope     (%)=       4.00          4.00
     Length            (m)=     109.20        109.20
     Mannings n           =       .013          .250

     Max.eff.Inten.(mm/hr)=      93.61          6.67
               over (min)        10.00         35.00
     Storage Coeff.  (min)=       1.82 (ii)    32.75 (ii)
     Unit Hyd. Tpeak (min)=       5.00         35.00
     Unit Hyd. peak  (cms)=        .32           .03
                                                      *TOTALS*
     PEAK FLOW       (cms)=        .16           .01          .16 (iii)
     TIME TO PEAK    (hrs)=        .67          1.42          .67
     RUNOFF VOLUME    (mm)=      38.02          5.70        13.35
     TOTAL RAINFALL   (mm)=      40.60         40.60        40.60
     RUNOFF COEFFICIENT   =        .94           .14          .33

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

       (i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
            CN*  =  60.0    Ia = Dep. Storage  (Above)
      (ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
*                   Post-Dev: Calibrate Catchment 201
--------------------
| CALIB            |
| STANDHYD  (0001) |   Area    (ha)=   2.38
|ID= 3 DT= 5.0 min |   Total Imp(%)=  45.00   Dir. Conn.(%)=  40.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.07          1.31
```

```
     Dep. Storage     (mm)=       2.00        15.00
     Average Slope     (%)=       4.00         4.00
     Length            (m)=     126.00       126.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      93.61         3.10
               over (min)        10.00        50.00
     Storage Coeff.  (min)=       1.99 (ii)   47.79 (ii)
     Unit Hyd. Tpeak (min)=       5.00        50.00
     Unit Hyd. peak  (cms)=        .31          .02
                                                        *TOTALS*
     PEAK FLOW       (cms)=        .35          .01           .35 (iii)
     TIME TO PEAK    (hrs)=        .75         2.08           .75
     RUNOFF VOLUME    (mm)=      38.02         3.29         17.07
     TOTAL RAINFALL   (mm)=      40.60        40.60         40.60
     RUNOFF COEFFICIENT   =        .94          .08           .42

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

       (i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
            CN*  =  55.9    Ia = Dep. Storage  (Above)
      (ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
*                   Post-Dev: Calibrate Catchment 202
--------------------
| CALIB             |
| NASHYD    (0001) |   Area    (ha)=  67.51   Curve Number   (CN)= 71.6
|ID= 4 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   1.28

     Unit Hyd Qpeak  (cms)=   2.01

     PEAK FLOW       (cms)=    .65 (i)
     TIME TO PEAK    (hrs)=   2.33
     RUNOFF VOLUME    (mm)=   9.03
     TOTAL RAINFALL   (mm)=  40.60
     RUNOFF COEFFICIENT   =    .22

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

--------------------------------------------------------------------------------
*                   Add post-dev site hydrographs

--------------------
| ADD HYD   (0001) |
|   2 +  3 =  5    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
```

```
          ID1= 2 (0001):     1.79      .16      .67    13.35
        + ID2= 3 (0001):     2.38      .35      .75    17.07
          ================================================
          ID = 5 (0001):     4.17      .41      .75    15.48

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
*                   Shift site hydrograph to account for ditch flow to outlet
*                   Path ~150 m (CA 200) and ~75 m (CA 201)
*                   Assume 5 min lag (assumes <=0.5 m/s flow velocity)
--------------------
| SHIFT HYD (0001) |
| IN= 5---> OUT= 6 |
| SHIFT=  5.0 min  |      AREA     QPEAK     TPEAK      R.V.
--------------------      (ha)     (cms)     (hrs)      (mm)
          ID= 5 (0001):    4.17      .41       .75     15.48
    SHIFT ID= 6 (0001):    4.17      .41       .83     15.48

--------------------------------------------------------------------------------
*                   Add lagged post-dev site, external hydrographs

--------------------
| ADD HYD   (0001) |
|   6 +  4 =  7    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
          ID1= 6 (0001):     4.17      .41      .83    15.48
        + ID2= 4 (0001):    67.51      .65     2.33     9.03
          ================================================
          ID = 7 (0001):    71.68      .66     2.33     9.40

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| SAVE HYD  (0001) |   AREA       (ha)=  71.68
| ID= 7   PCYC=107 |   QPEAK     (cms)=    .66 (i)
| DT= 5.0 min      |   TPEAK     (hrs)=   2.33
--------------------   VOLUME     (mm)=   9.40
  Filename: PST10Y2H.HYD
  Comments:

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

--------------------------------------------------------------------------------
*                   25 yr Event - Uncontrolled
********************************************************************************
--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 572.650
| Ptotal= 48.42 mm |                          B=   1.501
```

```
--------------------                              C=    .659
                        used in:   INTENSITY =  A / (t + B)^C

                        Duration of storm  =  2.00 hrs
                        Storm time step    =  5.00 min
                        Time to peak ratio =   .33

                     The CORRELATION coefficient is =  .9979

                      TIME       INPUT INT.           TAB. INT.
                     (min)        (mm/hr)              (mm/hr)
                        5.         177.70               166.78
                       10.         111.00               114.52
                       15.          87.10                90.27
                       30.          55.80                58.95
                       60.          39.30                37.93
                      120.          24.60                24.22


                  TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
                  .08    9.41 |   .58   45.49 |  1.08   18.38 |  1.58   10.79
                  .17   10.48 |   .67  166.78 |  1.17   16.24 |  1.67   10.18
                  .25   11.92 |   .75   56.48 |  1.25   14.63 |  1.75    9.65
                  .33   13.99 |   .83   34.55 |  1.33   13.37 |  1.83    9.18
                  .42   17.29 |   .92   26.07 |  1.42   12.35 |  1.92    8.77
                  .50   23.72 |  1.00   21.40 |  1.50   11.51 |  2.00    8.40


--------------------------------------------------------------------------------
*                   Pre-Dev: Calibrate CA 100
--------------------
| CALIB             |
| NASHYD    (0001) |   Area    (ha)=  71.63   Curve Number   (CN)= 71.4
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   1.27

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

     Unit Hyd Qpeak  (cms)=   2.15

     PEAK FLOW       (cms)=    .97 (i)
     TIME TO PEAK    (hrs)=   2.33
     RUNOFF VOLUME    (mm)=  12.63
     TOTAL RAINFALL   (mm)=  48.42
     RUNOFF COEFFICIENT   =    .26

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

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

```
--------------------
| SAVE HYD  (0001) |   AREA       (ha)=  71.63
| ID= 1   PCYC=110 |   QPEAK     (cms)=    .97 (i)
| DT= 5.0 min      |   TPEAK     (hrs)=   2.33
--------------------   VOLUME     (mm)=  12.63
  Filename: PRE25Y2H.HYD
  Comments:

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

--------------------------------------------------------------------------------
*                   Post-Dev: Calibrate Catchment 200
--------------------
| CALIB            |
| STANDHYD  (0001) |   Area    (ha)=   1.79
|ID= 2 DT= 5.0 min |   Total Imp(%)=  29.00   Dir. Conn.(%)=  24.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .52          1.27
     Dep. Storage     (mm)=       2.00          7.50
     Average Slope     (%)=       4.00          4.00
     Length            (m)=     109.20        109.20
     Mannings n           =       .013          .250

     Max.eff.Inten.(mm/hr)=     111.63         11.62
               over (min)       10.00         25.00
     Storage Coeff.  (min)=       1.70 (ii)    26.47 (ii)
     Unit Hyd. Tpeak (min)=       5.00         30.00
     Unit Hyd. peak  (cms)=        .32           .04
                                                        *TOTALS*
     PEAK FLOW       (cms)=        .19           .02          .19 (iii)
     TIME TO PEAK    (hrs)=        .67          1.25          .67
     RUNOFF VOLUME    (mm)=      45.72          8.33        17.22
     TOTAL RAINFALL   (mm)=      48.42         48.42        48.42
     RUNOFF COEFFICIENT   =        .94           .17          .36

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

       (i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
            CN*  =  60.0    Ia = Dep. Storage  (Above)
      (ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
*                   Post-Dev: Calibrate Catchment 201
--------------------
| CALIB            |
| STANDHYD  (0001) |   Area    (ha)=   2.38
|ID= 3 DT= 5.0 min |   Total Imp(%)=  45.00   Dir. Conn.(%)=  40.00
```

```
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.07         1.31
     Dep. Storage     (mm)=       2.00        15.00
     Average Slope     (%)=       4.00         4.00
     Length            (m)=     126.00       126.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=     111.63         5.59
               over (min)       10.00        40.00
     Storage Coeff.  (min)=       1.85 (ii)   38.02 (ii)
     Unit Hyd. Tpeak (min)=       5.00        40.00
     Unit Hyd. peak  (cms)=        .32          .03
                                                      *TOTALS*
     PEAK FLOW       (cms)=        .42          .01          .42 (iii)
     TIME TO PEAK    (hrs)=        .67         1.75          .67
     RUNOFF VOLUME    (mm)=      45.72         5.30        21.37
     TOTAL RAINFALL   (mm)=      48.42        48.42        48.42
     RUNOFF COEFFICIENT   =        .94          .11          .44

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

       (i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
            CN*  =  55.9    Ia = Dep. Storage  (Above)
      (ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
*                   Post-Dev: Calibrate Catchment 202
--------------------
| CALIB             |
| NASHYD    (0001) |   Area    (ha)=  67.51   Curve Number   (CN)= 71.6
|ID= 4 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   1.27

     Unit Hyd Qpeak  (cms)=   2.03

     PEAK FLOW       (cms)=    .92 (i)
     TIME TO PEAK    (hrs)=   2.33
     RUNOFF VOLUME    (mm)=  12.72
     TOTAL RAINFALL   (mm)=  48.42
     RUNOFF COEFFICIENT   =    .26

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

--------------------------------------------------------------------------------
*                   Add post-dev site hydrographs

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

```
| ADD HYD   (0001) |
|   2 +  3 =  5    |         AREA    QPEAK    TPEAK     R.V.
-------------------         (ha)    (cms)    (hrs)     (mm)
          ID1= 2 (0001):     1.79      .19      .67    17.22
        + ID2= 3 (0001):     2.38      .42      .67    21.37
          ================================================
          ID = 5 (0001):     4.17      .61      .67    19.59

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
*                   Shift site hydrograph to account for ditch flow to outlet
*                   Path ~150 m (CA 200) and ~75 m (CA 201)
*                   Assume 5 min lag (assumes <=0.5 m/s flow velocity)
--------------------
| SHIFT HYD (0001) |
| IN= 5---> OUT= 6 |
| SHIFT=  5.0 min  |      AREA     QPEAK     TPEAK      R.V.
-------------------      (ha)     (cms)     (hrs)      (mm)
          ID= 5 (0001):    4.17      .61       .67     19.59
    SHIFT ID= 6 (0001):    4.17      .61       .75     19.59

--------------------------------------------------------------------------------
*                   Add lagged post-dev site, external hydrographs

--------------------
| ADD HYD   (0001) |
|   6 +  4 =  7    |         AREA    QPEAK    TPEAK     R.V.
-------------------         (ha)    (cms)    (hrs)     (mm)
          ID1= 6 (0001):     4.17      .61      .75    19.59
        + ID2= 4 (0001):    67.51      .92     2.33    12.72
          ================================================
          ID = 7 (0001):    71.68      .94     2.33    13.12

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| SAVE HYD  (0001) |   AREA       (ha)=  71.68
| ID= 7   PCYC=109 |   QPEAK     (cms)=    .94 (i)
| DT= 5.0 min      |   TPEAK     (hrs)=   2.33
-------------------   VOLUME     (mm)=  13.12
  Filename: PST25Y2H.HYD
  Comments:

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

--------------------------------------------------------------------------------
*                   50 yr Event - Uncontrolled
********************************************************************************
```

```
--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 640.545
| Ptotal= 54.16 mm |                          B=   1.501
--------------------                          C=    .659
                        used in:   INTENSITY =  A / (t + B)^C

                        Duration of storm  =  2.00 hrs
                        Storm time step    =  5.00 min
                        Time to peak ratio =   .33

                     The CORRELATION coefficient is =  .9972

                      TIME       INPUT INT.           TAB. INT.
                     (min)        (mm/hr)              (mm/hr)
                        5.         201.20               186.55
                       10.         123.70               128.09
                       15.          96.90               100.97
                       30.          61.90                65.94
                       60.          44.20                42.43
                      120.          27.70                27.09


                  TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
                   .08   10.52 |   .58   50.88 |  1.08   20.56 |  1.58   12.07
                   .17   11.72 |   .67  186.55 |  1.17   18.16 |  1.67   11.39
                   .25   13.33 |   .75   63.18 |  1.25   16.36 |  1.75   10.80
                   .33   15.64 |   .83   38.64 |  1.33   14.95 |  1.83   10.27
                   .42   19.34 |   .92   29.17 |  1.42   13.81 |  1.92    9.81
                   .50   26.53 |  1.00   23.94 |  1.50   12.87 |  2.00    9.40


--------------------------------------------------------------------------------
*                    Pre-Dev: Calibrate CA 100
--------------------
| CALIB            |
| NASHYD    (0001) |   Area    (ha)=  71.63   Curve Number   (CN)= 71.4
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   1.27

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

     Unit Hyd Qpeak  (cms)=   2.15

     PEAK FLOW       (cms)=   1.19 (i)
     TIME TO PEAK    (hrs)=   2.33
     RUNOFF VOLUME    (mm)=  15.59
     TOTAL RAINFALL   (mm)=  54.16
     RUNOFF COEFFICIENT   =    .29
```

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

--------------------------------------------------------------------------------
--------------------
| SAVE HYD  (0001) |   AREA       (ha)=  71.63
| ID= 1   PCYC=112 |   QPEAK     (cms)=   1.19 (i)
| DT= 5.0 min      |   TPEAK     (hrs)=   2.33
--------------------   VOLUME     (mm)=  15.59
  Filename: PRE50Y2H.HYD
  Comments:

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

--------------------------------------------------------------------------------
*                   Post-Dev: Calibrate Catchment 200
--------------------
| CALIB            |
| STANDHYD  (0001) |   Area    (ha)=   1.79
|ID= 2 DT= 5.0 min |   Total Imp(%)=  29.00   Dir. Conn.(%)=  24.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .52          1.27
     Dep. Storage     (mm)=       2.00          7.50
     Average Slope     (%)=       4.00          4.00
     Length            (m)=     109.20        109.20
     Mannings n           =       .013          .250

     Max.eff.Inten.(mm/hr)=     124.86         14.82
               over (min)        10.00         25.00
     Storage Coeff.  (min)=       1.63 (ii)    24.10 (ii)
     Unit Hyd. Tpeak (min)=       5.00         25.00
     Unit Hyd. peak  (cms)=        .32           .05
                                                      *TOTALS*
     PEAK FLOW       (cms)=        .22           .03          .22 (iii)
     TIME TO PEAK    (hrs)=        .67          1.17          .67
     RUNOFF VOLUME    (mm)=      51.38         10.51        20.24
     TOTAL RAINFALL   (mm)=      54.16         54.16        54.16
     RUNOFF COEFFICIENT   =        .95           .19          .37

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

       (i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
            CN*  =  60.0    Ia = Dep. Storage  (Above)
      (ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
*                   Post-Dev: Calibrate Catchment 201
--------------------
```

```
| CALIB            |
| STANDHYD  (0001) |   Area    (ha)=   2.38
|ID= 3 DT= 5.0 min |   Total Imp(%)=  45.00   Dir. Conn.(%)=  40.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.07         1.31
     Dep. Storage     (mm)=       2.00        15.00
     Average Slope     (%)=       4.00         4.00
     Length            (m)=     126.00       126.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=     124.86         8.01
               over (min)       10.00        35.00
     Storage Coeff.  (min)=       1.77 (ii)   33.10 (ii)
     Unit Hyd. Tpeak (min)=       5.00        35.00
     Unit Hyd. peak  (cms)=        .32          .03
                                                      *TOTALS*
     PEAK FLOW       (cms)=        .47          .02          .47 (iii)
     TIME TO PEAK    (hrs)=        .67         1.58          .67
     RUNOFF VOLUME    (mm)=      51.38         7.03        24.69
     TOTAL RAINFALL   (mm)=      54.16        54.16        54.16
     RUNOFF COEFFICIENT   =        .95          .13          .46

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

       (i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
            CN*  =  55.9    Ia = Dep. Storage  (Above)
      (ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
*                   Post-Dev: Calibrate Catchment 202
--------------------
| CALIB            |
| NASHYD    (0001) |   Area    (ha)=  67.51   Curve Number   (CN)= 71.6
|ID= 4 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   1.27

     Unit Hyd Qpeak  (cms)=   2.03

     PEAK FLOW       (cms)=   1.13 (i)
     TIME TO PEAK    (hrs)=   2.33
     RUNOFF VOLUME    (mm)=  15.69
     TOTAL RAINFALL   (mm)=  54.16
     RUNOFF COEFFICIENT   =    .29

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

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

```
*                   Add post-dev site hydrographs

--------------------
| ADD HYD   (0001) |
|   2 +  3 =  5    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
          ID1= 2 (0001):     1.79      .22      .67    20.24
        + ID2= 3 (0001):     2.38      .47      .67    24.69
          ================================================
          ID = 5 (0001):     4.17      .69      .67    22.78

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
*                   Shift site hydrograph to account for ditch flow to outlet
*                   Path ~150 m (CA 200) and ~75 m (CA 201)
*                   Assume 5 min lag (assumes <=0.5 m/s flow velocity)
--------------------
| SHIFT HYD (0001) |
| IN= 5---> OUT= 6 |
| SHIFT=  5.0 min  |      AREA     QPEAK     TPEAK      R.V.
--------------------      (ha)     (cms)     (hrs)      (mm)
          ID= 5 (0001):    4.17      .69       .67     22.78
    SHIFT ID= 6 (0001):    4.17      .69       .75     22.78

--------------------------------------------------------------------------------
*                   Add lagged post-dev site, external hydrographs

--------------------
| ADD HYD   (0001) |
|   6 +  4 =  7    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
          ID1= 6 (0001):     4.17      .69      .75    22.78
        + ID2= 4 (0001):    67.51     1.13     2.33    15.69
          ================================================
          ID = 7 (0001):    71.68     1.16     2.33    16.10

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| SAVE HYD  (0001) |   AREA       (ha)=  71.68
| ID= 7   PCYC=111 |   QPEAK     (cms)=   1.16 (i)
| DT= 5.0 min      |   TPEAK     (hrs)=   2.33
--------------------   VOLUME     (mm)=  16.10
  Filename: PST50Y2H.HYD
  Comments:

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

```
--------------------------------------------------------------------------------
*                   100 yr Event - Uncontrolled
********************************************************************************
--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 708.927
| Ptotal= 59.94 mm |                          B=   1.501
--------------------                          C=    .659
                         used in:   INTENSITY =  A / (t + B)^C

                         Duration of storm  =  2.00 hrs
                         Storm time step    =  5.00 min
                         Time to peak ratio =   .33

                      The CORRELATION coefficient is =  .9965

                       TIME       INPUT INT.           TAB. INT.
                      (min)        (mm/hr)              (mm/hr)
                         5.         224.50               206.47
                        10.         136.20               141.77
                        15.         106.60               111.75
                        30.          68.00                72.98
                        60.          49.00                46.96
                       120.          30.70                29.98


                  TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
                   .08   11.65 |   .58   56.31 |  1.08   22.75 |  1.58   13.36
                   .17   12.97 |   .67  206.47 |  1.17   20.10 |  1.67   12.61
                   .25   14.75 |   .75   69.92 |  1.25   18.11 |  1.75   11.95
                   .33   17.31 |   .83   42.77 |  1.33   16.55 |  1.83   11.37
                   .42   21.41 |   .92   32.28 |  1.42   15.29 |  1.92   10.86
                   .50   29.36 |  1.00   26.49 |  1.50   14.24 |  2.00   10.40


--------------------------------------------------------------------------------
*                   Pre-Dev: Calibrate CA 100
--------------------
| CALIB            |
| NASHYD    (0001) |   Area    (ha)=  71.63   Curve Number   (CN)= 71.4
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   1.27

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

     Unit Hyd Qpeak  (cms)=   2.15

     PEAK FLOW       (cms)=   1.44 (i)
     TIME TO PEAK    (hrs)=   2.33
     RUNOFF VOLUME    (mm)=  18.76
```

```
     TOTAL RAINFALL   (mm)=  59.94
     RUNOFF COEFFICIENT   =    .31

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

--------------------------------------------------------------------------------
--------------------
| SAVE HYD  (0001) |   AREA       (ha)=  71.63
| ID= 1   PCYC=113 |   QPEAK     (cms)=   1.44 (i)
| DT= 5.0 min      |   TPEAK     (hrs)=   2.33
--------------------   VOLUME     (mm)=  18.76
  Filename: PRE00Y2H.HYD
  Comments:

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

--------------------------------------------------------------------------------
*                   Post-Dev: Calibrate Catchment 200
--------------------
| CALIB            |
| STANDHYD  (0001) |   Area    (ha)=   1.79
|ID= 2 DT= 5.0 min |   Total Imp(%)=  29.00   Dir. Conn.(%)=  24.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .52          1.27
     Dep. Storage     (mm)=       2.00          7.50
     Average Slope     (%)=       4.00          4.00
     Length            (m)=     109.20        109.20
     Mannings n           =       .013          .250

     Max.eff.Inten.(mm/hr)=     138.19         20.49
               over (min)        10.00         20.00
     Storage Coeff.  (min)=       1.56 (ii)    21.30 (ii)
     Unit Hyd. Tpeak (min)=       5.00         25.00
     Unit Hyd. peak  (cms)=        .33           .05
                                                      *TOTALS*
     PEAK FLOW       (cms)=        .24           .04          .24 (iii)
     TIME TO PEAK    (hrs)=        .67          1.08          .67
     RUNOFF VOLUME    (mm)=      57.07         12.89        23.43
     TOTAL RAINFALL   (mm)=      59.94         59.94        59.94
     RUNOFF COEFFICIENT   =        .95           .22          .39

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

       (i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
            CN*  =  60.0    Ia = Dep. Storage  (Above)
      (ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
```

```
--------------------------------------------------------------------------------
*                   Post-Dev: Calibrate Catchment 201
--------------------
| CALIB            |
| STANDHYD  (0001) |   Area    (ha)=   2.38
|ID= 3 DT= 5.0 min |   Total Imp(%)=  45.00   Dir. Conn.(%)=  40.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.07         1.31
     Dep. Storage     (mm)=       2.00        15.00
     Average Slope     (%)=       4.00         4.00
     Length            (m)=     126.00       126.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=     138.19        11.14
               over (min)        10.00        30.00
     Storage Coeff.  (min)=       1.70 (ii)   29.15 (ii)
     Unit Hyd. Tpeak (min)=       5.00        30.00
     Unit Hyd. peak  (cms)=        .32          .04
                                                      *TOTALS*
     PEAK FLOW       (cms)=        .52          .02          .53 (iii)
     TIME TO PEAK    (hrs)=        .67         1.42          .67
     RUNOFF VOLUME    (mm)=      57.07         8.97        28.15
     TOTAL RAINFALL   (mm)=      59.94        59.94        59.94
     RUNOFF COEFFICIENT   =        .95          .15          .47

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

       (i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
            CN*  =  55.9    Ia = Dep. Storage  (Above)
      (ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
*                   Post-Dev: Calibrate Catchment 202
--------------------
| CALIB            |
| NASHYD    (0001) |   Area    (ha)=  67.51   Curve Number   (CN)= 71.6
|ID= 4 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   1.27

     Unit Hyd Qpeak  (cms)=   2.03

     PEAK FLOW       (cms)=   1.36 (i)
     TIME TO PEAK    (hrs)=   2.33
     RUNOFF VOLUME    (mm)=  18.88
     TOTAL RAINFALL   (mm)=  59.94
     RUNOFF COEFFICIENT   =    .32
```

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

```
--------------------------------------------------------------------------------
*                   Add post-dev site hydrographs

--------------------
| ADD HYD   (0001) |
|   2 +  3 =  5    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
          ID1= 2 (0001):     1.79      .24      .67    23.43
        + ID2= 3 (0001):     2.38      .53      .67    28.15
          ================================================
          ID = 5 (0001):     4.17      .77      .67    26.12

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
*                   Shift site hydrograph to account for ditch flow to outlet
*                   Path ~150 m (CA 200) and ~75 m (CA 201)
*                   Assume 5 min lag (assumes <=0.5 m/s flow velocity)
--------------------
| SHIFT HYD (0001) |
| IN= 5---> OUT= 6 |
| SHIFT=  5.0 min  |      AREA     QPEAK     TPEAK      R.V.
--------------------      (ha)     (cms)     (hrs)      (mm)
          ID= 5 (0001):    4.17      .77       .67     26.12
    SHIFT ID= 6 (0001):    4.17      .77       .75     26.12

--------------------------------------------------------------------------------
*                   Add lagged post-dev site, external hydrographs

--------------------
| ADD HYD   (0001) |
|   6 +  4 =  7    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
          ID1= 6 (0001):     4.17      .77      .75    26.12
        + ID2= 4 (0001):    67.51     1.36     2.33    18.88
          ================================================
          ID = 7 (0001):    71.68     1.39     2.25    19.30

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| SAVE HYD  (0001) |   AREA       (ha)=  71.68
| ID= 7   PCYC=113 |   QPEAK     (cms)=   1.39 (i)
| DT= 5.0 min      |   TPEAK     (hrs)=   2.25
--------------------   VOLUME     (mm)=  19.30
  Filename: PST00Y2H.HYD
  Comments:
```

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

****

* Chicago 4-hr Events

****

* 2 yr Event - Uncontrolled

****

CHICAGO STORM
Ptotal= 30.87 mm

IDF curve parameters: A= 357.044
B= 3.000
C= .698
used in: INTENSITY = A / (t + B)^C

Duration of storm = 4.00 hrs
Storm time step = 5.00 min
Time to peak ratio = .33

The CORRELATION coefficient is = .9999

TIME (min)	INPUT INT. (mm/hr)	TAB. INT. (mm/hr)
5.	83.10	83.63
10.	60.30	59.59
15.	47.80	47.48
30.	31.10	31.10
60.	19.60	19.81
120.	12.30	12.42
360.	5.90	5.83

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.08	2.53	1.08	8.71	2.08	6.00	3.08	3.23
.17	2.66	1.17	12.40	2.17	5.55	3.17	3.13
.25	2.81	1.25	25.47	2.25	5.17	3.25	3.03
.33	2.98	1.33	83.63	2.33	4.85	3.33	2.94
.42	3.17	1.42	32.10	2.42	4.58	3.42	2.85
.50	3.41	1.50	18.87	2.50	4.33	3.50	2.77
.58	3.68	1.58	13.78	2.58	4.12	3.58	2.70
.67	4.02	1.67	11.05	2.67	3.93	3.67	2.63
.75	4.45	1.75	9.32	2.75	3.76	3.75	2.56
.83	5.01	1.83	8.12	2.83	3.61	3.83	2.50
.92	5.77	1.92	7.23	2.92	3.47	3.92	2.44
1.00	6.88	2.00	6.54	3.00	3.35	4.00	2.39

---

* Pre-Dev: Calibrate CA 100

```
--------------------
| CALIB            |
| NASHYD    (0001) |   Area    (ha)=  71.63   Curve Number   (CN)= 71.4
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   1.28

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

     Unit Hyd Qpeak  (cms)=   2.14

     PEAK FLOW       (cms)=    .31 (i)
     TIME TO PEAK    (hrs)=   3.33
     RUNOFF VOLUME    (mm)=   5.17
     TOTAL RAINFALL   (mm)=  30.87
     RUNOFF COEFFICIENT   =    .17

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

--------------------------------------------------------------------------------
--------------------
| SAVE HYD  (0001) |   AREA       (ha)=  71.63
| ID= 1   PCYC=119 |   QPEAK     (cms)=    .31 (i)
| DT= 5.0 min      |   TPEAK     (hrs)=   3.33
--------------------   VOLUME     (mm)=   5.17
  Filename: PRE2Y4H.HYD
  Comments:

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

--------------------------------------------------------------------------------
*                   Post-Dev: Calibrate Catchment 200
--------------------
| CALIB            |
| STANDHYD  (0001) |   Area    (ha)=   1.79
|ID= 2 DT= 5.0 min |   Total Imp(%)=  29.00   Dir. Conn.(%)=  24.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .52          1.27
     Dep. Storage     (mm)=       2.00          7.50
     Average Slope     (%)=       4.00          4.00
     Length            (m)=     109.20        109.20
     Mannings n             =       .013          .250

     Max.eff.Inten.(mm/hr)=      57.86          2.16
               over (min)        10.00         50.00
     Storage Coeff.  (min)=       2.21 (ii)    50.74 (ii)
     Unit Hyd. Tpeak (min)=       5.00         55.00
     Unit Hyd. peak  (cms)=        .30           .02
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .09           .00             .09 (iii)
```

```
     TIME TO PEAK    (hrs)=       1.42         2.67          1.42
     RUNOFF VOLUME    (mm)=      28.67         3.08          9.06
     TOTAL RAINFALL   (mm)=      30.87        30.87         30.87
     RUNOFF COEFFICIENT   =        .93          .10           .29

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

       (i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
            CN*  =  60.0    Ia = Dep. Storage  (Above)
      (ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
*                   Post-Dev: Calibrate Catchment 201
--------------------
| CALIB            |
| STANDHYD  (0001) |   Area    (ha)=   2.38
|ID= 3 DT= 5.0 min |   Total Imp(%)=  45.00   Dir. Conn.(%)=  40.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.07         1.31
     Dep. Storage     (mm)=       2.00        15.00
     Average Slope     (%)=       4.00         4.00
     Length            (m)=     126.00       126.00
     Mannings n             =       .013         .250

     Max.eff.Inten.(mm/hr)=      57.86          .71
               over (min)        10.00        85.00
     Storage Coeff.  (min)=       2.41 (ii)   85.16 (ii)
     Unit Hyd. Tpeak (min)=       5.00        90.00
     Unit Hyd. peak  (cms)=        .30          .01
                                                        *TOTALS*
     PEAK FLOW       (cms)=        .20          .00           .20 (iii)
     TIME TO PEAK    (hrs)=       1.42         4.17          1.42
     RUNOFF VOLUME    (mm)=      28.67         1.43         12.12
     TOTAL RAINFALL   (mm)=      30.87        30.87         30.87
     RUNOFF COEFFICIENT   =        .93          .05           .39

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

       (i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
            CN*  =  55.9    Ia = Dep. Storage  (Above)
      (ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
*                   Post-Dev: Calibrate Catchment 202
--------------------
```

```
| CALIB            |
| NASHYD    (0001) |   Area    (ha)=  67.51   Curve Number   (CN)= 71.6
|ID= 4 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
-------------------   U.H. Tp(hrs)=   1.28

     Unit Hyd Qpeak  (cms)=   2.01

     PEAK FLOW       (cms)=    .29 (i)
     TIME TO PEAK    (hrs)=   3.33
     RUNOFF VOLUME    (mm)=   5.21
     TOTAL RAINFALL   (mm)=  30.87
     RUNOFF COEFFICIENT   =    .17

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

--------------------------------------------------------------------------------
*                    Add post-dev site hydrographs

--------------------
| ADD HYD   (0001) |
|   2 +  3 =  5    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
          ID1= 2 (0001):     1.79      .09     1.42     9.06
        + ID2= 3 (0001):     2.38      .20     1.42    12.12
          ================================================
          ID = 5 (0001):     4.17      .29     1.42    10.82

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
*                    Shift site hydrograph to account for ditch flow to outlet
*                    Path ~150 m (CA 200) and ~75 m (CA 201)
*                    Assume 5 min lag (conservative, <0.5 m/s flow velocity)
--------------------
| SHIFT HYD (0001) |
| IN= 5---> OUT= 6 |
| SHIFT=  5.0 min  |      AREA     QPEAK     TPEAK      R.V.
--------------------      (ha)     (cms)     (hrs)      (mm)
          ID= 5 (0001):    4.17      .29      1.42     10.82
    SHIFT ID= 6 (0001):    4.17      .29      1.50     10.82

--------------------------------------------------------------------------------
*                    Add lagged post-dev site, external hydrographs

--------------------
| ADD HYD   (0001) |
|   6 +  4 =  7    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
          ID1= 6 (0001):     4.17      .29     1.50    10.82
        + ID2= 4 (0001):    67.51      .29     3.33     5.21
```

```
          ================================================
          ID = 7 (0001):    71.68      .31     1.50     5.54

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| SAVE HYD  (0001) |   AREA       (ha)=  71.68
| ID= 7   PCYC=119 |   QPEAK     (cms)=    .31 (i)
| DT= 5.0 min      |   TPEAK     (hrs)=   1.50
--------------------   VOLUME     (mm)=   5.54
  Filename: PST2Y4H.HYD
  Comments:

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

--------------------------------------------------------------------------------
*                    2 yr Event - Controlled
********************************************************************************
--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 357.044
| Ptotal= 30.87 mm |                          B=   3.000
--------------------                          C=    .698
                         used in:   INTENSITY =  A / (t + B)^C

                         Duration of storm  =  4.00 hrs
                         Storm time step    =  5.00 min
                         Time to peak ratio =   .33

                      The CORRELATION coefficient is =  .9999

                       TIME       INPUT INT.           TAB. INT.
                      (min)        (mm/hr)              (mm/hr)
                         5.          83.10                83.63
                        10.          60.30                59.59
                        15.          47.80                47.48
                        30.          31.10                31.10
                        60.          19.60                19.81
                       120.          12.30                12.42
                       360.           5.90                 5.83


                   TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                    hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
                    .08    2.53 |  1.08    8.71 |  2.08    6.00 |  3.08    3.23
                    .17    2.66 |  1.17   12.40 |  2.17    5.55 |  3.17    3.13
                    .25    2.81 |  1.25   25.47 |  2.25    5.17 |  3.25    3.03
                    .33    2.98 |  1.33   83.63 |  2.33    4.85 |  3.33    2.94
                    .42    3.17 |  1.42   32.10 |  2.42    4.58 |  3.42    2.85
                    .50    3.41 |  1.50   18.87 |  2.50    4.33 |  3.50    2.77
```

.58	3.68	1.58	13.78	2.58	4.12	3.58	2.70
.67	4.02	1.67	11.05	2.67	3.93	3.67	2.63
.75	4.45	1.75	9.32	2.75	3.76	3.75	2.56
.83	5.01	1.83	8.12	2.83	3.61	3.83	2.50
.92	5.77	1.92	7.23	2.92	3.47	3.92	2.44
1.00	6.88	2.00	6.54	3.00	3.35	4.00	2.39

---

* Pre-Dev: Calibrate CA 100

CALIB			
NASHYD (0001)	Area (ha)=	71.63	Curve Number (CN)= 71.4
ID= 1 DT= 5.0 min	Ia (mm)=	5.00	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)=	1.28	

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

Unit Hyd Qpeak (cms)= 2.14

PEAK FLOW (cms)= .31 (i)
TIME TO PEAK (hrs)= 3.33
RUNOFF VOLUME (mm)= 5.17
TOTAL RAINFALL (mm)= 30.87
RUNOFF COEFFICIENT = .17

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

SAVE HYD (0001)	AREA (ha)=	71.63
ID= 1 PCYC=119	QPEAK (cms)=	.31 (i)
DT= 5.0 min	TPEAK (hrs)=	3.33
	VOLUME (mm)=	5.17

Filename: PRE2Y4H.HYD
Comments:

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

---

* Post-Dev: Calibrate Catchment 200

CALIB			
STANDHYD (0001)	Area (ha)=	1.79	
ID= 2 DT= 5.0 min	Total Imp(%)=	29.00	Dir. Conn.(%)= 24.00

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	.52	1.27
Dep. Storage (mm)=	2.00	7.50
Average Slope (%)=	4.00	4.00

```
     Length            (m)=     109.20       109.20
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      57.86         2.16
               over (min)        10.00        50.00
     Storage Coeff.  (min)=       2.21 (ii)   50.74 (ii)
     Unit Hyd. Tpeak (min)=       5.00        55.00
     Unit Hyd. peak  (cms)=        .30          .02
                                                      *TOTALS*
     PEAK FLOW       (cms)=        .09          .00          .09 (iii)
     TIME TO PEAK    (hrs)=       1.42         2.67         1.42
     RUNOFF VOLUME    (mm)=      28.67         3.08         9.06
     TOTAL RAINFALL   (mm)=      30.87        30.87        30.87
     RUNOFF COEFFICIENT   =        .93          .10          .29

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

       (i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
            CN*  =  60.0    Ia = Dep. Storage  (Above)
      (ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
*                   Post-Dev: Calibrate Catchment 201
--------------------
| CALIB            |
| STANDHYD  (0001) |   Area    (ha)=   2.38
|ID= 3 DT= 5.0 min |   Total Imp(%)=  45.00   Dir. Conn.(%)=  40.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.07         1.31
     Dep. Storage     (mm)=       2.00        15.00
     Average Slope     (%)=       4.00         4.00
     Length            (m)=     126.00       126.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      57.86          .71
               over (min)        10.00        85.00
     Storage Coeff.  (min)=       2.41 (ii)   85.16 (ii)
     Unit Hyd. Tpeak (min)=       5.00        90.00
     Unit Hyd. peak  (cms)=        .30          .01
                                                      *TOTALS*
     PEAK FLOW       (cms)=        .20          .00          .20 (iii)
     TIME TO PEAK    (hrs)=       1.42         4.17         1.42
     RUNOFF VOLUME    (mm)=      28.67         1.43        12.12
     TOTAL RAINFALL   (mm)=      30.87        30.87        30.87
     RUNOFF COEFFICIENT   =        .93          .05          .39

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

```
       (i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
            CN*  =  55.9    Ia = Dep. Storage  (Above)
      (ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
*                   Split off 0.165 cms - capacity of CA 201 OGS

*                   Remainder direct discharge to outlet

--------------------
| DUHYD     (0001) |
| Inlet Cap.= .165 |
| #of Inlets=    1 |
| Total(cms)=   .2 |      AREA     QPEAK     TPEAK    R.V.
--------------------      (ha)     (cms)     (hrs)    (mm)
     TOTAL HYD.(ID= 3):   2.38       .20      1.42   12.12
     ==================================================
     MAJOR SYS.(ID= 4):    .09       .04      1.42   12.12
     MINOR SYS.(ID= 5):   2.29       .17      1.42   12.12

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
*                   Split off 0.015 cms from OGS - direct discharge to outlet

*                   Direct remainder to infiltration - 2yr quantity control

*                   Runoff directed to infiltration removed - no discharge
--------------------
| DUHYD     (0001) |
| Inlet Cap.= .015 |
| #of Inlets=    1 |
| Total(cms)=   .0 |      AREA     QPEAK     TPEAK    R.V.
--------------------      (ha)     (cms)     (hrs)    (mm)
     TOTAL HYD.(ID= 5):   2.29       .17      1.42   12.12
     ==================================================
     MAJOR SYS.(ID= 6):   1.03       .15      1.42   12.12
     MINOR SYS.(ID= 7):   1.26       .02      1.08   12.12

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
*                   Determine required infiltration storage volume

*                   Based on the volume of the infiltration hydrograph

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

```
| COMPUTE VOLUME   |
| ID= 6   (0001)   |             DISCHARGE      TIME
-------------------                (cms)       (hrs)
           START CONTROLLING AT      .00        1.00
           INFLOW HYD. PEAKS AT      .15        1.42
           STOP  CONTROLLING AT      .00        2.33

           REQUIRED STORAGE VOLUME (ha.m.)=    .0125
           TOTAL HYDROGRAPH VOLUME (ha.m.)=    .0125
           % OF HYDROGRAPH TO STORE       =  99.9997

           NOTE:  Storage was computed to reduce the Inflow

--------------------------------------------------------------------------------
*                   Add hydrographs for non-infiltrated CA 201 runoff

--------------------
| ADD HYD   (0001) |
|   4 +  7 =  8    |         AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)    (cms)    (hrs)     (mm)
          ID1= 4 (0001):      .09      .04     1.42    12.12
        + ID2= 7 (0001):     1.26      .02     1.08    12.12
          ================================================
          ID = 8 (0001):     1.35      .05     1.42    12.12

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
*                   Post-Dev: Calibrate Catchment 202
--------------------
| CALIB            |
| NASHYD    (0001) |   Area    (ha)=  67.51   Curve Number   (CN)= 71.6
|ID= 4 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
-------------------   U.H. Tp(hrs)=   1.28

     Unit Hyd Qpeak  (cms)=   2.01

     PEAK FLOW       (cms)=    .29 (i)
     TIME TO PEAK    (hrs)=   3.33
     RUNOFF VOLUME    (mm)=   5.21
     TOTAL RAINFALL   (mm)=  30.87
     RUNOFF COEFFICIENT   =    .17

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

--------------------------------------------------------------------------------
*                   Add post-dev site hydrographs

--------------------
| ADD HYD   (0001) |
```

```
|   2 +  8 =  5    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
          ID1= 2 (0001):     1.79      .09     1.42     9.06
        + ID2= 8 (0001):     1.35      .05     1.42    12.12
          ================================================
          ID = 5 (0001):     3.14      .14     1.42    10.38

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
*                   Shift site hydrograph to account for ditch flow to outlet
*                   Path ~150 m (CA 200) and ~75 m (CA 201)
*                   Assume 5 min lag (assumes <=0.5 m/s flow velocity)
--------------------
| SHIFT HYD (0001) |
| IN= 5---> OUT= 6 |
| SHIFT=  5.0 min  |      AREA     QPEAK     TPEAK      R.V.
--------------------      (ha)     (cms)     (hrs)      (mm)
          ID= 5 (0001):    3.14      .14      1.42     10.38
    SHIFT ID= 6 (0001):    3.14      .14      1.50     10.38

------------------------------------------------------------------------------
*                   Add lagged post-dev site, external hydrographs

--------------------
| ADD HYD   (0001) |
|   6 +  4 =  7    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
          ID1= 6 (0001):     3.14      .14     1.50    10.38
        + ID2= 4 (0001):    67.51      .29     3.33     5.21
          ================================================
          ID = 7 (0001):    70.65      .31     3.33     5.44

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
--------------------
| SAVE HYD  (0001) |   AREA       (ha)=  70.65
| ID= 7   PCYC=119 |   QPEAK     (cms)=    .31 (i)
| DT= 5.0 min      |   TPEAK     (hrs)=   3.33
--------------------   VOLUME      (mm)=   5.44
  Filename: PST2Y4H.HYD
  Comments:

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

------------------------------------------------------------------------------
*                   5 yr Event - Uncontrolled
******************************************************************************
--------------------
```

| CHICAGO STORM | IDF curve parameters: A= 434.425
| Ptotal= 42.30 mm | B= 1.773
C= .677
used in: INTENSITY = A / (t + B)^C

Duration of storm = 4.00 hrs
Storm time step = 5.00 min
Time to peak ratio = .33

The CORRELATION coefficient is = .9997

TIME (min)	INPUT INT. (mm/hr)	TAB. INT. (mm/hr)
5.	120.90	118.98
10.	80.60	81.83
15.	63.60	64.40
30.	41.00	41.79
60.	27.50	26.64
120.	17.20	16.83
360.	7.90	8.05

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.08	3.65	1.08	11.76	2.08	8.29	3.08	4.61
.17	3.83	1.17	16.35	2.17	7.70	3.17	4.47
.25	4.04	1.25	32.29	2.25	7.21	3.25	4.33
.33	4.27	1.33	118.98	2.33	6.79	3.33	4.21
.42	4.54	1.42	40.40	2.42	6.42	3.42	4.09
.50	4.85	1.50	24.21	2.50	6.10	3.50	3.99
.58	5.23	1.58	18.04	2.58	5.82	3.58	3.88
.67	5.68	1.67	14.68	2.67	5.56	3.67	3.79
.75	6.25	1.75	12.53	2.75	5.34	3.75	3.70
.83	6.99	1.83	11.01	2.83	5.13	3.83	3.61
.92	7.99	1.92	9.88	2.92	4.94	3.92	3.53
1.00	9.43	2.00	9.00	3.00	4.77	4.00	3.46

---

* Pre-Dev: Calibrate CA 100

CALIB	
NASHYD (0001)	Area (ha)= 71.63 Curve Number (CN)= 71.4
ID= 1 DT= 5.0 min	Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 1.28

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

Unit Hyd Qpeak (cms)= 2.14

```
     PEAK FLOW       (cms)=    .58 (i)
     TIME TO PEAK    (hrs)=   3.25
     RUNOFF VOLUME    (mm)=   9.87
     TOTAL RAINFALL   (mm)=  42.30
     RUNOFF COEFFICIENT   =    .23

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

--------------------------------------------------------------------------------
--------------------
| SAVE HYD  (0001) |   AREA       (ha)=  71.63
| ID= 1   PCYC=125 |   QPEAK     (cms)=    .58 (i)
| DT= 5.0 min      |   TPEAK     (hrs)=   3.25
--------------------   VOLUME     (mm)=   9.87
  Filename: PRE5Y4H.HYD
  Comments:

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

--------------------------------------------------------------------------------
*                   Post-Dev: Calibrate Catchment 200
--------------------
| CALIB            |
| STANDHYD  (0001) |   Area    (ha)=   1.79
|ID= 2 DT= 5.0 min |   Total Imp(%)=  29.00   Dir. Conn.(%)=  24.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .52          1.27
     Dep. Storage     (mm)=       2.00          7.50
     Average Slope     (%)=       4.00          4.00
     Length            (m)=     109.20        109.20
     Mannings n           =       .013          .250

     Max.eff.Inten.(mm/hr)=      79.69          5.47
               over (min)        10.00         35.00
     Storage Coeff.  (min)=       1.95 (ii)    35.44 (ii)
     Unit Hyd. Tpeak (min)=       5.00         40.00
     Unit Hyd. peak  (cms)=        .31           .03
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .13           .01           .13 (iii)
     TIME TO PEAK    (hrs)=       1.42          2.25          1.42
     RUNOFF VOLUME    (mm)=      40.01          6.34         14.30
     TOTAL RAINFALL   (mm)=      42.30         42.30         42.30
     RUNOFF COEFFICIENT   =        .95           .15           .34

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

       (i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
            CN*  =  60.0    Ia = Dep. Storage  (Above)
      (ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
```

```
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
*                   Post-Dev: Calibrate Catchment 201
--------------------
| CALIB            |
| STANDHYD  (0001) |   Area    (ha)=   2.38
|ID= 3 DT= 5.0 min |   Total Imp(%)=  45.00   Dir. Conn.(%)=  40.00
--------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.07         1.31
     Dep. Storage     (mm)=       2.00        15.00
     Average Slope     (%)=       4.00         4.00
     Length            (m)=     126.00       126.00
     Mannings n             =       .013         .250

     Max.eff.Inten.(mm/hr)=      79.69         2.28
               over (min)        10.00        55.00
     Storage Coeff.  (min)=       2.12 (ii)   53.91 (ii)
     Unit Hyd. Tpeak (min)=       5.00        55.00
     Unit Hyd. peak  (cms)=        .31          .02
                                                        *TOTALS*
     PEAK FLOW       (cms)=        .29          .00           .29 (iii)
     TIME TO PEAK    (hrs)=       1.42         3.00          1.42
     RUNOFF VOLUME    (mm)=      40.01         3.77         18.14
     TOTAL RAINFALL   (mm)=      42.30        42.30         42.30
     RUNOFF COEFFICIENT   =        .95          .09           .43

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

       (i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
            CN*  =  55.9    Ia = Dep. Storage  (Above)
      (ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
*                   Post-Dev: Calibrate Catchment 202
--------------------
| CALIB            |
| NASHYD    (0001) |   Area    (ha)=  67.51   Curve Number   (CN)= 71.6
|ID= 4 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   1.28

     Unit Hyd Qpeak  (cms)=   2.01

     PEAK FLOW       (cms)=    .55 (i)
     TIME TO PEAK    (hrs)=   3.25
     RUNOFF VOLUME    (mm)=   9.94
```

```
     TOTAL RAINFALL   (mm)=  42.30
     RUNOFF COEFFICIENT   =    .24

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

--------------------------------------------------------------------------------
*                    Add post-dev site hydrographs

--------------------
| ADD HYD   (0001) |
|   2 +  3 =  5    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
          ID1= 2 (0001):     1.79      .13     1.42    14.30
        + ID2= 3 (0001):     2.38      .29     1.42    18.14
          ================================================
          ID = 5 (0001):     4.17      .43     1.42    16.51

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
*                    Shift site hydrograph to account for ditch flow to outlet
*                    Path ~150 m (CA 200) and ~75 m (CA 201)
*                    Assume 5 min lag (assumes <=0.5 m/s flow velocity)
--------------------
| SHIFT HYD (0001) |
| IN= 5---> OUT= 6 |
| SHIFT=  5.0 min  |       AREA     QPEAK     TPEAK      R.V.
--------------------       (ha)     (cms)     (hrs)      (mm)
          ID= 5 (0001):     4.17      .43      1.42     16.51
    SHIFT ID= 6 (0001):     4.17      .43      1.50     16.51

--------------------------------------------------------------------------------
*                    Add lagged post-dev site, external hydrographs

--------------------
| ADD HYD   (0001) |
|   6 +  4 =  7    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
          ID1= 6 (0001):     4.17      .43     1.50    16.51
        + ID2= 4 (0001):    67.51      .55     3.25     9.94
          ================================================
          ID = 7 (0001):    71.68      .58     3.25    10.32

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| SAVE HYD  (0001) |   AREA       (ha)=  71.68
| ID= 7   PCYC=125 |   QPEAK     (cms)=    .58 (i)
| DT= 5.0 min      |   TPEAK     (hrs)=   3.25
```

```
--------------------   VOLUME     (mm)=  10.32
  Filename: PST5Y4H.HYD
  Comments:

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

--------------------------------------------------------------------------------
*                    10 yr Event - Uncontrolled
********************************************************************************
--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 496.545
| Ptotal= 50.01 mm |                          B=   1.501
--------------------                          C=    .671
                         used in:   INTENSITY =  A / (t + B)^C

                         Duration of storm  =  4.00 hrs
                         Storm time step    =  5.00 min
                         Time to peak ratio =   .33

                      The CORRELATION coefficient is =  .9994

                       TIME       INPUT INT.           TAB. INT.
                      (min)        (mm/hr)              (mm/hr)
                         5.         146.00               141.40
                        10.          94.00                96.43
                        15.          74.00                75.68
                        30.          47.50                49.04
                        60.          32.70                31.31
                       120.          20.50                19.82
                       360.           9.30                 9.54


                  TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
                   .08    4.38 |  1.08   13.87 |  2.08    9.84 |  3.08    5.52
                   .17    4.60 |  1.17   19.16 |  2.17    9.15 |  3.17    5.35
                   .25    4.84 |  1.25   37.35 |  2.25    8.58 |  3.25    5.19
                   .33    5.11 |  1.33  141.40 |  2.33    8.08 |  3.33    5.04
                   .42    5.43 |  1.42   46.58 |  2.42    7.65 |  3.42    4.91
                   .50    5.80 |  1.50   28.15 |  2.50    7.27 |  3.50    4.78
                   .58    6.25 |  1.58   21.11 |  2.58    6.94 |  3.58    4.66
                   .67    6.79 |  1.67   17.25 |  2.67    6.64 |  3.67    4.54
                   .75    7.46 |  1.75   14.76 |  2.75    6.37 |  3.75    4.44
                   .83    8.32 |  1.83   13.01 |  2.83    6.13 |  3.83    4.34
                   .92    9.49 |  1.92   11.70 |  2.92    5.91 |  3.92    4.24
                  1.00   11.17 |  2.00   10.67 |  3.00    5.71 |  4.00    4.15


--------------------------------------------------------------------------------
*                    Pre-Dev: Calibrate CA 100
```

```
--------------------
| CALIB            |
| NASHYD    (0001) |   Area    (ha)=  71.63   Curve Number   (CN)= 71.4
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   1.28

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

     Unit Hyd Qpeak  (cms)=   2.14

     PEAK FLOW       (cms)=    .81 (i)
     TIME TO PEAK    (hrs)=   3.25
     RUNOFF VOLUME    (mm)=  13.62
     TOTAL RAINFALL   (mm)=  50.01
     RUNOFF COEFFICIENT   =    .27

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

--------------------------------------------------------------------------------
--------------------
| SAVE HYD  (0001) |   AREA       (ha)=  71.63
| ID= 1   PCYC=128 |   QPEAK     (cms)=    .81 (i)
| DT= 5.0 min      |   TPEAK     (hrs)=   3.25
--------------------   VOLUME     (mm)=  13.62
  Filename: PRE10Y4H.HYD
  Comments:

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

--------------------------------------------------------------------------------
*                   Post-Dev: Calibrate Catchment 200
--------------------
| CALIB            |
| STANDHYD  (0001) |   Area    (ha)=   1.79
|ID= 2 DT= 5.0 min |   Total Imp(%)=  29.00   Dir. Conn.(%)=  24.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .52          1.27
     Dep. Storage     (mm)=       2.00          7.50
     Average Slope     (%)=       4.00          4.00
     Length            (m)=     109.20        109.20
     Mannings n           =       .013          .250

     Max.eff.Inten.(mm/hr)=      93.99          8.58
               over (min)        10.00         30.00
     Storage Coeff.  (min)=       1.82 (ii)    29.79 (ii)
     Unit Hyd. Tpeak (min)=       5.00         30.00
     Unit Hyd. peak  (cms)=        .32           .04
                                                      *TOTALS*
     PEAK FLOW       (cms)=        .16           .02          .16 (iii)
```

```
     TIME TO PEAK    (hrs)=       1.33         1.92          1.33
     RUNOFF VOLUME    (mm)=      47.66         9.06         18.22
     TOTAL RAINFALL   (mm)=      50.01        50.01         50.01
     RUNOFF COEFFICIENT   =        .95          .18           .36

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

       (i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
            CN*  =  60.0    Ia = Dep. Storage  (Above)
      (ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
*                   Post-Dev: Calibrate Catchment 201
--------------------
| CALIB            |
| STANDHYD  (0001) |   Area    (ha)=   2.38
|ID= 3 DT= 5.0 min |   Total Imp(%)=  45.00   Dir. Conn.(%)=  40.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.07         1.31
     Dep. Storage     (mm)=       2.00        15.00
     Average Slope     (%)=       4.00         4.00
     Length            (m)=     126.00       126.00
     Mannings n             =       .013         .250

     Max.eff.Inten.(mm/hr)=      93.99         4.08
               over (min)        10.00        45.00
     Storage Coeff.  (min)=       1.98 (ii)   43.02 (ii)
     Unit Hyd. Tpeak (min)=       5.00        45.00
     Unit Hyd. peak  (cms)=        .31          .03
                                                      *TOTALS*
     PEAK FLOW       (cms)=        .35          .01           .35 (iii)
     TIME TO PEAK    (hrs)=       1.42         2.58          1.42
     RUNOFF VOLUME    (mm)=      47.66         5.87         22.49
     TOTAL RAINFALL   (mm)=      50.01        50.01         50.01
     RUNOFF COEFFICIENT   =        .95          .12           .45

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

       (i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
            CN*  =  55.9    Ia = Dep. Storage  (Above)
      (ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
*                   Post-Dev: Calibrate Catchment 202
--------------------
```

```
| CALIB            |
| NASHYD    (0001) |   Area    (ha)=  67.51   Curve Number   (CN)= 71.6
|ID= 4 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
-------------------   U.H. Tp(hrs)=   1.28

     Unit Hyd Qpeak  (cms)=   2.01

     PEAK FLOW       (cms)=    .77 (i)
     TIME TO PEAK    (hrs)=   3.25
     RUNOFF VOLUME    (mm)=  13.71
     TOTAL RAINFALL   (mm)=  50.01
     RUNOFF COEFFICIENT   =    .27

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

--------------------------------------------------------------------------------
*                   Add post-dev site hydrographs

--------------------
| ADD HYD   (0001) |
|   2 +  3 =  5    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
          ID1= 2 (0001):     1.79      .16     1.33    18.22
        + ID2= 3 (0001):     2.38      .35     1.42    22.49
          ================================================
          ID = 5 (0001):     4.17      .42     1.42    20.66

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
*                   Shift site hydrograph to account for ditch flow to outlet
*                   Path ~150 m (CA 200) and ~75 m (CA 201)
*                   Assume 5 min lag (assumes <=0.5 m/s flow velocity)
--------------------
| SHIFT HYD (0001) |
| IN= 5---> OUT= 6 |
| SHIFT=  5.0 min  |      AREA     QPEAK     TPEAK      R.V.
--------------------      (ha)     (cms)     (hrs)      (mm)
          ID= 5 (0001):    4.17      .42      1.42     20.66
    SHIFT ID= 6 (0001):    4.17      .42      1.50     20.66

--------------------------------------------------------------------------------
*                   Add lagged post-dev site, external hydrographs

--------------------
| ADD HYD   (0001) |
|   6 +  4 =  7    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
          ID1= 6 (0001):     4.17      .42     1.50    20.66
        + ID2= 4 (0001):    67.51      .77     3.25    13.71
```

```
          ================================================
          ID = 7 (0001):    71.68      .80     3.25    14.12

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| SAVE HYD  (0001) |   AREA       (ha)=  71.68
| ID= 7   PCYC=127 |   QPEAK     (cms)=    .80 (i)
| DT= 5.0 min      |   TPEAK     (hrs)=   3.25
--------------------   VOLUME     (mm)=  14.12
  Filename: PST10Y4H.HYD
  Comments:

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

--------------------------------------------------------------------------------
*                    25 yr Event - Uncontrolled
********************************************************************************
--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 595.079
| Ptotal= 59.28 mm |                          B=   1.510
--------------------                          C=    .673
                         used in:   INTENSITY =  A / (t + B)^C

                         Duration of storm  =  4.00 hrs
                         Storm time step    =  5.00 min
                         Time to peak ratio =   .33

                      The CORRELATION coefficient is =  .9988

                       TIME       INPUT INT.           TAB. INT.
                      (min)        (mm/hr)              (mm/hr)
                         5.         177.70               168.67
                        10.         111.00               114.94
                        15.          87.10                90.16
                        30.          55.80                58.36
                        60.          39.30                37.21
                       120.          24.60                23.53
                       360.          11.00                11.30


                  TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
                   .08    5.17 |  1.08   16.42 |  2.08   11.63 |  3.08    6.51
                   .17    5.42 |  1.17   22.70 |  2.17   10.81 |  3.17    6.31
                   .25    5.70 |  1.25   44.37 |  2.25   10.13 |  3.25    6.12
                   .33    6.03 |  1.33  168.67 |  2.33    9.54 |  3.33    5.95
                   .42    6.41 |  1.42   55.39 |  2.42    9.03 |  3.42    5.79
                   .50    6.85 |  1.50   33.40 |  2.50    8.59 |  3.50    5.63
```

.58	7.37	1.58	25.02	2.58	8.19	3.58	5.49
.67	8.01	1.67	20.42	2.67	7.84	3.67	5.36
.75	8.80	1.75	17.47	2.75	7.52	3.75	5.23
.83	9.83	1.83	15.39	2.83	7.23	3.83	5.11
.92	11.21	1.92	13.83	2.92	6.97	3.92	5.00
1.00	13.21	2.00	12.61	3.00	6.73	4.00	4.89

---

* Pre-Dev: Calibrate CA 100

CALIB			
NASHYD (0001)	Area (ha)= 71.63	Curve Number (CN)= 71.4	
ID= 1 DT= 5.0 min	Ia (mm)= 5.00	# of Linear Res.(N)= 3.00	
	U.H. Tp(hrs)= 1.27		

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

Unit Hyd Qpeak (cms)= 2.15

PEAK FLOW (cms)= 1.12 (i)
TIME TO PEAK (hrs)= 3.17
RUNOFF VOLUME (mm)= 18.64
TOTAL RAINFALL (mm)= 59.28
RUNOFF COEFFICIENT = .31

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

SAVE HYD (0001)	AREA (ha)= 71.63
ID= 1 PCYC=130	QPEAK (cms)= 1.12 (i)
DT= 5.0 min	TPEAK (hrs)= 3.17
	VOLUME (mm)= 18.64

Filename: PRE25Y4H.HYD
Comments:

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

---

* Post-Dev: Calibrate Catchment 200

CALIB			
STANDHYD (0001)	Area (ha)= 1.79		
ID= 2 DT= 5.0 min	Total Imp(%)= 29.00	Dir. Conn.(%)= 24.00	

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	.52	1.27
Dep. Storage (mm)=	2.00	7.50
Average Slope (%)=	4.00	4.00

```
     Length            (m)=     109.20       109.20
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=     112.03        13.72
               over (min)        10.00        25.00
     Storage Coeff.  (min)=       1.70 (ii)   24.88 (ii)
     Unit Hyd. Tpeak (min)=       5.00        25.00
     Unit Hyd. peak  (cms)=        .32          .05
                                                      *TOTALS*
     PEAK FLOW       (cms)=        .19          .03           .20 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.75          1.33
     RUNOFF VOLUME    (mm)=      56.87        12.80         23.30
     TOTAL RAINFALL   (mm)=      59.28        59.28         59.28
     RUNOFF COEFFICIENT   =        .96          .22           .39

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

       (i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
            CN*  =  60.0    Ia = Dep. Storage  (Above)
      (ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
*                   Post-Dev: Calibrate Catchment 201
--------------------
| CALIB            |
| STANDHYD  (0001) |   Area    (ha)=   2.38
|ID= 3 DT= 5.0 min |   Total Imp(%)=  45.00   Dir. Conn.(%)=  40.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.07         1.31
     Dep. Storage     (mm)=       2.00        15.00
     Average Slope     (%)=       4.00         4.00
     Length            (m)=     126.00       126.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=     112.03         7.39
               over (min)        10.00        35.00
     Storage Coeff.  (min)=       1.85 (ii)   34.19 (ii)
     Unit Hyd. Tpeak (min)=       5.00        35.00
     Unit Hyd. peak  (cms)=        .32          .03
                                                      *TOTALS*
     PEAK FLOW       (cms)=        .42          .01           .42 (iii)
     TIME TO PEAK    (hrs)=       1.33         2.17          1.33
     RUNOFF VOLUME    (mm)=      56.87         8.90         28.00
     TOTAL RAINFALL   (mm)=      59.28        59.28         59.28
     RUNOFF COEFFICIENT   =        .96          .15           .47

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

```
       (i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
            CN*  =  55.9    Ia = Dep. Storage  (Above)
      (ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
*                   Post-Dev: Calibrate Catchment 202
--------------------
| CALIB            |
| NASHYD    (0001) |   Area    (ha)=  67.51   Curve Number   (CN)= 71.6
|ID= 4 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   1.27

     Unit Hyd Qpeak  (cms)=   2.03

     PEAK FLOW       (cms)=   1.06 (i)
     TIME TO PEAK    (hrs)=   3.17
     RUNOFF VOLUME    (mm)=  18.76
     TOTAL RAINFALL   (mm)=  59.28
     RUNOFF COEFFICIENT   =    .32

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

--------------------------------------------------------------------------------
*                   Add post-dev site hydrographs

--------------------
| ADD HYD   (0001) |
|   2 +  3 =  5    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
          ID1= 2 (0001):     1.79      .20     1.33    23.30
        + ID2= 3 (0001):     2.38      .42     1.33    28.00
          ================================================
          ID = 5 (0001):     4.17      .62     1.33    25.98

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
*                   Shift site hydrograph to account for ditch flow to outlet
*                   Path ~150 m (CA 200) and ~75 m (CA 201)
*                   Assume 5 min lag (assumes <=0.5 m/s flow velocity)
--------------------
| SHIFT HYD (0001) |
| IN= 5---> OUT= 6 |
| SHIFT=  5.0 min  |      AREA     QPEAK     TPEAK      R.V.
--------------------      (ha)     (cms)     (hrs)      (mm)
          ID= 5 (0001):    4.17      .62      1.33     25.98
    SHIFT ID= 6 (0001):    4.17      .62      1.42     25.98
```

```
--------------------------------------------------------------------------------
*                   Add lagged post-dev site, external hydrographs

--------------------
| ADD HYD   (0001) |
|   6 +  4 =  7    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
          ID1= 6 (0001):     4.17      .62     1.42    25.98
        + ID2= 4 (0001):    67.51     1.06     3.17    18.76
          ================================================
          ID = 7 (0001):    71.68     1.11     3.17    19.18

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| SAVE HYD  (0001) |   AREA       (ha)=  71.68
| ID= 7   PCYC=129 |   QPEAK     (cms)=   1.11 (i)
| DT= 5.0 min      |   TPEAK     (hrs)=   3.17
--------------------   VOLUME     (mm)=  19.18
  Filename: PST25Y4H.HYD
  Comments:

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

--------------------------------------------------------------------------------
*                   50 yr Event - Uncontrolled
********************************************************************************
--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 668.743
| Ptotal= 66.25 mm |                          B=   1.501
--------------------                          C=    .674
                         used in:   INTENSITY =  A / (t + B)^C

                         Duration of storm  =  4.00 hrs
                         Storm time step    =  5.00 min
                         Time to peak ratio =   .33

                    The CORRELATION coefficient is =  .9984

                     TIME       INPUT INT.           TAB. INT.
                    (min)        (mm/hr)              (mm/hr)
                       5.         201.20               189.37
                      10.         123.70               128.92
                      15.          96.90               101.08
                      30.          61.90                65.37
                      60.          44.20                41.64
                     120.          27.70                26.32
                     360.          12.20                12.62
```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.08	5.76	1.08	18.32	2.08	12.97	3.08	7.26
.17	6.04	1.17	25.35	2.17	12.06	3.17	7.03
.25	6.36	1.25	49.61	2.25	11.30	3.25	6.82
.33	6.72	1.33	189.37	2.33	10.64	3.33	6.63
.42	7.14	1.42	61.95	2.42	10.08	3.42	6.45
.50	7.63	1.50	37.32	2.50	9.58	3.50	6.28
.58	8.22	1.58	27.94	2.58	9.13	3.58	6.12
.67	8.93	1.67	22.80	2.67	8.74	3.67	5.97
.75	9.82	1.75	19.50	2.75	8.39	3.75	5.83
.83	10.96	1.83	17.18	2.83	8.07	3.83	5.70
.92	12.51	1.92	15.43	2.92	7.77	3.92	5.57
1.00	14.74	2.00	14.07	3.00	7.51	4.00	5.45

---

* Pre-Dev: Calibrate CA 100

CALIB			
NASHYD (0001)	Area (ha)= 71.63	Curve Number (CN)= 71.4	
ID= 1 DT= 5.0 min	Ia (mm)= 5.00	# of Linear Res.(N)= 3.00	
	U.H. Tp(hrs)= 1.27		

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

Unit Hyd Qpeak (cms)= 2.15

PEAK FLOW (cms)= 1.37 (i)
TIME TO PEAK (hrs)= 3.17
RUNOFF VOLUME (mm)= 22.74
TOTAL RAINFALL (mm)= 66.25
RUNOFF COEFFICIENT = .34

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

SAVE HYD (0001)	AREA (ha)= 71.63
ID= 1 PCYC=131	QPEAK (cms)= 1.37 (i)
DT= 5.0 min	TPEAK (hrs)= 3.17
	VOLUME (mm)= 22.74

Filename: PRE50Y4H.HYD
Comments:

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

```
*                   Post-Dev: Calibrate Catchment 200
--------------------
| CALIB            |
| STANDHYD  (0001) |   Area    (ha)=   1.79
|ID= 2 DT= 5.0 min |   Total Imp(%)=  29.00   Dir. Conn.(%)=  24.00
--------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=         .52          1.27
     Dep. Storage     (mm)=        2.00          7.50
     Average Slope     (%)=        4.00          4.00
     Length            (m)=      109.20        109.20
     Mannings n             =      .013          .250

     Max.eff.Inten.(mm/hr)=      125.66         17.33
               over (min)         10.00         25.00
     Storage Coeff.  (min)=        1.62 (ii)    22.73 (ii)
     Unit Hyd. Tpeak (min)=        5.00         25.00
     Unit Hyd. peak  (cms)=         .32           .05
                                                      *TOTALS*
     PEAK FLOW       (cms)=         .22           .04          .22 (iii)
     TIME TO PEAK    (hrs)=        1.33          1.75         1.33
     RUNOFF VOLUME    (mm)=       63.80         15.93        27.35
     TOTAL RAINFALL   (mm)=       66.25         66.25        66.25
     RUNOFF COEFFICIENT   =         .96           .24          .41

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

       (i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
            CN*  =  60.0    Ia = Dep. Storage  (Above)
      (ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
*                   Post-Dev: Calibrate Catchment 201
--------------------
| CALIB            |
| STANDHYD  (0001) |   Area    (ha)=   2.38
|ID= 3 DT= 5.0 min |   Total Imp(%)=  45.00   Dir. Conn.(%)=  40.00
--------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        1.07          1.31
     Dep. Storage     (mm)=        2.00         15.00
     Average Slope     (%)=        4.00          4.00
     Length            (m)=      126.00        126.00
     Mannings n             =      .013          .250

     Max.eff.Inten.(mm/hr)=      125.66         10.67
               over (min)         10.00         30.00
     Storage Coeff.  (min)=        1.77 (ii)    29.70 (ii)
```

```
     Unit Hyd. Tpeak (min)=       5.00        30.00
     Unit Hyd. peak  (cms)=        .32          .04
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .48          .02           .48 (iii)
     TIME TO PEAK    (hrs)=       1.33         2.00          1.33
     RUNOFF VOLUME    (mm)=      63.80        11.49         32.34
     TOTAL RAINFALL   (mm)=      66.25        66.25         66.25
     RUNOFF COEFFICIENT   =        .96          .17           .49

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

       (i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
            CN*  =  55.9    Ia = Dep. Storage  (Above)
      (ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
*                   Post-Dev: Calibrate Catchment 202
--------------------
| CALIB             |
| NASHYD    (0001) |   Area    (ha)=  67.51   Curve Number   (CN)= 71.6
|ID= 4 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   1.27

     Unit Hyd Qpeak  (cms)=   2.03

     PEAK FLOW       (cms)=   1.30 (i)
     TIME TO PEAK    (hrs)=   3.17
     RUNOFF VOLUME    (mm)=  22.88
     TOTAL RAINFALL   (mm)=  66.25
     RUNOFF COEFFICIENT   =    .35

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

--------------------------------------------------------------------------------
*                   Add post-dev site hydrographs

--------------------
| ADD HYD   (0001) |
|   2 +  3 =  5    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
          ID1= 2 (0001):     1.79      .22     1.33    27.35
        + ID2= 3 (0001):     2.38      .48     1.33    32.34
          ================================================
          ID = 5 (0001):     4.17      .70     1.33    30.20

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

```
*                   Shift site hydrograph to account for ditch flow to outlet
*                   Path ~150 m (CA 200) and ~75 m (CA 201)
*                   Assume 5 min lag (assumes <=0.5 m/s flow velocity)
--------------------
| SHIFT HYD (0001) |
| IN= 5---> OUT= 6 |
| SHIFT=  5.0 min  |      AREA     QPEAK     TPEAK      R.V.
--------------------      (ha)     (cms)     (hrs)      (mm)
          ID= 5 (0001):    4.17      .70      1.33     30.20
    SHIFT ID= 6 (0001):    4.17      .70      1.42     30.20

------------------------------------------------------------------------------
*                   Add lagged post-dev site, external hydrographs

--------------------
| ADD HYD   (0001) |
|   6 +  4 =  7    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
          ID1= 6 (0001):     4.17      .70     1.42    30.20
        + ID2= 4 (0001):    67.51     1.30     3.17    22.88
          ================================================
          ID = 7 (0001):    71.68     1.36     3.08    23.30

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
--------------------
| SAVE HYD  (0001) |   AREA       (ha)=  71.68
| ID= 7   PCYC=131 |   QPEAK     (cms)=   1.36 (i)
| DT= 5.0 min      |   TPEAK     (hrs)=   3.08
--------------------   VOLUME     (mm)=  23.30
  Filename: PST50Y4H.HYD
  Comments:

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

------------------------------------------------------------------------------
*                   100 yr Event - Uncontrolled
******************************************************************************
--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 740.025
| Ptotal= 73.31 mm |                          B=   1.509
--------------------                          C=    .674
                         used in:   INTENSITY =  A / (t + B)^C

                         Duration of storm  =  4.00 hrs
                         Storm time step    =  5.00 min
                         Time to peak ratio =   .33

                    The CORRELATION coefficient is =  .9981
```

TIME (min)	INPUT INT. (mm/hr)	TAB. INT. (mm/hr)
5.	224.50	209.38
10.	136.20	142.60
15.	106.60	111.82
30.	68.00	72.33
60.	49.00	46.08
120.	30.70	29.12
360.	13.50	13.97

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.08	6.37	1.08	20.28	2.08	14.36	3.08	8.03
.17	6.68	1.17	28.06	2.17	13.35	3.17	7.78
.25	7.03	1.25	54.92	2.25	12.50	3.25	7.55
.33	7.44	1.33	209.38	2.33	11.78	3.33	7.34
.42	7.90	1.42	68.59	2.42	11.15	3.42	7.14
.50	8.45	1.50	41.32	2.50	10.60	3.50	6.95
.58	9.09	1.58	30.93	2.58	10.11	3.58	6.77
.67	9.88	1.67	25.24	2.67	9.67	3.67	6.61
.75	10.86	1.75	21.59	2.75	9.28	3.75	6.45
.83	12.13	1.83	19.01	2.83	8.93	3.83	6.30
.92	13.84	1.92	17.08	2.92	8.60	3.92	6.16
1.00	16.31	2.00	15.57	3.00	8.31	4.00	6.03

---

* Pre-Dev: Calibrate CA 100

CALIB			
NASHYD (0001)	Area (ha)= 71.63	Curve Number (CN)= 71.4	
ID= 1 DT= 5.0 min	Ia (mm)= 5.00	# of Linear Res.(N)= 3.00	
	U.H. Tp(hrs)= 1.27		

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

Unit Hyd Qpeak (cms)= 2.15

PEAK FLOW (cms)= 1.64 (i)
TIME TO PEAK (hrs)= 3.17
RUNOFF VOLUME (mm)= 27.11
TOTAL RAINFALL (mm)= 73.31
RUNOFF COEFFICIENT = .37

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

```
| SAVE HYD  (0001) |   AREA       (ha)=  71.63
| ID= 1   PCYC=133 |   QPEAK     (cms)=   1.64 (i)
| DT= 5.0 min      |   TPEAK     (hrs)=   3.17
--------------------   VOLUME     (mm)=  27.11
  Filename: PRE00Y4H.HYD
  Comments:

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

--------------------------------------------------------------------------------
*                   Post-Dev: Calibrate Catchment 200
--------------------
| CALIB            |
| STANDHYD  (0001) |   Area    (ha)=   1.79
|ID= 2 DT= 5.0 min |   Total Imp(%)=  29.00   Dir. Conn.(%)=  24.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .52          1.27
     Dep. Storage     (mm)=       2.00          7.50
     Average Slope     (%)=       4.00          4.00
     Length            (m)=     109.20        109.20
     Mannings n           =       .013          .250

     Max.eff.Inten.(mm/hr)=     138.99         24.05
               over (min)        10.00         20.00
     Storage Coeff.  (min)=       1.56 (ii)    20.08 (ii)
     Unit Hyd. Tpeak (min)=       5.00         25.00
     Unit Hyd. peak  (cms)=        .33           .05
                                                      *TOTALS*
     PEAK FLOW       (cms)=        .24           .05          .25 (iii)
     TIME TO PEAK    (hrs)=       1.33          1.75          1.33
     RUNOFF VOLUME    (mm)=      70.81         19.33         31.61
     TOTAL RAINFALL   (mm)=      73.31         73.31         73.31
     RUNOFF COEFFICIENT   =        .97           .26           .43

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

       (i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
            CN*  =  60.0    Ia = Dep. Storage  (Above)
      (ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
*                   Post-Dev: Calibrate Catchment 201
--------------------
| CALIB            |
| STANDHYD  (0001) |   Area    (ha)=   2.38
|ID= 3 DT= 5.0 min |   Total Imp(%)=  45.00   Dir. Conn.(%)=  40.00
--------------------
```

```
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.07         1.31
     Dep. Storage     (mm)=       2.00        15.00
     Average Slope     (%)=       4.00         4.00
     Length            (m)=     126.00       126.00
     Mannings n             =       .013         .250

     Max.eff.Inten.(mm/hr)=     138.99        15.01
               over (min)        10.00        25.00
     Storage Coeff.  (min)=       1.70 (ii)   26.06 (ii)
     Unit Hyd. Tpeak (min)=       5.00        30.00
     Unit Hyd. peak  (cms)=        .32          .04
                                                        *TOTALS*
     PEAK FLOW       (cms)=        .53          .03           .53 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.92          1.33
     RUNOFF VOLUME    (mm)=      70.81        14.37         36.87
     TOTAL RAINFALL   (mm)=      73.31        73.31         73.31
     RUNOFF COEFFICIENT   =        .97          .20           .50

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

       (i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
            CN*  =  55.9    Ia = Dep. Storage  (Above)
      (ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
*                   Post-Dev: Calibrate Catchment 202
--------------------
| CALIB            |
| NASHYD    (0001) |   Area    (ha)=  67.51   Curve Number   (CN)= 71.6
|ID= 4 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   1.27

     Unit Hyd Qpeak  (cms)=   2.03

     PEAK FLOW       (cms)=   1.55 (i)
     TIME TO PEAK    (hrs)=   3.17
     RUNOFF VOLUME    (mm)=  27.27
     TOTAL RAINFALL   (mm)=  73.31
     RUNOFF COEFFICIENT   =    .37

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

--------------------------------------------------------------------------------
*                   Add post-dev site hydrographs

--------------------
| ADD HYD   (0001) |
```

```
|   2 +  3 =  5    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
          ID1= 2 (0001):     1.79      .25     1.33    31.61
        + ID2= 3 (0001):     2.38      .53     1.33    36.87
          ================================================
          ID = 5 (0001):     4.17      .78     1.33    34.62

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
*                   Shift site hydrograph to account for ditch flow to outlet
*                   Path ~150 m (CA 200) and ~75 m (CA 201)
*                   Assume 5 min lag (assumes <=0.5 m/s flow velocity)
--------------------
| SHIFT HYD (0001) |
| IN= 5---> OUT= 6 |
| SHIFT=  5.0 min  |      AREA     QPEAK     TPEAK      R.V.
--------------------      (ha)     (cms)     (hrs)      (mm)
          ID= 5 (0001):    4.17      .78      1.33     34.62
    SHIFT ID= 6 (0001):    4.17      .78      1.42     34.62

------------------------------------------------------------------------------
*                   Add lagged post-dev site, external hydrographs

--------------------
| ADD HYD   (0001) |
|   6 +  4 =  7    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
          ID1= 6 (0001):     4.17      .78     1.42    34.62
        + ID2= 4 (0001):    67.51     1.55     3.17    27.27
          ================================================
          ID = 7 (0001):    71.68     1.62     3.08    27.70

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
--------------------
| SAVE HYD  (0001) |   AREA       (ha)=  71.68
| ID= 7   PCYC=132 |   QPEAK     (cms)=   1.62 (i)
| DT= 5.0 min      |   TPEAK     (hrs)=   3.08
--------------------   VOLUME      (mm)=  27.70
  Filename: PST00Y4H.HYD
  Comments:

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

------------------------------------------------------------------------------
******************************************************************************
*                   SCS II 12-hr Events
******************************************************************************
```

```
*                   2 yr Event - Uncontrolled
********************************************************************************

--------------------
|    READ STORM    |    Filename: 2SCS12.STM
| Ptotal= 43.81 mm |    Comments: *2 Yr 24 hr SCS II Trenton
--------------------
                TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
                1.00    1.10 |  4.00    1.75 |  7.00    5.69 | 10.00    1.53
                2.00    1.10 |  5.00    3.07 |  8.00    2.63 | 11.00     .88
                3.00    1.31 |  6.00   22.34 |  9.00    1.53 | 12.00     .88

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

*                   Pre-Dev: Calibrate CA 100
--------------------
| CALIB            |
| NASHYD    (0001) |   Area    (ha)=  71.63   Curve Number   (CN)= 71.4
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   1.28

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

     Unit Hyd Qpeak  (cms)=   2.14

     PEAK FLOW       (cms)=    .53 (i)
     TIME TO PEAK    (hrs)=   7.33
     RUNOFF VOLUME    (mm)=  10.68
     TOTAL RAINFALL   (mm)=  43.81
     RUNOFF COEFFICIENT   =    .24

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

--------------------------------------------------------------------------------
--------------------
| SAVE HYD  (0001) |   AREA       (ha)=  71.63
| ID= 1   PCYC=206 |   QPEAK     (cms)=    .53 (i)
| DT= 5.0 min      |   TPEAK     (hrs)=   7.33
--------------------   VOLUME     (mm)=  10.68
  Filename: PRE2Y12.HYD
  Comments:

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

--------------------------------------------------------------------------------
*                   Post-Dev: Calibrate Catchment 200
--------------------
| CALIB            |
| STANDHYD  (0001) |   Area    (ha)=   1.79
```

```
|ID= 2 DT= 5.0 min |   Total Imp(%)=  29.00   Dir. Conn.(%)=  24.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .52          1.27
     Dep. Storage     (mm)=       2.00          7.50
     Average Slope     (%)=       4.00          4.00
     Length            (m)=     109.20        109.20
     Mannings n           =       .013          .250

     Max.eff.Inten.(mm/hr)=      22.34          4.20
               over (min)        10.00         40.00
     Storage Coeff.  (min)=       3.24 (ii)    40.44 (ii)
     Unit Hyd. Tpeak (min)=       5.00         45.00
     Unit Hyd. peak  (cms)=        .27           .03
                                                      *TOTALS*
     PEAK FLOW       (cms)=        .03           .01          .03 (iii)
     TIME TO PEAK    (hrs)=       5.83          6.75          6.17
     RUNOFF VOLUME    (mm)=      41.74          6.92         15.13
     TOTAL RAINFALL   (mm)=      43.81         43.81         43.81
     RUNOFF COEFFICIENT   =        .95           .16           .35

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

       (i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
            CN*  =  60.0    Ia = Dep. Storage  (Above)
      (ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
*                   Post-Dev: Calibrate Catchment 201
--------------------
| CALIB            |
| STANDHYD  (0001) |   Area    (ha)=   2.38
|ID= 3 DT= 5.0 min |   Total Imp(%)=  45.00   Dir. Conn.(%)=  40.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.07          1.31
     Dep. Storage     (mm)=       2.00         15.00
     Average Slope     (%)=       4.00          4.00
     Length            (m)=     126.00        126.00
     Mannings n           =       .013          .250

     Max.eff.Inten.(mm/hr)=      22.34          1.98
               over (min)        10.00         55.00
     Storage Coeff.  (min)=       3.53 (ii)    58.26 (ii)
     Unit Hyd. Tpeak (min)=       5.00         60.00
     Unit Hyd. peak  (cms)=        .26           .02
                                                      *TOTALS*
     PEAK FLOW       (cms)=        .06           .00          .06 (iii)
```

```
     TIME TO PEAK    (hrs)=       5.92         7.08          6.17
     RUNOFF VOLUME    (mm)=      41.74         4.21         19.04
     TOTAL RAINFALL   (mm)=      43.81        43.81         43.81
     RUNOFF COEFFICIENT   =        .95          .10           .43

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

       (i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
            CN*  =  55.9    Ia = Dep. Storage  (Above)
      (ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
*                   Post-Dev: Calibrate Catchment 202
--------------------
| CALIB             |
| NASHYD    (0001) |   Area    (ha)=  67.51   Curve Number   (CN)= 71.6
|ID= 4 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   1.28

     Unit Hyd Qpeak  (cms)=   2.01

     PEAK FLOW       (cms)=    .51 (i)
     TIME TO PEAK    (hrs)=   7.33
     RUNOFF VOLUME    (mm)=  10.75
     TOTAL RAINFALL   (mm)=  43.81
     RUNOFF COEFFICIENT   =    .25

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

--------------------------------------------------------------------------------
*                   Add post-dev site hydrographs

--------------------
| ADD HYD   (0001) |
|   2 +  3 =  5    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
          ID1= 2 (0001):     1.79      .03     6.17    15.13
        + ID2= 3 (0001):     2.38      .06     6.17    19.04
          ================================================
          ID = 5 (0001):     4.17      .09     6.17    17.39

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
*                   Shift site hydrograph to account for ditch flow to outlet
*                   Path ~150 m (CA 200) and ~75 m (CA 201)
*                   Assume 5 min lag (conservative, <0.5 m/s flow velocity)
--------------------
```

| SHIFT HYD (0001) |
| IN= 5---> OUT= 6 |
| SHIFT= 5.0 min |

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID= 5 (0001):	4.17	.09	6.17	17.39
SHIFT ID= 6 (0001):	4.17	.09	6.25	17.39

---

* Add lagged post-dev site, external hydrographs

| ADD HYD (0001) |
| 6 + 4 = 7 |

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 6 (0001):	4.17	.09	6.25	17.39
+ ID2= 4 (0001):	67.51	.51	7.33	10.75
ID = 7 (0001):	71.68	.54	7.25	11.14

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

SAVE HYD (0001)	AREA (ha)= 71.68
ID= 7 PCYC=206	QPEAK (cms)= .54 (i)
DT= 5.0 min	TPEAK (hrs)= 7.25
	VOLUME (mm)= 11.14

Filename: PST2Y12.HYD
Comments:

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

---

* 2 yr Event - Controlled

****

READ STORM	Filename: 2SCS12.STM
Ptotal= 43.81 mm	Comments: *2 Yr 24 hr SCS II Trenton

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
1.00	1.10	4.00	1.75	7.00	5.69	10.00	1.53
2.00	1.10	5.00	3.07	8.00	2.63	11.00	.88
3.00	1.31	6.00	22.34	9.00	1.53	12.00	.88

---

* Pre-Dev: Calibrate CA 100

```
| CALIB            |
| NASHYD    (0001) |   Area    (ha)=  71.63   Curve Number   (CN)= 71.4
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
-------------------   U.H. Tp(hrs)=   1.28

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

     Unit Hyd Qpeak  (cms)=   2.14

     PEAK FLOW       (cms)=    .53 (i)
     TIME TO PEAK    (hrs)=   7.33
     RUNOFF VOLUME    (mm)=  10.68
     TOTAL RAINFALL   (mm)=  43.81
     RUNOFF COEFFICIENT   =    .24

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

--------------------------------------------------------------------------------
--------------------
| SAVE HYD  (0001) |   AREA       (ha)=  71.63
| ID= 1   PCYC=206 |   QPEAK     (cms)=    .53 (i)
| DT= 5.0 min      |   TPEAK     (hrs)=   7.33
--------------------   VOLUME     (mm)=  10.68
  Filename: PRE2Y12.HYD
  Comments:

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

--------------------------------------------------------------------------------
*                   Post-Dev: Calibrate Catchment 200
--------------------
| CALIB            |
| STANDHYD  (0001) |   Area    (ha)=   1.79
|ID= 2 DT= 5.0 min |   Total Imp(%)=  29.00   Dir. Conn.(%)=  24.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .52          1.27
     Dep. Storage     (mm)=       2.00          7.50
     Average Slope     (%)=       4.00          4.00
     Length            (m)=     109.20        109.20
     Mannings n           =       .013          .250

     Max.eff.Inten.(mm/hr)=      22.34          4.20
               over (min)        10.00         40.00
     Storage Coeff.  (min)=       3.24 (ii)    40.44 (ii)
     Unit Hyd. Tpeak (min)=       5.00         45.00
     Unit Hyd. peak  (cms)=        .27           .03
                                                        *TOTALS*
     PEAK FLOW       (cms)=        .03           .01           .03 (iii)
     TIME TO PEAK    (hrs)=       5.83          6.75          6.17
```

```
     RUNOFF VOLUME    (mm)=      41.74         6.92          15.13
     TOTAL RAINFALL   (mm)=      43.81        43.81          43.81
     RUNOFF COEFFICIENT   =        .95          .16            .35

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

       (i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
            CN*  =  60.0    Ia = Dep. Storage  (Above)
      (ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
*                   Post-Dev: Calibrate Catchment 201
--------------------
| CALIB            |
| STANDHYD  (0001) |   Area    (ha)=   2.38
|ID= 3 DT= 5.0 min |   Total Imp(%)=  45.00   Dir. Conn.(%)=  40.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.07         1.31
     Dep. Storage     (mm)=       2.00        15.00
     Average Slope     (%)=       4.00         4.00
     Length            (m)=     126.00       126.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      22.34         1.98
               over (min)        10.00        55.00
     Storage Coeff.  (min)=       3.53 (ii)   58.26 (ii)
     Unit Hyd. Tpeak (min)=       5.00        60.00
     Unit Hyd. peak  (cms)=        .26          .02
                                                        *TOTALS*
     PEAK FLOW       (cms)=        .06          .00            .06 (iii)
     TIME TO PEAK    (hrs)=       5.92         7.08           6.17
     RUNOFF VOLUME    (mm)=      41.74         4.21          19.04
     TOTAL RAINFALL   (mm)=      43.81        43.81          43.81
     RUNOFF COEFFICIENT   =        .95          .10            .43

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

       (i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
            CN*  =  55.9    Ia = Dep. Storage  (Above)
      (ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
*                   Split off 0.165 cms - capacity of CA 201 OGS

*                   Remainder direct discharge to outlet
```

```
--------------------
| DUHYD     (0001) |
| Inlet Cap.= .165 |
| #of Inlets=    1 |
| Total(cms)=   .2 |      AREA     QPEAK     TPEAK    R.V.
--------------------      (ha)     (cms)     (hrs)    (mm)
     TOTAL HYD.(ID= 3):   2.38       .06      6.17   19.04
     ==================================================
     MAJOR SYS.(ID= 4):    .00       .00       .00     .00
     MINOR SYS.(ID= 5):   2.38       .06      6.17   19.04

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
*                   Split off 0.015 cms from OGS - direct discharge to outlet

*                   Direct remainder to infiltration - 2yr quantity control

*                   Runoff directed to infiltration removed - no discharge
--------------------
| DUHYD     (0001) |
| Inlet Cap.= .015 |
| #of Inlets=    1 |
| Total(cms)=   .0 |      AREA     QPEAK     TPEAK    R.V.
--------------------      (ha)     (cms)     (hrs)    (mm)
     TOTAL HYD.(ID= 5):   2.38       .06      6.17   19.04
     ==================================================
     MAJOR SYS.(ID= 6):    .90       .05      6.17   19.04
     MINOR SYS.(ID= 7):   1.48       .02      5.25   19.04

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
*                   Determine required infiltration storage volume

*                   Based on the volume of the infiltration hydrograph

--------------------
| COMPUTE VOLUME   |
| ID= 6   (0001)   |             DISCHARGE      TIME
--------------------               (cms)       (hrs)
           START CONTROLLING AT      .00        5.17
           INFLOW HYD. PEAKS AT      .05        6.17
           STOP  CONTROLLING AT      .00        7.25

           REQUIRED STORAGE VOLUME (ha.m.)=    .0171
           TOTAL HYDROGRAPH VOLUME (ha.m.)=    .0171
           % OF HYDROGRAPH TO STORE       =  99.9997
```

```
           NOTE:  Storage was computed to reduce the Inflow

--------------------------------------------------------------------------------
*                   Add hydrographs for non-infiltrated CA 201 runoff

--------------------
| ADD HYD   (0001) |
|   4 +  7 =  8    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
*** W A R N I N G :  HYDROGRAPH 0001 <ID= 4> IS DRY.
*** W A R N I N G :  HYDROGRAPH 0001 = HYDROGRAPH 0001
          ID1= 4 (0001):      .00      .00      .00      .00
        + ID2= 7 (0001):     1.48      .02     5.25    19.04
          ================================================
          ID = 8 (0001):     1.48      .02     5.25    19.04

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
*                   Post-Dev: Calibrate Catchment 202
--------------------
| CALIB            |
| NASHYD    (0001) |   Area    (ha)=  67.51   Curve Number   (CN)= 71.6
|ID= 4 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   1.28

     Unit Hyd Qpeak  (cms)=   2.01

     PEAK FLOW       (cms)=    .51 (i)
     TIME TO PEAK    (hrs)=   7.33
     RUNOFF VOLUME    (mm)=  11.36
     TOTAL RAINFALL   (mm)=  43.81
     RUNOFF COEFFICIENT   =    .26

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

--------------------------------------------------------------------------------
*                   Add post-dev site hydrographs

--------------------
| ADD HYD   (0001) |
|   2 +  8 =  5    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
          ID1= 2 (0001):     1.79      .03     6.17    15.13
        + ID2= 8 (0001):     1.48      .02     5.25    19.04
          ================================================
          ID = 5 (0001):     3.27      .05     6.17    16.92

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

```
--------------------------------------------------------------------------------
*                   Shift site hydrograph to account for ditch flow to outlet
*                   Path ~150 m (CA 200) and ~75 m (CA 201)
*                   Assume 5 min lag (assumes <=0.5 m/s flow velocity)
--------------------
| SHIFT HYD (0001) |
| IN= 5---> OUT= 6 |
| SHIFT=  5.0 min  |      AREA     QPEAK     TPEAK      R.V.
--------------------      (ha)     (cms)     (hrs)      (mm)
          ID= 5 (0001):    3.27      .05      6.17     16.92
    SHIFT ID= 6 (0001):    3.27      .05      6.25     16.92

--------------------------------------------------------------------------------
*                   Add lagged post-dev site, external hydrographs

--------------------
| ADD HYD   (0001) |
|   6 +  4 =  7    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
          ID1= 6 (0001):     3.27      .05     6.25    16.92
        + ID2= 4 (0001):    67.51      .51     7.33    11.36
          ================================================
          ID = 7 (0001):    70.78      .53     7.25    11.62

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| SAVE HYD  (0001) |   AREA       (ha)=  70.78
| ID= 7   PCYC=213 |   QPEAK     (cms)=    .53 (i)
| DT= 5.0 min      |   TPEAK     (hrs)=   7.25
--------------------   VOLUME      (mm)=  11.62
  Filename: PST2Y12.HYD
  Comments:

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

--------------------------------------------------------------------------------
*                   5 yr Event - Uncontrolled
********************************************************************************

--------------------
|    READ STORM    |    Filename: 5SCS12.STM
| Ptotal= 57.92 mm |    Comments: *5 Yr 12 hr SCS II Trenton
--------------------
                TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
                1.00    1.45 |  4.00    2.32 |  7.00    7.53 | 10.00    2.03
                2.00    1.45 |  5.00    4.05 |  8.00    3.47 | 11.00    1.16
                3.00    1.74 |  6.00   29.53 |  9.00    2.03 | 12.00    1.16
```

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

*                   Pre-Dev: Calibrate CA 100
--------------------
| CALIB            |
| NASHYD    (0001) |   Area    (ha)=  71.63   Curve Number   (CN)= 71.4
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   1.28

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

     Unit Hyd Qpeak  (cms)=   2.14

     PEAK FLOW       (cms)=    .91 (i)
     TIME TO PEAK    (hrs)=   7.33
     RUNOFF VOLUME    (mm)=  18.05
     TOTAL RAINFALL   (mm)=  57.92
     RUNOFF COEFFICIENT   =    .31

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

--------------------------------------------------------------------------------
--------------------
| SAVE HYD  (0001) |   AREA       (ha)=  71.63
| ID= 1   PCYC=211 |   QPEAK     (cms)=    .91 (i)
| DT= 5.0 min      |   TPEAK     (hrs)=   7.33
--------------------   VOLUME     (mm)=  18.05
  Filename: PRE5Y12.HYD
  Comments:

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

--------------------------------------------------------------------------------
*                   Post-Dev: Calibrate Catchment 200
--------------------
| CALIB            |
| STANDHYD  (0001) |   Area    (ha)=   1.79
|ID= 2 DT= 5.0 min |   Total Imp(%)=  29.00   Dir. Conn.(%)=  24.00
--------------------

                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .52          1.27
     Dep. Storage     (mm)=       2.00          7.50
     Average Slope     (%)=       4.00          4.00
     Length            (m)=     109.20        109.20
     Mannings n           =       .013          .250

     Max.eff.Inten.(mm/hr)=      29.53          8.29
               over (min)        10.00         30.00
     Storage Coeff.  (min)=       2.89 (ii)    31.24 (ii)
```

```
     Unit Hyd. Tpeak (min)=       5.00        35.00
     Unit Hyd. peak  (cms)=        .28          .03
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .04          .02           .05 (iii)
     TIME TO PEAK    (hrs)=       5.75         6.42          6.08
     RUNOFF VOLUME    (mm)=      55.82        12.36         22.68
     TOTAL RAINFALL   (mm)=      57.92        57.92         57.92
     RUNOFF COEFFICIENT   =        .96          .21           .39

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

       (i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
            CN*  =  60.0    Ia = Dep. Storage  (Above)
      (ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
*                   Post-Dev: Calibrate Catchment 201
--------------------
| CALIB            |
| STANDHYD  (0001) |   Area    (ha)=   2.38
|ID= 3 DT= 5.0 min |   Total Imp(%)=  45.00   Dir. Conn.(%)=  40.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.07         1.31
     Dep. Storage     (mm)=       2.00        15.00
     Average Slope     (%)=       4.00         4.00
     Length            (m)=     126.00       126.00
     Mannings n             =       .013         .250

     Max.eff.Inten.(mm/hr)=      29.53         5.15
               over (min)        10.00        40.00
     Storage Coeff.  (min)=       3.15 (ii)   40.54 (ii)
     Unit Hyd. Tpeak (min)=       5.00        45.00
     Unit Hyd. peak  (cms)=        .27          .03
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .08          .01           .08 (iii)
     TIME TO PEAK    (hrs)=       5.92         6.75          6.17
     RUNOFF VOLUME    (mm)=      55.82         8.53         27.35
     TOTAL RAINFALL   (mm)=      57.92        57.92         57.92
     RUNOFF COEFFICIENT   =        .96          .15           .47

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

       (i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
            CN*  =  55.9    Ia = Dep. Storage  (Above)
      (ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
```

```
--------------------------------------------------------------------------------
*                   Post-Dev: Calibrate Catchment 202
--------------------
| CALIB            |
| NASHYD    (0001) |   Area    (ha)=  67.51   Curve Number   (CN)= 71.6
|ID= 4 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   1.28

     Unit Hyd Qpeak  (cms)=   2.01

     PEAK FLOW       (cms)=    .87 (i)
     TIME TO PEAK    (hrs)=   7.33
     RUNOFF VOLUME    (mm)=  18.17
     TOTAL RAINFALL   (mm)=  57.92
     RUNOFF COEFFICIENT   =    .31

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

--------------------------------------------------------------------------------
*                   Add post-dev site hydrographs

--------------------
| ADD HYD   (0001) |
|   2 +  3 =  5    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
          ID1= 2 (0001):     1.79      .05     6.08    22.68
        + ID2= 3 (0001):     2.38      .08     6.17    27.35
          ================================================
          ID = 5 (0001):     4.17      .13     6.08    25.36

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
*                   Shift site hydrograph to account for ditch flow to outlet
*                   Path ~150 m (CA 200) and ~75 m (CA 201)
*                   Assume 5 min lag (assumes <=0.5 m/s flow velocity)
--------------------
| SHIFT HYD (0001) |
| IN= 5---> OUT= 6 |
| SHIFT=  5.0 min  |      AREA     QPEAK     TPEAK      R.V.
--------------------      (ha)     (cms)     (hrs)      (mm)
          ID= 5 (0001):    4.17      .13      6.08     25.36
    SHIFT ID= 6 (0001):    4.17      .13      6.17     25.36

--------------------------------------------------------------------------------
*                   Add lagged post-dev site, external hydrographs

--------------------
| ADD HYD   (0001) |
```

```
|   6 +  4 =  7    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
          ID1= 6 (0001):     4.17      .13     6.17    25.36
        + ID2= 4 (0001):    67.51      .87     7.33    18.17
          ================================================
          ID = 7 (0001):    71.68      .91     7.17    18.58

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| SAVE HYD  (0001) |   AREA       (ha)=  71.68
| ID= 7   PCYC=210 |   QPEAK     (cms)=    .91 (i)
| DT= 5.0 min      |   TPEAK     (hrs)=   7.17
--------------------   VOLUME     (mm)=  18.58
  Filename: PST5Y12.HYD
  Comments:

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

--------------------------------------------------------------------------------
*                   10 yr Event - Uncontrolled
********************************************************************************

--------------------
|    READ STORM    |    Filename: 10SCS12.STM
| Ptotal= 67.19 mm |    Comments: *10 Yr 12 hr SCS II Trenton
--------------------
                TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
                1.00    1.68 |  4.00    2.69 |  7.00    8.74 | 10.00    2.35
                2.00    1.68 |  5.00    4.70 |  8.00    4.03 | 11.00    1.34
                3.00    2.02 |  6.00   34.27 |  9.00    2.35 | 12.00    1.34

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

*                   Pre-Dev: Calibrate CA 100
--------------------
| CALIB            |
| NASHYD    (0001) |   Area    (ha)=  71.63   Curve Number   (CN)= 71.4
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   1.28

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

     Unit Hyd Qpeak  (cms)=   2.14

     PEAK FLOW       (cms)=   1.20 (i)
     TIME TO PEAK    (hrs)=   7.25
     RUNOFF VOLUME    (mm)=  23.52
```

```
     TOTAL RAINFALL   (mm)=  67.19
     RUNOFF COEFFICIENT   =    .35

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

--------------------------------------------------------------------------------
--------------------
| SAVE HYD  (0001) |   AREA       (ha)=  71.63
| ID= 1   PCYC=213 |   QPEAK     (cms)=   1.20 (i)
| DT= 5.0 min      |   TPEAK     (hrs)=   7.25
--------------------   VOLUME     (mm)=  23.52
  Filename: PRE10Y12.HYD
  Comments:

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

--------------------------------------------------------------------------------
*                   Post-Dev: Calibrate Catchment 200
--------------------
| CALIB            |
| STANDHYD  (0001) |   Area    (ha)=   1.79
|ID= 2 DT= 5.0 min |   Total Imp(%)=  29.00   Dir. Conn.(%)=  24.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .52          1.27
     Dep. Storage     (mm)=       2.00          7.50
     Average Slope     (%)=       4.00          4.00
     Length            (m)=     109.20        109.20
     Mannings n           =       .013          .250

     Max.eff.Inten.(mm/hr)=      34.27         11.51
               over (min)        10.00         25.00
     Storage Coeff.  (min)=       2.73 (ii)    27.60 (ii)
     Unit Hyd. Tpeak (min)=       5.00         30.00
     Unit Hyd. peak  (cms)=        .29           .04
                                                        *TOTALS*
     PEAK FLOW       (cms)=        .04           .03           .06 (iii)
     TIME TO PEAK    (hrs)=       5.67          6.33          6.08
     RUNOFF VOLUME    (mm)=      65.08         16.53         28.08
     TOTAL RAINFALL   (mm)=      67.19         67.19         67.19
     RUNOFF COEFFICIENT   =        .97           .25           .42

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

       (i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
            CN*  =  60.0    Ia = Dep. Storage  (Above)
      (ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
```

```
--------------------------------------------------------------------------------
*                   Post-Dev: Calibrate Catchment 201
--------------------
| CALIB            |
| STANDHYD  (0001) |   Area    (ha)=   2.38
|ID= 3 DT= 5.0 min |   Total Imp(%)=  45.00   Dir. Conn.(%)=  40.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.07         1.31
     Dep. Storage     (mm)=       2.00        15.00
     Average Slope     (%)=       4.00         4.00
     Length            (m)=     126.00       126.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      34.27         7.87
               over (min)        10.00        35.00
     Storage Coeff.  (min)=       2.97 (ii)   34.51 (ii)
     Unit Hyd. Tpeak (min)=       5.00        35.00
     Unit Hyd. peak  (cms)=        .28          .03
                                                        *TOTALS*
     PEAK FLOW       (cms)=        .09          .02           .10 (iii)
     TIME TO PEAK    (hrs)=       5.75         6.50          6.08
     RUNOFF VOLUME    (mm)=      65.08        12.00         33.14
     TOTAL RAINFALL   (mm)=      67.19        67.19         67.19
     RUNOFF COEFFICIENT   =        .97          .18           .49

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

       (i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
            CN*  =  55.9    Ia = Dep. Storage  (Above)
      (ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
*                   Post-Dev: Calibrate Catchment 202
--------------------
| CALIB            |
| NASHYD    (0001) |   Area    (ha)=  67.51   Curve Number   (CN)= 71.6
|ID= 4 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   1.28

     Unit Hyd Qpeak  (cms)=   2.01

     PEAK FLOW       (cms)=   1.14 (i)
     TIME TO PEAK    (hrs)=   7.25
     RUNOFF VOLUME    (mm)=  23.66
     TOTAL RAINFALL   (mm)=  67.19
     RUNOFF COEFFICIENT   =    .35
```

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

```
--------------------------------------------------------------------------------
*                   Add post-dev site hydrographs

--------------------
| ADD HYD   (0001) |
|   2 +  3 =  5    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
          ID1= 2 (0001):     1.79      .06     6.08    28.08
        + ID2= 3 (0001):     2.38      .10     6.08    33.14
          ================================================
          ID = 5 (0001):     4.17      .17     6.08    30.98

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
*                   Shift site hydrograph to account for ditch flow to outlet
*                   Path ~150 m (CA 200) and ~75 m (CA 201)
*                   Assume 5 min lag (assumes <=0.5 m/s flow velocity)
--------------------
| SHIFT HYD (0001) |
| IN= 5---> OUT= 6 |
| SHIFT=  5.0 min  |      AREA     QPEAK     TPEAK      R.V.
--------------------      (ha)     (cms)     (hrs)      (mm)
          ID= 5 (0001):    4.17      .17      6.08     30.98
    SHIFT ID= 6 (0001):    4.17      .17      6.17     30.98

--------------------------------------------------------------------------------
*                   Add lagged post-dev site, external hydrographs

--------------------
| ADD HYD   (0001) |
|   6 +  4 =  7    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
          ID1= 6 (0001):     4.17      .17     6.17    30.98
        + ID2= 4 (0001):    67.51     1.14     7.25    23.66
          ================================================
          ID = 7 (0001):    71.68     1.20     7.17    24.09

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| SAVE HYD  (0001) |   AREA       (ha)=  71.68
| ID= 7   PCYC=212 |   QPEAK     (cms)=   1.20 (i)
| DT= 5.0 min      |   TPEAK     (hrs)=   7.17
--------------------   VOLUME     (mm)=  24.09
  Filename: PST10Y12.HYD
  Comments:
```

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

```
*                   25 yr Event - Uncontrolled
**********************************************************************
```

READ STORM	Filename: 25SCS12.STM
Ptotal= 79.10 mm	Comments: *25 Yr 12 hr SCS II Trenton

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
1.00	1.98	4.00	3.16	7.00	10.28	10.00	2.77
2.00	1.98	5.00	5.54	8.00	4.75	11.00	1.58
3.00	2.37	6.00	40.34	9.00	2.77	12.00	1.58

```
*                   Pre-Dev: Calibrate CA 100
```

CALIB			
NASHYD (0001)	Area (ha)= 71.63	Curve Number (CN)= 71.4	
ID= 1 DT= 5.0 min	Ia (mm)= 5.00	# of Linear Res.(N)= 3.00	
	U.H. Tp(hrs)= 1.27		

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

```
     Unit Hyd Qpeak  (cms)=   2.15

     PEAK FLOW       (cms)=   1.61 (i)
     TIME TO PEAK    (hrs)=   7.25
     RUNOFF VOLUME    (mm)=  31.13
     TOTAL RAINFALL   (mm)=  79.10
     RUNOFF COEFFICIENT   =    .39

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

SAVE HYD (0001)	AREA (ha)= 71.63
ID= 1 PCYC=215	QPEAK (cms)= 1.61 (i)
DT= 5.0 min	TPEAK (hrs)= 7.25
	VOLUME (mm)= 31.13

```
  Filename: PRE25Y12.HYD
  Comments:

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

```
*                   Post-Dev: Calibrate Catchment 200
--------------------
| CALIB            |
| STANDHYD  (0001) |   Area    (ha)=   1.79
|ID= 2 DT= 5.0 min |   Total Imp(%)=  29.00   Dir. Conn.(%)=  24.00
--------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=         .52          1.27
     Dep. Storage     (mm)=        2.00          7.50
     Average Slope     (%)=        4.00          4.00
     Length            (m)=      109.20        109.20
     Mannings n             =       .013          .250

     Max.eff.Inten.(mm/hr)=       40.34         15.61
               over (min)         10.00         25.00
     Storage Coeff.  (min)=        2.55 (ii)    24.57 (ii)
     Unit Hyd. Tpeak (min)=        5.00         25.00
     Unit Hyd. peak  (cms)=         .29           .05
                                                          *TOTALS*
     PEAK FLOW       (cms)=         .05           .04            .09 (iii)
     TIME TO PEAK    (hrs)=        5.67          6.25           6.08
     RUNOFF VOLUME    (mm)=       76.97         22.50          35.50
     TOTAL RAINFALL   (mm)=       79.10         79.10          79.10
     RUNOFF COEFFICIENT   =         .97           .28            .45

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

       (i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
            CN*  =  60.0    Ia = Dep. Storage  (Above)
      (ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
*                   Post-Dev: Calibrate Catchment 201
--------------------
| CALIB            |
| STANDHYD  (0001) |   Area    (ha)=   2.38
|ID= 3 DT= 5.0 min |   Total Imp(%)=  45.00   Dir. Conn.(%)=  40.00
--------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        1.07          1.31
     Dep. Storage     (mm)=        2.00         15.00
     Average Slope     (%)=        4.00          4.00
     Length            (m)=      126.00        126.00
     Mannings n             =       .013          .250

     Max.eff.Inten.(mm/hr)=       40.34         11.88
               over (min)         10.00         30.00
     Storage Coeff.  (min)=        2.78 (ii)    29.54 (ii)
```

```
     Unit Hyd. Tpeak (min)=       5.00        30.00
     Unit Hyd. peak  (cms)=        .28          .04
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .11          .03           .13 (iii)
     TIME TO PEAK    (hrs)=       5.75         6.33          6.08
     RUNOFF VOLUME    (mm)=      76.97        17.09         40.97
     TOTAL RAINFALL   (mm)=      79.10        79.10         79.10
     RUNOFF COEFFICIENT   =        .97          .22           .52

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

       (i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
            CN*  =  55.9    Ia = Dep. Storage  (Above)
      (ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
*                   Post-Dev: Calibrate Catchment 202
--------------------
| CALIB             |
| NASHYD    (0001) |   Area    (ha)=  67.51   Curve Number   (CN)= 71.6
|ID= 4 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   1.27

     Unit Hyd Qpeak  (cms)=   2.03

     PEAK FLOW       (cms)=   1.52 (i)
     TIME TO PEAK    (hrs)=   7.25
     RUNOFF VOLUME    (mm)=  31.31
     TOTAL RAINFALL   (mm)=  79.10
     RUNOFF COEFFICIENT   =    .40

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

--------------------------------------------------------------------------------
*                   Add post-dev site hydrographs

--------------------
| ADD HYD   (0001) |
|   2 +  3 =  5    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
          ID1= 2 (0001):     1.79      .09     6.08    35.50
        + ID2= 3 (0001):     2.38      .13     6.08    40.97
          ================================================
          ID = 5 (0001):     4.17      .22     6.08    38.63

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

```
*                   Shift site hydrograph to account for ditch flow to outlet
*                   Path ~150 m (CA 200) and ~75 m (CA 201)
*                   Assume 5 min lag (assumes <=0.5 m/s flow velocity)
--------------------
| SHIFT HYD (0001) |
| IN= 5---> OUT= 6 |
| SHIFT=  5.0 min  |      AREA     QPEAK     TPEAK      R.V.
--------------------      (ha)     (cms)     (hrs)      (mm)
          ID= 5 (0001):    4.17      .22      6.08     38.63
    SHIFT ID= 6 (0001):    4.17      .22      6.17     38.63

--------------------------------------------------------------------------------
*                   Add lagged post-dev site, external hydrographs

--------------------
| ADD HYD   (0001) |
|   6 +  4 =  7    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
          ID1= 6 (0001):     4.17      .22     6.17    38.63
        + ID2= 4 (0001):    67.51     1.52     7.25    31.31
          ================================================
          ID = 7 (0001):    71.68     1.60     7.17    31.74

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| SAVE HYD  (0001) |   AREA       (ha)=  71.68
| ID= 7   PCYC=214 |   QPEAK     (cms)=   1.60 (i)
| DT= 5.0 min      |   TPEAK     (hrs)=   7.17
--------------------   VOLUME     (mm)=  31.74
  Filename: PST25Y12.HYD
  Comments:

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

--------------------------------------------------------------------------------
*                   50 yr Event - Uncontrolled
********************************************************************************

--------------------
|    READ STORM    |    Filename: 50SCS12.STM
| Ptotal= 87.81 mm |    Comments: *50 Yr 12 hr SCS II Trenton
--------------------
                TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
                1.00    2.20 |  4.00    3.51 |  7.00   11.41 | 10.00    3.07
                2.00    2.20 |  5.00    6.15 |  8.00    5.27 | 11.00    1.76
                3.00    2.63 |  6.00   44.78 |  9.00    3.07 | 12.00    1.76
```

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

*                   Pre-Dev: Calibrate CA 100
--------------------
| CALIB            |
| NASHYD    (0001) |   Area    (ha)=  71.63   Curve Number   (CN)= 71.4
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   1.27

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

     Unit Hyd Qpeak  (cms)=   2.15

     PEAK FLOW       (cms)=   1.92 (i)
     TIME TO PEAK    (hrs)=   7.25
     RUNOFF VOLUME    (mm)=  37.05
     TOTAL RAINFALL   (mm)=  87.81
     RUNOFF COEFFICIENT   =    .42

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

--------------------------------------------------------------------------------
--------------------
| SAVE HYD  (0001) |   AREA       (ha)=  71.63
| ID= 1   PCYC=216 |   QPEAK     (cms)=   1.92 (i)
| DT= 5.0 min      |   TPEAK     (hrs)=   7.25
--------------------   VOLUME     (mm)=  37.05
  Filename: PRE50Y12.HYD
  Comments:

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

--------------------------------------------------------------------------------
*                   Post-Dev: Calibrate Catchment 200
--------------------
| CALIB            |
| STANDHYD  (0001) |   Area    (ha)=   1.79
|ID= 2 DT= 5.0 min |   Total Imp(%)=  29.00   Dir. Conn.(%)=  24.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .52          1.27
     Dep. Storage     (mm)=       2.00          7.50
     Average Slope     (%)=       4.00          4.00
     Length            (m)=     109.20        109.20
     Mannings n           =       .013          .250

     Max.eff.Inten.(mm/hr)=      44.78         18.86
               over (min)        10.00         25.00
     Storage Coeff.  (min)=       2.45 (ii)    22.86 (ii)
     Unit Hyd. Tpeak (min)=       5.00         25.00
```

```
     Unit Hyd. peak  (cms)=        .30          .05
                                                              *TOTALS*
     PEAK FLOW       (cms)=        .05          .05            .10 (iii)
     TIME TO PEAK    (hrs)=       5.67         6.25           6.08
     RUNOFF VOLUME    (mm)=      85.66        27.24          41.18
     TOTAL RAINFALL   (mm)=      87.81        87.81          87.81
     RUNOFF COEFFICIENT   =        .98          .31            .47

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

       (i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
            CN*  =  60.0    Ia = Dep. Storage  (Above)
      (ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
*                   Post-Dev: Calibrate Catchment 201
--------------------
| CALIB            |
| STANDHYD  (0001) |   Area    (ha)=   2.38
|ID= 3 DT= 5.0 min |   Total Imp(%)=  45.00   Dir. Conn.(%)=  40.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.07         1.31
     Dep. Storage     (mm)=       2.00        15.00
     Average Slope     (%)=       4.00         4.00
     Length            (m)=     126.00       126.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      44.78        15.37
               over (min)        10.00        25.00
     Storage Coeff.  (min)=       2.67 (ii)   26.81 (ii)
     Unit Hyd. Tpeak (min)=       5.00        30.00
     Unit Hyd. peak  (cms)=        .29          .04
                                                              *TOTALS*
     PEAK FLOW       (cms)=        .12          .04            .15 (iii)
     TIME TO PEAK    (hrs)=       5.75         6.33           6.08
     RUNOFF VOLUME    (mm)=      85.66        21.21          46.92
     TOTAL RAINFALL   (mm)=      87.81        87.81          87.81
     RUNOFF COEFFICIENT   =        .98          .24            .53

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

       (i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
            CN*  =  55.9    Ia = Dep. Storage  (Above)
      (ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
```

```
--------------------------------------------------------------------------------
*                   Post-Dev: Calibrate Catchment 202
--------------------
| CALIB            |
| NASHYD    (0001) |   Area    (ha)=  67.51   Curve Number   (CN)= 71.6
|ID= 4 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   1.27

     Unit Hyd Qpeak  (cms)=   2.03

     PEAK FLOW       (cms)=   1.82 (i)
     TIME TO PEAK    (hrs)=   7.25
     RUNOFF VOLUME    (mm)=  37.25
     TOTAL RAINFALL   (mm)=  87.81
     RUNOFF COEFFICIENT   =    .42

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

--------------------------------------------------------------------------------
*                   Add post-dev site hydrographs

--------------------
| ADD HYD   (0001) |
|   2 +  3 =  5    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
          ID1= 2 (0001):     1.79      .10     6.08    41.18
        + ID2= 3 (0001):     2.38      .15     6.08    46.92
          ================================================
          ID = 5 (0001):     4.17      .25     6.08    44.47

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
*                   Shift site hydrograph to account for ditch flow to outlet
*                   Path ~150 m (CA 200) and ~75 m (CA 201)
*                   Assume 5 min lag (assumes <=0.5 m/s flow velocity)
--------------------
| SHIFT HYD (0001) |
| IN= 5---> OUT= 6 |
| SHIFT=  5.0 min  |      AREA     QPEAK     TPEAK      R.V.
--------------------      (ha)     (cms)     (hrs)      (mm)
          ID= 5 (0001):    4.17      .25      6.08     44.47
    SHIFT ID= 6 (0001):    4.17      .25      6.17     44.47

--------------------------------------------------------------------------------
*                   Add lagged post-dev site, external hydrographs

--------------------
| ADD HYD   (0001) |
|   6 +  4 =  7    |         AREA    QPEAK    TPEAK     R.V.
```

```
--------------------          (ha)    (cms)    (hrs)     (mm)
          ID1= 6 (0001):     4.17      .25     6.17    44.47
        + ID2= 4 (0001):    67.51     1.82     7.25    37.25
          ================================================
          ID = 7 (0001):    71.68     1.91     7.17    37.67

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| SAVE HYD  (0001) |   AREA       (ha)=  71.68
| ID= 7   PCYC=216 |   QPEAK     (cms)=   1.91 (i)
| DT= 5.0 min      |   TPEAK     (hrs)=   7.17
--------------------   VOLUME     (mm)=  37.67
  Filename: PST50Y12.HYD
  Comments:

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

--------------------------------------------------------------------------------
*                    100 yr Event - Uncontrolled
********************************************************************************

--------------------
|    READ STORM    |    Filename: 100SCS12.STM
| Ptotal= 96.52 mm |    Comments: *100 Yr 12 hr SCS II Trenton
--------------------
                TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
                1.00    2.41 |  4.00    3.86 |  7.00   12.55 | 10.00    3.38
                2.00    2.41 |  5.00    6.76 |  8.00    5.79 | 11.00    1.93
                3.00    2.90 |  6.00   49.22 |  9.00    3.38 | 12.00    1.93

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

*                   Pre-Dev: Calibrate CA 100
--------------------
| CALIB            |
| NASHYD    (0001) |   Area    (ha)=  71.63   Curve Number   (CN)= 71.4
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   1.27

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

     Unit Hyd Qpeak  (cms)=   2.15

     PEAK FLOW       (cms)=   2.25 (i)
     TIME TO PEAK    (hrs)=   7.25
     RUNOFF VOLUME    (mm)=  43.22
     TOTAL RAINFALL   (mm)=  96.52
```

```
     RUNOFF COEFFICIENT   =    .45

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

--------------------------------------------------------------------------------
--------------------
| SAVE HYD  (0001) |   AREA       (ha)=  71.63
| ID= 1   PCYC=217 |   QPEAK     (cms)=   2.25 (i)
| DT= 5.0 min      |   TPEAK     (hrs)=   7.25
--------------------   VOLUME     (mm)=  43.22
  Filename: PRE00Y12.HYD
  Comments:

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

--------------------------------------------------------------------------------
*                   Post-Dev: Calibrate Catchment 200
--------------------
| CALIB            |
| STANDHYD  (0001) |   Area    (ha)=   1.79
|ID= 2 DT= 5.0 min |   Total Imp(%)=  29.00   Dir. Conn.(%)=  24.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .52          1.27
     Dep. Storage     (mm)=       2.00          7.50
     Average Slope     (%)=       4.00          4.00
     Length            (m)=     109.20        109.20
     Mannings n           =       .013          .250

     Max.eff.Inten.(mm/hr)=      49.22         22.90
               over (min)        10.00         20.00
     Storage Coeff.  (min)=       2.36 (ii)    21.25 (ii)
     Unit Hyd. Tpeak (min)=       5.00         25.00
     Unit Hyd. peak  (cms)=        .30           .05
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .06           .06           .12 (iii)
     TIME TO PEAK    (hrs)=       5.67          6.25          6.08
     RUNOFF VOLUME    (mm)=      94.36         32.25         47.08
     TOTAL RAINFALL   (mm)=      96.52         96.52         96.52
     RUNOFF COEFFICIENT   =        .98           .33           .49

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

       (i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
            CN*  =  60.0    Ia = Dep. Storage  (Above)
      (ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

```
*                   Post-Dev: Calibrate Catchment 201
--------------------
| CALIB            |
| STANDHYD  (0001) |   Area    (ha)=   2.38
|ID= 3 DT= 5.0 min |   Total Imp(%)=  45.00   Dir. Conn.(%)=  40.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.07         1.31
     Dep. Storage     (mm)=       2.00        15.00
     Average Slope     (%)=       4.00         4.00
     Length            (m)=     126.00       126.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      49.22        18.54
               over (min)        10.00        25.00
     Storage Coeff.  (min)=       2.57 (ii)   24.96 (ii)
     Unit Hyd. Tpeak (min)=       5.00        25.00
     Unit Hyd. peak  (cms)=        .29          .05
                                                      *TOTALS*
     PEAK FLOW       (cms)=        .13          .05          .17 (iii)
     TIME TO PEAK    (hrs)=       5.75         6.25          6.08
     RUNOFF VOLUME    (mm)=      94.36        25.63         53.06
     TOTAL RAINFALL   (mm)=      96.52        96.52         96.52
     RUNOFF COEFFICIENT   =        .98          .27           .55

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

       (i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
            CN*  =  55.9    Ia = Dep. Storage  (Above)
      (ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
*                   Post-Dev: Calibrate Catchment 202
--------------------
| CALIB            |
| NASHYD    (0001) |   Area    (ha)=  67.51   Curve Number   (CN)= 71.6
|ID= 4 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   1.27

     Unit Hyd Qpeak  (cms)=   2.03

     PEAK FLOW       (cms)=   2.13 (i)
     TIME TO PEAK    (hrs)=   7.25
     RUNOFF VOLUME    (mm)=  43.44
     TOTAL RAINFALL   (mm)=  96.52
     RUNOFF COEFFICIENT   =    .45

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

```
--------------------------------------------------------------------------------
*                   Add post-dev site hydrographs

--------------------
| ADD HYD   (0001) |
|   2 +  3 =  5    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
          ID1= 2 (0001):     1.79      .12     6.08    47.08
        + ID2= 3 (0001):     2.38      .17     6.08    53.06
          ================================================
          ID = 5 (0001):     4.17      .29     6.08    50.51

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
*                   Shift site hydrograph to account for ditch flow to outlet
*                   Path ~150 m (CA 200) and ~75 m (CA 201)
*                   Assume 5 min lag (assumes <=0.5 m/s flow velocity)
--------------------
| SHIFT HYD (0001) |
| IN= 5---> OUT= 6 |
| SHIFT=  5.0 min  |       AREA     QPEAK     TPEAK      R.V.
--------------------       (ha)     (cms)     (hrs)      (mm)
          ID= 5 (0001):    4.17      .29      6.08     50.51
    SHIFT ID= 6 (0001):    4.17      .29      6.17     50.51

--------------------------------------------------------------------------------
*                   Add lagged post-dev site, external hydrographs

--------------------
| ADD HYD   (0001) |
|   6 +  4 =  7    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
          ID1= 6 (0001):     4.17      .29     6.17    50.51
        + ID2= 4 (0001):    67.51     2.13     7.25    43.44
          ================================================
          ID = 7 (0001):    71.68     2.23     7.17    43.85

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| SAVE HYD  (0001) |   AREA       (ha)=  71.68
| ID= 7   PCYC=217 |   QPEAK     (cms)=   2.23 (i)
| DT= 5.0 min      |   TPEAK     (hrs)=   7.17
--------------------   VOLUME     (mm)=  43.85
  Filename: PST00Y12.HYD
  Comments:
```

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

****

* SCS II 24-hr Events

****

* 2 yr Event - Uncontrolled

****

READ STORM	Filename: 2SCS24.STM
Ptotal= 50.39 mm	Comments: *2 Yr 24 hr SCS II Trenton

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
1.00	.55	7.00	1.01	13.00	5.49	19.00	.91
2.00	.55	8.00	1.01	14.00	2.42	20.00	.91
3.00	.66	9.00	1.36	15.00	1.51	21.00	.60
4.00	.66	10.00	1.71	16.00	1.51	22.00	.60
5.00	.81	11.00	2.72	17.00	.91	23.00	.60
6.00	.81	12.00	21.57	18.00	.91	24.00	.60

---

* Pre-Dev: Calibrate CA 100

CALIB			
NASHYD (0001)	Area (ha)= 71.63	Curve Number (CN)= 71.4
ID= 1 DT= 5.0 min	Ia (mm)= 5.00	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 1.28	

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

Unit Hyd Qpeak (cms)= 2.14

PEAK FLOW (cms)= .59 (i)
TIME TO PEAK (hrs)= 13.25
RUNOFF VOLUME (mm)= 13.97
TOTAL RAINFALL (mm)= 50.39
RUNOFF COEFFICIENT = .28

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

SAVE HYD (0001)	AREA (ha)= 71.63
ID= 1 PCYC=347	QPEAK (cms)= .59 (i)
DT= 5.0 min	TPEAK (hrs)= 13.25
	VOLUME (mm)= 13.97

Filename: PRE2Y24.HYD

Comments:

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

```
*                   Post-Dev: Calibrate Catchment 200
--------------------
| CALIB            |
| STANDHYD  (0001) |   Area    (ha)=   1.79
|ID= 2 DT= 5.0 min |   Total Imp(%)=  29.00   Dir. Conn.(%)=  24.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .52         1.27
     Dep. Storage     (mm)=       2.00         7.50
     Average Slope     (%)=       4.00         4.00
     Length            (m)=     109.20       109.20
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      21.57         4.70
               over (min)        10.00        40.00
     Storage Coeff.  (min)=       3.28 (ii)   38.86 (ii)
     Unit Hyd. Tpeak (min)=       5.00        40.00
     Unit Hyd. peak  (cms)=        .27          .03
                                                      *TOTALS*
     PEAK FLOW       (cms)=        .03          .01          .03 (iii)
     TIME TO PEAK    (hrs)=      11.92        12.58         12.17
     RUNOFF VOLUME    (mm)=      48.34         9.32         18.53
     TOTAL RAINFALL   (mm)=      50.39        50.39         50.39
     RUNOFF COEFFICIENT   =        .96          .18           .37

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

       (i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
            CN*  =  60.0    Ia = Dep. Storage  (Above)
      (ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
```

```
*                   Post-Dev: Calibrate Catchment 201
--------------------
| CALIB            |
| STANDHYD  (0001) |   Area    (ha)=   2.38
|ID= 3 DT= 5.0 min |   Total Imp(%)=  45.00   Dir. Conn.(%)=  40.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.07         1.31
     Dep. Storage     (mm)=       2.00        15.00
     Average Slope     (%)=       4.00         4.00
     Length            (m)=     126.00       126.00
```

```
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=     21.57         2.52
               over (min)       10.00        50.00
     Storage Coeff.  (min)=      3.58 (ii)   53.31 (ii)
     Unit Hyd. Tpeak (min)=      5.00        55.00
     Unit Hyd. peak  (cms)=       .26          .02
                                                        *TOTALS*
     PEAK FLOW       (cms)=       .06          .01           .06 (iii)
     TIME TO PEAK    (hrs)=     12.00        13.00         12.17
     RUNOFF VOLUME    (mm)=     48.34         6.08         22.85
     TOTAL RAINFALL   (mm)=     50.39        50.39         50.39
     RUNOFF COEFFICIENT   =       .96          .12           .45

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

       (i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
            CN*  =  55.9    Ia = Dep. Storage  (Above)
      (ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
*                   Post-Dev: Calibrate Catchment 202
--------------------
| CALIB             |
| NASHYD    (0001) |   Area    (ha)=  67.51   Curve Number   (CN)= 71.6
|ID= 4 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   1.28

     Unit Hyd Qpeak  (cms)=   2.01

     PEAK FLOW       (cms)=    .56 (i)
     TIME TO PEAK    (hrs)=  13.25
     RUNOFF VOLUME    (mm)=  14.07
     TOTAL RAINFALL   (mm)=  50.39
     RUNOFF COEFFICIENT   =    .28

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

--------------------------------------------------------------------------------
*                   Add post-dev site hydrographs

--------------------
| ADD HYD   (0001) |
|   2 +  3 =  5    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
          ID1= 2 (0001):     1.79      .03    12.17    18.53
        + ID2= 3 (0001):     2.38      .06    12.17    22.85
          ================================================
```

```
          ID = 5 (0001):     4.17      .09    12.17    21.02

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
*                   Shift site hydrograph to account for ditch flow to outlet
*                   Path ~150 m (CA 200) and ~75 m (CA 201)
*                   Assume 5 min lag (conservative, <0.5 m/s flow velocity)
--------------------
| SHIFT HYD (0001) |
| IN= 5---> OUT= 6 |
| SHIFT=  5.0 min  |      AREA     QPEAK     TPEAK      R.V.
--------------------      (ha)     (cms)     (hrs)      (mm)
          ID= 5 (0001):    4.17      .09     12.17     21.02
    SHIFT ID= 6 (0001):    4.17      .09     12.25     21.02

--------------------------------------------------------------------------------
*                   Add lagged post-dev site, external hydrographs

--------------------
| ADD HYD   (0001) |
|   6 +  4 =  7    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
          ID1= 6 (0001):     4.17      .09    12.25    21.02
        + ID2= 4 (0001):    67.51      .56    13.25    14.07
          ================================================
          ID = 7 (0001):    71.68      .60    13.25    14.47

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| SAVE HYD  (0001) |   AREA       (ha)=  71.68
| ID= 7   PCYC=346 |   QPEAK     (cms)=    .60 (i)
| DT= 5.0 min      |   TPEAK     (hrs)=  13.25
--------------------   VOLUME      (mm)=  14.47
  Filename: PST2Y24.HYD
  Comments:

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

--------------------------------------------------------------------------------
*                   2 yr Event - Controlled
********************************************************************************

--------------------
|    READ STORM    |    Filename: 2SCS24.STM
| Ptotal= 50.39 mm |    Comments: *2 Yr 24 hr SCS II Trenton
--------------------
                TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
```

hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
1.00	.55	7.00	1.01	13.00	5.49	19.00	.91
2.00	.55	8.00	1.01	14.00	2.42	20.00	.91
3.00	.66	9.00	1.36	15.00	1.51	21.00	.60
4.00	.66	10.00	1.71	16.00	1.51	22.00	.60
5.00	.81	11.00	2.72	17.00	.91	23.00	.60
6.00	.81	12.00	21.57	18.00	.91	24.00	.60

---

* Pre-Dev: Calibrate CA 100

CALIB			
NASHYD (0001)	Area (ha)=	71.63	Curve Number (CN)= 71.4
ID= 1 DT= 5.0 min	Ia (mm)=	5.00	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)=	1.28	

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

Unit Hyd Qpeak (cms)= 2.14

PEAK FLOW (cms)= .59 (i)
TIME TO PEAK (hrs)= 13.25
RUNOFF VOLUME (mm)= 13.97
TOTAL RAINFALL (mm)= 50.39
RUNOFF COEFFICIENT = .28

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

SAVE HYD (0001)	AREA (ha)=	71.63
ID= 1 PCYC=347	QPEAK (cms)=	.59 (i)
DT= 5.0 min	TPEAK (hrs)=	13.25
	VOLUME (mm)=	13.97

Filename: PRE2Y24.HYD
Comments:

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

---

* Post-Dev: Calibrate Catchment 200

CALIB			
STANDHYD (0001)	Area (ha)=	1.79	
ID= 2 DT= 5.0 min	Total Imp(%)=	29.00	Dir. Conn.(%)= 24.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	.52	1.27
Dep. Storage	(mm)=	2.00	7.50

```
     Average Slope     (%)=       4.00         4.00
     Length            (m)=     109.20       109.20
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      21.57         4.70
               over (min)        10.00        40.00
     Storage Coeff.  (min)=       3.28 (ii)   38.86 (ii)
     Unit Hyd. Tpeak (min)=       5.00        40.00
     Unit Hyd. peak  (cms)=        .27          .03
                                                        *TOTALS*
     PEAK FLOW       (cms)=        .03          .01          .03 (iii)
     TIME TO PEAK    (hrs)=      11.92        12.58         12.17
     RUNOFF VOLUME    (mm)=      48.34         9.32         18.53
     TOTAL RAINFALL   (mm)=      50.39        50.39         50.39
     RUNOFF COEFFICIENT   =        .96          .18           .37

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

       (i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
            CN*  =  60.0    Ia = Dep. Storage  (Above)
      (ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
*                   Post-Dev: Calibrate Catchment 201
--------------------
| CALIB            |
| STANDHYD  (0001) |   Area    (ha)=   2.38
|ID= 3 DT= 5.0 min |   Total Imp(%)=  45.00   Dir. Conn.(%)=  40.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.07         1.31
     Dep. Storage     (mm)=       2.00        15.00
     Average Slope     (%)=       4.00         4.00
     Length            (m)=     126.00       126.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      21.57         2.52
               over (min)        10.00        50.00
     Storage Coeff.  (min)=       3.58 (ii)   53.31 (ii)
     Unit Hyd. Tpeak (min)=       5.00        55.00
     Unit Hyd. peak  (cms)=        .26          .02
                                                        *TOTALS*
     PEAK FLOW       (cms)=        .06          .01          .06 (iii)
     TIME TO PEAK    (hrs)=      12.00        13.00         12.17
     RUNOFF VOLUME    (mm)=      48.34         6.08         22.85
     TOTAL RAINFALL   (mm)=      50.39        50.39         50.39
     RUNOFF COEFFICIENT   =        .96          .12           .45
```

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

(i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
CN* = 55.9 Ia = Dep. Storage (Above)
(ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

---

* Split off 0.165 cms - capacity of CA 201 OGS

* Remainder direct discharge to outlet

DUHYD (0001)
Inlet Cap.= .165
#of Inlets= 1
Total(cms)= .2

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
TOTAL HYD.(ID= 3):	2.38	.06	12.17	22.85
MAJOR SYS.(ID= 4):	.00	.00	.00	.00
MINOR SYS.(ID= 5):	2.38	.06	12.17	22.85

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

---

* Split off 0.015 cms from OGS - direct discharge to outlet

* Direct remainder to infiltration - 2yr quantity control

* Runoff directed to infiltration removed - no discharge

DUHYD (0001)
Inlet Cap.= .015
#of Inlets= 1
Total(cms)= .0

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
TOTAL HYD.(ID= 5):	2.38	.06	12.17	22.85
MAJOR SYS.(ID= 6):	.74	.04	12.17	22.85
MINOR SYS.(ID= 7):	1.65	.02	11.25	22.85

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

---

* Determine required infiltration storage volume

* Based on the volume of the infiltration hydrograph

```
--------------------
| COMPUTE VOLUME   |
| ID= 6   (0001)   |             DISCHARGE      TIME
--------------------               (cms)       (hrs)
           START CONTROLLING AT      .00       11.17
           INFLOW HYD. PEAKS AT      .04       12.17
           STOP  CONTROLLING AT      .00       13.25

           REQUIRED STORAGE VOLUME (ha.m.)=    .0168
           TOTAL HYDROGRAPH VOLUME (ha.m.)=    .0168
           % OF HYDROGRAPH TO STORE       =  99.9996

           NOTE:  Storage was computed to reduce the Inflow

--------------------------------------------------------------------------------
*                  Add hydrographs for non-infiltrated CA 201 runoff

--------------------
| ADD HYD   (0001) |
|   4 +  7 =  8    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
*** W A R N I N G :  HYDROGRAPH 0001 <ID= 4> IS DRY.
*** W A R N I N G :  HYDROGRAPH 0001 = HYDROGRAPH 0001
          ID1= 4 (0001):      .00      .00      .00      .00
        + ID2= 7 (0001):     1.65      .02    11.25    22.85
          ================================================
          ID = 8 (0001):     1.65      .02    11.25    22.85

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
*                  Post-Dev: Calibrate Catchment 202
--------------------
| CALIB            |
| NASHYD    (0001) |   Area    (ha)=  67.51   Curve Number   (CN)= 71.6
|ID= 4 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   1.28

     Unit Hyd Qpeak  (cms)=   2.01

     PEAK FLOW       (cms)=    .56 (i)
     TIME TO PEAK    (hrs)=  13.25
     RUNOFF VOLUME    (mm)=  14.52
     TOTAL RAINFALL   (mm)=  50.39
     RUNOFF COEFFICIENT   =    .29

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

--------------------------------------------------------------------------------
*                  Add post-dev site hydrographs
```

```
--------------------
| ADD HYD   (0001) |
|   2 +  8 =  5    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
          ID1= 2 (0001):     1.79      .03    12.17    18.53
        + ID2= 8 (0001):     1.65      .02    11.25    22.85
          ================================================
          ID = 5 (0001):     3.44      .05    12.17    20.62

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
*                   Shift site hydrograph to account for ditch flow to outlet
*                   Path ~150 m (CA 200) and ~75 m (CA 201)
*                   Assume 5 min lag (assumes <=0.5 m/s flow velocity)
--------------------
| SHIFT HYD (0001) |
| IN= 5---> OUT= 6 |
| SHIFT=  5.0 min  |      AREA     QPEAK     TPEAK      R.V.
--------------------      (ha)     (cms)     (hrs)      (mm)
          ID= 5 (0001):    3.44      .05     12.17     20.62
    SHIFT ID= 6 (0001):    3.44      .05     12.25     20.62

--------------------------------------------------------------------------------
*                   Add lagged post-dev site, external hydrographs

--------------------
| ADD HYD   (0001) |
|   6 +  4 =  7    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
          ID1= 6 (0001):     3.44      .05    12.25    20.62
        + ID2= 4 (0001):    67.51      .56    13.25    14.52
          ================================================
          ID = 7 (0001):    70.95      .59    13.25    14.81

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| SAVE HYD  (0001) |   AREA       (ha)=  70.95
| ID= 7   PCYC=353 |   QPEAK     (cms)=    .59 (i)
| DT= 5.0 min      |   TPEAK     (hrs)=  13.25
--------------------   VOLUME     (mm)=  14.81
  Filename: PST2Y24.HYD
  Comments:

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

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

```
*                   5 yr Event - Uncontrolled
**************************************************************************

--------------------
|    READ STORM    |    Filename: 5SCS24.STM
| Ptotal= 65.91 mm |    Comments: *5 Yr 24 hr SCS II Trenton
--------------------
                TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
                1.00     .72 |  7.00    1.32 | 13.00    7.18 | 19.00    1.19
                2.00     .72 |  8.00    1.32 | 14.00    3.16 | 20.00    1.19
                3.00     .86 |  9.00    1.78 | 15.00    1.98 | 21.00     .79
                4.00     .86 | 10.00    2.24 | 16.00    1.98 | 22.00     .79
                5.00    1.05 | 11.00    3.56 | 17.00    1.19 | 23.00     .79
                6.00    1.05 | 12.00   28.21 | 18.00    1.19 | 24.00     .79

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

*                   Pre-Dev: Calibrate CA 100
--------------------
| CALIB            |
| NASHYD    (0001) |   Area    (ha)=  71.63   Curve Number   (CN)= 71.4
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   1.28

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

     Unit Hyd Qpeak  (cms)=   2.14

     PEAK FLOW       (cms)=    .98 (i)
     TIME TO PEAK    (hrs)=  13.25
     RUNOFF VOLUME    (mm)=  22.77
     TOTAL RAINFALL   (mm)=  65.91
     RUNOFF COEFFICIENT   =    .35

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

--------------------------------------------------------------------------------
--------------------
| SAVE HYD  (0001) |   AREA       (ha)=  71.63
| ID= 1   PCYC=351 |   QPEAK     (cms)=    .98 (i)
| DT= 5.0 min      |   TPEAK     (hrs)=  13.25
--------------------   VOLUME     (mm)=  22.77
  Filename: PRE5Y24.HYD
  Comments:

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

--------------------------------------------------------------------------------
*                   Post-Dev: Calibrate Catchment 200
```

```
--------------------
| CALIB            |
| STANDHYD  (0001) |   Area    (ha)=   1.79
|ID= 2 DT= 5.0 min |   Total Imp(%)=  29.00   Dir. Conn.(%)=  24.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .52         1.27
     Dep. Storage     (mm)=       2.00         7.50
     Average Slope     (%)=       4.00         4.00
     Length            (m)=     109.20       109.20
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      28.21         8.75
               over (min)        10.00        30.00
     Storage Coeff.  (min)=       2.95 (ii)   30.70 (ii)
     Unit Hyd. Tpeak (min)=       5.00        35.00
     Unit Hyd. peak  (cms)=        .28          .04
                                                      *TOTALS*
     PEAK FLOW       (cms)=        .03          .02          .05 (iii)
     TIME TO PEAK    (hrs)=      11.75        12.42         12.08
     RUNOFF VOLUME    (mm)=      63.84        15.95         27.34
     TOTAL RAINFALL   (mm)=      65.91        65.91         65.91
     RUNOFF COEFFICIENT   =        .97          .24           .41

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

       (i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
            CN*  =  60.0    Ia = Dep. Storage  (Above)
      (ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
*                   Post-Dev: Calibrate Catchment 201
--------------------
| CALIB            |
| STANDHYD  (0001) |   Area    (ha)=   2.38
|ID= 3 DT= 5.0 min |   Total Imp(%)=  45.00   Dir. Conn.(%)=  40.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.07         1.31
     Dep. Storage     (mm)=       2.00        15.00
     Average Slope     (%)=       4.00         4.00
     Length            (m)=     126.00       126.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      28.21         6.12
               over (min)        10.00        35.00
     Storage Coeff.  (min)=       3.21 (ii)   38.09 (ii)
     Unit Hyd. Tpeak (min)=       5.00        40.00
```

```
     Unit Hyd. peak  (cms)=        .27          .03
                                                              *TOTALS*
     PEAK FLOW       (cms)=        .07          .01             .08 (iii)
     TIME TO PEAK    (hrs)=      11.92        12.67           12.17
     RUNOFF VOLUME    (mm)=      63.84        11.51           32.34
     TOTAL RAINFALL   (mm)=      65.91        65.91           65.91
     RUNOFF COEFFICIENT   =        .97          .17             .49

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

       (i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
            CN*  =  55.9    Ia = Dep. Storage  (Above)
      (ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
*                   Post-Dev: Calibrate Catchment 202
--------------------
| CALIB            |
| NASHYD    (0001) |   Area    (ha)=  67.51   Curve Number   (CN)= 71.6
|ID= 4 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   1.28

     Unit Hyd Qpeak  (cms)=   2.01

     PEAK FLOW       (cms)=    .93 (i)
     TIME TO PEAK    (hrs)=  13.25
     RUNOFF VOLUME    (mm)=  22.91
     TOTAL RAINFALL   (mm)=  65.91
     RUNOFF COEFFICIENT   =    .35

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

--------------------------------------------------------------------------------
*                   Add post-dev site hydrographs

--------------------
| ADD HYD   (0001) |
|   2 +  3 =  5    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
          ID1= 2 (0001):     1.79      .05    12.08    27.34
        + ID2= 3 (0001):     2.38      .08    12.17    32.34
          ================================================
          ID = 5 (0001):     4.17      .13    12.08    30.22

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
*                   Shift site hydrograph to account for ditch flow to outlet
```

```
*                   Path ~150 m (CA 200) and ~75 m (CA 201)
*                   Assume 5 min lag (assumes <=0.5 m/s flow velocity)
--------------------
| SHIFT HYD (0001) |
| IN= 5---> OUT= 6 |
| SHIFT=  5.0 min  |      AREA     QPEAK     TPEAK      R.V.
--------------------      (ha)     (cms)     (hrs)      (mm)
          ID= 5 (0001):    4.17      .13     12.08     30.22
    SHIFT ID= 6 (0001):    4.17      .13     12.17     30.22

--------------------------------------------------------------------------------
*                   Add lagged post-dev site, external hydrographs

--------------------
| ADD HYD   (0001) |
|   6 +  4 =  7    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
          ID1= 6 (0001):     4.17      .13    12.17    30.22
        + ID2= 4 (0001):    67.51      .93    13.25    22.91
          ================================================
          ID = 7 (0001):    71.68      .98    13.17    23.33

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| SAVE HYD  (0001) |   AREA       (ha)=  71.68
| ID= 7   PCYC=351 |   QPEAK     (cms)=    .98 (i)
| DT= 5.0 min      |   TPEAK     (hrs)=  13.17
--------------------   VOLUME     (mm)=  23.33
  Filename: PST5Y24.HYD
  Comments:

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

--------------------------------------------------------------------------------
*                   10 yr Event - Uncontrolled
********************************************************************************

--------------------
|    READ STORM    |    Filename: 10SCS24.STM
| Ptotal= 76.08 mm |    Comments: *10 Yr 24 hr SCS II Trenton
--------------------
                TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
                1.00     .84 |  7.00    1.52 | 13.00    8.29 | 19.00    1.37
                2.00     .84 |  8.00    1.52 | 14.00    3.65 | 20.00    1.37
                3.00     .99 |  9.00    2.05 | 15.00    2.28 | 21.00     .91
                4.00     .99 | 10.00    2.59 | 16.00    2.28 | 22.00     .91
                5.00    1.22 | 11.00    4.11 | 17.00    1.37 | 23.00     .91
```

```
                6.00    1.22 | 12.00   32.57 | 18.00    1.37 | 24.00     .91

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

*                   Pre-Dev: Calibrate CA 100
--------------------
| CALIB            |
| NASHYD    (0001) |   Area    (ha)=  71.63   Curve Number   (CN)= 71.4
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   1.28

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

     Unit Hyd Qpeak  (cms)=   2.14

     PEAK FLOW       (cms)=   1.27 (i)
     TIME TO PEAK    (hrs)=  13.25
     RUNOFF VOLUME    (mm)=  29.18
     TOTAL RAINFALL   (mm)=  76.08
     RUNOFF COEFFICIENT   =    .38

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

--------------------------------------------------------------------------------
--------------------
| SAVE HYD  (0001) |   AREA       (ha)=  71.63
| ID= 1   PCYC=353 |   QPEAK     (cms)=   1.27 (i)
| DT= 5.0 min      |   TPEAK     (hrs)=  13.25
--------------------   VOLUME     (mm)=  29.18
  Filename: PRE10Y24.HYD
  Comments:

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

--------------------------------------------------------------------------------
*                   Post-Dev: Calibrate Catchment 200
--------------------
| CALIB            |
| STANDHYD  (0001) |   Area    (ha)=   1.79
|ID= 2 DT= 5.0 min |   Total Imp(%)=  29.00   Dir. Conn.(%)=  24.00
--------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .52          1.27
     Dep. Storage     (mm)=       2.00          7.50
     Average Slope     (%)=       4.00          4.00
     Length            (m)=     109.20        109.20
     Mannings n           =       .013          .250

     Max.eff.Inten.(mm/hr)=      32.57         11.86
               over (min)        10.00         25.00
```

```
     Storage Coeff.  (min)=       2.78 (ii)   27.36 (ii)
     Unit Hyd. Tpeak (min)=       5.00        30.00
     Unit Hyd. peak  (cms)=        .28          .04
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .04          .03           .07 (iii)
     TIME TO PEAK    (hrs)=      11.75        12.33         12.08
     RUNOFF VOLUME    (mm)=      74.00        20.95         33.60
     TOTAL RAINFALL   (mm)=      76.08        76.08         76.08
     RUNOFF COEFFICIENT   =        .97          .28           .44

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

       (i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
            CN*  =  60.0    Ia = Dep. Storage  (Above)
      (ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
*                   Post-Dev: Calibrate Catchment 201
--------------------
| CALIB            |
| STANDHYD  (0001) |   Area    (ha)=   2.38
|ID= 3 DT= 5.0 min |   Total Imp(%)=  45.00   Dir. Conn.(%)=  40.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.07         1.31
     Dep. Storage     (mm)=       2.00        15.00
     Average Slope     (%)=       4.00         4.00
     Length            (m)=     126.00       126.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      32.57         8.52
               over (min)        10.00        35.00
     Storage Coeff.  (min)=       3.03 (ii)   33.59 (ii)
     Unit Hyd. Tpeak (min)=       5.00        35.00
     Unit Hyd. peak  (cms)=        .27          .03
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .09          .02           .10 (iii)
     TIME TO PEAK    (hrs)=      11.83        12.42         12.08
     RUNOFF VOLUME    (mm)=      74.00        15.76         38.97
     TOTAL RAINFALL   (mm)=      76.08        76.08         76.08
     RUNOFF COEFFICIENT   =        .97          .21           .51

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

       (i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
            CN*  =  55.9    Ia = Dep. Storage  (Above)
      (ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
           THAN THE STORAGE COEFFICIENT.
```

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

```
--------------------------------------------------------------------------------
*                   Post-Dev: Calibrate Catchment 202
--------------------
| CALIB            |
| NASHYD    (0001) |   Area    (ha)=  67.51   Curve Number   (CN)= 71.6
|ID= 4 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   1.28

     Unit Hyd Qpeak  (cms)=   2.01

     PEAK FLOW       (cms)=   1.20 (i)
     TIME TO PEAK    (hrs)=  13.25
     RUNOFF VOLUME    (mm)=  29.35
     TOTAL RAINFALL   (mm)=  76.08
     RUNOFF COEFFICIENT   =    .39

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

--------------------------------------------------------------------------------
*                   Add post-dev site hydrographs

--------------------
| ADD HYD   (0001) |
|   2 +  3 =  5    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
          ID1= 2 (0001):     1.79      .07    12.08    33.60
        + ID2= 3 (0001):     2.38      .10    12.08    38.97
          ================================================
          ID = 5 (0001):     4.17      .17    12.08    36.68

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
*                   Shift site hydrograph to account for ditch flow to outlet
*                   Path ~150 m (CA 200) and ~75 m (CA 201)
*                   Assume 5 min lag (assumes <=0.5 m/s flow velocity)
--------------------
| SHIFT HYD (0001) |
| IN= 5---> OUT= 6 |
| SHIFT=  5.0 min  |      AREA     QPEAK     TPEAK      R.V.
--------------------      (ha)     (cms)     (hrs)      (mm)
          ID= 5 (0001):    4.17      .17     12.08     36.68
    SHIFT ID= 6 (0001):    4.17      .17     12.17     36.68

--------------------------------------------------------------------------------
*                   Add lagged post-dev site, external hydrographs

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

ADD HYD (0001)
6 + 4 = 7

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 6 (0001):	4.17	.17	12.17	36.68
+ ID2= 4 (0001):	67.51	1.20	13.25	29.35
ID = 7 (0001):	71.68	1.26	13.17	29.78

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

SAVE HYD (0001)	AREA (ha)= 71.68
ID= 7 PCYC=353	QPEAK (cms)= 1.26 (i)
DT= 5.0 min	TPEAK (hrs)= 13.17
	VOLUME (mm)= 29.78

Filename: PST10Y24.HYD
Comments:

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

---

* 25 yr Event - Uncontrolled
****

READ STORM	Filename: 25SCS24.STM
Ptotal= 89.00 mm	Comments: *25 Yr 24 hr SCS II Trenton

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
1.00	.98	7.00	1.78	13.00	9.70	19.00	1.60
2.00	.98	8.00	1.78	14.00	4.27	20.00	1.60
3.00	1.16	9.00	2.40	15.00	2.67	21.00	1.07
4.00	1.16	10.00	3.03	16.00	2.67	22.00	1.07
5.00	1.42	11.00	4.81	17.00	1.60	23.00	1.07
6.00	1.42	12.00	38.09	18.00	1.60	24.00	1.07

---

* Pre-Dev: Calibrate CA 100

CALIB					
NASHYD (0001)	Area (ha)=	71.63	Curve Number (CN)=	71.4
ID= 1 DT= 5.0 min	Ia (mm)=	5.00	# of Linear Res.(N)=	3.00
	U.H. Tp(hrs)=	1.27		

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

Unit Hyd Qpeak (cms)= 2.15

```
     PEAK FLOW       (cms)=   1.67 (i)
     TIME TO PEAK    (hrs)=  13.17
     RUNOFF VOLUME    (mm)=  37.92
     TOTAL RAINFALL   (mm)=  89.00
     RUNOFF COEFFICIENT   =    .43

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

--------------------------------------------------------------------------------
--------------------
| SAVE HYD  (0001) |   AREA       (ha)=  71.63
| ID= 1   PCYC=355 |   QPEAK     (cms)=   1.67 (i)
| DT= 5.0 min      |   TPEAK     (hrs)=  13.17
--------------------   VOLUME     (mm)=  37.92
  Filename: PRE25Y24.HYD
  Comments:

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

--------------------------------------------------------------------------------
*                   Post-Dev: Calibrate Catchment 200
--------------------
| CALIB            |
| STANDHYD  (0001) |   Area    (ha)=   1.79
|ID= 2 DT= 5.0 min |   Total Imp(%)=  29.00   Dir. Conn.(%)=  24.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .52          1.27
     Dep. Storage     (mm)=       2.00          7.50
     Average Slope     (%)=       4.00          4.00
     Length            (m)=     109.20        109.20
     Mannings n           =       .013          .250

     Max.eff.Inten.(mm/hr)=      38.09         15.79
               over (min)        10.00         25.00
     Storage Coeff.  (min)=       2.61 (ii)    24.53 (ii)
     Unit Hyd. Tpeak (min)=       5.00         25.00
     Unit Hyd. peak  (cms)=        .29           .05
                                                      *TOTALS*
     PEAK FLOW       (cms)=        .05           .04          .09 (iii)
     TIME TO PEAK    (hrs)=      11.75         12.25        12.08
     RUNOFF VOLUME    (mm)=      86.91         27.94        42.01
     TOTAL RAINFALL   (mm)=      89.00         89.00        89.00
     RUNOFF COEFFICIENT   =        .98           .31          .47

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

       (i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
            CN*  =  60.0    Ia = Dep. Storage  (Above)
```

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

--------------------------------------------------------------------------------
*                   Post-Dev: Calibrate Catchment 201
--------------------
| CALIB            |
| STANDHYD  (0001) |   Area    (ha)=   2.38
|ID= 3 DT= 5.0 min |   Total Imp(%)=  45.00   Dir. Conn.(%)=  40.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.07         1.31
     Dep. Storage     (mm)=       2.00        15.00
     Average Slope     (%)=       4.00         4.00
     Length            (m)=     126.00       126.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      38.09        12.38
               over (min)        10.00        30.00
     Storage Coeff.  (min)=       2.85 (ii)   29.17 (ii)
     Unit Hyd. Tpeak (min)=       5.00        30.00
     Unit Hyd. peak  (cms)=        .28          .04
                                                        *TOTALS*
     PEAK FLOW       (cms)=        .10          .03           .13 (iii)
     TIME TO PEAK    (hrs)=      11.83        12.33         12.08
     RUNOFF VOLUME    (mm)=      86.91        21.82         47.79
     TOTAL RAINFALL   (mm)=      89.00        89.00         89.00
     RUNOFF COEFFICIENT   =        .98          .25           .54

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

       (i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
            CN*  =  55.9    Ia = Dep. Storage  (Above)
      (ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
*                   Post-Dev: Calibrate Catchment 202
--------------------
| CALIB            |
| NASHYD    (0001) |   Area    (ha)=  67.51   Curve Number   (CN)= 71.6
|ID= 4 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   1.27

     Unit Hyd Qpeak  (cms)=   2.03

     PEAK FLOW       (cms)=   1.58 (i)
     TIME TO PEAK    (hrs)=  13.17
```

```
     RUNOFF VOLUME    (mm)=  38.13
     TOTAL RAINFALL   (mm)=  89.00
     RUNOFF COEFFICIENT   =    .43

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

--------------------------------------------------------------------------------
*                   Add post-dev site hydrographs

--------------------
| ADD HYD   (0001) |
|   2 +  3 =  5    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
          ID1= 2 (0001):     1.79      .09    12.08    42.01
        + ID2= 3 (0001):     2.38      .13    12.08    47.79
          ================================================
          ID = 5 (0001):     4.17      .21    12.08    45.32

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
*                   Shift site hydrograph to account for ditch flow to outlet
*                   Path ~150 m (CA 200) and ~75 m (CA 201)
*                   Assume 5 min lag (assumes <=0.5 m/s flow velocity)
--------------------
| SHIFT HYD (0001) |
| IN= 5---> OUT= 6 |
| SHIFT=  5.0 min  |      AREA     QPEAK     TPEAK      R.V.
--------------------      (ha)     (cms)     (hrs)      (mm)
          ID= 5 (0001):    4.17      .21     12.08     45.32
    SHIFT ID= 6 (0001):    4.17      .21     12.17     45.32

--------------------------------------------------------------------------------
*                   Add lagged post-dev site, external hydrographs

--------------------
| ADD HYD   (0001) |
|   6 +  4 =  7    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
          ID1= 6 (0001):     4.17      .21    12.17    45.32
        + ID2= 4 (0001):    67.51     1.58    13.17    38.13
          ================================================
          ID = 7 (0001):    71.68     1.66    13.17    38.54

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| SAVE HYD  (0001) |   AREA       (ha)=  71.68
| ID= 7   PCYC=354 |   QPEAK     (cms)=   1.66 (i)
```

```
| DT= 5.0 min      |   TPEAK     (hrs)=  13.17
--------------------   VOLUME     (mm)=  38.54
  Filename: PST25Y24.HYD
  Comments:

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

--------------------------------------------------------------------------------
*                    50 yr Event - Uncontrolled
********************************************************************************

--------------------
|    READ STORM    |    Filename: 50SCS24.STM
| Ptotal= 98.55 mm |    Comments: *50 Yr 24 hr SCS II Trenton
--------------------
                TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
                1.00    1.08 |  7.00    1.97 | 13.00   10.75 | 19.00    1.77
                2.00    1.08 |  8.00    1.97 | 14.00    4.73 | 20.00    1.77
                3.00    1.28 |  9.00    2.66 | 15.00    2.96 | 21.00    1.18
                4.00    1.28 | 10.00    3.35 | 16.00    2.96 | 22.00    1.18
                5.00    1.58 | 11.00    5.32 | 17.00    1.77 | 23.00    1.18
                6.00    1.58 | 12.00   42.20 | 18.00    1.77 | 24.00    1.18

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

*                   Pre-Dev: Calibrate CA 100
--------------------
| CALIB            |
| NASHYD    (0001) |   Area    (ha)=  71.63   Curve Number   (CN)= 71.4
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   1.27

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

     Unit Hyd Qpeak  (cms)=   2.15

     PEAK FLOW       (cms)=   1.98 (i)
     TIME TO PEAK    (hrs)=  13.17
     RUNOFF VOLUME    (mm)=  44.74
     TOTAL RAINFALL   (mm)=  98.55
     RUNOFF COEFFICIENT   =    .45

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

--------------------------------------------------------------------------------
--------------------
| SAVE HYD  (0001) |   AREA       (ha)=  71.63
| ID= 1   PCYC=356 |   QPEAK     (cms)=   1.98 (i)
| DT= 5.0 min      |   TPEAK     (hrs)=  13.17
```

```
--------------------   VOLUME     (mm)=  44.74
  Filename: PRE50Y24.HYD
  Comments:

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

--------------------------------------------------------------------------------
*                   Post-Dev: Calibrate Catchment 200
--------------------
| CALIB            |
| STANDHYD  (0001) |   Area    (ha)=   1.79
|ID= 2 DT= 5.0 min |   Total Imp(%)=  29.00   Dir. Conn.(%)=  24.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .52          1.27
     Dep. Storage     (mm)=       2.00          7.50
     Average Slope     (%)=       4.00          4.00
     Length            (m)=     109.20        109.20
     Mannings n             =       .013          .250

     Max.eff.Inten.(mm/hr)=      42.20         18.93
               over (min)        10.00         25.00
     Storage Coeff.  (min)=       2.51 (ii)    22.89 (ii)
     Unit Hyd. Tpeak (min)=       5.00         25.00
     Unit Hyd. peak  (cms)=        .29           .05
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .05           .05           .10 (iii)
     TIME TO PEAK    (hrs)=      11.67         12.25          12.08
     RUNOFF VOLUME    (mm)=      96.45         33.50          48.52
     TOTAL RAINFALL   (mm)=      98.55         98.55          98.55
     RUNOFF COEFFICIENT   =        .98           .34            .49

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

       (i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
            CN*  =  60.0    Ia = Dep. Storage  (Above)
      (ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
*                   Post-Dev: Calibrate Catchment 201
--------------------
| CALIB            |
| STANDHYD  (0001) |   Area    (ha)=   2.38
|ID= 3 DT= 5.0 min |   Total Imp(%)=  45.00   Dir. Conn.(%)=  40.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.07          1.31
     Dep. Storage     (mm)=       2.00         15.00
```

```
     Average Slope     (%)=       4.00         4.00
     Length            (m)=     126.00       126.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      42.20        15.71
               over (min)        10.00        25.00
     Storage Coeff.  (min)=       2.73 (ii)   26.66 (ii)
     Unit Hyd. Tpeak (min)=       5.00        30.00
     Unit Hyd. peak  (cms)=        .29          .04
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .11          .04           .15 (iii)
     TIME TO PEAK    (hrs)=      11.75        12.33         12.08
     RUNOFF VOLUME    (mm)=      96.45        26.73         54.55
     TOTAL RAINFALL   (mm)=      98.55        98.55         98.55
     RUNOFF COEFFICIENT   =        .98          .27           .55

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

       (i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
            CN*  =  55.9    Ia = Dep. Storage  (Above)
      (ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
*                   Post-Dev: Calibrate Catchment 202
--------------------
| CALIB            |
| NASHYD    (0001) |   Area    (ha)=  67.51   Curve Number   (CN)= 71.6
|ID= 4 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   1.27

     Unit Hyd Qpeak  (cms)=   2.03

     PEAK FLOW       (cms)=   1.87 (i)
     TIME TO PEAK    (hrs)=  13.17
     RUNOFF VOLUME    (mm)=  44.97
     TOTAL RAINFALL   (mm)=  98.55
     RUNOFF COEFFICIENT   =    .46

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

--------------------------------------------------------------------------------
*                   Add post-dev site hydrographs

--------------------
| ADD HYD   (0001) |
|   2 +  3 =  5    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
          ID1= 2 (0001):     1.79      .10    12.08    48.52
```

```
        + ID2= 3 (0001):     2.38      .15    12.08    54.55
          ================================================
          ID = 5 (0001):     4.17      .25    12.08    51.97

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
*                   Shift site hydrograph to account for ditch flow to outlet
*                   Path ~150 m (CA 200) and ~75 m (CA 201)
*                   Assume 5 min lag (assumes <=0.5 m/s flow velocity)
--------------------
| SHIFT HYD (0001) |
| IN= 5---> OUT= 6 |
| SHIFT=  5.0 min  |      AREA     QPEAK     TPEAK      R.V.
--------------------      (ha)     (cms)     (hrs)      (mm)
          ID= 5 (0001):    4.17      .25     12.08     51.97
    SHIFT ID= 6 (0001):    4.17      .25     12.17     51.97

------------------------------------------------------------------------------
*                   Add lagged post-dev site, external hydrographs

--------------------
| ADD HYD   (0001) |
|   6 +  4 =  7    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
          ID1= 6 (0001):     4.17      .25    12.17    51.97
        + ID2= 4 (0001):    67.51     1.87    13.17    44.97
          ================================================
          ID = 7 (0001):    71.68     1.96    13.17    45.37

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
--------------------
| SAVE HYD  (0001) |   AREA       (ha)=  71.68
| ID= 7   PCYC=356 |   QPEAK     (cms)=   1.96 (i)
| DT= 5.0 min      |   TPEAK     (hrs)=  13.17
--------------------   VOLUME     (mm)=  45.37
  Filename: PST50Y24.HYD
  Comments:

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

------------------------------------------------------------------------------
*                   100 yr Event - Uncontrolled
******************************************************************************

--------------------
|    READ STORM    |    Filename: 100SCS24.STM
| Ptotal=108.14 mm |    Comments: *100 Yr 24 hr SCS II Trenton
```

```
--------------------
                TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
                1.00    1.19 |  7.00    2.16 | 13.00   11.78 | 19.00    1.95
                2.00    1.19 |  8.00    2.16 | 14.00    5.19 | 20.00    1.95
                3.00    1.41 |  9.00    2.92 | 15.00    3.24 | 21.00    1.30
                4.00    1.41 | 10.00    3.68 | 16.00    3.24 | 22.00    1.30
                5.00    1.73 | 11.00    5.84 | 17.00    1.95 | 23.00    1.30
                6.00    1.73 | 12.00   46.27 | 18.00    1.95 | 24.00    1.30

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

*                   Pre-Dev: Calibrate CA 100
--------------------
| CALIB            |
| NASHYD    (0001) |   Area    (ha)=  71.63   Curve Number   (CN)= 71.4
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   1.27

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

     Unit Hyd Qpeak  (cms)=   2.15

     PEAK FLOW       (cms)=   2.30 (i)
     TIME TO PEAK    (hrs)=  13.17
     RUNOFF VOLUME    (mm)=  51.84
     TOTAL RAINFALL   (mm)= 108.14
     RUNOFF COEFFICIENT   =    .48

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

------------------------------------------------------------------------------
--------------------
| SAVE HYD  (0001) |   AREA       (ha)=  71.63
| ID= 1   PCYC=357 |   QPEAK     (cms)=   2.30 (i)
| DT= 5.0 min      |   TPEAK     (hrs)=  13.17
--------------------   VOLUME     (mm)=  51.84
  Filename: PRE00Y24.HYD
  Comments:

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

------------------------------------------------------------------------------
*                   Post-Dev: Calibrate Catchment 200
--------------------
| CALIB            |
| STANDHYD  (0001) |   Area    (ha)=   1.79
|ID= 2 DT= 5.0 min |   Total Imp(%)=  29.00   Dir. Conn.(%)=  24.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
```

```
     Surface Area     (ha)=        .52         1.27
     Dep. Storage     (mm)=       2.00         7.50
     Average Slope     (%)=       4.00         4.00
     Length            (m)=     109.20       109.20
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      46.27        22.72
               over (min)        10.00        20.00
     Storage Coeff.  (min)=       2.42 (ii)   21.36 (ii)
     Unit Hyd. Tpeak (min)=       5.00        25.00
     Unit Hyd. peak  (cms)=        .30          .05
                                                      *TOTALS*
     PEAK FLOW       (cms)=        .06          .06          .12 (iii)
     TIME TO PEAK    (hrs)=      11.67        12.25         12.08
     RUNOFF VOLUME    (mm)=     106.03        39.37         55.30
     TOTAL RAINFALL   (mm)=     108.14       108.14        108.14
     RUNOFF COEFFICIENT   =        .98          .36           .51

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

       (i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
            CN*  =  60.0    Ia = Dep. Storage  (Above)
      (ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
*                  Post-Dev: Calibrate Catchment 201
--------------------
| CALIB            |
| STANDHYD  (0001) |   Area    (ha)=   2.38
|ID= 3 DT= 5.0 min |   Total Imp(%)=  45.00   Dir. Conn.(%)=  40.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.07         1.31
     Dep. Storage     (mm)=       2.00        15.00
     Average Slope     (%)=       4.00         4.00
     Length            (m)=     126.00       126.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      46.27        18.78
               over (min)        10.00        25.00
     Storage Coeff.  (min)=       2.64 (ii)   24.91 (ii)
     Unit Hyd. Tpeak (min)=       5.00        25.00
     Unit Hyd. peak  (cms)=        .29          .05
                                                      *TOTALS*
     PEAK FLOW       (cms)=        .12          .05          .17 (iii)
     TIME TO PEAK    (hrs)=      11.75        12.25         12.08
     RUNOFF VOLUME    (mm)=     106.03        31.98         61.53
     TOTAL RAINFALL   (mm)=     108.14       108.14        108.14
```

```
     RUNOFF COEFFICIENT   =        .98          .30           .57

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

       (i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
            CN*  =  55.9    Ia = Dep. Storage  (Above)
      (ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
*                   Post-Dev: Calibrate Catchment 202
--------------------
| CALIB            |
| NASHYD    (0001) |   Area    (ha)=  67.51   Curve Number   (CN)= 71.6
|ID= 4 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   1.27

     Unit Hyd Qpeak  (cms)=   2.03

     PEAK FLOW       (cms)=   2.18 (i)
     TIME TO PEAK    (hrs)=  13.17
     RUNOFF VOLUME    (mm)=  52.09
     TOTAL RAINFALL   (mm)= 108.14
     RUNOFF COEFFICIENT   =    .48

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

--------------------------------------------------------------------------------
*                   Add post-dev site hydrographs

--------------------
| ADD HYD   (0001) |
|   2 +  3 =  5    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
          ID1= 2 (0001):     1.79      .12    12.08    55.30
        + ID2= 3 (0001):     2.38      .17    12.08    61.53
          ================================================
          ID = 5 (0001):     4.17      .28    12.08    58.87

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
*                   Shift site hydrograph to account for ditch flow to outlet
*                   Path ~150 m (CA 200) and ~75 m (CA 201)
*                   Assume 5 min lag (assumes <=0.5 m/s flow velocity)
--------------------
| SHIFT HYD (0001) |
| IN= 5---> OUT= 6 |
| SHIFT=  5.0 min  |      AREA     QPEAK     TPEAK      R.V.
```

```
--------------------      (ha)     (cms)     (hrs)      (mm)
          ID= 5 (0001):    4.17      .28     12.08     58.87
    SHIFT ID= 6 (0001):    4.17      .28     12.17     58.87

------------------------------------------------------------------------------
*                   Add lagged post-dev site, external hydrographs

--------------------
| ADD HYD   (0001) |
|   6 +  4 =  7    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
          ID1= 6 (0001):     4.17      .28    12.17    58.87
        + ID2= 4 (0001):    67.51     2.18    13.17    52.09
          ================================================
          ID = 7 (0001):    71.68     2.28    13.17    52.48

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
--------------------
| SAVE HYD  (0001) |   AREA       (ha)=  71.68
| ID= 7   PCYC=357 |   QPEAK     (cms)=   2.28 (i)
| DT= 5.0 min      |   TPEAK     (hrs)=  13.17
--------------------   VOLUME     (mm)=  52.48
  Filename: PST00Y24.HYD
  Comments:

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

------------------------------------------------------------------------------
******************************************************************************
*                   90th % Event
******************************************************************************
*                   Uncontrolled
******************************************************************************

--------------------
|    READ STORM    |    Filename: 27Chcago.stm
| Ptotal= 27.00 mm |    Comments: 4 Hr Chicago 27mm
--------------------
                TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
                 .08    1.87 |  1.08    7.67 |  2.08    4.98 |  3.08    2.46
                 .17    1.98 |  1.17   11.55 |  2.17    4.55 |  3.17    2.37
                 .25    2.10 |  1.25   25.39 |  2.25    4.19 |  3.25    2.29
                 .33    2.24 |  1.33   74.37 |  2.33    3.90 |  3.33    2.20
                 .42    2.41 |  1.42   32.29 |  2.42    3.65 |  3.42    2.13
                 .50    2.60 |  1.50   18.50 |  2.50    3.43 |  3.50    2.06
                 .58    2.85 |  1.58   13.01 |  2.58    3.24 |  3.58    2.01
                 .67    3.15 |  1.67   10.10 |  2.67    3.07 |  3.67    1.94
```

```
                .75    3.54 |  1.75    8.29 |  2.75    2.92 |  3.75    1.89
                .83    4.04 |  1.83    7.07 |  2.83    2.79 |  3.83    1.84
                .92    4.76 |  1.92    6.19 |  2.92    2.67 |  3.92    1.79
               1.00    5.84 |  2.00    5.51 |  3.00    2.56 |  4.00    1.75

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

*                   Pre-Dev: Calibrate CA 100
--------------------
| CALIB            |
| NASHYD    (0001) |   Area    (ha)=  71.63   Curve Number   (CN)= 71.4
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   1.28

     Unit Hyd Qpeak  (cms)=   2.14

     PEAK FLOW       (cms)=    .23 (i)
     TIME TO PEAK    (hrs)=   3.25
     RUNOFF VOLUME    (mm)=   3.91
     TOTAL RAINFALL   (mm)=  27.00
     RUNOFF COEFFICIENT   =    .14

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

--------------------------------------------------------------------------------
--------------------
| SAVE HYD  (0001) |   AREA       (ha)=  71.63
| ID= 1   PCYC=117 |   QPEAK     (cms)=    .23 (i)
| DT= 5.0 min      |   TPEAK     (hrs)=   3.25
--------------------   VOLUME     (mm)=   3.91
  Filename: PRE90PCT.HYD
  Comments:

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

--------------------------------------------------------------------------------
*                   Post-Dev: Calibrate Catchment 200
--------------------
| CALIB            |
| STANDHYD  (0001) |   Area    (ha)=   1.79
|ID= 2 DT= 5.0 min |   Total Imp(%)=  29.00   Dir. Conn.(%)=  24.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .52          1.27
     Dep. Storage     (mm)=       2.00          7.50
     Average Slope     (%)=       4.00          4.00
     Length            (m)=     109.20        109.20
     Mannings n           =       .013          .250

     Max.eff.Inten.(mm/hr)=      53.33          1.50
```

```
               over (min)       10.00        60.00
     Storage Coeff.  (min)=       2.28 (ii)   58.54 (ii)
     Unit Hyd. Tpeak (min)=       5.00        60.00
     Unit Hyd. peak  (cms)=        .30          .02
                                                        *TOTALS*
     PEAK FLOW       (cms)=        .08          .00           .08 (iii)
     TIME TO PEAK    (hrs)=       1.42         2.75          1.42
     RUNOFF VOLUME    (mm)=      25.00         2.24          7.52
     TOTAL RAINFALL   (mm)=      27.00        27.00         27.00
     RUNOFF COEFFICIENT   =        .93          .08           .28

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

       (i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
            CN*  =  60.0    Ia = Dep. Storage  (Above)
      (ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
*                   Post-Dev: Calibrate Catchment 201
--------------------
| CALIB            |
| STANDHYD  (0001) |   Area    (ha)=   2.38
|ID= 3 DT= 5.0 min |   Total Imp(%)=  45.00   Dir. Conn.(%)=  40.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.07         1.31
     Dep. Storage     (mm)=       2.00        15.00
     Average Slope     (%)=       4.00         4.00
     Length            (m)=     126.00       126.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      53.33          .42
               over (min)       10.00       105.00
     Storage Coeff.  (min)=       2.49 (ii)  104.76 (ii)
     Unit Hyd. Tpeak (min)=       5.00       105.00
     Unit Hyd. peak  (cms)=        .29          .01
                                                        *TOTALS*
     PEAK FLOW       (cms)=        .18          .00           .18 (iii)
     TIME TO PEAK    (hrs)=       1.42         4.42          1.42
     RUNOFF VOLUME    (mm)=      25.00          .89         10.18
     TOTAL RAINFALL   (mm)=      27.00        27.00         27.00
     RUNOFF COEFFICIENT   =        .93          .03           .38

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

       (i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
            CN*  =  55.9    Ia = Dep. Storage  (Above)
      (ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
```

```
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
*                   Post-Dev: Calibrate Catchment 202
--------------------
| CALIB             |
| NASHYD    (0001) |   Area    (ha)=  67.51   Curve Number   (CN)= 71.6
|ID= 4 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   1.28

     Unit Hyd Qpeak  (cms)=   2.01

     PEAK FLOW       (cms)=    .22 (i)
     TIME TO PEAK    (hrs)=   3.25
     RUNOFF VOLUME    (mm)=   3.94
     TOTAL RAINFALL   (mm)=  27.00
     RUNOFF COEFFICIENT   =    .15

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

--------------------------------------------------------------------------------
*                   Add post-dev site hydrographs

--------------------
| ADD HYD   (0001) |
|   2 +  3 =  5    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
          ID1= 2 (0001):     1.79      .08     1.42     7.52
        + ID2= 3 (0001):     2.38      .18     1.42    10.18
          ================================================
          ID = 5 (0001):     4.17      .26     1.42     9.05

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
*                   Shift site hydrograph to account for ditch flow to outlet
*                   Path ~150 m (CA 200) and ~75 m (CA 201)
*                   Assume 5 min lag (conservative, <0.5 m/s flow velocity)
--------------------
| SHIFT HYD (0001) |
| IN= 5---> OUT= 6 |
| SHIFT=  5.0 min  |      AREA     QPEAK     TPEAK      R.V.
--------------------      (ha)     (cms)     (hrs)      (mm)
          ID= 5 (0001):    4.17      .26      1.42      9.05
    SHIFT ID= 6 (0001):    4.17      .26      1.50      9.05

--------------------------------------------------------------------------------
*                   Add lagged post-dev site, external hydrographs
```

```
--------------------
| ADD HYD   (0001) |
|   6 +  4 =  7    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
          ID1= 6 (0001):     4.17      .26     1.50     9.05
        + ID2= 4 (0001):    67.51      .22     3.25     3.94
          ================================================
          ID = 7 (0001):    71.68      .27     1.50     4.24

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| SAVE HYD  (0001) |   AREA       (ha)=  71.68
| ID= 7   PCYC=116 |   QPEAK     (cms)=    .27 (i)
| DT= 5.0 min      |   TPEAK     (hrs)=   1.50
--------------------   VOLUME     (mm)=   4.24
  Filename: PST90PCT.HYD
  Comments:

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

--------------------------------------------------------------------------------
*                   Controlled
********************************************************************************

--------------------
|    READ STORM    |    Filename: 27Chcago.stm
| Ptotal= 27.00 mm |    Comments: 4 Hr Chicago 27mm
--------------------
                TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
                 .08    1.87 |  1.08    7.67 |  2.08    4.98 |  3.08    2.46
                 .17    1.98 |  1.17   11.55 |  2.17    4.55 |  3.17    2.37
                 .25    2.10 |  1.25   25.39 |  2.25    4.19 |  3.25    2.29
                 .33    2.24 |  1.33   74.37 |  2.33    3.90 |  3.33    2.20
                 .42    2.41 |  1.42   32.29 |  2.42    3.65 |  3.42    2.13
                 .50    2.60 |  1.50   18.50 |  2.50    3.43 |  3.50    2.06
                 .58    2.85 |  1.58   13.01 |  2.58    3.24 |  3.58    2.01
                 .67    3.15 |  1.67   10.10 |  2.67    3.07 |  3.67    1.94
                 .75    3.54 |  1.75    8.29 |  2.75    2.92 |  3.75    1.89
                 .83    4.04 |  1.83    7.07 |  2.83    2.79 |  3.83    1.84
                 .92    4.76 |  1.92    6.19 |  2.92    2.67 |  3.92    1.79
                1.00    5.84 |  2.00    5.51 |  3.00    2.56 |  4.00    1.75

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

*                   Pre-Dev: Calibrate CA 100
--------------------
| CALIB            |
```

```
| NASHYD    (0001) |   Area    (ha)=  71.63   Curve Number   (CN)= 71.4
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
-------------------   U.H. Tp(hrs)=   1.28

     Unit Hyd Qpeak  (cms)=   2.14

     PEAK FLOW       (cms)=    .23 (i)
     TIME TO PEAK    (hrs)=   3.25
     RUNOFF VOLUME    (mm)=   3.91
     TOTAL RAINFALL   (mm)=  27.00
     RUNOFF COEFFICIENT   =    .14

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

--------------------------------------------------------------------------------
--------------------
| SAVE HYD  (0001) |   AREA       (ha)=  71.63
| ID= 1   PCYC=117 |   QPEAK     (cms)=    .23 (i)
| DT= 5.0 min      |   TPEAK     (hrs)=   3.25
-------------------   VOLUME     (mm)=   3.91
  Filename: PRE90PCT.HYD
  Comments:

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

--------------------------------------------------------------------------------
*                   Post-Dev: Calibrate Catchment 200
--------------------
| CALIB             |
| STANDHYD  (0001) |   Area    (ha)=   1.79
|ID= 2 DT= 5.0 min |   Total Imp(%)=  29.00   Dir. Conn.(%)=  24.00
--------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .52          1.27
     Dep. Storage     (mm)=       2.00          7.50
     Average Slope     (%)=       4.00          4.00
     Length            (m)=     109.20        109.20
     Mannings n           =       .013          .250

     Max.eff.Inten.(mm/hr)=      53.33          1.50
               over (min)        10.00         60.00
     Storage Coeff.  (min)=       2.28 (ii)    58.54 (ii)
     Unit Hyd. Tpeak (min)=       5.00         60.00
     Unit Hyd. peak  (cms)=        .30           .02
                                                      *TOTALS*
     PEAK FLOW       (cms)=        .08           .00           .08 (iii)
     TIME TO PEAK    (hrs)=       1.42          2.75          1.42
     RUNOFF VOLUME    (mm)=      25.00          2.24          7.52
     TOTAL RAINFALL   (mm)=      27.00         27.00         27.00
     RUNOFF COEFFICIENT   =        .93           .08           .28
```

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

       (i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
            CN*  =  60.0    Ia = Dep. Storage  (Above)
      (ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
*                   Post-Dev: Calibrate Catchment 201
--------------------
| CALIB            |
| STANDHYD  (0001) |   Area    (ha)=   2.38
|ID= 3 DT= 5.0 min |   Total Imp(%)=  45.00   Dir. Conn.(%)=  40.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.07         1.31
     Dep. Storage     (mm)=       2.00        15.00
     Average Slope     (%)=       4.00         4.00
     Length            (m)=     126.00       126.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      53.33          .42
               over (min)        10.00       105.00
     Storage Coeff.  (min)=       2.49 (ii)  104.76 (ii)
     Unit Hyd. Tpeak (min)=       5.00       105.00
     Unit Hyd. peak  (cms)=        .29          .01
                                                        *TOTALS*
     PEAK FLOW       (cms)=        .18          .00           .18 (iii)
     TIME TO PEAK    (hrs)=       1.42         4.42          1.42
     RUNOFF VOLUME    (mm)=      25.00          .89         10.18
     TOTAL RAINFALL   (mm)=      27.00        27.00         27.00
     RUNOFF COEFFICIENT   =        .93          .03           .38

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

       (i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
            CN*  =  55.9    Ia = Dep. Storage  (Above)
      (ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
*                   Split off 0.165 cms - capacity of CA 201 OGS

*                   Remainder direct discharge to outlet

--------------------
| DUHYD     (0001) |
```

```
| Inlet Cap.= .165 |
| #of Inlets=    1 |
| Total(cms)=   .2 |      AREA     QPEAK     TPEAK    R.V.
-------------------      (ha)     (cms)     (hrs)    (mm)
     TOTAL HYD.(ID= 3):   2.38       .18      1.42   10.18
     ================================================
     MAJOR SYS.(ID= 4):    .04       .01      1.42   10.18
     MINOR SYS.(ID= 5):   2.34       .17      1.42   10.18

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
*                   Split off 0.015 cms from OGS - direct discharge to outlet

*                   Direct remainder to infiltration - 2yr quantity control

*                   Runoff directed to infiltration removed - no discharge
--------------------
| DUHYD     (0001) |
| Inlet Cap.= .015 |
| #of Inlets=    1 |
| Total(cms)=   .0 |      AREA     QPEAK     TPEAK    R.V.
-------------------      (ha)     (cms)     (hrs)    (mm)
     TOTAL HYD.(ID= 5):   2.34       .17      1.42   10.18
     ================================================
     MAJOR SYS.(ID= 6):   1.14       .15      1.42   10.18
     MINOR SYS.(ID= 7):   1.20       .02      1.17   10.18

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
*                   Determine required infiltration storage volume

*                   Based on the volume of the infiltration hydrograph

--------------------
| COMPUTE VOLUME   |
| ID= 6   (0001)   |             DISCHARGE      TIME
--------------------               (cms)       (hrs)
           START CONTROLLING AT      .00        1.08
           INFLOW HYD. PEAKS AT      .15        1.42
           STOP  CONTROLLING AT      .00        2.08

           REQUIRED STORAGE VOLUME (ha.m.)=    .0117
           TOTAL HYDROGRAPH VOLUME (ha.m.)=    .0117
           % OF HYDROGRAPH TO STORE       =  99.9997

           NOTE:  Storage was computed to reduce the Inflow

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

```
*                   Add hydrographs for non-infiltrated CA 201 runoff

--------------------
| ADD HYD   (0001) |
|   4 +  7 =  8    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
          ID1= 4 (0001):      .04      .01     1.42    10.18
        + ID2= 7 (0001):     1.20      .02     1.17    10.18
          ================================================
          ID = 8 (0001):     1.24      .03     1.42    10.18

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
*                   Post-Dev: Calibrate Catchment 202
--------------------
| CALIB            |
| NASHYD    (0001) |   Area    (ha)=  67.51   Curve Number   (CN)= 71.6
|ID= 4 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   1.28

     Unit Hyd Qpeak  (cms)=   2.01

     PEAK FLOW       (cms)=    .22 (i)
     TIME TO PEAK    (hrs)=   3.25
     RUNOFF VOLUME    (mm)=   3.94
     TOTAL RAINFALL   (mm)=  27.00
     RUNOFF COEFFICIENT   =    .15

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

--------------------------------------------------------------------------------
*                   Add post-dev site hydrographs

--------------------
| ADD HYD   (0001) |
|   2 +  8 =  5    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
          ID1= 2 (0001):     1.79      .08     1.42     7.52
        + ID2= 8 (0001):     1.24      .03     1.42    10.18
          ================================================
          ID = 5 (0001):     3.03      .11     1.42     8.62

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
*                   Shift site hydrograph to account for ditch flow to outlet
*                   Path ~150 m (CA 200) and ~75 m (CA 201)
*                   Assume 5 min lag (assumes <=0.5 m/s flow velocity)
--------------------
```

```
| SHIFT HYD (0001) |
| IN= 5---> OUT= 6 |
| SHIFT=  5.0 min  |      AREA     QPEAK     TPEAK      R.V.
-------------------      (ha)     (cms)     (hrs)      (mm)
          ID= 5 (0001):    3.03      .11      1.42      8.62
    SHIFT ID= 6 (0001):    3.03      .11      1.50      8.62

------------------------------------------------------------------------------
*                   Add lagged post-dev site, external hydrographs

--------------------
| ADD HYD   (0001) |
|   6 +  4 =  7    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
          ID1= 6 (0001):     3.03      .11     1.50     8.62
        + ID2= 4 (0001):    67.51      .22     3.25     3.94
          ================================================
          ID = 7 (0001):    70.54      .24     3.25     4.14

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
--------------------
| SAVE HYD  (0001) |   AREA       (ha)=  70.54
| ID= 7   PCYC=116 |   QPEAK     (cms)=    .24 (i)
| DT= 5.0 min      |   TPEAK     (hrs)=   3.25
--------------------   VOLUME      (mm)=   4.14
  Filename: PST90PCT.HYD
  Comments:

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

------------------------------------------------------------------------------
******************************************************************************
*                   Regulatory Timmins Event - Uncontrolled
******************************************************************************

--------------------
|    READ STORM    |    Filename: Timmins.stm
| Ptotal=193.00 mm |    Comments: *12 HOUR - Timmins STORM
--------------------
                TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
                1.00   15.00 |  4.00    3.00 |  7.00   43.00 | 10.00   13.00
                2.00   20.00 |  5.00    5.00 |  8.00   20.00 | 11.00   13.00
                3.00   10.00 |  6.00   20.00 |  9.00   23.00 | 12.00    8.00

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

*                   Pre-Dev: Calibrate CA 100
```

```
--------------------
| CALIB            |
| NASHYD    (0001) |   Area    (ha)=  71.63   Curve Number   (CN)= 71.4
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   1.27

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

     Unit Hyd Qpeak  (cms)=   2.15

     PEAK FLOW       (cms)=   3.82 (i)
     TIME TO PEAK    (hrs)=   8.42
     RUNOFF VOLUME    (mm)= 121.40
     TOTAL RAINFALL   (mm)= 193.00
     RUNOFF COEFFICIENT   =    .63

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

------------------------------------------------------------------------------
--------------------
| SAVE HYD  (0001) |   AREA       (ha)=  71.63
| ID= 1   PCYC=233 |   QPEAK     (cms)=   3.82 (i)
| DT= 5.0 min      |   TPEAK     (hrs)=   8.42
--------------------   VOLUME     (mm)= 121.40
  Filename: PRETMMNS.HYD
  Comments:

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

------------------------------------------------------------------------------
*                   Post-Dev: Calibrate Catchment 200
--------------------
| CALIB            |
| STANDHYD  (0001) |   Area    (ha)=   1.79
|ID= 2 DT= 5.0 min |   Total Imp(%)=  29.00   Dir. Conn.(%)=  24.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .52          1.27
     Dep. Storage     (mm)=       2.00          7.50
     Average Slope     (%)=       4.00          4.00
     Length            (m)=     109.20        109.20
     Mannings n           =       .013          .250

     Max.eff.Inten.(mm/hr)=      43.00         28.98
               over (min)        10.00         20.00
     Storage Coeff.  (min)=       2.49 (ii)    19.68 (ii)
     Unit Hyd. Tpeak (min)=       5.00         20.00
     Unit Hyd. peak  (cms)=        .29           .06
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .05           .09            .14 (iii)
```

```
     TIME TO PEAK    (hrs)=       6.67         7.17           7.08
     RUNOFF VOLUME    (mm)=     190.33        99.98         121.60
     TOTAL RAINFALL   (mm)=     193.00       193.00         193.00
     RUNOFF COEFFICIENT   =        .99          .52            .63

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

       (i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
            CN*  =  60.0    Ia = Dep. Storage  (Above)
      (ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
*                   Post-Dev: Calibrate Catchment 201
--------------------
| CALIB            |
| STANDHYD  (0001) |   Area    (ha)=   2.38
|ID= 3 DT= 5.0 min |   Total Imp(%)=  45.00   Dir. Conn.(%)=  40.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.07         1.31
     Dep. Storage     (mm)=       2.00        15.00
     Average Slope     (%)=       4.00         4.00
     Length            (m)=     126.00       126.00
     Mannings n             =       .013         .250

     Max.eff.Inten.(mm/hr)=      43.00        26.53
               over (min)        10.00        20.00
     Storage Coeff.  (min)=       2.71 (ii)   22.12 (ii)
     Unit Hyd. Tpeak (min)=       5.00        25.00
     Unit Hyd. peak  (cms)=        .29          .05
                                                        *TOTALS*
     PEAK FLOW       (cms)=        .11          .08            .20 (iii)
     TIME TO PEAK    (hrs)=       6.75         7.17           7.08
     RUNOFF VOLUME    (mm)=     190.33        88.03         128.90
     TOTAL RAINFALL   (mm)=     193.00       193.00         193.00
     RUNOFF COEFFICIENT   =        .99          .46            .67

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

       (i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
            CN*  =  55.9    Ia = Dep. Storage  (Above)
      (ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
*                   Post-Dev: Calibrate Catchment 202
--------------------
```

```
| CALIB            |
| NASHYD    (0001) |   Area    (ha)=  67.51   Curve Number   (CN)= 71.6
|ID= 4 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
-------------------   U.H. Tp(hrs)=   1.27

     Unit Hyd Qpeak  (cms)=   2.03

     PEAK FLOW       (cms)=   3.61 (i)
     TIME TO PEAK    (hrs)=   8.42
     RUNOFF VOLUME    (mm)= 121.81
     TOTAL RAINFALL   (mm)= 193.00
     RUNOFF COEFFICIENT   =    .63

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

--------------------------------------------------------------------------------
*                   Add post-dev site hydrographs

--------------------
| ADD HYD   (0001) |
|   2 +  3 =  5    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
          ID1= 2 (0001):     1.79      .14     7.08   121.60
        + ID2= 3 (0001):     2.38      .20     7.08   128.90
          ================================================
          ID = 5 (0001):     4.17      .34     7.08   125.78

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
*                   Shift site hydrograph to account for ditch flow to outlet
*                   Path ~150 m (CA 200) and ~75 m (CA 201)
*                   Assume 5 min lag (assumes <=0.5 m/s flow velocity)
--------------------
| SHIFT HYD (0001) |
| IN= 5---> OUT= 6 |
| SHIFT=  5.0 min  |      AREA     QPEAK     TPEAK      R.V.
--------------------      (ha)     (cms)     (hrs)      (mm)
          ID= 5 (0001):    4.17      .34      7.08    125.78
    SHIFT ID= 6 (0001):    4.17      .34      7.17    125.78

--------------------------------------------------------------------------------
*                   Add lagged post-dev site, external hydrographs

--------------------
| ADD HYD   (0001) |
|   6 +  4 =  7    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
          ID1= 6 (0001):     4.17      .34     7.17   125.78
        + ID2= 4 (0001):    67.51     3.61     8.42   121.81
```

```
          ================================================
          ID = 7 (0001):    71.68     3.81     8.50   122.05

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| SAVE HYD  (0001) |   AREA       (ha)=  71.68
| ID= 7   PCYC=233 |   QPEAK     (cms)=   3.81 (i)
| DT= 5.0 min      |   TPEAK     (hrs)=   8.50
--------------------   VOLUME     (mm)= 122.05
  Filename: PSTTMMNS.HYD
  Comments:

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

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

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

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

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    I N T E R H Y M O
       O   O    T      T    H   H   Y Y   MM MM  O   O   * * * 1989a * * *
       O   O    T      T    HHHHH    Y    M M M  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO             01636

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  Input   filename: ROSCOTST.DAT
  Output  filename: ROSCOTST.OUT
  Summary filename: ROSCOTST.SUM



DATE: 07-24-2026                      TIME: 10:35:19


COMMENTS: _____________________________________________________________

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

*
*                   McDonald Homes - Rosco Ave Subdivision
*
*                   Using Environment Canada IDF V3.4
*                   Trenton, Station 6158875, 1965-2017
*
*                   Original Model Prepared: July 14, 2026
*                   Date of Last Revision: July 24, 2026
*                   Duncan Burgess, BASc
*
*                   Find runoff volume of dev. CA (original properties)
*                   2-100 yr: 2 hr & 4 hr Chicago, 12 hr & 24 hr SCS II

*                   90th % Event (27 mm, 4hr - Chicago)
*                   Regulatory Event (Timmins, 12 hr)

*                   To calibrate topsoil enhancement 27% volume reduction
*
*                   LGI, LGP (m) from L=SQRT(A/1.5)*100
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*                    Chicago 2-hr Events
*********************************************************************************
*                    2 yr Event
*********************************************************************************
--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 404.288
| Ptotal= 24.44 mm |                          B=   3.844
--------------------                          C=    .726
                         used in:   INTENSITY =  A / (t + B)^C

                         Duration of storm  =  2.00 hrs
                         Storm time step    =  5.00 min
                         Time to peak ratio =   .33

                      The CORRELATION coefficient is = 1.0000

                       TIME       INPUT INT.           TAB. INT.
                      (min)        (mm/hr)              (mm/hr)
                         5.          83.10                83.07
                        10.          60.30                60.00
                        15.          47.80                47.96
                        30.          31.10                31.35
                        60.          19.60                19.78
                       120.          12.30                12.23


                  TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
                   .08    4.10 |   .58   26.21 |  1.08    9.03 |  1.58    4.81
                   .17    4.65 |   .67   83.07 |  1.17    7.79 |  1.67    4.50
                   .25    5.40 |   .75   33.27 |  1.25    6.88 |  1.75    4.22
                   .33    6.53 |   .83   19.18 |  1.33    6.19 |  1.83    3.99
                   .42    8.40 |   .92   13.74 |  1.42    5.64 |  1.92    3.78
                   .50   12.28 |  1.00   10.84 |  1.50    5.19 |  2.00    3.60


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*                    Post-Dev: Calibrate Catchment 200
--------------------
| CALIB            |
| STANDHYD  (0001) |   Area    (ha)=   1.79
|ID= 2 DT= 5.0 min |   Total Imp(%)=  29.00   Dir. Conn.(%)=  24.00
--------------------
                                IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=         .52          1.27
     Dep. Storage     (mm)=        2.00          5.00
     Average Slope     (%)=        4.00          4.00
     Length            (m)=      109.20        109.20
     Mannings n             =       .013          .250
```

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

		IMPERVIOUS	PERVIOUS (i)	
Max.eff.Inten.(mm/hr)=		58.17	2.77	
over (min)		10.00	45.00	
Storage Coeff. (min)=		2.21 (ii)	46.14 (ii)	
Unit Hyd. Tpeak (min)=		5.00	50.00	
Unit Hyd. peak (cms)=		.30	.02	
				TOTALS
PEAK FLOW	(cms)=	.09	.01	.09 (iii)
TIME TO PEAK	(hrs)=	.75	1.83	.75
RUNOFF VOLUME	(mm)=	22.14	2.57	7.12
TOTAL RAINFALL	(mm)=	24.44	24.44	24.44
RUNOFF COEFFICIENT	=	.91	.11	.29

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

(i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
CN* = 65.0 Ia = Dep. Storage (Above)
(ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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* Post-Dev: Calibrate Catchment 201

CALIB	
STANDHYD (0001)	Area (ha)= 2.38
ID= 3 DT= 5.0 min	Total Imp(%)= 45.00 Dir. Conn.(%)= 40.00

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	1.07	1.31	
Dep. Storage	(mm)=	2.00	5.00	
Average Slope	(%)=	4.00	4.00	
Length	(m)=	126.00	126.00	
Mannings n	=	.013	.250	
Max.eff.Inten.(mm/hr)=		58.17	2.85	
over (min)		10.00	50.00	
Storage Coeff. (min)=		2.40 (ii)	49.78 (ii)	
Unit Hyd. Tpeak (min)=		5.00	50.00	
Unit Hyd. peak (cms)=		.30	.02	
				TOTALS
PEAK FLOW	(cms)=	.20	.01	.20 (iii)
TIME TO PEAK	(hrs)=	.75	1.83	.75
RUNOFF VOLUME	(mm)=	22.14	2.73	10.37
TOTAL RAINFALL	(mm)=	24.44	24.44	24.44
RUNOFF COEFFICIENT	=	.91	.11	.42

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

```
       (i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
            CN*  =  65.9    Ia = Dep. Storage  (Above)
      (ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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*                    5 yr Event
********************************************************************************
--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 408.141
| Ptotal= 34.34 mm |                          B=   1.508
--------------------                          C=    .660
                         used in:   INTENSITY =  A / (t + B)^C

                         Duration of storm  =  2.00 hrs
                         Storm time step    =  5.00 min
                         Time to peak ratio =   .33

                      The CORRELATION coefficient is =  .9997

                       TIME       INPUT INT.           TAB. INT.
                      (min)        (mm/hr)              (mm/hr)
                         5.         120.90               118.56
                        10.          80.60                81.39
                        15.          63.60                64.14
                        30.          41.00                41.87
                        60.          27.50                26.92
                       120.          17.20                17.18


                  TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
                   .08    6.66 |   .58   32.29 |  1.08   13.02 |  1.58    7.64
                   .17    7.41 |   .67  118.56 |  1.17   11.50 |  1.67    7.20
                   .25    8.43 |   .75   40.10 |  1.25   10.36 |  1.75    6.83
                   .33    9.90 |   .83   24.50 |  1.33    9.46 |  1.83    6.50
                   .42   12.25 |   .92   18.48 |  1.42    8.74 |  1.92    6.20
                   .50   16.81 |  1.00   15.16 |  1.50    8.14 |  2.00    5.94


--------------------------------------------------------------------------------
*                    Post-Dev: Calibrate Catchment 200
--------------------
| CALIB            |
| STANDHYD  (0001) |   Area    (ha)=   1.79
|ID= 2 DT= 5.0 min |   Total Imp(%)=  29.00   Dir. Conn.(%)=  24.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
```

```
     Surface Area     (ha)=        .52         1.27
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       4.00         4.00
     Length            (m)=     109.20       109.20
     Mannings n           =       .013         .250

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

                              IMPERVIOUS    PERVIOUS (i)
     Max.eff.Inten.(mm/hr)=      79.33         6.43
                over (min)       10.00        35.00
     Storage Coeff.  (min)=       1.95 (ii)   33.34 (ii)
     Unit Hyd. Tpeak (min)=       5.00        35.00
     Unit Hyd. peak  (cms)=        .31          .03
                                                        *TOTALS*
     PEAK FLOW       (cms)=        .13          .01           .13 (iii)
     TIME TO PEAK    (hrs)=        .75         1.50           .75
     RUNOFF VOLUME    (mm)=      31.85         5.42         11.65
     TOTAL RAINFALL   (mm)=      34.34        34.34         34.34
     RUNOFF COEFFICIENT   =        .93          .16           .34

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

       (i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
            CN*  =  65.0    Ia = Dep. Storage  (Above)
      (ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
*                  Post-Dev: Calibrate Catchment 201
--------------------
| CALIB            |
| STANDHYD  (0001) |   Area    (ha)=   2.38
|ID= 3 DT= 5.0 min |   Total Imp(%)=  45.00   Dir. Conn.(%)=  40.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.07         1.31
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       4.00         4.00
     Length            (m)=     126.00       126.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      79.33         6.93
                over (min)       10.00        35.00
     Storage Coeff.  (min)=       2.12 (ii)   35.33 (ii)
     Unit Hyd. Tpeak (min)=       5.00        40.00
     Unit Hyd. peak  (cms)=        .31          .03
                                                        *TOTALS*
     PEAK FLOW       (cms)=        .29          .01           .29 (iii)
```

```
     TIME TO PEAK    (hrs)=        .75         1.58           .75
     RUNOFF VOLUME    (mm)=      31.85         5.72         16.09
     TOTAL RAINFALL   (mm)=      34.34        34.34         34.34
     RUNOFF COEFFICIENT   =        .93          .17           .47

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

       (i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
            CN*  =  65.9    Ia = Dep. Storage  (Above)
      (ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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*                   10 yr Event
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--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 480.238
| Ptotal= 40.60 mm |                          B=   1.501
--------------------                          C=    .659
                         used in:   INTENSITY =  A / (t + B)^C

                         Duration of storm  =  2.00 hrs
                         Storm time step    =  5.00 min
                         Time to peak ratio =   .33

                      The CORRELATION coefficient is =  .9990

                       TIME       INPUT INT.           TAB. INT.
                      (min)        (mm/hr)              (mm/hr)
                         5.         146.00               139.86
                        10.          94.00                96.04
                        15.          74.00                75.70
                        30.          47.50                49.44
                        60.          32.70                31.81
                       120.          20.50                20.31


                  TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
                   .08    7.89 |   .58   38.15 |  1.08   15.41 |  1.58    9.05
                   .17    8.79 |   .67  139.86 |  1.17   13.62 |  1.67    8.54
                   .25    9.99 |   .75   47.36 |  1.25   12.27 |  1.75    8.09
                   .33   11.73 |   .83   28.97 |  1.33   11.21 |  1.83    7.70
                   .42   14.50 |   .92   21.87 |  1.42   10.36 |  1.92    7.36
                   .50   19.89 |  1.00   17.95 |  1.50    9.65 |  2.00    7.05


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*                   Post-Dev: Calibrate Catchment 200
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--------------------
| CALIB            |
| STANDHYD  (0001) |   Area    (ha)=   1.79
|ID= 2 DT= 5.0 min |   Total Imp(%)=  29.00   Dir. Conn.(%)=  24.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .52         1.27
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       4.00         4.00
     Length            (m)=     109.20       109.20
     Mannings n             =       .013         .250

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

                              IMPERVIOUS    PERVIOUS (i)
     Max.eff.Inten.(mm/hr)=      93.61         9.88
               over (min)        10.00        30.00
     Storage Coeff.  (min)=       1.82 (ii)   28.26 (ii)
     Unit Hyd. Tpeak (min)=       5.00        30.00
     Unit Hyd. peak  (cms)=        .32          .04
                                                        *TOTALS*
     PEAK FLOW       (cms)=        .16          .02           .16 (iii)
     TIME TO PEAK    (hrs)=        .67         1.25           .67
     RUNOFF VOLUME    (mm)=      38.02         7.66         14.85
     TOTAL RAINFALL   (mm)=      40.60        40.60         40.60
     RUNOFF COEFFICIENT   =        .94          .19           .37

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

       (i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
            CN*  =  65.0    Ia = Dep. Storage  (Above)
      (ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
*                   Post-Dev: Calibrate Catchment 201
--------------------
| CALIB            |
| STANDHYD  (0001) |   Area    (ha)=   2.38
|ID= 3 DT= 5.0 min |   Total Imp(%)=  45.00   Dir. Conn.(%)=  40.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.07         1.31
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       4.00         4.00
     Length            (m)=     126.00       126.00
     Mannings n             =       .013         .250

     Max.eff.Inten.(mm/hr)=      93.61        10.61
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```
                over (min)       10.00        30.00
     Storage Coeff.  (min)=       1.99 (ii)   29.98 (ii)
     Unit Hyd. Tpeak (min)=       5.00        30.00
     Unit Hyd. peak  (cms)=        .31          .04
                                                      *TOTALS*
     PEAK FLOW       (cms)=        .35          .02          .35 (iii)
     TIME TO PEAK    (hrs)=        .75         1.33          .75
     RUNOFF VOLUME    (mm)=      38.02         8.05        19.97
     TOTAL RAINFALL   (mm)=      40.60        40.60        40.60
     RUNOFF COEFFICIENT   =        .94          .20          .49

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

       (i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
            CN*  =  65.9    Ia = Dep. Storage  (Above)
      (ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
*                    25 yr Event
********************************************************************************
--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 572.650
| Ptotal= 48.42 mm |                          B=   1.501
--------------------                          C=    .659
                         used in:   INTENSITY =  A / (t + B)^C

                         Duration of storm  =  2.00 hrs
                         Storm time step    =  5.00 min
                         Time to peak ratio =   .33

                      The CORRELATION coefficient is =  .9979

                       TIME       INPUT INT.           TAB. INT.
                      (min)        (mm/hr)              (mm/hr)
                         5.         177.70               166.78
                        10.         111.00               114.52
                        15.          87.10                90.27
                        30.          55.80                58.95
                        60.          39.30                37.93
                       120.          24.60                24.22


                  TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
                   .08    9.41 |   .58   45.49 |  1.08   18.38 |  1.58   10.79
                   .17   10.48 |   .67  166.78 |  1.17   16.24 |  1.67   10.18
                   .25   11.92 |   .75   56.48 |  1.25   14.63 |  1.75    9.65
                   .33   13.99 |   .83   34.55 |  1.33   13.37 |  1.83    9.18
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                .42   17.29 |   .92   26.07 |  1.42   12.35 |  1.92    8.77
                .50   23.72 |  1.00   21.40 |  1.50   11.51 |  2.00    8.40


--------------------------------------------------------------------------------
*                   Post-Dev: Calibrate Catchment 200
--------------------
| CALIB            |
| STANDHYD  (0001) |   Area    (ha)=   1.79
|ID= 2 DT= 5.0 min |   Total Imp(%)=  29.00   Dir. Conn.(%)=  24.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .52         1.27
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       4.00         4.00
     Length            (m)=     109.20       109.20
     Mannings n           =       .013         .250

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

                             IMPERVIOUS    PERVIOUS (i)
     Max.eff.Inten.(mm/hr)=     111.63        15.50
               over (min)        10.00        25.00
     Storage Coeff.  (min)=       1.70 (ii)   23.78 (ii)
     Unit Hyd. Tpeak (min)=       5.00        25.00
     Unit Hyd. peak  (cms)=        .32          .05
                                                      *TOTALS*
     PEAK FLOW       (cms)=        .19          .03          .20 (iii)
     TIME TO PEAK    (hrs)=        .67         1.17          .67
     RUNOFF VOLUME    (mm)=      45.72        10.85         19.14
     TOTAL RAINFALL   (mm)=      48.42        48.42         48.42
     RUNOFF COEFFICIENT   =        .94          .22           .40

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

       (i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
            CN*  =  65.0    Ia = Dep. Storage  (Above)
      (ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
*                   Post-Dev: Calibrate Catchment 201
--------------------
| CALIB            |
| STANDHYD  (0001) |   Area    (ha)=   2.38
|ID= 3 DT= 5.0 min |   Total Imp(%)=  45.00   Dir. Conn.(%)=  40.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.07         1.31
```

Dep. Storage	(mm)=	2.00	5.00	
Average Slope	(%)=	4.00	4.00	
Length	(m)=	126.00	126.00	
Mannings n	=	.013	.250	
Max.eff.Inten.	(mm/hr)=	111.63	16.61	
over	(min)	10.00	25.00	
Storage Coeff.	(min)=	1.85 (ii)	25.25 (ii)	
Unit Hyd. Tpeak	(min)=	5.00	30.00	
Unit Hyd. peak	(cms)=	.32	.04	
				TOTALS
PEAK FLOW	(cms)=	.42	.03	.42 (iii)
TIME TO PEAK	(hrs)=	.67	1.17	.67
RUNOFF VOLUME	(mm)=	45.72	11.37	25.05
TOTAL RAINFALL	(mm)=	48.42	48.42	48.42
RUNOFF COEFFICIENT	=	.94	.23	.52

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

(i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
CN* = 65.9 Ia = Dep. Storage (Above)
(ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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* 50 yr Event

****

CHICAGO STORM
Ptotal= 54.16 mm

IDF curve parameters: A= 640.545
B= 1.501
C= .659
used in: INTENSITY = A / (t + B)^C

Duration of storm = 2.00 hrs
Storm time step = 5.00 min
Time to peak ratio = .33

The CORRELATION coefficient is = .9972

TIME (min)	INPUT INT. (mm/hr)	TAB. INT. (mm/hr)
5.	201.20	186.55
10.	123.70	128.09
15.	96.90	100.97
30.	61.90	65.94
60.	44.20	42.43
120.	27.70	27.09

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.08	10.52	.58	50.88	1.08	20.56	1.58	12.07
.17	11.72	.67	186.55	1.17	18.16	1.67	11.39
.25	13.33	.75	63.18	1.25	16.36	1.75	10.80
.33	15.64	.83	38.64	1.33	14.95	1.83	10.27
.42	19.34	.92	29.17	1.42	13.81	1.92	9.81
.50	26.53	1.00	23.94	1.50	12.87	2.00	9.40

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* Post-Dev: Calibrate Catchment 200

CALIB
STANDHYD (0001)
ID= 2 DT= 5.0 min

Area (ha)= 1.79
Total Imp(%)= 29.00 Dir. Conn.(%)= 24.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	.52	1.27
Dep. Storage	(mm)=	2.00	5.00
Average Slope	(%)=	4.00	4.00
Length	(m)=	109.20	109.20
Mannings n	=	.013	.250

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

		IMPERVIOUS	PERVIOUS (i)	
Max.eff.Inten.(mm/hr)=		124.86	21.70	
over (min)		10.00	20.00	
Storage Coeff. (min)=		1.63 (ii)	20.92 (ii)	
Unit Hyd. Tpeak (min)=		5.00	25.00	
Unit Hyd. peak (cms)=		.32	.05	
				TOTALS
PEAK FLOW	(cms)=	.22	.04	.22 (iii)
TIME TO PEAK	(hrs)=	.67	1.08	.67
RUNOFF VOLUME	(mm)=	51.38	13.44	22.48
TOTAL RAINFALL	(mm)=	54.16	54.16	54.16
RUNOFF COEFFICIENT	=	.95	.25	.42

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

(i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
CN* = 65.0 Ia = Dep. Storage (Above)

(ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
THAN THE STORAGE COEFFICIENT.

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

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* Post-Dev: Calibrate Catchment 201

```
| CALIB            |
| STANDHYD  (0001) |   Area    (ha)=   2.38
|ID= 3 DT= 5.0 min |   Total Imp(%)=  45.00   Dir. Conn.(%)=  40.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.07         1.31
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       4.00         4.00
     Length            (m)=     126.00       126.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=     124.86        20.68
               over (min)        10.00        25.00
     Storage Coeff.  (min)=       1.77 (ii)   23.21 (ii)
     Unit Hyd. Tpeak (min)=       5.00        25.00
     Unit Hyd. peak  (cms)=        .32          .05
                                                        *TOTALS*
     PEAK FLOW       (cms)=        .47          .04           .48 (iii)
     TIME TO PEAK    (hrs)=        .67         1.08           .67
     RUNOFF VOLUME    (mm)=      51.38        14.06         28.93
     TOTAL RAINFALL   (mm)=      54.16        54.16         54.16
     RUNOFF COEFFICIENT   =        .95          .26           .53

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

       (i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
            CN*  =  65.9    Ia = Dep. Storage  (Above)
      (ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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*                   100 yr Event
********************************************************************************
--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 708.927
| Ptotal= 59.94 mm |                          B=   1.501
--------------------                          C=    .659
                         used in:   INTENSITY =  A / (t + B)^C

                         Duration of storm  =  2.00 hrs
                         Storm time step    =  5.00 min
                         Time to peak ratio =   .33

                       The CORRELATION coefficient is =  .9965

                        TIME       INPUT INT.           TAB. INT.
                       (min)        (mm/hr)              (mm/hr)
                          5.         224.50               206.47
                         10.         136.20               141.77
```

15.	106.60	111.75
30.	68.00	72.98
60.	49.00	46.96
120.	30.70	29.98

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.08	11.65	.58	56.31	1.08	22.75	1.58	13.36
.17	12.97	.67	206.47	1.17	20.10	1.67	12.61
.25	14.75	.75	69.92	1.25	18.11	1.75	11.95
.33	17.31	.83	42.77	1.33	16.55	1.83	11.37
.42	21.41	.92	32.28	1.42	15.29	1.92	10.86
.50	29.36	1.00	26.49	1.50	14.24	2.00	10.40

---

* Post-Dev: Calibrate Catchment 200

CALIB	
STANDHYD (0001)	Area (ha)= 1.79
ID= 2 DT= 5.0 min	Total Imp(%)= 29.00 Dir. Conn.(%)= 24.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	.52	1.27
Dep. Storage	(mm)=	2.00	5.00
Average Slope	(%)=	4.00	4.00
Length	(m)=	109.20	109.20
Mannings n	=	.013	.250

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

		IMPERVIOUS	PERVIOUS (i)	
Max.eff.Inten.	(mm/hr)=	138.19	26.42	
over	(min)	10.00	20.00	
Storage Coeff.	(min)=	1.56 (ii)	19.40 (ii)	
Unit Hyd. Tpeak	(min)=	5.00	20.00	
Unit Hyd. peak	(cms)=	.33	.06	
				TOTALS
PEAK FLOW	(cms)=	.24	.05	.25 (iii)
TIME TO PEAK	(hrs)=	.67	1.00	.67
RUNOFF VOLUME	(mm)=	57.07	16.25	25.98
TOTAL RAINFALL	(mm)=	59.94	59.94	59.94
RUNOFF COEFFICIENT	=	.95	.27	.43

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

(i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
CN* = 65.0 Ia = Dep. Storage (Above)

(ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL

```
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
*                   Post-Dev: Calibrate Catchment 201
--------------------
| CALIB            |
| STANDHYD  (0001) |   Area    (ha)=   2.38
|ID= 3 DT= 5.0 min |   Total Imp(%)=  45.00   Dir. Conn.(%)=  40.00
--------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.07         1.31
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       4.00         4.00
     Length            (m)=     126.00       126.00
     Mannings n             =       .013         .250

     Max.eff.Inten.(mm/hr)=     138.19        28.23
               over (min)       10.00        20.00
     Storage Coeff.  (min)=       1.70 (ii)   20.63 (ii)
     Unit Hyd. Tpeak (min)=       5.00        25.00
     Unit Hyd. peak  (cms)=        .32          .05
                                                        *TOTALS*
     PEAK FLOW       (cms)=        .52          .06           .53 (iii)
     TIME TO PEAK    (hrs)=        .67         1.08           .67
     RUNOFF VOLUME    (mm)=      57.07        16.97         32.96
     TOTAL RAINFALL   (mm)=      59.94        59.94         59.94
     RUNOFF COEFFICIENT   =        .95          .28           .55

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

       (i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
            CN*  =  65.9    Ia = Dep. Storage  (Above)
      (ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
********************************************************************************
*                   Chicago 4-hr Events
********************************************************************************
*                   2 yr Event
********************************************************************************
--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 357.044
| Ptotal= 30.87 mm |                          B=   3.000
--------------------                          C=    .698
                       used in:   INTENSITY =  A / (t + B)^C

                       Duration of storm  =  4.00 hrs
```

Storm time step = 5.00 min
Time to peak ratio = .33

The CORRELATION coefficient is = .9999

TIME (min)	INPUT INT. (mm/hr)	TAB. INT. (mm/hr)
5.	83.10	83.63
10.	60.30	59.59
15.	47.80	47.48
30.	31.10	31.10
60.	19.60	19.81
120.	12.30	12.42
360.	5.90	5.83

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.08	2.53	1.08	8.71	2.08	6.00	3.08	3.23
.17	2.66	1.17	12.40	2.17	5.55	3.17	3.13
.25	2.81	1.25	25.47	2.25	5.17	3.25	3.03
.33	2.98	1.33	83.63	2.33	4.85	3.33	2.94
.42	3.17	1.42	32.10	2.42	4.58	3.42	2.85
.50	3.41	1.50	18.87	2.50	4.33	3.50	2.77
.58	3.68	1.58	13.78	2.58	4.12	3.58	2.70
.67	4.02	1.67	11.05	2.67	3.93	3.67	2.63
.75	4.45	1.75	9.32	2.75	3.76	3.75	2.56
.83	5.01	1.83	8.12	2.83	3.61	3.83	2.50
.92	5.77	1.92	7.23	2.92	3.47	3.92	2.44
1.00	6.88	2.00	6.54	3.00	3.35	4.00	2.39

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* Post-Dev: Calibrate Catchment 200

CALIB
STANDHYD (0001)
ID= 2 DT= 5.0 min

Area (ha)= 1.79
Total Imp(%)= 29.00 Dir. Conn.(%)= 24.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	.52	1.27
Dep. Storage	(mm)=	2.00	5.00
Average Slope	(%)=	4.00	4.00
Length	(m)=	109.20	109.20
Mannings n	=	.013	.250

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

	IMPERVIOUS	PERVIOUS (i)
Max.eff.Inten.(mm/hr)=	57.86	3.63

```
               over (min)       10.00        40.00
     Storage Coeff.  (min)=       2.21 (ii)   41.65 (ii)
     Unit Hyd. Tpeak (min)=       5.00        45.00
     Unit Hyd. peak  (cms)=        .30          .03
                                                        *TOTALS*
     PEAK FLOW       (cms)=        .09          .01           .09 (iii)
     TIME TO PEAK    (hrs)=       1.42         2.33          1.42
     RUNOFF VOLUME    (mm)=      28.67         4.40         10.09
     TOTAL RAINFALL   (mm)=      30.87        30.87         30.87
     RUNOFF COEFFICIENT   =        .93          .14           .33

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

       (i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
            CN*  =  65.0    Ia = Dep. Storage  (Above)
      (ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
*                   Post-Dev: Calibrate Catchment 201
--------------------
| CALIB            |
| STANDHYD  (0001) |   Area    (ha)=   2.38
|ID= 3 DT= 5.0 min |   Total Imp(%)=  45.00   Dir. Conn.(%)=  40.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.07         1.31
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       4.00         4.00
     Length            (m)=     126.00       126.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      57.86         3.69
               over (min)       10.00        45.00
     Storage Coeff.  (min)=       2.41 (ii)   45.12 (ii)
     Unit Hyd. Tpeak (min)=       5.00        50.00
     Unit Hyd. peak  (cms)=        .30          .02
                                                        *TOTALS*
     PEAK FLOW       (cms)=        .20          .01           .20 (iii)
     TIME TO PEAK    (hrs)=       1.42         2.42          1.42
     RUNOFF VOLUME    (mm)=      28.67         4.64         14.14
     TOTAL RAINFALL   (mm)=      30.87        30.87         30.87
     RUNOFF COEFFICIENT   =        .93          .15           .46

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

       (i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
            CN*  =  65.9    Ia = Dep. Storage  (Above)
      (ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
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THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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* 5 yr Event

****

CHICAGO STORM
Ptotal= 42.30 mm

IDF curve parameters: A= 434.425
B= 1.773
C= .677
used in: INTENSITY = A / (t + B)^C

Duration of storm = 4.00 hrs
Storm time step = 5.00 min
Time to peak ratio = .33

The CORRELATION coefficient is = .9997

TIME (min)	INPUT INT. (mm/hr)	TAB. INT. (mm/hr)
5.	120.90	118.98
10.	80.60	81.83
15.	63.60	64.40
30.	41.00	41.79
60.	27.50	26.64
120.	17.20	16.83
360.	7.90	8.05

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.08	3.65	1.08	11.76	2.08	8.29	3.08	4.61
.17	3.83	1.17	16.35	2.17	7.70	3.17	4.47
.25	4.04	1.25	32.29	2.25	7.21	3.25	4.33
.33	4.27	1.33	118.98	2.33	6.79	3.33	4.21
.42	4.54	1.42	40.40	2.42	6.42	3.42	4.09
.50	4.85	1.50	24.21	2.50	6.10	3.50	3.99
.58	5.23	1.58	18.04	2.58	5.82	3.58	3.88
.67	5.68	1.67	14.68	2.67	5.56	3.67	3.79
.75	6.25	1.75	12.53	2.75	5.34	3.75	3.70
.83	6.99	1.83	11.01	2.83	5.13	3.83	3.61
.92	7.99	1.92	9.88	2.92	4.94	3.92	3.53
1.00	9.43	2.00	9.00	3.00	4.77	4.00	3.46

---

* Post-Dev: Calibrate Catchment 200

CALIB
STANDHYD (0001)

Area (ha)= 1.79

```
|ID= 2 DT= 5.0 min |   Total Imp(%)=  29.00   Dir. Conn.(%)=  24.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .52         1.27
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       4.00         4.00
     Length            (m)=     109.20       109.20
     Mannings n           =       .013         .250

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

                              IMPERVIOUS    PERVIOUS (i)
     Max.eff.Inten.(mm/hr)=      79.69         8.19
               over (min)        10.00        30.00
     Storage Coeff.  (min)=       1.95 (ii)   30.44 (ii)
     Unit Hyd. Tpeak (min)=       5.00        35.00
     Unit Hyd. peak  (cms)=        .31          .04
                                                      *TOTALS*
     PEAK FLOW       (cms)=        .13          .02          .14 (iii)
     TIME TO PEAK    (hrs)=       1.42         2.08         1.42
     RUNOFF VOLUME    (mm)=      40.01         8.45        15.92
     TOTAL RAINFALL   (mm)=      42.30        42.30        42.30
     RUNOFF COEFFICIENT   =        .95          .20          .38

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

       (i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
            CN*  =  65.0    Ia = Dep. Storage  (Above)
      (ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
*                   Post-Dev: Calibrate Catchment 201
--------------------
| CALIB            |
| STANDHYD  (0001) |   Area    (ha)=   2.38
|ID= 3 DT= 5.0 min |   Total Imp(%)=  45.00   Dir. Conn.(%)=  40.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.07         1.31
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       4.00         4.00
     Length            (m)=     126.00       126.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      79.69         8.10
               over (min)        10.00        35.00
     Storage Coeff.  (min)=       2.12 (ii)   33.31 (ii)
     Unit Hyd. Tpeak (min)=       5.00        35.00
```

Unit Hyd. peak (cms)=	.31	.03		
			TOTALS	
PEAK FLOW (cms)=	.29	.02	.29 (iii)	
TIME TO PEAK (hrs)=	1.42	2.08	1.42	
RUNOFF VOLUME (mm)=	40.01	8.87	21.25	
TOTAL RAINFALL (mm)=	42.30	42.30	42.30	
RUNOFF COEFFICIENT =	.95	.21	.50	

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

(i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
CN* = 65.9 Ia = Dep. Storage (Above)
(ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

---

* 10 yr Event

****

CHICAGO STORM
Ptotal= 50.01 mm

IDF curve parameters: A= 496.545
B= 1.501
C= .671
used in: INTENSITY = A / (t + B)^C

Duration of storm = 4.00 hrs
Storm time step = 5.00 min
Time to peak ratio = .33

The CORRELATION coefficient is = .9994

TIME (min)	INPUT INT. (mm/hr)	TAB. INT. (mm/hr)
5.	146.00	141.40
10.	94.00	96.43
15.	74.00	75.68
30.	47.50	49.04
60.	32.70	31.31
120.	20.50	19.82
360.	9.30	9.54

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.08	4.38	1.08	13.87	2.08	9.84	3.08	5.52
.17	4.60	1.17	19.16	2.17	9.15	3.17	5.35
.25	4.84	1.25	37.35	2.25	8.58	3.25	5.19
.33	5.11	1.33	141.40	2.33	8.08	3.33	5.04
.42	5.43	1.42	46.58	2.42	7.65	3.42	4.91
.50	5.80	1.50	28.15	2.50	7.27	3.50	4.78

.58	6.25	1.58	21.11	2.58	6.94	3.58	4.66
.67	6.79	1.67	17.25	2.67	6.64	3.67	4.54
.75	7.46	1.75	14.76	2.75	6.37	3.75	4.44
.83	8.32	1.83	13.01	2.83	6.13	3.83	4.34
.92	9.49	1.92	11.70	2.92	5.91	3.92	4.24
1.00	11.17	2.00	10.67	3.00	5.71	4.00	4.15

---

* Post-Dev: Calibrate Catchment 200

CALIB	
STANDHYD (0001)	Area (ha)= 1.79
ID= 2 DT= 5.0 min	Total Imp(%)= 29.00 Dir. Conn.(%)= 24.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	.52	1.27
Dep. Storage	(mm)=	2.00	5.00
Average Slope	(%)=	4.00	4.00
Length	(m)=	109.20	109.20
Mannings n	=	.013	.250

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

		IMPERVIOUS	PERVIOUS (i)	
Max.eff.Inten.(mm/hr)	=	93.99	12.65	
over	(min)	10.00	25.00	
Storage Coeff.	(min)=	1.82 (ii)	25.76 (ii)	
Unit Hyd. Tpeak	(min)=	5.00	30.00	
Unit Hyd. peak	(cms)=	.32	.04	
				TOTALS
PEAK FLOW	(cms)=	.16	.02	.16 (iii)
TIME TO PEAK	(hrs)=	1.33	1.83	1.33
RUNOFF VOLUME	(mm)=	47.66	11.72	20.25
TOTAL RAINFALL	(mm)=	50.01	50.01	50.01
RUNOFF COEFFICIENT	=	.95	.23	.40

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

(i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
CN* = 65.0 Ia = Dep. Storage (Above)

(ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
THAN THE STORAGE COEFFICIENT.

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

---

* Post-Dev: Calibrate Catchment 201

CALIB	
STANDHYD (0001)	Area (ha)= 2.38

```
|ID= 3 DT= 5.0 min |   Total Imp(%)=  45.00   Dir. Conn.(%)=  40.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.07         1.31
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       4.00         4.00
     Length            (m)=     126.00       126.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      93.99        12.26
               over (min)        10.00        30.00
     Storage Coeff.  (min)=       1.98 (ii)   28.40 (ii)
     Unit Hyd. Tpeak (min)=       5.00        30.00
     Unit Hyd. peak  (cms)=        .31          .04
                                                      *TOTALS*
     PEAK FLOW       (cms)=        .35          .03          .35 (iii)
     TIME TO PEAK    (hrs)=       1.42         1.92         1.42
     RUNOFF VOLUME    (mm)=      47.66        12.27        26.36
     TOTAL RAINFALL   (mm)=      50.01        50.01        50.01
     RUNOFF COEFFICIENT   =        .95          .25          .53

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

       (i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
            CN*  =  65.9    Ia = Dep. Storage  (Above)
      (ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
*                    25 yr Event
********************************************************************************
--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 595.079
| Ptotal= 59.28 mm |                          B=   1.510
--------------------                          C=    .673
                         used in:   INTENSITY =  A / (t + B)^C

                         Duration of storm  =  4.00 hrs
                         Storm time step    =  5.00 min
                         Time to peak ratio =   .33

                      The CORRELATION coefficient is =  .9988

                       TIME       INPUT INT.           TAB. INT.
                      (min)        (mm/hr)              (mm/hr)
                         5.         177.70               168.67
                        10.         111.00               114.94
                        15.          87.10                90.16
                        30.          55.80                58.36
```

60.	39.30	37.21
120.	24.60	23.53
360.	11.00	11.30

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.08	5.17	1.08	16.42	2.08	11.63	3.08	6.51
.17	5.42	1.17	22.70	2.17	10.81	3.17	6.31
.25	5.70	1.25	44.37	2.25	10.13	3.25	6.12
.33	6.03	1.33	168.67	2.33	9.54	3.33	5.95
.42	6.41	1.42	55.39	2.42	9.03	3.42	5.79
.50	6.85	1.50	33.40	2.50	8.59	3.50	5.63
.58	7.37	1.58	25.02	2.58	8.19	3.58	5.49
.67	8.01	1.67	20.42	2.67	7.84	3.67	5.36
.75	8.80	1.75	17.47	2.75	7.52	3.75	5.23
.83	9.83	1.83	15.39	2.83	7.23	3.83	5.11
.92	11.21	1.92	13.83	2.92	6.97	3.92	5.00
1.00	13.21	2.00	12.61	3.00	6.73	4.00	4.89

---

* Post-Dev: Calibrate Catchment 200

CALIB	
STANDHYD (0001)	Area (ha)= 1.79
ID= 2 DT= 5.0 min	Total Imp(%)= 29.00 Dir. Conn.(%)= 24.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	.52	1.27
Dep. Storage	(mm)=	2.00	5.00
Average Slope	(%)=	4.00	4.00
Length	(m)=	109.20	109.20
Mannings n	=	.013	.250

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

		IMPERVIOUS	PERVIOUS (i)	
Max.eff.Inten.	(mm/hr)=	112.03	20.15	
over	(min)	10.00	20.00	
Storage Coeff.	(min)=	1.70 (ii)	21.57 (ii)	
Unit Hyd. Tpeak	(min)=	5.00	25.00	
Unit Hyd. peak	(cms)=	.32	.05	
				TOTALS
PEAK FLOW	(cms)=	.19	.04	.20 (iii)
TIME TO PEAK	(hrs)=	1.33	1.75	1.33
RUNOFF VOLUME	(mm)=	56.87	16.14	25.84
TOTAL RAINFALL	(mm)=	59.28	59.28	59.28
RUNOFF COEFFICIENT	=	.96	.27	.44

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

       (i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
            CN*  =  65.0    Ia = Dep. Storage  (Above)
      (ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
*                   Post-Dev: Calibrate Catchment 201
--------------------
| CALIB            |
| STANDHYD  (0001) |   Area    (ha)=   2.38
|ID= 3 DT= 5.0 min |   Total Imp(%)=  45.00   Dir. Conn.(%)=  40.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.07         1.31
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       4.00         4.00
     Length            (m)=     126.00       126.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=     112.03        19.01
               over (min)        10.00        25.00
     Storage Coeff.  (min)=       1.85 (ii)   24.02 (ii)
     Unit Hyd. Tpeak (min)=       5.00        25.00
     Unit Hyd. peak  (cms)=        .32          .05
                                                      *TOTALS*
     PEAK FLOW       (cms)=        .42          .04          .43 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.75         1.33
     RUNOFF VOLUME    (mm)=      56.87        16.86        32.81
     TOTAL RAINFALL   (mm)=      59.28        59.28        59.28
     RUNOFF COEFFICIENT   =        .96          .28          .55

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

       (i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
            CN*  =  65.9    Ia = Dep. Storage  (Above)
      (ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
*                   50 yr Event
********************************************************************************
--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 668.743
| Ptotal= 66.25 mm |                          B=   1.501
--------------------                          C=    .674
                         used in:   INTENSITY =  A / (t + B)^C
```

Duration of storm = 4.00 hrs
Storm time step = 5.00 min
Time to peak ratio = .33

The CORRELATION coefficient is = .9984

TIME (min)	INPUT INT. (mm/hr)	TAB. INT. (mm/hr)
5.	201.20	189.37
10.	123.70	128.92
15.	96.90	101.08
30.	61.90	65.37
60.	44.20	41.64
120.	27.70	26.32
360.	12.20	12.62

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.08	5.76	1.08	18.32	2.08	12.97	3.08	7.26
.17	6.04	1.17	25.35	2.17	12.06	3.17	7.03
.25	6.36	1.25	49.61	2.25	11.30	3.25	6.82
.33	6.72	1.33	189.37	2.33	10.64	3.33	6.63
.42	7.14	1.42	61.95	2.42	10.08	3.42	6.45
.50	7.63	1.50	37.32	2.50	9.58	3.50	6.28
.58	8.22	1.58	27.94	2.58	9.13	3.58	6.12
.67	8.93	1.67	22.80	2.67	8.74	3.67	5.97
.75	9.82	1.75	19.50	2.75	8.39	3.75	5.83
.83	10.96	1.83	17.18	2.83	8.07	3.83	5.70
.92	12.51	1.92	15.43	2.92	7.77	3.92	5.57
1.00	14.74	2.00	14.07	3.00	7.51	4.00	5.45

---

* Post-Dev: Calibrate Catchment 200

CALIB
STANDHYD (0001)
ID= 2 DT= 5.0 min

Area (ha)= 1.79
Total Imp(%)= 29.00 Dir. Conn.(%)= 24.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	.52	1.27
Dep. Storage	(mm)=	2.00	5.00
Average Slope	(%)=	4.00	4.00
Length	(m)=	109.20	109.20
Mannings n	=	.013	.250

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

```
                              IMPERVIOUS    PERVIOUS (i)
     Max.eff.Inten.(mm/hr)=     125.66        25.04
               over (min)        10.00        20.00
     Storage Coeff.  (min)=       1.62 (ii)   19.85 (ii)
     Unit Hyd. Tpeak (min)=       5.00        20.00
     Unit Hyd. peak  (cms)=        .32          .06
                                                        *TOTALS*
     PEAK FLOW       (cms)=        .22          .05           .23 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.67          1.33
     RUNOFF VOLUME    (mm)=      63.80        19.78         30.27
     TOTAL RAINFALL   (mm)=      66.25        66.25         66.25
     RUNOFF COEFFICIENT   =        .96          .30           .46

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

       (i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
            CN*  =  65.0    Ia = Dep. Storage  (Above)
      (ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
*                   Post-Dev: Calibrate Catchment 201
--------------------
| CALIB            |
| STANDHYD  (0001) |   Area    (ha)=   2.38
|ID= 3 DT= 5.0 min |   Total Imp(%)=  45.00   Dir. Conn.(%)=  40.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.07         1.31
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       4.00         4.00
     Length            (m)=     126.00       126.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=     125.66        26.73
               over (min)        10.00        20.00
     Storage Coeff.  (min)=       1.77 (ii)   21.11 (ii)
     Unit Hyd. Tpeak (min)=       5.00        25.00
     Unit Hyd. peak  (cms)=        .32          .05
                                                        *TOTALS*
     PEAK FLOW       (cms)=        .48          .05           .49 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.75          1.33
     RUNOFF VOLUME    (mm)=      63.80        20.62         37.84
     TOTAL RAINFALL   (mm)=      66.25        66.25         66.25
     RUNOFF COEFFICIENT   =        .96          .31           .57

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

       (i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
```

```
            CN*  =  65.9    Ia = Dep. Storage  (Above)
      (ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
*                   100 yr Event
********************************************************************************
--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 740.025
| Ptotal= 73.31 mm |                          B=   1.509
--------------------                          C=    .674
                        used in:   INTENSITY =  A / (t + B)^C

                        Duration of storm  =  4.00 hrs
                        Storm time step    =  5.00 min
                        Time to peak ratio =   .33

                     The CORRELATION coefficient is =  .9981

                      TIME       INPUT INT.           TAB. INT.
                     (min)        (mm/hr)              (mm/hr)
                        5.         224.50               209.38
                       10.         136.20               142.60
                       15.         106.60               111.82
                       30.          68.00                72.33
                       60.          49.00                46.08
                      120.          30.70                29.12
                      360.          13.50                13.97


                TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
                 .08    6.37 |  1.08   20.28 |  2.08   14.36 |  3.08    8.03
                 .17    6.68 |  1.17   28.06 |  2.17   13.35 |  3.17    7.78
                 .25    7.03 |  1.25   54.92 |  2.25   12.50 |  3.25    7.55
                 .33    7.44 |  1.33  209.38 |  2.33   11.78 |  3.33    7.34
                 .42    7.90 |  1.42   68.59 |  2.42   11.15 |  3.42    7.14
                 .50    8.45 |  1.50   41.32 |  2.50   10.60 |  3.50    6.95
                 .58    9.09 |  1.58   30.93 |  2.58   10.11 |  3.58    6.77
                 .67    9.88 |  1.67   25.24 |  2.67    9.67 |  3.67    6.61
                 .75   10.86 |  1.75   21.59 |  2.75    9.28 |  3.75    6.45
                 .83   12.13 |  1.83   19.01 |  2.83    8.93 |  3.83    6.30
                 .92   13.84 |  1.92   17.08 |  2.92    8.60 |  3.92    6.16
                1.00   16.31 |  2.00   15.57 |  3.00    8.31 |  4.00    6.03


--------------------------------------------------------------------------------
*                   Post-Dev: Calibrate Catchment 200
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```
| CALIB            |
| STANDHYD  (0001) |   Area    (ha)=   1.79
|ID= 2 DT= 5.0 min |   Total Imp(%)=  29.00   Dir. Conn.(%)=  24.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .52          1.27
     Dep. Storage     (mm)=       2.00          5.00
     Average Slope     (%)=       4.00          4.00
     Length            (m)=     109.20        109.20
     Mannings n           =       .013          .250

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

                              IMPERVIOUS    PERVIOUS (i)
     Max.eff.Inten.(mm/hr)=     138.99         30.26
               over (min)        10.00         20.00
     Storage Coeff.  (min)=       1.56 (ii)    18.45 (ii)
     Unit Hyd. Tpeak (min)=       5.00         20.00
     Unit Hyd. peak  (cms)=        .33           .06
                                                      *TOTALS*
     PEAK FLOW       (cms)=        .24           .07          .26 (iii)
     TIME TO PEAK    (hrs)=       1.33          1.67          1.33
     RUNOFF VOLUME    (mm)=      70.81         23.70         34.94
     TOTAL RAINFALL   (mm)=      73.31         73.31         73.31
     RUNOFF COEFFICIENT   =        .97           .32           .48

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

       (i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
            CN*  =  65.0    Ia = Dep. Storage  (Above)
      (ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
*                   Post-Dev: Calibrate Catchment 201
--------------------
| CALIB            |
| STANDHYD  (0001) |   Area    (ha)=   2.38
|ID= 3 DT= 5.0 min |   Total Imp(%)=  45.00   Dir. Conn.(%)=  40.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.07          1.31
     Dep. Storage     (mm)=       2.00          5.00
     Average Slope     (%)=       4.00          4.00
     Length            (m)=     126.00        126.00
     Mannings n           =       .013          .250

     Max.eff.Inten.(mm/hr)=     138.99         32.26
               over (min)        10.00         20.00
```

```
     Storage Coeff.  (min)=       1.70 (ii)   19.64 (ii)
     Unit Hyd. Tpeak (min)=       5.00        20.00
     Unit Hyd. peak  (cms)=        .32          .06
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .53          .07           .55 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.67          1.33
     RUNOFF VOLUME    (mm)=      70.81        24.67         43.07
     TOTAL RAINFALL   (mm)=      73.31        73.31         73.31
     RUNOFF COEFFICIENT   =        .97          .34           .59

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

       (i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
            CN*  =  65.9    Ia = Dep. Storage  (Above)
      (ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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********************************************************************************
*                   SCS II 12-hr Events
********************************************************************************
*                   2 yr Event
********************************************************************************

--------------------
|    READ STORM    |    Filename: 2SCS12.STM
| Ptotal= 43.81 mm |    Comments: *2 Yr 24 hr SCS II Trenton
--------------------
                TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
                1.00    1.10 |  4.00    1.75 |  7.00    5.69 | 10.00    1.53
                2.00    1.10 |  5.00    3.07 |  8.00    2.63 | 11.00     .88
                3.00    1.31 |  6.00   22.34 |  9.00    1.53 | 12.00     .88

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

*                   Post-Dev: Calibrate Catchment 200
--------------------
| CALIB            |
| STANDHYD  (0001) |   Area    (ha)=   1.79
|ID= 2 DT= 5.0 min |   Total Imp(%)=  29.00   Dir. Conn.(%)=  24.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .52         1.27
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       4.00         4.00
     Length            (m)=     109.20       109.20
     Mannings n           =       .013         .250
```

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

	IMPERVIOUS	PERVIOUS (i)	
Max.eff.Inten.(mm/hr)=	22.34	5.87	
over (min)	10.00	35.00	
Storage Coeff. (min)=	3.24 (ii)	35.78 (ii)	
Unit Hyd. Tpeak (min)=	5.00	40.00	
Unit Hyd. peak (cms)=	.27	.03	
			TOTALS
PEAK FLOW (cms)=	.03	.01	.04 (iii)
TIME TO PEAK (hrs)=	5.83	6.58	6.17
RUNOFF VOLUME (mm)=	41.74	9.15	16.85
TOTAL RAINFALL (mm)=	43.81	43.81	43.81
RUNOFF COEFFICIENT =	.95	.21	.38

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

(i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
CN* = 65.0 Ia = Dep. Storage (Above)
(ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

---

* Post-Dev: Calibrate Catchment 201

CALIB	
STANDHYD (0001)	Area (ha)= 2.38
ID= 3 DT= 5.0 min	Total Imp(%)= 45.00 Dir. Conn.(%)= 40.00

	IMPERVIOUS	PERVIOUS (i)	
Surface Area (ha)=	1.07	1.31	
Dep. Storage (mm)=	2.00	5.00	
Average Slope (%)=	4.00	4.00	
Length (m)=	126.00	126.00	
Mannings n =	.013	.250	
Max.eff.Inten.(mm/hr)=	22.34	6.30	
over (min)	10.00	35.00	
Storage Coeff. (min)=	3.53 (ii)	38.02 (ii)	
Unit Hyd. Tpeak (min)=	5.00	40.00	
Unit Hyd. peak (cms)=	.26	.03	
			TOTALS
PEAK FLOW (cms)=	.06	.01	.07 (iii)
TIME TO PEAK (hrs)=	5.92	6.58	6.17
RUNOFF VOLUME (mm)=	41.74	9.60	22.36
TOTAL RAINFALL (mm)=	43.81	43.81	43.81
RUNOFF COEFFICIENT =	.95	.22	.51

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

(i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
CN* = 65.9 Ia = Dep. Storage (Above)
(ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

---

* 5 yr Event
****

| READ STORM | Filename: 5SCS12.STM
| Ptotal= 57.92 mm | Comments: *5 Yr 12 hr SCS II Trenton

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
1.00	1.45	4.00	2.32	7.00	7.53	10.00	2.03
2.00	1.45	5.00	4.05	8.00	3.47	11.00	1.16
3.00	1.74	6.00	29.53	9.00	2.03	12.00	1.16

---

* Post-Dev: Calibrate Catchment 200

| CALIB STANDHYD (0001) | Area (ha)= 1.79
|ID= 2 DT= 5.0 min | Total Imp(%)= 29.00 Dir. Conn.(%)= 24.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	.52	1.27
Dep. Storage	(mm)=	2.00	5.00
Average Slope	(%)=	4.00	4.00
Length	(m)=	109.20	109.20
Mannings n	=	.013	.250

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

		IMPERVIOUS	PERVIOUS (i)	
Max.eff.Inten.	(mm/hr)=	29.53	10.43	
	over (min)	10.00	30.00	
Storage Coeff.	(min)=	2.89 (ii)	28.76 (ii)	
Unit Hyd. Tpeak	(min)=	5.00	30.00	
Unit Hyd. peak	(cms)=	.28	.04	
				TOTALS
PEAK FLOW	(cms)=	.04	.03	.06 (iii)
TIME TO PEAK	(hrs)=	5.75	6.33	6.08
RUNOFF VOLUME	(mm)=	55.82	15.62	25.17
TOTAL RAINFALL	(mm)=	57.92	57.92	57.92
RUNOFF COEFFICIENT	=	.96	.27	.43

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

(i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
CN* = 65.0 Ia = Dep. Storage (Above)
(ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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* Post-Dev: Calibrate Catchment 201

CALIB	
STANDHYD (0001)	Area (ha)= 2.38
ID= 3 DT= 5.0 min	Total Imp(%)= 45.00 Dir. Conn.(%)= 40.00

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	1.07	1.31	
Dep. Storage	(mm)=	2.00	5.00	
Average Slope	(%)=	4.00	4.00	
Length	(m)=	126.00	126.00	
Mannings n	=	.013	.250	
Max.eff.Inten.	(mm/hr)=	29.53	11.12	
over	(min)	10.00	30.00	
Storage Coeff.	(min)=	3.15 (ii)	30.63 (ii)	
Unit Hyd. Tpeak	(min)=	5.00	35.00	
Unit Hyd. peak	(cms)=	.27	.04	
				TOTALS
PEAK FLOW	(cms)=	.08	.03	.10 (iii)
TIME TO PEAK	(hrs)=	5.92	6.50	6.17
RUNOFF VOLUME	(mm)=	55.82	16.32	32.05
TOTAL RAINFALL	(mm)=	57.92	57.92	57.92
RUNOFF COEFFICIENT	=	.96	.28	.55

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

(i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
CN* = 65.9 Ia = Dep. Storage (Above)
(ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

---

* 10 yr Event
****

READ STORM	Filename: 10SCS12.STM
Ptotal= 67.19 mm	Comments: *10 Yr 12 hr SCS II Trenton

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
1.00	1.68	4.00	2.69	7.00	8.74	10.00	2.35
2.00	1.68	5.00	4.70	8.00	4.03	11.00	1.34
3.00	2.02	6.00	34.27	9.00	2.35	12.00	1.34

---

* Post-Dev: Calibrate Catchment 200

CALIB STANDHYD (0001) ID= 2 DT= 5.0 min	Area (ha)= 1.79 Total Imp(%)= 29.00 Dir. Conn.(%)= 24.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	.52	1.27
Dep. Storage	(mm)=	2.00	5.00
Average Slope	(%)=	4.00	4.00
Length	(m)=	109.20	109.20
Mannings n	=	.013	.250

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

		IMPERVIOUS	PERVIOUS (i)	
Max.eff.Inten.	(mm/hr)=	34.27	14.10	
over	(min)	10.00	25.00	
Storage Coeff.	(min)=	2.73 (ii)	25.66 (ii)	
Unit Hyd. Tpeak	(min)=	5.00	30.00	
Unit Hyd. peak	(cms)=	.29	.04	
				TOTALS
PEAK FLOW	(cms)=	.04	.04	.07 (iii)
TIME TO PEAK	(hrs)=	5.67	6.33	6.08
RUNOFF VOLUME	(mm)=	65.08	20.48	31.10
TOTAL RAINFALL	(mm)=	67.19	67.19	67.19
RUNOFF COEFFICIENT	=	.97	.30	.46

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

(i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
CN* = 65.0 Ia = Dep. Storage (Above)
(ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

---

* Post-Dev: Calibrate Catchment 201

CALIB STANDHYD (0001)	Area (ha)= 2.38

```
|ID= 3 DT= 5.0 min |   Total Imp(%)=  45.00   Dir. Conn.(%)=  40.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.07         1.31
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       4.00         4.00
     Length            (m)=     126.00       126.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      34.27        14.98
               over (min)        10.00        25.00
     Storage Coeff.  (min)=       2.97 (ii)   27.36 (ii)
     Unit Hyd. Tpeak (min)=       5.00        30.00
     Unit Hyd. peak  (cms)=        .28          .04
                                                      *TOTALS*
     PEAK FLOW       (cms)=        .09          .04          .12 (iii)
     TIME TO PEAK    (hrs)=       5.75         6.33         6.08
     RUNOFF VOLUME    (mm)=      65.08        21.35        38.77
     TOTAL RAINFALL   (mm)=      67.19        67.19        67.19
     RUNOFF COEFFICIENT   =        .97          .32          .58

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

       (i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
            CN*  =  65.9    Ia = Dep. Storage  (Above)
      (ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
*                   25 yr Event
********************************************************************************

--------------------
|    READ STORM    |    Filename: 25SCS12.STM
| Ptotal= 79.10 mm |    Comments: *25 Yr 12 hr SCS II Trenton
--------------------
                TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
                1.00    1.98 |  4.00    3.16 |  7.00   10.28 | 10.00    2.77
                2.00    1.98 |  5.00    5.54 |  8.00    4.75 | 11.00    1.58
                3.00    2.37 |  6.00   40.34 |  9.00    2.77 | 12.00    1.58

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

*                   Post-Dev: Calibrate Catchment 200
--------------------
| CALIB            |
| STANDHYD  (0001) |   Area    (ha)=   1.79
|ID= 2 DT= 5.0 min |   Total Imp(%)=  29.00   Dir. Conn.(%)=  24.00
```

```
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .52          1.27
     Dep. Storage     (mm)=       2.00          5.00
     Average Slope     (%)=       4.00          4.00
     Length            (m)=     109.20        109.20
     Mannings n           =       .013          .250

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

                              IMPERVIOUS    PERVIOUS (i)
     Max.eff.Inten.(mm/hr)=      40.34         18.75
               over (min)        10.00         25.00
     Storage Coeff.  (min)=       2.55 (ii)    23.01 (ii)
     Unit Hyd. Tpeak (min)=       5.00         25.00
     Unit Hyd. peak  (cms)=        .29           .05
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .05           .05           .10 (iii)
     TIME TO PEAK    (hrs)=       5.67          6.25          6.08
     RUNOFF VOLUME    (mm)=      76.97         27.32         39.16
     TOTAL RAINFALL   (mm)=      79.10         79.10         79.10
     RUNOFF COEFFICIENT   =        .97           .35           .50

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

       (i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
            CN*  =  65.0    Ia = Dep. Storage  (Above)
      (ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
*                   Post-Dev: Calibrate Catchment 201
--------------------
| CALIB            |
| STANDHYD  (0001) |   Area    (ha)=   2.38
|ID= 3 DT= 5.0 min |   Total Imp(%)=  45.00   Dir. Conn.(%)=  40.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.07          1.31
     Dep. Storage     (mm)=       2.00          5.00
     Average Slope     (%)=       4.00          4.00
     Length            (m)=     126.00        126.00
     Mannings n           =       .013          .250

     Max.eff.Inten.(mm/hr)=      40.34         19.86
               over (min)        10.00         25.00
     Storage Coeff.  (min)=       2.78 (ii)    24.57 (ii)
     Unit Hyd. Tpeak (min)=       5.00         25.00
     Unit Hyd. peak  (cms)=        .28           .05
```

```
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .11          .05           .16 (iii)
     TIME TO PEAK    (hrs)=       5.75         6.25          6.08
     RUNOFF VOLUME    (mm)=      76.97        28.39         47.77
     TOTAL RAINFALL   (mm)=      79.10        79.10         79.10
     RUNOFF COEFFICIENT   =        .97          .36           .60

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

       (i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
            CN*  =  65.9    Ia = Dep. Storage  (Above)
      (ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
*                    50 yr Event
********************************************************************************

--------------------
|    READ STORM    |    Filename: 50SCS12.STM
| Ptotal= 87.81 mm |    Comments: *50 Yr 12 hr SCS II Trenton
--------------------
                TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
                1.00    2.20 |  4.00    3.51 |  7.00   11.41 | 10.00    3.07
                2.00    2.20 |  5.00    6.15 |  8.00    5.27 | 11.00    1.76
                3.00    2.63 |  6.00   44.78 |  9.00    3.07 | 12.00    1.76

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

*                    Post-Dev: Calibrate Catchment 200
--------------------
| CALIB            |
| STANDHYD  (0001) |   Area    (ha)=   1.79
|ID= 2 DT= 5.0 min |   Total Imp(%)=  29.00   Dir. Conn.(%)=  24.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .52         1.27
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       4.00         4.00
     Length            (m)=     109.20       109.20
     Mannings n           =       .013         .250

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

                              IMPERVIOUS    PERVIOUS (i)
     Max.eff.Inten.(mm/hr)=      44.78        22.94
               over (min)        10.00        20.00
     Storage Coeff.  (min)=       2.45 (ii)   21.32 (ii)
```

```
     Unit Hyd. Tpeak (min)=       5.00        25.00
     Unit Hyd. peak  (cms)=        .30          .05
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .05          .06           .11 (iii)
     TIME TO PEAK    (hrs)=       5.67         6.25          6.08
     RUNOFF VOLUME    (mm)=      85.66        32.68         45.32
     TOTAL RAINFALL   (mm)=      87.81        87.81         87.81
     RUNOFF COEFFICIENT   =        .98          .37           .52

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

       (i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
            CN*  =  65.0    Ia = Dep. Storage  (Above)
      (ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
*                   Post-Dev: Calibrate Catchment 201
--------------------
| CALIB            |
| STANDHYD  (0001) |   Area    (ha)=   2.38
|ID= 3 DT= 5.0 min |   Total Imp(%)=  45.00   Dir. Conn.(%)=  40.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.07         1.31
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       4.00         4.00
     Length            (m)=     126.00       126.00
     Mannings n             =       .013         .250

     Max.eff.Inten.(mm/hr)=      44.78        23.66
               over (min)        10.00        25.00
     Storage Coeff.  (min)=       2.67 (ii)   22.98 (ii)
     Unit Hyd. Tpeak (min)=       5.00        25.00
     Unit Hyd. peak  (cms)=        .29          .05
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .12          .07           .18 (iii)
     TIME TO PEAK    (hrs)=       5.75         6.25          6.08
     RUNOFF VOLUME    (mm)=      85.66        33.91         54.55
     TOTAL RAINFALL   (mm)=      87.81        87.81         87.81
     RUNOFF COEFFICIENT   =        .98          .39           .62

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

       (i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
            CN*  =  65.9    Ia = Dep. Storage  (Above)
      (ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
```

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*                    100 yr Event
********************************************************************************

--------------------
|    READ STORM    |    Filename: 100SCS12.STM
| Ptotal= 96.52 mm |    Comments: *100 Yr 12 hr SCS II Trenton
--------------------
                TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
                1.00    2.41 |  4.00    3.86 |  7.00   12.55 | 10.00    3.38
                2.00    2.41 |  5.00    6.76 |  8.00    5.79 | 11.00    1.93
                3.00    2.90 |  6.00   49.22 |  9.00    3.38 | 12.00    1.93

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

*                    Post-Dev: Calibrate Catchment 200
--------------------
| CALIB            |
| STANDHYD  (0001) |   Area    (ha)=   1.79
|ID= 2 DT= 5.0 min |   Total Imp(%)=  29.00   Dir. Conn.(%)=  24.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .52          1.27
     Dep. Storage     (mm)=       2.00          5.00
     Average Slope     (%)=       4.00          4.00
     Length            (m)=     109.20        109.20
     Mannings n             =       .013          .250

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

                              IMPERVIOUS    PERVIOUS (i)
     Max.eff.Inten.(mm/hr)=      49.22         26.80
               over (min)        10.00         20.00
     Storage Coeff.  (min)=       2.36 (ii)    20.09 (ii)
     Unit Hyd. Tpeak (min)=       5.00         25.00
     Unit Hyd. peak  (cms)=        .30           .05
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .06           .07           .13 (iii)
     TIME TO PEAK    (hrs)=       5.67          6.25          6.08
     RUNOFF VOLUME    (mm)=      94.36         38.31         51.69
     TOTAL RAINFALL   (mm)=      96.52         96.52         96.52
     RUNOFF COEFFICIENT   =        .98           .40           .54

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

       (i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
            CN*  =  65.0    Ia = Dep. Storage  (Above)
      (ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
```

```
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
*                   Post-Dev: Calibrate Catchment 201
--------------------
| CALIB            |
| STANDHYD  (0001) |   Area    (ha)=   2.38
|ID= 3 DT= 5.0 min |   Total Imp(%)=  45.00   Dir. Conn.(%)=  40.00
--------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.07         1.31
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       4.00         4.00
     Length            (m)=     126.00       126.00
     Mannings n             =       .013         .250

     Max.eff.Inten.(mm/hr)=      49.22        28.26
               over (min)        10.00        20.00
     Storage Coeff.  (min)=       2.57 (ii)   21.49 (ii)
     Unit Hyd. Tpeak (min)=       5.00        25.00
     Unit Hyd. peak  (cms)=        .29          .05
                                                        *TOTALS*
     PEAK FLOW       (cms)=        .13          .08           .21 (iii)
     TIME TO PEAK    (hrs)=       5.75         6.25          6.08
     RUNOFF VOLUME    (mm)=      94.36        39.68         61.50
     TOTAL RAINFALL   (mm)=      96.52        96.52         96.52
     RUNOFF COEFFICIENT   =        .98          .41           .64

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

       (i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
            CN*  =  65.9    Ia = Dep. Storage  (Above)
      (ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
********************************************************************************
*                   SCS II 24-hr Events
********************************************************************************
*                   2 yr Event
********************************************************************************

--------------------
|    READ STORM    |    Filename: 2SCS24.STM
| Ptotal= 50.39 mm |    Comments: *2 Yr 24 hr SCS II Trenton
--------------------
                TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
```

1.00	.55	7.00	1.01	13.00	5.49	19.00	.91
2.00	.55	8.00	1.01	14.00	2.42	20.00	.91
3.00	.66	9.00	1.36	15.00	1.51	21.00	.60
4.00	.66	10.00	1.71	16.00	1.51	22.00	.60
5.00	.81	11.00	2.72	17.00	.91	23.00	.60
6.00	.81	12.00	21.57	18.00	.91	24.00	.60

---

* Post-Dev: Calibrate Catchment 200

CALIB	
STANDHYD (0001)	Area (ha)= 1.79
ID= 2 DT= 5.0 min	Total Imp(%)= 29.00 Dir. Conn.(%)= 24.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	.52	1.27
Dep. Storage	(mm)=	2.00	5.00
Average Slope	(%)=	4.00	4.00
Length	(m)=	109.20	109.20
Mannings n	=	.013	.250

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

		IMPERVIOUS	PERVIOUS (i)	
Max.eff.Inten.(mm/hr)=		21.57	6.36	
over (min)		10.00	35.00	
Storage Coeff.	(min)=	3.28 (ii)	34.81 (ii)	
Unit Hyd. Tpeak	(min)=	5.00	35.00	
Unit Hyd. peak	(cms)=	.27	.03	
				TOTALS
PEAK FLOW	(cms)=	.03	.02	.04 (iii)
TIME TO PEAK	(hrs)=	11.92	12.50	12.17
RUNOFF VOLUME	(mm)=	48.34	12.03	20.60
TOTAL RAINFALL	(mm)=	50.39	50.39	50.39
RUNOFF COEFFICIENT	=	.96	.24	.41

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

(i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
CN* = 65.0 Ia = Dep. Storage (Above)

(ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
THAN THE STORAGE COEFFICIENT.

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

---

* Post-Dev: Calibrate Catchment 201

CALIB	
STANDHYD (0001)	Area (ha)= 2.38

|ID= 3 DT= 5.0 min | Total Imp(%)= 45.00 Dir. Conn.(%)= 40.00

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	1.07	1.31	
Dep. Storage	(mm)=	2.00	5.00	
Average Slope	(%)=	4.00	4.00	
Length	(m)=	126.00	126.00	
Mannings n	=	.013	.250	
Max.eff.Inten.(mm/hr)	=	21.57	6.80	
over (min)		10.00	35.00	
Storage Coeff.	(min)=	3.58 (ii)	37.02 (ii)	
Unit Hyd. Tpeak	(min)=	5.00	40.00	
Unit Hyd. peak	(cms)=	.26	.03	
				TOTALS
PEAK FLOW	(cms)=	.06	.02	.07 (iii)
TIME TO PEAK	(hrs)=	12.00	12.58	12.17
RUNOFF VOLUME	(mm)=	48.34	12.59	26.79
TOTAL RAINFALL	(mm)=	50.39	50.39	50.39
RUNOFF COEFFICIENT	=	.96	.25	.53

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

(i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
CN* = 65.9 Ia = Dep. Storage (Above)
(ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

---

* 5 yr Event

****

READ STORM	Filename: 5SCS24.STM
Ptotal= 65.91 mm	Comments: *5 Yr 24 hr SCS II Trenton

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
1.00	.72	7.00	1.32	13.00	7.18	19.00	1.19
2.00	.72	8.00	1.32	14.00	3.16	20.00	1.19
3.00	.86	9.00	1.78	15.00	1.98	21.00	.79
4.00	.86	10.00	2.24	16.00	1.98	22.00	.79
5.00	1.05	11.00	3.56	17.00	1.19	23.00	.79
6.00	1.05	12.00	28.21	18.00	1.19	24.00	.79

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* Post-Dev: Calibrate Catchment 200

```
| CALIB            |
| STANDHYD  (0001) |   Area    (ha)=   1.79
|ID= 2 DT= 5.0 min |   Total Imp(%)=  29.00   Dir. Conn.(%)=  24.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .52          1.27
     Dep. Storage     (mm)=       2.00          5.00
     Average Slope     (%)=       4.00          4.00
     Length            (m)=     109.20        109.20
     Mannings n           =       .013          .250

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

                              IMPERVIOUS    PERVIOUS (i)
     Max.eff.Inten.(mm/hr)=      28.21         10.84
               over (min)        10.00         30.00
     Storage Coeff.  (min)=       2.95 (ii)    28.42 (ii)
     Unit Hyd. Tpeak (min)=       5.00         30.00
     Unit Hyd. peak  (cms)=        .28           .04
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .03           .03            .06 (iii)
     TIME TO PEAK    (hrs)=      11.75         12.33          12.08
     RUNOFF VOLUME    (mm)=      63.84         19.81          30.27
     TOTAL RAINFALL   (mm)=      65.91         65.91          65.91
     RUNOFF COEFFICIENT   =        .97           .30            .46

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

       (i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
            CN*  =  65.0    Ia = Dep. Storage  (Above)
      (ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
*                   Post-Dev: Calibrate Catchment 201
--------------------
| CALIB            |
| STANDHYD  (0001) |   Area    (ha)=   2.38
|ID= 3 DT= 5.0 min |   Total Imp(%)=  45.00   Dir. Conn.(%)=  40.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        1.07          1.31
     Dep. Storage     (mm)=       2.00          5.00
     Average Slope     (%)=       4.00          4.00
     Length            (m)=     126.00        126.00
     Mannings n           =       .013          .250

     Max.eff.Inten.(mm/hr)=      28.21         11.53
               over (min)        10.00         30.00
```

Storage Coeff. (min)=	3.21 (ii)	30.29 (ii)	
Unit Hyd. Tpeak (min)=	5.00	35.00	
Unit Hyd. peak (cms)=	.27	.04	
			TOTALS
PEAK FLOW (cms)=	.07	.03	.10 (iii)
TIME TO PEAK (hrs)=	11.92	12.50	12.17
RUNOFF VOLUME (mm)=	63.84	20.65	37.86
TOTAL RAINFALL (mm)=	65.91	65.91	65.91
RUNOFF COEFFICIENT =	.97	.31	.57

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

(i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
CN* = 65.9 Ia = Dep. Storage (Above)
(ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

---

* 10 yr Event
****

READ STORM	Filename: 10SCS24.STM
Ptotal= 76.08 mm	Comments: *10 Yr 24 hr SCS II Trenton

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
1.00	.84	7.00	1.52	13.00	8.29	19.00	1.37
2.00	.84	8.00	1.52	14.00	3.65	20.00	1.37
3.00	.99	9.00	2.05	15.00	2.28	21.00	.91
4.00	.99	10.00	2.59	16.00	2.28	22.00	.91
5.00	1.22	11.00	4.11	17.00	1.37	23.00	.91
6.00	1.22	12.00	32.57	18.00	1.37	24.00	.91

---

* Post-Dev: Calibrate Catchment 200

CALIB STANDHYD (0001)	Area (ha)= 1.79
ID= 2 DT= 5.0 min	Total Imp(%)= 29.00 Dir. Conn.(%)= 24.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	.52	1.27
Dep. Storage	(mm)=	2.00	5.00
Average Slope	(%)=	4.00	4.00
Length	(m)=	109.20	109.20
Mannings n	=	.013	.250

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

		IMPERVIOUS	PERVIOUS (i)	
Max.eff.Inten.(mm/hr)=		32.57	14.37	
over (min)		10.00	25.00	
Storage Coeff. (min)=		2.78 (ii)	25.54 (ii)	
Unit Hyd. Tpeak (min)=		5.00	30.00	
Unit Hyd. peak (cms)=		.28	.04	
				TOTALS
PEAK FLOW	(cms)=	.04	.04	.07 (iii)
TIME TO PEAK	(hrs)=	11.75	12.25	12.08
RUNOFF VOLUME	(mm)=	74.00	25.56	37.10
TOTAL RAINFALL	(mm)=	76.08	76.08	76.08
RUNOFF COEFFICIENT	=	.97	.34	.49

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

(i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
CN* = 65.0 Ia = Dep. Storage (Above)
(ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

---

* Post-Dev: Calibrate Catchment 201

CALIB	
STANDHYD (0001)	Area (ha)= 2.38
ID= 3 DT= 5.0 min	Total Imp(%)= 45.00 Dir. Conn.(%)= 40.00

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	1.07	1.31	
Dep. Storage	(mm)=	2.00	5.00	
Average Slope	(%)=	4.00	4.00	
Length	(m)=	126.00	126.00	
Mannings n	=	.013	.250	
Max.eff.Inten.(mm/hr)=		32.57	15.24	
over (min)		10.00	25.00	
Storage Coeff. (min)=		3.03 (ii)	27.25 (ii)	
Unit Hyd. Tpeak (min)=		5.00	30.00	
Unit Hyd. peak (cms)=		.27	.04	
				TOTALS
PEAK FLOW	(cms)=	.09	.04	.12 (iii)
TIME TO PEAK	(hrs)=	11.83	12.33	12.08
RUNOFF VOLUME	(mm)=	74.00	26.58	45.48
TOTAL RAINFALL	(mm)=	76.08	76.08	76.08
RUNOFF COEFFICIENT	=	.97	.35	.60

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

(i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
CN* = 65.9 Ia = Dep. Storage (Above)
(ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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* 25 yr Event
****

READ STORM	Filename: 25SCS24.STM
Ptotal= 89.00 mm	Comments: *25 Yr 24 hr SCS II Trenton

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
1.00	.98	7.00	1.78	13.00	9.70	19.00	1.60
2.00	.98	8.00	1.78	14.00	4.27	20.00	1.60
3.00	1.16	9.00	2.40	15.00	2.67	21.00	1.07
4.00	1.16	10.00	3.03	16.00	2.67	22.00	1.07
5.00	1.42	11.00	4.81	17.00	1.60	23.00	1.07
6.00	1.42	12.00	38.09	18.00	1.60	24.00	1.07

---

* Post-Dev: Calibrate Catchment 200

CALIB	
STANDHYD (0001)	Area (ha)= 1.79
ID= 2 DT= 5.0 min	Total Imp(%)= 29.00 Dir. Conn.(%)= 24.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	.52	1.27
Dep. Storage	(mm)=	2.00	5.00
Average Slope	(%)=	4.00	4.00
Length	(m)=	109.20	109.20
Mannings n	=	.013	.250

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

		IMPERVIOUS	PERVIOUS (i)	
				TOTALS
Max.eff.Inten.	(mm/hr)=	38.09	18.79	
over	(min)	10.00	25.00	
Storage Coeff.	(min)=	2.61 (ii)	23.06 (ii)	
Unit Hyd. Tpeak	(min)=	5.00	25.00	
Unit Hyd. peak	(cms)=	.29	.05	
PEAK FLOW	(cms)=	.05	.05	.10 (iii)
TIME TO PEAK	(hrs)=	11.75	12.25	12.08

```
     RUNOFF VOLUME    (mm)=      86.91        33.47          46.21
     TOTAL RAINFALL   (mm)=      89.00        89.00          89.00
     RUNOFF COEFFICIENT   =        .98          .38            .52

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

       (i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
            CN*  =  65.0    Ia = Dep. Storage  (Above)
      (ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
*                   Post-Dev: Calibrate Catchment 201
--------------------
| CALIB            |
| STANDHYD  (0001) |   Area    (ha)=   2.38
|ID= 3 DT= 5.0 min |   Total Imp(%)=  45.00   Dir. Conn.(%)=  40.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.07         1.31
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       4.00         4.00
     Length            (m)=     126.00       126.00
     Mannings n             =       .013         .250

     Max.eff.Inten.(mm/hr)=      38.09        19.87
               over (min)        10.00        25.00
     Storage Coeff.  (min)=       2.85 (ii)   24.63 (ii)
     Unit Hyd. Tpeak (min)=       5.00        25.00
     Unit Hyd. peak  (cms)=        .28          .05
                                                        *TOTALS*
     PEAK FLOW       (cms)=        .10          .06            .15 (iii)
     TIME TO PEAK    (hrs)=      11.83        12.25          12.08
     RUNOFF VOLUME    (mm)=      86.91        34.72          55.54
     TOTAL RAINFALL   (mm)=      89.00        89.00          89.00
     RUNOFF COEFFICIENT   =        .98          .39            .62

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

       (i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
            CN*  =  65.9    Ia = Dep. Storage  (Above)
      (ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
*                   50 yr Event
********************************************************************************
```

```
--------------------
|    READ STORM    |    Filename: 50SCS24.STM
| Ptotal= 98.55 mm |    Comments: *50 Yr 24 hr SCS II Trenton
--------------------
```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
1.00	1.08	7.00	1.97	13.00	10.75	19.00	1.77
2.00	1.08	8.00	1.97	14.00	4.73	20.00	1.77
3.00	1.28	9.00	2.66	15.00	2.96	21.00	1.18
4.00	1.28	10.00	3.35	16.00	2.96	22.00	1.18
5.00	1.58	11.00	5.32	17.00	1.77	23.00	1.18
6.00	1.58	12.00	42.20	18.00	1.77	24.00	1.18

---

* Post-Dev: Calibrate Catchment 200

```
--------------------
| CALIB            |
| STANDHYD  (0001) |   Area    (ha)=   1.79
|ID= 2 DT= 5.0 min |   Total Imp(%)=  29.00   Dir. Conn.(%)=  24.00
--------------------
```

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	.52	1.27
Dep. Storage	(mm)=	2.00	5.00
Average Slope	(%)=	4.00	4.00
Length	(m)=	109.20	109.20
Mannings n	=	.013	.250

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

		IMPERVIOUS	PERVIOUS (i)	
Max.eff.Inten.	(mm/hr)=	42.20	22.73	
over	(min)	10.00	20.00	
Storage Coeff.	(min)=	2.51 (ii)	21.45 (ii)	
Unit Hyd. Tpeak	(min)=	5.00	25.00	
Unit Hyd. peak	(cms)=	.29	.05	
				TOTALS
PEAK FLOW	(cms)=	.05	.06	.11 (iii)
TIME TO PEAK	(hrs)=	11.67	12.17	12.08
RUNOFF VOLUME	(mm)=	96.45	39.70	53.25
TOTAL RAINFALL	(mm)=	98.55	98.55	98.55
RUNOFF COEFFICIENT	=	.98	.40	.54

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

(i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
CN* = 65.0 Ia = Dep. Storage (Above)

(ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
THAN THE STORAGE COEFFICIENT.

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

```
--------------------------------------------------------------------------------
*                   Post-Dev: Calibrate Catchment 201
--------------------
| CALIB            |
| STANDHYD  (0001) |   Area    (ha)=   2.38
|ID= 3 DT= 5.0 min |   Total Imp(%)=  45.00   Dir. Conn.(%)=  40.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.07         1.31
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       4.00         4.00
     Length            (m)=     126.00       126.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      42.20        23.51
               over (min)        10.00        25.00
     Storage Coeff.  (min)=       2.73 (ii)   23.10 (ii)
     Unit Hyd. Tpeak (min)=       5.00        25.00
     Unit Hyd. peak  (cms)=        .29          .05
                                                        *TOTALS*
     PEAK FLOW       (cms)=        .11          .07           .18 (iii)
     TIME TO PEAK    (hrs)=      11.75        12.25         12.08
     RUNOFF VOLUME    (mm)=      96.45        41.11         63.18
     TOTAL RAINFALL   (mm)=      98.55        98.55         98.55
     RUNOFF COEFFICIENT   =        .98          .42           .64

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

       (i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
            CN*  =  65.9    Ia = Dep. Storage  (Above)
      (ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
*                   100 yr Event
********************************************************************************

--------------------
|    READ STORM    |    Filename: 100SCS24.STM
| Ptotal=108.14 mm |    Comments: *100 Yr 24 hr SCS II Trenton
--------------------
                TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
                1.00    1.19 |  7.00    2.16 | 13.00   11.78 | 19.00    1.95
                2.00    1.19 |  8.00    2.16 | 14.00    5.19 | 20.00    1.95
                3.00    1.41 |  9.00    2.92 | 15.00    3.24 | 21.00    1.30
                4.00    1.41 | 10.00    3.68 | 16.00    3.24 | 22.00    1.30
                5.00    1.73 | 11.00    5.84 | 17.00    1.95 | 23.00    1.30
```

```
                6.00    1.73 | 12.00   46.27 | 18.00    1.95 | 24.00    1.30

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

*                   Post-Dev: Calibrate Catchment 200
--------------------
| CALIB            |
| STANDHYD  (0001) |   Area    (ha)=   1.79
|ID= 2 DT= 5.0 min |   Total Imp(%)=  29.00   Dir. Conn.(%)=  24.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .52         1.27
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       4.00         4.00
     Length            (m)=     109.20       109.20
     Mannings n           =       .013         .250

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

                              IMPERVIOUS    PERVIOUS (i)
     Max.eff.Inten.(mm/hr)=      46.27        26.39
               over (min)        10.00        20.00
     Storage Coeff.  (min)=       2.42 (ii)   20.26 (ii)
     Unit Hyd. Tpeak (min)=       5.00        25.00
     Unit Hyd. peak  (cms)=        .30          .05
                                                        *TOTALS*
     PEAK FLOW       (cms)=        .06          .07           .13 (iii)
     TIME TO PEAK    (hrs)=      11.67        12.17         12.08
     RUNOFF VOLUME    (mm)=     106.03        46.22         60.51
     TOTAL RAINFALL   (mm)=     108.14       108.14        108.14
     RUNOFF COEFFICIENT   =        .98          .43           .56

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

       (i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
            CN*  =  65.0    Ia = Dep. Storage  (Above)
      (ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
*                   Post-Dev: Calibrate Catchment 201
--------------------
| CALIB            |
| STANDHYD  (0001) |   Area    (ha)=   2.38
|ID= 3 DT= 5.0 min |   Total Imp(%)=  45.00   Dir. Conn.(%)=  40.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.07         1.31
     Dep. Storage     (mm)=       2.00         5.00
```

Average Slope	(%)=	4.00	4.00	
Length	(m)=	126.00	126.00	
Mannings n	=	.013	.250	
Max.eff.Inten.(mm/hr)	=	46.27	27.79	
over	(min)	10.00	20.00	
Storage Coeff.	(min)=	2.64 (ii)	21.68 (ii)	
Unit Hyd. Tpeak	(min)=	5.00	25.00	
Unit Hyd. peak	(cms)=	.29	.05	
				TOTALS
PEAK FLOW	(cms)=	.12	.08	.20 (iii)
TIME TO PEAK	(hrs)=	11.75	12.17	12.08
RUNOFF VOLUME	(mm)=	106.03	47.79	71.04
TOTAL RAINFALL	(mm)=	108.14	108.14	108.14
RUNOFF COEFFICIENT	=	.98	.44	.66

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

(i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
CN* = 65.9 Ia = Dep. Storage (Above)
(ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

****

* 90th % Event

****

READ STORM	Filename: 27Chcago.stm
Ptotal= 27.00 mm	Comments: 4 Hr Chicago 27mm

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.08	1.87	1.08	7.67	2.08	4.98	3.08	2.46
.17	1.98	1.17	11.55	2.17	4.55	3.17	2.37
.25	2.10	1.25	25.39	2.25	4.19	3.25	2.29
.33	2.24	1.33	74.37	2.33	3.90	3.33	2.20
.42	2.41	1.42	32.29	2.42	3.65	3.42	2.13
.50	2.60	1.50	18.50	2.50	3.43	3.50	2.06
.58	2.85	1.58	13.01	2.58	3.24	3.58	2.01
.67	3.15	1.67	10.10	2.67	3.07	3.67	1.94
.75	3.54	1.75	8.29	2.75	2.92	3.75	1.89
.83	4.04	1.83	7.07	2.83	2.79	3.83	1.84
.92	4.76	1.92	6.19	2.92	2.67	3.92	1.79
1.00	5.84	2.00	5.51	3.00	2.56	4.00	1.75

```
*                   Post-Dev: Calibrate Catchment 200
--------------------
| CALIB            |
| STANDHYD  (0001) |   Area    (ha)=   1.79
|ID= 2 DT= 5.0 min |   Total Imp(%)=  29.00   Dir. Conn.(%)=  24.00
--------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=         .52          1.27
     Dep. Storage     (mm)=        2.00          5.00
     Average Slope     (%)=        4.00          4.00
     Length            (m)=      109.20        109.20
     Mannings n             =      .013          .250

     Max.eff.Inten.(mm/hr)=       53.33          2.73
               over (min)         10.00         45.00
     Storage Coeff.  (min)=        2.28 (ii)    46.53 (ii)
     Unit Hyd. Tpeak (min)=        5.00         50.00
     Unit Hyd. peak  (cms)=         .30           .02
                                                          *TOTALS*
     PEAK FLOW       (cms)=         .08           .01          .08 (iii)
     TIME TO PEAK    (hrs)=        1.42          2.42         1.42
     RUNOFF VOLUME    (mm)=       25.00          3.32         8.37
     TOTAL RAINFALL   (mm)=       27.00         27.00        27.00
     RUNOFF COEFFICIENT   =         .93           .12          .31

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

       (i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
            CN*  =  65.0    Ia = Dep. Storage  (Above)
      (ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
*                   Post-Dev: Calibrate Catchment 201
--------------------
| CALIB            |
| STANDHYD  (0001) |   Area    (ha)=   2.38
|ID= 3 DT= 5.0 min |   Total Imp(%)=  45.00   Dir. Conn.(%)=  40.00
--------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=         1.07          1.31
     Dep. Storage     (mm)=        2.00          5.00
     Average Slope     (%)=        4.00          4.00
     Length            (m)=      126.00        126.00
     Mannings n             =      .013          .250

     Max.eff.Inten.(mm/hr)=       53.33          2.78
               over (min)         10.00         50.00
     Storage Coeff.  (min)=        2.49 (ii)    50.31 (ii)
```

```
     Unit Hyd. Tpeak (min)=       5.00        55.00
     Unit Hyd. peak  (cms)=        .29          .02
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .18          .01           .18 (iii)
     TIME TO PEAK    (hrs)=       1.42         2.50          1.42
     RUNOFF VOLUME    (mm)=      25.00         3.52         11.99
     TOTAL RAINFALL   (mm)=      27.00        27.00         27.00
     RUNOFF COEFFICIENT   =        .93          .13           .44

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

       (i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
            CN*  =  65.9    Ia = Dep. Storage  (Above)
      (ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
********************************************************************************
*                    Regulatory Timmins Event
********************************************************************************

--------------------
|    READ STORM    |    Filename: Timmins.stm
| Ptotal=193.00 mm |    Comments: *12 HOUR - Timmins STORM
--------------------
                TIME     RAIN |  TIME     RAIN |  TIME     RAIN |  TIME     RAIN
                 hrs    mm/hr |   hrs    mm/hr |   hrs    mm/hr |   hrs    mm/hr
                1.00    15.00 |  4.00     3.00 |  7.00    43.00 | 10.00    13.00
                2.00    20.00 |  5.00     5.00 |  8.00    20.00 | 11.00    13.00
                3.00    10.00 |  6.00    20.00 |  9.00    23.00 | 12.00     8.00

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

*                    Post-Dev: Calibrate Catchment 200
--------------------
| CALIB            |
| STANDHYD  (0001) |   Area    (ha)=   1.79
|ID= 2 DT= 5.0 min |   Total Imp(%)=  29.00   Dir. Conn.(%)=  24.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .52          1.27
     Dep. Storage     (mm)=       2.00          5.00
     Average Slope     (%)=       4.00          4.00
     Length            (m)=     109.20        109.20
     Mannings n           =       .013          .250

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

                              IMPERVIOUS    PERVIOUS (i)
```

```
     Max.eff.Inten.(mm/hr)=      43.00        32.05
                over (min)       10.00        20.00
     Storage Coeff.  (min)=       2.49 (ii)   19.00 (ii)
     Unit Hyd. Tpeak (min)=       5.00        20.00
     Unit Hyd. peak  (cms)=        .29          .06
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .05          .10           .15 (iii)
     TIME TO PEAK    (hrs)=       6.67         7.08          7.08
     RUNOFF VOLUME    (mm)=     190.33       111.65        130.47
     TOTAL RAINFALL   (mm)=     193.00       193.00        193.00
     RUNOFF COEFFICIENT   =        .99          .58           .68

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

       (i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
            CN*  =  65.0    Ia = Dep. Storage  (Above)
      (ii) COMPUTATIONAL TIME STEP SHOULD BE SMALL OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
*                   Post-Dev: Calibrate Catchment 201
--------------------
| CALIB            |
| STANDHYD  (0001) |   Area    (ha)=   2.38
|ID= 3 DT= 5.0 min |   Total Imp(%)=  45.00   Dir. Conn.(%)=  40.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.07         1.31
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       4.00         4.00
     Length            (m)=     126.00       126.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      43.00        33.41
                over (min)       10.00        20.00
     Storage Coeff.  (min)=       2.71 (ii)   20.41 (ii)
     Unit Hyd. Tpeak (min)=       5.00        25.00
     Unit Hyd. peak  (cms)=        .29          .05
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .11          .11           .22 (iii)
     TIME TO PEAK    (hrs)=       6.75         7.17          7.08
     RUNOFF VOLUME    (mm)=     190.33       114.36        144.70
     TOTAL RAINFALL   (mm)=     193.00       193.00        193.00
     RUNOFF COEFFICIENT   =        .99          .59           .75

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

       (i) CN PROCEDURE SELECTED FOR RAINFALL LOSSES:
            CN*  =  65.9    Ia = Dep. Storage  (Above)
```

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

FINISH

==========

APPENDIX E

OGS Unit Sizing Calculations

ECHELON ENVIRONMENTAL

rainwater MANAGEMENT

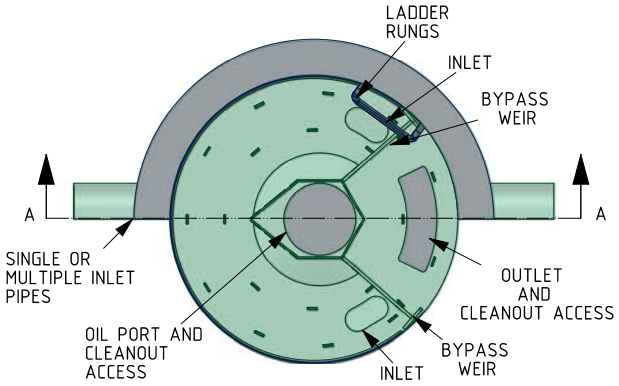
ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION
BASED ON THE RATIONAL RAINFALL METHOD
BASED ON ETV PARTICLE SIZE

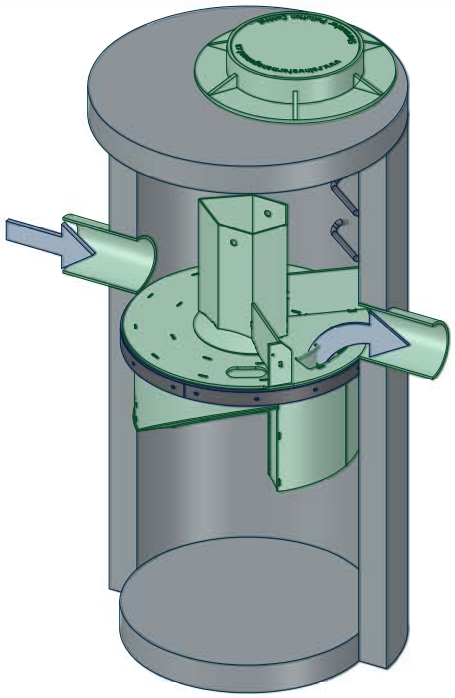
Area:	1.790	ha	**Project:**	Rosco Avenue
Runoff C:	0.37		**OGS Site ID:**	West Unit
RWM Model:	RWM DM 1200 OS		**Location:**	Campbellford, ON
Manhole Dia.	1220	mm	**Engineer:**	Jewell Engineering
			Contact:	Duncan Burgess

Rainfall Intensity[1] (mm/hr)	Percent Rainfall Volume[1]	Cumulative Rainfall Volume	Total Flowrate (l/s)	Surface Loading Rate (L/min/m^2)	Removal Efficiency[2] (%)	Incremental Removal (%)
0.5	9.5%	9.5%	0.9	47	76.0	7.2
1.0	10.4%	19.9%	1.8	95	73.5	7.6
1.5	8.9%	28.8%	2.8	142	71.1	6.4
2.0	8.1%	36.9%	3.7	189	68.7	5.6
2.5	7.3%	44.2%	4.6	236	66.4	4.8
3.0	5.6%	49.9%	5.5	284	64.3	3.6
3.5	5.1%	55.0%	6.4	331	62.1	3.2
4.0	4.1%	59.0%	7.4	378	59.9	2.4
4.5	3.2%	62.2%	8.3	425	58.8	1.9
5.0	3.3%	65.5%	9.2	473	58.5	1.9
6.0	6.4%	71.9%	11.0	567	58.0	3.7
7.0	4.7%	76.6%	12.9	662	56.8	2.7
8.0	4.1%	80.7%	14.7	756	55.3	2.3
9.0	2.8%	83.5%	16.6	851	53.8	1.5
10.0	2.0%	85.5%	18.4	945	52.4	1.1
15.0	7.3%	92.8%	27.6	1418	45.7	3.3
20.0	3.7%	96.5%	36.8	1891	39.2	1.5
25.0	2.5%	99.1%	46.0	2364	32.7	0.8
30.0	0.2%	99.3%	55.2	2836	26.2	0.0
35.0	0.5%	99.7%	64.4	3309	19.7	0.1
40.0	0.3%	100.0%	73.6	3782	13.2	0.0
45.0	0.0%	100.0%	82.9	4255	6.7	0.0
50.0	0.0%	100.0%	92.1	4727	0.2	0.0
					Predicted Net Annual Load Removal Efficiency =	**61.7%**
					Annual Runoff Treated =	**94.2%**

1 - Based on 32 years of hourly rainfall data from Canadian Station 6166418, Peterborough ON

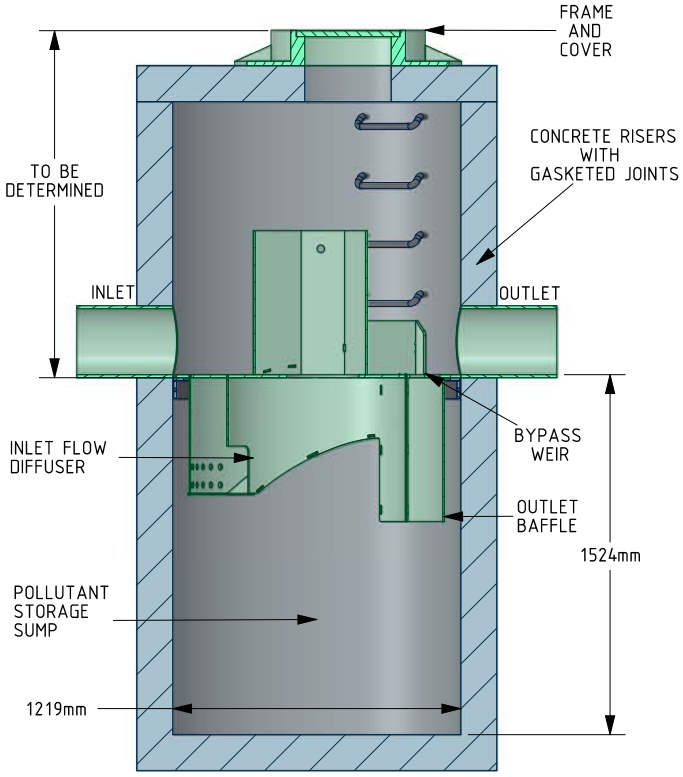
2- Removal Efficiency based on constant sediment influent concentration at all flow rates





TYPICAL DRAWING NOT FOR CONSTRUCTION

SCALE 1:36



SECTION A-A

DESIGN NOTES

1. INLET AND OUTLET PIPE CAN BE UP TO 90 DEGREES APART DEPENDING ON PIPE AND MANHOLE SIZE. IF IN DOUBT, PLEASE CONTACT ECHELON.
2. THE RWM DM-OS UNIT CAN HANDLE MULTIPLE INLET PIPES AS WELL AS A TOP INLET.

GENERAL NOTES

1. ECHELON TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE.
2. ALL DIMENSIONS ARE SHOWN IN MILLIMETERS.
3. FOR FABRICATION DRAWINGS WITH DETAILED STRUCTURE DIMENSIONS AND WEIGHTS, CONTACT ECHELON. www.echelonenvironmental.ca
4. RWM WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING.
5. STRUCTURE AND CASTINGS SHALL MEET REQUIRED LOAD RATINGS, ASSUMING GROUNDWATER ELEVATION AT, OR BELOW THE OUTLET PIPE INVERT ELEVATION. ENGINEER OF RECORD TO CONFIRM ACTUAL GROUNDWATER ELEVATION.
6. MANHOLE MANUFACTURED TO LOCAL SPECIFICATIONS.

INSTALLATION NOTES

1. ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY THE ENGINEER OF RECORD.
2. CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE MANHOLE STRUCTURE (LIFTING DEVICES NOT PROVIDED). HEAVIEST LIFT DEPENDS ON RISER HEIGHTS.
3. CONTRACTOR TO ADD GASKETS OR JOINT SEALANT BETWEEN ALL STRUCTURE SECTIONS, AND ASSEMBLE STRUCTURE AS REQUIRED.
4. CONTRACTOR TO PROVIDE, INSTALL, AND GROUT PIPES, MATCH PIPE INVERTS WITH ELEVATIONS SHOWN.
5. CONTRACTOR TO TAKE APPROPRIATE MEASURES TO ASSURE UNIT IS WATER TIGHT. IT IS SUGGESTED THAT ALL JOINTS BELOW PIPE INVERTS ARE GROUTED.

ECHELON ENVIRONMENTAL
www.echelonenvironmental.ca
905-948-0000

FILE		MODEL			
ECHELON-DM-1200-OS-TYPICAL - REV1		RWM-DM-1200-OS			
JOB / IDENTIFIER		REV	CREATOR	APPROVED	SHEET
DM-OS		01	AG		1 of 1
MATERIAL	THICKNESS	SCALE	CREATED	LAST SAVED	
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ECHELON ENVIRONMENTAL

rainwater MANAGEMENT

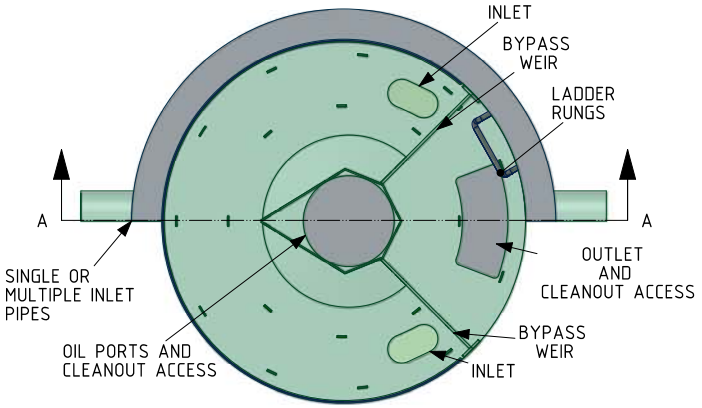
ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION
BASED ON THE RATIONAL RAINFALL METHOD
BASED ON FINE PARTICLE SIZE

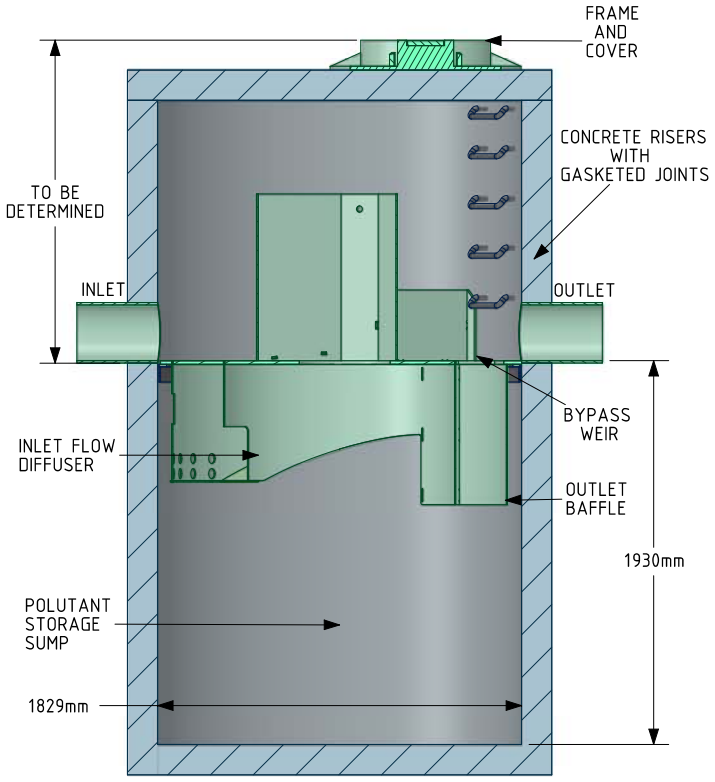
Area:	2.380	ha	**Project:**	Rosco Avenue
Runoff C:	0.50		**OGS Site ID:**	East Unit
RWM Model:	RWM DM 1800 OS		**Location:**	Campbellford, ON
Manhole Dia.	1829	mm	**Engineer:**	Jewell Engineering
			Contact:	Duncan Burgess

Rainfall Intensity[1] (mm/hr)	Percent Rainfall Volume[1]	Cumulative Rainfall Volume	Total Flowrate (l/s)	Surface Loading Rate (L/min/m^2)	Removal Efficiency[2] (%)	Incremental Removal (%)
0.5	9.5%	9.5%	1.7	38	76.4	7.3
1.0	10.4%	19.9%	3.3	76	91.8	9.5
1.5	8.9%	28.8%	5.0	113	90.2	8.1
2.0	8.1%	36.9%	6.6	151	89.2	7.3
2.5	7.3%	44.2%	8.3	189	88.3	6.4
3.0	5.6%	49.9%	9.9	227	87.7	4.9
3.5	5.1%	55.0%	11.6	265	87.4	4.5
4.0	4.1%	59.0%	13.2	302	87.0	3.5
4.5	3.2%	62.2%	14.9	340	86.6	2.8
5.0	3.3%	65.5%	16.5	378	86.2	2.8
6.0	6.4%	71.9%	19.8	454	85.2	5.4
7.0	4.7%	76.6%	23.2	529	84.1	3.9
8.0	4.1%	80.7%	26.5	605	82.9	3.4
9.0	2.8%	83.5%	29.8	680	81.8	2.3
10.0	2.0%	85.5%	33.1	756	80.7	1.6
15.0	7.3%	92.8%	49.6	1134	73.7	5.4
20.0	3.7%	96.5%	66.2	1512	64.2	2.4
25.0	2.5%	99.1%	82.7	1890	54.8	1.4
30.0	0.2%	99.3%	99.2	2268	45.3	0.1
35.0	0.5%	99.7%	115.8	2646	35.9	0.2
40.0	0.3%	100.0%	132.3	3023	26.4	0.1
45.0	0.0%	100.0%	148.9	3401	17.0	0.0
50.0	0.0%	100.0%	165.4	3779	7.5	0.0
					Predicted Net Annual Load Removal Efficiency =	**83.3%**
					Annual Runoff Treated =	**99.3%**

1 - Based on 32 years of hourly rainfall data from Canadian Station 6166418, Peterborough ON

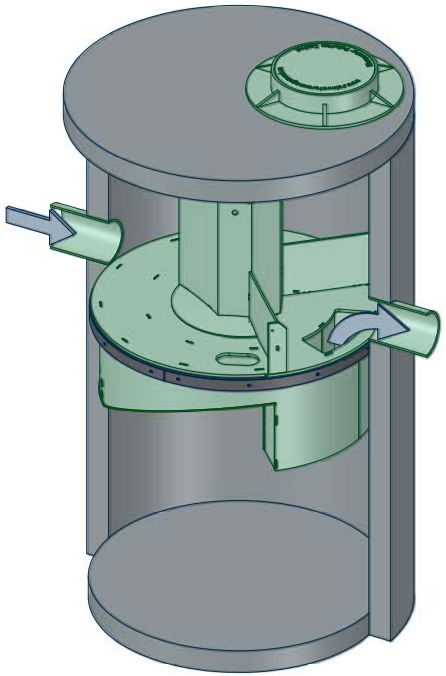
2- Removal Efficiency based on constant sediment influent concentration at all flow rates





SECTION A-A

TYPICAL DRAWING NOT FOR CONSTRUCTION



SCALE 1:46

DESIGN NOTES

1. INLET AND OUTLET PIPE CAN BE UP TO 90 DEGREES APART DEPENDING ON PIPE AND MANHOLE SIZE. IF IN DOUBT, PLEASE CONTACT ECHELON.
2. THE RWM DM-OS UNIT CAN HANDLE MULTIPLE INLET PIPES AS WELL AS A TOP INLET.

GENERAL NOTES

1. ECHELON TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE.
2. ALL DIMENSIONS ARE SHOWN IN MILLIMETERS.
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ECHELON ENVIRONMENTAL
www.echelonenvironmental.ca
905-948-0000

FILE		MODEL			
ECHELON-DM-1800-OS-TYPICAL - REV1		RWM-DM-1800-OS			
JOB / IDENTIFIER		REV	CREATOR	APPROVED	SHEET
DM-OS		01	AG		1 of 1
MATERIAL	THICKNESS	SCALE	CREATED	LAST SAVED	
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ECHELON ENVIRONMENTAL

ANNUAL SEDIMENT LOADING VOLUME ESTIMATE

Project Name:	Rosco Avenue	**Engineer:**	Jewell Engineering
Location:	Campbellford, ON	**Contact:**	Duncan Burgess
OGS ID:	West Unit	**Report Date:**	12-Aug-26

Area:	1.79	ha	**OGS Model:**	RWM DM 1200 OS	
C-Value:	0.37		**Sediment Capacity:**	1067	
Rainfall Station:	Peterborough, ON		**Estimated Cleanout Frequency:**	5	Years

Assumptions

Average Annual Precipitation	712.5	mm	
Event Mean Concentration	120	mg/L	(Average)
Estimated Sediment Density	1.6	kg/L	
Grit Capture Efficiency	60	%	

Annual Grit Accumualtion Estimation for Rosco Avenue

Runoff Volume =	Area x Rainfall Depth x Runoff Coefficient =	4719	m^3
Sediment Collected =	Grit Concentration x Runoff Volume x Grit Capture Efficiency =	340	kg
Annual Sediment Volume =	Mass / Apparent Density =	212	L

ECHELON ENVIRONMENTAL

ANNUAL SEDIMENT LOADING VOLUME ESTIMATE

Project Name:	Rosco Avenue	**Engineer:**	Jewell Engineering
Location:	Campbellford, ON	**Contact:**	Duncan Burgess
OGS ID:	East Unit	**Report Date:**	12-Aug-26

Area:	2.38	ha	**OGS Model:**	RWM DM 1800 OS	
C-Value:	0.50		**Sediment Capacity:**	2780	
Rainfall Station:	Peterborough, ON		**Estimated Cleanout Frequency:**	5	Years

Assumptions

Average Annual Precipitation	712.5	mm	
Event Mean Concentration	120	mg/L	(Average)
Estimated Sediment Density	1.6	kg/L	
Grit Capture Efficiency	80	%	

Annual Grit Accumualtion Estimation for Rosco Avenue

Runoff Volume =	Area x Rainfall Depth x Runoff Coefficient =	8479	m^3
Sediment Collected =	Grit Concentration x Runoff Volume x Grit Capture Efficiency =	814	kg
Annual Sediment Volume =	Mass / Apparent Density =	509	L

APPENDIX F

OGS Unit Operations & Maintenance Manual

rainwater MANAGEMENT

RWM-DM[1] AND DM[1]-OS TECHNICAL AND OPERATION MANUAL

Made In:

Canada

Represented in Ontario by:

ECHELON ENVIRONMENTAL

Contact: p: 905-948-1000 I e: info@echelonenvironmental.ca

Website: https://echelonenvironmental.ca/

Overview

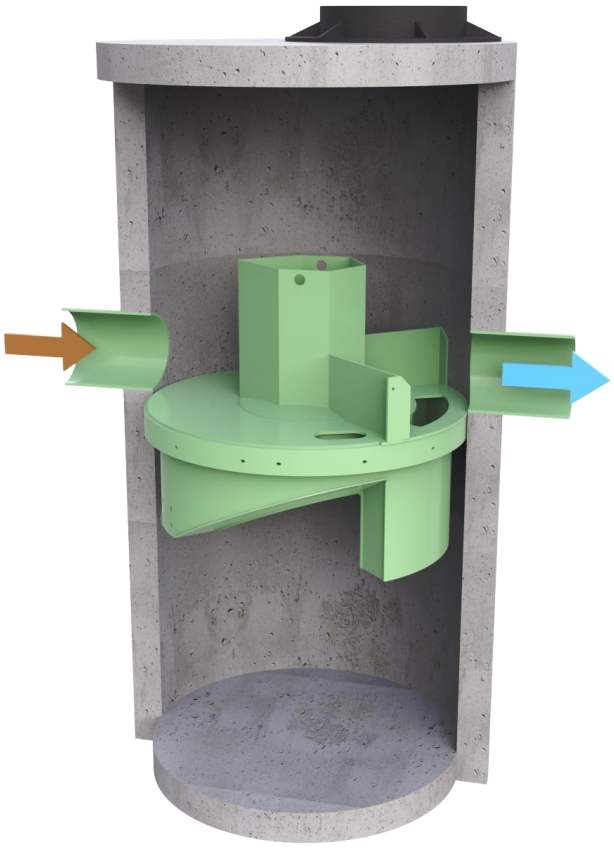
The Rainwater Management RWM-DM[1] Stormwater Treatment System is a hydrodynamic oil/grit separator (OGS) that provides a unique flow path inside the treatment chamber that effectively promotes gravity settling to remove solids from stormwater runoff. The RWM-DM[1] is also very effective in removing and retaining other pollutants such as free oil and other particulate material like nutrients and metals either attached to sediment or heavy enough to settle in the removal process.

The RWM-DM[1] utilizes an internal bypass that directs the treatment flows into the treatment/storage chamber and bypasses the peak events without scouring previously captured pollutants. The RWM-DM[1] can be installed in an inline configuration knowing that the scour prevention technology is second to none.

This RWM-DM[1] is quite versatile in that it can be installed as a bend structure, can accommodate multiple inlets and/or a top inlet (grated lid), and does not require an elevation difference between the inlet and outlet pipes. Rainwater Management is innovative in that we can create custom designs for almost any application that you may have. Contact us with your configuration requirements.

The RWM-DM[1] unit has been fully third-party tested by an ETV-approved laboratory and is listed on the ETV Canada verified technologies list.

How It Works



Water enters the upper inlet chamber of the RWM-DM[1] OGS where it is split by a deflector to minimize turbulence. This maximizes the effective flowpath and efficiently directs the flow to the 2 inlet openings.

It is at the weirs that the water enters the treatment chamber on either side of the center access cylinder directed via chutes designed to enhance the settling of sediment. A vortex is formed at each inlet opening so that any floatabe oil or trash will get drawn down into the treatment chamber where it will float to the underside of the sealed disk. Oil and floatables are stored out of the flow path and will be retained for removal by a vacuum truck.

The design of the system creates a longer flow path and a quiescent zone to maximize settling of pollutants inside the sump. Water then flows up the outlet duct and out the outlet pipe, leaving behind any captured sediment, oil, and trash.

During higher intensity events, the incoming water begins to overflow the internal bypass weirs which allows the unit to continue treating the design flow (which will continue to remove any bedload of heavier pollutants that flow in the bottom of the pipe) while bypassing the additional flows. As the scour testing results show, there is virtually no scour of previously trapped pollutants ensuring retention of previously capture pollutants.

RWM-DM[1] and DM[1]-OS Details

RWM Model	Inside Diameter (mm)	Sump Depth Below Outlet Invert (mm)	Minimum Rim-Invert Distance[1] (mm)	Total Liquid Volume[2] (litres)	ETV Sediment Depth[3] (mm)	Oil Storage Capacity[4] (litres)
DM[1]-900/ DM[1]-900-OS	914	1118	600	867	550	140
DM[1]-1050/ DM[1]-1050-OS	1066	1270	600	1270	610	220
DM[1]-1200/ DM[1]-1200-OS	1219	1520	610	2134	750	270
DM[1]-1500/ DM[1]-1500-OS	1524	1829	750	3738	900	560
DM[1]-1800/ DM[1]-1800-OS	1829	2108	850	5828	1000	950
DM[1]-2100/ DM[1]-2100-OS	2134	2540	950	8755	1200	1570
DM[1]-2400/ DM[1]-2400-OS	2438	2794	1050	12275	1300	2293
DM[1]-3050/ DM[1]-3050-OS	3048	3505	1200	24212	1700	4520
DM[1]-3660/ DM[1]-3660-OS	3658	4013	1350	39277	1900	7800

1. This distance is dependent upon many factors. Contact Echelon Environmental with your project details so we can provide a minimum distance based on your specific project.
2. This volume is the total volume below invert. This can be increased if needed.
3. This capacity is based on ETV approved testing.
4. This capacity is from the bottom of the outlet baffle to the underside of the bypass chamber. This can be increased if needed. Dry weather spill volume.
5. Contact Echelon Environmental if you would like a design report and/or to utilize a coarser particle size or alternative testing criteria. Either of these cases could result in a downsized unit to meet local requirements.

RWM-DM[1] and DM[1]-OS Design

The RWM-DM[1] and RWM-DM[1]-OS are sized depending on the Federal, Provincial, or Municipal requirements. The ETV particle size removal is derived from Verified third-party lab testing based om the Canadian Environmental Technology Verification Programs Procedure for Laboratory Testing of Oil-Grit Separators utilizing the following specific site parameters:

- Drainage area
- Local rainfall data
- Site imperviousness
- Scour protection for high flows
- Onsite flow control for runoff
- Oil spill requirements
- Sediment storage capacity
- ETV particle size distribution Capture
- Third party testing at ETV approved laboratory
- ETV verification (pending)

Many areas within Canada have different requirements for sizing OGS units and interpretations of how they want details applied. Contact Rainwater Management for design assistance or visit our website.

Application

The RWM-DM[1] and DM[1]-OS units are suited to any commercial, residential, or industrial application where pollution removal and retention is required. The units are normally deployed in concrete manhole below ground but they can be configured for above ground use in Stainless Steel, Fiberglass or HDPE tanks. The RWM-DM[1] testing shows that the capture pollutants will be removed and stored in the manhole without allowing any to be released during peak events. Scour testing showed virtually 100% retention of captured pollutants over all flows. For sites where oil spill capture and greater than 99% retention is needed the RWM-DM[1]-OS unit should be utilized. The RWM-DM[1] also captures oil but the RWM-DM[1]-OS has been specifically designed for oil spill capture and retention even during peak events.

Canadian ETV - ISO 14034 Information

Particle Size Distribution

The ISO 14034 (Canadian ETV) Particle Size Distribution that is utilized for testing all OGS units is shown below. This is the particle size distribution utilized in whole or in part for this sizing.

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

Scour Testing

RWM-DM[1] and RWM-DM[1]-OS units have an internal bypass that directs the treatment flows into the treatment/storage chamber and bypasses the peak events without scouring previously capture pollutants. This has been third-party verified during the Canadian ETV testing. The RWM-DM[1] OGS units can be installed in an inline configuration knowing that the scour prevention technology is second to none.

Oil Retention

The RWM DM[1]-OS unit effectively achieved almost 100 % oil retention for all flows during the third-party testing of the Light Liquid Retention Simulation Test Protocol.

Installation

The RWM-DM[1] internals will arrive onsite pre-installed in the manhole. Ensure that you have the shop drawings for your specific project to ensure proper installation orientation and depth. The design allows for the inlet and outlet inverts to be the same elevation but there are variances allowed that must be confirmed during the design phase. The installation of the manhole must follow the recommendations of the specifying engineer as well as all local, provincial and federal requirements in terms of supporting soil, backfill and anti-floatation requirements. The inlet/outlet pipe installation into the manholes must also follow the recommendations of the specifying engineer as well as the local requirements. The required opening types (gasketed, pipe stub, rough opening, cored opening) will be provided by Echelon Environmental as specified during the order process. All local, provincial and federal safety procedures for manhole installation must be followed.

Inspection

The most important part of the inspection and maintenance is that all local, Provincial, Federal and OSHA health and safety requirements are followed. Under no circumstance should there be entry into the units without the proper procedures in place.

Inspection of the RWM-DM[1] units is conducted from the surface and does not require entry into the manhole. We provide easy access for the vacuum hose through the outlet opening in the bypass disk to check for sediment depth. Oil storage can be checked through the center opening. Visual inspection of the internal components is also necessary to ensure nothing is damaged or blocked.

Maintenance

Maintenance is completed with a vacuum truck from the surface and also does not require entry into the manhole. The sediment in the lower treatment chamber can be removed with a vacuum truck through either the outlet opening or through the center access. If there is oil present, the typical procedure is to remove the oil from the water surface through the center access opening and dispose of it according to local regulations.

ETV Depth of Sediment for Maintenance	
Model	Depth (mm)
DM[1]-900/ DM[1]-900-OS	550
DM[1]-1050/ DM[1]-1050-OS	600
DM[1]-1200/ DM[1]-1200-OS	750
DM[1]-1500/ DM[1]-1500-OS	900
DM[1]-1800/ DM[1]-1800-OS	1000
DM[1]-2100/ DM[1]-2100-OS	1200
DM[1]-2400/ DM[1]-2400-OS	1300
DM[1]-3000/ DM[1]-3000-OS	1700
DM[1]-3600/ DM[1]-3600-OS	1900

Note that maintenance frequency is dependent on the site conditions. For example, units installed before construction is completed will require more frequent cleanout than post-construction. It is recommended that the unit is inspected every six months post-install while observing the site conditions and changes to site conditions to determine the proper maintenance frequency. The cost of maintenance, cleanout, and disposal is also dependent on the location and requirements.

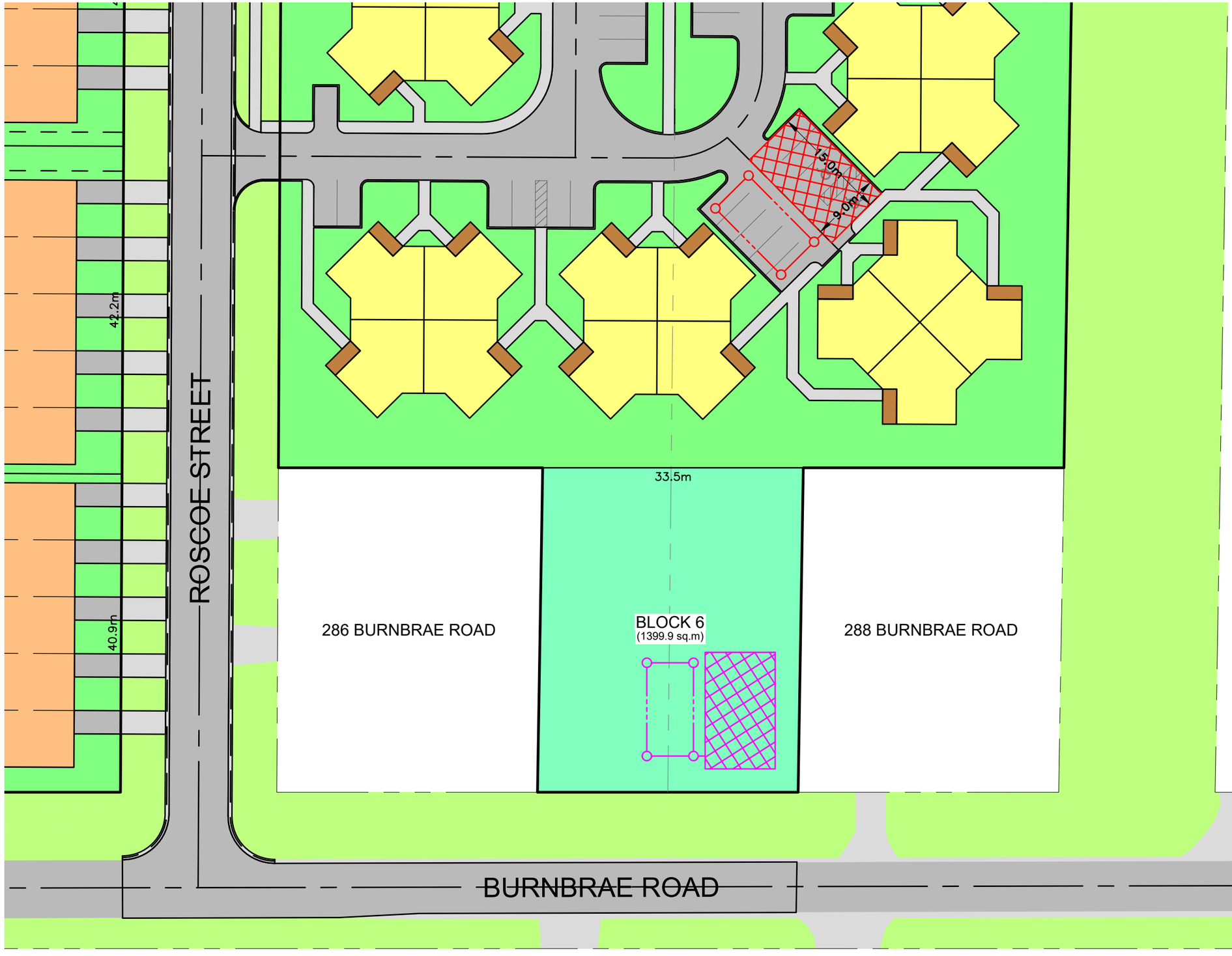
The RWM-DM[1]-OS system is recommended for areas where the possibility of a hydrocarbon spill may occur. Please also refer to the Echelon Environmental Coalescing Plate Oil Water separators where 15 mg/l or lower oil effluent discharge is required. It is recommended that if hydrocarbons are present during inspection that they are removed immediately. The RWM-DM[1]-OS system in the ETV light liquid test shows greater than 99% retention but it is still recommended to remove any captured oil immediately. Contact Echelon Environmental if you want to add oil sensing alarms.

Disposal of all captured pollutants needs to conform to all local, provincial and federal disposal guidelines. For any modifications to the existing design where additional pollutant capacity or any other modification is desired contact RWM with your requirements.

APPENDIX G

Quantity Control System Layouts

08/17/2026



GENERAL NOTES:

- ALL INFORMATION TO BE VERIFIED ON SITE PRIOR TO COMMENCING ANY WORK. ANY DISCREPANCIES ARE TO BE REPORTED TO THE CONSULTANT IMMEDIATELY.
- ALL UTILITY LOCATIONS SHOWN ON THE DRAWINGS ARE APPROXIMATE. THE CONTRACTOR SHALL CONFIRM THE LOCATION ON SITE AND ASSUME ALL LIABILITY FOR DAMAGE TO ALL UTILITIES.
- EXCLUDING THE BENCHMARK AND DESCRIPTION PROVIDED FOR THIS PROJECT, NO OTHER ELEVATIONS ARE TO BE USED AS A REFERENCE ELEVATION FOR ANY PURPOSE.

METRIC NOTE:

- ALL DIMENSIONS SHOWN ARE IN METRES OR MILLIMETRES, UNLESS OTHERWISE NOTED.

GEOMETRIC NOTE:

- ALL SURVEY DATA SHOWN ON THIS DRAWING WAS RECORDED USING REAL-TIME KINETIC (RTK) GPS OBSERVATIONS IN REFERENCE TO UTM 18 NORTH COORDINATE SYSTEM.
- ALL ELEVATIONS ARE IN REFERENCE TO LOCAL DATUM NAD83 - GEODETIC MODEL HT2_0, UNLESS DESCRIBED OTHERWISE.

** DRAWINGS ARE NOT TO BE SCALED **

REVISIONS

NO.	DATE	DESCRIPTION	BY

LEGEND

OPTION A
STORAGE
OGS & SEWER

OPTION B
STORAGE
OGS & SEWER

N W E S

JEWELL ENGINEERING

ROSCOE STREET
McDONALD HOMES

TOWN OF CAMPBELLFORD

SWM FACILITY OPTIONS

DRAWN BY: JH	PROJECT NO: 6041	
DESIGNED BY: DB	DATE: August 2026	
CHECKED BY: BK	SCALE: HORIZONTAL -1:500 VERTICAL -N/A	
APPROVED BY:	CONTRACT NO:	DRAWING NO: G-1

F:\FTP\PROJECT FILES\MCDONALD, DAVE\CAMPBELLFORD SUBD 260-6041\DRAWINGS\3 SHEETS\6041 - REPORT - SWM FACILITY