DAVENPORT SUBDIVISION

Township of Georgian Bluffs (Sarawak)
Project No. 06-D-3969

FUNCTIONAL PLANNING REPORT

STORMWATER MANAGEMENT COMPONENT

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1.0 INTRODUCTION

The proposed Davenport Subdivision is located on part of Lot 27, Concession III in the geographic township of Sarawak, now in the Township of Georgian Bluffs. The owner is proposing to develop 6.625 hectares of land adjacent to Church Side Road East, and leave the remaining property undeveloped. The proposed development will result in the creation of 29 rural residential lots.

The site is located approximately ten kilometres north of the City of Owen Sound, in the area of East Linton on the west side of Owen Sound. The project site is south of Church Side Road East, east of Grey County Road No.1, and west of Balmy Beach Road. The site is bordered by residential lands on the west, east and south sides. The area north of the project site is still rural agricultural land. The entire project site is well vegetated as either inactive pasture/meadow or wooded areas.

The development of the project site requires a stormwater management plan which addresses the potential impacts of increased surfacewater runoff with consideration given to the quality of that runoff and erosion control. Given the relatively low imperviousness which will be associated with a rural residential development it is preferred to utilize source and conveyance controls to provide the stormwater controls required. Due to the relatively low slopes (0 - 5.0%), source and conveyance controls will be feasible in providing adequate stormwater controls for the project site.

The goal of the stormwater management controls will be to meet the quantity control requirements of the Township of Georgian Bluffs and the Grey Sauble Conservation Authority (GSCA) plus the quality control requirements of GSCA and the Ontario Ministry of the Environment (MOE) 2003 guidelines. Due to the close proximity to Georgian Bay, "Enhanced" water quality treatment will be provided. It is also the intention of the development to control post-development peak flow rates due to the increase in impervious areas to as close to pre-development levels as possible.

2.0 EXISTING CONDITIONS

The existing project site has variable topography with good vegetation cover over the majority of the site. The topography of the site and external associated lands varies from quite flat on the project site to very steep in the east with slopes approaching 30% on the west side of Balmy Beach Road. The existing land use of the project site consists mainly of idle field and meadow with a single detached family dwelling with surrounding manicured lawn and some scrub brush in the center of the site. Runoff from the subdivision and adjacent lands crosses easterly under Balmy Beach Road

through one of two existing culverts. A 800mm diameter corrugated steel pipe (C.S.P.) culvert underneath Balmy Beach Road or a 760mm diameter corrugated steel pipe culvert near the intersection of Balmy Beach Road and Church Side Road East. Both culverts drain into Georgian Bay (Owen Sound), with the 800mm culvert across privately owned lands and the 760mm within the municipal roadway.

Based on the Grey County soil mapping from the Ministry of Agriculture and Food there are two main types of surficial soils present within the study area; Morely Bouldery Clay and Donnybrook Sandy Loam. Morely Bouldery Clay accounts for 100% of the surficial soil within the project site and is considered a poorly drained calcareous stony loam till. This loam soil is classified as type 'C' within the Soil Conservation Service (SCS) hydrologic soil grouping. Donnybrook Sandy Loam is present as surficial soil to the west of the project site, within the watershed area that drains through the site. It is considered a well drained moderately gravelly sand loam and is classified as type 'AB' within the Soil Conservation Service (SCS) hydrologic soil grouping.

Under existing conditions, the project site is considered three watershed areas based on the natural topography of the land determined by contour data (1.0m interval) from Ontario Base Maps, a stormwater management report prepared by Crozier & Associates (April, 2008) for the adjacent property to the south and a topographical survey carried out by M.J. Davenport & Associates plus a visual field inspection. The existing subwatershed areas are illustrated on Pre-Development Subwatershed Areas Drawing No. 3969-SW1.

The existing subwatershed area includes:

Subwatershed Area No. 1 (8.195 hectares) consists of a small area of the north western portion of the project site and additional area west of the site that drains towards the subject property. This subwatershed area is comprised primarily of open meadow with patches of mature trees and several single family detached dwellings and manicured landscaped areas. Under pre-development conditions this area drains mostly as sheet flow towards the roadside ditches running north-south across the subject property.

Subwatershed Area No. 2 (2.313 hectares) consists of an area within the subject property on both the east and west side of the existing driveway. This subwatershed area is comprised primarily of open pasture/meadows with a portion of a small treed area and a single family detached dwelling and manicured landscaped areas. Under pre-development conditions this area drains as sheet flow towards the existing ditches on both the east and west sides of the existing driveway.

Subwatershed Area No. 3 (1.561 hectares) consists of the easterly area within the subject property. This subwatershed area is comprised primarily of open pasture/meadows with a portion of a small treed area and a single family detached dwelling and manicured landscaped areas. Under pre-development conditions this area drains as sheet flow easterly onto adjacent lands.

The parameters used in the Visual Otthymo computer program are shown in Table 1.

Table 1
Existing Subwatershed Area Information

Sub-watershed	Area (ha)	Land use	Slope (%)	Length (m)	C	Time to Peak (hr)	CN*	Ia (mm)
1	8.195	Woods / Meadow	3.0	650	0.376	0.407	67	5.0
2	2.313	Meadow / Lawns	3.0	320	0.446	0.246	75	5.0
3	1.561	Meadow / Lawns	3.0	70	0.393	0.129	75	5.0

The weighted runoff coefficient, 'C' is based upon "Design Chart 1.07: Runoff Coefficients" of the MTO Drainage Management Manual (MTO, 1997). The 'C' value considers the land use and topography plus the hydrologic soil classification or soil texture then is used to calculate "Time to Peak." Figure 3 in Appendix I "Supporting Information" includes the calculation of "time to peak".

Curve Number (CN) is based upon "Design Chart 1.09: Soil/Land Use Curve Numbers" of the MTO Drainage Management Manual (MTO, 1997). The CN value considers the soil type and the Hydrologic condition. The Curve Number (CN*) is the weighted value for the antecede moisture condition of the soil (AMC II). The weighted Curve Number (CN*) is calculated based on the weighted average of the imperviousness of the subwatershed area. For modelling purposes different CN* values are used due to the existence of different quantities of impervious areas within the subwatershed area. An initial abstraction value (Ia) of 5.0mm or less was used. Figure 2 in Appendix I includes the conversion of CN value to CN*.

The Visual OTTHYMO computer program was used to model the surface water runoff from the subject area under existing conditions. Peak flows for varying return periods were computed, and the results are shown in Table 5 on page 10. The detailed Visual OTTHYMO output for the existing conditions is attached in Appendix II.

3.0 POST DEVELOPMENT CONDITIONS

The development will create 29 rural residential lots with three streets constructed as rural road cross sections consistent with standards specified by the Township of Georgian Bluffs. The existing ditching along the proposed Street 'B' will be widened to accommodate the design criteria for enhanced grass swales and an under drained infiltration trench will be installed under the proposed swale to promote infiltration and provide quality control. The current gravel roadway will be paved with hot mix asphalt complete with gravel shoulders. Streets 'A' and 'C' will be constructed as rural road cross sections with complete with under drained infiltration trench beneath the roadside ditches. This configuration will affect all three pre-development watershed areas and will require some minor lot grading in addition to construction of two new roads, roadside ditching and other swales around the property to control stormwater runoff unto adjacent properties.

The proposed subwatershed areas include:

Subwatershed Area No. 1 (4.823 hectares) consists of the area west of the project site that drains towards the site as well the majority of the impervious area and ditching of proposed Street 'A' . This subwatershed area will remain largely unchanged, with the exception being the construction of Street 'A' as a hot mix asphalt road and associated enhanced grass swale ditching. The majority of the ditching for Street 'A' will be directed toward the existing roadside ditch along Church Side Road East. This will divert westerly flowing water into the Church Side Road East roadside ditch after passing through the enhanced grass swale ditching of Street 'A', instead of flowing across the subject property. All area west of the subject property is assumed to remain unchanged. The low impervious area of this subwatershed allows the use of the NasHYD command in the Visual OTTHYMO model.

Subwatershed Area No. 2 (1.396 hectares) consists of the area west of the subject property, but east of proposed Street 'A' and is identified as the Greig property on the design drawings. This subwatershed area will remain largely unchanged, with the exception being the extension of the existing grassed swale that runs along the border of the project site and the Greig lands. This grassed swale will divert stormwater flowing westerly from the Greig property into the Church Side Road East ditch directly, rather than allowing it to flow across the subject property as it does under pre-development conditions. The proposed extension of the swale will be constructed as a enhanced grass swale without a proposed under drain. The low impervious area of this subwatershed allows the use of the NasHYD command in the Visual OTTHYMO model.

Subwatershed Area No. 3 (3.628 hectares) consists of the majority of the area within the subject property. This area includes half of the area of Street 'B', the entirety of Street 'C' as well as the driveways, rooftop areas and grassed yards of lots 11-29. This subwatershed includes all of the area draining to the west side of the roadside ditch for Street 'B' within the project site. This subwatershed area will be developed into 19 rural residential lots complete with single family detached homes, driveways and manicured lawn areas. Under post-development conditions the frontages of lots 11-29 will now drain into the roadside ditches of Street 'B' and 'C'. The roadside ditches along Street 'B' will be constructed as low slope enhanced grass swales and will outlet into the existing Church Side Road East ditch. The higher impervious area of this subwatershed (28.58%) due to the proposed development allows the use of the StandHYD command in the Visual OTTHYMO model.

Subwatershed Area No. 4 (0.827 hectares) consists of the area within the subject property draining to the east side of the roadside ditch of Street 'B'. This area includes the remaining half of the Street 'B' as well as the driveways and some rooftop areas of lots 1-10. This subwatershed area will be developed into 10 rural residential lots complete with single family detached homes, driveways and manicured lawn areas. Under post-development conditions the frontages of lots 1-10 will now drain into the east side roadside ditch of Street 'B'. The roadside ditches along Street 'B' will be constructed as low slope enhanced grass swales and will outlet into the existing Church Side Road East ditch. The higher impervious area of this subwatershed (32.77%) due to the proposed development allows the use of the StandHYD command in the Visual OTTHYMO model.

Subwatershed Area No. 5 (1.394 hectares) consists of the easterly area within the subject property and includes the majority of the rooftop rainwater discharge and rear yards of lots 1-10. The drainage for this subwatershed area will remain largely unchanged and will be developed into manicured lawn areas and single family dwellings. Under post-development conditions this area drains in the existing direction, easterly as sheet flow into a low slope enhanced grass swale running along the rear lot lines of lots 1-10. This swale will treat and direct stormwater runoff into the existing Church Side Road East ditch. The lower impervious area of this subwatershed allows the use of the NasHYD command in the Visual OTTHYMO model.

All parameters used to model the post-development subwatershed areas in the Visual Otthymo program are shown in Table 2 and 3.

Table 2
Proposed StandHYD Subwatershed Areas Information

Sub-watershed Area	Area (ha)	Imperviousness (%)		Slope (%)		Length (m)		CN*	Ia (mm)
		Total	Connected	Imp.	Perv.	Imp.	Perv.		
3	3.628	29	19	2.0	3.0	155.5	440	86	3.0
4	0.827	33	19	2.0	3.0	74.3	275	88	2.0

Table 3
Proposed NasHYD Subwatershed Area Information

Sub-watershed	Area (ha)	Land use	Slope (%)	Length (m)	C	Time to Peak (hr)	CN*	Ia (mm)
1	4.823	Woods / Meadow	3.0	475	0.369	0.353	66	5.0
2	1.396	Woods / Meadow	2.5	230	0.410	0.240	75	5.0
5	1.394	Lawns	3.0	295	0.441	0.239	84	4.0

Curve Number (CN) is based upon "Design Chart 1.09: Soil/Land Use Curve Numbers" of the MTO Drainage Management Manual (MTO, 1997). The 'CN' value considers the hydrologic soil type of 'AB' and 'C'. The weighted CN values were used to calculate the modified CN values, CN*, for use in the Visual Otthymo modelling. The calculation of the CN* values can be found in Figure 4 of Appendix I.

Peak flows listed in this report were calculated using the Visual Otthymo (version 2.0) computer modeling program. Peak flows were calculated for each of the 2, 5, 10, 25, 50 and 100 year design storms. Calculations include consideration for the 6 hour SCS Type II and Chicago storm distribution and the 1 Hour AES storm distribution. Rainfall data for the site was taken from the Owen Sound gauging station and is included in Appendix I.

4.0 STORMWATER QUALITY AND QUANTITY CONTROL

The project site area requires Enhanced Protection as described in the Ministry of the Environment and Energy's "Stormwater Management Practices Planning and Design Manual, 2003".

Providing quality and quantity control for Streets 'A', 'B' and 'C' along with the rooftop rainwater from the proposed residences and associated driveways (Subwatershed Area No. 3 and No. 4) is critical. Stormwater quality and quantity control will be achieved on this site through source and conveyance controls using a treatment train approach incorporating aspects of low impact development techniques.

The opportunity for rainwater infiltration into the native soils is limited due to the fact that the percolation rate of the native loam till soils range from 3.6 to 36 millimetres per hour according to the hydrogeological report prepared by GHD (July, 2017) for the subject site. In order to promote infiltration and achieve a pre/post development water balance, we are proposing several different low impact development techniques. It is important to note that according to the low impact development stormwater management planning and design guide, low impact development techniques can work in any soil type despite low measured infiltration rates on the subject site.

Surface water runoff from the proposed right-of-way lands will be controlled, treated and conveyed using the roadside ditches constructed as enhanced grassed swales with infiltration under-drains. The proposed enhanced grassed swales will be located on either side of Streets 'A', 'B' and 'C', however, the Street 'C' swales will not be constructed with an under drain due to the higher swale slope which limits infiltration potential.

In order for enhanced grass swales to provide quality control benefits, several design criteria must be met. According to section 4.8 regarding enhanced grass swales from the Low Impact Development Stormwater Management Planning and Design Guide, pg 4-137 to 4-148, stormwater velocity and flow depth need to be minimised during the 25mm quality storm event in order to provide quality control. Due to the possible re-suspension of solids under larger storm events, infiltration is the primary desired treatment mechanism, rather than filtration. The target velocity for stormwater flow during the 4 hour, 25mm Chicago storm event is 0.5 m/s or less in order to allow suspended solids to be captured in the grass and to promote infiltration. Furthermore, flow depth during the 25mm storm should be a maximum of two-thirds of the height of the proposed vegetation. Using un-maintained grass with an approximate height of 150-200mm as the proposed vegetation, that corresponds to a

maximum flow depth of approximately 133mm.

In order to meet these design objectives, the enhanced grass swales have been designed with low longitudinal slopes, in the range of 0.33%-1.0%. The proposed swales have been designed with a trapezoidal shape with a 762mm wide bottom section and maximum 3:1 side slopes in order to encourage pre-treatment as the stormwater enters the swales as sheet flow. Rather than construct permanent rock check dams in the enhanced grass swales, which can make periodic maintenance difficult, the enhanced grass swales have been designed with triple-french under drains. These under drains will capture low flow storm events, promoting infiltration and treatment, while also preventing frequent ponding in the swale due to the low slopes and low permeability soils found on the project site. These under drains will outlet into the existing Church Side Road East roadside ditch in order prevent the underlying soils from becoming constantly saturated. These design factors combined provide a velocity of less than 0.5 m/s and a maximum flow depth of 0.13m or less during the 4 hour, 25mm Chicago quality storm event in the Visual Otthymo model. The resulting flow depth and velocity of stormwater in the various swales proposed on site from the Visual Otthymo model are summarized in Table 4 below.

Table 4
Post Development Enhanced Grass Swale Information

Enhanced Grass Swale (# in VOH Model)	Area (ha)	Channel Length (m)	Channel Slope (%)	25mm Flow Depth (m)	Velocity (m/s)
Street 'A' Roadside Swale (113)	4.823	200.0	0.50	0.08	0.28
West Site/Greig Enhanced Grass Swale (109)	1.396	123.0	0.50	0.03	0.14
Street 'B' Left Roadside Swale (110)	3.628	350.0	0.52	0.12	0.41
Street 'B' Right Roadside Swale (116)	0.827	250.0	0.33	0.06	0.19
East Property Line Swale (111)	1.394	250.0	0.78	0.06	0.29

The under-drain will consist of three six (6) inch diameter perforated "Big O" pipes surrounded by 3/4" washed stone. Taking into account the 40% void ratio in the clear

stone, the volume of water able to contained within the under-drain structure is approximately 0.14 cubic metres per lineal metre of under drain. Street 'A' has been designed with approximately 395.9 lineal metres of under drain between both sides of the road, resulting in a storage volume of 55.43 cubic metres of storage beneath the enhanced grass swale. Street 'B' has been designed with roughly 480 lineal metres of under drain, totaling approximately 67.20 cubic metres of storage within the under drain structure. The water captured within the under-drain will slowly percolate into the underlying native soils in-between storm events, helping to promote groundwater recharge and providing quality control within the development.

In order to reduce the stormwater runoff from rooftop rainwater from the proposed houses, we are proposing that all of the rooftop rain water be directed onto pervious landscaped areas that have a minimum pervious flow path of 5 metres. Known as a downspout disconnection, the pervious area should be graded between one to five percent and an energy dissipater should be placed at the location of the downspout in order to ensure a level spread of flow. Rooftop rainwater is considered clean, and therefore does not require quality control. The downspout disconnect detail can be found on Drawing No. 3969-SW2 prepared by M.J. Davenport & Associates.

We are also proposing to maximize pervious surfaces by planning the subdivision with single detached lots and large grassed lawns. The larger grassed areas on each individual lot will further promote attenuation and re-use of stormwater as well as work in conjunction with the rooftop rainwater leader disconnect feature to attenuate rooftop rainwater before reaching the roadside ditch.

Peak flows listed in this report were calculated using the Visual Otthymo (version 2.0) computer modeling program. Peak flows were calculated for each of the 2, 5, 10, 25, 50 and 100 year design storms. Calculations include consideration for the 1 hour AES, 6 hour Chicago and the 6 hour SCS Type II storm distribution.

The wide range of design storms were utilized in the Visual Otthymo Model to ensure that both peak flows and maximum runoff volumes are incorporated into the stormwater management facility design. Rainfall data for the site was taken from the Owen Sound gauging station and is included in Appendix I.

Table 5 summarizes the 100 year peak flows for the existing condition compared to the proposed uncontrolled condition for all design storms discharging off site.

Table 5 – Existing and Proposed Uncontrolled 100 Year Peak Flows Draining Off-site

Design Storm (yr)	Peak Flows (m^3/s)								
	6 Hour Chicago			6 Hour SCS			1 Hour AES		
	Pre	Post	Diff	Pre	Post	Diff	Pre	Post	Diff
2	0.155	0.247	0.092	0.194	0.309	0.115	0.107	0.208	0.101
5	0.283	0.378	0.095	0.341	0.492	0.151	0.210	0.324	0.114
10	0.402	0.498	0.096	0.455	0.629	0.174	0.293	0.413	0.120
25	0.529	0.666	0.137	0.610	0.824	0.214	0.412	0.538	0.126
50	0.672	0.837	0.165	0.736	0.968	0.232	0.507	0.642	0.135
100	0.774	0.989	0.215	0.867	1.140	0.273	0.611	0.747	0.136

Table 5 indicates that off site flows will increase to a maximum peak flow of 1.140 cubic metres per second during the 100 year, 6 hour SCS Type II storm event under post development conditions. Quantity control measures are required to reduce the post development peak flows to be closer to pre-development levels. To achieve this, conveyance controls incorporating low impact development methods will be employed. The series of proposed enhanced grass swales capturing and conveying flow on site will reduce the peak flow off site when compared to the uncontrolled condition.

The peak flows discharging off-site for the pre-development and post-development controlled condition are summarized in Table 6.

Table 6 – Existing and Proposed 100 Year Peak Flows Draining Off-site

Design Storm (yr)	Peak Flows (m^3/s)								
	6 Hour Chicago			6 Hour SCS			1 Hour AES		
	Pre	Post	Diff	Pre	Post	Diff	Pre	Post	Diff
2	0.155	0.190	0.035	0.194	0.232	0.038	0.107	0.137	0.030
5	0.283	0.343	0.060	0.341	0.404	0.063	0.210	0.248	0.038
10	0.402	0.488	0.086	0.455	0.534	0.079	0.293	0.347	0.054
25	0.529	0.652	0.123	0.610	0.723	0.113	0.412	0.491	0.079
50	0.672	0.819	0.147	0.736	0.861	0.125	0.507	0.616	0.109
100	0.774	0.964	0.190	0.867	1.030	0.163	0.611	0.741	0.130

Table 6 indicates that off-site stormwater peak flows will see a net increase in all storm events under post development conditions. It is important to note that the simulated conditions do not include consideration for the storage capacity of the proposed roadside ditch under-drain and therefore do not take into account the

reduced peak flow and flow depth resulting from the under drain. Proposed municipal roadside ditch upgrades downstream of the subject property will expand the conveyance capacity in order to safely direct the increase in post development peak stormwater flows to Owen Sound Bay.

The supporting calculations for the stormwater management simulation are included in Appendix I. The summary and detailed Visual Otthymo output files for all three (3) scenarios are included in Appendix I.

5.0 EROSION AND SEDIMENTATION CONTROL

Erosion and sedimentation control measures will be installed within the development during every step of construction, to minimize the effects on lands external to the development as well as to protect the infiltration techniques within the development.

Infiltration underdrains are susceptible to clogging during the construction stage of development. As a result, we are recommending that the municipal infrastructure be constructed within the Right-of-Way before the underdrain is installed. Two rows of silt fence will be installed in the Street 'A' and 'B' ditches before they outlet into Church Side Road East to capture any sedimentation that enters the road side ditches. After paving is complete on the proposed road way, the underdrain shall be installed under the road side ditches and the silt fencing can be removed. After the under-drains are installed, terrafix erosion control blankets (or approved equivalent) will be placed in all roadside ditches in order to accelerate the rate of re-vegetation, while also preventing excessive erosion of the channel until vegetation can be established. Furthermore, the erosion control blanket will capture any sedimentation coming from earth moving operations on the individual lots.

During construction of homes on the individual lots, the municipal road side ditches shall be protected from silt entering the ditch by installing silt fence between the proposed residence and the road side ditches.

The erosion and sedimentation control measures shall be inspected after every major rainfall event, and sediment buildup shall be cleaned and removed from the ditches as required. The proposed erosion controls shall be constructed according to drawing No. 3969-EC1 prepared by M.J. Davenport & Associates.

6.0 CONCLUSIONS AND RECOMMENDATIONS

In our professional opinion, the combination of source and conveyance controls proposed, along with downstream municipal ditch upgrades, will provide adequate quality and quantity control for the proposed development preventing adverse negative impacts on adjacent and downstream land owners.

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January 23, 2019

APPENDIX I

STORMWATER MANAGEMENT SUPPORTING INFORMATION

FIGURE 1
DAVENPORT SUBDIVISION
WEIGHTED VALUES FOR CN & C - PRE-DEVELOPMENT
UNCALIBRATED PARAMETERS

Soil Type from Mapping	Hydrologic Soil Group for Modelling	Land Use	CN Value	Runoff Coeff. C'	Subwatershed No. 1 Area (ha.)	Subwatershed No. 1 Weighted CN Portion	Subwatershed No. 1 Weighted C Portion	Subwatershed No. 2 Area (ha.)	Subwatershed No. 2 Weighted CN Portion	Subwatershed No. 2 Weighted C Portion	Subwatershed No. 3 Area (ha.)	Subwatershed No. 3 Weighted CN Portion	Subwatershed No. 3 Weighted C Portion
Morely Bouldery Clay	C	Woodland	77	0.35	1.682	129.514	0.589	0.057	4.389	0.020	0.072	5.544	0.025
Morely Bouldery Clay	C	Meadow	71	0.40	3.995	283.645	1.598	1.834	130.214	0.734	1.087	77.177	0.435
Morely Bouldery Clay	C	Lawns	82	0.35	0.089	7.298	0.031	0.185	15.170	0.065	0.382	31.324	0.134
Morely Bouldery Clay	C	Impervious	98	0.90	0.225	22.050	0.203	0.237	23.226	0.213	0.020	1.960	0.018
Donnybrook Sandy Loam	AB	Woodland	54	0.25	2.032	109.728	0.508	0.000	0.000	0.000	0.000	0.000	0.000
Donnybrook Sandy Loam	AB	Impervious	98	0.90	0.172	16.856	0.155	0.000	0.000	0.000	0.000	0.000	0.000
				Total Area :	8.195			2.313			1.561		
				Weighted CN :		69.444			74.794			74.315	
				Weighted 'C' :			0.376			0.446			0.392

FIGURE 2
DAVENPORT SUBDIVISION
CONVERSION OF CN TO CN* - PRE-DEVELOPMENT
UNCALIBRATED PARAMETERS

Subwatershed	Command	CN (AMC II)	CN (AMC III)	S (mm)	Calculated Ia	P	Q	Standard Ia	S*	CN* (AMC III)	CN* (AMC II)
Post-Development Conditions											
1	101	69.4	84	48.38	7.26	126.8	85.10	5	52.52	83	67
2	102	74.8	88	34.64	5.20	151.3	118.11	5	34.92	88	75
3	103	74.3	88	34.64	5.20	151.3	118.11	5	34.92	88	75

The CN values used for each subcatchment are the weighted values calculated based upon the different soils and land use.

CN for Condition I	CN for Condition II	CN for Condition III	CN for Condition II
0	0	0	0
2	5	13	5
4	10	22	10
6	15	30	15
9	20	37	20
12	25	43	25
15	30	50	30
16	31	51	31
16	32	52	32
17	33	53	33
18	34	54	34
18	35	55	35
19	36	56	36
20	37	57	37
21	38	58	38
21	39	59	39
22	40	60	40
23	41	61	41
24	42	62	42
25	43	63	43
25	44	64	44
26	45	65	45
27	46	66	46
28	47	67	47
29	48	68	48
30	49	69	49
31	50	70	50
31	51	70	51
32	52	71	52
33	53	72	53
34	54	73	54
35	55	74	55
36	56	75	56
37	57	75	57
38	58	76	58
39	59	77	59
40	60	78	60
41	61	78	61
42	62	79	62
43	63	80	63
44	64	81	64
45	65	82	65
46	66	82	66
47	67	83	67
48	68	84	68
50	69	84	69
51	70	85	70
52	71	86	71
53	72	86	72
54	73	87	73
55	74	88	74
57	75	88	75
58	76	89	76
59	77	89	77
60	78	90	78
62	79	91	79
63	80	91	80
64	81	92	81
66	82	92	82
67	83	93	83
68	84	93	84
70	85	94	85
72	86	94	86
73	87	95	87
75	88	95	88
76	89	96	89
78	90	96	90
80	91	97	91
81	92	97	92
83	93	98	93
85	94	98	94
87	95	98	95
89	96	99	96
91	97	99	97
94	98	99	98
97	99	100	99
100	100	100	100

FIGURE 3
DAVENPORT SUBDIVISION
TIME TO PEAK (Tp) FOR DIFFERENT RETURN PERIODS

Subwatershed	Area (ha)	Average Slope (%)	Travel Length (m)	Runoff Coefficient - 'C'				Time to Peak (hr)			
				2/5/10 Year	25 Year	50 Year	100 Year	2/5/10 Year	25 Year	50 Year	100 Year
Pre-Development											
1	8.195	3.00	650	0.376	0.414	0.451	0.470	0.467	0.443	0.419	0.407
2	2.313	3.00	320	0.446	0.491	0.535	0.558	0.296	0.276	0.256	0.246
3	1.561	3.00	70	0.392	0.431	0.470	0.490	0.150	0.142	0.133	0.129

Bransby-Williams Method
Post-Development Urban Watersheds

Subwatershed	Average Slope (%)	Travel Length (m)	Velocity (m/s)	Time to Peak (hr)

FIGURE 4
DAVENPORT SUBDIVISION
WEIGHTED VALUES FOR CN & C - POST-DEVELOPMENT
UNCALIBRATED PARAMETERS

Soil Type from Mapping	Hydrologic Soil Group for Modelling	Land Use	CN Value	Runoff Coeff. C'	Subwatershed No. 1			Subwatershed No. 2			Subwatershed No. 3			Subwatershed No. 4			Subwatershed No. 5		
					Area (ha.)	Weighted CN Portion	Weighted C Portion	Area (ha.)	Weighted CN Portion	Weighted C Portion	Area (ha.)	Weighted CN Portion	Weighted C Portion	Area (ha.)	Weighted CN Portion	Weighted C Portion	Area (ha.)	Weighted CN Portion	Weighted C Portion
Morely Bouldery Clay	C	Woodland	77	0.35	1.206	92.862	0.422	0.476	36.652	0.167	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Morely Bouldery Clay	C	Meadow	71	0.40	1.080	76.680	0.432	0.822	58.362	0.329	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Morely Bouldery Clay	C	Lawns	82	0.35	0.069	5.658	0.024	0.020	1.640	0.007	2.591	212.462	0.907	0.556	45.592	0.195	1.164	95.448	0.407
Morely Bouldery Clay	C	Impervious	98	0.90	0.264	25.872	0.238	0.078	7.644	0.070	1.037	101.626	0.933	0.271	26.558	0.244	0.230	22.540	0.207
Donnybrook Sandy Loam	AB	Woodland	54	0.25	2.032	109.728	0.508	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Donnybrook Sandy Loam	AB	Impervious	98	0.90	0.172	16.856	0.155	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
				Total Area :	4.823			1.396			3.628			0.827			1.394		
				Weighted CN :		67.936			74.712			86.573			87.243			84.640	
				Weighted 'C' :			0.369			0.410			0.507			0.530			0.441

FIGURE 5
DAVENPORT SUBDIVISION
CONVERSION OF CN TO CN* - POST-DEVELOPMENT
UNCALIBRATED PARAMETERS

Subwatershed	Command	CN (AMC II)	CN (AMC III)	S (mm)	Calculated Ia	P	Q	Standard Ia	S*	CN* (AMC III)	CN* (AMC II)
Post-Development Conditions											
1	101	67.9	83	52.02	7.80	126.8	82.80	5	57.37	82	66
2	102	74.7	88	34.64	5.20	102.9	72.13	5	34.97	88	75
3	103	86.6	94	16.21	3.24	126.8	109.23	3	16.52	94	86
4	104	87.2	95	13.37	2.67	126.8	112.06	2	14.19	95	88
5	105	84.6	93	19.12	3.82	126.8	106.43	4	18.89	93	84

The CN values used for each subcatchment are the weighted values calculated based upon the different soils and land use.

CN for Condition I	CN for Condition II	CN for Condition III	CN for Condition II
0	0	0	0
2	5	13	5
4	10	22	10
6	15	30	15
9	20	37	20
12	25	43	25
15	30	50	30
16	31	51	31
16	32	52	32
17	33	53	33
18	34	54	34
18	35	55	35
19	36	56	36
20	37	57	37
21	38	58	38
21	39	59	39
22	40	60	40
23	41	61	41
24	42	62	42
25	43	63	43
25	44	64	44
26	45	65	45
27	46	66	46
28	47	67	47
29	48	68	48
30	49	69	49
31	50	70	50
31	51	70	51
32	52	71	52
33	53	72	53
34	54	73	54
35	55	74	55
36	56	75	56
37	57	75	57
38	58	76	58
39	59	77	59
40	60	78	60
41	61	78	61
42	62	79	62
43	63	80	63
44	64	81	64
45	65	82	65
46	66	82	66
47	67	83	67
48	68	84	68
50	69	84	69
51	70	85	70
52	71	86	71
53	72	86	72
54	73	87	73
55	74	88	74
57	75	88	75
58	76	89	76
59	77	89	77
60	78	90	78
62	79	91	79
63	80	91	80
64	81	92	81
66	82	92	82
67	83	93	83
68	84	93	84
70	85	94	85
72	86	94	86
73	87	95	87
75	88	95	88
76	89	96	89
78	90	96	90
80	91	97	91
81	92	97	92
83	93	98	93
85	94	98	94
87	95	98	95
89	96	99	96
91	97	99	97
94	98	99	98
97	99	100	99
100	100	100	100

FIGURE 6
DAVENPORT SUBDIVISION
TIME TO PEAK (Tp) FOR DIFFERENT RETURN PERIODS

Subwatershed	Area (ha)	Average Slope (%)	Travel Length (m)	Runoff Coefficient - 'C'				Time to Peak (hr)			
				2/5/10 Year	25 Year	50 Year	100 Year	2/5/10 Year	25 Year	50 Year	100 Year
Post-Development											
1	4.823	3.00	475	0.369	0.406	0.443	0.461	0.404	0.383	0.363	0.353
2	1.396	2.50	230	0.410	0.451	0.492	0.513	0.281	0.265	0.248	0.240
5	1.394	3.00	295	0.441	0.485	0.529	0.551	0.287	0.268	0.248	0.239

Bransby-Williams Method
Post-Development Urban Watersheds

Subwatershed	Average Slope (%)	Travel Length (m)	Velocity (m/s)	Time to Peak (hr)
3	2.0	440.0		0.477
4	2.0	275.0		0.346

Design Chart 1.07: Runoff Coefficients

- Urban for 5 to 10-Year Storms

Land Use		Runoff Coefficient	
		Min.	Max.
Pavement	- asphalt or concrete	0.80	0.95
- brick		0.70	0.85
Gravel roads and shoulders		0.40	0.60
Roofs		0.70	0.95
Business	- downtown	0.70	0.95
- neighbourhood		0.50	0.70
- light		0.50	0.80
- heavy		0.60	0.90
Residential	- single family urban	0.30	0.50
- multiple, detached		0.40	0.60
- multiple, attached		0.60	0.75
- suburban		0.25	0.40
Industrial	- light	0.50	0.80
- heavy		0.60	0.90
Apartments		0.50	0.70
Parks, cemeteries		0.10	0.25
Playgrounds (unpaved)		0.20	0.35
Railroad yards		0.20	0.35
Unimproved areas		0.10	0.30
Lawns	- Sandy soil		
- flat, to 2%		0.05	0.10
- average, 2 to 7%		0.10	0.15
- steep, over 7%		0.15	0.20
- Clayey soil			
- flat, to 2%		0.13	0.17
- average, 2 to 7%		0.18	0.22
- steep, over 7%		0.25	0.35

For flat or permeable surfaces, use the lower values. For steeper or more impervious surfaces, use the higher values. For return period of more than 10 years, increase above values as 25-year - add 10%, 50-year - add 20%, 100-year - add 25%.

The coefficients listed above are for unfrozen ground.

Design Chart 1.07: Runoff Coefficients (Continued)

- Rural

Land Use & Topography[3]	Soil Texture		
	Open Sand Loam	Loam or Silt Loam	Clay Loam or Clay
CULTIVATED			
Flat 0 - 5% Slopes	0.22	0.35	0.55
Rolling 5 - 10% Slopes	0.30	0.45	0.60
Hilly 10- 30% Slopes	0.40	0.65	0.70
PASTURE			
Flat 0 - 5% Slopes	0.10	0.28	0.40
Rolling 5 - 10% Slopes	0.15	0.35	0.45
Hilly 10- 30% Slopes	0.22	0.40	0.55
WOODLAND OR CUTOVER			
Flat 0 - 5% Slopes	0.08	0.25	0.35
Rolling 5 - 10% Slopes	0.12	0.30	0.42
Hilly 10- 30% Slopes	0.18	0.35	0.52
BARE ROCK	COVERAGE[3]		
	30%	50%	70%
Flat 0 - 5% Slopes	0.40	0.55	0.75
Rolling 5 - 10% Slopes	0.50	0.65	0.80
Hilly 10- 30% Slopes	0.55	0.70	0.85
LAKES AND WETLANDS	0.05		

[2] Terrain Slopes

[3] Interpolate for other values of % imperviousness

Sources: American Society of Civil Engineers - ASCE (1960)
U.S. Department of Agriculture (1972)

Design Chart 1.08: Hydrologic Soil Groups

- Based on Surficial Geology Maps

Map Ref.No.	Soil Type or Texture	Hydrologic Soil Group (Tentative)
	Ground Moraine	
1a	Usually sandy till, stony, varying depth. (Most widespread type in Shield).	Usually B (shallow); may be A or AB
1b	Clayey till, varying depth.	BC-C
	End or Interlobate Moraine	
2a	Sand & stones, deep. (May be rough topography).	A
2b	Sand & stones capped by till, deep.	A-C depending on type of till.
2c	Sand & stones, deep. (Smoother topography).	A
	Kames & Eskers	
3a	Sand & stones, deep. (May be rough topography).	A
3b	Sand & stones capped by till, deep.	A-C depending on type of till.
3c	Sand & stones, deep. (Smoother topography).	A
	Lacustrine	
4a	Clay & silt, in lowlands.	BC-C
4b	Fine sand, in lowlands.	AB-B
4c	Sand, in lowlands.	AB
4d	Sand (deltas & valley trains).	A-AB
	Outwash	
5	Sand, some gravel, deep.	A
	Aeolian	
6	Very fine sand & silt, shallow. (Loess)	B
	Bedrock	
7	Bare bedrock (normally negligible areas).	Varies according to rock type.

Source: Ministry of Natural Resources - MNR

Design Chart 1.08: Hydrologic Soil Groups (Continued)

- Based on Soil Texture

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

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

Design Chart 1.09: Soil/Land Use Curve Numbers

Land Use	Treatment or Practice	Hydrologic Condition[4]	Hydrologic Soil Group			
			A	B	C	D
Fallow	Straight row	---	77	86	91	94
Row crops	"	Poor	72	81	88	91
	"	Good	67	78	85	89
	Contoured	Poor	70	79	84	88
	"	Good	65	75	82	86
	" and terraced	Poor	66	74	8	82
	" " "	Good	62	71	78	81
Small grain	Straight row	Poor	65	76	84	88
		Good	63	75	83	87
	Contoured	Poor	63	74	82	85
		Good	61	73	81	84
	" and terraced	Poor	61	72	79	82
		Good	59	70	78	81
Close-seeded	Straight row	Poor	66	77	85	89
legumes[2]	" "	Good	58	72	81	85
or	Contoured	Poor	64	75	83	85
rotation	"	Good	55	69	78	83
meadow	" and terraced	Poor	63	73	80	83
	" and terraced	Good	51	67	76	80
Pasture		Poor	68	79	86	89
or range		Fair	49	69	79	84
	Contoured	Good	39	61	74	80
	"	Poor	47	67	81	88
	"	Fair	25	59	75	83
		Good	6	35	70	79
Meadow		Good	30	58	71	78
Woods		Poor	45	66	77	83
		Fair	36	60	73	79
		Good	25	55	70	77
Farmsteads		---	59	74	82	86
		---	72	82	87	89
		---	74	84	90	92

For average anticedent soil moisture condition (AMC II)
[2] Close-drilled or broadcast.

[4] The hydrologic condition of cropland is good if a good crop rotation practice is used; it is poor if one crop is grown continuously.

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

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

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

Notes

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

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

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

idf_v2-3_2014_12_21_611_ON_6116132_OWEN_SOUND_MOE
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

2014/12/21

OWEN SOUND MOE ON 6116132

Latitude: 44 35'N Longitude: 80 56'W Elevation/Altitude: 178 m

Years/Années : 1965 - 2006 # Years/Années : 37

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	12.7	16.0	23.9	28.7	32.3	35.1	35.1	35.1	35.1
1966	6.9	8.9	13.2	18.8	21.8	22.1	30.5	32.0	32.3
1967	11.4	15.7	21.3	38.1	43.9	43.9	43.9	46.5	52.6
1968	14.7	19.6	24.4	31.2	43.9	56.4	63.8	68.1	75.9
1969	6.6	13.0	17.0	22.9	30.2	39.4	49.3	71.9	71.9
1970	10.2	18.8	25.4	32.5	41.4	42.7	42.7	55.6	55.6
1971	7.6	12.2	17.3	26.9	36.1	39.1	55.6	55.6	55.9
1972	7.4	13.2	18.3	19.3	20.1	23.6	36.8	42.7	42.7
1973	5.8	10.2	12.4	16.3	16.5	16.5	18.3	29.7	33.5
1974	6.6	10.4	11.7	16.3	18.8	23.9	43.9	43.9	45.0
1975	6.9	9.4	9.4	11.2	17.0	17.0	24.6	25.4	25.4
1976	7.1	13.2	17.3	22.4	22.6	22.6	29.2	31.7	34.8
1977	13.0	14.7	18.0	22.9	22.9	25.1	26.9	37.3	37.3
1979	18.4	26.0	26.4	30.4	32.1	32.2	41.1	47.1	48.3
1980	9.4	16.1	19.8	30.8	32.0	41.3	45.7	45.7	72.4
1981	-99.9	-99.9	-99.9	-99.9	14.5	19.7	29.4	40.6	41.4
1982	11.8	11.8	12.0	12.0	12.6	23.0	52.6	56.6	56.8
1983	5.6	7.8	8.2	15.7	27.3	38.2	46.8	50.0	53.4
1984	6.9	11.4	15.6	22.3	36.4	45.1	47.0	47.0	47.0
1985	10.1	16.0	18.0	22.4	25.9	32.1	44.8	62.4	73.0
1986	4.6	8.4	11.2	12.4	16.2	16.3	39.2	43.3	60.9
1987	9.0	13.5	15.1	15.1	15.5	15.8	17.0	28.0	28.0
1988	11.4	14.2	18.0	21.0	24.8	27.7	35.9	45.0	54.0
1989	6.9	12.1	12.7	13.5	13.9	14.0	-99.9	-99.9	47.2
1990	10.6	15.0	18.7	27.4	34.1	35.9	40.0	45.4	45.4
1991	5.6	7.0	8.1	8.3	10.5	18.0	27.3	28.6	38.9
1992	4.8	7.4	8.4	8.9	14.1	18.2	27.9	43.3	47.5
1993	7.7	15.4	23.1	25.9	27.9	28.6	33.1	39.0	49.9
1994	5.2	10.4	15.4	27.4	32.4	32.6	35.7	35.7	48.0
1995	7.6	12.0	12.5	12.5	16.4	21.6	30.5	33.2	38.7
1996	10.8	15.3	18.1	27.8	32.5	41.7	47.0	55.9	55.9
1999	7.2	11.1	15.2	20.6	21.7	21.7	36.5	40.8	42.4
2000	7.2	14.1	18.0	33.0	53.0	70.3	79.3	79.5	80.5
2001	5.2	9.0	11.6	14.6	21.4	24.4	30.8	35.6	42.0
2002	8.2	11.0	12.8	15.8	16.4	25.8	53.0	54.8	65.2

2003	11.2	16.3	20.6	24.5	30.5	32.2	32.4	32.4	48.1
2004	6.5	9.7	11.3	16.9	27.8	35.4	54.6	70.8	76.2
2006	12.2	17.4	20.0	30.6	53.1	74.8	74.8	76.6	85.8
# Yrs. Années	37	37	37	37	38	38	37	37	38
Mean Moyenne	8.7	13.1	16.2	21.5	26.6	31.4	40.6	46.3	51.2
Std. Dev. Écart-type	3.1	3.9	4.9	7.6	10.9	14.0	13.8	14.1	15.1
Skew. Dissymétrie	1.08	0.96	0.23	0.13	0.73	1.39	0.89	0.76	0.58
Kurtosis	4.39	5.17	2.55	2.32	3.23	5.37	4.30	3.09	2.87

*-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
1979	5 min	18.4	18.4
1979	10 min	26.0	25.2

****

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

****

Duration/Durée	2 yr/ans	5 yr/ans	10 yr/ans	25 yr/ans	50 yr/ans	100 yr/ans	#Years Années
5 min	8.2	10.9	12.7	15.0	16.7	18.4	37
10 min	12.4	15.9	18.1	21.0	23.1	25.2	37
15 min	15.4	19.8	22.7	26.3	29.0	31.7	37
30 min	20.3	27.0	31.5	37.1	41.3	45.5	37
1 h	24.8	34.5	40.8	48.9	54.9	60.9	38
2 h	29.1	41.5	49.7	60.1	67.8	75.5	38
6 h	38.4	50.5	58.6	68.7	76.3	83.8	37
12 h	44.0	56.5	64.7	75.2	83.0	90.7	37
24 h	48.7	62.0	70.9	82.0	90.3	98.5	38

****

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 yr/ans	5 yr/ans	10 yr/ans	25 yr/ans	50 yr/ans	100 yr/ans	#Years Années
5 min	98.0	130.8	152.4	179.8	200.2	220.3	37
	+/- 11.0	+/- 18.5	+/- 24.9	+/- 33.6	+/- 40.2	+/- 46.9	37
10 min	74.6	95.2	108.7	125.9	138.7	151.3	37
	+/- 6.9	+/- 11.6	+/- 15.6	+/- 21.1	+/- 25.2	+/- 29.4	37
15 min	61.7	79.1	90.6	105.2	116.0	126.8	37
	+/- 5.8	+/- 9.8	+/- 13.3	+/- 17.9	+/- 21.4	+/- 24.9	37
30 min	40.6	54.1	63.0	74.3	82.7	91.0	37
	+/- 4.5	+/- 7.6	+/- 10.3	+/- 13.8	+/- 16.6	+/- 19.3	37
1 h	24.8	34.5	40.8	48.9	54.9	60.9	38
	+/- 3.2	+/- 5.4	+/- 7.3	+/- 9.8	+/- 11.7	+/- 13.6	38

2 h		14.6		20.8		24.9		30.1		33.9		37.7	38
	+/-	2.0	+/-	3.5	+/-	4.7	+/-	6.3	+/-	7.5	+/-	8.8	38
6 h		6.4		8.4		9.8		11.5		12.7		14.0	37
	+/-	0.7	+/-	1.1	+/-	1.5	+/-	2.1	+/-	2.5	+/-	2.9	37
12 h		3.7		4.7		5.4		6.3		6.9		7.6	37
	+/-	0.3	+/-	0.6	+/-	0.8	+/-	1.1	+/-	1.3	+/-	1.5	37
24 h		2.0		2.6		3.0		3.4		3.8		4.1	38
	+/-	0.2	+/-	0.3	+/-	0.4	+/-	0.6	+/-	0.7	+/-	0.8	38

****

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

R = Interpolated Rainfall rate (mm/h)/Intensité 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
Mean of RR/Moyenne de RR	36.3	47.8	55.4	65.0	72.2	79.3
Std. Dev. /Écart-type (RR)	34.8	45.4	52.5	61.4	68.1	74.7
Std. Error/Erreur-type	10.4	13.9	16.3	19.4	21.7	24.0
Coefficient (A)	21.8	28.8	33.5	39.3	43.7	48.0
Exponent/Exposant (B)	-0.701	-0.703	-0.704	-0.705	-0.706	-0.706
Mean % Error/% erreur moyenne	10.2	12.2	13.1	13.8	14.3	14.8

4.8 Enhanced Grass Swale

4.8.1 Overview

Description

Enhanced grass swales are vegetated open channels designed to convey, treat and attenuate stormwater runoff (also referred to as enhanced vegetated swales). Check dams and vegetation in the swale slows the water to allow sedimentation, filtration through the root zone and soil matrix, evapotranspiration, and infiltration into the underlying native soil. Simple grass channels or ditches have long been used for stormwater conveyance, particularly for roadway drainage. Enhanced grass swales incorporate design features such as modified geometry and check dams that improve the contaminant removal and runoff reduction functions of simple grass channel and roadside ditch designs (Figure 4.8.1). A dry swale is a design variation that incorporates an engineered soil media bed and optional perforated pipe underdrain system (see Section 4.9 – Dry Swale). Enhanced grass swales are not capable of providing the same water balance and water quality benefits as dry swales, as they lack the engineered soil media and storage capacity of that best management practice.

Where development density, topography and depth to water table permit, enhanced grass swales are a preferred alternative to both curb and gutter and storm drains as a stormwater conveyance system. When incorporated into a site design, they can reduce impervious cover, accent the natural landscape, and provide aesthetic benefits.

Figure 4.8.1 Enhanced grass swales can be applied in road rights-of-way or along parking lots

Source: Seattle Public Utilities (left); Sue Donaldson (right)

Figure 4.8.2 Enhanced grass swales feature check dams that temporarily pond runoff to increase pollutant retention and infiltration and decrease flow velocity

Source: Delaware Department of Transportation (left); Center for Watershed Protection (right)

Common Concerns

If they are properly designed and maintained, enhanced grass swales can provide stormwater treatment and improved site aesthetics. However, there are some common concerns associated with their use:

- *Risk of Groundwater Contamination*: Most pollutants in urban runoff are well retained by infiltration practices and soils and therefore, have a low to moderate potential for groundwater contamination (Pitt *et al.*, 1999). Chloride and sodium from de-icing salts applied to roads and parking areas during winter are not well attenuated in soil and can easily travel to shallow groundwater. Infiltration of de-icing salt constituents is also known to increase the mobility of certain heavy metals in soil (*e.g.*, lead, copper and cadmium), thereby raising the potential for elevated concentrations in underlying groundwater (Amrhein *et al.*, 1992; Bauske and Goetz, 1993). However, very few studies that have sampled groundwater below infiltration facilities or roadside ditches receiving de-icing salt laden runoff have found concentrations of heavy metals that exceed drinking water standards (*e.g.*, Howard and Beck, 1993; Granato *et al.*, 1995). To minimize risk of groundwater contamination the following management approaches are recommended (Pitt *et al.*, 1999; TRCA, 2009b):
    - stormwater infiltration practices should not receive runoff from high traffic areas where large amounts of de-icing salts are applied (*e.g.*, busy highways), nor from pollution hot spots (*e.g.*, source areas where land uses or activities have the potential to generate highly contaminated runoff such as vehicle fuelling, servicing or demolition areas, outdoor storage or handling areas for hazardous materials and some heavy industry sites);
    - prioritize infiltration of runoff from source areas that are comparatively less contaminated such as roofs, low traffic roads and parking areas; and,
    - apply sedimentation pretreatment practices (*e.g.*, oil and grit separators) before infiltration of road or parking area runoff.

- *Risk of Soil Contamination:* Available evidence from monitoring studies indicates that small distributed stormwater infiltration practices do not contaminate underlying soils, even after more than 10 years of operation (TRCA, 2008).

- *On Private Property*: If enhanced grass swales are installed on private lots, property owners or managers will need to be educated on their routine maintenance needs, understand the long-term maintenance plan, and may be subject to a legally binding maintenance agreement. An incentive program such as a storm sewer user fee based on the area of impervious cover on a property that is directly connected to a storm sewer (*i.e.*, does not first drain to a pervious area or LID practice) could be used to encourage property owners or managers to maintain existing practices. Alternatively, swales could be located in an expanded road right-of-way or "stormwater easement" so that municipal staff can access the facility in the event it fails to function properly.

- *Maintenance*: The major maintenance requirement associated with grass swales is mowing. Occasionally, sediment will need to be removed, although this can be minimized by ensuring that upstream areas are stabilized and incorporating pretreatment devices (*e.g.*, vegetated filter strips, sedimentation forebays, gravel diaphragms). If grass swales are installed on private lots, homeowners need to be educated on routine maintenance requirements.

- *Erosion:* Erosion can be prevented by limiting the allowable longitudinal slope and incorporating check dams. Additionally, designers can use permanent reinforcement matting on swales designed for high velocity flows and temporary matting during the vegetation establishment period.

- *Standing Water and Mosquitoes:* Properly designed grass swales will not pond water for longer than 24 hours following a storm event. However, poor design, installation, or maintenance can lead to nuisance conditions.

Physical Suitability and Constraints

Enhanced grass swales are suitable on sites where development density, topography and water table depth permit their implementation. Some key constraints to their application include:

- *Available Space:* Grass swales usually consume about 5 to 15 percent of their contributing drainage area. A width of at least 2 metres is needed.

- *Site Topography:* Site topography constrains the application of grass swales. Longitudinal slopes between 0.5 and 6% are allowable. This prevents ponding while providing residence time and preventing erosion. On slopes steeper than 3%, check dams should be used.

- *Water Table*: Designers should ensure that the bottom of the swale is separated from the seasonally high water table or top of bedrock elevation by at least one (1) metre.

- *Soils:* Grass swales can be applied on sites with any type of soils.

- *Drainage Area and Runoff Volume:* The conveyance capacity should match the drainage area. Sheet flow to the grass swale is preferable. If drainage areas are greater than 2 hectares, high discharge through the swale may not allow for filtering and infiltration, and may create erosive conditions. Typical ratios of impervious drainage area to swale area range from 5:1 to 10:1.

- *Pollution Hot Spot Runoff:* To protect groundwater from possible contamination, source areas where land uses or human activities have the potential to generate highly contaminated runoff (*e.g.*, vehicle fueling, servicing and demolition areas, outdoor storage and handling areas for hazardous materials and some heavy industry sites) should not be treated by grass swales.

- *Setbacks from Buildings:* Enhanced grass swales should be located a minimum of four (4) metres from building foundations to prevent water damage.

- *Proximity to Underground Utilities:* Utilities running parallel to the grass swale should be offset from the centerline of the swale. Underground utilities below the bottom of the swale are not a problem.

Typical Performance

The ability of enhanced grass swales to help meet stormwater management objectives is summarized in Table 4.8.1.

Table 4.8.1 Ability of enhanced grass swales to meet SWM objectives

BMP	Water Balance Benefit	Water Quality Improvement	Stream Channel Erosion Control Benefit
Enhanced Grass Swale	Partial – depends on soil infiltration rate	Yes, if design velocity is 0.5 m/s or less for a 4 hour, 25 mm Chicago storm	Partial – depends on soil infiltration rate

Water Balance

Runoff reduction by grass swales is generally low, but is strongly influenced by soil type, slope, vegetative cover and the length of the swale. Recent research indicates that a conservative runoff reduction rate of 20 to 10% can be used depending on whether soils fall in hydrologic soil groups A/B or C/D, respectively. The runoff reduction rates can be doubled if the native soils on which the swale is located have been tilled to a depth of 300 mm and amended with compost to achieve an organic content of between 8 and 15% by weight or 30 to 40% by volume.

Table 4.8.2 Volumetric runoff reduction achieved by enhanced grass swales

LID Practice	Location	% Runoff Reduction	Reference
Grass Swale	Virginia	0%	Schueler (1983)
Grass Swale	Various	40%	Strecker *et al.*(2004)
Grass Swale	California	27 to 41%	Barrett *et al.* (2004)
Runoff Reduction Estimate[1]		**20% on HSG A or B soils; 10% on HSG C or D soils**	

Notes:
1. This estimate is provided only for the purpose of initial screening of LID practices suitable for achieving stormwater management objectives and targets. Performance of individual facilities will vary depending on site specific contexts and facility design parameters and should be estimated as part of the design process and submitted with other documentation for review by the approval authority.

Water Quality – Pollutant Removal Capacity

Research has shown the pollutant mass removal rates of grass swales are variable, depending on influent pollutant concentrations (Bäckström *et al.*, 2006), but generally moderate for most pollutants (Barrett *et al.*, 1998; Deletic and Fletcher, 2006). Median pollutant mass removal rates of swales from available performance studies are 76% for total suspended solids, 55% for total phosphorus, and 50% for total nitrogen (Deletic and Fletcher, 2006). Significant reductions in total zinc and copper event mean concentrations have been observed in performance studies with a median value of 60%, but results have varied widely (Barrett, 2008). Site specific factors such as slope, soil type, infiltration rate, swale length and vegetative cover also affect pollutant mass removal rates. In general, the dominant pollutant removal mechanism operating in grass swales is infiltration, rather than filtration, because pollutants trapped on the surface of the swale by vegetation or check dams are not permanently bound (Bäckström *et al.*, 2006). Designers should maximize the degree of infiltration achieved within a grass swale by incorporating check dams and ensuring the native soils have infiltration rates of 15 mm/hr or greater or specifying that the soils be tilled and amended with compost prior to planting.

Several of the factors that can significantly increase or decrease the pollutant removal capacity of grass channels are provided in Table 4.8.3.

Table 4.8.3 Factors that influence the pollutant removal capacity of grass swales

Factors that Reduce Removal Rates	Factors that Enhance Removal Rates
Longitudinal slope > 1%	Longitudinal slope < 1%
Measured soil infiltration rate < 15 mm/hr	Measured soil infiltration rate is 15 mm/hr or greater
Flow velocity within channel > 0.5 m/s during a 4 hour, 25 mm Chicago storm event	Flow velocity within channel is 0.5 m/s or less during a 4 hour, 25 mm Chicago storm event
No pretreatment	Pretreatment with vegetated filter strips, gravel diaphragms and/or sedimentation forebays
Side slopes steeper than 3:1 (H:V)	Side slopes 3:1 (H:V) or less

4.8.2 Design Template

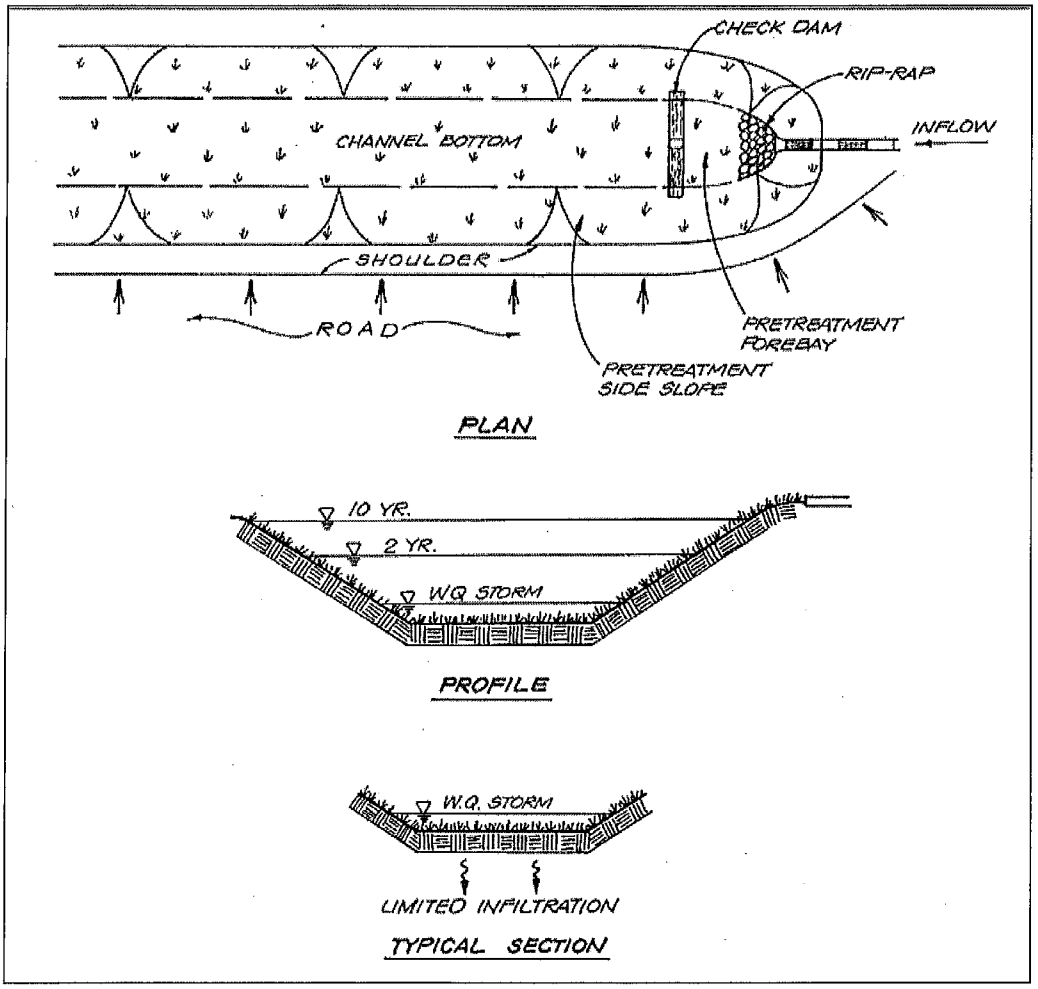
Applications

Enhanced grass swales are well suited for conveying and treating runoff from highways and other roads because they are a linear practice and easily incorporated into road rights-of-way. They are also a suitable practice for managing runoff from parking lots, roofs and pervious surfaces, such as yards, parks and landscaped areas. Grass swales can be used as snow storage areas.

Grass swales can also provide pretreatment for other stormwater best management practices, such as bioretention areas, soakaways and perforated pipe systems or be designed in series with other practices as part of a treatment train approach. They are often impractical in densely developed urban areas because they consume a large amount of space. Where development density and topograph permit, grass swales can be used in place of conventional curb and gutter and storm drain systems.

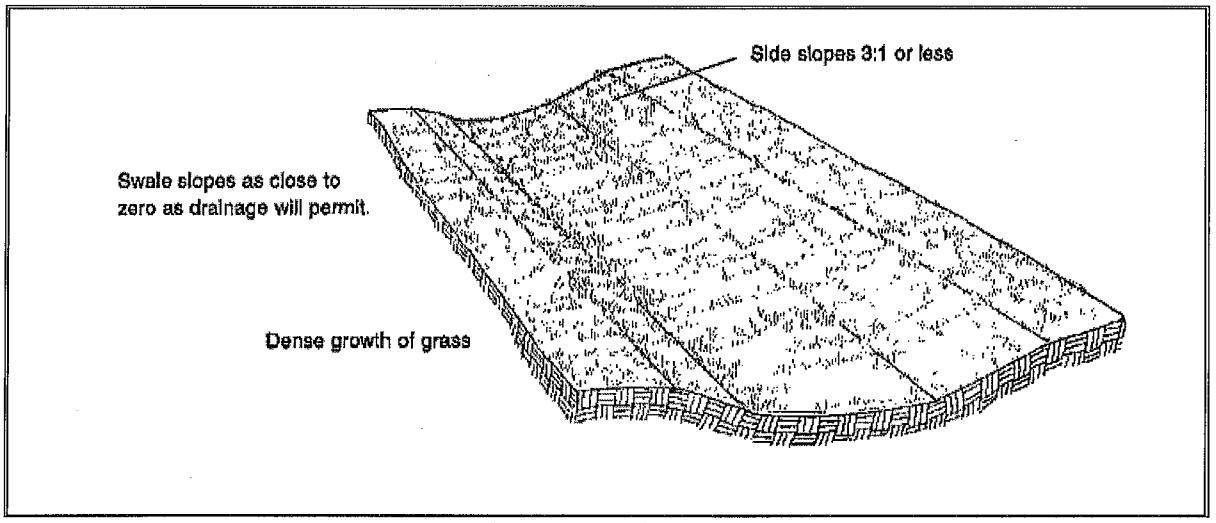
Typical Details

Figure 4.8.3 Plan, profile, and section views of a grass swale



Source: ARC, 2001

Figure 4.8.4 Plan view of a grass swale



Source: ARC, 2001

Design Guidance

Geometry and Site Layout

Design guidance regarding the geometry and layout of grass swales is provided below.

- *Shape:* Grass swales should be designed with a trapezoidal or parabolic cross section. Trapezoidal swales will generally evolve into parabolic swales over time, so the initial trapezoidal cross section design should be checked for capacity and conveyance assuming it is a parabolic cross section. Swale length between culverts should be 5 metres or greater.

- *Bottom Width:* Grass swales should be designed with a bottom width between 0.75 and 3.0 metres. The design width should allow for shallow flows and adequate water quality treatment, while preventing flows from concentrating and creating gullies.

- *Longitudinal Slope:* Slopes should be between 0.5% and 4%. Check dams should be incorporated on slopes greater than 3% (PDEP, 2006).

- *Length*: When used to convey and treat road runoff, the length simply parallels the road, and therefore should be equal to, or greater than the contributing roadway length.

- *Flow Depth:* The maximum flow depth should correspond to two-thirds the height of the vegetation. Vegetation in some grass swales may reach heights of 150 millimetres; therefore a maximum flow depth of 100 millimetres is recommended during a 4 hour, 25 mm Chicago storm event.

- *Side Slopes:* The side slopes should be as flat as possible to aid in providing pretreatment for lateral incoming flows and to maximize the swale filtering surface. Steeper side slopes are likely to have erosion gullying from incoming lateral flows. A maximum slope of 2.5:1 (H:V) is recommended and a 4:1 slope is preferred where space permits.

Pretreatment

A pea gravel diaphragm located along the top of each bank can be used to provide pretreatment of any stormwater runoff that may be entering the swale laterally along its length. Vegetated filter strips or mild side slopes (3:1) also provide pretreatment for any lateral sheet flow entering the swale. Sedimentation forebays at inlets to the swale are also a pretreatment option.

Conveyance and Overflow

Grass swales must be designed for a maximum velocity of 0.5 m/s or less for the 4 hour 25 mm Chicago storm. The swale should also convey the locally required design storm (usually the 10 year storm) at non-erosive velocities.

Soil Amendments

If soils along the location of the swale are highly compacted, or of such low fertility that vegetation cannot become established, they should be tilled to a depth of 300 mm and amended with compost to achieve an organic content of 8 to 15% by weight or 30 to 40% by volume.

Landscaping

Designers should choose grasses that can withstand both wet and dry periods as well as relatively high velocity flows within the swale. For applications along roads and parking lots, where snow will be plowed and stored, non woody and salt tolerant species should be chosen. Taller and denser grasses are preferable, though the species of grass is less important than percent coverage (Barrett *et al.*, 2004). Appendix B provides further guidance regarding suitable species and planting.

Other Design Resources

Section 4.9.8 of the OMOE *Stormwater Management Planning and Design Manual* (2003) provides further guidance regarding design and modelling performance of enhanced grass swales. Several other stormwater manuals that provide useful design guidance for grass swales include:

Minnesota Stormwater Manual
http://www.pca.state.mn.us/water/stormwater/stormwater-manual.html

Virginia Stormwater Management Handbook
http://www.dcr.virginia.gov/soil_&_water/stormwat.shtml

Georgia Stormwater Management Manual
http://www.georgiastormwater.com/

BMP Sizing

Enhanced grass swale designs are flow rate based. The swale should be designed for a maximum flow velocity of 0.5 m/s and flow depth of 100 mm during a 4 hour 25 mm Chicago storm event. The suggested Manning's n for use in Manning's equation is 0.027 (grass swale) to 0.050 (shrub vegetated or cobble lined swale). Given typical urban swale dimensions (0.75 m bottom width, 2.5:1 side slopes and 0.5 m depth), the contributing drainage area is generally limited to ≤ 2 hectares to maintain flow ≤ 0.15 m^3/s and velocity ≤ 0.5 m/s. Table 4.8.4 describes the relationship between imperviousness of the development and maximum drainage area that can be treated by a grass swale.

Table 4.8.4 Grassed swale drainage area guidelines

Percent Imperviousness	Maximum Drainage Area (hectares)
35	2.0
75	1.5
90	1.0

Source: OMOE, 2003.

For further guidance regarding BMP sizing, refer to the OMOE *Stormwater Management Planning and Design Manual* (OMOE, 2003).

Design Specifications

Recommended design specifications for enhanced grass swales are provided in Table 4.8.5

Table 4.8.5 Design specifications for enhanced grass swales

Component	Specification	Quantity
Check Dams	Check dams should be constructed of a non-erosive material such as suitably sized aggregate, wood, gabions, riprap, or concrete. All check dams should be underlain with filter fabric conforming to local design standards. Wood used for check dams should consist of pressure treated logs or timbers, or water-resistant tree species such as cedar, hemlock, swamp oak or locust.	Spacing should be based on the longitudinal slope and desired ponding volume
Pea Gravel Diaphragm	Washed stone between 3 and 10 mm in diameter.	Minimum of 300 mm wide and 600 mm deep

Construction Considerations

Grass swales should be clearly marked before site work begins to avoid disturbance during construction. No vehicular traffic, except that specifically used to construct the facility, should be allowed within the swale site. Any accumulation of sediment that does occur within the swale must be removed during the final stages of grading to achieve the design cross section. Final grading and planting should not occur until the adjoining

areas draining into the swale are stabilized. Flow should not be diverted into the swale until the banks are stabilized.

Preferably, the swale should be planted in the spring so that the vegetation can become established with minimal irrigation. Installation of erosion control matting or blanketing to stabilize soil during establishment of vegetation is highly recommended. If sod is used, it should be placed with staggered ends and secured by rolling the sod. This helps to prevent gullies.

4.8.3 Maintenance and Construction Costs

Inspection and Maintenance

Maintenance requirements for enhanced grass swales is similar to vegetated filter strips and typically involve a low level of activity after vegetation becomes established. Grass channel maintenance procedures are already in place at many municipal public works and transportation departments. These procedures should be compared to the recommendations below (Table 4.8.6) to assure that the infiltration and water quality benefits of enhanced grass swales are preserved. Routine roadside ditch maintenance practices such as scraping and re-grading should be avoided at swale locations. Vehicles should not be parked or driven on grass swales. For routine mowing, the lightest possible mowing equipment should be used to prevent soil compaction.

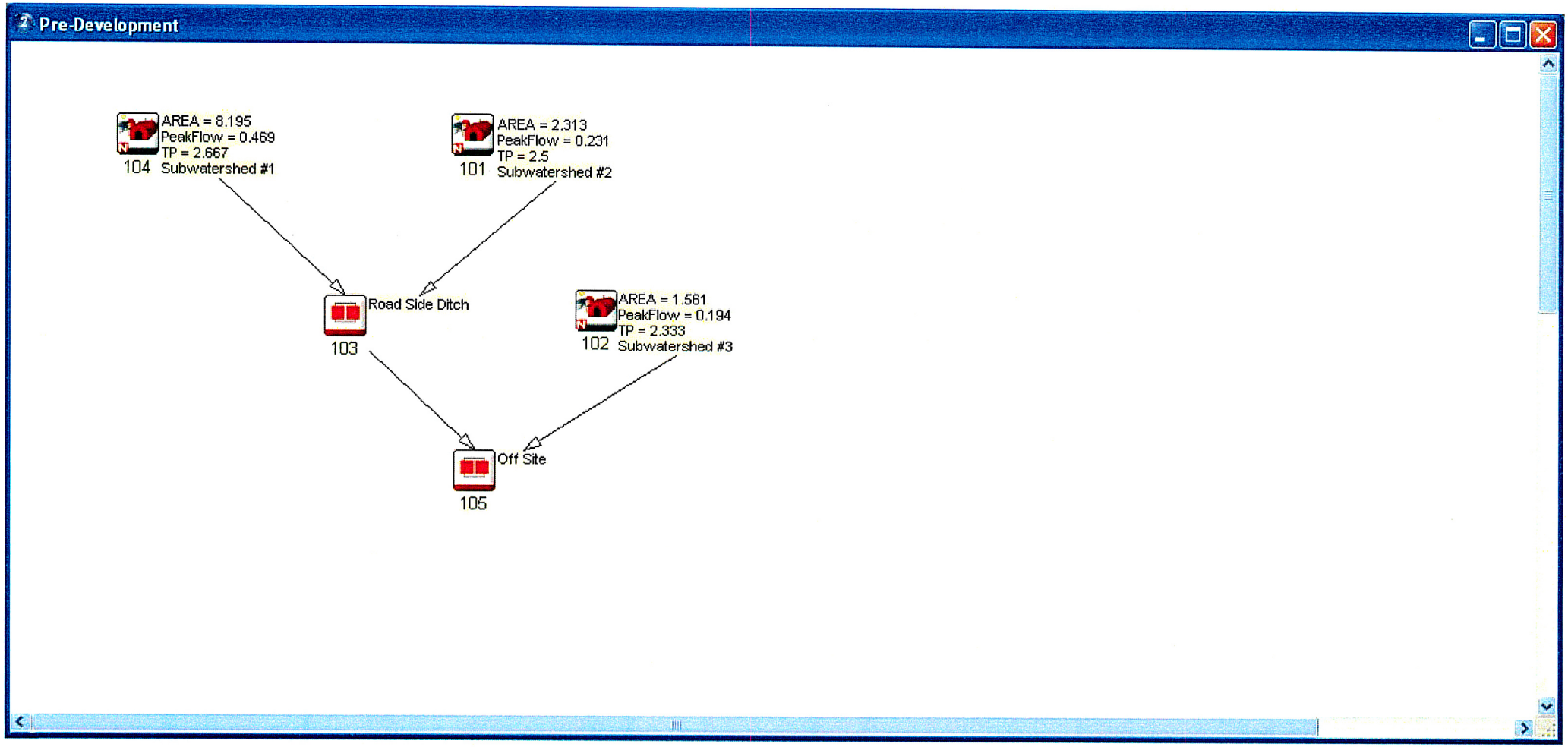
For swales located on private property, the property owner or manager is responsible for maintenance as outlined in a legally binding maintenance agreement. Roadside swales in residential areas generally receive routine maintenance from homeowners who should be advised regarding recommended maintenance activities.

Table 4.8.6 Typical inspection and maintenance activities for enhanced grass swales

Activity	Schedule
▪ Inspect for vegetation density (at least 80% coverage), damage by foot or vehicular traffic, channelization, accumulation of debris, trash and sediment, and structural damage to pretreatment devices.	After every major storm event (>25 mm), quarterly for the first two years, and twice annually thereafter.
▪ Regular watering may be required during the first two years while vegetation is becoming established; ▪ Mow grass to maintain height between 75 to 150 mm; ▪ Remove trash and debris from pretreatment devices, the swale surface and inlet and outlets.	At least twice annually. More frequently if desired for aesthetic reasons.
▪ Remove accumulated sediment from pretreatment devices, inlets and outlets; ▪ Replace dead vegetation, remove invasive growth, dethatch, remove thatching and aerate (PDEP, 2006; ▪ Repair eroded or sparsely vegetated areas; ▪ Remove accumulated sediment on the swale surface when dry and exceeds 25 mm depth (PDEP, 2006); ▪ If gullies are observed along the swale, regrading and revegetating may be required.	Annually or as needed

APPENDIX II

VISUAL OTTHYMO OUTPUT
PRE DEVELOPMENT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PeakFlow = 0.469
TP = 2.667
104 Subwatershed #1
AREA = 2.313
PeakFlow = 0.231
TP = 2.5
101 Subwatershed #2
Road Side Ditch
103
AREA = 1.561
PeakFlow = 0.194
TP = 2.333
102 Subwatershed #3
Off Site
105

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

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USER:


COMMENTS: ____________________________________________________________


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| Ptotal= 25.00 mm |                           B=   7.500
--------------------                           C=    .790
                         used in:   INTENSITY =  A / (t + B)^C

                         Duration of storm  =  4.00 hrs
                         Storm time step    = 10.00 min
                         Time to peak ratio =    .38

                  TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
                   .17    1.66 |  1.17    6.41 |  2.17    4.73 |  3.17    2.05
                   .33    1.87 |  1.33   14.61 |  2.33    3.84 |  3.33    1.89
                   .50    2.16 |  1.50   50.69 |  2.50    3.25 |  3.50    1.75
                   .67    2.55 |  1.67   17.59 |  2.67    2.82 |  3.67    1.63
                   .83    3.16 |  1.83    9.15 |  2.83    2.50 |  3.83    1.53
                  1.00    4.20 |  2.00    6.21 |  3.00    2.25 |  4.00    1.44
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     TIME TO PEAK    (hrs)=   1.500
     RUNOFF VOLUME    (mm)=   3.385
     TOTAL RAINFALL   (mm)=  24.995
     RUNOFF COEFFICIENT   =    .135

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

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     Unit Hyd Qpeak  (cms)=    .359

     PEAK FLOW       (cms)=    .020 (i)
     TIME TO PEAK    (hrs)=   1.667
     RUNOFF VOLUME    (mm)=   3.773
     TOTAL RAINFALL   (mm)=  24.995
     RUNOFF COEFFICIENT   =    .151

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     PEAK FLOW       (cms)=    .040 (i)
     TIME TO PEAK    (hrs)=   2.000
     RUNOFF VOLUME    (mm)=   2.750
     TOTAL RAINFALL   (mm)=  24.995
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     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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        + ID2= 2 (0104):    8.19     .040     2.00     2.75
          ============================================
          ID = 3 (0103):   10.51     .057     1.83     2.98
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```
     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

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

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         VV     I    SSSSS  UUUUU  A   A  LLLLL

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USER:

COMMENTS: _____

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B= 7.500
C= .790
used in: INTENSITY = A / (t + B)^C

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Storm time step = 10.00 min
Time to peak ratio = .38

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.33	1.59	1.83	5.71	3.33	4.42	4.83	1.96
.50	1.71	2.00	8.73	3.50	3.84	5.00	1.86
.67	1.86	2.17	19.90	3.67	3.41	5.17	1.76
.83	2.04	2.33	69.00	3.83	3.07	5.33	1.68
1.00	2.26	2.50	23.94	4.00	2.79	5.50	1.61

1.17	2.55	2.67	12.46	4.17	2.57	5.67	1.54
1.33	2.94	2.83	8.46	4.33	2.38	5.83	1.48
1.50	3.48	3.00	6.44	4.50	2.22	6.00	1.42

CALIB	
NASHYD (0102)	Area (ha)= 1.56 Curve Number (CN)= 75.0
ID= 1 DT=10.0 min	Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= .13

Unit Hyd Qpeak (cms)= .462

PEAK FLOW (cms)= .041 (i)
TIME TO PEAK (hrs)= 2.333
RUNOFF VOLUME (mm)= 7.930
TOTAL RAINFALL (mm)= 37.363
RUNOFF COEFFICIENT = .212

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

CALIB	
NASHYD (0101)	Area (ha)= 2.31 Curve Number (CN)= 75.0
ID= 1 DT=10.0 min	Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= .25

Unit Hyd Qpeak (cms)= .359

PEAK FLOW (cms)= .048 (i)
TIME TO PEAK (hrs)= 2.500
RUNOFF VOLUME (mm)= 8.840
TOTAL RAINFALL (mm)= 37.363
RUNOFF COEFFICIENT = .237

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

CALIB	
NASHYD (0104)	Area (ha)= 8.19 Curve Number (CN)= 67.0
ID= 1 DT=10.0 min	Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= .41

Unit Hyd Qpeak (cms)= .769

PEAK FLOW (cms)= .092 (i)
TIME TO PEAK (hrs)= 2.833
RUNOFF VOLUME (mm)= 6.639
TOTAL RAINFALL (mm)= 37.363
RUNOFF COEFFICIENT = .178

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

ADD HYD (0103)	1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
	ID1= 1 (0101):	2.31	.048	2.50	8.84

+ ID2= 2 (0104):	8.19	.092	2.83	6.64
ID = 3 (0103):	10.51	.134	2.67	7.12

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0105)	1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
	ID1= 1 (0102):	1.56	.041	2.33	7.93
	+ ID2= 2 (0103):	10.51	.134	2.67	7.12
	ID = 3 (0105):	12.07	.155	2.67	7.23

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

| CHICAGO STORM | Ptotal= 48.64 mm |

IDF curve parameters: A=1098.000
B= 10.100
C= .830
used in: INTENSITY = A / (t + B)^C

Duration of storm = 6.00 hrs
Storm time step = 10.00 min
Time to peak ratio = .38

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.17	1.65	1.67	5.38	3.17	6.69	4.67	2.40
.33	1.78	1.83	7.38	3.33	5.55	4.83	2.25
.50	1.93	2.00	11.78	3.50	4.74	5.00	2.12
.67	2.12	2.17	28.11	3.67	4.15	5.17	2.00
.83	2.35	2.33	90.98	3.83	3.69	5.33	1.90
1.00	2.63	2.50	33.98	4.00	3.33	5.50	1.80
1.17	3.01	2.67	17.30	4.17	3.03	5.67	1.72
1.33	3.51	2.83	11.37	4.33	2.79	5.83	1.64
1.50	4.24	3.00	8.43	4.50	2.58	6.00	1.58

CALIB	
NASHYD (0102)	Area (ha)= 1.56 Curve Number (CN)= 75.0
ID= 1 DT=10.0 min	Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= .13

Unit Hyd Qpeak (cms)= .462

PEAK FLOW (cms)= .074 (i)
TIME TO PEAK (hrs)= 2.333
RUNOFF VOLUME (mm)= 13.154
TOTAL RAINFALL (mm)= 48.645
RUNOFF COEFFICIENT = .270

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

CALIB	
NASHYD (0101)	Area (ha)= 2.31 Curve Number (CN)= 75.0
ID= 1 DT=10.0 min	Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= .25

Unit Hyd Qpeak (cms)= .359

PEAK FLOW (cms)= .087 (i)
TIME TO PEAK (hrs)= 2.500
RUNOFF VOLUME (mm)= 14.665
TOTAL RAINFALL (mm)= 48.645
RUNOFF COEFFICIENT = .301

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

CALIB	
NASHYD (0104)	Area (ha)= 8.19 Curve Number (CN)= 67.0
ID= 1 DT=10.0 min	Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= .41

Unit Hyd Qpeak (cms)= .769

PEAK FLOW (cms)= .168 (i)
TIME TO PEAK (hrs)= 2.833
RUNOFF VOLUME (mm)= 11.268
TOTAL RAINFALL (mm)= 48.645
RUNOFF COEFFICIENT = .232

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

ADD HYD (0103)	1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
	ID1= 1 (0101):	2.31	.087	2.50	14.66
	+ ID2= 2 (0104):	8.19	.168	2.83	11.27
	ID = 3 (0103):	10.51	.245	2.67	12.02

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0105)	1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
	ID1= 1 (0102):	1.56	.074	2.33	13.15
	+ ID2= 2 (0103):	10.51	.245	2.67	12.02
	ID = 3 (0105):	12.07	.283	2.67	12.16

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

****

** SIMULATION NUMBER: 3 **

CHICAGO STORM	Ptotal= 57.49 mm

IDF curve parameters: A=1560.000
B= 13.000
C= .860
used in: INTENSITY = A / (t + B)^C

Duration of storm = 6.00 hrs
Storm time step = 10.00 min
Time to peak ratio = .38

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.17	1.73	1.67	6.29	3.17	7.97	4.67	2.60
.33	1.88	1.83	8.87	3.33	6.51	4.83	2.42
.50	2.06	2.00	14.61	3.50	5.48	5.00	2.27
.67	2.27	2.17	35.36	3.67	4.74	5.17	2.13
.83	2.54	2.33	105.21	3.83	4.17	5.33	2.01
1.00	2.88	2.50	42.69	4.00	3.72	5.50	1.90
1.17	3.33	2.67	21.79	4.17	3.36	5.67	1.81
1.33	3.95	2.83	14.08	4.33	3.06	5.83	1.72
1.50	4.85	3.00	10.23	4.50	2.81	6.00	1.64

CALIB	NASHYD (0102)	ID= 1 DT=10.0 min

Area (ha)= 1.56 Curve Number (CN)= 75.0
Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= .13

Unit Hyd Qpeak (cms)= .462

PEAK FLOW (cms)= .102 (i)
TIME TO PEAK (hrs)= 2.333
RUNOFF VOLUME (mm)= 17.800
TOTAL RAINFALL (mm)= 57.490
RUNOFF COEFFICIENT = .310

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

CALIB	NASHYD (0101)	ID= 1 DT=10.0 min

Area (ha)= 2.31 Curve Number (CN)= 75.0
Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= .25

Unit Hyd Qpeak (cms)= .359

PEAK FLOW (cms)= .121 (i)
TIME TO PEAK (hrs)= 2.500
RUNOFF VOLUME (mm)= 19.843
TOTAL RAINFALL (mm)= 57.490
RUNOFF COEFFICIENT = .345

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

CALIB

NASHYD (0104)	ID= 1 DT=10.0 min

Area (ha)= 8.19 Curve Number (CN)= 67.0
Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= .41

Unit Hyd Qpeak (cms)= .769

PEAK FLOW (cms)= .240 (i)
TIME TO PEAK (hrs)= 2.833
RUNOFF VOLUME (mm)= 15.487
TOTAL RAINFALL (mm)= 57.490
RUNOFF COEFFICIENT = .269

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

ADD HYD (0103)	1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0101):	2.31	.121	2.50	19.84
+ ID2= 2 (0104):	8.19	.240	2.83	15.49
ID = 3 (0103):	10.51	.348	2.67	16.45

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0105)	1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0102):	1.56	.102	2.33	17.80
+ ID2= 2 (0103):	10.51	.348	2.67	16.45
ID = 3 (0105):	12.07	.402	2.67	16.62

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

** SIMULATION NUMBER: 4 **

CHICAGO STORM	Ptotal= 65.65 mm

IDF curve parameters: A=2010.000
B= 14.000
C= .880
used in: INTENSITY = A / (t + B)^C

Duration of storm = 6.00 hrs
Storm time step = 10.00 min
Time to peak ratio = .38

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.17	1.78	1.67	6.98	3.17	8.95	4.67	2.75
.33	1.95	1.83	10.01	3.33	7.23	4.83	2.55
.50	2.14	2.00	16.85	3.50	6.04	5.00	2.37
.67	2.38	2.17	41.62	3.67	5.17	5.17	2.22
.83	2.67	2.33	122.63	3.83	4.52	5.33	2.09
1.00	3.05	2.50	50.34	4.00	4.00	5.50	1.97

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
1.17	3.56	2.67	25.45	4.17	3.60	5.67	1.87
1.33	4.27	2.83	16.21	4.33	3.26	5.83	1.77
1.50	5.31	3.00	11.63	4.50	2.98	6.00	1.69

CALIB	NASHYD (0102)	ID= 1 DT=10.0 min

Area (ha)= 1.56 Curve Number (CN)= 75.0
Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= .13

Unit Hyd Qpeak (cms)= .462

PEAK FLOW (cms)= .134 (i)
TIME TO PEAK (hrs)= 2.333
RUNOFF VOLUME (mm)= 22.427
TOTAL RAINFALL (mm)= 65.646
RUNOFF COEFFICIENT = .342

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

CALIB	NASHYD (0101)	ID= 1 DT=10.0 min

Area (ha)= 2.31 Curve Number (CN)= 75.0
Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= .25

Unit Hyd Qpeak (cms)= .359

PEAK FLOW (cms)= .159 (i)
TIME TO PEAK (hrs)= 2.500
RUNOFF VOLUME (mm)= 25.002
TOTAL RAINFALL (mm)= 65.646
RUNOFF COEFFICIENT = .381

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

CALIB	NASHYD (0104)	ID= 1 DT=10.0 min

Area (ha)= 8.19 Curve Number (CN)= 67.0
Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= .41

Unit Hyd Qpeak (cms)= .769

PEAK FLOW (cms)= .317 (i)
TIME TO PEAK (hrs)= 2.833
RUNOFF VOLUME (mm)= 19.765
TOTAL RAINFALL (mm)= 65.646
RUNOFF COEFFICIENT = .301

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

ADD HYD (0103)	1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0101):	2.31	.159	2.50	25.00

+ ID2= 2 (0104):	8.19	.317	2.83	19.77
ID = 3 (0103):	10.51	.460	2.67	20.92

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0105)	1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0102):	1.56	.134	2.33	22.43
+ ID2= 2 (0103):	10.51	.460	2.67	20.92
ID = 3 (0105):	12.07	.529	2.67	21.11

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

** SIMULATION NUMBER: 5 **

CHICAGO STORM	Ptotal= 76.13 mm

IDF curve parameters: A=2200.000
B= 14.600
C= .870
used in: INTENSITY = A / (t + B)^C

Duration of storm = 6.00 hrs
Storm time step = 10.00 min
Time to peak ratio = .38

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.17	2.22	1.67	8.42	3.17	10.74	4.67	3.38
.33	2.41	1.83	11.98	3.33	8.72	4.83	3.14
.50	2.65	2.00	19.90	3.50	7.31	5.00	2.93
.67	2.93	2.17	47.86	3.67	6.28	5.17	2.75
.83	3.29	2.33	135.62	3.83	5.50	5.33	2.59
1.00	3.75	2.50	57.60	4.00	4.89	5.50	2.44
1.17	4.36	2.67	29.73	4.17	4.40	5.67	2.32
1.33	5.21	2.83	19.18	4.33	4.00	5.83	2.20
1.50	6.45	3.00	13.86	4.50	3.67	6.00	2.10

CALIB	NASHYD (0102)	ID= 1 DT=10.0 min

Area (ha)= 1.56 Curve Number (CN)= 75.0
Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= .13

Unit Hyd Qpeak (cms)= .462

PEAK FLOW (cms)= .168 (i)
TIME TO PEAK (hrs)= 2.333
RUNOFF VOLUME (mm)= 28.775
TOTAL RAINFALL (mm)= 76.131
RUNOFF COEFFICIENT = .378

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

```
| CALIB                |
| NASHYD    (0101) |   Area    (ha)=   2.31   Curve Number   (CN)= 75.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=    .25

     Unit Hyd Qpeak  (cms)=    .359

     PEAK FLOW       (cms)=    .200 (i)
     TIME TO PEAK    (hrs)=   2.500
     RUNOFF VOLUME    (mm)=  32.079
     TOTAL RAINFALL   (mm)=  76.131
     RUNOFF COEFFICIENT   =    .421

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

--------------------
| CALIB                |
| NASHYD    (0104) |   Area    (ha)=   8.19   Curve Number   (CN)= 67.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=    .41

     Unit Hyd Qpeak  (cms)=    .769

     PEAK FLOW       (cms)=    .406 (i)
     TIME TO PEAK    (hrs)=   2.833
     RUNOFF VOLUME    (mm)=  25.737
     TOTAL RAINFALL   (mm)=  76.131
     RUNOFF COEFFICIENT   =    .338

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

--------------------
| ADD HYD   (0103) |
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)      (mm)
          ID1= 1 (0101):     2.31    .200     2.50    32.08
        + ID2= 2 (0104):     8.19    .406     2.83    25.74
          ==========================================
          ID = 3 (0103):    10.51    .586     2.67    27.13

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------
| ADD HYD   (0105) |
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)      (mm)
          ID1= 1 (0102):     1.56    .168     2.33    28.78
        + ID2= 2 (0103):    10.51    .586     2.67    27.13
          ==========================================
          ID = 3 (0105):    12.07    .672     2.67    27.35

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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 ** SIMULATION NUMBER:   6 **
 ****************************

--------------------
| CHICAGO STORM    |    IDF curve parameters: A=2507.000
| Ptotal= 81.72 mm |                          B=  14.800
--------------------                          C=    .880
                        used in:   INTENSITY =  A / (t + B)^C

                        Duration of storm  =  6.00 hrs
                        Storm time step    = 10.00 min
                        Time to peak ratio =   .38

  TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
   .17    2.25 |  1.67    8.85 |  3.17   11.36 |  4.67    3.47
   .33    2.45 |  1.83   12.70 |  3.33    9.17 |  4.83    3.22
   .50    2.70 |  2.00   21.34 |  3.50    7.66 |  5.00    3.00
   .67    3.00 |  2.17   52.05 |  3.67    6.56 |  5.17    2.81
   .83    3.38 |  2.33  148.61 |  3.83    5.72 |  5.33    2.64
  1.00    3.86 |  2.50   62.77 |  4.00    5.07 |  5.50    2.49
  1.17    4.51 |  2.67   32.11 |  4.17    4.55 |  5.67    2.36
  1.33    5.41 |  2.83   20.54 |  4.33    4.12 |  5.83    2.24
  1.50    6.73 |  3.00   14.75 |  4.50    3.77 |  6.00    2.13

--------------------
| CALIB                |
| NASHYD    (0102) |   Area    (ha)=   1.56   Curve Number   (CN)= 75.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=    .13

     Unit Hyd Qpeak  (cms)=    .462

     PEAK FLOW       (cms)=    .194 (i)
     TIME TO PEAK    (hrs)=   2.333
     RUNOFF VOLUME    (mm)=  32.319
     TOTAL RAINFALL   (mm)=  81.724
     RUNOFF COEFFICIENT   =    .395

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

--------------------
| CALIB                |
| NASHYD    (0101) |   Area    (ha)=   2.31   Curve Number   (CN)= 75.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=    .25

     Unit Hyd Qpeak  (cms)=    .359

     PEAK FLOW       (cms)=    .231 (i)
     TIME TO PEAK    (hrs)=   2.500
     RUNOFF VOLUME    (mm)=  36.030
     TOTAL RAINFALL   (mm)=  81.724
     RUNOFF COEFFICIENT   =    .441

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

--------------------
| CALIB                |
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```
| NASHYD    (0104) |   Area    (ha)=   8.19   Curve Number   (CN)= 67.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=    .41

     Unit Hyd Qpeak  (cms)=    .769

     PEAK FLOW       (cms)=    .469 (i)
     TIME TO PEAK    (hrs)=   2.667
     RUNOFF VOLUME    (mm)=  29.114
     TOTAL RAINFALL   (mm)=  81.724
     RUNOFF COEFFICIENT   =    .356

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

--------------------
| ADD HYD   (0103) |
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)      (mm)
          ID1= 1 (0101):     2.31    .231     2.50    36.03
        + ID2= 2 (0104):     8.19    .469     2.67    29.11
          ==========================================
          ID = 3 (0103):    10.51    .676     2.67    30.64

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------
| ADD HYD   (0105) |
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)      (mm)
          ID1= 1 (0102):     1.56    .194     2.33    32.32
        + ID2= 2 (0103):    10.51    .676     2.67    30.64
          ==========================================
          ID = 3 (0105):    12.07    .774     2.67    30.85

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

       OOO   TTTTT  TTTTT  H    H  Y    Y  M    M   OOO    TM, Version 2.0
      O   O    T      T    H    H   Y  Y   MM  MM  O   O
      O   O    T      T    H    H    Y     M    M  O   O   Licensed To: MJ Davenport

       OOO     T      T    H    H    Y     M    M   OOO                  vo2-0057
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                   ***** D E T A I L E D   O U T P U T *****

  Input   filename: C:\Program Files\Visual OTTHYMO v2.0\voin.dat

  Output  filename: C:\visual otthymo files\3969\3969-All
Scenarios\Pre-Development.out
  Summary filename: C:\visual otthymo files\3969\3969-All
Scenarios\Pre-Development.sum


DATE: 1/23/2019                            TIME: 1:36:05 PM

USER:


COMMENTS: ____________________________________________________________


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

--------------------
| MASS STORM        |     Filename: C:\visual otthymo files\4456\AES 1-hr.mst
| Ptotal= 22.50 mm |     Comments: AES 1 HOUR STORM DISTRIBUTION a=21min k=
--------------------
                          Duration of storm    =  1.00 hrs
                          Mass curve time step =  5.00 min

                 TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
                  .08   10.02 |   .33   69.93 |   .58   11.10 |   .83     .81
                  .17   30.00 |   .42   64.29 |   .67    4.62 |   .92     .30
                  .25   49.98 |   .50   27.03 |   .75    1.92 |  1.00     .03

-----------------------------------------------------------------------------
--------------------
| CALIB             |
| NASHYD    (0102)  |    Area    (ha)=   1.56   Curve Number   (CN)= 75.0
|ID= 1 DT=10.0 min  |    Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
```



```
--------------------   U.H. Tp(hrs)=    .13

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


                            ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
                 .167   20.01 |  .500   45.66 |  .833    1.36 |
                 .333   59.95 |  .667    7.86 | 1.000     .16 |

     Unit Hyd Qpeak  (cms)=    .462

     PEAK FLOW       (cms)=    .034 (i)
     TIME TO PEAK    (hrs)=    .500
     RUNOFF VOLUME    (mm)=   2.656
     TOTAL RAINFALL   (mm)=  22.500
     RUNOFF COEFFICIENT   =    .118

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

--------------------------------------------------------------------------------
--------------------
| CALIB             |
| NASHYD    (0101)  |    Area    (ha)=   2.31   Curve Number   (CN)= 75.0
|ID= 1 DT=10.0 min  |    Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=    .25

     Unit Hyd Qpeak  (cms)=    .359

     PEAK FLOW       (cms)=    .033 (i)
     TIME TO PEAK    (hrs)=    .667
     RUNOFF VOLUME    (mm)=   2.961
     TOTAL RAINFALL   (mm)=  22.500
     RUNOFF COEFFICIENT   =    .132

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

--------------------------------------------------------------------------------
--------------------
| CALIB             |
| NASHYD    (0104)  |    Area    (ha)=   8.19   Curve Number   (CN)= 67.0
|ID= 1 DT=10.0 min  |    Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=    .41

     Unit Hyd Qpeak  (cms)=    .769

     PEAK FLOW       (cms)=    .058 (i)
     TIME TO PEAK    (hrs)=    .833
     RUNOFF VOLUME    (mm)=   2.144
     TOTAL RAINFALL   (mm)=  22.500
     RUNOFF COEFFICIENT   =    .095

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

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

--------------------
| ADD HYD   (0103) |
|   1 + 2 =  3     |        AREA    QPEAK    TPEAK     R.V.
--------------------        (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (0101):      2.31    .033      .67     2.96
      + ID2= 2 (0104):      8.19    .058      .83     2.14
```



```
          ==================================================
          ID = 3 (0103):     10.51    .090      .67     2.32

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD   (0105) |
|   1 + 2 =  3     |        AREA    QPEAK    TPEAK     R.V.
--------------------        (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (0102):      1.56    .034      .50     2.66
      + ID2= 2 (0103):     10.51    .090      .67     2.32
          ==================================================
          ID = 3 (0105):     12.07    .107      .67     2.37

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| MASS STORM        |     Filename: C:\visual otthymo files\4456\AES 1-hr.mst
| Ptotal= 30.50 mm |     Comments: AES 1 HOUR STORM DISTRIBUTION a=21min k=
--------------------
                          Duration of storm    =  1.00 hrs
                          Mass curve time step =  5.00 min

                 TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
                  .08   13.58 |   .33   94.79 |   .58   15.04 |   .83    1.10
                  .17   40.66 |   .42   87.14 |   .67    6.26 |   .92     .40
                  .25   67.75 |   .50   36.64 |   .75    2.60 |  1.00     .04

-----------------------------------------------------------------------------
--------------------
| CALIB             |
| NASHYD    (0102)  |    Area    (ha)=   1.56   Curve Number   (CN)= 75.0
|ID= 1 DT=10.0 min  |    Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=    .13

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


                            ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
                 .167   27.12 |  .500   61.89 |  .833    1.85 |
                 .333   81.27 |  .667   10.65 | 1.000     .22 |

     Unit Hyd Qpeak  (cms)=    .462

     PEAK FLOW       (cms)=    .065 (i)
     TIME TO PEAK    (hrs)=    .500
     RUNOFF VOLUME    (mm)=   5.230
     TOTAL RAINFALL   (mm)=  30.500
     RUNOFF COEFFICIENT   =    .171

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

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



```
--------------------
| CALIB             |
| NASHYD    (0101)  |    Area    (ha)=   2.31   Curve Number   (CN)= 75.0
|ID= 1 DT=10.0 min  |    Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=    .25

     Unit Hyd Qpeak  (cms)=    .359

     PEAK FLOW       (cms)=    .064 (i)
     TIME TO PEAK    (hrs)=    .667
     RUNOFF VOLUME    (mm)=   5.830
     TOTAL RAINFALL   (mm)=  30.500
     RUNOFF COEFFICIENT   =    .191

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

--------------------------------------------------------------------------------
--------------------
| CALIB             |
| NASHYD    (0104)  |    Area    (ha)=   8.19   Curve Number   (CN)= 67.0
|ID= 1 DT=10.0 min  |    Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=    .41

     Unit Hyd Qpeak  (cms)=    .769

     PEAK FLOW       (cms)=    .116 (i)
     TIME TO PEAK    (hrs)=    .667
     RUNOFF VOLUME    (mm)=   4.310
     TOTAL RAINFALL   (mm)=  30.500
     RUNOFF COEFFICIENT   =    .141

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

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

--------------------
| ADD HYD   (0103) |
|   1 + 2 =  3     |        AREA    QPEAK    TPEAK     R.V.
--------------------        (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (0101):      2.31    .064      .67     5.83
      + ID2= 2 (0104):      8.19    .116      .67     4.31
          ==================================================
          ID = 3 (0103):     10.51    .180      .67     4.64

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD   (0105) |
|   1 + 2 =  3     |        AREA    QPEAK    TPEAK     R.V.
--------------------        (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (0102):      1.56    .065      .50     5.23
      + ID2= 2 (0103):     10.51    .180      .67     4.64
          ==================================================
          ID = 3 (0105):     12.07    .210      .67     4.72

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
  ****************************
  ** SIMULATION NUMBER:   3 **
  ****************************
```

```
--------------------
| MASS STORM       |    Filename: C:\visual otthymo files\4456\AES 1-hr.mst
| Ptotal= 35.80 mm |    Comments: AES 1 HOUR STORM DISTRIBUTION a=21min k=
--------------------
                        Duration of storm    =  1.00 hrs
                        Mass curve time step =  5.00 min

                TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
                 .08   15.94 |   .33  111.27 |   .58   17.66 |   .83    1.29
                 .17   47.73 |   .42  102.29 |   .67    7.35 |   .92     .47
                 .25   79.52 |   .50   43.00 |   .75    3.05 |  1.00     .04

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD    (0102) |   Area    (ha)=   1.56   Curve Number   (CN)= 75.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=    .13

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

                            ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
                .167   31.83 |  .500   72.65 |  .833    2.17 |
                .333   95.39 |  .667   12.50 | 1.000     .26 |

    Unit Hyd Qpeak  (cms)=    .462

    PEAK FLOW       (cms)=    .089 (i)
    TIME TO PEAK    (hrs)=    .500
    RUNOFF VOLUME    (mm)=   7.279
    TOTAL RAINFALL   (mm)=  35.800
    RUNOFF COEFFICIENT   =    .203

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD    (0101) |   Area    (ha)=   2.31   Curve Number   (CN)= 75.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=    .25

    Unit Hyd Qpeak  (cms)=    .359

    PEAK FLOW       (cms)=    .089 (i)
    TIME TO PEAK    (hrs)=    .500
    RUNOFF VOLUME    (mm)=   8.115
    TOTAL RAINFALL   (mm)=  35.800
    RUNOFF COEFFICIENT   =    .227

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD    (0104) |   Area    (ha)=   8.19   Curve Number   (CN)= 67.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=    .41
```



```
    Unit Hyd Qpeak  (cms)=    .769

    PEAK FLOW       (cms)=    .164 (i)
    TIME TO PEAK    (hrs)=    .667
    RUNOFF VOLUME    (mm)=   6.074
    TOTAL RAINFALL   (mm)=  35.800
    RUNOFF COEFFICIENT   =    .170

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

--------------------------------------------------------------------------------
--------------------
| ADD HYD   (0103) |
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
         ID1= 1 (0101):     2.31    .089      .50     8.12
       + ID2= 2 (0104):     8.19    .164      .67     6.07
         ================================================
         ID = 3 (0103):    10.51    .252      .67     6.52

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| ADD HYD   (0105) |
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
         ID1= 1 (0102):     1.56    .089      .50     7.28
       + ID2= 2 (0103):    10.51    .252      .67     6.52
         ================================================
         ID = 3 (0105):    12.07    .293      .67     6.62

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| MASS STORM       |    Filename: C:\visual otthymo files\4456\AES 1-hr.mst
| Ptotal= 42.50 mm |    Comments: AES 1 HOUR STORM DISTRIBUTION a=21min k=
--------------------
                        Duration of storm    =  1.00 hrs
                        Mass curve time step =  5.00 min

                TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
                 .08   18.92 |   .33  132.09 |   .58   20.96 |   .83    1.53
                 .17   56.66 |   .42  121.43 |   .67    8.72 |   .92     .56
                 .25   94.40 |   .50   51.05 |   .75    3.62 |  1.00     .05

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD    (0102) |   Area    (ha)=   1.56   Curve Number   (CN)= 75.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=    .13

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



```
                            ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
                .167   37.79 |  .500   86.24 |  .833    2.58 |
                .333  113.25 |  .667   14.84 | 1.000     .31 |

    Unit Hyd Qpeak  (cms)=    .462

    PEAK FLOW       (cms)=    .124 (i)
    TIME TO PEAK    (hrs)=    .500
    RUNOFF VOLUME    (mm)=  10.199
    TOTAL RAINFALL   (mm)=  42.500
    RUNOFF COEFFICIENT   =    .240

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD    (0101) |   Area    (ha)=   2.31   Curve Number   (CN)= 75.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=    .25

    Unit Hyd Qpeak  (cms)=    .359

    PEAK FLOW       (cms)=    .125 (i)
    TIME TO PEAK    (hrs)=    .500
    RUNOFF VOLUME    (mm)=  11.370
    TOTAL RAINFALL   (mm)=  42.500
    RUNOFF COEFFICIENT   =    .268

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD    (0104) |   Area    (ha)=   8.19   Curve Number   (CN)= 67.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=    .41

    Unit Hyd Qpeak  (cms)=    .769

    PEAK FLOW       (cms)=    .233 (i)
    TIME TO PEAK    (hrs)=    .667
    RUNOFF VOLUME    (mm)=   8.633
    TOTAL RAINFALL   (mm)=  42.500
    RUNOFF COEFFICIENT   =    .203

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

--------------------------------------------------------------------------------
--------------------
| ADD HYD   (0103) |
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
         ID1= 1 (0101):     2.31    .125      .50    11.37
       + ID2= 2 (0104):     8.19    .233      .67     8.63
         ================================================
         ID = 3 (0103):    10.51    .356      .67     9.24
```



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

--------------------------------------------------------------------------------
--------------------
| ADD HYD   (0105) |
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
         ID1= 1 (0102):     1.56    .124      .50    10.20
       + ID2= 2 (0103):    10.51    .356      .67     9.24
         ================================================
         ID = 3 (0105):    12.07    .412      .67     9.36

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
  ****************************
  ** SIMULATION NUMBER:   5 **
  ****************************

--------------------
| MASS STORM       |    Filename: C:\visual otthymo files\4456\AES 1-hr.mst
| Ptotal= 47.40 mm |    Comments: AES 1 HOUR STORM DISTRIBUTION a=21min k=
--------------------
                        Duration of storm    =  1.00 hrs
                        Mass curve time step =  5.00 min

                TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
                 .08   21.10 |   .33  147.32 |   .58   23.38 |   .83    1.71
                 .17   63.19 |   .42  135.43 |   .67    9.73 |   .92     .63
                 .25  105.28 |   .50   56.94 |   .75    4.04 |  1.00     .06

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD    (0102) |   Area    (ha)=   1.56   Curve Number   (CN)= 75.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=    .13

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

                            ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
                .167   42.15 |  .500   96.18 |  .833    2.87 |
                .333  126.30 |  .667   16.55 | 1.000     .34 |

    Unit Hyd Qpeak  (cms)=    .462

    PEAK FLOW       (cms)=    .151 (i)
    TIME TO PEAK    (hrs)=    .500
    RUNOFF VOLUME    (mm)=  12.536
    TOTAL RAINFALL   (mm)=  47.400
    RUNOFF COEFFICIENT   =    .264

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD    (0101) |   Area    (ha)=   2.31   Curve Number   (CN)= 75.0
```

```
|ID= 1 DT=10.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
-------------------   U.H. Tp(hrs)=    .25

     Unit Hyd Qpeak  (cms)=    .359

     PEAK FLOW       (cms)=    .155 (i)
     TIME TO PEAK    (hrs)=    .500
     RUNOFF VOLUME    (mm)=  13.976
     TOTAL RAINFALL   (mm)=  47.400
     RUNOFF COEFFICIENT   =    .295

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

--------------------------------------------------------------------------------
-------------------
| CALIB             |
| NASHYD    (0104) |   Area    (ha)=   8.19   Curve Number   (CN)= 67.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
-------------------   U.H. Tp(hrs)=    .41

     Unit Hyd Qpeak  (cms)=    .769

     PEAK FLOW       (cms)=    .290 (i)
     TIME TO PEAK    (hrs)=    .667
     RUNOFF VOLUME    (mm)=  10.713
     TOTAL RAINFALL   (mm)=  47.400
     RUNOFF COEFFICIENT   =    .226

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

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

-------------------
| ADD HYD   (0103) |
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------         (ha)    (cms)    (hrs)     (mm)
         ID1= 1 (0101):     2.31     .155      .50    13.98
       + ID2= 2 (0104):     8.19     .290      .67    10.71
         ================================================
         ID = 3 (0103):    10.51     .440      .67    11.43

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

-------------------
| ADD HYD   (0105) |
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------         (ha)    (cms)    (hrs)     (mm)
         ID1= 1 (0102):     1.56     .151      .50    12.54
       + ID2= 2 (0103):    10.51     .440      .67    11.43
         ================================================
         ID = 3 (0105):    12.07     .507      .67    11.57

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
  ****************************
  ** SIMULATION NUMBER:   6 **
  ****************************

-------------------
| MASS STORM       |    Filename: C:\visual otthymo files\4456\AES 1-hr.mst
```



```
| Ptotal= 52.40 mm |    Comments: AES 1 HOUR STORM DISTRIBUTION a=21min k=
-------------------

                       Duration of storm    =  1.00 hrs
                       Mass curve time step =  5.00 min

                TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
                 .08   23.33 |   .33  162.86 |   .58   25.84 |   .83    1.89
                 .17   69.86 |   .42  149.72 |   .67   10.75 |   .92     .69
                 .25  116.39 |   .50   62.94 |   .75    4.46 |  1.00     .06

--------------------------------------------------------------------------------
-------------------
| CALIB             |
| NASHYD    (0102) |   Area    (ha)=   1.56   Curve Number   (CN)= 75.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
-------------------   U.H. Tp(hrs)=    .13

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

                              ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
                .167   46.59 |  .500  106.33 |  .833    3.18 |
                .333  139.63 |  .667   18.30 | 1.000     .38 |

     Unit Hyd Qpeak  (cms)=    .462

     PEAK FLOW       (cms)=    .180 (i)
     TIME TO PEAK    (hrs)=    .500
     RUNOFF VOLUME    (mm)=  15.074
     TOTAL RAINFALL   (mm)=  52.400
     RUNOFF COEFFICIENT   =    .288

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

--------------------------------------------------------------------------------
-------------------
| CALIB             |
| NASHYD    (0101) |   Area    (ha)=   2.31   Curve Number   (CN)= 75.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
-------------------   U.H. Tp(hrs)=    .25

     Unit Hyd Qpeak  (cms)=    .359

     PEAK FLOW       (cms)=    .186 (i)
     TIME TO PEAK    (hrs)=    .500
     RUNOFF VOLUME    (mm)=  16.805
     TOTAL RAINFALL   (mm)=  52.400
     RUNOFF COEFFICIENT   =    .321

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

--------------------------------------------------------------------------------
-------------------
| CALIB             |
| NASHYD    (0104) |   Area    (ha)=   8.19   Curve Number   (CN)= 67.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
-------------------   U.H. Tp(hrs)=    .41

     Unit Hyd Qpeak  (cms)=    .769
```



```
     PEAK FLOW       (cms)=    .353 (i)
     TIME TO PEAK    (hrs)=    .667
     RUNOFF VOLUME    (mm)=  13.001
     TOTAL RAINFALL   (mm)=  52.400
     RUNOFF COEFFICIENT   =    .248

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

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

-------------------
| ADD HYD   (0103) |
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------         (ha)    (cms)    (hrs)     (mm)
         ID1= 1 (0101):     2.31     .186      .50    16.80
       + ID2= 2 (0104):     8.19     .353      .67    13.00
         ================================================
         ID = 3 (0103):    10.51     .531      .67    13.84

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

-------------------
| ADD HYD   (0105) |
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------         (ha)    (cms)    (hrs)     (mm)
         ID1= 1 (0102):     1.56     .180      .50    15.07
       + ID2= 2 (0103):    10.51     .531      .67    13.84
         ================================================
         ID = 3 (0105):    12.07     .611      .67    14.00

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

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

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

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM, Version 2.0
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M  M  O   O   Licensed To: MJ Davenport

        OOO     T      T    H   H    Y    M   M   OOO                vo2-0057


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

  Input   filename: C:\Program Files\Visual OTTHYMO v2.0\voin.dat

  Output  filename: C:\visual otthymo files\3969\3969-All
Scenarios\Pre-Development.out
  Summary filename: C:\visual otthymo files\3969\3969-All
Scenarios\Pre-Development.sum

DATE: 1/23/2019                           TIME: 1:32:44 PM

USER:


COMMENTS: _____________________________________________________
```

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

--------------------
| MASS STORM       |    Filename: C:\visual otthymo files\4456\SCS II 6-hr.mst
| Ptotal= 38.40 mm |    Comments: SCS 6 HOUR TYPE II STORM DISTRIBUTION
--------------------
                       Duration of storm    =  6.00 hrs
                       Mass curve time step = 10.00 min

      TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
       hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
       .17    1.61 |  1.67    3.92 |  3.17    8.52 |  4.67    2.30
       .33    1.38 |  1.83    3.69 |  3.33    8.29 |  4.83    2.30
       .50    1.61 |  2.00    3.92 |  3.50    8.52 |  5.00    2.30
       .67    2.30 |  2.17    4.61 |  3.67    3.92 |  5.17    1.61
       .83    2.30 |  2.33    4.61 |  3.83    3.69 |  5.33    1.38
      1.00    2.30 |  2.50    4.61 |  4.00    3.92 |  5.50    1.61
      1.17    2.30 |  2.67   23.04 |  4.17    3.00 |  5.67    1.61
      1.33    2.30 |  2.83   41.47 |  4.33    3.23 |  5.83    1.38
      1.50    2.30 |  3.00   59.90 |  4.50    3.00 |  6.00    1.61
```



```
--------------------
| CALIB            |
| NASHYD    (0102) |   Area    (ha)=   1.56   Curve Number   (CN)= 75.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=    .13

     Unit Hyd Qpeak  (cms)=    .462

     PEAK FLOW       (cms)=    .061 (i)
     TIME TO PEAK    (hrs)=   3.000
     RUNOFF VOLUME    (mm)=   8.372
     TOTAL RAINFALL   (mm)=  38.400
     RUNOFF COEFFICIENT   =    .218

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

```
--------------------
| CALIB            |
| NASHYD    (0101) |   Area    (ha)=   2.31   Curve Number   (CN)= 75.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=    .25

     Unit Hyd Qpeak  (cms)=    .359

     PEAK FLOW       (cms)=    .059 (i)
     TIME TO PEAK    (hrs)=   3.000
     RUNOFF VOLUME    (mm)=   9.333
     TOTAL RAINFALL   (mm)=  38.400
     RUNOFF COEFFICIENT   =    .243

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

```
--------------------
| CALIB            |
| NASHYD    (0104) |   Area    (ha)=   8.19   Curve Number   (CN)= 67.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=    .41

     Unit Hyd Qpeak  (cms)=    .769

     PEAK FLOW       (cms)=    .113 (i)
     TIME TO PEAK    (hrs)=   3.333
     RUNOFF VOLUME    (mm)=   7.025
     TOTAL RAINFALL   (mm)=  38.400
     RUNOFF COEFFICIENT   =    .183

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

```
--------------------
| ADD HYD    (0103) |
|   1 +  2 =  3     |          AREA    QPEAK    TPEAK     R.V.
--------------------            (ha)    (cms)    (hrs)     (mm)
         ID1= 1 (0101):     2.31    .059     3.00     9.33
       + ID2= 2 (0104):     8.19    .113     3.33     7.03
         ================================================
         ID = 3 (0103):    10.51    .167     3.17     7.53
```


NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```
--------------------
| ADD HYD    (0105) |
|   1 +  2 =  3     |          AREA    QPEAK    TPEAK     R.V.
--------------------            (ha)    (cms)    (hrs)     (mm)
         ID1= 1 (0102):     1.56    .061     3.00     8.37
       + ID2= 2 (0103):    10.51    .167     3.17     7.53
         ================================================
         ID = 3 (0105):    12.07    .194     3.00     7.64
```

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| MASS STORM       |    Filename: C:\visual otthymo files\4456\SCS II 6-hr.mst
| Ptotal= 50.50 mm |    Comments: SCS 6 HOUR TYPE II STORM DISTRIBUTION
--------------------
                       Duration of storm    =  6.00 hrs
                       Mass curve time step = 10.00 min

      TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
       hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
       .17    2.12 |  1.67    5.15 |  3.17   11.21 |  4.67    3.03
       .33    1.82 |  1.83    4.85 |  3.33   10.91 |  4.83    3.03
       .50    2.12 |  2.00    5.15 |  3.50   11.21 |  5.00    3.03
       .67    3.03 |  2.17    6.06 |  3.67    5.15 |  5.17    2.12
       .83    3.03 |  2.33    6.06 |  3.83    4.85 |  5.33    1.82
      1.00    3.03 |  2.50    6.06 |  4.00    5.15 |  5.50    2.12
      1.17    3.03 |  2.67   30.30 |  4.17    3.94 |  5.67    2.12
      1.33    3.03 |  2.83   54.54 |  4.33    4.24 |  5.83    1.82
      1.50    3.03 |  3.00   78.78 |  4.50    3.94 |  6.00    2.12
```

```
--------------------
| CALIB            |
| NASHYD    (0102) |   Area    (ha)=   1.56   Curve Number   (CN)= 75.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=    .13

     Unit Hyd Qpeak  (cms)=    .462

     PEAK FLOW       (cms)=    .103 (i)
     TIME TO PEAK    (hrs)=   3.000
     RUNOFF VOLUME    (mm)=  14.093
     TOTAL RAINFALL   (mm)=  50.500
     RUNOFF COEFFICIENT   =    .279

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

```
--------------------
| CALIB            |
| NASHYD    (0101) |   Area    (ha)=   2.31   Curve Number   (CN)= 75.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=    .25
```



```
     Unit Hyd Qpeak  (cms)=    .359

     PEAK FLOW       (cms)=    .103 (i)
     TIME TO PEAK    (hrs)=   3.000
     RUNOFF VOLUME    (mm)=  15.711
     TOTAL RAINFALL   (mm)=  50.500
     RUNOFF COEFFICIENT   =    .311

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

```
--------------------
| CALIB            |
| NASHYD    (0104) |   Area    (ha)=   8.19   Curve Number   (CN)= 67.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=    .41

     Unit Hyd Qpeak  (cms)=    .769

     PEAK FLOW       (cms)=    .197 (i)
     TIME TO PEAK    (hrs)=   3.333
     RUNOFF VOLUME    (mm)=  12.113
     TOTAL RAINFALL   (mm)=  50.500
     RUNOFF COEFFICIENT   =    .240

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

```
--------------------
| ADD HYD    (0103) |
|   1 +  2 =  3     |          AREA    QPEAK    TPEAK     R.V.
--------------------            (ha)    (cms)    (hrs)     (mm)
         ID1= 1 (0101):     2.31    .103     3.00    15.71
       + ID2= 2 (0104):     8.19    .197     3.33    12.11
         ================================================
         ID = 3 (0103):    10.51    .293     3.17    12.91
```

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```
--------------------
| ADD HYD    (0105) |
|   1 +  2 =  3     |          AREA    QPEAK    TPEAK     R.V.
--------------------            (ha)    (cms)    (hrs)     (mm)
         ID1= 1 (0102):     1.56    .103     3.00    14.09
       + ID2= 2 (0103):    10.51    .293     3.17    12.91
         ================================================
         ID = 3 (0105):    12.07    .341     3.00    13.06
```

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| MASS STORM       |    Filename: C:\visual otthymo files\4456\SCS II 6-hr.mst
| Ptotal= 58.60 mm |    Comments: SCS 6 HOUR TYPE II STORM DISTRIBUTION
--------------------
                       Duration of storm    =  6.00 hrs
```

Mass curve time step = 10.00 min

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.17	2.46	1.67	5.98	3.17	13.01	4.67	3.52
.33	2.11	1.83	5.63	3.33	12.66	4.83	3.52
.50	2.46	2.00	5.98	3.50	13.01	5.00	3.52
.67	3.52	2.17	7.03	3.67	5.98	5.17	2.46
.83	3.52	2.33	7.03	3.83	5.63	5.33	2.11
1.00	3.52	2.50	7.03	4.00	5.98	5.50	2.46
1.17	3.52	2.67	35.16	4.17	4.57	5.67	2.46
1.33	3.52	2.83	63.29	4.33	4.92	5.83	2.11
1.50	3.52	3.00	91.42	4.50	4.57	6.00	2.46

CALIB			
NASHYD (0102)	Area	(ha)= 1.56	Curve Number (CN)= 75.0
ID= 1 DT=10.0 min	Ia	(mm)= 5.00	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= .13		

Unit Hyd Qpeak (cms)= .462

PEAK FLOW (cms)= .135 (i)
TIME TO PEAK (hrs)= 3.000
RUNOFF VOLUME (mm)= 18.411
TOTAL RAINFALL (mm)= 58.600
RUNOFF COEFFICIENT = .314

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

CALIB			
NASHYD (0101)	Area	(ha)= 2.31	Curve Number (CN)= 75.0
ID= 1 DT=10.0 min	Ia	(mm)= 5.00	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= .25		

Unit Hyd Qpeak (cms)= .359

PEAK FLOW (cms)= .136 (i)
TIME TO PEAK (hrs)= 3.000
RUNOFF VOLUME (mm)= 20.525
TOTAL RAINFALL (mm)= 58.600
RUNOFF COEFFICIENT = .350

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

CALIB			
NASHYD (0104)	Area	(ha)= 8.19	Curve Number (CN)= 67.0
ID= 1 DT=10.0 min	Ia	(mm)= 5.00	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= .41		

Unit Hyd Qpeak (cms)= .769

PEAK FLOW (cms)= .263 (i)
TIME TO PEAK (hrs)= 3.333
RUNOFF VOLUME (mm)= 16.048
TOTAL RAINFALL (mm)= 58.600
RUNOFF COEFFICIENT = .274

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

ADD HYD (0103)					
1 + 2 = 3		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
	ID1= 1 (0101):	2.31	.136	3.00	20.53
	+ ID2= 2 (0104):	8.19	.263	3.33	16.05
	ID = 3 (0103):	10.51	.390	3.17	17.03

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0105)					
1 + 2 = 3		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
	ID1= 1 (0102):	1.56	.135	3.00	18.41
	+ ID2= 2 (0103):	10.51	.390	3.17	17.03
	ID = 3 (0105):	12.07	.455	3.00	17.21

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

** SIMULATION NUMBER: 4 **

MASS STORM	Filename: C:\visual otthymo files\4456\SCS II 6-hr.mst
Ptotal= 68.70 mm	Comments: SCS 6 HOUR TYPE II STORM DISTRIBUTION

Duration of storm = 6.00 hrs
Mass curve time step = 10.00 min

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.17	2.89	1.67	7.01	3.17	15.25	4.67	4.12
.33	2.47	1.83	6.60	3.33	14.84	4.83	4.12
.50	2.89	2.00	7.01	3.50	15.25	5.00	4.12
.67	4.12	2.17	8.24	3.67	7.01	5.17	2.89
.83	4.12	2.33	8.24	3.83	6.60	5.33	2.47
1.00	4.12	2.50	8.24	4.00	7.01	5.50	2.89
1.17	4.12	2.67	41.22	4.17	5.36	5.67	2.89
1.33	4.12	2.83	74.20	4.33	5.77	5.83	2.47
1.50	4.12	3.00	107.17	4.50	5.36	6.00	2.89

CALIB			
NASHYD (0102)	Area	(ha)= 1.56	Curve Number (CN)= 75.0
ID= 1 DT=10.0 min	Ia	(mm)= 5.00	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= .13		

Unit Hyd Qpeak (cms)= .462

PEAK FLOW (cms)= .177 (i)
TIME TO PEAK (hrs)= 3.000

RUNOFF VOLUME (mm)= 24.233
TOTAL RAINFALL (mm)= 68.700
RUNOFF COEFFICIENT = .353

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

CALIB			
NASHYD (0101)	Area	(ha)= 2.31	Curve Number (CN)= 75.0
ID= 1 DT=10.0 min	Ia	(mm)= 5.00	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= .25		

Unit Hyd Qpeak (cms)= .359

PEAK FLOW (cms)= .181 (i)
TIME TO PEAK (hrs)= 3.000
RUNOFF VOLUME (mm)= 27.016
TOTAL RAINFALL (mm)= 68.700
RUNOFF COEFFICIENT = .393

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

CALIB			
NASHYD (0104)	Area	(ha)= 8.19	Curve Number (CN)= 67.0
ID= 1 DT=10.0 min	Ia	(mm)= 5.00	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= .41		

Unit Hyd Qpeak (cms)= .769

PEAK FLOW (cms)= .354 (i)
TIME TO PEAK (hrs)= 3.333
RUNOFF VOLUME (mm)= 21.453
TOTAL RAINFALL (mm)= 68.700
RUNOFF COEFFICIENT = .312

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

ADD HYD (0103)					
1 + 2 = 3		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
	ID1= 1 (0101):	2.31	.181	3.00	27.02
	+ ID2= 2 (0104):	8.19	.354	3.33	21.45
	ID = 3 (0103):	10.51	.523	3.17	22.68

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0105)					
1 + 2 = 3		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
	ID1= 1 (0102):	1.56	.177	3.00	24.23
	+ ID2= 2 (0103):	10.51	.523	3.17	22.68
	ID = 3 (0105):	12.07	.610	3.00	22.88

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

** SIMULATION NUMBER: 5 **

MASS STORM	Filename: C:\visual otthymo files\4456\SCS II 6-hr.mst
Ptotal= 76.30 mm	Comments: SCS 6 HOUR TYPE II STORM DISTRIBUTION

Duration of storm = 6.00 hrs
Mass curve time step = 10.00 min

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.17	3.20	1.67	7.78	3.17	16.94	4.67	4.58
.33	2.75	1.83	7.32	3.33	16.48	4.83	4.58
.50	3.20	2.00	7.78	3.50	16.94	5.00	4.58
.67	4.58	2.17	9.16	3.67	7.78	5.17	3.20
.83	4.58	2.33	9.16	3.83	7.32	5.33	2.75
1.00	4.58	2.50	9.16	4.00	7.78	5.50	3.20
1.17	4.58	2.67	45.78	4.17	5.95	5.67	3.20
1.33	4.58	2.83	82.40	4.33	6.41	5.83	2.75
1.50	4.58	3.00	119.03	4.50	5.95	6.00	3.20

CALIB			
NASHYD (0102)	Area	(ha)= 1.56	Curve Number (CN)= 75.0
ID= 1 DT=10.0 min	Ia	(mm)= 5.00	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= .13		

Unit Hyd Qpeak (cms)= .462

PEAK FLOW (cms)= .211 (i)
TIME TO PEAK (hrs)= 3.000
RUNOFF VOLUME (mm)= 28.881
TOTAL RAINFALL (mm)= 76.300
RUNOFF COEFFICIENT = .379

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

CALIB			
NASHYD (0101)	Area	(ha)= 2.31	Curve Number (CN)= 75.0
ID= 1 DT=10.0 min	Ia	(mm)= 5.00	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= .25		

Unit Hyd Qpeak (cms)= .359

PEAK FLOW (cms)= .217 (i)
TIME TO PEAK (hrs)= 3.000
RUNOFF VOLUME (mm)= 32.198
TOTAL RAINFALL (mm)= 76.300
RUNOFF COEFFICIENT = .422

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

CALIB					
NASHYD (0104)	Area	(ha)=	8.19	Curve Number (CN)=	67.0
ID= 1 DT=10.0 min	Ia	(mm)=	5.00	# of Linear Res.(N)=	3.00
	U.H. Tp(hrs)=		.41		

Unit Hyd Qpeak (cms)= .769

PEAK FLOW (cms)= .428 (i)
TIME TO PEAK (hrs)= 3.333
RUNOFF VOLUME (mm)= 25.838
TOTAL RAINFALL (mm)= 76.300
RUNOFF COEFFICIENT = .339

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

ADD HYD (0103)	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0101):	2.31	.217	3.00	32.20
+ ID2= 2 (0104):	8.19	.428	3.33	25.84
ID = 3 (0103):	10.51	.632	3.17	27.24

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0105)	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0102):	1.56	.211	3.00	28.88
+ ID2= 2 (0103):	10.51	.632	3.17	27.24
ID = 3 (0105):	12.07	.736	3.00	27.45

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

** SIMULATION NUMBER: 6 **

MASS STORM	Filename: C:\visual otthymo files\4456\SCS II 6-hr.mst
Ptotal= 83.80 mm	Comments: SCS 6 HOUR TYPE II STORM DISTRIBUTION

Duration of storm = 6.00 hrs
Mass curve time step = 10.00 min

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.17	3.52	1.67	8.55	3.17	18.60	4.67	5.03
.33	3.02	1.83	8.04	3.33	18.10	4.83	5.03
.50	3.52	2.00	8.55	3.50	18.60	5.00	5.03
.67	5.03	2.17	10.06	3.67	8.55	5.17	3.52
.83	5.03	2.33	10.06	3.83	8.04	5.33	3.02
1.00	5.03	2.50	10.06	4.00	8.55	5.50	3.52
1.17	5.03	2.67	50.28	4.17	6.54	5.67	3.52
1.33	5.03	2.83	90.50	4.33	7.04	5.83	3.02

1.50	5.03	3.00	130.73	4.50	6.54	6.00	3.52	

CALIB					
NASHYD (0102)	Area	(ha)=	1.56	Curve Number (CN)=	75.0
ID= 1 DT=10.0 min	Ia	(mm)=	5.00	# of Linear Res.(N)=	3.00
	U.H. Tp(hrs)=		.13		

Unit Hyd Qpeak (cms)= .462

PEAK FLOW (cms)= .246 (i)
TIME TO PEAK (hrs)= 3.000
RUNOFF VOLUME (mm)= 33.658
TOTAL RAINFALL (mm)= 83.800
RUNOFF COEFFICIENT = .402

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

CALIB					
NASHYD (0101)	Area	(ha)=	2.31	Curve Number (CN)=	75.0
ID= 1 DT=10.0 min	Ia	(mm)=	5.00	# of Linear Res.(N)=	3.00
	U.H. Tp(hrs)=		.25		

Unit Hyd Qpeak (cms)= .359

PEAK FLOW (cms)= .254 (i)
TIME TO PEAK (hrs)= 3.000
RUNOFF VOLUME (mm)= 37.523
TOTAL RAINFALL (mm)= 83.800
RUNOFF COEFFICIENT = .448

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

CALIB					
NASHYD (0104)	Area	(ha)=	8.19	Curve Number (CN)=	67.0
ID= 1 DT=10.0 min	Ia	(mm)=	5.00	# of Linear Res.(N)=	3.00
	U.H. Tp(hrs)=		.41		

Unit Hyd Qpeak (cms)= .769

PEAK FLOW (cms)= .505 (i)
TIME TO PEAK (hrs)= 3.333
RUNOFF VOLUME (mm)= 30.398
TOTAL RAINFALL (mm)= 83.800
RUNOFF COEFFICIENT = .363

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

ADD HYD (0103)	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0101):	2.31	.254	3.00	37.52
+ ID2= 2 (0104):	8.19	.505	3.33	30.40
ID = 3 (0103):	10.51	.744	3.17	31.97

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

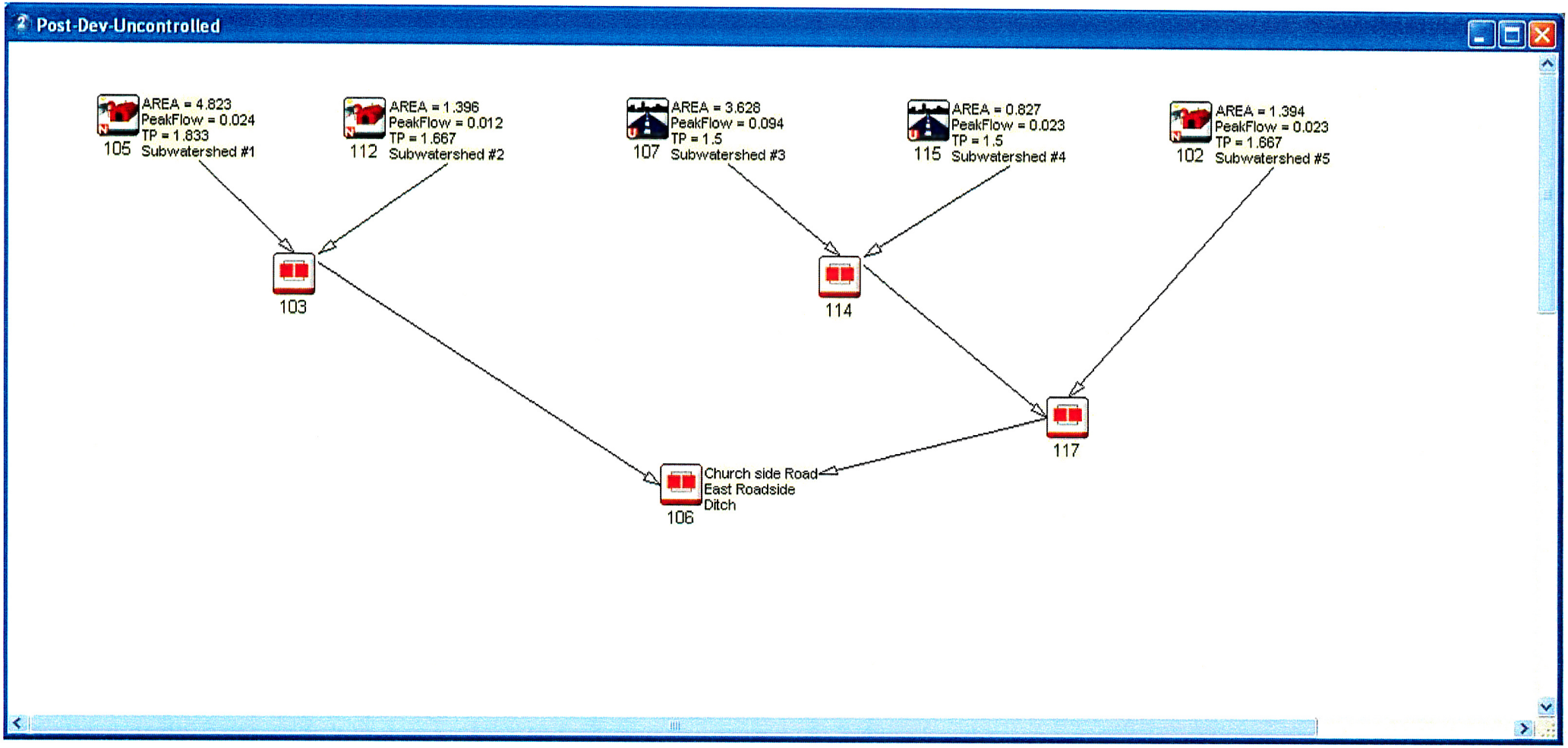
ADD HYD (0105)	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0102):	1.56	.246	3.00	33.66
+ ID2= 2 (0103):	10.51	.744	3.17	31.97
ID = 3 (0105):	12.07	.867	3.00	32.19

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

FINISH

APPENDIX III

VISUAL OTTHYMO OUTPUT
POST DEVELOPMENT UN-CONTROLLED


Post-Dev-Uncontrolled
AREA = 4.823
PeakFlow = 0.024
TP = 1.833
105 Subwatershed #1
AREA = 1.396
PeakFlow = 0.012
TP = 1.667
112 Subwatershed #2
AREA = 3.628
PeakFlow = 0.094
TP = 1.5
107 Subwatershed #3
AREA = 0.827
PeakFlow = 0.023
TP = 1.5
115 Subwatershed #4
AREA = 1.394
PeakFlow = 0.023
TP = 1.667
102 Subwatershed #5
103
114
117
Church side Road
East Roadside
Ditch
106

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

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

       OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM, Version 2.0
      O   O    T      T    H   H   Y Y   MM MM  O   O
      O   O    T      T    H   H    Y    M   M  O   O   Licensed To: MJ Davenport

       OOO     T      T    H   H    Y    M   M   OOO                 vo2-0057
```

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

  Input   filename: C:\Program Files\Visual OTTHYMO v2.0\voin.dat

  Output  filename: C:\visual otthymo files\3969\3969-All
Scenarios\Post-Dev-Uncontrolled.out
  Summary filename: C:\visual otthymo files\3969\3969-All
Scenarios\Post-Dev-Uncontrolled.sum


DATE: 1/23/2019                          TIME: 1:55:59 PM

USER:


COMMENTS: ____________________________________________________________


--------------------------------------------------------------------------------
  ****************************
  ** SIMULATION NUMBER:   9 **
  ****************************

--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 486.300
| Ptotal= 25.00 mm |                          B=   7.500
--------------------                          C=    .790
                        used in:   INTENSITY =  A / (t + B)^C

                        Duration of storm  =  4.00 hrs
                        Storm time step    = 10.00 min
                        Time to peak ratio =   .38

                  TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
                   .17    1.66 |  1.17    6.41 |  2.17    4.73 |  3.17    2.05
                   .33    1.87 |  1.33   14.61 |  2.33    3.84 |  3.33    1.89
                   .50    2.16 |  1.50   50.69 |  2.50    3.25 |  3.50    1.75
                   .67    2.55 |  1.67   17.59 |  2.67    2.82 |  3.67    1.63
                   .83    3.16 |  1.83    9.15 |  2.83    2.50 |  3.83    1.53
                  1.00    4.20 |  2.00    6.21 |  3.00    2.25 |  4.00    1.44
```



```
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD    (0105) |   Area    (ha)=   4.82   Curve Number   (CN)= 66.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=    .35

     Unit Hyd Qpeak  (cms)=    .522

     PEAK FLOW       (cms)=    .024 (i)
     TIME TO PEAK    (hrs)=   1.833
     RUNOFF VOLUME    (mm)=   2.642
     TOTAL RAINFALL   (mm)=  24.995
     RUNOFF COEFFICIENT   =    .106

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD    (0112) |   Area    (ha)=   1.40   Curve Number   (CN)= 75.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=    .24

     Unit Hyd Qpeak  (cms)=    .222

     PEAK FLOW       (cms)=    .012 (i)
     TIME TO PEAK    (hrs)=   1.667
     RUNOFF VOLUME    (mm)=   3.769
     TOTAL RAINFALL   (mm)=  24.995
     RUNOFF COEFFICIENT   =    .151

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

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

--------------------
| ADD HYD   (0103) |
|   1 + 2 =  3     |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (0105):       4.82     .024     1.83     2.64
      + ID2= 2 (0112):       1.40     .012     1.67     3.77
        ==================================================
        ID = 3 (0103):       6.22     .036     1.83     2.90

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD    (0102) |   Area    (ha)=   1.39   Curve Number   (CN)= 84.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   4.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=    .24

     Unit Hyd Qpeak  (cms)=    .223

     PEAK FLOW       (cms)=    .023 (i)
     TIME TO PEAK    (hrs)=   1.667
     RUNOFF VOLUME    (mm)=   6.267
     TOTAL RAINFALL   (mm)=  24.995
     RUNOFF COEFFICIENT   =    .251
```



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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD  (0115) |   Area    (ha)=    .83
|ID= 1 DT= 5.0 min |   Total Imp(%)=  33.00   Dir. Conn.(%)=  19.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      .27          .55
     Dep. Storage     (mm)=     1.00         2.00
     Average Slope     (%)=     2.00         3.00
     Length            (m)=    74.30       275.00
     Mannings n           =     .013         .250

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


                           ---- TRANSFORMED HYETOGRAPH ----
                  TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
                  .083    1.66 | 1.083    6.41 | 2.083    4.73 |  3.08    2.05
                  .167    1.66 | 1.167    6.41 | 2.167    4.73 |  3.17    2.05
                  .250    1.87 | 1.250   14.61 | 2.250    3.84 |  3.25    1.89
                  .333    1.87 | 1.333   14.61 | 2.333    3.84 |  3.33    1.89
                  .417    2.16 | 1.417   50.69 | 2.417    3.25 |  3.42    1.75
                  .500    2.16 | 1.500   50.69 | 2.500    3.25 |  3.50    1.75
                  .583    2.55 | 1.583   17.59 | 2.583    2.82 |  3.58    1.63
                  .667    2.55 | 1.667   17.59 | 2.667    2.82 |  3.67    1.63
                  .750    3.16 | 1.750    9.15 | 2.750    2.50 |  3.75    1.53
                  .833    3.16 | 1.833    9.15 | 2.833    2.50 |  3.83    1.53
                  .917    4.20 | 1.917    6.21 | 2.917    2.25 |  3.92    1.44
                 1.000    4.20 | 2.000    6.21 | 3.000    2.25 |  4.00    1.44

     Max.Eff.Inten.(mm/hr)=    50.69        10.32
                over (min)      5.00        55.00
     Storage Coeff.  (min)=     2.28 (ii)   51.57 (ii)
     Unit Hyd. Tpeak (min)=     5.00        55.00
     Unit Hyd. peak  (cms)=      .30          .02
                                                          *TOTALS*
     PEAK FLOW       (cms)=      .02          .01          .023 (iii)
     TIME TO PEAK    (hrs)=     1.50         2.42          1.50
     RUNOFF VOLUME    (mm)=    24.00        10.48         13.01
     TOTAL RAINFALL   (mm)=    25.00        25.00         25.00
     RUNOFF COEFFICIENT   =      .96          .42           .52

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

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN*  =  88.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD  (0107) |   Area    (ha)=   3.63
|ID= 1 DT= 5.0 min |   Total Imp(%)=  29.40   Dir. Conn.(%)=  19.00
--------------------
```



```
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=     1.07         2.56
     Dep. Storage     (mm)=     1.00         3.00
     Average Slope     (%)=     2.00         3.00
     Length            (m)=   155.50       440.00
     Mannings n           =     .013         .250

     Max.Eff.Inten.(mm/hr)=    50.69         7.08
                over (min)      5.00        80.00
     Storage Coeff.  (min)=     3.55 (ii)   79.52 (ii)
     Unit Hyd. Tpeak (min)=     5.00        80.00
     Unit Hyd. peak  (cms)=      .26          .01
                                                          *TOTALS*
     PEAK FLOW       (cms)=      .09          .02          .094 (iii)
     TIME TO PEAK    (hrs)=     1.50         2.92          1.50
     RUNOFF VOLUME    (mm)=    24.00         8.57         11.49
     TOTAL RAINFALL   (mm)=    25.00        25.00         25.00
     RUNOFF COEFFICIENT   =      .96          .34           .46

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

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN*  =  86.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

--------------------
| ADD HYD   (0114) |
|   1 + 2 =  3     |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (0115):        .83     .023     1.50    13.01
      + ID2= 2 (0107):       3.63     .094     1.50    11.49
        ==================================================
        ID = 3 (0114):       4.45     .117     1.50    11.77

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| ADD HYD   (0117) |
|   1 + 2 =  3     |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (0102):       1.39     .023     1.67     6.27
      + ID2= 2 (0114):       4.45     .117     1.50    11.77
        ==================================================
        ID = 3 (0117):       5.85     .132     1.50    10.46

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD   (0106) |
|   1 + 2 =  3     |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (0103):       6.22     .036     1.83     2.90
      + ID2= 2 (0117):       5.85     .132     1.50    10.46
```

Pre-Dev-Uncon-25mm

ID = 3 (0106):	12.07	.148	1.50	6.56

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

FINISH

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

 OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM, Version 2.0
O   O    T      T    H   H   Y Y   MM MM  O   O
O   O    T      T    H   H    Y    M   M  O   O   Licensed To: MJ Davenport

 OOO     T      T    H   H    Y    M   M   OOO                vo2-0057
```

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

Input filename: C:\Program Files\Visual OTTHYMO v2.0\voin.dat

Output filename: C:\visual otthymo files\3969\3969-All Scenarios\Post-Dev-Uncontrolled.out
Summary filename: C:\visual otthymo files\3969\3969-All Scenarios\Post-Dev-Uncontrolled.sum

DATE: 1/23/2019 TIME: 1:54:35 PM

USER:

COMMENTS: _____

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

| CHICAGO STORM | Ptotal= 37.36 mm |

IDF curve parameters: A= 662.000
B= 7.500
C= .790
used in: INTENSITY = A / (t + B)^C

Duration of storm = 6.00 hrs
Storm time step = 10.00 min
Time to peak ratio = .38

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.17	1.48	1.67	4.30	3.17	5.23	4.67	2.08
.33	1.59	1.83	5.71	3.33	4.42	4.83	1.96
.50	1.71	2.00	8.73	3.50	3.84	5.00	1.86
.67	1.86	2.17	19.90	3.67	3.41	5.17	1.76
.83	2.04	2.33	69.00	3.83	3.07	5.33	1.68
1.00	2.26	2.50	23.94	4.00	2.79	5.50	1.61

1.17	2.55	2.67	12.46	4.17	2.57	5.67	1.54
1.33	2.94	2.83	8.46	4.33	2.38	5.83	1.48
1.50	3.48	3.00	6.44	4.50	2.22	6.00	1.42

CALIB	
NASHYD (0105)	Area (ha)= 4.82 Curve Number (CN)= 66.0
ID= 1 DT=10.0 min	Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= .35

Unit Hyd Qpeak (cms)= .522

PEAK FLOW (cms)= .057 (i)
TIME TO PEAK (hrs)= 2.667
RUNOFF VOLUME (mm)= 6.397
TOTAL RAINFALL (mm)= 37.363
RUNOFF COEFFICIENT = .171

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

CALIB	
NASHYD (0112)	Area (ha)= 1.40 Curve Number (CN)= 75.0
ID= 1 DT=10.0 min	Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= .24

Unit Hyd Qpeak (cms)= .222

PEAK FLOW (cms)= .029 (i)
TIME TO PEAK (hrs)= 2.500
RUNOFF VOLUME (mm)= 8.830
TOTAL RAINFALL (mm)= 37.363
RUNOFF COEFFICIENT = .236

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

ADD HYD (0103)		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
1 + 2 = 3	ID1= 1 (0105):	4.82	.057	2.67	6.40
	+ ID2= 2 (0112):	1.40	.029	2.50	8.83
	ID = 3 (0103):	6.22	.084	2.67	6.94

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB	
NASHYD (0102)	Area (ha)= 1.39 Curve Number (CN)= 84.0
ID= 1 DT=10.0 min	Ia (mm)= 4.00 # of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= .24

Unit Hyd Qpeak (cms)= .223

PEAK FLOW (cms)= .048 (i)
TIME TO PEAK (hrs)= 2.500

RUNOFF VOLUME (mm)= 13.432
TOTAL RAINFALL (mm)= 37.363
RUNOFF COEFFICIENT = .359

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

CALIB	
STANDHYD (0115)	Area (ha)= .83
ID= 1 DT= 5.0 min	Total Imp(%)= 33.00 Dir. Conn.(%)= 19.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	.27	.55
Dep. Storage	(mm)=	1.00	2.00
Average Slope	(%)=	2.00	3.00
Length	(m)=	74.30	275.00
Mannings n	=	.013	.250

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.083	1.48	1.583	4.30	3.083	5.23	4.58	2.08
.167	1.48	1.667	4.30	3.167	5.23	4.67	2.08
.250	1.59	1.750	5.71	3.250	4.42	4.75	1.96
.333	1.59	1.833	5.71	3.333	4.42	4.83	1.96
.417	1.71	1.917	8.73	3.417	3.84	4.92	1.86
.500	1.71	2.000	8.73	3.500	3.84	5.00	1.86
.583	1.86	2.083	19.90	3.583	3.41	5.08	1.76
.667	1.86	2.167	19.90	3.667	3.41	5.17	1.76
.750	2.04	2.250	69.00	3.750	3.07	5.25	1.68
.833	2.04	2.333	69.00	3.833	3.07	5.33	1.68
.917	2.26	2.417	23.94	3.917	2.79	5.42	1.61
1.000	2.26	2.500	23.94	4.000	2.79	5.50	1.61
1.083	2.55	2.583	12.46	4.083	2.57	5.58	1.54
1.167	2.55	2.667	12.46	4.167	2.57	5.67	1.54
1.250	2.94	2.750	8.46	4.250	2.38	5.75	1.48
1.333	2.94	2.833	8.46	4.333	2.38	5.83	1.48
1.417	3.48	2.917	6.44	4.417	2.22	5.92	1.42
1.500	3.48	3.000	6.44	4.500	2.22	6.00	1.42

				TOTALS
Max.Eff.Inten.(mm/hr)=		69.00	20.78	
	over (min)	5.00	40.00	
Storage Coeff. (min)=		2.01 (ii)	39.27 (ii)	
Unit Hyd. Tpeak (min)=		5.00	40.00	
Unit Hyd. peak (cms)=		.31	.03	
PEAK FLOW	(cms)=	.03	.02	.034 (iii)
TIME TO PEAK	(hrs)=	2.33	2.92	2.33
RUNOFF VOLUME	(mm)=	36.36	19.81	22.93
TOTAL RAINFALL	(mm)=	37.36	37.36	37.36
RUNOFF COEFFICIENT	=	.97	.53	.61

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 88.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL

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

CALIB	
STANDHYD (0107)	Area (ha)= 3.63
ID= 1 DT= 5.0 min	Total Imp(%)= 29.40 Dir. Conn.(%)= 19.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	1.07	2.56
Dep. Storage	(mm)=	1.00	3.00
Average Slope	(%)=	2.00	3.00
Length	(m)=	155.50	440.00
Mannings n	=	.013	.250

				TOTALS
Max.Eff.Inten.(mm/hr)=		69.00	13.00	
	over (min)	5.00	65.00	
Storage Coeff. (min)=		3.14 (ii)	62.72 (ii)	
Unit Hyd. Tpeak (min)=		5.00	65.00	
Unit Hyd. peak (cms)=		.27	.02	
PEAK FLOW	(cms)=	.13	.05	.133 (iii)
TIME TO PEAK	(hrs)=	2.33	3.42	2.33
RUNOFF VOLUME	(mm)=	36.36	17.06	20.72
TOTAL RAINFALL	(mm)=	37.36	37.36	37.36
RUNOFF COEFFICIENT	=	.97	.46	.55

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 86.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0114)		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
1 + 2 = 3	ID1= 1 (0115):	.83	.034	2.33	22.93
	+ ID2= 2 (0107):	3.63	.133	2.33	20.72
	ID = 3 (0114):	4.45	.167	2.33	21.13

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0117)		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
1 + 2 = 3	ID1= 1 (0102):	1.39	.048	2.50	13.43
	+ ID2= 2 (0114):	4.45	.167	2.33	21.13
	ID = 3 (0117):	5.85	.202	2.33	19.29

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0106)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0103):		6.22	.084	2.67	6.94
+ ID2= 2 (0117):		5.85	.202	2.33	19.29
ID = 3 (0106):		12.07	.247	2.33	12.93

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

CHICAGO STORM | Ptotal= 48.64 mm

IDF curve parameters: A=1098.000
B= 10.100
C= .830
used in: INTENSITY = A / (t + B)^C

Duration of storm = 6.00 hrs
Storm time step = 10.00 min
Time to peak ratio = .38

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.17	1.65	1.67	5.38	3.17	6.69	4.67	2.40
.33	1.78	1.83	7.38	3.33	5.55	4.83	2.25
.50	1.93	2.00	11.78	3.50	4.74	5.00	2.12
.67	2.12	2.17	28.11	3.67	4.15	5.17	2.00
.83	2.35	2.33	90.98	3.83	3.69	5.33	1.90
1.00	2.63	2.50	33.98	4.00	3.33	5.50	1.80
1.17	3.01	2.67	17.30	4.17	3.03	5.67	1.72
1.33	3.51	2.83	11.37	4.33	2.79	5.83	1.64
1.50	4.24	3.00	8.43	4.50	2.58	6.00	1.58

CALIB | NASHYD (0105) | ID= 1 DT=10.0 min | Area (ha)= 4.82 Curve Number (CN)= 66.0 | Ia (mm)= 5.00 # of Linear Res.(N)= 3.00 | U.H. Tp(hrs)= .35

Unit Hyd Qpeak (cms)= .522

PEAK FLOW (cms)= .106 (i)
TIME TO PEAK (hrs)= 2.667
RUNOFF VOLUME (mm)= 10.883
TOTAL RAINFALL (mm)= 48.645
RUNOFF COEFFICIENT = .224

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

CALIB | NASHYD (0112) | Area (ha)= 1.40 Curve Number (CN)= 75.0

.167	1.65	1.667	5.38	3.167	6.69	4.67	2.40
.250	1.78	1.750	7.38	3.250	5.55	4.75	2.25
.333	1.78	1.833	7.38	3.333	5.55	4.83	2.25
.417	1.93	1.917	11.78	3.417	4.74	4.92	2.12
.500	1.93	2.000	11.78	3.500	4.74	5.00	2.12
.583	2.12	2.083	28.11	3.583	4.15	5.08	2.00
.667	2.12	2.167	28.11	3.667	4.15	5.17	2.00
.750	2.35	2.250	90.98	3.750	3.69	5.25	1.90
.833	2.35	2.333	90.98	3.833	3.69	5.33	1.90
.917	2.63	2.417	33.98	3.917	3.33	5.42	1.80
1.000	2.63	2.500	33.98	4.000	3.33	5.50	1.80
1.083	3.01	2.583	17.30	4.083	3.03	5.58	1.72
1.167	3.01	2.667	17.30	4.167	3.03	5.67	1.72
1.250	3.51	2.750	11.37	4.250	2.79	5.75	1.64
1.333	3.51	2.833	11.37	4.333	2.79	5.83	1.64
1.417	4.24	2.917	8.43	4.417	2.58	5.92	1.58
1.500	4.24	3.000	8.43	4.500	2.58	6.00	1.58

			TOTALS
Max.Eff.Inten.(mm/hr)=	90.98	38.59	
over (min)	5.00	35.00	
Storage Coeff. (min)=	1.80 (ii)	30.88 (ii)	
Unit Hyd. Tpeak (min)=	5.00	35.00	
Unit Hyd. peak (cms)=	.32	.04	
PEAK FLOW (cms)=	.04	.04	.048 (iii)
TIME TO PEAK (hrs)=	2.33	2.83	2.33
RUNOFF VOLUME (mm)=	47.64	29.19	32.68
TOTAL RAINFALL (mm)=	48.64	48.64	48.64
RUNOFF COEFFICIENT =	.98	.60	.67

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 88.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB | STANDHYD (0107) | ID= 1 DT= 5.0 min | Area (ha)= 3.63 | Total Imp(%)= 29.40 Dir. Conn.(%)= 19.00

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	1.07	2.56
Dep. Storage (mm)=	1.00	3.00
Average Slope (%)=	2.00	3.00
Length (m)=	155.50	440.00
Mannings n =	.013	.250

			TOTALS
Max.Eff.Inten.(mm/hr)=	90.98	23.44	
over (min)	5.00	50.00	
Storage Coeff. (min)=	2.81 (ii)	49.87 (ii)	
Unit Hyd. Tpeak (min)=	5.00	50.00	
Unit Hyd. peak (cms)=	.28	.02	
PEAK FLOW (cms)=	.17	.10	.185 (iii)
TIME TO PEAK (hrs)=	2.33	3.17	2.33
RUNOFF VOLUME (mm)=	47.64	25.82	29.96
TOTAL RAINFALL (mm)=	48.64	48.64	48.64

ID= 1 DT=10.0 min | Ia (mm)= 5.00 # of Linear Res.(N)= 3.00 | U.H. Tp(hrs)= .24

Unit Hyd Qpeak (cms)= .222

PEAK FLOW (cms)= .053 (i)
TIME TO PEAK (hrs)= 2.500
RUNOFF VOLUME (mm)= 14.647
TOTAL RAINFALL (mm)= 48.645
RUNOFF COEFFICIENT = .301

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

ADD HYD (0103)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0105):		4.82	.106	2.67	10.88
+ ID2= 2 (0112):		1.40	.053	2.50	14.65
ID = 3 (0103):		6.22	.153	2.67	11.73

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB | NASHYD (0102) | ID= 1 DT=10.0 min | Area (ha)= 1.39 Curve Number (CN)= 84.0 | Ia (mm)= 4.00 # of Linear Res.(N)= 3.00 | U.H. Tp(hrs)= .24

Unit Hyd Qpeak (cms)= .223

PEAK FLOW (cms)= .081 (i)
TIME TO PEAK (hrs)= 2.500
RUNOFF VOLUME (mm)= 21.135
TOTAL RAINFALL (mm)= 48.645
RUNOFF COEFFICIENT = .434

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

CALIB | STANDHYD (0115) | ID= 1 DT= 5.0 min | Area (ha)= .83 | Total Imp(%)= 33.00 Dir. Conn.(%)= 19.00

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	.27	.55
Dep. Storage (mm)=	1.00	2.00
Average Slope (%)=	2.00	3.00
Length (m)=	74.30	275.00
Mannings n =	.013	.250

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.083	1.65	1.583	5.38	3.083	6.69	4.58	2.40

RUNOFF COEFFICIENT = .98 .53 .62

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 86.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0114)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0115):		.83	.048	2.33	32.68
+ ID2= 2 (0107):		3.63	.185	2.33	29.96
ID = 3 (0114):		4.45	.233	2.33	30.46

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0117)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0102):		1.39	.081	2.50	21.13
+ ID2= 2 (0114):		4.45	.233	2.33	30.46
ID = 3 (0117):		5.85	.293	2.33	28.24

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0106)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0103):		6.22	.153	2.67	11.73
+ ID2= 2 (0117):		5.85	.293	2.33	28.24
ID = 3 (0106):		12.07	.378	2.33	19.73

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

CHICAGO STORM | Ptotal= 57.49 mm

IDF curve parameters: A=1560.000
B= 13.000
C= .860
used in: INTENSITY = A / (t + B)^C

Duration of storm = 6.00 hrs

Storm time step = 10.00 min
Time to peak ratio = .38

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.17	1.73	1.67	6.29	3.17	7.97	4.67	2.60
.33	1.88	1.83	8.87	3.33	6.51	4.83	2.42
.50	2.06	2.00	14.61	3.50	5.48	5.00	2.27
.67	2.27	2.17	35.36	3.67	4.74	5.17	2.13
.83	2.54	2.33	105.21	3.83	4.17	5.33	2.01
1.00	2.88	2.50	42.69	4.00	3.72	5.50	1.90
1.17	3.33	2.67	21.79	4.17	3.36	5.67	1.81
1.33	3.95	2.83	14.08	4.33	3.06	5.83	1.72
1.50	4.85	3.00	10.23	4.50	2.81	6.00	1.64

CALIB
NASHYD (0105) | Area (ha)= 4.82 Curve Number (CN)= 66.0
ID= 1 DT=10.0 min | Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= .35

Unit Hyd Qpeak (cms)= .522

PEAK FLOW (cms)= .151 (i)
TIME TO PEAK (hrs)= 2.667
RUNOFF VOLUME (mm)= 14.982
TOTAL RAINFALL (mm)= 57.490
RUNOFF COEFFICIENT = .261

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

CALIB
NASHYD (0112) | Area (ha)= 1.40 Curve Number (CN)= 75.0
ID= 1 DT=10.0 min | Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= .24

Unit Hyd Qpeak (cms)= .222

PEAK FLOW (cms)= .074 (i)
TIME TO PEAK (hrs)= 2.500
RUNOFF VOLUME (mm)= 19.820
TOTAL RAINFALL (mm)= 57.490
RUNOFF COEFFICIENT = .345

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

ADD HYD (0103) | 1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0105):	4.82	.151	2.67	14.98
+ ID2= 2 (0112):	1.40	.074	2.50	19.82
ID = 3 (0103):	6.22	.218	2.67	16.07

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RUNOFF VOLUME (mm)=	56.49	36.90	40.60
TOTAL RAINFALL (mm)=	57.49	57.49	57.49
RUNOFF COEFFICIENT =	.98	.64	.71

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 88.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB
STANDHYD (0107) | Area (ha)= 3.63
ID= 1 DT= 5.0 min | Total Imp(%)= 29.40 Dir. Conn.(%)= 19.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	1.07	2.56
Dep. Storage	(mm)=	1.00	3.00
Average Slope	(%)=	2.00	3.00
Length	(m)=	155.50	440.00
Mannings n	=	.013	.250

				TOTALS
Max.Eff.Inten.(mm/hr)=		105.21	35.48	
over (min)		5.00	45.00	
Storage Coeff. (min)=		2.65 (ii)	42.52 (ii)	
Unit Hyd. Tpeak (min)=		5.00	45.00	
Unit Hyd. peak (cms)=		.29	.03	
PEAK FLOW	(cms)=	.20	.14	.223 (iii)
TIME TO PEAK	(hrs)=	2.33	3.00	2.33
RUNOFF VOLUME	(mm)=	56.49	33.12	37.56
TOTAL RAINFALL	(mm)=	57.49	57.49	57.49
RUNOFF COEFFICIENT	=	.98	.58	.65

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 86.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0114) | 1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0115):	.83	.060	2.33	40.60
+ ID2= 2 (0107):	3.63	.223	2.33	37.56
ID = 3 (0114):	4.45	.283	2.33	38.12

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB
NASHYD (0102) | Area (ha)= 1.39 Curve Number (CN)= 84.0
ID= 1 DT=10.0 min | Ia (mm)= 4.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= .24

Unit Hyd Qpeak (cms)= .223

PEAK FLOW (cms)= .109 (i)
TIME TO PEAK (hrs)= 2.500
RUNOFF VOLUME (mm)= 27.705
TOTAL RAINFALL (mm)= 57.490
RUNOFF COEFFICIENT = .482

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

CALIB
STANDHYD (0115) | Area (ha)= .83
ID= 1 DT= 5.0 min | Total Imp(%)= 33.00 Dir. Conn.(%)= 19.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	.27	.55
Dep. Storage	(mm)=	1.00	2.00
Average Slope	(%)=	2.00	3.00
Length	(m)=	74.30	275.00
Mannings n	=	.013	.250

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.083	1.73	1.583	6.29	3.083	7.97	4.58	2.60
.167	1.73	1.667	6.29	3.167	7.97	4.67	2.60
.250	1.88	1.750	8.87	3.250	6.51	4.75	2.42
.333	1.88	1.833	8.87	3.333	6.51	4.83	2.42
.417	2.06	1.917	14.61	3.417	5.48	4.92	2.27
.500	2.06	2.000	14.61	3.500	5.48	5.00	2.27
.583	2.27	2.083	35.36	3.583	4.74	5.08	2.13
.667	2.27	2.167	35.36	3.667	4.74	5.17	2.13
.750	2.54	2.250	105.21	3.750	4.17	5.25	2.01
.833	2.54	2.333	105.21	3.833	4.17	5.33	2.01
.917	2.88	2.417	42.69	3.917	3.72	5.42	1.90
1.000	2.88	2.500	42.69	4.000	3.72	5.50	1.90
1.083	3.33	2.583	21.79	4.083	3.36	5.58	1.81
1.167	3.33	2.667	21.79	4.167	3.36	5.67	1.81
1.250	3.95	2.750	14.08	4.250	3.06	5.75	1.72
1.333	3.95	2.833	14.08	4.333	3.06	5.83	1.72
1.417	4.85	2.917	10.23	4.417	2.81	5.92	1.64
1.500	4.85	3.000	10.23	4.500	2.81	6.00	1.64

				TOTALS
Max.Eff.Inten.(mm/hr)=		105.21	49.44	
over (min)		5.00	30.00	
Storage Coeff. (min)=		1.70 (ii)	28.04 (ii)	
Unit Hyd. Tpeak (min)=		5.00	30.00	
Unit Hyd. peak (cms)=		.32	.04	
PEAK FLOW	(cms)=	.05	.05	.060 (iii)
TIME TO PEAK	(hrs)=	2.33	2.75	2.33

ADD HYD (0117) | 1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0102):	1.39	.109	2.50	27.71
+ ID2= 2 (0114):	4.45	.283	2.33	38.12
ID = 3 (0117):	5.85	.364	2.33	35.64

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0106) | 1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0103):	6.22	.218	2.67	16.07
+ ID2= 2 (0117):	5.85	.364	2.33	35.64
ID = 3 (0106):	12.07	.498	2.50	25.55

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

** SIMULATION NUMBER: 4 **

CHICAGO STORM | Ptotal= 65.65 mm	IDF curve parameters: A=2010.000 B= 14.000 C= .880

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

Duration of storm = 6.00 hrs
Storm time step = 10.00 min
Time to peak ratio = .38

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.17	1.78	1.67	6.98	3.17	8.95	4.67	2.75
.33	1.95	1.83	10.01	3.33	7.23	4.83	2.55
.50	2.14	2.00	16.85	3.50	6.04	5.00	2.37
.67	2.38	2.17	41.62	3.67	5.17	5.17	2.22
.83	2.67	2.33	122.63	3.83	4.52	5.33	2.09
1.00	3.05	2.50	50.34	4.00	4.00	5.50	1.97
1.17	3.56	2.67	25.45	4.17	3.60	5.67	1.87
1.33	4.27	2.83	16.21	4.33	3.26	5.83	1.77
1.50	5.31	3.00	11.63	4.50	2.98	6.00	1.69

CALIB
NASHYD (0105) | Area (ha)= 4.82 Curve Number (CN)= 66.0
ID= 1 DT=10.0 min | Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= .35

Unit Hyd Qpeak (cms)= .522

PEAK FLOW (cms)= .201 (i)

```
     TIME TO PEAK    (hrs)=   2.667
     RUNOFF VOLUME    (mm)=  19.147
     TOTAL RAINFALL   (mm)=  65.646
     RUNOFF COEFFICIENT   =    .292

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

--------------------------------------------------------------------------------
--------------------
| CALIB              |
| NASHYD    (0112) |   Area    (ha)=   1.40   Curve Number   (CN)= 75.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=    .24

     Unit Hyd Qpeak  (cms)=    .222

     PEAK FLOW       (cms)=    .098 (i)
     TIME TO PEAK    (hrs)=   2.500
     RUNOFF VOLUME    (mm)=  24.972
     TOTAL RAINFALL   (mm)=  65.646
     RUNOFF COEFFICIENT   =    .380

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

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--------------------
| ADD HYD   (0103) |
|   1 +  2 =  3    |        AREA    QPEAK    TPEAK     R.V.
--------------------        (ha)    (cms)    (hrs)     (mm)
         ID1= 1 (0105):     4.82    .201     2.67    19.15
       + ID2= 2 (0112):     1.40    .098     2.50    24.97
         ==========================================
         ID = 3 (0103):     6.22    .288     2.67    20.45

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| CALIB              |
| NASHYD    (0102) |   Area    (ha)=   1.39   Curve Number   (CN)= 84.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   4.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=    .24

     Unit Hyd Qpeak  (cms)=    .223

     PEAK FLOW       (cms)=    .140 (i)
     TIME TO PEAK    (hrs)=   2.500
     RUNOFF VOLUME    (mm)=  34.070
     TOTAL RAINFALL   (mm)=  65.646
     RUNOFF COEFFICIENT   =    .519

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

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--------------------
| CALIB              |
| STANDHYD  (0115) |   Area    (ha)=    .83
|ID= 1 DT= 5.0 min |   Total Imp(%)=  33.00   Dir. Conn.(%)=  19.00
--------------------

                         IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       .27          .55
     Dep. Storage     (mm)=      1.00         2.00
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     Average Slope     (%)=      2.00         3.00
     Length            (m)=     74.30       275.00
     Mannings n            =     .013         .250

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

                      ---- TRANSFORMED HYETOGRAPH ----
     TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
      hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
     .083    1.78 | 1.583    6.98 | 3.083    8.95 | 4.58     2.75
     .167    1.78 | 1.667    6.98 | 3.167    8.95 | 4.67     2.75
     .250    1.95 | 1.750   10.01 | 3.250    7.23 | 4.75     2.55
     .333    1.95 | 1.833   10.01 | 3.333    7.23 | 4.83     2.55
     .417    2.14 | 1.917   16.85 | 3.417    6.04 | 4.92     2.37
     .500    2.14 | 2.000   16.85 | 3.500    6.04 | 5.00     2.37
     .583    2.38 | 2.083   41.62 | 3.583    5.17 | 5.08     2.22
     .667    2.38 | 2.167   41.62 | 3.667    5.17 | 5.17     2.22
     .750    2.67 | 2.250  122.63 | 3.750    4.52 | 5.25     2.09
     .833    2.67 | 2.333  122.63 | 3.833    4.52 | 5.33     2.09
     .917    3.05 | 2.417   50.34 | 3.917    4.00 | 5.42     1.97
    1.000    3.05 | 2.500   50.34 | 4.000    4.00 | 5.50     1.97
    1.083    3.56 | 2.583   25.45 | 4.083    3.60 | 5.58     1.87
    1.167    3.56 | 2.667   25.45 | 4.167    3.60 | 5.67     1.87
    1.250    4.27 | 2.750   16.21 | 4.250    3.26 | 5.75     1.77
    1.333    4.27 | 2.833   16.21 | 4.333    3.26 | 5.83     1.77
    1.417    5.31 | 2.917   11.63 | 4.417    2.98 | 5.92     1.69
    1.500    5.31 | 3.000   11.63 | 4.500    2.98 | 6.00     1.69

     Max.Eff.Inten.(mm/hr)=    122.63        67.74
           over (min)          5.00        25.00
     Storage Coeff.  (min)=    1.60 (ii)   24.82 (ii)
     Unit Hyd. Tpeak (min)=    5.00        25.00
     Unit Hyd. peak  (cms)=     .32          .05
                                                    *TOTALS*
     PEAK FLOW       (cms)=     .05          .07        .077 (iii)
     TIME TO PEAK    (hrs)=    2.33         2.67         2.33
     RUNOFF VOLUME    (mm)=   64.65        44.20        48.07
     TOTAL RAINFALL   (mm)=   65.65        65.65        65.65
     RUNOFF COEFFICIENT   =     .98          .67          .73

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  88.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD  (0107) |   Area    (ha)=   3.63
|ID= 1 DT= 5.0 min |   Total Imp(%)=  29.40   Dir. Conn.(%)=  19.00
--------------------

                         IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      1.07         2.56
     Dep. Storage     (mm)=      1.00         3.00
     Average Slope     (%)=      2.00         3.00
     Length            (m)=    155.50       440.00
     Mannings n            =     .013         .250
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     Max.Eff.Inten.(mm/hr)=    122.63        44.30
           over (min)          5.00        40.00
     Storage Coeff.  (min)=    2.49 (ii)   38.98 (ii)
     Unit Hyd. Tpeak (min)=    5.00        40.00
     Unit Hyd. peak  (cms)=     .29          .03
                                                    *TOTALS*
     PEAK FLOW       (cms)=     .23          .19        .270 (iii)
     TIME TO PEAK    (hrs)=    2.33         2.92         2.33
     RUNOFF VOLUME    (mm)=   64.65        40.10        44.76
     TOTAL RAINFALL   (mm)=   65.65        65.65        65.65
     RUNOFF COEFFICIENT   =     .98          .61          .68

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  86.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| ADD HYD   (0114) |
|   1 +  2 =  3    |        AREA    QPEAK    TPEAK     R.V.
--------------------        (ha)    (cms)    (hrs)     (mm)
         ID1= 1 (0115):      .83    .077     2.33    48.07
       + ID2= 2 (0107):     3.63    .270     2.33    44.76
         ==========================================
         ID = 3 (0114):     4.45    .347     2.33    45.37

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| ADD HYD   (0117) |
|   1 +  2 =  3    |        AREA    QPEAK    TPEAK     R.V.
--------------------        (ha)    (cms)    (hrs)     (mm)
         ID1= 1 (0102):     1.39    .140     2.50    34.07
       + ID2= 2 (0114):     4.45    .347     2.33    45.37
         ==========================================
         ID = 3 (0117):     5.85    .451     2.33    42.68

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| ADD HYD   (0106) |
|   1 +  2 =  3    |        AREA    QPEAK    TPEAK     R.V.
--------------------        (ha)    (cms)    (hrs)     (mm)
         ID1= 1 (0103):     6.22    .288     2.67    20.45
       + ID2= 2 (0117):     5.85    .451     2.33    42.68
         ==========================================
         ID = 3 (0106):    12.07    .666     2.67    31.23

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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  ****************************
  ** SIMULATION NUMBER:   5 **
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| CHICAGO STORM    |     IDF curve parameters: A=2200.000
| Ptotal= 76.13 mm |                           B=  14.600
--------------------                           C=    .870
                          used in:   INTENSITY =  A / (t + B)^C

                          Duration of storm  =  6.00 hrs
                          Storm time step    = 10.00 min
                          Time to peak ratio =   .38

     TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
      hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
      .17    2.22 |  1.67    8.42 |  3.17   10.74 |  4.67    3.38
      .33    2.41 |  1.83   11.98 |  3.33    8.72 |  4.83    3.14
      .50    2.65 |  2.00   19.90 |  3.50    7.31 |  5.00    2.93
      .67    2.93 |  2.17   47.86 |  3.67    6.28 |  5.17    2.75
      .83    3.29 |  2.33  135.62 |  3.83    5.50 |  5.33    2.59
     1.00    3.75 |  2.50   57.60 |  4.00    4.89 |  5.50    2.44
     1.17    4.36 |  2.67   29.73 |  4.17    4.40 |  5.67    2.32
     1.33    5.21 |  2.83   19.18 |  4.33    4.00 |  5.83    2.20
     1.50    6.45 |  3.00   13.86 |  4.50    3.67 |  6.00    2.10

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--------------------
| CALIB              |
| NASHYD    (0105) |   Area    (ha)=   4.82   Curve Number   (CN)= 66.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=    .35

     Unit Hyd Qpeak  (cms)=    .522

     PEAK FLOW       (cms)=    .257 (i)
     TIME TO PEAK    (hrs)=   2.667
     RUNOFF VOLUME    (mm)=  24.972
     TOTAL RAINFALL   (mm)=  76.131
     RUNOFF COEFFICIENT   =    .328

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

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--------------------
| CALIB              |
| NASHYD    (0112) |   Area    (ha)=   1.40   Curve Number   (CN)= 75.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=    .24

     Unit Hyd Qpeak  (cms)=    .222

     PEAK FLOW       (cms)=    .123 (i)
     TIME TO PEAK    (hrs)=   2.500
     RUNOFF VOLUME    (mm)=  32.041
     TOTAL RAINFALL   (mm)=  76.131
     RUNOFF COEFFICIENT   =    .421

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

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ADD HYD (0103)					
1 + 2 = 3		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
	ID1= 1 (0105):	4.82	.257	2.67	24.97
	+ ID2= 2 (0112):	1.40	.123	2.50	32.04
	ID = 3 (0103):	6.22	.366	2.67	26.56

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB				
NASHYD (0102)	Area (ha)= 1.39	Curve Number (CN)= 84.0		
ID= 1 DT=10.0 min	Ia (mm)= 4.00	# of Linear Res.(N)= 3.00		
	U.H. Tp(hrs)= .24			

Unit Hyd Qpeak (cms)= .223

PEAK FLOW (cms)= .171 (i)
TIME TO PEAK (hrs)= 2.500
RUNOFF VOLUME (mm)= 42.587
TOTAL RAINFALL (mm)= 76.131
RUNOFF COEFFICIENT = .559

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

CALIB			
STANDHYD (0115)	Area (ha)= .83		
ID= 1 DT= 5.0 min	Total Imp(%)= 33.00	Dir. Conn.(%)= 19.00	

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	.27	.55
Dep. Storage (mm)=	1.00	2.00
Average Slope (%)=	2.00	3.00
Length (m)=	74.30	275.00
Mannings n =	.013	.250

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.083	2.22	1.583	8.42	3.083	10.74	4.58	3.38
.167	2.22	1.667	8.42	3.167	10.74	4.67	3.38
.250	2.41	1.750	11.98	3.250	8.72	4.75	3.14
.333	2.41	1.833	11.98	3.333	8.72	4.83	3.14
.417	2.65	1.917	19.90	3.417	7.31	4.92	2.93
.500	2.65	2.000	19.90	3.500	7.31	5.00	2.93
.583	2.93	2.083	47.86	3.583	6.28	5.08	2.75
.667	2.93	2.167	47.86	3.667	6.28	5.17	2.75
.750	3.29	2.250	135.62	3.750	5.50	5.25	2.59
.833	3.29	2.333	135.62	3.833	5.50	5.33	2.59
.917	3.75	2.417	57.60	3.917	4.89	5.42	2.44
1.000	3.75	2.500	57.60	4.000	4.89	5.50	2.44
1.083	4.36	2.583	29.73	4.083	4.40	5.58	2.32
1.167	4.36	2.667	29.73	4.167	4.40	5.67	2.32
1.250	5.21	2.750	19.18	4.250	4.00	5.75	2.20
1.333	5.21	2.833	19.18	4.333	4.00	5.83	2.20

1.417	6.45	2.917	13.86	4.417	3.67	5.92	2.10
1.500	6.45	3.000	13.86	4.500	3.67	6.00	2.10

Max.Eff.Inten.(mm/hr)= 135.62 79.92
over (min) 5.00 25.00
Storage Coeff. (min)= 1.54 (ii) 23.27 (ii)
Unit Hyd. Tpeak (min)= 5.00 25.00
Unit Hyd. peak (cms)= .33 .05

		TOTALS
PEAK FLOW	(cms)=	.06 .08 .094 (iii)
TIME TO PEAK	(hrs)=	2.33 2.67 2.67
RUNOFF VOLUME	(mm)=	75.13 53.79 57.82
TOTAL RAINFALL	(mm)=	76.13 76.13 76.13
RUNOFF COEFFICIENT	=	.99 .71 .76

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 88.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB			
STANDHYD (0107)	Area (ha)= 3.63		
ID= 1 DT= 5.0 min	Total Imp(%)= 29.40	Dir. Conn.(%)= 19.00	

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	1.07	2.56
Dep. Storage (mm)=	1.00	3.00
Average Slope (%)=	2.00	3.00
Length (m)=	155.50	440.00
Mannings n =	.013	.250

Max.Eff.Inten.(mm/hr)= 135.62 57.63
over (min) 5.00 40.00
Storage Coeff. (min)= 2.39 (ii) 35.24 (ii)
Unit Hyd. Tpeak (min)= 5.00 40.00
Unit Hyd. peak (cms)= .30 .03

		TOTALS
PEAK FLOW	(cms)=	.26 .24 .310 (iii)
TIME TO PEAK	(hrs)=	2.33 2.33 2.33
RUNOFF VOLUME	(mm)=	75.13 49.33 54.23
TOTAL RAINFALL	(mm)=	76.13 76.13 76.13
RUNOFF COEFFICIENT	=	.99 .65 .71

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 86.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0114)					
1 + 2 = 3		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
	ID1= 1 (0115):	.83	.094	2.67	57.82
	+ ID2= 2 (0107):	3.63	.310	2.33	54.23
	ID = 3 (0114):	4.45	.400	2.33	54.90

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0117)					
1 + 2 = 3		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
	ID1= 1 (0102):	1.39	.171	2.50	42.59
	+ ID2= 2 (0114):	4.45	.400	2.33	54.90
	ID = 3 (0117):	5.85	.529	2.33	51.96

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0106)					
1 + 2 = 3		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
	ID1= 1 (0103):	6.22	.366	2.67	26.56
	+ ID2= 2 (0117):	5.85	.529	2.33	51.96
	ID = 3 (0106):	12.07	.837	2.67	38.87

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

****
** SIMULATION NUMBER: 6 **
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CHICAGO STORM	IDF curve parameters: A=2507.000
Ptotal= 81.72 mm	B= 14.800
	C= .880

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

Duration of storm = 6.00 hrs
Storm time step = 10.00 min
Time to peak ratio = .38

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.17	2.25	1.67	8.85	3.17	11.36	4.67	3.47
.33	2.45	1.83	12.70	3.33	9.17	4.83	3.22
.50	2.70	2.00	21.34	3.50	7.66	5.00	3.00
.67	3.00	2.17	52.05	3.67	6.56	5.17	2.81
.83	3.38	2.33	148.61	3.83	5.72	5.33	2.64
1.00	3.86	2.50	62.77	4.00	5.07	5.50	2.49
1.17	4.51	2.67	32.11	4.17	4.55	5.67	2.36
1.33	5.41	2.83	20.54	4.33	4.12	5.83	2.24
1.50	6.73	3.00	14.75	4.50	3.77	6.00	2.13

CALIB			
NASHYD (0105)	Area (ha)= 4.82	Curve Number (CN)= 66.0	
ID= 1 DT=10.0 min	Ia (mm)= 5.00	# of Linear Res.(N)= 3.00	
	U.H. Tp(hrs)= .35		

Unit Hyd Qpeak (cms)= .522

PEAK FLOW (cms)= .298 (i)
TIME TO PEAK (hrs)= 2.667
RUNOFF VOLUME (mm)= 28.272
TOTAL RAINFALL (mm)= 81.724
RUNOFF COEFFICIENT = .346

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

CALIB			
NASHYD (0112)	Area (ha)= 1.40	Curve Number (CN)= 75.0	
ID= 1 DT=10.0 min	Ia (mm)= 5.00	# of Linear Res.(N)= 3.00	
	U.H. Tp(hrs)= .24		

Unit Hyd Qpeak (cms)= .222

PEAK FLOW (cms)= .141 (i)
TIME TO PEAK (hrs)= 2.500
RUNOFF VOLUME (mm)= 35.987
TOTAL RAINFALL (mm)= 81.724
RUNOFF COEFFICIENT = .440

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

ADD HYD (0103)					
1 + 2 = 3		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
	ID1= 1 (0105):	4.82	.298	2.67	28.27
	+ ID2= 2 (0112):	1.40	.141	2.50	35.99
	ID = 3 (0103):	6.22	.422	2.67	30.00

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOW IF ANY.

CALIB			
NASHYD (0102)	Area (ha)= 1.39	Curve Number (CN)= 84.0	
ID= 1 DT=10.0 min	Ia (mm)= 4.00	# of Linear Res.(N)= 3.00	
	U.H. Tp(hrs)= .24		

Unit Hyd Qpeak (cms)= .223

PEAK FLOW (cms)= .194 (i)
TIME TO PEAK (hrs)= 2.500
RUNOFF VOLUME (mm)= 47.255
TOTAL RAINFALL (mm)= 81.724
RUNOFF COEFFICIENT = .578

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

CALIB				
STANDHYD (0115)	Area	(ha)=	.83	
ID= 1 DT= 5.0 min	Total Imp(%)=	33.00	Dir. Conn.(%)=	19.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	.27	.55
Dep. Storage	(mm)=	1.00	2.00
Average Slope	(%)=	2.00	3.00
Length	(m)=	74.30	275.00
Mannings n	=	.013	.250

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.083	2.25	1.583	8.85	3.083	11.36	4.58	3.47
.167	2.25	1.667	8.85	3.167	11.36	4.67	3.47
.250	2.45	1.750	12.70	3.250	9.17	4.75	3.22
.333	2.45	1.833	12.70	3.333	9.17	4.83	3.22
.417	2.70	1.917	21.34	3.417	7.66	4.92	3.00
.500	2.70	2.000	21.34	3.500	7.66	5.00	3.00
.583	3.00	2.083	52.05	3.583	6.56	5.08	2.81
.667	3.00	2.167	52.05	3.667	6.56	5.17	2.81
.750	3.38	2.250	148.61	3.750	5.72	5.25	2.64
.833	3.38	2.333	148.61	3.833	5.72	5.33	2.64
.917	3.86	2.417	62.78	3.917	5.07	5.42	2.49
1.000	3.86	2.500	62.77	4.000	5.07	5.50	2.49
1.083	4.51	2.583	32.11	4.083	4.55	5.58	2.36
1.167	4.51	2.667	32.11	4.167	4.55	5.67	2.36
1.250	5.41	2.750	20.54	4.250	4.12	5.75	2.24
1.333	5.41	2.833	20.54	4.333	4.12	5.83	2.24
1.417	6.73	2.917	14.75	4.417	3.77	5.92	2.13
1.500	6.73	3.000	14.75	4.500	3.77	6.00	2.13

Max.Eff.Inten.(mm/hr)=		148.61	101.98	
over (min)		5.00	25.00	
Storage Coeff. (min)=		1.48 (ii)	21.20 (ii)	
Unit Hyd. Tpeak (min)=		5.00	25.00	
Unit Hyd. peak (cms)=		.33	.05	
				TOTALS
PEAK FLOW	(cms)=	.06	.09	.108 (iii)
TIME TO PEAK	(hrs)=	2.33	2.67	2.67
RUNOFF VOLUME	(mm)=	80.72	58.97	63.09
TOTAL RAINFALL	(mm)=	81.72	81.72	81.72
RUNOFF COEFFICIENT	=	.99	.72	.77

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 88.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB				
STANDHYD (0107)	Area	(ha)=	3.63	
ID= 1 DT= 5.0 min	Total Imp(%)=	29.40	Dir. Conn.(%)=	19.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	1.07	2.56
Dep. Storage	(mm)=	1.00	3.00
Average Slope	(%)=	2.00	3.00
Length	(m)=	155.50	440.00
Mannings n	=	.013	.250

Max.Eff.Inten.(mm/hr)=		148.61	64.62	
over (min)		5.00	35.00	
Storage Coeff. (min)=		2.31 (ii)	33.68 (ii)	
Unit Hyd. Tpeak (min)=		5.00	35.00	
Unit Hyd. peak (cms)=		.30	.03	
				TOTALS
PEAK FLOW	(cms)=	.28	.29	.354 (iii)
TIME TO PEAK	(hrs)=	2.33	2.83	2.33
RUNOFF VOLUME	(mm)=	80.72	54.35	59.36
TOTAL RAINFALL	(mm)=	81.72	81.72	81.72
RUNOFF COEFFICIENT	=	.99	.67	.73

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 86.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0114)					
1 + 2 = 3		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
	ID1= 1 (0115):	.83	.108	2.67	63.09
	+ ID2= 2 (0107):	3.63	.354	2.33	59.36
	ID = 3 (0114):	4.45	.455	2.33	60.05

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0117)					
1 + 2 = 3		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
	ID1= 1 (0102):	1.39	.194	2.50	47.26
	+ ID2= 2 (0114):	4.45	.455	2.33	60.05
	ID = 3 (0117):	5.85	.603	2.33	57.00

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0106)					
1 + 2 = 3		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
	ID1= 1 (0103):	6.22	.422	2.67	30.00
	+ ID2= 2 (0117):	5.85	.603	2.33	57.00
	ID = 3 (0106):	12.07	.989	2.67	43.09

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

FINISH

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

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

       OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM, Version 2.0
      O   O    T      T    H   H   Y Y   MM MM  O   O
      O   O    T      T    H   H    Y    M   M  O   O   Licensed To: MJ Davenport

       OOO     T      T    H   H    Y    M   M   OOO                  vo2-0057
```

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

  Input   filename: C:\Program Files\Visual OTTHYMO v2.0\voin.dat

  Output  filename: C:\visual otthymo files\3969\3969-All
Scenarios\Post-Dev-Uncontrolled.out
  Summary filename: C:\visual otthymo files\3969\3969-All
Scenarios\Post-Dev-Uncontrolled.sum

DATE: 1/23/2019                              TIME: 1:53:29 PM

USER:


COMMENTS: ____________________________________________________________

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

--------------------
| MASS STORM        |     Filename: C:\visual otthymo files\4456\AES 1-hr.mst
| Ptotal= 22.50 mm  |     Comments: AES 1 HOUR STORM DISTRIBUTION a=21min k=
--------------------
                          Duration of storm     =  1.00 hrs
                          Mass curve time step  =  5.00 min

              TIME    RAIN  |  TIME    RAIN  |  TIME    RAIN  |  TIME    RAIN
               hrs   mm/hr  |   hrs   mm/hr  |   hrs   mm/hr  |   hrs   mm/hr
               .08   10.02  |   .33   69.93  |   .58   11.10  |   .83     .81
               .17   30.00  |   .42   64.29  |   .67    4.62  |   .92     .30
               .25   49.98  |   .50   27.03  |   .75    1.92  |  1.00     .03

--------------------------------------------------------------------------------
--------------------
| CALIB             |
| NASHYD     (0105) |   Area    (ha)=    4.82   Curve Number   (CN)= 66.0
|ID= 1 DT=10.0 min  |   Ia      (mm)=    5.00   # of Linear Res.(N)= 3.00
```



```
--------------------   U.H. Tp(hrs)=    .35

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

                           ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
                 .167   20.01 |  .500   45.66 |  .833    1.36 |
                 .333   59.95 |  .667    7.86 | 1.000     .16 |

     Unit Hyd Qpeak  (cms)=    .522

     PEAK FLOW       (cms)=    .038 (i)
     TIME TO PEAK    (hrs)=    .667
     RUNOFF VOLUME    (mm)=   2.058
     TOTAL RAINFALL   (mm)=  22.500
     RUNOFF COEFFICIENT   =    .091

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

--------------------------------------------------------------------------------
--------------------
| CALIB             |
| NASHYD     (0112) |   Area    (ha)=    1.40   Curve Number   (CN)= 75.0
|ID= 1 DT=10.0 min  |   Ia      (mm)=    5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=    .24

     Unit Hyd Qpeak  (cms)=    .222

     PEAK FLOW       (cms)=    .020 (i)
     TIME TO PEAK    (hrs)=    .667
     RUNOFF VOLUME    (mm)=   2.957
     TOTAL RAINFALL   (mm)=  22.500
     RUNOFF COEFFICIENT   =    .131

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

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--------------------
| ADD HYD   (0103) |
|   1 + 2 =  3     |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
          ID1= 1 (0105):      4.82    .038      .67      2.06
        + ID2= 2 (0112):      1.40    .020      .67      2.96
          ===============================================
          ID = 3 (0103):      6.22    .058      .67      2.26

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB             |
| NASHYD     (0102) |   Area    (ha)=    1.39   Curve Number   (CN)= 84.0
|ID= 1 DT=10.0 min  |   Ia      (mm)=    4.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=    .24

     Unit Hyd Qpeak  (cms)=    .223

     PEAK FLOW       (cms)=    .034 (i)
     TIME TO PEAK    (hrs)=    .500
     RUNOFF VOLUME    (mm)=   5.048
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     TOTAL RAINFALL   (mm)=  22.500
     RUNOFF COEFFICIENT   =    .224

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

--------------------------------------------------------------------------------
--------------------
| CALIB             |
| STANDHYD  (0115)  |   Area    (ha)=     .83
|ID= 1 DT= 5.0 min  |   Total Imp(%)=  33.00   Dir. Conn.(%)=  19.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      .27          .55
     Dep. Storage     (mm)=     1.00         2.00
     Average Slope     (%)=     2.00         3.00
     Length            (m)=    74.30       275.00
     Mannings n           =     .013         .250

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

                           ---- TRANSFORMED HYETOGRAPH ----
              TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
               hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
              .083   10.02 |  .333   69.93 |  .583   11.10 |   .83     .81
              .167   30.00 |  .417   64.29 |  .667    4.62 |   .92     .30
              .250   49.98 |  .500   27.03 |  .750    1.92 |  1.00     .03

     Max.Eff.Inten.(mm/hr)=     69.93        14.12
                over (min)      5.00        50.00
     Storage Coeff.  (min)=     2.00 (ii)   45.48 (ii)
     Unit Hyd. Tpeak (min)=     5.00        50.00
     Unit Hyd. peak  (cms)=      .31          .02
                                                        *TOTALS*
     PEAK FLOW       (cms)=      .03          .01         .030 (iii)
     TIME TO PEAK    (hrs)=      .33         1.17          .33
     RUNOFF VOLUME    (mm)=    21.50         8.78        11.16
     TOTAL RAINFALL   (mm)=    22.50        22.50        22.50
     RUNOFF COEFFICIENT   =      .96          .39          .50

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  88.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB             |
| STANDHYD  (0107)  |   Area    (ha)=    3.63
|ID= 1 DT= 5.0 min  |   Total Imp(%)=  29.40   Dir. Conn.(%)=  19.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=     1.07         2.56
     Dep. Storage     (mm)=     1.00         3.00
     Average Slope     (%)=     2.00         3.00
     Length            (m)=   155.50       440.00
     Mannings n           =     .013         .250
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     Max.Eff.Inten.(mm/hr)=     69.93         8.11
                over (min)      5.00        80.00
     Storage Coeff.  (min)=     3.12 (ii)   75.07 (ii)
     Unit Hyd. Tpeak (min)=     5.00        80.00
     Unit Hyd. peak  (cms)=      .27          .01
                                                        *TOTALS*
     PEAK FLOW       (cms)=      .12          .03         .125 (iii)
     TIME TO PEAK    (hrs)=      .33         1.67          .42
     RUNOFF VOLUME    (mm)=    21.50         7.07         9.80
     TOTAL RAINFALL   (mm)=    22.50        22.50        22.50
     RUNOFF COEFFICIENT   =      .96          .31          .44

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  86.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

--------------------
| ADD HYD   (0114) |
|   1 + 2 =  3     |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
          ID1= 1 (0115):       .83    .030      .33     11.16
        + ID2= 2 (0107):      3.63    .125      .42      9.80
          ===============================================
          ID = 3 (0114):      4.45    .155      .42     10.05

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD   (0117) |
|   1 + 2 =  3     |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
          ID1= 1 (0102):      1.39    .034      .50      5.05
        + ID2= 2 (0114):      4.45    .155      .42     10.05
          ===============================================
          ID = 3 (0117):      5.85    .178      .42      8.86

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD   (0106) |
|   1 + 2 =  3     |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
          ID1= 1 (0103):      6.22    .058      .67      2.26
        + ID2= 2 (0117):      5.85    .178      .42      8.86
          ===============================================
          ID = 3 (0106):     12.07    .208      .42      5.46

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

MASS STORM	Ptotal= 30.50 mm

Filename: C:\visual otthymo files\4456\AES 1-hr.mst
Comments: AES 1 HOUR STORM DISTRIBUTION a=21min k=

Duration of storm = 1.00 hrs
Mass curve time step = 5.00 min

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.08	13.58	.33	94.79	.58	15.04	.83	1.10
.17	40.66	.42	87.14	.67	6.26	.92	.40
.25	67.75	.50	36.64	.75	2.60	1.00	.04

CALIB	NASHYD (0105)	ID= 1 DT=10.0 min

Area (ha)= 4.82 Curve Number (CN)= 66.0
Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= .35

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.167	27.12	.500	61.89	.833	1.85		
.333	81.27	.667	10.65	1.000	.22		

Unit Hyd Qpeak (cms)= .522

PEAK FLOW (cms)= .076 (i)
TIME TO PEAK (hrs)= .667
RUNOFF VOLUME (mm)= 4.146
TOTAL RAINFALL (mm)= 30.500
RUNOFF COEFFICIENT = .136

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

CALIB	NASHYD (0112)	ID= 1 DT=10.0 min

Area (ha)= 1.40 Curve Number (CN)= 75.0
Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= .24

Unit Hyd Qpeak (cms)= .222

PEAK FLOW (cms)= .039 (i)
TIME TO PEAK (hrs)= .500
RUNOFF VOLUME (mm)= 5.823
TOTAL RAINFALL (mm)= 30.500
RUNOFF COEFFICIENT = .191

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

ADD HYD (0103)

1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0105):	4.82	.076	.67	4.15
+ ID2= 2 (0112):	1.40	.039	.50	5.82
ID = 3 (0103):	6.22	.115	.67	4.52

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB	NASHYD (0102)	ID= 1 DT=10.0 min

Area (ha)= 1.39 Curve Number (CN)= 84.0
Ia (mm)= 4.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= .24

Unit Hyd Qpeak (cms)= .223

PEAK FLOW (cms)= .064 (i)
TIME TO PEAK (hrs)= .500
RUNOFF VOLUME (mm)= 9.250
TOTAL RAINFALL (mm)= 30.500
RUNOFF COEFFICIENT = .303

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

CALIB	STANDHYD (0115)	ID= 1 DT= 5.0 min

Area (ha)= .83
Total Imp(%)= 33.00 Dir. Conn.(%)= 19.00

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	.27	.55
Dep. Storage (mm)=	1.00	2.00
Average Slope (%)=	2.00	3.00
Length (m)=	74.30	275.00
Mannings n =	.013	.250

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.083	13.58	.333	94.79	.583	15.04	.83	1.10
.167	40.66	.417	87.14	.667	6.26	.92	.40
.250	67.75	.500	36.64	.750	2.60	1.00	.04

Max.Eff.Inten.(mm/hr)=	94.79	29.46	
over (min)	5.00	35.00	
Storage Coeff. (min)=	1.77 (ii)	34.17 (ii)	
Unit Hyd. Tpeak (min)=	5.00	35.00	
Unit Hyd. peak (cms)=	.32	.03	
			TOTALS
PEAK FLOW (cms)=	.04	.03	.044 (iii)
TIME TO PEAK (hrs)=	.33	.92	.42
RUNOFF VOLUME (mm)=	29.50	14.47	17.30
TOTAL RAINFALL (mm)=	30.50	30.50	30.50
RUNOFF COEFFICIENT =	.97	.47	.57

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

YOU SHOULD CONSIDER SPLITTING THE AREA.

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 88.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB	STANDHYD (0107)	ID= 1 DT= 5.0 min

Area (ha)= 3.63
Total Imp(%)= 29.40 Dir. Conn.(%)= 19.00

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	1.07	2.56
Dep. Storage (mm)=	1.00	3.00
Average Slope (%)=	2.00	3.00
Length (m)=	155.50	440.00
Mannings n =	.013	.250

Max.Eff.Inten.(mm/hr)=	94.79	13.96	
over (min)	5.00	65.00	
Storage Coeff. (min)=	2.76 (ii)	60.68 (ii)	
Unit Hyd. Tpeak (min)=	5.00	65.00	
Unit Hyd. peak (cms)=	.28	.02	
			TOTALS
PEAK FLOW (cms)=	.17	.06	.174 (iii)
TIME TO PEAK (hrs)=	.33	1.42	.33
RUNOFF VOLUME (mm)=	29.50	12.16	15.45
TOTAL RAINFALL (mm)=	30.50	30.50	30.50
RUNOFF COEFFICIENT =	.97	.40	.51

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 86.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0114)	1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0115):	.83	.044	.42	17.30
+ ID2= 2 (0107):	3.63	.174	.33	15.45
ID = 3 (0114):	4.45	.218	.42	15.79

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0117)	1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0102):	1.39	.064	.50	9.25

+ ID2= 2 (0114):	4.45	.218	.42	15.79
ID = 3 (0117):	5.85	.262	.42	14.23

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0106)	1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0103):	6.22	.115	.67	4.52
+ ID2= 2 (0117):	5.85	.262	.42	14.23
ID = 3 (0106):	12.07	.324	.42	9.23

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

MASS STORM	Ptotal= 35.80 mm

Filename: C:\visual otthymo files\4456\AES 1-hr.mst
Comments: AES 1 HOUR STORM DISTRIBUTION a=21min k=

Duration of storm = 1.00 hrs
Mass curve time step = 5.00 min

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.08	15.94	.33	111.27	.58	17.66	.83	1.29
.17	47.73	.42	102.29	.67	7.35	.92	.47
.25	79.52	.50	43.00	.75	3.05	1.00	.04

CALIB	NASHYD (0105)	ID= 1 DT=10.0 min

Area (ha)= 4.82 Curve Number (CN)= 66.0
Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= .35

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.167	31.83	.500	72.65	.833	2.17		
.333	95.39	.667	12.50	1.000	.26		

Unit Hyd Qpeak (cms)= .522

PEAK FLOW (cms)= .108 (i)
TIME TO PEAK (hrs)= .667
RUNOFF VOLUME (mm)= 5.850
TOTAL RAINFALL (mm)= 35.800
RUNOFF COEFFICIENT = .163

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

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--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD    (0112) |   Area    (ha)=   1.40   Curve Number   (CN)= 75.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=    .24

     Unit Hyd Qpeak  (cms)=    .222

     PEAK FLOW       (cms)=    .055 (i)
     TIME TO PEAK    (hrs)=    .500
     RUNOFF VOLUME    (mm)=   8.105
     TOTAL RAINFALL   (mm)=  35.800
     RUNOFF COEFFICIENT   =    .226

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

--------------------------------------------------------------------------------
--------------------
| ADD HYD   (0103) |
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
          ID1= 1 (0105):     4.82    .108      .67     5.85
        + ID2= 2 (0112):     1.40    .055      .50     8.11
          ================================================
          ID = 3 (0103):     6.22    .161      .67     6.36

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD    (0102) |   Area    (ha)=   1.39   Curve Number   (CN)= 84.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   4.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=    .24

     Unit Hyd Qpeak  (cms)=    .223

     PEAK FLOW       (cms)=    .086 (i)
     TIME TO PEAK    (hrs)=    .500
     RUNOFF VOLUME    (mm)=  12.441
     TOTAL RAINFALL   (mm)=  35.800
     RUNOFF COEFFICIENT   =    .348

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD  (0115) |   Area    (ha)=    .83
|ID= 1 DT= 5.0 min |   Total Imp(%)=  33.00   Dir. Conn.(%)=  19.00
--------------------

                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       .27         .55
     Dep. Storage     (mm)=      1.00        2.00
     Average Slope     (%)=      2.00        3.00
     Length            (m)=     74.30      275.00
     Mannings n             =    .013        .250

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

                                Page 9
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                                  ---- TRANSFORMED HYETOGRAPH ----
          TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
           hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
          .083   15.94 |  .333  111.27 |  .583   17.66 |   .83    1.29
          .167   47.73 |  .417  102.29 |  .667    7.35 |   .92     .47
          .250   79.52 |  .500   43.00 |  .750    3.05 |  1.00     .04

     Max.Eff.Inten.(mm/hr)=    111.27        43.12
               over (min)        5.00        30.00
     Storage Coeff. (min)=       1.66 (ii)   29.48 (ii)
     Unit Hyd. Tpeak (min)=      5.00        30.00
     Unit Hyd. peak  (cms)=       .32          .04
                                                      *TOTALS*
     PEAK FLOW       (cms)=       .05          .04          .055 (iii)
     TIME TO PEAK    (hrs)=       .33          .83           .42
     RUNOFF VOLUME    (mm)=     34.80        18.57         21.63
     TOTAL RAINFALL   (mm)=     35.80        35.80         35.80
     RUNOFF COEFFICIENT   =       .97          .52           .60

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  88.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD  (0107) |   Area    (ha)=   3.63
|ID= 1 DT= 5.0 min |   Total Imp(%)=  29.40   Dir. Conn.(%)=  19.00
--------------------

                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      1.07        2.56
     Dep. Storage     (mm)=      1.00        3.00
     Average Slope     (%)=      2.00        3.00
     Length            (m)=    155.50      440.00
     Mannings n             =    .013        .250

     Max.Eff.Inten.(mm/hr)=    111.27        21.90
               over (min)        5.00        55.00
     Storage Coeff. (min)=       2.59 (ii)   50.95 (ii)
     Unit Hyd. Tpeak (min)=      5.00        55.00
     Unit Hyd. peak  (cms)=       .29          .02
                                                      *TOTALS*
     PEAK FLOW       (cms)=       .20          .09          .208 (iii)
     TIME TO PEAK    (hrs)=       .33         1.25           .42
     RUNOFF VOLUME    (mm)=     34.80        15.91         19.49
     TOTAL RAINFALL   (mm)=     35.80        35.80         35.80
     RUNOFF COEFFICIENT   =       .97          .44           .54

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  86.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
                                Page 10
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--------------------------------------------------------------------------------
--------------------
| ADD HYD   (0114) |
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
          ID1= 1 (0115):      .83    .055      .42    21.63
        + ID2= 2 (0107):     3.63    .208      .42    19.49
          ================================================
          ID = 3 (0114):     4.45    .263      .42    19.89

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| ADD HYD   (0117) |
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
          ID1= 1 (0102):     1.39    .086      .50    12.44
        + ID2= 2 (0114):     4.45    .263      .42    19.89
          ================================================
          ID = 3 (0117):     5.85    .324      .42    18.13

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| ADD HYD   (0106) |
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
          ID1= 1 (0103):     6.22    .161      .67     6.36
        + ID2= 2 (0117):     5.85    .324      .42    18.13
          ================================================
          ID = 3 (0106):    12.07    .413      .42    12.06

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| MASS STORM       |    Filename: C:\visual otthymo files\4456\AES 1-hr.mst
| Ptotal= 42.50 mm |    Comments: AES 1 HOUR STORM DISTRIBUTION a=21min k=
--------------------

                         Duration of storm    =  1.00 hrs
                         Mass curve time step =  5.00 min

          TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
           hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
           .08   18.92 |   .33  132.09 |   .58   20.96 |   .83    1.53
           .17   56.66 |   .42  121.43 |   .67    8.72 |   .92     .56
           .25   94.40 |   .50   51.05 |   .75    3.62 |  1.00     .05

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD    (0105) |   Area    (ha)=   4.82   Curve Number   (CN)= 66.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
                                Page 11
```



```
--------------------   U.H. Tp(hrs)=    .35

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

                                  ---- TRANSFORMED HYETOGRAPH ----
          TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
           hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
          .167   37.79 |  .500   86.24 |  .833    2.58 |
          .333  113.25 |  .667   14.84 | 1.000     .31 |

     Unit Hyd Qpeak  (cms)=    .522

     PEAK FLOW       (cms)=    .153 (i)
     TIME TO PEAK    (hrs)=    .667
     RUNOFF VOLUME    (mm)=   8.327
     TOTAL RAINFALL   (mm)=  42.500
     RUNOFF COEFFICIENT   =    .196

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD    (0112) |   Area    (ha)=   1.40   Curve Number   (CN)= 75.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=    .24

     Unit Hyd Qpeak  (cms)=    .222

     PEAK FLOW       (cms)=    .078 (i)
     TIME TO PEAK    (hrs)=    .500
     RUNOFF VOLUME    (mm)=  11.357
     TOTAL RAINFALL   (mm)=  42.500
     RUNOFF COEFFICIENT   =    .267

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

--------------------------------------------------------------------------------
--------------------
| ADD HYD   (0103) |
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
          ID1= 1 (0105):     4.82    .153      .67     8.33
        + ID2= 2 (0112):     1.40    .078      .50    11.36
          ================================================
          ID = 3 (0103):     6.22    .227      .67     9.01

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD    (0102) |   Area    (ha)=   1.39   Curve Number   (CN)= 84.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   4.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=    .24

     Unit Hyd Qpeak  (cms)=    .223

     PEAK FLOW       (cms)=    .117 (i)
     TIME TO PEAK    (hrs)=    .500
     RUNOFF VOLUME    (mm)=  16.829
                                Page 12
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TOTAL RAINFALL (mm)= 42.500
RUNOFF COEFFICIENT = .396

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

CALIB	
STANDHYD (0115)	Area (ha)= .83
ID= 1 DT= 5.0 min	Total Imp(%)= 33.00 Dir. Conn.(%)= 19.00

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	.27	.55
Dep. Storage (mm)=	1.00	2.00
Average Slope (%)=	2.00	3.00
Length (m)=	74.30	275.00
Mannings n =	.013	.250

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.083	18.92	.333	132.09	.583	20.96	.83	1.53
.167	56.66	.417	121.43	.667	8.72	.92	.56
.250	94.40	.500	51.05	.750	3.62	1.00	.05

			TOTALS
Max.Eff.Inten.(mm/hr)=	132.09	64.88	
over (min)	5.00	30.00	
Storage Coeff. (min)=	1.55 (ii)	25.18 (ii)	
Unit Hyd. Tpeak (min)=	5.00	30.00	
Unit Hyd. peak (cms)=	.33	.04	
PEAK FLOW (cms)=	.06	.05	.069 (iii)
TIME TO PEAK (hrs)=	.33	.83	.42
RUNOFF VOLUME (mm)=	41.50	24.01	27.31
TOTAL RAINFALL (mm)=	42.50	42.50	42.50
RUNOFF COEFFICIENT =	.98	.56	.64

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 88.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB	
STANDHYD (0107)	Area (ha)= 3.63
ID= 1 DT= 5.0 min	Total Imp(%)= 29.40 Dir. Conn.(%)= 19.00

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	1.07	2.56
Dep. Storage (mm)=	1.00	3.00
Average Slope (%)=	2.00	3.00
Length (m)=	155.50	440.00
Mannings n =	.013	.250

			TOTALS
Max.Eff.Inten.(mm/hr)=	132.09	35.82	
over (min)	5.00	45.00	
Storage Coeff. (min)=	2.42 (ii)	42.14 (ii)	
Unit Hyd. Tpeak (min)=	5.00	45.00	
Unit Hyd. peak (cms)=	.30	.03	
PEAK FLOW (cms)=	.24	.14	.257 (iii)
TIME TO PEAK (hrs)=	.33	1.08	.42
RUNOFF VOLUME (mm)=	41.50	20.95	24.85
TOTAL RAINFALL (mm)=	42.50	42.50	42.50
RUNOFF COEFFICIENT =	.98	.49	.58

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 86.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0114)				
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0115):	.83	.069	.42	27.31
+ ID2= 2 (0107):	3.63	.257	.42	24.85
ID = 3 (0114):	4.45	.325	.42	25.31

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0117)				
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0102):	1.39	.117	.50	16.83
+ ID2= 2 (0114):	4.45	.325	.42	25.31
ID = 3 (0117):	5.85	.409	.42	23.30

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0106)				
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0103):	6.22	.227	.67	9.01
+ ID2= 2 (0117):	5.85	.409	.42	23.30
ID = 3 (0106):	12.07	.538	.42	15.93

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

****

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

MASS STORM	Filename: C:\visual otthymo files\4456\AES 1-hr.mst
Ptotal= 47.40 mm	Comments: AES 1 HOUR STORM DISTRIBUTION a=21min k=

Duration of storm = 1.00 hrs
Mass curve time step = 5.00 min

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.08	21.10	.33	147.32	.58	23.38	.83	1.71
.17	63.19	.42	135.43	.67	9.73	.92	.63
.25	105.28	.50	56.94	.75	4.04	1.00	.06

CALIB					
NASHYD (0105)	Area (ha)=	4.82	Curve Number (CN)=	66.0
ID= 1 DT=10.0 min	Ia (mm)=	5.00	# of Linear Res.(N)=	3.00
	U.H. Tp(hrs)=	.35		

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.167	42.15	.500	96.18	.833	2.87		
.333	126.30	.667	16.55	1.000	.34		

Unit Hyd Qpeak (cms)= .522

PEAK FLOW (cms)= .190 (i)
TIME TO PEAK (hrs)= .667
RUNOFF VOLUME (mm)= 10.345
TOTAL RAINFALL (mm)= 47.400
RUNOFF COEFFICIENT = .218

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

CALIB					
NASHYD (0112)	Area (ha)=	1.40	Curve Number (CN)=	75.0
ID= 1 DT=10.0 min	Ia (mm)=	5.00	# of Linear Res.(N)=	3.00
	U.H. Tp(hrs)=	.24		

Unit Hyd Qpeak (cms)= .222

PEAK FLOW (cms)= .096 (i)
TIME TO PEAK (hrs)= .500
RUNOFF VOLUME (mm)= 13.959
TOTAL RAINFALL (mm)= 47.400
RUNOFF COEFFICIENT = .294

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

ADD HYD (0103)				

1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0105):	4.82	.190	.67	10.34
+ ID2= 2 (0112):	1.40	.096	.50	13.96
ID = 3 (0103):	6.22	.281	.67	11.16

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB					
NASHYD (0102)	Area (ha)=	1.39	Curve Number (CN)=	84.0
ID= 1 DT=10.0 min	Ia (mm)=	4.00	# of Linear Res.(N)=	3.00
	U.H. Tp(hrs)=	.24		

Unit Hyd Qpeak (cms)= .223

PEAK FLOW (cms)= .141 (i)
TIME TO PEAK (hrs)= .500
RUNOFF VOLUME (mm)= 20.244
TOTAL RAINFALL (mm)= 47.400
RUNOFF COEFFICIENT = .427

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

CALIB					
STANDHYD (0115)	Area (ha)=	.83		
ID= 1 DT= 5.0 min	Total Imp(%)=	33.00	Dir. Conn.(%)=	19.00

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	.27	.55
Dep. Storage (mm)=	1.00	2.00
Average Slope (%)=	2.00	3.00
Length (m)=	74.30	275.00
Mannings n =	.013	.250

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.083	21.10	.333	147.32	.583	23.38	.83	1.71
.167	63.19	.417	135.43	.667	9.73	.92	.63
.250	105.28	.500	56.94	.750	4.04	1.00	.06

			TOTALS
Max.Eff.Inten.(mm/hr)=	147.32	75.84	
over (min)	5.00	25.00	
Storage Coeff. (min)=	1.49 (ii)	23.68 (ii)	
Unit Hyd. Tpeak (min)=	5.00	25.00	
Unit Hyd. peak (cms)=	.33	.05	
PEAK FLOW (cms)=	.06	.07	.084 (iii)
TIME TO PEAK (hrs)=	.33	.75	.42
RUNOFF VOLUME (mm)=	46.40	28.13	31.59
TOTAL RAINFALL (mm)=	47.40	47.40	47.40
RUNOFF COEFFICIENT =	.98	.59	.67

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

YOU SHOULD CONSIDER SPLITTING THE AREA.

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 88.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB				
STANDHYD (0107)	Area (ha)= 3.63			
ID= 1 DT= 5.0 min	Total Imp(%)= 29.40	Dir. Conn.(%)= 19.00		

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	1.07	2.56
Dep. Storage (mm)=	1.00	3.00
Average Slope (%)=	2.00	3.00
Length (m)=	155.50	440.00
Mannings n =	.013	.250

Max.Eff.Inten.(mm/hr)=	147.32	42.43	
over (min)	5.00	40.00	
Storage Coeff. (min)=	2.32 (ii)	39.44 (ii)	
Unit Hyd. Tpeak (min)=	5.00	40.00	
Unit Hyd. peak (cms)=	.30	.03	
			TOTALS
PEAK FLOW (cms)=	.27	.18	.295 (iii)
TIME TO PEAK (hrs)=	.33	1.00	.42
RUNOFF VOLUME (mm)=	46.40	24.82	28.91
TOTAL RAINFALL (mm)=	47.40	47.40	47.40
RUNOFF COEFFICIENT =	.98	.52	.61

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 86.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0114)				
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0115):	.83	.084	.42	31.59
+ ID2= 2 (0107):	3.63	.295	.42	28.91
ID = 3 (0114):	4.45	.378	.42	29.41

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0117)				
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0102):	1.39	.141	.50	20.24

+ ID2= 2 (0114):	4.45	.378	.42	29.41
ID = 3 (0117):	5.85	.480	.42	27.23

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0106)				
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0103):	6.22	.281	.67	11.16
+ ID2= 2 (0117):	5.85	.480	.42	27.23
ID = 3 (0106):	12.07	.642	.42	18.95

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

** SIMULATION NUMBER: 6 **

MASS STORM	Filename: C:\visual otthymo files\4456\AES 1-hr.mst
Ptotal= 52.40 mm	Comments: AES 1 HOUR STORM DISTRIBUTION a=21min k=

Duration of storm = 1.00 hrs
Mass curve time step = 5.00 min

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.08	23.33	.33	162.86	.58	25.84	.83	1.89
.17	69.86	.42	149.72	.67	10.75	.92	.69
.25	116.39	.50	62.94	.75	4.46	1.00	.06

CALIB			
NASHYD (0105)	Area (ha)= 4.82	Curve Number (CN)= 66.0	
ID= 1 DT=10.0 min	Ia (mm)= 5.00	# of Linear Res.(N)= 3.00	
	U.H. Tp(hrs)= .35		

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.167	46.59	.500	106.33	.833	3.18		
.333	139.63	.667	18.30	1.000	.38		

Unit Hyd Qpeak (cms)= .522

PEAK FLOW (cms)= .231 (i)
TIME TO PEAK (hrs)= .667
RUNOFF VOLUME (mm)= 12.566
TOTAL RAINFALL (mm)= 52.400
RUNOFF COEFFICIENT = .240

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

CALIB				
NASHYD (0112)	Area (ha)= 1.40	Curve Number (CN)= 75.0		
ID= 1 DT=10.0 min	Ia (mm)= 5.00	# of Linear Res.(N)= 3.00		
	U.H. Tp(hrs)= .24			

Unit Hyd Qpeak (cms)= .222

PEAK FLOW (cms)= .115 (i)
TIME TO PEAK (hrs)= .500
RUNOFF VOLUME (mm)= 16.785
TOTAL RAINFALL (mm)= 52.400
RUNOFF COEFFICIENT = .320

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

ADD HYD (0103)				
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0105):	4.82	.231	.67	12.57
+ ID2= 2 (0112):	1.40	.115	.50	16.78
ID = 3 (0103):	6.22	.339	.67	13.51

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB				
NASHYD (0102)	Area (ha)= 1.39	Curve Number (CN)= 84.0		
ID= 1 DT=10.0 min	Ia (mm)= 4.00	# of Linear Res.(N)= 3.00		
	U.H. Tp(hrs)= .24			

Unit Hyd Qpeak (cms)= .223

PEAK FLOW (cms)= .166 (i)
TIME TO PEAK (hrs)= .500
RUNOFF VOLUME (mm)= 23.876
TOTAL RAINFALL (mm)= 52.400
RUNOFF COEFFICIENT = .456

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

CALIB				
STANDHYD (0115)	Area (ha)= .83			
ID= 1 DT= 5.0 min	Total Imp(%)= 33.00	Dir. Conn.(%)= 19.00		

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	.27	.55
Dep. Storage (mm)=	1.00	2.00
Average Slope (%)=	2.00	3.00
Length (m)=	74.30	275.00
Mannings n =	.013	.250

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.083	23.33	.333	162.86	.583	25.84	.83	1.89
.167	69.86	.417	149.72	.667	10.75	.92	.69
.250	116.39	.500	62.94	.750	4.46	1.00	.06

Max.Eff.Inten.(mm/hr)=	162.86	102.33	
over (min)	5.00	25.00	
Storage Coeff. (min)=	1.43 (ii)	21.12 (ii)	
Unit Hyd. Tpeak (min)=	5.00	25.00	
Unit Hyd. peak (cms)=	.33	.05	
			TOTALS
PEAK FLOW (cms)=	.07	.09	.096 (iii)
TIME TO PEAK (hrs)=	.33	.75	.42
RUNOFF VOLUME (mm)=	51.40	32.43	36.02
TOTAL RAINFALL (mm)=	52.40	52.40	52.40
RUNOFF COEFFICIENT =	.98	.62	.69

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 88.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB				
STANDHYD (0107)	Area (ha)= 3.63			
ID= 1 DT= 5.0 min	Total Imp(%)= 29.40	Dir. Conn.(%)= 19.00		

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	1.07	2.56
Dep. Storage (mm)=	1.00	3.00
Average Slope (%)=	2.00	3.00
Length (m)=	155.50	440.00
Mannings n =	.013	.250

Max.Eff.Inten.(mm/hr)=	162.86	55.84	
over (min)	5.00	40.00	
Storage Coeff. (min)=	2.23 (ii)	35.48 (ii)	
Unit Hyd. Tpeak (min)=	5.00	40.00	
Unit Hyd. peak (cms)=	.30	.03	
			TOTALS
PEAK FLOW (cms)=	.30	.22	.331 (iii)
TIME TO PEAK (hrs)=	.33	1.00	.42
RUNOFF VOLUME (mm)=	51.40	28.88	33.15
TOTAL RAINFALL (mm)=	52.40	52.40	52.40
RUNOFF COEFFICIENT =	.98	.55	.63

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 86.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0114)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
	ID1= 1 (0115):	.83	.096	.42	36.02
	+ ID2= 2 (0107):	3.63	.331	.42	33.15
	ID = 3 (0114):	4.45	.428	.42	33.69

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0117)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
	ID1= 1 (0102):	1.39	.166	.50	23.88
	+ ID2= 2 (0114):	4.45	.428	.42	33.69
	ID = 3 (0117):	5.85	.549	.42	31.36

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0106)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
	ID1= 1 (0103):	6.22	.339	.67	13.51
	+ ID2= 2 (0117):	5.85	.549	.42	31.36
	ID = 3 (0106):	12.07	.747	.42	22.16

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

FINISH

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================================================================================

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

       OOO   TTTTT  TTTTT  H    H  Y    Y  M    M   OOO    TM, Version 2.0
      O   O    T      T    H    H   Y  Y   MM  MM  O   O
      O   O    T      T    H    H    Y     M    M  O   O   Licensed To: MJ Davenport

       OOO     T      T    H    H    Y     M    M   OOO                   vo2-0057
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                   ***** D E T A I L E D   O U T P U T *****

  Input   filename: C:\Program Files\Visual OTTHYMO v2.0\voin.dat

  Output  filename: C:\visual otthymo files\3969\3969-All
Scenarios\Post-Dev-Uncontrolled.out
  Summary filename: C:\visual otthymo files\3969\3969-All
Scenarios\Post-Dev-Uncontrolled.sum


DATE: 1/23/2019                           TIME: 1:51:00 PM

USER:


COMMENTS: ____________________________________________________________


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

--------------------
| MASS STORM        |     Filename: C:\visual otthymo files\4456\SCS II 6-hr.mst
| Ptotal= 38.40 mm  |     Comments: SCS 6 HOUR TYPE II STORM DISTRIBUTION
--------------------
                          Duration of storm    =  6.00 hrs
                          Mass curve time step = 10.00 min

               TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
                .17    1.61 |  1.67    3.92 |  3.17    8.52 |  4.67    2.30
                .33    1.38 |  1.83    3.69 |  3.33    8.29 |  4.83    2.30
                .50    1.61 |  2.00    3.92 |  3.50    8.52 |  5.00    2.30
                .67    2.30 |  2.17    4.61 |  3.67    3.92 |  5.17    1.61
                .83    2.30 |  2.33    4.61 |  3.83    3.69 |  5.33    1.38
               1.00    2.30 |  2.50    4.61 |  4.00    3.92 |  5.50    1.61
               1.17    2.30 |  2.67   23.04 |  4.17    3.00 |  5.67    1.61
               1.33    2.30 |  2.83   41.47 |  4.33    3.23 |  5.83    1.38
               1.50    2.30 |  3.00   59.90 |  4.50    3.00 |  6.00    1.61
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--------------------
| CALIB              |
| NASHYD    (0105)   |   Area    (ha)=   4.82   Curve Number   (CN)= 66.0
|ID= 1 DT=10.0 min   |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------     U.H. Tp(hrs)=    .35

     Unit Hyd Qpeak  (cms)=     .522

     PEAK FLOW       (cms)=     .071 (i)
     TIME TO PEAK    (hrs)=    3.167
     RUNOFF VOLUME    (mm)=    6.771
     TOTAL RAINFALL   (mm)=   38.400
     RUNOFF COEFFICIENT   =     .176

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

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--------------------
| CALIB              |
| NASHYD    (0112)   |   Area    (ha)=   1.40   Curve Number   (CN)= 75.0
|ID= 1 DT=10.0 min   |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------     U.H. Tp(hrs)=    .24

     Unit Hyd Qpeak  (cms)=     .222

     PEAK FLOW       (cms)=     .037 (i)
     TIME TO PEAK    (hrs)=    3.000
     RUNOFF VOLUME    (mm)=    9.322
     TOTAL RAINFALL   (mm)=   38.400
     RUNOFF COEFFICIENT   =     .243

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

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--------------------
| ADD HYD   (0103) |
|   1 + 2 =  3     |         AREA     QPEAK     TPEAK      R.V.
--------------------         (ha)     (cms)     (hrs)      (mm)
          ID1= 1 (0105):     4.82      .071      3.17      6.77
        + ID2= 2 (0112):     1.40      .037      3.00      9.32
          ============================================================
          ID = 3 (0103):     6.22      .107      3.17      7.34

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| CALIB              |
| NASHYD    (0102)   |   Area    (ha)=   1.39   Curve Number   (CN)= 84.0
|ID= 1 DT=10.0 min   |   Ia      (mm)=   4.00   # of Linear Res.(N)= 3.00
--------------------     U.H. Tp(hrs)=    .24

     Unit Hyd Qpeak  (cms)=     .223

     PEAK FLOW       (cms)=     .058 (i)
     TIME TO PEAK    (hrs)=    3.000
     RUNOFF VOLUME    (mm)=   14.101
     TOTAL RAINFALL   (mm)=   38.400
     RUNOFF COEFFICIENT   =     .367
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     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD  (0115)   |   Area    (ha)=    .83
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  33.00   Dir. Conn.(%)=  19.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      .27          .55
     Dep. Storage     (mm)=     1.00         2.00
     Average Slope     (%)=     2.00         3.00
     Length            (m)=    74.30       275.00
     Mannings n          =      .013         .250

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


                          ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
               .083    1.61 | 1.583    3.92 | 3.083    8.53 |  4.58    2.30
               .167    1.61 | 1.667    3.92 | 3.167    8.52 |  4.67    2.30
               .250    1.38 | 1.750    3.69 | 3.250    8.29 |  4.75    2.30
               .333    1.38 | 1.833    3.69 | 3.333    8.29 |  4.83    2.30
               .417    1.61 | 1.917    3.92 | 3.417    8.52 |  4.92    2.30
               .500    1.61 | 2.000    3.92 | 3.500    8.52 |  5.00    2.30
               .583    2.30 | 2.083    4.61 | 3.583    3.92 |  5.08    1.61
               .667    2.30 | 2.167    4.61 | 3.667    3.92 |  5.17    1.61
               .750    2.30 | 2.250    4.61 | 3.750    3.69 |  5.25    1.38
               .833    2.30 | 2.333    4.61 | 3.833    3.69 |  5.33    1.38
               .917    2.30 | 2.417    4.61 | 3.917    3.92 |  5.42    1.61
              1.000    2.30 | 2.500    4.61 | 4.000    3.92 |  5.50    1.61
              1.083    2.30 | 2.583   23.04 | 4.083    3.00 |  5.58    1.61
              1.167    2.30 | 2.667   23.04 | 4.167    3.00 |  5.67    1.61
              1.250    2.30 | 2.750   41.47 | 4.250    3.23 |  5.75    1.38
              1.333    2.30 | 2.833   41.47 | 4.333    3.23 |  5.83    1.38
              1.417    2.30 | 2.917   59.90 | 4.417    3.00 |  5.92    1.61
              1.500    2.30 | 3.000   59.90 | 4.500    3.00 |  6.00    1.61

     Max.Eff.Inten.(mm/hr)=    59.90        25.36
                over (min)      5.00        40.00
     Storage Coeff.  (min)=     2.13 (ii)   36.53 (ii)
     Unit Hyd. Tpeak (min)=     5.00        40.00
     Unit Hyd. peak  (cms)=      .31          .03
                                                          *TOTALS*
     PEAK FLOW       (cms)=      .03          .02            .035 (iii)
     TIME TO PEAK    (hrs)=     3.00         3.50            3.00
     RUNOFF VOLUME    (mm)=    37.40        20.65           23.80
     TOTAL RAINFALL   (mm)=    38.40        38.40           38.40
     RUNOFF COEFFICIENT   =      .97          .54             .62

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

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN*  =  88.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD  (0107)   |   Area    (ha)=   3.63
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  29.40   Dir. Conn.(%)=  19.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=     1.07         2.56
     Dep. Storage     (mm)=     1.00         3.00
     Average Slope     (%)=     2.00         3.00
     Length            (m)=   155.50       440.00
     Mannings n          =      .013         .250

     Max.Eff.Inten.(mm/hr)=    59.90        14.73
                over (min)      5.00        60.00
     Storage Coeff.  (min)=     3.32 (ii)   59.99 (ii)
     Unit Hyd. Tpeak (min)=     5.00        60.00
     Unit Hyd. peak  (cms)=      .26          .02
                                                          *TOTALS*
     PEAK FLOW       (cms)=      .11          .06            .126 (iii)
     TIME TO PEAK    (hrs)=     3.00         3.92            3.00
     RUNOFF VOLUME    (mm)=    37.40        17.83           21.54
     TOTAL RAINFALL   (mm)=    38.40        38.40           38.40
     RUNOFF COEFFICIENT   =      .97          .46             .56

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

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN*  =  86.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| ADD HYD   (0114) |
|   1 + 2 =  3     |         AREA     QPEAK     TPEAK      R.V.
--------------------         (ha)     (cms)     (hrs)      (mm)
          ID1= 1 (0115):      .83      .035      3.00     23.80
        + ID2= 2 (0107):     3.63      .126      3.00     21.54
          ============================================================
          ID = 3 (0114):     4.45      .161      3.00     21.96

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| ADD HYD   (0117) |
|   1 + 2 =  3     |         AREA     QPEAK     TPEAK      R.V.
--------------------         (ha)     (cms)     (hrs)      (mm)
          ID1= 1 (0102):     1.39      .058      3.00     14.10
        + ID2= 2 (0114):     4.45      .161      3.00     21.96
          ============================================================
          ID = 3 (0117):     5.85      .219      3.00     20.09

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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ADD HYD (0106)		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
1 + 2 = 3	ID1= 1 (0103):	6.22	.107	3.17	7.34
	+ ID2= 2 (0117):	5.85	.219	3.00	20.09
	ID = 3 (0106):	12.07	.309	3.00	13.52

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

MASS STORM	Ptotal= 50.50 mm

Filename: C:\visual otthymo files\4456\SCS II 6-hr.mst
Comments: SCS 6 HOUR TYPE II STORM DISTRIBUTION

Duration of storm = 6.00 hrs
Mass curve time step = 10.00 min

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.17	2.12	1.67	5.15	3.17	11.21	4.67	3.03
.33	1.82	1.83	4.85	3.33	10.91	4.83	3.03
.50	2.12	2.00	5.15	3.50	11.21	5.00	3.03
.67	3.03	2.17	6.06	3.67	5.15	5.17	2.12
.83	3.03	2.33	6.06	3.83	4.85	5.33	1.82
1.00	3.03	2.50	6.06	4.00	5.15	5.50	2.12
1.17	3.03	2.67	30.30	4.17	3.94	5.67	2.12
1.33	3.03	2.83	54.54	4.33	4.24	5.83	1.82
1.50	3.03	3.00	78.78	4.50	3.94	6.00	2.12

CALIB NASHYD (0105)	ID= 1 DT=10.0 min	Area (ha)= 4.82	Curve Number (CN)= 66.0
		Ia (mm)= 5.00	# of Linear Res.(N)= 3.00
		U.H. Tp(hrs)= .35	

Unit Hyd Qpeak (cms)= .522

PEAK FLOW (cms)= .126 (i)
TIME TO PEAK (hrs)= 3.167
RUNOFF VOLUME (mm)= 11.703
TOTAL RAINFALL (mm)= 50.500
RUNOFF COEFFICIENT = .232

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

CALIB NASHYD (0112)	ID= 1 DT=10.0 min	Area (ha)= 1.40	Curve Number (CN)= 75.0
		Ia (mm)= 5.00	# of Linear Res.(N)= 3.00
		U.H. Tp(hrs)= .24	

Unit Hyd Qpeak (cms)= .222

PEAK FLOW (cms)= .064 (i)
TIME TO PEAK (hrs)= 3.000
RUNOFF VOLUME (mm)= 15.692

TOTAL RAINFALL (mm)= 50.500
RUNOFF COEFFICIENT = .311

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

ADD HYD (0103)		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
1 + 2 = 3	ID1= 1 (0105):	4.82	.126	3.17	11.70
	+ ID2= 2 (0112):	1.40	.064	3.00	15.69
	ID = 3 (0103):	6.22	.186	3.17	12.60

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB NASHYD (0102)	ID= 1 DT=10.0 min	Area (ha)= 1.39	Curve Number (CN)= 84.0
		Ia (mm)= 4.00	# of Linear Res.(N)= 3.00
		U.H. Tp(hrs)= .24	

Unit Hyd Qpeak (cms)= .223

PEAK FLOW (cms)= .095 (i)
TIME TO PEAK (hrs)= 3.000
RUNOFF VOLUME (mm)= 22.480
TOTAL RAINFALL (mm)= 50.500
RUNOFF COEFFICIENT = .445

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

CALIB STANDHYD (0115)	ID= 1 DT= 5.0 min	Area (ha)= .83	
		Total Imp(%)= 33.00	Dir. Conn.(%)= 19.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	.27	.55
Dep. Storage	(mm)=	1.00	2.00
Average Slope	(%)=	2.00	3.00
Length	(m)=	74.30	275.00
Mannings n	=	.013	.250

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.083	2.12	1.583	5.15	3.083	11.21	4.58	3.03
.167	2.12	1.667	5.15	3.167	11.21	4.67	3.03
.250	1.82	1.750	4.85	3.250	10.91	4.75	3.03
.333	1.82	1.833	4.85	3.333	10.91	4.83	3.03
.417	2.12	1.917	5.15	3.417	11.21	4.92	3.03
.500	2.12	2.000	5.15	3.500	11.21	5.00	3.03
.583	3.03	2.083	6.06	3.583	5.15	5.08	2.12
.667	3.03	2.167	6.06	3.667	5.15	5.17	2.12
.750	3.03	2.250	6.06	3.750	4.85	5.25	1.82

.833	3.03	2.333	6.06	3.833	4.85	5.33	1.82
.917	3.03	2.417	6.06	3.917	5.15	5.42	2.12
1.000	3.03	2.500	6.06	4.000	5.15	5.50	2.12
1.083	3.03	2.583	30.30	4.083	3.94	5.58	2.12
1.167	3.03	2.667	30.30	4.167	3.94	5.67	2.12
1.250	3.03	2.750	54.54	4.250	4.24	5.75	1.82
1.333	3.03	2.833	54.54	4.333	4.24	5.83	1.82
1.417	3.03	2.917	78.78	4.417	3.94	5.92	2.12
1.500	3.03	3.000	78.78	4.500	3.94	6.00	2.12

				TOTALS
Max.Eff.Inten.(mm/hr)=	78.78	42.77		
over (min)	5.00	30.00		
Storage Coeff. (min)=	1.91 (ii)	29.82 (ii)		
Unit Hyd. Tpeak (min)=	5.00	30.00		
Unit Hyd. peak (cms)=	.32	.04		
PEAK FLOW (cms)=	.03	.04	.055 (iii)	
TIME TO PEAK (hrs)=	3.00	3.33	3.00	
RUNOFF VOLUME (mm)=	49.50	30.79	34.32	
TOTAL RAINFALL (mm)=	50.50	50.50	50.50	
RUNOFF COEFFICIENT =	.98	.61	.68	

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 88.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB STANDHYD (0107)	ID= 1 DT= 5.0 min	Area (ha)= 3.63	
		Total Imp(%)= 29.40	Dir. Conn.(%)= 19.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	1.07	2.56
Dep. Storage	(mm)=	1.00	3.00
Average Slope	(%)=	2.00	3.00
Length	(m)=	155.50	440.00
Mannings n	=	.013	.250

				TOTALS
Max.Eff.Inten.(mm/hr)=	78.78	26.97		
over (min)	5.00	50.00		
Storage Coeff. (min)=	2.98 (ii)	47.47 (ii)		
Unit Hyd. Tpeak (min)=	5.00	50.00		
Unit Hyd. peak (cms)=	.28	.02		
PEAK FLOW (cms)=	.15	.11	.182 (iii)	
TIME TO PEAK (hrs)=	3.00	3.67	3.00	
RUNOFF VOLUME (mm)=	49.50	27.32	31.53	
TOTAL RAINFALL (mm)=	50.50	50.50	50.50	
RUNOFF COEFFICIENT =	.98	.54	.62	

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 86.0 Ia = Dep. Storage (Above)

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

ADD HYD (0114)		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
1 + 2 = 3	ID1= 1 (0115):	.83	.055	3.00	34.32
	+ ID2= 2 (0107):	3.63	.182	3.00	31.53
	ID = 3 (0114):	4.45	.237	3.00	32.05

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0117)		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
1 + 2 = 3	ID1= 1 (0102):	1.39	.095	3.00	22.48
	+ ID2= 2 (0114):	4.45	.237	3.00	32.05
	ID = 3 (0117):	5.85	.332	3.00	29.77

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0106)		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
1 + 2 = 3	ID1= 1 (0103):	6.22	.186	3.17	12.60
	+ ID2= 2 (0117):	5.85	.332	3.00	29.77
	ID = 3 (0106):	12.07	.492	3.00	20.92

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

MASS STORM	Ptotal= 58.60 mm

Filename: C:\visual otthymo files\4456\SCS II 6-hr.mst
Comments: SCS 6 HOUR TYPE II STORM DISTRIBUTION

Duration of storm = 6.00 hrs
Mass curve time step = 10.00 min

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.17	2.46	1.67	5.98	3.17	13.01	4.67	3.52
.33	2.11	1.83	5.63	3.33	12.66	4.83	3.52
.50	2.46	2.00	5.98	3.50	13.01	5.00	3.52
.67	3.52	2.17	7.03	3.67	5.98	5.17	2.46
.83	3.52	2.33	7.03	3.83	5.63	5.33	2.11
1.00	3.52	2.50	7.03	4.00	5.98	5.50	2.46

1.17	3.52	2.67	35.16	4.17	4.57	5.67	2.46
1.33	3.52	2.83	63.29	4.33	4.92	5.83	2.11
1.50	3.52	3.00	91.42	4.50	4.57	6.00	2.46

CALIB					
NASHYD (0105)	Area	(ha)=	4.82	Curve Number (CN)=	66.0
ID= 1 DT=10.0 min	Ia	(mm)=	5.00	# of Linear Res.(N)=	3.00
	U.H. Tp(hrs)=		.35		

Unit Hyd Qpeak (cms)= .522

PEAK FLOW (cms)= .169 (i)
TIME TO PEAK (hrs)= 3.167
RUNOFF VOLUME (mm)= 15.528
TOTAL RAINFALL (mm)= 58.600
RUNOFF COEFFICIENT = .265

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

CALIB					
NASHYD (0112)	Area	(ha)=	1.40	Curve Number (CN)=	75.0
ID= 1 DT=10.0 min	Ia	(mm)=	5.00	# of Linear Res.(N)=	3.00
	U.H. Tp(hrs)=		.24		

Unit Hyd Qpeak (cms)= .222

PEAK FLOW (cms)= .084 (i)
TIME TO PEAK (hrs)= 3.000
RUNOFF VOLUME (mm)= 20.501
TOTAL RAINFALL (mm)= 58.600
RUNOFF COEFFICIENT = .350

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

ADD HYD (0103)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0105):	4.82	.169	3.17	15.53
+ ID2= 2 (0112):	1.40	.084	3.00	20.50
ID = 3 (0103):	6.22	.248	3.17	16.64

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB					
NASHYD (0102)	Area	(ha)=	1.39	Curve Number (CN)=	84.0
ID= 1 DT=10.0 min	Ia	(mm)=	4.00	# of Linear Res.(N)=	3.00
	U.H. Tp(hrs)=		.24		

Unit Hyd Qpeak (cms)= .223

PEAK FLOW (cms)= .122 (i)
TIME TO PEAK (hrs)= 3.000
RUNOFF VOLUME (mm)= 28.556

TOTAL RAINFALL (mm)= 58.600
RUNOFF COEFFICIENT = .487

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

CALIB					
STANDHYD (0115)	Area	(ha)=	.83		
ID= 1 DT= 5.0 min	Total Imp(%)=		33.00	Dir. Conn.(%)=	19.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	.27	.55
Dep. Storage	(mm)=	1.00	2.00
Average Slope	(%)=	2.00	3.00
Length	(m)=	74.30	275.00
Mannings n	=	.013	.250

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.083	2.46	1.583	5.98	3.083	13.01	4.58	3.52
.167	2.46	1.667	5.98	3.167	13.01	4.67	3.52
.250	2.11	1.750	5.63	3.250	12.66	4.75	3.52
.333	2.11	1.833	5.63	3.333	12.66	4.83	3.52
.417	2.46	1.917	5.98	3.417	13.01	4.92	3.52
.500	2.46	2.000	5.98	3.500	13.01	5.00	3.52
.583	3.52	2.083	7.03	3.583	5.98	5.08	2.46
.667	3.52	2.167	7.03	3.667	5.98	5.17	2.46
.750	3.52	2.250	7.03	3.750	5.63	5.25	2.11
.833	3.52	2.333	7.03	3.833	5.63	5.33	2.11
.917	3.52	2.417	7.03	3.917	5.98	5.42	2.46
1.000	3.52	2.500	7.03	4.000	5.98	5.50	2.46
1.083	3.52	2.583	35.16	4.083	4.57	5.58	2.46
1.167	3.52	2.667	35.16	4.167	4.57	5.67	2.46
1.250	3.52	2.750	63.29	4.250	4.92	5.75	2.11
1.333	3.52	2.833	63.29	4.333	4.92	5.83	2.11
1.417	3.52	2.917	91.42	4.417	4.57	5.92	2.46
1.500	3.52	3.000	91.42	4.500	4.57	6.00	2.46

Max.Eff.Inten.(mm/hr)=		91.42	59.44
over (min)		5.00	30.00
Storage Coeff. (min)=		1.80 (ii)	26.27 (ii)
Unit Hyd. Tpeak (min)=		5.00	30.00
Unit Hyd. peak (cms)=		.32	.04

		TOTALS
PEAK FLOW	(cms)=	.04 .05 .068 (iii)
TIME TO PEAK	(hrs)=	3.00 3.33 3.00
RUNOFF VOLUME	(mm)=	57.60 37.89 41.61
TOTAL RAINFALL	(mm)=	58.60 58.60 58.60
RUNOFF COEFFICIENT	=	.98 .65 .71

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 88.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.

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

CALIB					
STANDHYD (0107)	Area	(ha)=	3.63		
ID= 1 DT= 5.0 min	Total Imp(%)=		29.40	Dir. Conn.(%)=	19.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	1.07	2.56
Dep. Storage	(mm)=	1.00	3.00
Average Slope	(%)=	2.00	3.00
Length	(m)=	155.50	440.00
Mannings n	=	.013	.250

Max.Eff.Inten.(mm/hr)=		91.42	36.55
over (min)		5.00	45.00
Storage Coeff. (min)=		2.80 (ii)	42.21 (ii)
Unit Hyd. Tpeak (min)=		5.00	45.00
Unit Hyd. peak (cms)=		.28	.03

		TOTALS
PEAK FLOW	(cms)=	.17 .15 .225 (iii)
TIME TO PEAK	(hrs)=	3.00 3.58 3.00
RUNOFF VOLUME	(mm)=	57.60 34.06 38.53
TOTAL RAINFALL	(mm)=	58.60 58.60 58.60
RUNOFF COEFFICIENT	=	.98 .58 .66

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 86.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0114)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0115):	.83	.068	3.00	41.61
+ ID2= 2 (0107):	3.63	.225	3.00	38.53
ID = 3 (0114):	4.45	.293	3.00	39.10

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0117)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0102):	1.39	.122	3.00	28.56
+ ID2= 2 (0114):	4.45	.293	3.00	39.10
ID = 3 (0117):	5.85	.415	3.00	36.59

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0106)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0103):	6.22	.248	3.17	16.64
+ ID2= 2 (0117):	5.85	.415	3.00	36.59
ID = 3 (0106):	12.07	.629	3.00	26.31

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

MASS STORM	Filename: C:\visual otthymo files\4456\SCS II 6-hr.mst
Ptotal= 68.70 mm	Comments: SCS 6 HOUR TYPE II STORM DISTRIBUTION

Duration of storm = 6.00 hrs
Mass curve time step = 10.00 min

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.17	2.89	1.67	7.01	3.17	15.25	4.67	4.12
.33	2.47	1.83	6.60	3.33	14.84	4.83	4.12
.50	2.89	2.00	7.01	3.50	15.25	5.00	4.12
.67	4.12	2.17	8.24	3.67	7.01	5.17	2.89
.83	4.12	2.33	8.24	3.83	6.60	5.33	2.47
1.00	4.12	2.50	8.24	4.00	7.01	5.50	2.89
1.17	4.12	2.67	41.22	4.17	5.36	5.67	2.89
1.33	4.12	2.83	74.20	4.33	5.77	5.83	2.47
1.50	4.12	3.00	107.17	4.50	5.36	6.00	2.89

CALIB					
NASHYD (0105)	Area	(ha)=	4.82	Curve Number (CN)=	66.0
ID= 1 DT=10.0 min	Ia	(mm)=	5.00	# of Linear Res.(N)=	3.00
	U.H. Tp(hrs)=		.35		

Unit Hyd Qpeak (cms)= .522

PEAK FLOW (cms)= .228 (i)
TIME TO PEAK (hrs)= 3.167
RUNOFF VOLUME (mm)= 20.792
TOTAL RAINFALL (mm)= 68.700
RUNOFF COEFFICIENT = .303

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

CALIB					
NASHYD (0112)	Area	(ha)=	1.40	Curve Number (CN)=	75.0
ID= 1 DT=10.0 min	Ia	(mm)=	5.00	# of Linear Res.(N)=	3.00
	U.H. Tp(hrs)=		.24		

Unit Hyd Qpeak (cms)= .222

```
     PEAK FLOW       (cms)=    .112 (i)
     TIME TO PEAK    (hrs)=   3.000
     RUNOFF VOLUME    (mm)=  26.984
     TOTAL RAINFALL   (mm)=  68.700
     RUNOFF COEFFICIENT   =    .393

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

ADD HYD (0103)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0105):		4.82	.228	3.17	20.79
+ ID2= 2 (0112):		1.40	.112	3.00	26.98
ID = 3 (0103):		6.22	.332	3.17	22.18

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB					
NASHYD (0102)	Area (ha)=	1.39	Curve Number (CN)=	84.0	
ID= 1 DT=10.0 min	Ia (mm)=	4.00	# of Linear Res.(N)=	3.00	
	U.H. Tp(hrs)=	.24			

```
     Unit Hyd Qpeak  (cms)=    .223

     PEAK FLOW       (cms)=    .157 (i)
     TIME TO PEAK    (hrs)=   3.000
     RUNOFF VOLUME    (mm)=  36.516
     TOTAL RAINFALL   (mm)=  68.700
     RUNOFF COEFFICIENT   =    .532

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

CALIB					
STANDHYD (0115)	Area (ha)=	.83			
ID= 1 DT= 5.0 min	Total Imp(%)=	33.00	Dir. Conn.(%)=	19.00	

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	.27	.55
Dep. Storage (mm)=	1.00	2.00
Average Slope (%)=	2.00	3.00
Length (m)=	74.30	275.00
Mannings n =	.013	.250

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.083	2.89	1.583	7.01	3.083	15.25	4.58	4.12
.167	2.89	1.667	7.01	3.167	15.25	4.67	4.12
.250	2.47	1.750	6.60	3.250	14.84	4.75	4.12
.333	2.47	1.833	6.60	3.333	14.84	4.83	4.12
.417	2.89	1.917	7.01	3.417	15.25	4.92	4.12
.500	2.89	2.000	7.01	3.500	15.25	5.00	4.12

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.583	4.12	2.083	8.24	3.583	7.01	5.08	2.89
.667	4.12	2.167	8.24	3.667	7.01	5.17	2.89
.750	4.12	2.250	8.24	3.750	6.60	5.25	2.47
.833	4.12	2.333	8.24	3.833	6.60	5.33	2.47
.917	4.12	2.417	8.24	3.917	7.01	5.42	2.89
1.000	4.12	2.500	8.24	4.000	7.01	5.50	2.89
1.083	4.12	2.583	41.22	4.083	5.36	5.58	2.89
1.167	4.12	2.667	41.22	4.167	5.36	5.67	2.89
1.250	4.12	2.750	74.20	4.250	5.77	5.75	2.47
1.333	4.12	2.833	74.20	4.333	5.77	5.83	2.47
1.417	4.12	2.917	107.17	4.417	5.36	5.92	2.89
1.500	4.12	3.000	107.17	4.500	5.36	6.00	2.89

```
     Max.Eff.Inten.(mm/hr)=     107.17        73.77
               over (min)          5.00        25.00
     Storage Coeff.  (min)=       1.69 (ii)   24.13 (ii)
     Unit Hyd. Tpeak (min)=       5.00        25.00
     Unit Hyd. peak  (cms)=        .32          .05
                                                      *TOTALS*
     PEAK FLOW       (cms)=        .05          .07          .092 (iii)
     TIME TO PEAK    (hrs)=       3.00         3.25          3.00
     RUNOFF VOLUME    (mm)=      67.70        46.97         50.90
     TOTAL RAINFALL   (mm)=      68.70        68.70         68.70
     RUNOFF COEFFICIENT   =        .99          .68           .74

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  88.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
```

CALIB					
STANDHYD (0107)	Area (ha)=	3.63			
ID= 1 DT= 5.0 min	Total Imp(%)=	29.40	Dir. Conn.(%)=	19.00	

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	1.07	2.56
Dep. Storage (mm)=	1.00	3.00
Average Slope (%)=	2.00	3.00
Length (m)=	155.50	440.00
Mannings n =	.013	.250

```
     Max.Eff.Inten.(mm/hr)=     107.17        50.61
               over (min)          5.00        40.00
     Storage Coeff.  (min)=       2.63 (ii)   37.22 (ii)
     Unit Hyd. Tpeak (min)=       5.00        40.00
     Unit Hyd. peak  (cms)=        .29          .03
                                                      *TOTALS*
     PEAK FLOW       (cms)=        .20          .21          .286 (iii)
     TIME TO PEAK    (hrs)=       3.00         3.50          3.00
     RUNOFF VOLUME    (mm)=      67.70        42.76         47.50
     TOTAL RAINFALL   (mm)=      68.70        68.70         68.70
     RUNOFF COEFFICIENT   =        .99          .62           .69

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



```
       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  86.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
```

ADD HYD (0114)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0115):		.83	.092	3.00	50.90
+ ID2= 2 (0107):		3.63	.286	3.00	47.50
ID = 3 (0114):		4.45	.378	3.00	48.13

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0117)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0102):		1.39	.157	3.00	36.52
+ ID2= 2 (0114):		4.45	.378	3.00	48.13
ID = 3 (0117):		5.85	.534	3.00	45.36

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0106)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0103):		6.22	.332	3.17	22.18
+ ID2= 2 (0117):		5.85	.534	3.00	45.36
ID = 3 (0106):		12.07	.824	3.00	33.42

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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  ****************************
  ** SIMULATION NUMBER:   5 **
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MASS STORM		
Ptotal= 76.30 mm	Filename: C:\visual otthymo files\4456\SCS II 6-hr.mst	
	Comments: SCS 6 HOUR TYPE II STORM DISTRIBUTION	

```
                    Duration of storm    =  6.00 hrs
                    Mass curve time step = 10.00 min
```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.17	3.20	1.67	7.78	3.17	16.94	4.67	4.58
.33	2.75	1.83	7.32	3.33	16.48	4.83	4.58
.50	3.20	2.00	7.78	3.50	16.94	5.00	4.58

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.67	4.58	2.17	9.16	3.67	7.78	5.17	3.20
.83	4.58	2.33	9.16	3.83	7.32	5.33	2.75
1.00	4.58	2.50	9.16	4.00	7.78	5.50	3.20
1.17	4.58	2.67	45.78	4.17	5.95	5.67	3.20
1.33	4.58	2.83	82.40	4.33	6.41	5.83	2.75
1.50	4.58	3.00	119.03	4.50	5.95	6.00	3.20

CALIB					
NASHYD (0105)	Area (ha)=	4.82	Curve Number (CN)=	66.0	
ID= 1 DT=10.0 min	Ia (mm)=	5.00	# of Linear Res.(N)=	3.00	
	U.H. Tp(hrs)=	.35			

```
     Unit Hyd Qpeak  (cms)=    .522

     PEAK FLOW       (cms)=    .277 (i)
     TIME TO PEAK    (hrs)=   3.167
     RUNOFF VOLUME    (mm)=  25.070
     TOTAL RAINFALL   (mm)=  76.300
     RUNOFF COEFFICIENT   =    .329

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

CALIB					
NASHYD (0112)	Area (ha)=	1.40	Curve Number (CN)=	75.0	
ID= 1 DT=10.0 min	Ia (mm)=	5.00	# of Linear Res.(N)=	3.00	
	U.H. Tp(hrs)=	.24			

```
     Unit Hyd Qpeak  (cms)=    .222

     PEAK FLOW       (cms)=    .134 (i)
     TIME TO PEAK    (hrs)=   3.000
     RUNOFF VOLUME    (mm)=  32.159
     TOTAL RAINFALL   (mm)=  76.300
     RUNOFF COEFFICIENT   =    .421

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

ADD HYD (0103)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0105):		4.82	.277	3.17	25.07
+ ID2= 2 (0112):		1.40	.134	3.00	32.16
ID = 3 (0103):		6.22	.401	3.17	26.66

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB					
NASHYD (0102)	Area (ha)=	1.39	Curve Number (CN)=	84.0	
ID= 1 DT=10.0 min	Ia (mm)=	4.00	# of Linear Res.(N)=	3.00	
	U.H. Tp(hrs)=	.24			

```
     Unit Hyd Qpeak  (cms)=    .223
```

PEAK FLOW (cms)= .184 (i)
TIME TO PEAK (hrs)= 3.000
RUNOFF VOLUME (mm)= 42.727
TOTAL RAINFALL (mm)= 76.300
RUNOFF COEFFICIENT = .560

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

CALIB
STANDHYD (0115)
ID= 1 DT= 5.0 min

Area (ha)= .83
Total Imp(%)= 33.00 Dir. Conn.(%)= 19.00

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	.27	.55
Dep. Storage (mm)=	1.00	2.00
Average Slope (%)=	2.00	3.00
Length (m)=	74.30	275.00
Mannings n =	.013	.250

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.083	3.20	1.583	7.78	3.083	16.94	4.58	4.58
.167	3.20	1.667	7.78	3.167	16.94	4.67	4.58
.250	2.75	1.750	7.32	3.250	16.48	4.75	4.58
.333	2.75	1.833	7.32	3.333	16.48	4.83	4.58
.417	3.20	1.917	7.78	3.417	16.94	4.92	4.58
.500	3.20	2.000	7.78	3.500	16.94	5.00	4.58
.583	4.58	2.083	9.16	3.583	7.78	5.08	3.20
.667	4.58	2.167	9.16	3.667	7.78	5.17	3.20
.750	4.58	2.250	9.16	3.750	7.32	5.25	2.75
.833	4.58	2.333	9.16	3.833	7.32	5.33	2.75
.917	4.58	2.417	9.16	3.917	7.78	5.42	3.20
1.000	4.58	2.500	9.16	4.000	7.78	5.50	3.20
1.083	4.58	2.583	45.78	4.083	5.95	5.58	3.20
1.167	4.58	2.667	45.78	4.167	5.95	5.67	3.20
1.250	4.58	2.750	82.40	4.250	6.41	5.75	2.75
1.333	4.58	2.833	82.40	4.333	6.41	5.83	2.75
1.417	4.58	2.917	119.03	4.417	5.95	5.92	3.20
1.500	4.58	3.000	119.03	4.500	5.95	6.00	3.20

		TOTALS
Max.Eff.Inten.(mm/hr)=	119.03	84.71
over (min)	5.00	25.00
Storage Coeff. (min)=	1.62 (ii)	22.85 (ii)
Unit Hyd. Tpeak (min)=	5.00	25.00
Unit Hyd. peak (cms)=	.32	.05
PEAK FLOW (cms)=	.05	.08 .106 (iii)
TIME TO PEAK (hrs)=	3.00	3.25 3.00
RUNOFF VOLUME (mm)=	75.30	53.94 57.98
TOTAL RAINFALL (mm)=	76.30	76.30 76.30
RUNOFF COEFFICIENT =	.99	.71 .76

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:

CN* = 88.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB
STANDHYD (0107)
ID= 1 DT= 5.0 min

Area (ha)= 3.63
Total Imp(%)= 29.40 Dir. Conn.(%)= 19.00

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	1.07	2.56
Dep. Storage (mm)=	1.00	3.00
Average Slope (%)=	2.00	3.00
Length (m)=	155.50	440.00
Mannings n =	.013	.250

		TOTALS
Max.Eff.Inten.(mm/hr)=	119.03	58.72
over (min)	5.00	40.00
Storage Coeff. (min)=	2.52 (ii)	35.12 (ii)
Unit Hyd. Tpeak (min)=	5.00	40.00
Unit Hyd. peak (cms)=	.29	.03
PEAK FLOW (cms)=	.23	.25 .327 (iii)
TIME TO PEAK (hrs)=	3.00	3.50 3.00
RUNOFF VOLUME (mm)=	75.30	49.48 54.38
TOTAL RAINFALL (mm)=	76.30	76.30 76.30
RUNOFF COEFFICIENT =	.99	.65 .71

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 86.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0114)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0115):	.83	.106	3.00	57.98
+ ID2= 2 (0107):	3.63	.327	3.00	54.38
ID = 3 (0114):	4.45	.433	3.00	55.05

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0117)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0102):	1.39	.184	3.00	42.73
+ ID2= 2 (0114):	4.45	.433	3.00	55.05
ID = 3 (0117):	5.85	.617	3.00	52.12

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0106)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0103):	6.22	.401	3.17	26.66
+ ID2= 2 (0117):	5.85	.617	3.00	52.12
ID = 3 (0106):	12.07	.968	3.00	39.00

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

** SIMULATION NUMBER: 6 **

MASS STORM
Ptotal= 83.80 mm

Filename: C:\visual otthymo files\4456\SCS II 6-hr.mst
Comments: SCS 6 HOUR TYPE II STORM DISTRIBUTION

Duration of storm = 6.00 hrs
Mass curve time step = 10.00 min

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.17	3.52	1.67	8.55	3.17	18.60	4.67	5.03
.33	3.02	1.83	8.04	3.33	18.10	4.83	5.03
.50	3.52	2.00	8.55	3.50	18.60	5.00	5.03
.67	5.03	2.17	10.06	3.67	8.55	5.17	3.52
.83	5.03	2.33	10.06	3.83	8.04	5.33	3.02
1.00	5.03	2.50	10.06	4.00	8.55	5.50	3.52
1.17	5.03	2.67	50.28	4.17	6.54	5.67	3.52
1.33	5.03	2.83	90.50	4.33	7.04	5.83	3.02
1.50	5.03	3.00	130.73	4.50	6.54	6.00	3.52

CALIB
NASHYD (0105)
ID= 1 DT=10.0 min

Area (ha)= 4.82 Curve Number (CN)= 66.0
Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= .35

Unit Hyd Qpeak (cms)= .522

PEAK FLOW (cms)= .327 (i)
TIME TO PEAK (hrs)= 3.167
RUNOFF VOLUME (mm)= 29.527
TOTAL RAINFALL (mm)= 83.800
RUNOFF COEFFICIENT = .352

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

CALIB
NASHYD (0112)
ID= 1 DT=10.0 min

Area (ha)= 1.40 Curve Number (CN)= 75.0
Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= .24

Unit Hyd Qpeak (cms)= .222

PEAK FLOW (cms)= .157 (i)
TIME TO PEAK (hrs)= 3.000
RUNOFF VOLUME (mm)= 37.478
TOTAL RAINFALL (mm)= 83.800
RUNOFF COEFFICIENT = .447

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

ADD HYD (0103)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0105):	4.82	.327	3.17	29.53
+ ID2= 2 (0112):	1.40	.157	3.00	37.48
ID = 3 (0103):	6.22	.472	3.17	31.31

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB
NASHYD (0102)
ID= 1 DT=10.0 min

Area (ha)= 1.39 Curve Number (CN)= 84.0
Ia (mm)= 4.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= .24

Unit Hyd Qpeak (cms)= .223

PEAK FLOW (cms)= .212 (i)
TIME TO PEAK (hrs)= 3.000
RUNOFF VOLUME (mm)= 49.006
TOTAL RAINFALL (mm)= 83.800
RUNOFF COEFFICIENT = .585

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

CALIB
STANDHYD (0115)
ID= 1 DT= 5.0 min

Area (ha)= .83
Total Imp(%)= 33.00 Dir. Conn.(%)= 19.00

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	.27	.55
Dep. Storage (mm)=	1.00	2.00
Average Slope (%)=	2.00	3.00
Length (m)=	74.30	275.00
Mannings n =	.013	.250

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.083	3.52	1.583	8.55	3.083	18.60	4.58	5.03
.167	3.52	1.667	8.55	3.167	18.60	4.67	5.03
.250	3.02	1.750	8.04	3.250	18.10	4.75	5.03

.333	3.02	1.833	8.04	3.333	18.10	4.83	5.03
.417	3.52	1.917	8.55	3.417	18.60	4.92	5.03
.500	3.52	2.000	8.55	3.500	18.60	5.00	5.03
.583	5.03	2.083	10.06	3.583	8.55	5.08	3.52
.667	5.03	2.167	10.06	3.667	8.55	5.17	3.52
.750	5.03	2.250	10.06	3.750	8.04	5.25	3.02
.833	5.03	2.333	10.06	3.833	8.04	5.33	3.02
.917	5.03	2.417	10.06	3.917	8.55	5.42	3.52
1.000	5.03	2.500	10.06	4.000	8.55	5.50	3.52
1.083	5.03	2.583	50.28	4.083	6.54	5.58	3.52
1.167	5.03	2.667	50.28	4.167	6.54	5.67	3.52
1.250	5.03	2.750	90.50	4.250	7.04	5.75	3.02
1.333	5.03	2.833	90.50	4.333	7.04	5.83	3.02
1.417	5.03	2.917	130.73	4.417	6.54	5.92	3.52
1.500	5.03	3.000	130.73	4.500	6.54	6.00	3.52

```
     Max.Eff.Inten.(mm/hr)=     130.73       109.46
               over (min)         5.00        25.00
     Storage Coeff.  (min)=       1.56 (ii)   20.72 (ii)
     Unit Hyd. Tpeak (min)=       5.00        25.00
     Unit Hyd. peak  (cms)=        .33          .05
                                                    *TOTALS*
     PEAK FLOW       (cms)=        .06          .10          .122 (iii)
     TIME TO PEAK    (hrs)=       3.00         3.25         3.00
     RUNOFF VOLUME    (mm)=      82.80        60.90        65.05
     TOTAL RAINFALL   (mm)=      83.80        83.80        83.80
     RUNOFF COEFFICIENT   =        .99          .73          .78

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  88.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD  (0107) |   Area    (ha)=   3.63
|ID= 1 DT= 5.0 min |   Total Imp(%)=  29.40   Dir. Conn.(%)=  19.00
--------------------

                         IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.07         2.56
     Dep. Storage     (mm)=       1.00         3.00
     Average Slope     (%)=       2.00         3.00
     Length            (m)=     155.50       440.00
     Mannings n            =       .013         .250

     Max.Eff.Inten.(mm/hr)=     130.73        74.94
               over (min)         5.00        35.00
     Storage Coeff.  (min)=       2.43 (ii)   31.99 (ii)
     Unit Hyd. Tpeak (min)=       5.00        35.00
     Unit Hyd. peak  (cms)=        .30          .03
                                                    *TOTALS*
     PEAK FLOW       (cms)=        .25          .31          .391 (iii)
     TIME TO PEAK    (hrs)=       3.00         3.42         3.00
     RUNOFF VOLUME    (mm)=      82.80        56.23        61.27
     TOTAL RAINFALL   (mm)=      83.80        83.80        83.80
     RUNOFF COEFFICIENT   =        .99          .67          .73
```



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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  86.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| ADD HYD   (0114) |
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK      R.V.
--------------------          (ha)    (cms)    (hrs)      (mm)
         ID1= 1 (0115):        .83     .122     3.00     65.05
       + ID2= 2 (0107):       3.63     .391     3.00     61.27
         ==========================================================
         ID = 3 (0114):       4.45     .512     3.00     61.97

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| ADD HYD   (0117) |
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK      R.V.
--------------------          (ha)    (cms)    (hrs)      (mm)
         ID1= 1 (0102):       1.39     .212     3.00     49.01
       + ID2= 2 (0114):       4.45     .512     3.00     61.97
         ==========================================================
         ID = 3 (0117):       5.85     .724     3.00     58.88

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| ADD HYD   (0106) |
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK      R.V.
--------------------          (ha)    (cms)    (hrs)      (mm)
         ID1= 1 (0103):       6.22     .472     3.17     31.31
       + ID2= 2 (0117):       5.85     .724     3.00     58.88
         ==========================================================
         ID = 3 (0106):      12.07    1.140     3.00     44.67

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

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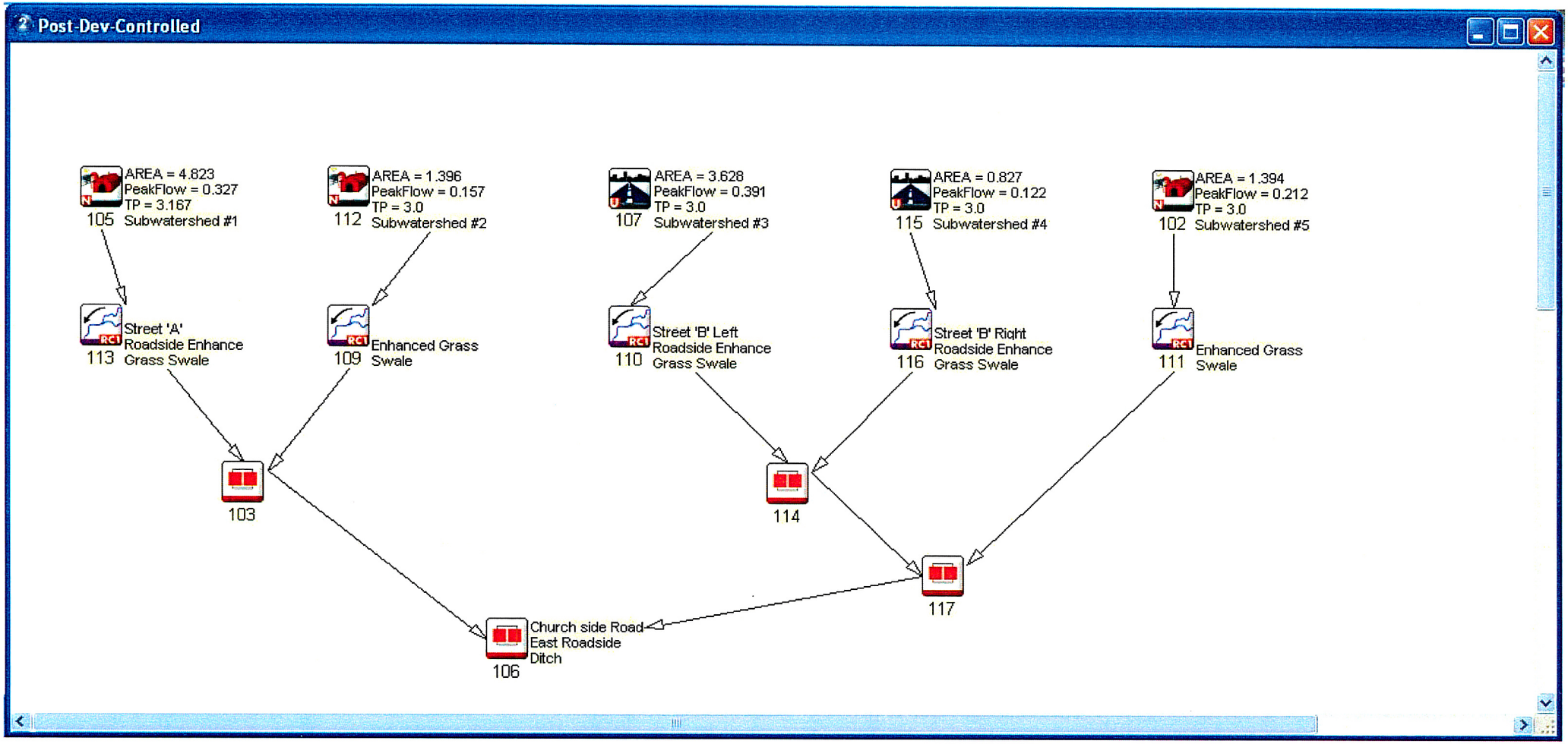

APPENDIX IV

VISUAL OTTHYMO OUTPUT
POST DEVELOPMENT CONTROLLED


Post-Dev-Controlled
AREA = 4.823
PeakFlow = 0.327
TP = 3.167
105 Subwatershed #1
AREA = 1.396
PeakFlow = 0.157
TP = 3.0
112 Subwatershed #2
AREA = 3.628
PeakFlow = 0.391
TP = 3.0
107 Subwatershed #3
AREA = 0.827
PeakFlow = 0.122
TP = 3.0
115 Subwatershed #4
AREA = 1.394
PeakFlow = 0.212
TP = 3.0
102 Subwatershed #5
Street 'A'
Roadside Enhance
Grass Swale
113
Enhanced Grass
Swale
109
Street 'B' Left
Roadside Enhance
Grass Swale
110
Street 'B' Right
Roadside Enhance
Grass Swale
116
Enhanced Grass
Swale
111
103
114
117
Church side Road
East Roadside
Ditch
106

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

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

       OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM, Version 2.0
      O   O    T      T    H   H   Y Y   MM MM  O   O
      O   O    T      T    H   H    Y    M   M  O   O   Licensed To: MJ Davenport
       OOO     T      T    H   H    Y    M   M   OOO                  vo2-0057
```

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

  Input   filename: C:\Program Files\Visual OTTHYMO v2.0\voin.dat

  Output  filename: C:\visual otthymo files\3969\3969-All
Scenarios\Post-Dev-Controlled.out
  Summary filename: C:\visual otthymo files\3969\3969-All
Scenarios\Post-Dev-Controlled.sum

DATE: 1/23/2019                         TIME: 2:11:33 PM

USER:

COMMENTS: ____________________________________________________________

-------------------------------------------------------------------------------
  ****************************
  ** SIMULATION NUMBER:   9 **
  ****************************

--------------------
| CHICAGO STORM    |     IDF curve parameters: A= 486.300
| Ptotal= 25.00 mm |                           B=   7.500
--------------------                           C=    .790
                         used in:   INTENSITY =  A / (t + B)^C

                         Duration of storm  =  4.00 hrs
                         Storm time step    = 10.00 min
                         Time to peak ratio =   .38

                  TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
                   .17    1.66 |  1.17    6.41 |  2.17    4.73 |  3.17    2.05
                   .33    1.87 |  1.33   14.61 |  2.33    3.84 |  3.33    1.89
                   .50    2.16 |  1.50   50.69 |  2.50    3.25 |  3.50    1.75
                   .67    2.55 |  1.67   17.59 |  2.67    2.82 |  3.67    1.63
                   .83    3.16 |  1.83    9.15 |  2.83    2.50 |  3.83    1.53
                  1.00    4.20 |  2.00    6.21 |  3.00    2.25 |  4.00    1.44
```



```
-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD  (0115) |   Area    (ha)=    .83
|ID= 1 DT= 5.0 min |   Total Imp(%)=  33.00   Dir. Conn.(%)=  19.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      .27          .55
     Dep. Storage     (mm)=     1.00         2.00
     Average Slope     (%)=     2.00         3.00
     Length            (m)=    74.30       275.00
     Mannings n          =      .013         .250

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

                          ---- TRANSFORMED HYETOGRAPH ----
                  TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
                  .083    1.66 | 1.083    6.41 | 2.083    4.73 |  3.08    2.05
                  .167    1.66 | 1.167    6.41 | 2.167    4.73 |  3.17    2.05
                  .250    1.87 | 1.250   14.61 | 2.250    3.84 |  3.25    1.89
                  .333    1.87 | 1.333   14.61 | 2.333    3.84 |  3.33    1.89
                  .417    2.16 | 1.417   50.69 | 2.417    3.25 |  3.42    1.75
                  .500    2.16 | 1.500   50.69 | 2.500    3.25 |  3.50    1.75
                  .583    2.55 | 1.583   17.59 | 2.583    2.82 |  3.58    1.63
                  .667    2.55 | 1.667   17.59 | 2.667    2.82 |  3.67    1.63
                  .750    3.16 | 1.750    9.15 | 2.750    2.50 |  3.75    1.53
                  .833    3.16 | 1.833    9.15 | 2.833    2.50 |  3.83    1.53
                  .917    4.20 | 1.917    6.21 | 2.917    2.25 |  3.92    1.44
                 1.000    4.20 | 2.000    6.21 | 3.000    2.25 |  4.00    1.44

     Max.Eff.Inten.(mm/hr)=       50.69        10.32
                over (min)         5.00        55.00
     Storage Coeff.  (min)=        2.28 (ii)   51.57 (ii)
     Unit Hyd. Tpeak (min)=        5.00        55.00
     Unit Hyd. peak  (cms)=         .30          .02
                                                            *TOTALS*
     PEAK FLOW       (cms)=         .02          .01           .023 (iii)
     TIME TO PEAK    (hrs)=        1.50         2.42          1.50
     RUNOFF VOLUME    (mm)=       24.00        10.48         13.01
     TOTAL RAINFALL   (mm)=       25.00        25.00         25.00
     RUNOFF COEFFICIENT   =         .96          .42           .52

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

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =  88.0    Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
--------------------
| ROUTE CHN (0116) |
| IN= 2---> OUT= 1 |      Routing time step (min)'=  5.00
--------------------
               <------ DATA FOR SECTION (    1.1) ------>
               Distance      Elevation       Manning
```



```
                   .00         215.60         .0500
                  1.80         215.00      .0500 / .0500  Main Channel
                  2.56         215.00      .0500 / .0500  Main Channel
                  4.36         215.60         .0500

     <-------------------- TRAVEL TIME TABLE --------------------->
      DEPTH     ELEV      VOLUME    FLOW RATE    VELOCITY    TRAV.TIME
       (m)       (m)     (cu.m.)      (cms)       (m/s)        (min)
       .03    215.03    .676E+01        .0          .13        33.24
       .06    215.06    .150E+02        .0          .21        19.61
       .09    215.09    .248E+02        .0          .29        14.23
       .13    215.13    .360E+02        .1          .37        11.28
       .16    215.16    .488E+02        .1          .44         9.41
       .19    215.19    .630E+02        .1          .51         8.11
       .22    215.22    .787E+02        .2          .58         7.15
       .25    215.25    .960E+02        .2          .65         6.41
       .28    215.28    .115E+03        .3          .72         5.83
       .32    215.32    .135E+03        .4          .78         5.35
       .35    215.35    .157E+03        .5          .84         4.95
       .38    215.38    .180E+03        .6          .90         4.62
       .41    215.41    .205E+03        .8          .96         4.33
       .44    215.44    .231E+03        .9         1.02         4.09
       .47    215.47    .258E+03       1.1         1.08         3.87
       .51    215.51    .288E+03       1.3         1.13         3.68
       .54    215.54    .318E+03       1.5         1.19         3.51
       .57    215.57    .350E+03       1.7         1.24         3.35
       .60    215.60    .384E+03       2.0         1.30         3.22

                              <---- hydrograph ---->   <-pipe / channel->
                        AREA    QPEAK   TPEAK   R.V.   MAX DEPTH   MAX VEL
                        (ha)    (cms)   (hrs)   (mm)      (m)       (m/s)
    INFLOW : ID= 2 (0115)   .83     .02    1.50  13.01      .08        .26
    OUTFLOW: ID= 1 (0116)   .83     .01    1.58  12.95      .06        .19

-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD  (0107) |   Area    (ha)=   3.63
|ID= 1 DT= 5.0 min |   Total Imp(%)=  29.40   Dir. Conn.(%)=  19.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=     1.07         2.56
     Dep. Storage     (mm)=     1.00         3.00
     Average Slope     (%)=     2.00         3.00
     Length            (m)=   155.50       440.00
     Mannings n          =      .013         .250

     Max.Eff.Inten.(mm/hr)=       50.69         7.08
                over (min)         5.00        80.00
     Storage Coeff.  (min)=        3.55 (ii)   79.52 (ii)
     Unit Hyd. Tpeak (min)=        5.00        80.00
     Unit Hyd. peak  (cms)=         .26          .01
                                                            *TOTALS*
     PEAK FLOW       (cms)=         .09          .02           .094 (iii)
     TIME TO PEAK    (hrs)=        1.50         2.92          1.50
     RUNOFF VOLUME    (mm)=       24.00         8.57         11.49
     TOTAL RAINFALL   (mm)=       25.00        25.00         25.00
     RUNOFF COEFFICIENT   =         .96          .34           .46

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



```
        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =  86.0    Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
--------------------
| ROUTE CHN (0110) |
| IN= 2---> OUT= 1 |      Routing time step (min)'=  5.00
--------------------
               <------ DATA FOR SECTION (    1.1) ------>
               Distance      Elevation       Manning
                   .00         215.60         .0500
                  1.80         215.00      .0500 / .0500  Main Channel
                  2.56         215.00      .0500 / .0500  Main Channel
                  4.36         215.60         .0500

     <-------------------- TRAVEL TIME TABLE --------------------->
      DEPTH     ELEV      VOLUME    FLOW RATE    VELOCITY    TRAV.TIME
       (m)       (m)     (cu.m.)      (cms)       (m/s)        (min)
       .03    215.03    .947E+01        .0          .15        38.53
       .06    215.06    .210E+02        .0          .25        23.36
       .09    215.09    .347E+02        .0          .34        17.30
       .13    215.13    .504E+02        .1          .42        13.94
       .16    215.16    .683E+02        .1          .50        11.77
       .19    215.19    .882E+02        .1          .57        10.25
       .22    215.22    .110E+03        .2          .64         9.11
       .25    215.25    .134E+03        .3          .71         8.23
       .28    215.28    .161E+03        .4          .78         7.53
       .32    215.32    .189E+03        .5          .84         6.95
       .35    215.35    .219E+03        .6          .90         6.47
       .38    215.38    .252E+03        .7          .96         6.05
       .41    215.41    .286E+03        .8         1.02         5.70
       .44    215.44    .323E+03       1.0         1.08         5.39
       .47    215.47    .362E+03       1.2         1.14         5.12
       .51    215.51    .403E+03       1.4         1.20         4.88
       .54    215.54    .446E+03       1.6         1.25         4.66
       .57    215.57    .491E+03       1.8         1.30         4.47
       .60    215.60    .538E+03       2.1         1.36         4.30

                              <---- hydrograph ---->   <-pipe / channel->
                        AREA    QPEAK   TPEAK   R.V.   MAX DEPTH   MAX VEL
                        (ha)    (cms)   (hrs)   (mm)      (m)       (m/s)
    INFLOW : ID= 2 (0107)  3.63     .09    1.50  11.49      .16        .49
    OUTFLOW: ID= 1 (0110)  3.63     .06    1.58  11.48      .12        .41

-------------------------------------------------------------------------------
--------------------
| ADD HYD   (0114) |
|   1 +  2 =  3    |        AREA     QPEAK     TPEAK      R.V.
--------------------        (ha)     (cms)     (hrs)      (mm)
         ID1= 1 (0116):      .83      .011      1.58     12.95
       + ID2= 2 (0110):     3.63      .059      1.58     11.48
         ==============================================
         ID = 3 (0114):     4.45      .070      1.58     11.75

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

CALIB					
NASHYD (0102)	Area (ha)= 1.39	Curve Number (CN)= 84.0			
ID= 1 DT=10.0 min	Ia (mm)= 4.00	# of Linear Res.(N)= 3.00			
	U.H. Tp(hrs)= .24				

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.167	1.66	1.167	6.41	2.167	4.73	3.17	2.05
.333	1.87	1.333	14.61	2.333	3.84	3.33	1.89
.500	2.16	1.500	50.69	2.500	3.25	3.50	1.75
.667	2.55	1.667	17.59	2.667	2.82	3.67	1.63
.833	3.16	1.833	9.15	2.833	2.50	3.83	1.53
1.000	4.20	2.000	6.21	3.000	2.25	4.00	.00

Unit Hyd Qpeak (cms)= .223

PEAK FLOW (cms)= .023 (i)
TIME TO PEAK (hrs)= 1.667
RUNOFF VOLUME (mm)= 6.146
TOTAL RAINFALL (mm)= 24.755
RUNOFF COEFFICIENT = .248

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

ROUTE CHN (0111)		
IN= 2---> OUT= 1	Routing time step (min)'= 5.00	

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

Distance	Elevation	Manning	
.00	215.60	.0500	
3.00	215.00	.0500	Main Channel
3.76	215.00	.0500	
5.56	215.60	.0000	

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

DEPTH (m)	ELEV (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME (min)
.03	215.03	.701E+01	.0	.18	22.93
.06	215.06	.160E+02	.0	.29	14.14
.09	215.09	.270E+02	.0	.39	10.61
.13	215.13	.400E+02	.1	.48	8.65
.16	215.16	.550E+02	.1	.56	7.38
.19	215.19	.720E+02	.2	.64	6.48
.22	215.22	.909E+02	.3	.72	5.80
.25	215.25	.112E+03	.4	.79	5.27
.28	215.28	.135E+03	.5	.86	4.85
.32	215.32	.160E+03	.6	.93	4.50
.35	215.35	.187E+03	.7	.99	4.21
.38	215.38	.216E+03	.9	1.05	3.95
.41	215.41	.247E+03	1.1	1.12	3.74
.44	215.44	.280E+03	1.3	1.17	3.55
.47	215.47	.314E+03	1.6	1.23	3.38
.51	215.51	.351E+03	1.8	1.29	3.23
.54	215.54	.390E+03	2.1	1.35	3.09
.57	215.57	.431E+03	2.4	1.40	2.97
.60	215.60	.474E+03	2.8	1.46	2.86

	<---- hydrograph ----> AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	<-pipe / channel-> MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 2 (0102)	1.39	.02	1.67	6.15	.07	.31
OUTFLOW: ID= 1 (0111)	1.39	.02	1.92	6.06	.06	.29

ADD HYD (0117)				
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0114):	4.45	.070	1.58	11.75
+ ID2= 2 (0111):	1.39	.019	1.92	6.06
ID = 3 (0117):	5.85	.076	1.58	10.40

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB					
NASHYD (0105)	Area (ha)= 4.82	Curve Number (CN)= 66.0			
ID= 1 DT=10.0 min	Ia (mm)= 5.00	# of Linear Res.(N)= 3.00			
	U.H. Tp(hrs)= .35				

Unit Hyd Qpeak (cms)= .522

PEAK FLOW (cms)= .024 (i)
TIME TO PEAK (hrs)= 1.833
RUNOFF VOLUME (mm)= 2.583
TOTAL RAINFALL (mm)= 24.755
RUNOFF COEFFICIENT = .104

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

ROUTE CHN (0113)		
IN= 2---> OUT= 1	Routing time step (min)'= 5.00	

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

Distance	Elevation	Manning	
.00	215.60	.0500	
1.80	215.00	.0500 / .0500	Main Channel
2.56	215.00	.0500 / .0500	Main Channel
4.36	215.60	.0500	

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

DEPTH (m)	ELEV (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME (min)
.03	215.03	.541E+01	.0	.15	22.38
.06	215.06	.120E+02	.0	.25	13.54
.09	215.09	.198E+02	.0	.33	10.01
.13	215.13	.288E+02	.1	.41	8.05
.16	215.16	.390E+02	.1	.49	6.79
.19	215.19	.504E+02	.1	.56	5.91
.22	215.22	.630E+02	.2	.63	5.25
.25	215.25	.768E+02	.3	.70	4.74
.28	215.28	.917E+02	.4	.77	4.33
.32	215.32	.108E+03	.4	.83	4.00

.35	215.35	.125E+03	.6	.90	3.72
.38	215.38	.144E+03	.7	.96	3.48
.41	215.41	.164E+03	.8	1.02	3.28
.44	215.44	.185E+03	1.0	1.08	3.10
.47	215.47	.207E+03	1.2	1.13	2.94
.51	215.51	.230E+03	1.4	1.19	2.80
.54	215.54	.255E+03	1.6	1.24	2.68
.57	215.57	.280E+03	1.8	1.30	2.57
.60	215.60	.307E+03	2.1	1.35	2.47

	<---- hydrograph ----> AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	<-pipe / channel-> MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 2 (0105)	4.82	.02	1.83	2.58	.08	.28
OUTFLOW: ID= 1 (0113)	4.82	.02	2.08	2.56	.08	.28

CALIB					
NASHYD (0112)	Area (ha)= 1.40	Curve Number (CN)= 75.0			
ID= 1 DT=10.0 min	Ia (mm)= 5.00	# of Linear Res.(N)= 3.00			
	U.H. Tp(hrs)= .24				

Unit Hyd Qpeak (cms)= .222

PEAK FLOW (cms)= .012 (i)
TIME TO PEAK (hrs)= 1.667
RUNOFF VOLUME (mm)= 3.687
TOTAL RAINFALL (mm)= 24.755
RUNOFF COEFFICIENT = .149

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

ROUTE CHN (0109)		
IN= 2---> OUT= 1	Routing time step (min)'= 5.00	

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

Distance	Elevation	Manning	
.00	215.60	.0500	
1.80	215.00	.0500 / .0500	Main Channel
3.80	215.00	.0500	Main Channel
5.60	215.60	.0500	

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

DEPTH (m)	ELEV (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME (min)
.03	215.03	.813E+01	.0	.14	14.28
.06	215.06	.170E+02	.0	.23	8.87
.09	215.09	.266E+02	.1	.31	6.68
.13	215.13	.369E+02	.1	.38	5.45
.16	215.16	.480E+02	.2	.44	4.64
.19	215.19	.598E+02	.2	.50	4.07
.22	215.22	.724E+02	.3	.56	3.64
.25	215.25	.857E+02	.4	.62	3.30
.28	215.28	.997E+02	.5	.68	3.03
.32	215.32	.114E+03	.7	.73	2.80
.35	215.35	.130E+03	.8	.78	2.61
.38	215.38	.146E+03	1.0	.84	2.45
.41	215.41	.163E+03	1.2	.89	2.31
.44	215.44	.181E+03	1.4	.94	2.18

.47	215.47	.199E+03	1.6	.99	2.08
.51	215.51	.218E+03	1.8	1.04	1.98
.54	215.54	.238E+03	2.1	1.08	1.89
.57	215.57	.259E+03	2.4	1.13	1.81
.60	215.60	.280E+03	2.7	1.18	1.74

	<---- hydrograph ----> AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	<-pipe / channel-> MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 2 (0112)	1.40	.01	1.67	3.69	.04	.15
OUTFLOW: ID= 1 (0109)	1.40	.01	2.00	3.62	.03	.14

ADD HYD (0103)				
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0113):	4.82	.022	2.08	2.56
+ ID2= 2 (0109):	1.40	.010	2.00	3.62
ID = 3 (0103):	6.22	.032	2.08	2.80

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0106)				
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0117):	5.85	.076	1.58	10.40
+ ID2= 2 (0103):	6.22	.032	2.08	2.80
ID = 3 (0106):	12.07	.088	1.92	6.48

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

FINISH

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==============================================================================

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

      OOO   TTTTT  TTTTT  H    H  Y    Y  M    M   OOO    TM, Version 2.0
     O   O    T      T    H    H   Y  Y   MM  MM  O   O
     O   O    T      T    H    H    Y     M    M  O   O   Licensed To: MJ Davenport
      OOO     T      T    H    H    Y     M    M   OOO                 vo2-0057
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                    ***** D E T A I L E D   O U T P U T *****

  Input   filename: C:\Program Files\Visual OTTHYMO v2.0\voin.dat

  Output  filename: C:\visual otthymo files\3969\3969-All
Scenarios\Post-Dev-Controlled.out
  Summary filename: C:\visual otthymo files\3969\3969-All
Scenarios\Post-Dev-Controlled.sum

DATE: 1/23/2019                          TIME: 1:59:05 PM

USER:

COMMENTS: ____________________________________________________

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

--------------------
| CHICAGO STORM    |     IDF curve parameters: A= 662.000
| Ptotal= 37.36 mm |                           B=   7.500
--------------------                           C=    .790
                         used in:   INTENSITY =  A / (t + B)^C

                         Duration of storm  =  6.00 hrs
                         Storm time step    = 10.00 min
                         Time to peak ratio =   .38

              TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
               hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
               .17    1.48 |  1.67    4.30 |  3.17    5.23 |  4.67    2.08
               .33    1.59 |  1.83    5.71 |  3.33    4.42 |  4.83    1.96
               .50    1.71 |  2.00    8.73 |  3.50    3.84 |  5.00    1.86
               .67    1.86 |  2.17   19.90 |  3.67    3.41 |  5.17    1.76
               .83    2.04 |  2.33   69.00 |  3.83    3.07 |  5.33    1.68
              1.00    2.26 |  2.50   23.94 |  4.00    2.79 |  5.50    1.61
```



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              1.17    2.55 |  2.67   12.46 |  4.17    2.57 |  5.67    1.54
              1.33    2.94 |  2.83    8.46 |  4.33    2.38 |  5.83    1.48
              1.50    3.48 |  3.00    6.44 |  4.50    2.22 |  6.00    1.42

------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD  (0115) |   Area    (ha)=     .83
|ID= 1 DT= 5.0 min |   Total Imp(%)=  33.00   Dir. Conn.(%)=  19.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=      .27          .55
    Dep. Storage     (mm)=     1.00         2.00
    Average Slope     (%)=     2.00         3.00
    Length            (m)=    74.30       275.00
    Mannings n          =      .013         .250

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

                          ---- TRANSFORMED HYETOGRAPH ----
              TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
               hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
              .083    1.48 | 1.583    4.30 | 3.083    5.23 | 4.58    2.08
              .167    1.48 | 1.667    4.30 | 3.167    5.23 | 4.67    2.08
              .250    1.59 | 1.750    5.71 | 3.250    4.42 | 4.75    1.96
              .333    1.59 | 1.833    5.71 | 3.333    4.42 | 4.83    1.96
              .417    1.71 | 1.917    8.73 | 3.417    3.84 | 4.92    1.86
              .500    1.71 | 2.000    8.73 | 3.500    3.84 | 5.00    1.86
              .583    1.86 | 2.083   19.90 | 3.583    3.41 | 5.08    1.76
              .667    1.86 | 2.167   19.90 | 3.667    3.41 | 5.17    1.76
              .750    2.04 | 2.250   69.00 | 3.750    3.07 | 5.25    1.68
              .833    2.04 | 2.333   69.00 | 3.833    3.07 | 5.33    1.68
              .917    2.26 | 2.417   23.94 | 3.917    2.79 | 5.42    1.61
             1.000    2.26 | 2.500   23.94 | 4.000    2.79 | 5.50    1.61
             1.083    2.55 | 2.583   12.46 | 4.083    2.57 | 5.58    1.54
             1.167    2.55 | 2.667   12.46 | 4.167    2.57 | 5.67    1.54
             1.250    2.94 | 2.750    8.46 | 4.250    2.38 | 5.75    1.48
             1.333    2.94 | 2.833    8.46 | 4.333    2.38 | 5.83    1.48
             1.417    3.48 | 2.917    6.44 | 4.417    2.22 | 5.92    1.42
             1.500    3.48 | 3.000    6.44 | 4.500    2.22 | 6.00    1.42

    Max.Eff.Inten.(mm/hr)=      69.00        20.78
               over (min)       5.00        40.00
    Storage Coeff.  (min)=      2.01 (ii)   39.27 (ii)
    Unit Hyd. Tpeak (min)=      5.00        40.00
    Unit Hyd. peak  (cms)=       .31          .03
                                                          *TOTALS*
    PEAK FLOW       (cms)=       .03          .02           .034 (iii)
    TIME TO PEAK    (hrs)=      2.33         2.92          2.33
    RUNOFF VOLUME    (mm)=     36.36        19.81         22.93
    TOTAL RAINFALL   (mm)=     37.36        37.36         37.36
    RUNOFF COEFFICIENT   =       .97          .53           .61

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

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN*  =  88.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
```



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

------------------------------------------------------------------------------
--------------------
| ROUTE CHN (0116) |
| IN= 2---> OUT= 1 |     Routing time step (min)'=  5.00
--------------------
               <------ DATA FOR SECTION (    1.1) ------>
               Distance      Elevation        Manning
                  .00          215.60          .0500
                 1.80          215.00       .0500 / .0500  Main Channel
                 2.56          215.00       .0500 / .0500  Main Channel
                 4.36          215.60          .0500

     <--------------------- TRAVEL TIME TABLE ---------------------->
      DEPTH    ELEV      VOLUME    FLOW RATE    VELOCITY   TRAV.TIME
       (m)      (m)     (cu.m.)      (cms)        (m/s)      (min)
       .03    215.03    .676E+01       .0           .13      33.24
       .06    215.06    .150E+02       .0           .21      19.61
       .09    215.09    .248E+02       .0           .29      14.23
       .13    215.13    .360E+02       .1           .37      11.28
       .16    215.16    .488E+02       .1           .44       9.41
       .19    215.19    .630E+02       .1           .51       8.11
       .22    215.22    .787E+02       .2           .58       7.15
       .25    215.25    .960E+02       .2           .65       6.41
       .28    215.28    .115E+03       .3           .72       5.83
       .32    215.32    .135E+03       .4           .78       5.35
       .35    215.35    .157E+03       .5           .84       4.95
       .38    215.38    .180E+03       .6           .90       4.62
       .41    215.41    .205E+03       .8           .96       4.33
       .44    215.44    .231E+03       .9          1.02       4.09
       .47    215.47    .258E+03      1.1          1.08       3.87
       .51    215.51    .288E+03      1.3          1.13       3.68
       .54    215.54    .318E+03      1.5          1.19       3.51
       .57    215.57    .350E+03      1.7          1.24       3.35
       .60    215.60    .384E+03      2.0          1.30       3.22

                              <---- hydrograph ---->   <-pipe / channel->
                        AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                        (ha)    (cms)   (hrs)   (mm)      (m)      (m/s)
    INFLOW : ID= 2 (0115)  .83    .03    2.33  22.93      .10       .31
    OUTFLOW: ID= 1 (0116)  .83    .02    3.08  22.84      .08       .25

------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD  (0107) |   Area    (ha)=    3.63
|ID= 1 DT= 5.0 min |   Total Imp(%)=  29.40   Dir. Conn.(%)=  19.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=     1.07         2.56
    Dep. Storage     (mm)=     1.00         3.00
    Average Slope     (%)=     2.00         3.00
    Length            (m)=   155.50       440.00
    Mannings n          =      .013         .250

    Max.Eff.Inten.(mm/hr)=      69.00        13.00
               over (min)       5.00        65.00
    Storage Coeff.  (min)=      3.14 (ii)   62.72 (ii)
    Unit Hyd. Tpeak (min)=      5.00        65.00
    Unit Hyd. peak  (cms)=       .27          .02
                                                          *TOTALS*
```



```
    PEAK FLOW       (cms)=       .13          .05           .133 (iii)
    TIME TO PEAK    (hrs)=      2.33         3.42          2.33
    RUNOFF VOLUME    (mm)=     36.36        17.06         20.72
    TOTAL RAINFALL   (mm)=     37.36        37.36         37.36
    RUNOFF COEFFICIENT   =       .97          .46           .55

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

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN*  =  86.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------
--------------------
| ROUTE CHN (0110) |
| IN= 2---> OUT= 1 |     Routing time step (min)'=  5.00
--------------------
               <------ DATA FOR SECTION (    1.1) ------>
               Distance      Elevation        Manning
                  .00          215.60          .0500
                 1.80          215.00       .0500 / .0500  Main Channel
                 2.56          215.00       .0500 / .0500  Main Channel
                 4.36          215.60          .0500

     <--------------------- TRAVEL TIME TABLE ---------------------->
      DEPTH    ELEV      VOLUME    FLOW RATE    VELOCITY   TRAV.TIME
       (m)      (m)     (cu.m.)      (cms)        (m/s)      (min)
       .03    215.03    .947E+01       .0           .15      38.53
       .06    215.06    .210E+02       .0           .25      23.36
       .09    215.09    .347E+02       .0           .34      17.30
       .13    215.13    .504E+02       .1           .42      13.94
       .16    215.16    .683E+02       .1           .50      11.77
       .19    215.19    .882E+02       .1           .57      10.25
       .22    215.22    .110E+03       .2           .64       9.11
       .25    215.25    .134E+03       .3           .71       8.23
       .28    215.28    .161E+03       .4           .78       7.53
       .32    215.32    .189E+03       .5           .84       6.95
       .35    215.35    .219E+03       .6           .90       6.47
       .38    215.38    .252E+03       .7           .96       6.05
       .41    215.41    .286E+03       .8          1.02       5.70
       .44    215.44    .323E+03      1.0          1.08       5.39
       .47    215.47    .362E+03      1.2          1.14       5.12
       .51    215.51    .403E+03      1.4          1.20       4.88
       .54    215.54    .446E+03      1.6          1.25       4.66
       .57    215.57    .491E+03      1.8          1.30       4.47
       .60    215.60    .538E+03      2.1          1.36       4.30

                              <---- hydrograph ---->   <-pipe / channel->
                        AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                        (ha)    (cms)   (hrs)   (mm)      (m)      (m/s)
    INFLOW : ID= 2 (0107) 3.63    .13    2.33  20.72      .18       .55
    OUTFLOW: ID= 1 (0110) 3.63    .09    2.42  20.70      .15       .47

------------------------------------------------------------------------------
--------------------
| ADD HYD   (0114) |
|   1 +  2 =  3    |        AREA    QPEAK    TPEAK     R.V.
```

	(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0116):	.83	.021	3.08	22.84
+ ID2= 2 (0110):	3.63	.088	2.42	20.70
ID = 3 (0114):	4.45	.108	2.42	21.10

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB			
NASHYD (0102)	Area (ha)=	1.39	Curve Number (CN)= 84.0
ID= 1 DT=10.0 min	Ia (mm)=	4.00	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)=	.24	

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.167	1.48	1.667	4.30	3.167	5.23	4.67	2.08
.333	1.59	1.833	5.71	3.333	4.42	4.83	1.96
.500	1.71	2.000	8.73	3.500	3.84	5.00	1.86
.667	1.86	2.167	19.90	3.667	3.41	5.17	1.76
.833	2.04	2.333	69.00	3.833	3.07	5.33	1.68
1.000	2.26	2.500	23.94	4.000	2.79	5.50	1.61
1.167	2.55	2.667	12.46	4.167	2.57	5.67	1.54
1.333	2.94	2.833	8.46	4.333	2.38	5.83	1.48
1.500	3.48	3.000	6.44	4.500	2.22	6.00	1.42

Unit Hyd Qpeak (cms)= .223

PEAK FLOW (cms)= .048 (i)
TIME TO PEAK (hrs)= 2.500
RUNOFF VOLUME (mm)= 13.432
TOTAL RAINFALL (mm)= 37.363
RUNOFF COEFFICIENT = .359

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

ROUTE CHN (0111)	
IN= 2---> OUT= 1	Routing time step (min)'= 5.00

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

Distance	Elevation	Manning	
.00	215.60	.0500	
3.00	215.00	.0500	Main Channel
3.76	215.00	.0500	
5.56	215.60	.0000	

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

DEPTH (m)	ELEV (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME (min)
.03	215.03	.701E+01	.0	.18	22.93
.06	215.06	.160E+02	.0	.29	14.14
.09	215.09	.270E+02	.0	.39	10.61
.13	215.13	.400E+02	.1	.48	8.65
.16	215.16	.550E+02	.1	.56	7.38
.19	215.19	.720E+02	.2	.64	6.48
.22	215.22	.909E+02	.3	.72	5.80

.25	215.25	.112E+03	.4	.79	5.27
.28	215.28	.135E+03	.5	.86	4.85
.32	215.32	.160E+03	.6	.93	4.50
.35	215.35	.187E+03	.7	.99	4.21
.38	215.38	.216E+03	.9	1.05	3.95
.41	215.41	.247E+03	1.1	1.12	3.74
.44	215.44	.280E+03	1.3	1.17	3.55
.47	215.47	.314E+03	1.6	1.23	3.38
.51	215.51	.351E+03	1.8	1.29	3.23
.54	215.54	.390E+03	2.1	1.35	3.09
.57	215.57	.431E+03	2.4	1.40	2.97
.60	215.60	.474E+03	2.8	1.46	2.86

<---- hydrograph ----> <-pipe / channel->

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 2 (0102)	1.39	.05	2.50	13.43	.10	.40
OUTFLOW: ID= 1 (0111)	1.39	.04	2.67	13.36	.09	.39

ADD HYD (0117)				
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0114):	4.45	.108	2.42	21.10
+ ID2= 2 (0111):	1.39	.041	2.67	13.36
ID = 3 (0117):	5.85	.129	2.42	19.25

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB			
NASHYD (0105)	Area (ha)=	4.82	Curve Number (CN)= 66.0
ID= 1 DT=10.0 min	Ia (mm)=	5.00	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)=	.35	

Unit Hyd Qpeak (cms)= .522

PEAK FLOW (cms)= .057 (i)
TIME TO PEAK (hrs)= 2.667
RUNOFF VOLUME (mm)= 6.397
TOTAL RAINFALL (mm)= 37.363
RUNOFF COEFFICIENT = .171

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

ROUTE CHN (0113)	
IN= 2---> OUT= 1	Routing time step (min)'= 5.00

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

Distance	Elevation	Manning	
.00	215.60	.0500	
1.80	215.00	.0500 / .0500	Main Channel
2.56	215.00	.0500 / .0500	Main Channel
4.36	215.60	.0500	

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

DEPTH (m)	ELEV (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME (min)
.03	215.03	.541E+01	.0	.15	22.38
.06	215.06	.120E+02	.0	.25	13.54
.09	215.09	.198E+02	.0	.33	10.01
.13	215.13	.288E+02	.1	.41	8.05
.16	215.16	.390E+02	.1	.49	6.79
.19	215.19	.504E+02	.1	.56	5.91
.22	215.22	.630E+02	.2	.63	5.25
.25	215.25	.768E+02	.3	.70	4.74
.28	215.28	.917E+02	.4	.77	4.33
.32	215.32	.108E+03	.4	.83	4.00
.35	215.35	.125E+03	.6	.90	3.72
.38	215.38	.144E+03	.7	.96	3.48
.41	215.41	.164E+03	.8	1.02	3.28
.44	215.44	.185E+03	1.0	1.08	3.10
.47	215.47	.207E+03	1.2	1.13	2.94
.51	215.51	.230E+03	1.4	1.19	2.80
.54	215.54	.255E+03	1.6	1.24	2.68
.57	215.57	.280E+03	1.8	1.30	2.57
.60	215.60	.307E+03	2.1	1.35	2.47

<---- hydrograph ----> <-pipe / channel->

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 2 (0105)	4.82	.06	2.67	6.40	.12	.40
OUTFLOW: ID= 1 (0113)	4.82	.05	2.83	6.37	.12	.39

CALIB			
NASHYD (0112)	Area (ha)=	1.40	Curve Number (CN)= 75.0
ID= 1 DT=10.0 min	Ia (mm)=	5.00	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)=	.24	

Unit Hyd Qpeak (cms)= .222

PEAK FLOW (cms)= .029 (i)
TIME TO PEAK (hrs)= 2.500
RUNOFF VOLUME (mm)= 8.830
TOTAL RAINFALL (mm)= 37.363
RUNOFF COEFFICIENT = .236

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

ROUTE CHN (0109)	
IN= 2---> OUT= 1	Routing time step (min)'= 5.00

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

Distance	Elevation	Manning	
.00	215.60	.0500	
1.80	215.00	.0500 / .0500	Main Channel
3.80	215.00	.0500	Main Channel
5.60	215.60	.0500	

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

DEPTH (m)	ELEV (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME (min)
.03	215.03	.813E+01	.0	.14	14.28
.06	215.06	.170E+02	.0	.23	8.87

.09	215.09	.266E+02	.1	.31	6.68
.13	215.13	.369E+02	.1	.38	5.45
.16	215.16	.480E+02	.2	.44	4.64
.19	215.19	.598E+02	.2	.50	4.07
.22	215.22	.724E+02	.3	.56	3.64
.25	215.25	.857E+02	.4	.62	3.30
.28	215.28	.997E+02	.5	.68	3.03
.32	215.32	.114E+03	.7	.73	2.80
.35	215.35	.130E+03	.8	.78	2.61
.38	215.38	.146E+03	1.0	.84	2.45
.41	215.41	.163E+03	1.2	.89	2.31
.44	215.44	.181E+03	1.4	.94	2.18
.47	215.47	.199E+03	1.6	.99	2.08
.51	215.51	.218E+03	1.8	1.04	1.98
.54	215.54	.238E+03	2.1	1.08	1.89
.57	215.57	.259E+03	2.4	1.13	1.81
.60	215.60	.280E+03	2.7	1.18	1.74

<---- hydrograph ----> <-pipe / channel->

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 2 (0112)	1.40	.03	2.50	8.83	.06	.22
OUTFLOW: ID= 1 (0109)	1.40	.03	2.67	8.77	.05	.20

ADD HYD (0103)				
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0113):	4.82	.054	2.83	6.37
+ ID2= 2 (0109):	1.40	.025	2.67	8.77
ID = 3 (0103):	6.22	.079	2.75	6.91

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0106)				
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0117):	5.85	.129	2.42	19.25
+ ID2= 2 (0103):	6.22	.079	2.75	6.91
ID = 3 (0106):	12.07	.190	2.67	12.89

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

CHICAGO STORM	
Ptotal= 48.64 mm	IDF curve parameters: A=1098.000
	B= 10.100
	C= .830
	used in: INTENSITY = A / (t + B)^C

Duration of storm = 6.00 hrs

Storm time step = 10.00 min
Time to peak ratio = .38

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.17	1.65	1.67	5.38	3.17	6.69	4.67	2.40
.33	1.78	1.83	7.38	3.33	5.55	4.83	2.25
.50	1.93	2.00	11.78	3.50	4.74	5.00	2.12
.67	2.12	2.17	28.11	3.67	4.15	5.17	2.00
.83	2.35	2.33	90.98	3.83	3.69	5.33	1.90
1.00	2.63	2.50	33.98	4.00	3.33	5.50	1.80
1.17	3.01	2.67	17.30	4.17	3.03	5.67	1.72
1.33	3.51	2.83	11.37	4.33	2.79	5.83	1.64
1.50	4.24	3.00	8.43	4.50	2.58	6.00	1.58

CALIB
STANDHYD (0115)
ID= 1 DT= 5.0 min

Area (ha)= .83
Total Imp(%)= 33.00 Dir. Conn.(%)= 19.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	.27	.55
Dep. Storage	(mm)=	1.00	2.00
Average Slope	(%)=	2.00	3.00
Length	(m)=	74.30	275.00
Mannings n	=	.013	.250

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.083	1.65	1.583	5.38	3.083	6.69	4.58	2.40
.167	1.65	1.667	5.38	3.167	6.69	4.67	2.40
.250	1.78	1.750	7.38	3.250	5.55	4.75	2.25
.333	1.78	1.833	7.38	3.333	5.55	4.83	2.25
.417	1.93	1.917	11.78	3.417	4.74	4.92	2.12
.500	1.93	2.000	11.78	3.500	4.74	5.00	2.12
.583	2.12	2.083	28.11	3.583	4.15	5.08	2.00
.667	2.12	2.167	28.11	3.667	4.15	5.17	2.00
.750	2.35	2.250	90.98	3.750	3.69	5.25	1.90
.833	2.35	2.333	90.98	3.833	3.69	5.33	1.90
.917	2.63	2.417	33.98	3.917	3.33	5.42	1.80
1.000	2.63	2.500	33.98	4.000	3.33	5.50	1.80
1.083	3.01	2.583	17.30	4.083	3.03	5.58	1.72
1.167	3.01	2.667	17.30	4.167	3.03	5.67	1.72
1.250	3.51	2.750	11.37	4.250	2.79	5.75	1.64
1.333	3.51	2.833	11.37	4.333	2.79	5.83	1.64
1.417	4.24	2.917	8.43	4.417	2.58	5.92	1.58
1.500	4.24	3.000	8.43	4.500	2.58	6.00	1.58

				TOTALS
Max.Eff.Inten.(mm/hr)=		90.98	38.59	
over (min)		5.00	35.00	
Storage Coeff. (min)=		1.80 (ii)	30.88 (ii)	
Unit Hyd. Tpeak (min)=		5.00	35.00	
Unit Hyd. peak (cms)=		.32	.04	
PEAK FLOW	(cms)=	.04	.04	.048 (iii)
TIME TO PEAK	(hrs)=	2.33	2.83	2.33
RUNOFF VOLUME	(mm)=	47.64	29.19	32.68

TOTAL RAINFALL	(mm)=	48.64	48.64 48.64
RUNOFF COEFFICIENT	=	.98	.60 .67

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 88.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ROUTE CHN (0116)
IN= 2---> OUT= 1

Routing time step (min)'= 5.00

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

Distance	Elevation	Manning	
.00	215.60	.0500	
1.80	215.00	.0500 / .0500	Main Channel
2.56	215.00	.0500 / .0500	Main Channel
4.36	215.60	.0500	

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

DEPTH (m)	ELEV (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME (min)
.03	215.03	.676E+01	.0	.13	33.24
.06	215.06	.150E+02	.0	.21	19.61
.09	215.09	.248E+02	.0	.29	14.23
.13	215.13	.360E+02	.1	.37	11.28
.16	215.16	.488E+02	.1	.44	9.41
.19	215.19	.630E+02	.1	.51	8.11
.22	215.22	.787E+02	.2	.58	7.15
.25	215.25	.960E+02	.2	.65	6.41
.28	215.28	.115E+03	.3	.72	5.83
.32	215.32	.135E+03	.4	.78	5.35
.35	215.35	.157E+03	.5	.84	4.95
.38	215.38	.180E+03	.6	.90	4.62
.41	215.41	.205E+03	.8	.96	4.33
.44	215.44	.231E+03	.9	1.02	4.09
.47	215.47	.258E+03	1.1	1.08	3.87
.51	215.51	.288E+03	1.3	1.13	3.68
.54	215.54	.318E+03	1.5	1.19	3.51
.57	215.57	.350E+03	1.7	1.24	3.35
.60	215.60	.384E+03	2.0	1.30	3.22

		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	MAX DEPTH (m)	MAX VEL (m/s)
		<---- hydrograph ---->				<-pipe / channel->	
INFLOW : ID= 2 (0115)		.83	.05	2.33	32.68	.12	.35
OUTFLOW: ID= 1 (0116)		.83	.04	2.92	32.55	.11	.32

CALIB
STANDHYD (0107)
ID= 1 DT= 5.0 min

Area (ha)= 3.63
Total Imp(%)= 29.40 Dir. Conn.(%)= 19.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	1.07	2.56

Dep. Storage	(mm)=	1.00	3.00
Average Slope	(%)=	2.00	3.00
Length	(m)=	155.50	440.00
Mannings n	=	.013	.250

				TOTALS
Max.Eff.Inten.(mm/hr)=		90.98	23.44	
over (min)		5.00	50.00	
Storage Coeff. (min)=		2.81 (ii)	49.87 (ii)	
Unit Hyd. Tpeak (min)=		5.00	50.00	
Unit Hyd. peak (cms)=		.28	.02	
PEAK FLOW	(cms)=	.17	.10	.185 (iii)
TIME TO PEAK	(hrs)=	2.33	3.17	2.33
RUNOFF VOLUME	(mm)=	47.64	25.82	29.96
TOTAL RAINFALL	(mm)=	48.64	48.64	48.64
RUNOFF COEFFICIENT	=	.98	.53	.62

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 86.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ROUTE CHN (0110)
IN= 2---> OUT= 1

Routing time step (min)'= 5.00

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

Distance	Elevation	Manning	
.00	215.60	.0500	
1.80	215.00	.0500 / .0500	Main Channel
2.56	215.00	.0500 / .0500	Main Channel
4.36	215.60	.0500	

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

DEPTH (m)	ELEV (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME (min)
.03	215.03	.947E+01	.0	.15	38.53
.06	215.06	.210E+02	.0	.25	23.36
.09	215.09	.347E+02	.0	.34	17.30
.13	215.13	.504E+02	.1	.42	13.94
.16	215.16	.683E+02	.1	.50	11.77
.19	215.19	.882E+02	.1	.57	10.25
.22	215.22	.110E+03	.2	.64	9.11
.25	215.25	.134E+03	.3	.71	8.23
.28	215.28	.161E+03	.4	.78	7.53
.32	215.32	.189E+03	.5	.84	6.95
.35	215.35	.219E+03	.6	.90	6.47
.38	215.38	.252E+03	.7	.96	6.05
.41	215.41	.286E+03	.8	1.02	5.70
.44	215.44	.323E+03	1.0	1.08	5.39
.47	215.47	.362E+03	1.2	1.14	5.12
.51	215.51	.403E+03	1.4	1.20	4.88
.54	215.54	.446E+03	1.6	1.25	4.66
.57	215.57	.491E+03	1.8	1.30	4.47
.60	215.60	.538E+03	2.1	1.36	4.30

		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	MAX DEPTH (m)	MAX VEL (m/s)
		<---- hydrograph ---->				<-pipe / channel->	
INFLOW : ID= 2 (0107)		3.63	.18	2.33	29.96	.21	.62
OUTFLOW: ID= 1 (0110)		3.63	.13	2.42	29.93	.18	.54

ADD HYD (0114)		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
1 + 2 = 3	ID1= 1 (0116):	.83	.038	2.92	32.55
	+ ID2= 2 (0110):	3.63	.130	2.42	29.93
	ID = 3 (0114):	4.45	.162	2.42	30.42

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB
NASHYD (0102)
ID= 1 DT=10.0 min

Area (ha)= 1.39 Curve Number (CN)= 84.0
Ia (mm)= 4.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= .24

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.167	1.65	1.667	5.38	3.167	6.69	4.67	2.40
.333	1.78	1.833	7.38	3.333	5.55	4.83	2.25
.500	1.93	2.000	11.78	3.500	4.74	5.00	2.12
.667	2.12	2.167	28.11	3.667	4.15	5.17	2.00
.833	2.35	2.333	90.98	3.833	3.69	5.33	1.90
1.000	2.63	2.500	33.98	4.000	3.33	5.50	1.80
1.167	3.01	2.667	17.30	4.167	3.03	5.67	1.72
1.333	3.51	2.833	11.37	4.333	2.79	5.83	1.64
1.500	4.24	3.000	8.43	4.500	2.58	6.00	1.58

Unit Hyd Qpeak (cms)= .223

PEAK FLOW (cms)= .081 (i)
TIME TO PEAK (hrs)= 2.500
RUNOFF VOLUME (mm)= 21.135
TOTAL RAINFALL (mm)= 48.645
RUNOFF COEFFICIENT = .434

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

ROUTE CHN (0111)
IN= 2---> OUT= 1

Routing time step (min)'= 5.00

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

Distance	Elevation	Manning	
.00	215.60	.0500	
3.00	215.00	.0500	Main Channel
3.76	215.00	.0500	
5.56	215.60	.0000	

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

DEPTH (m)	ELEV (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME (min)
.03	215.03	.701E+01	.0	.18	22.93
.06	215.06	.160E+02	.0	.29	14.14
.09	215.09	.270E+02	.0	.39	10.61
.13	215.13	.400E+02	.1	.48	8.65
.16	215.16	.550E+02	.1	.56	7.38
.19	215.19	.720E+02	.2	.64	6.48
.22	215.22	.909E+02	.3	.72	5.80
.25	215.25	.112E+03	.4	.79	5.27
.28	215.28	.135E+03	.5	.86	4.85
.32	215.32	.160E+03	.6	.93	4.50
.35	215.35	.187E+03	.7	.99	4.21
.38	215.38	.216E+03	.9	1.05	3.95
.41	215.41	.247E+03	1.1	1.12	3.74
.44	215.44	.280E+03	1.3	1.17	3.55
.47	215.47	.314E+03	1.6	1.23	3.38
.51	215.51	.351E+03	1.8	1.29	3.23
.54	215.54	.390E+03	2.1	1.35	3.09
.57	215.57	.431E+03	2.4	1.40	2.97
.60	215.60	.474E+03	2.8	1.46	2.86

	<---- hydrograph ---->				<-pipe / channel->	
	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 2 (0102)	1.39	.08	2.50	21.13	.13	.49
OUTFLOW: ID= 1 (0111)	1.39	.07	2.67	21.06	.12	.47

ADD HYD (0117)				
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0114):	4.45	.162	2.42	30.42
+ ID2= 2 (0111):	1.39	.072	2.67	21.06
ID = 3 (0117):	5.85	.207	2.50	28.19

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB			
NASHYD (0105)	Area (ha)= 4.82	Curve Number (CN)= 66.0	
ID= 1 DT=10.0 min	Ia (mm)= 5.00	# of Linear Res.(N)= 3.00	
	U.H. Tp(hrs)= .35		

Unit Hyd Qpeak (cms)= .522

PEAK FLOW (cms)= .106 (i)
TIME TO PEAK (hrs)= 2.667
RUNOFF VOLUME (mm)= 10.883
TOTAL RAINFALL (mm)= 48.645
RUNOFF COEFFICIENT = .224

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

ROUTE CHN (0113)	
IN= 2---> OUT= 1	Routing time step (min)'= 5.00

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

Distance	Elevation	Manning	
.00	215.60	.0500	
1.80	215.00	.0500 / .0500	Main Channel
2.56	215.00	.0500 / .0500	Main Channel
4.36	215.60	.0500	

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

DEPTH (m)	ELEV (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME (min)
.03	215.03	.541E+01	.0	.15	22.38
.06	215.06	.120E+02	.0	.25	13.54
.09	215.09	.198E+02	.0	.33	10.01
.13	215.13	.288E+02	.1	.41	8.05
.16	215.16	.390E+02	.1	.49	6.79
.19	215.19	.504E+02	.1	.56	5.91
.22	215.22	.630E+02	.2	.63	5.25
.25	215.25	.768E+02	.3	.70	4.74
.28	215.28	.917E+02	.4	.77	4.33
.32	215.32	.108E+03	.4	.83	4.00
.35	215.35	.125E+03	.6	.90	3.72
.38	215.38	.144E+03	.7	.96	3.48
.41	215.41	.164E+03	.8	1.02	3.28
.44	215.44	.185E+03	1.0	1.08	3.10
.47	215.47	.207E+03	1.2	1.13	2.94
.51	215.51	.230E+03	1.4	1.19	2.80
.54	215.54	.255E+03	1.6	1.24	2.68
.57	215.57	.280E+03	1.8	1.30	2.57
.60	215.60	.307E+03	2.1	1.35	2.47

	<---- hydrograph ---->				<-pipe / channel->	
	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 2 (0105)	4.82	.11	2.67	10.88	.16	.50
OUTFLOW: ID= 1 (0113)	4.82	.10	2.75	10.86	.16	.50

CALIB			
NASHYD (0112)	Area (ha)= 1.40	Curve Number (CN)= 75.0	
ID= 1 DT=10.0 min	Ia (mm)= 5.00	# of Linear Res.(N)= 3.00	
	U.H. Tp(hrs)= .24		

Unit Hyd Qpeak (cms)= .222

PEAK FLOW (cms)= .053 (i)
TIME TO PEAK (hrs)= 2.500
RUNOFF VOLUME (mm)= 14.647
TOTAL RAINFALL (mm)= 48.645
RUNOFF COEFFICIENT = .301

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

ROUTE CHN (0109)	
IN= 2---> OUT= 1	Routing time step (min)'= 5.00

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

Distance	Elevation	Manning	
.00	215.60	.0500	
1.80	215.00	.0500 / .0500	Main Channel
3.80	215.00	.0500	Main Channel
5.60	215.60	.0500	

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

DEPTH (m)	ELEV (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME (min)
.03	215.03	.813E+01	.0	.14	14.28
.06	215.06	.170E+02	.0	.23	8.87
.09	215.09	.266E+02	.1	.31	6.68
.13	215.13	.369E+02	.1	.38	5.45
.16	215.16	.480E+02	.2	.44	4.64
.19	215.19	.598E+02	.2	.50	4.07
.22	215.22	.724E+02	.3	.56	3.64
.25	215.25	.857E+02	.4	.62	3.30
.28	215.28	.997E+02	.5	.68	3.03
.32	215.32	.114E+03	.7	.73	2.80
.35	215.35	.130E+03	.8	.78	2.61
.38	215.38	.146E+03	1.0	.84	2.45
.41	215.41	.163E+03	1.2	.89	2.31
.44	215.44	.181E+03	1.4	.94	2.18
.47	215.47	.199E+03	1.6	.99	2.08
.51	215.51	.218E+03	1.8	1.04	1.98
.54	215.54	.238E+03	2.1	1.08	1.89
.57	215.57	.259E+03	2.4	1.13	1.81
.60	215.60	.280E+03	2.7	1.18	1.74

	<---- hydrograph ---->				<-pipe / channel->	
	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 2 (0112)	1.40	.05	2.50	14.65	.08	.27
OUTFLOW: ID= 1 (0109)	1.40	.05	2.67	14.59	.08	.26

ADD HYD (0103)				
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0113):	4.82	.102	2.75	10.86
+ ID2= 2 (0109):	1.40	.049	2.67	14.59
ID = 3 (0103):	6.22	.148	2.75	11.70

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0106)				
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0117):	5.85	.207	2.50	28.19
+ ID2= 2 (0103):	6.22	.148	2.75	11.70
ID = 3 (0106):	12.07	.343	2.67	19.69

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

CHICAGO STORM	IDF curve parameters: A=1560.000
Ptotal= 57.49 mm	B= 13.000
	C= .860
	used in: INTENSITY = A / (t + B)^C

Duration of storm = 6.00 hrs
Storm time step = 10.00 min
Time to peak ratio = .38

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.17	1.73	1.67	6.29	3.17	7.97	4.67	2.60
.33	1.88	1.83	8.87	3.33	6.51	4.83	2.42
.50	2.06	2.00	14.61	3.50	5.48	5.00	2.27
.67	2.27	2.17	35.36	3.67	4.74	5.17	2.13
.83	2.54	2.33	105.21	3.83	4.17	5.33	2.01
1.00	2.88	2.50	42.69	4.00	3.72	5.50	1.90
1.17	3.33	2.67	21.79	4.17	3.36	5.67	1.81
1.33	3.95	2.83	14.08	4.33	3.06	5.83	1.72
1.50	4.85	3.00	10.23	4.50	2.81	6.00	1.64

CALIB			
STANDHYD (0115)	Area (ha)= .83		
ID= 1 DT= 5.0 min	Total Imp(%)= 33.00	Dir. Conn.(%)= 19.00	

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	.27	.55
Dep. Storage (mm)=	1.00	2.00
Average Slope (%)=	2.00	3.00
Length (m)=	74.30	275.00
Mannings n =	.013	.250

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.083	1.73	1.583	6.29	3.083	7.97	4.58	2.60
.167	1.73	1.667	6.29	3.167	7.97	4.67	2.60
.250	1.88	1.750	8.87	3.250	6.51	4.75	2.42
.333	1.88	1.833	8.87	3.333	6.51	4.83	2.42
.417	2.06	1.917	14.61	3.417	5.48	4.92	2.27
.500	2.06	2.000	14.61	3.500	5.48	5.00	2.27
.583	2.27	2.083	35.36	3.583	4.74	5.08	2.13
.667	2.27	2.167	35.36	3.667	4.74	5.17	2.13
.750	2.54	2.250	105.21	3.750	4.17	5.25	2.01
.833	2.54	2.333	105.21	3.833	4.17	5.33	2.01
.917	2.88	2.417	42.69	3.917	3.72	5.42	1.90
1.000	2.88	2.500	42.69	4.000	3.72	5.50	1.90
1.083	3.33	2.583	21.79	4.083	3.36	5.58	1.81
1.167	3.33	2.667	21.79	4.167	3.36	5.67	1.81
1.250	3.95	2.750	14.08	4.250	3.06	5.75	1.72
1.333	3.95	2.833	14.08	4.333	3.06	5.83	1.72
1.417	4.85	2.917	10.23	4.417	2.81	5.92	1.64

1.500	4.85	3.000	10.23	4.500	2.81	6.00	1.64

Max.Eff.Inten.(mm/hr)=	105.21	49.44	
over (min)	5.00	30.00	
Storage Coeff. (min)=	1.70 (ii)	28.04 (ii)	
Unit Hyd. Tpeak (min)=	5.00	30.00	
Unit Hyd. peak (cms)=	.32	.04	
			TOTALS
PEAK FLOW (cms)=	.05	.05	.060 (iii)
TIME TO PEAK (hrs)=	2.33	2.75	2.33
RUNOFF VOLUME (mm)=	56.49	36.90	40.60
TOTAL RAINFALL (mm)=	57.49	57.49	57.49
RUNOFF COEFFICIENT =	.98	.64	.71

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 88.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ROUTE CHN (0116)
IN= 2---> OUT= 1

Routing time step (min)'= 5.00

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

Distance	Elevation	Manning	
.00	215.60	.0500	
1.80	215.00	.0500 / .0500	Main Channel
2.56	215.00	.0500 / .0500	Main Channel
4.36	215.60	.0500	

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

DEPTH (m)	ELEV (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME (min)
.03	215.03	.676E+01	.0	.13	33.24
.06	215.06	.150E+02	.0	.21	19.61
.09	215.09	.248E+02	.0	.29	14.23
.13	215.13	.360E+02	.1	.37	11.28
.16	215.16	.488E+02	.1	.44	9.41
.19	215.19	.630E+02	.1	.51	8.11
.22	215.22	.787E+02	.2	.58	7.15
.25	215.25	.960E+02	.2	.65	6.41
.28	215.28	.115E+03	.3	.72	5.83
.32	215.32	.135E+03	.4	.78	5.35
.35	215.35	.157E+03	.5	.84	4.95
.38	215.38	.180E+03	.6	.90	4.62
.41	215.41	.205E+03	.8	.96	4.33
.44	215.44	.231E+03	.9	1.02	4.09
.47	215.47	.258E+03	1.1	1.08	3.87
.51	215.51	.288E+03	1.3	1.13	3.68
.54	215.54	.318E+03	1.5	1.19	3.51
.57	215.57	.350E+03	1.7	1.24	3.35
.60	215.60	.384E+03	2.0	1.30	3.22

<---- hydrograph ----> <-pipe / channel->

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 2 (0115)	.83	.06	2.33	40.60	.13	.38

OUTFLOW: ID= 1 (0116)	.83	.05	2.83	40.46	.13	.37	

CALIB
STANDHYD (0107)
ID= 1 DT= 5.0 min

Area (ha)= 3.63
Total Imp(%)= 29.40 Dir. Conn.(%)= 19.00

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	1.07	2.56
Dep. Storage (mm)=	1.00	3.00
Average Slope (%)=	2.00	3.00
Length (m)=	155.50	440.00
Mannings n =	.013	.250

Max.Eff.Inten.(mm/hr)=	105.21	35.48	
over (min)	5.00	45.00	
Storage Coeff. (min)=	2.65 (ii)	42.52 (ii)	
Unit Hyd. Tpeak (min)=	5.00	45.00	
Unit Hyd. peak (cms)=	.29	.03	
			TOTALS
PEAK FLOW (cms)=	.20	.14	.223 (iii)
TIME TO PEAK (hrs)=	2.33	3.00	2.33
RUNOFF VOLUME (mm)=	56.49	33.12	37.56
TOTAL RAINFALL (mm)=	57.49	57.49	57.49
RUNOFF COEFFICIENT =	.98	.58	.65

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 86.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ROUTE CHN (0110)
IN= 2---> OUT= 1

Routing time step (min)'= 5.00

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

Distance	Elevation	Manning	
.00	215.60	.0500	
1.80	215.00	.0500 / .0500	Main Channel
2.56	215.00	.0500 / .0500	Main Channel
4.36	215.60	.0500	

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

DEPTH (m)	ELEV (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME (min)
.03	215.03	.947E+01	.0	.15	38.53
.06	215.06	.210E+02	.0	.25	23.36
.09	215.09	.347E+02	.0	.34	17.30
.13	215.13	.504E+02	.1	.42	13.94
.16	215.16	.683E+02	.1	.50	11.77
.19	215.19	.882E+02	.1	.57	10.25
.22	215.22	.110E+03	.2	.64	9.11
.25	215.25	.134E+03	.3	.71	8.23
.28	215.28	.161E+03	.4	.78	7.53
.32	215.32	.189E+03	.5	.84	6.95

.35	215.35	.219E+03	.6	.90	6.47		
.38	215.38	.252E+03	.7	.96	6.05		
.41	215.41	.286E+03	.8	1.02	5.70		
.44	215.44	.323E+03	1.0	1.08	5.39		
.47	215.47	.362E+03	1.2	1.14	5.12		
.51	215.51	.403E+03	1.4	1.20	4.88		
.54	215.54	.446E+03	1.6	1.25	4.66		
.57	215.57	.491E+03	1.8	1.30	4.47		
.60	215.60	.538E+03	2.1	1.36	4.30		

<---- hydrograph ----> <-pipe / channel->

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 2 (0107)	3.63	.22	2.33	37.56	.23	.66
OUTFLOW: ID= 1 (0110)	3.63	.16	2.42	37.53	.20	.59

ADD HYD (0114)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0116):	.83	.054	2.83	40.46
+ ID2= 2 (0110):	3.63	.165	2.42	37.53
ID = 3 (0114):	4.45	.208	2.42	38.07

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB
NASHYD (0102)
ID= 1 DT=10.0 min

Area (ha)= 1.39 Curve Number (CN)= 84.0
Ia (mm)= 4.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= .24

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.167	1.73	1.667	6.29	3.167	7.97	4.67	2.60
.333	1.88	1.833	8.87	3.333	6.51	4.83	2.42
.500	2.06	2.000	14.61	3.500	5.48	5.00	2.27
.667	2.27	2.167	35.36	3.667	4.74	5.17	2.13
.833	2.54	2.333	105.21	3.833	4.17	5.33	2.01
1.000	2.88	2.500	42.69	4.000	3.72	5.50	1.90
1.167	3.33	2.667	21.79	4.167	3.36	5.67	1.81
1.333	3.95	2.833	14.08	4.333	3.06	5.83	1.72
1.500	4.85	3.000	10.23	4.500	2.81	6.00	1.64

Unit Hyd Qpeak (cms)= .223

PEAK FLOW	(cms)=	.109 (i)
TIME TO PEAK	(hrs)=	2.500
RUNOFF VOLUME	(mm)=	27.705
TOTAL RAINFALL	(mm)=	57.490
RUNOFF COEFFICIENT	=	.482

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

ROUTE CHN (0111)
IN= 2---> OUT= 1

Routing time step (min)'= 5.00

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

Distance	Elevation	Manning	
.00	215.60	.0500	
3.00	215.00	.0500	Main Channel
3.76	215.00	.0500	
5.56	215.60	.0000	

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

DEPTH (m)	ELEV (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME (min)
.03	215.03	.701E+01	.0	.18	22.93
.06	215.06	.160E+02	.0	.29	14.14
.09	215.09	.270E+02	.0	.39	10.61
.13	215.13	.400E+02	.1	.48	8.65
.16	215.16	.550E+02	.1	.56	7.38
.19	215.19	.720E+02	.2	.64	6.48
.22	215.22	.909E+02	.3	.72	5.80
.25	215.25	.112E+03	.4	.79	5.27
.28	215.28	.135E+03	.5	.86	4.85
.32	215.32	.160E+03	.6	.93	4.50
.35	215.35	.187E+03	.7	.99	4.21
.38	215.38	.216E+03	.9	1.05	3.95
.41	215.41	.247E+03	1.1	1.12	3.74
.44	215.44	.280E+03	1.3	1.17	3.55
.47	215.47	.314E+03	1.6	1.23	3.38
.51	215.51	.351E+03	1.8	1.29	3.23
.54	215.54	.390E+03	2.1	1.35	3.09
.57	215.57	.431E+03	2.4	1.40	2.97
.60	215.60	.474E+03	2.8	1.46	2.86

<---- hydrograph ----> <-pipe / channel->

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 2 (0102)	1.39	.11	2.50	27.71	.15	.54
OUTFLOW: ID= 1 (0111)	1.39	.10	2.58	27.62	.14	.52

ADD HYD (0117)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0114):	4.45	.208	2.42	38.07
+ ID2= 2 (0111):	1.39	.099	2.58	27.62
ID = 3 (0117):	5.85	.282	2.58	35.58

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB
NASHYD (0105)
ID= 1 DT=10.0 min

Area (ha)= 4.82 Curve Number (CN)= 66.0
Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= .35

Unit Hyd Qpeak (cms)= .522

PEAK FLOW (cms)= .151 (i)
TIME TO PEAK (hrs)= 2.667
RUNOFF VOLUME (mm)= 14.982
TOTAL RAINFALL (mm)= 57.490
RUNOFF COEFFICIENT = .261

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

| ROUTE CHN (0113) |
| IN= 2---> OUT= 1 |

Routing time step (min)'= 5.00

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

Distance	Elevation	Manning	
.00	215.60	.0500	
1.80	215.00	.0500 / .0500	Main Channel
2.56	215.00	.0500 / .0500	Main Channel
4.36	215.60	.0500	

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

DEPTH (m)	ELEV (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME (min)
.03	215.03	.541E+01	.0	.15	22.38
.06	215.06	.120E+02	.0	.25	13.54
.09	215.09	.198E+02	.0	.33	10.01
.13	215.13	.288E+02	.1	.41	8.05
.16	215.16	.390E+02	.1	.49	6.79
.19	215.19	.504E+02	.1	.56	5.91
.22	215.22	.630E+02	.2	.63	5.25
.25	215.25	.768E+02	.3	.70	4.74
.28	215.28	.917E+02	.4	.77	4.33
.32	215.32	.108E+03	.4	.83	4.00
.35	215.35	.125E+03	.6	.90	3.72
.38	215.38	.144E+03	.7	.96	3.48
.41	215.41	.164E+03	.8	1.02	3.28
.44	215.44	.185E+03	1.0	1.08	3.10
.47	215.47	.207E+03	1.2	1.13	2.94
.51	215.51	.230E+03	1.4	1.19	2.80
.54	215.54	.255E+03	1.6	1.24	2.68
.57	215.57	.280E+03	1.8	1.30	2.57
.60	215.60	.307E+03	2.1	1.35	2.47

	<---- hydrograph ---->			<-pipe / channel->	
	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 2 (0105)	4.82	.15	2.67	14.98	.19	.57
OUTFLOW: ID= 1 (0113)	4.82	.15	2.75	14.96	.19	.57

| CALIB |
| NASHYD (0112) |
| ID= 1 DT=10.0 min |

Area (ha)= 1.40 Curve Number (CN)= 75.0
Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= .24

Unit Hyd Qpeak (cms)= .222

PEAK FLOW (cms)= .074 (i)
TIME TO PEAK (hrs)= 2.500
RUNOFF VOLUME (mm)= 19.820

TOTAL RAINFALL (mm)= 57.490
RUNOFF COEFFICIENT = .345

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

| ROUTE CHN (0109) |
| IN= 2---> OUT= 1 |

Routing time step (min)'= 5.00

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

Distance	Elevation	Manning	
.00	215.60	.0500	
1.80	215.00	.0500 / .0500	Main Channel
3.80	215.00	.0500	Main Channel
5.60	215.60	.0500	

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

DEPTH (m)	ELEV (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME (min)
.03	215.03	.813E+01	.0	.14	14.28
.06	215.06	.170E+02	.0	.23	8.87
.09	215.09	.266E+02	.1	.31	6.68
.13	215.13	.369E+02	.1	.38	5.45
.16	215.16	.480E+02	.2	.44	4.64
.19	215.19	.598E+02	.2	.50	4.07
.22	215.22	.724E+02	.3	.56	3.64
.25	215.25	.857E+02	.4	.62	3.30
.28	215.28	.997E+02	.5	.68	3.03
.32	215.32	.114E+03	.7	.73	2.80
.35	215.35	.130E+03	.8	.78	2.61
.38	215.38	.146E+03	1.0	.84	2.45
.41	215.41	.163E+03	1.2	.89	2.31
.44	215.44	.181E+03	1.4	.94	2.18
.47	215.47	.199E+03	1.6	.99	2.08
.51	215.51	.218E+03	1.8	1.04	1.98
.54	215.54	.238E+03	2.1	1.08	1.89
.57	215.57	.259E+03	2.4	1.13	1.81
.60	215.60	.280E+03	2.7	1.18	1.74

	<---- hydrograph ---->			<-pipe / channel->	
	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 2 (0112)	1.40	.07	2.50	19.82	.10	.32
OUTFLOW: ID= 1 (0109)	1.40	.07	2.58	19.77	.10	.31

| ADD HYD (0103) |
| 1 + 2 = 3 |

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0113):	4.82	.147	2.75	14.96
+ ID2= 2 (0109):	1.40	.071	2.58	19.77
ID = 3 (0103):	6.22	.212	2.75	16.04

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

| ADD HYD (0106) |
| 1 + 2 = 3 |

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0117):	5.85	.282	2.58	35.58
+ ID2= 2 (0103):	6.22	.212	2.75	16.04
ID = 3 (0106):	12.07	.488	2.67	25.51

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

| CHICAGO STORM |
| Ptotal= 65.65 mm |

IDF curve parameters: A=2010.000
B= 14.000
C= .880
used in: INTENSITY = A / (t + B)^C

Duration of storm = 6.00 hrs
Storm time step = 10.00 min
Time to peak ratio = .38

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.17	1.78	1.67	6.98	3.17	8.95	4.67	2.75
.33	1.95	1.83	10.01	3.33	7.23	4.83	2.55
.50	2.14	2.00	16.85	3.50	6.04	5.00	2.37
.67	2.38	2.17	41.62	3.67	5.17	5.17	2.22
.83	2.67	2.33	122.63	3.83	4.52	5.33	2.09
1.00	3.05	2.50	50.34	4.00	4.00	5.50	1.97
1.17	3.56	2.67	25.45	4.17	3.60	5.67	1.87
1.33	4.27	2.83	16.21	4.33	3.26	5.83	1.77
1.50	5.31	3.00	11.63	4.50	2.98	6.00	1.69

| CALIB |
| STANDHYD (0115) |
| ID= 1 DT= 5.0 min |

Area (ha)= .83
Total Imp(%)= 33.00 Dir. Conn.(%)= 19.00

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	.27	.55
Dep. Storage (mm)=	1.00	2.00
Average Slope (%)=	2.00	3.00
Length (m)=	74.30	275.00
Mannings n =	.013	.250

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.083	1.78	1.583	6.98	3.083	8.95	4.58	2.75
.167	1.78	1.667	6.98	3.167	8.95	4.67	2.75
.250	1.95	1.750	10.01	3.250	7.23	4.75	2.55
.333	1.95	1.833	10.01	3.333	7.23	4.83	2.55
.417	2.14	1.917	16.85	3.417	6.04	4.92	2.37
.500	2.14	2.000	16.85	3.500	6.04	5.00	2.37

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.583	2.38	2.083	41.62	3.583	5.17	5.08	2.22
.667	2.38	2.167	41.62	3.667	5.17	5.17	2.22
.750	2.67	2.250	122.63	3.750	4.52	5.25	2.09
.833	2.67	2.333	122.63	3.833	4.52	5.33	2.09
.917	3.05	2.417	50.34	3.917	4.00	5.42	1.97
1.000	3.05	2.500	50.34	4.000	4.00	5.50	1.97
1.083	3.56	2.583	25.45	4.083	3.60	5.58	1.87
1.167	3.56	2.667	25.45	4.167	3.60	5.67	1.87
1.250	4.27	2.750	16.21	4.250	3.26	5.75	1.77
1.333	4.27	2.833	16.21	4.333	3.26	5.83	1.77
1.417	5.31	2.917	11.63	4.417	2.98	5.92	1.69
1.500	5.31	3.000	11.63	4.500	2.98	6.00	1.69

			TOTALS
Max.Eff.Inten.(mm/hr)=	122.63	67.74	
over (min)	5.00	25.00	
Storage Coeff. (min)=	1.60 (ii)	24.82 (ii)	
Unit Hyd. Tpeak (min)=	5.00	25.00	
Unit Hyd. peak (cms)=	.32	.05	
PEAK FLOW (cms)=	.05	.07	.077 (iii)
TIME TO PEAK (hrs)=	2.33	2.67	2.33
RUNOFF VOLUME (mm)=	64.65	44.20	48.07
TOTAL RAINFALL (mm)=	65.65	65.65	65.65
RUNOFF COEFFICIENT =	.98	.67	.73

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 88.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

| ROUTE CHN (0116) |
| IN= 2---> OUT= 1 |

Routing time step (min)'= 5.00

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

Distance	Elevation	Manning	
.00	215.60	.0500	
1.80	215.00	.0500 / .0500	Main Channel
2.56	215.00	.0500 / .0500	Main Channel
4.36	215.60	.0500	

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

DEPTH (m)	ELEV (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME (min)
.03	215.03	.676E+01	.0	.13	33.24
.06	215.06	.150E+02	.0	.21	19.61
.09	215.09	.248E+02	.0	.29	14.23
.13	215.13	.360E+02	.1	.37	11.28
.16	215.16	.488E+02	.1	.44	9.41
.19	215.19	.630E+02	.1	.51	8.11
.22	215.22	.787E+02	.2	.58	7.15
.25	215.25	.960E+02	.2	.65	6.41
.28	215.28	.115E+03	.3	.72	5.83
.32	215.32	.135E+03	.4	.78	5.35
.35	215.35	.157E+03	.5	.84	4.95
.38	215.38	.180E+03	.6	.90	4.62
.41	215.41	.205E+03	.8	.96	4.33

.44	215.44	.231E+03	.9	1.02	4.09
.47	215.47	.258E+03	1.1	1.08	3.87
.51	215.51	.288E+03	1.3	1.13	3.68
.54	215.54	.318E+03	1.5	1.19	3.51
.57	215.57	.350E+03	1.7	1.24	3.35
.60	215.60	.384E+03	2.0	1.30	3.22

	<---- hydrograph ---->				<-pipe / channel->	
	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 2 (0115)	.83	.08	2.33	48.07	.15	.42
OUTFLOW: ID= 1 (0116)	.83	.07	2.75	47.89	.14	.41

CALIB STANDHYD (0107) | ID= 1 DT= 5.0 min	Area (ha)= 3.63 Total Imp(%)= 29.40 Dir. Conn.(%)= 19.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	1.07	2.56
Dep. Storage	(mm)=	1.00	3.00
Average Slope	(%)=	2.00	3.00
Length	(m)=	155.50	440.00
Mannings n	=	.013	.250
Max.Eff.Inten.(mm/hr)=		122.63	44.30
over (min)		5.00	40.00
Storage Coeff. (min)=		2.49 (ii)	38.98 (ii)
Unit Hyd. Tpeak (min)=		5.00	40.00
Unit Hyd. peak (cms)=		.29	.03

		TOTALS
PEAK FLOW	(cms)=	.23 .270 (iii)
TIME TO PEAK	(hrs)=	2.33 2.33
RUNOFF VOLUME	(mm)=	64.65 40.10 44.76
TOTAL RAINFALL	(mm)=	65.65 65.65
RUNOFF COEFFICIENT	=	.98 .61 .68

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 86.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ROUTE CHN (0110) | IN= 2---> OUT= 1	Routing time step (min)'= 5.00

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

Distance	Elevation	Manning	
.00	215.60	.0500	
1.80	215.00	.0500 / .0500	Main Channel
2.56	215.00	.0500 / .0500	Main Channel
4.36	215.60	.0500	

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

DEPTH	ELEV	VOLUME	FLOW RATE	VELOCITY	TRAV.TIME

(m)	(m)	(cu.m.)	(cms)	(m/s)	(min)
.03	215.03	.947E+01	.0	.15	38.53
.06	215.06	.210E+02	.0	.25	23.36
.09	215.09	.347E+02	.0	.34	17.30
.13	215.13	.504E+02	.1	.42	13.94
.16	215.16	.683E+02	.1	.50	11.77
.19	215.19	.882E+02	.1	.57	10.25
.22	215.22	.110E+03	.2	.64	9.11
.25	215.25	.134E+03	.3	.71	8.23
.28	215.28	.161E+03	.4	.78	7.53
.32	215.32	.189E+03	.5	.84	6.95
.35	215.35	.219E+03	.6	.90	6.47
.38	215.38	.252E+03	.7	.96	6.05
.41	215.41	.286E+03	.8	1.02	5.70
.44	215.44	.323E+03	1.0	1.08	5.39
.47	215.47	.362E+03	1.2	1.14	5.12
.51	215.51	.403E+03	1.4	1.20	4.88
.54	215.54	.446E+03	1.6	1.25	4.66
.57	215.57	.491E+03	1.8	1.30	4.47
.60	215.60	.538E+03	2.1	1.36	4.30

	<---- hydrograph ---->				<-pipe / channel->	
	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 2 (0107)	3.63	.27	2.33	44.76	.25	.71
OUTFLOW: ID= 1 (0110)	3.63	.21	3.00	44.73	.22	.65

ADD HYD (0114) | 1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0116):	.83	.072	2.75	47.89
+ ID2= 2 (0110):	3.63	.210	3.00	44.73
ID = 3 (0114):	4.45	.271	3.00	45.31

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB NASHYD (0102) | ID= 1 DT=10.0 min	Area (ha)= 1.39 Ia (mm)= 4.00 U.H. Tp(hrs)= .24	Curve Number (CN)= 84.0 # of Linear Res.(N)= 3.00

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.167	1.78	1.667	6.98	3.167	8.95	4.67	2.75
.333	1.95	1.833	10.01	3.333	7.23	4.83	2.55
.500	2.14	2.000	16.85	3.500	6.04	5.00	2.37
.667	2.38	2.167	41.62	3.667	5.17	5.17	2.22
.833	2.67	2.333	122.63	3.833	4.52	5.33	2.09
1.000	3.05	2.500	50.34	4.000	4.00	5.50	1.97
1.167	3.56	2.667	25.45	4.167	3.60	5.67	1.87
1.333	4.27	2.833	16.21	4.333	3.26	5.83	1.77
1.500	5.31	3.000	11.63	4.500	2.98	6.00	1.69

Unit Hyd Qpeak (cms)= .223

PEAK FLOW (cms)= .140 (i)
TIME TO PEAK (hrs)= 2.500
RUNOFF VOLUME (mm)= 34.070
TOTAL RAINFALL (mm)= 65.646
RUNOFF COEFFICIENT = .519

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

ROUTE CHN (0111) | IN= 2---> OUT= 1	Routing time step (min)'= 5.00

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

Distance	Elevation	Manning	
.00	215.60	.0500	
3.00	215.00	.0500	Main Channel
3.76	215.00	.0500	
5.56	215.60	.0000	

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

DEPTH (m)	ELEV (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME (min)
.03	215.03	.701E+01	.0	.18	22.93
.06	215.06	.160E+02	.0	.29	14.14
.09	215.09	.270E+02	.0	.39	10.61
.13	215.13	.400E+02	.1	.48	8.65
.16	215.16	.550E+02	.1	.56	7.38
.19	215.19	.720E+02	.2	.64	6.48
.22	215.22	.909E+02	.3	.72	5.80
.25	215.25	.112E+03	.4	.79	5.27
.28	215.28	.135E+03	.5	.86	4.85
.32	215.32	.160E+03	.6	.93	4.50
.35	215.35	.187E+03	.7	.99	4.21
.38	215.38	.216E+03	.9	1.05	3.95
.41	215.41	.247E+03	1.1	1.12	3.74
.44	215.44	.280E+03	1.3	1.17	3.55
.47	215.47	.314E+03	1.6	1.23	3.38
.51	215.51	.351E+03	1.8	1.29	3.23
.54	215.54	.390E+03	2.1	1.35	3.09
.57	215.57	.431E+03	2.4	1.40	2.97
.60	215.60	.474E+03	2.8	1.46	2.86

	<---- hydrograph ---->				<-pipe / channel->	
	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 2 (0102)	1.39	.14	2.50	34.07	.17	.58
OUTFLOW: ID= 1 (0111)	1.39	.13	2.58	34.00	.16	.57

ADD HYD (0117) | 1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0114):	4.45	.271	3.00	45.31
+ ID2= 2 (0111):	1.39	.129	2.58	34.00
ID = 3 (0117):	5.85	.373	2.58	42.62

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB NASHYD (0105) | ID= 1 DT=10.0 min	Area (ha)= 4.82 Ia (mm)= 5.00 U.H. Tp(hrs)= .35	Curve Number (CN)= 66.0 # of Linear Res.(N)= 3.00

Unit Hyd Qpeak (cms)= .522

PEAK FLOW (cms)= .201 (i)
TIME TO PEAK (hrs)= 2.667
RUNOFF VOLUME (mm)= 19.147
TOTAL RAINFALL (mm)= 65.646
RUNOFF COEFFICIENT = .292

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

ROUTE CHN (0113) | IN= 2---> OUT= 1	Routing time step (min)'= 5.00

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

Distance	Elevation	Manning	
.00	215.60	.0500	
1.80	215.00	.0500 / .0500	Main Channel
2.56	215.00	.0500 / .0500	Main Channel
4.36	215.60	.0500	

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

DEPTH (m)	ELEV (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME (min)
.03	215.03	.541E+01	.0	.15	22.38
.06	215.06	.120E+02	.0	.25	13.54
.09	215.09	.198E+02	.0	.33	10.01
.13	215.13	.288E+02	.1	.41	8.05
.16	215.16	.390E+02	.1	.49	6.79
.19	215.19	.504E+02	.1	.56	5.91
.22	215.22	.630E+02	.2	.63	5.25
.25	215.25	.768E+02	.3	.70	4.74
.28	215.28	.917E+02	.4	.77	4.33
.32	215.32	.108E+03	.4	.83	4.00
.35	215.35	.125E+03	.6	.90	3.72
.38	215.38	.144E+03	.7	.96	3.48
.41	215.41	.164E+03	.8	1.02	3.28
.44	215.44	.185E+03	1.0	1.08	3.10
.47	215.47	.207E+03	1.2	1.13	2.94
.51	215.51	.230E+03	1.4	1.19	2.80
.54	215.54	.255E+03	1.6	1.24	2.68
.57	215.57	.280E+03	1.8	1.30	2.57
.60	215.60	.307E+03	2.1	1.35	2.47

	<---- hydrograph ---->				<-pipe / channel->	
	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 2 (0105)	4.82	.20	2.67	19.15	.22	.64
OUTFLOW: ID= 1 (0113)	4.82	.20	2.75	19.12	.22	.63

```
| CALIB                |
| NASHYD    (0112) |   Area    (ha)=   1.40   Curve Number   (CN)= 75.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
                       U.H. Tp(hrs)=    .24

     Unit Hyd Qpeak  (cms)=    .222

     PEAK FLOW       (cms)=    .098 (i)
     TIME TO PEAK    (hrs)=   2.500
     RUNOFF VOLUME    (mm)=  24.972
     TOTAL RAINFALL   (mm)=  65.646
     RUNOFF COEFFICIENT   =    .380

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

| ROUTE CHN (0109) |
| IN= 2---> OUT= 1 |     Routing time step (min)'=  5.00

               <----- DATA FOR SECTION (   1.1) ------>
               Distance      Elevation       Manning
                  .00         215.60          .0500
                 1.80         215.00     .0500 / .0500  Main Channel
                 3.80         215.00          .0500      Main Channel
                 5.60         215.60          .0500

      <---------------------- TRAVEL TIME TABLE ----------------------->
       DEPTH     ELEV      VOLUME    FLOW RATE    VELOCITY   TRAV.TIME
         (m)      (m)     (cu.m.)      (cms)        (m/s)      (min)
         .03   215.03    .813E+01         .0          .14      14.28
         .06   215.06    .170E+02         .0          .23       8.87
         .09   215.09    .266E+02         .1          .31       6.68
         .13   215.13    .369E+02         .1          .38       5.45
         .16   215.16    .480E+02         .2          .44       4.64
         .19   215.19    .598E+02         .2          .50       4.07
         .22   215.22    .724E+02         .3          .56       3.64
         .25   215.25    .857E+02         .4          .62       3.30
         .28   215.28    .997E+02         .5          .68       3.03
         .32   215.32    .114E+03         .7          .73       2.80
         .35   215.35    .130E+03         .8          .78       2.61
         .38   215.38    .146E+03        1.0          .84       2.45
         .41   215.41    .163E+03        1.2          .89       2.31
         .44   215.44    .181E+03        1.4          .94       2.18
         .47   215.47    .199E+03        1.6          .99       2.08
         .51   215.51    .218E+03        1.8         1.04       1.98
         .54   215.54    .238E+03        2.1         1.08       1.89
         .57   215.57    .259E+03        2.4         1.13       1.81
         .60   215.60    .280E+03        2.7         1.18       1.74

                                <---- hydrograph ---->   <-pipe / channel->
                          AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                          (ha)    (cms)   (hrs)   (mm)       (m)      (m/s)
     INFLOW : ID= 2 (0112)    1.40      .10    2.50  24.97       .12       .35
     OUTFLOW: ID= 1 (0109)    1.40      .09    2.58  24.92       .11       .34

| ADD HYD   (0103) |
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
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                          (ha)     (cms)     (hrs)      (mm)
          ID1= 1 (0113):     4.82      .197     2.75     19.12
        + ID2= 2 (0109):     1.40      .093     2.58     24.92
          ID = 3 (0103):     6.22      .281     2.67     20.42

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

| ADD HYD   (0106) |
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
                          (ha)     (cms)     (hrs)      (mm)
          ID1= 1 (0117):     5.85      .373     2.58     42.62
        + ID2= 2 (0103):     6.22      .281     2.67     20.42
          ID = 3 (0106):    12.07      .652     2.67     31.18

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

| CHICAGO STORM    |    IDF curve parameters: A=2200.000
| Ptotal= 76.13 mm |                          B=  14.600
                     C=    .870
                     used in:   INTENSITY =  A / (t + B)^C

                     Duration of storm  =  6.00 hrs
                     Storm time step    = 10.00 min
                     Time to peak ratio =  .38

     TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
      hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
      .17    2.22 |  1.67    8.42 |  3.17   10.74 |  4.67    3.38
      .33    2.41 |  1.83   11.98 |  3.33    8.72 |  4.83    3.14
      .50    2.65 |  2.00   19.90 |  3.50    7.31 |  5.00    2.93
      .67    2.93 |  2.17   47.86 |  3.67    6.28 |  5.17    2.75
      .83    3.29 |  2.33  135.62 |  3.83    5.50 |  5.33    2.59
     1.00    3.75 |  2.50   57.60 |  4.00    4.89 |  5.50    2.44
     1.17    4.36 |  2.67   29.73 |  4.17    4.40 |  5.67    2.32
     1.33    5.21 |  2.83   19.18 |  4.33    4.00 |  5.83    2.20
     1.50    6.45 |  3.00   13.86 |  4.50    3.67 |  6.00    2.10

| CALIB            |
| STANDHYD  (0115) |   Area    (ha)=    .83
|ID= 1 DT= 5.0 min |   Total Imp(%)=  33.00   Dir. Conn.(%)=  19.00

                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       .27          .55
     Dep. Storage     (mm)=      1.00         2.00
     Average Slope     (%)=      2.00         3.00
     Length            (m)=     74.30       275.00
     Mannings n           =      .013         .250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.
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                          ---- TRANSFORMED HYETOGRAPH ----
     TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
      hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
      .083   2.22 | 1.583    8.42 | 3.083   10.74 | 4.58    3.38
      .167   2.22 | 1.667    8.42 | 3.167   10.74 | 4.67    3.38
      .250   2.41 | 1.750   11.98 | 3.250    8.72 | 4.75    3.14
      .333   2.41 | 1.833   11.98 | 3.333    8.72 | 4.83    3.14
      .417   2.65 | 1.917   19.90 | 3.417    7.31 | 4.92    2.93
      .500   2.65 | 2.000   19.90 | 3.500    7.31 | 5.00    2.93
      .583   2.93 | 2.083   47.86 | 3.583    6.28 | 5.08    2.75
      .667   2.93 | 2.167   47.86 | 3.667    6.28 | 5.17    2.75
      .750   3.29 | 2.250  135.62 | 3.750    5.50 | 5.25    2.59
      .833   3.29 | 2.333  135.62 | 3.833    5.50 | 5.33    2.59
      .917   3.75 | 2.417   57.60 | 3.917    4.89 | 5.42    2.44
     1.000   3.75 | 2.500   57.60 | 4.000    4.89 | 5.50    2.44
     1.083   4.36 | 2.583   29.73 | 4.083    4.40 | 5.58    2.32
     1.167   4.36 | 2.667   29.73 | 4.167    4.40 | 5.67    2.32
     1.250   5.21 | 2.750   19.18 | 4.250    4.00 | 5.75    2.20
     1.333   5.21 | 2.833   19.18 | 4.333    4.00 | 5.83    2.20
     1.417   6.45 | 2.917   13.86 | 4.417    3.67 | 5.92    2.10
     1.500   6.45 | 3.000   13.86 | 4.500    3.67 | 6.00    2.10

     Max.Eff.Inten.(mm/hr)=     135.62        79.92
                   over (min)        5.00        25.00
     Storage Coeff.  (min)=       1.54 (ii)   23.27 (ii)
     Unit Hyd. Tpeak (min)=       5.00        25.00
     Unit Hyd. peak  (cms)=        .33          .05
                                                      *TOTALS*
     PEAK FLOW       (cms)=        .06          .08          .094 (iii)
     TIME TO PEAK    (hrs)=       2.33         2.67         2.67
     RUNOFF VOLUME    (mm)=      75.13        53.79        57.82
     TOTAL RAINFALL   (mm)=      76.13        76.13        76.13
     RUNOFF COEFFICIENT   =        .99          .71          .76

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

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN*  =  88.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

| ROUTE CHN (0116) |
| IN= 2---> OUT= 1 |     Routing time step (min)'=  5.00

               <------ DATA FOR SECTION (   1.1) ------>
               Distance      Elevation       Manning
                  .00         215.60          .0500
                 1.80         215.00     .0500 / .0500  Main Channel
                 2.56         215.00     .0500 / .0500  Main Channel
                 4.36         215.60          .0500

      <---------------------- TRAVEL TIME TABLE ----------------------->
       DEPTH     ELEV      VOLUME    FLOW RATE    VELOCITY   TRAV.TIME
         (m)      (m)     (cu.m.)      (cms)        (m/s)      (min)
         .03   215.03    .676E+01         .0          .13      33.24
         .06   215.06    .150E+02         .0          .21      19.61
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         .09   215.09    .248E+02         .0          .29      14.23
         .13   215.13    .360E+02         .1          .37      11.28
         .16   215.16    .488E+02         .1          .44       9.41
         .19   215.19    .630E+02         .1          .51       8.11
         .22   215.22    .787E+02         .2          .58       7.15
         .25   215.25    .960E+02         .2          .65       6.41
         .28   215.28    .115E+03         .3          .72       5.83
         .32   215.32    .135E+03         .4          .78       5.35
         .35   215.35    .157E+03         .5          .84       4.95
         .38   215.38    .180E+03         .6          .90       4.62
         .41   215.41    .205E+03         .8          .96       4.33
         .44   215.44    .231E+03         .9         1.02       4.09
         .47   215.47    .258E+03        1.1         1.08       3.87
         .51   215.51    .288E+03        1.3         1.13       3.68
         .54   215.54    .318E+03        1.5         1.19       3.51
         .57   215.57    .350E+03        1.7         1.24       3.35
         .60   215.60    .384E+03        2.0         1.30       3.22

                                <---- hydrograph ---->   <-pipe / channel->
                          AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                          (ha)    (cms)   (hrs)   (mm)       (m)      (m/s)
     INFLOW : ID= 2 (0115)     .83      .09    2.67  57.82       .16       .45
     OUTFLOW: ID= 1 (0116)     .83      .09    2.75  57.62       .16       .45

| CALIB            |
| STANDHYD  (0107) |   Area    (ha)=   3.63
|ID= 1 DT= 5.0 min |   Total Imp(%)=  29.40   Dir. Conn.(%)=  19.00

                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      1.07         2.56
     Dep. Storage     (mm)=      1.00         3.00
     Average Slope     (%)=      2.00         3.00
     Length            (m)=    155.50       440.00
     Mannings n           =      .013         .250

     Max.Eff.Inten.(mm/hr)=     135.62        57.63
                   over (min)        5.00        40.00
     Storage Coeff.  (min)=       2.39 (ii)   35.24 (ii)
     Unit Hyd. Tpeak (min)=       5.00        40.00
     Unit Hyd. peak  (cms)=        .30          .03
                                                      *TOTALS*
     PEAK FLOW       (cms)=        .26          .24          .310 (iii)
     TIME TO PEAK    (hrs)=       2.33         2.92         2.33
     RUNOFF VOLUME    (mm)=      75.13        49.33        54.23
     TOTAL RAINFALL   (mm)=      76.13        76.13        76.13
     RUNOFF COEFFICIENT   =        .99          .65          .71

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

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN*  =  86.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

| ROUTE CHN (0110) |
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| IN= 2---> OUT= 1 | Routing time step (min)'= 5.00

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

Distance	Elevation	Manning	
.00	215.60	.0500	
1.80	215.00	.0500 / .0500	Main Channel
2.56	215.00	.0500 / .0500	Main Channel
4.36	215.60	.0500	

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

DEPTH (m)	ELEV (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME (min)
.03	215.03	.947E+01	.0	.15	38.53
.06	215.06	.210E+02	.0	.25	23.36
.09	215.09	.347E+02	.0	.34	17.30
.13	215.13	.504E+02	.1	.42	13.94
.16	215.16	.683E+02	.1	.50	11.77
.19	215.19	.882E+02	.1	.57	10.25
.22	215.22	.110E+03	.2	.64	9.11
.25	215.25	.134E+03	.3	.71	8.23
.28	215.28	.161E+03	.4	.78	7.53
.32	215.32	.189E+03	.5	.84	6.95
.35	215.35	.219E+03	.6	.90	6.47
.38	215.38	.252E+03	.7	.96	6.05
.41	215.41	.286E+03	.8	1.02	5.70
.44	215.44	.323E+03	1.0	1.08	5.39
.47	215.47	.362E+03	1.2	1.14	5.12
.51	215.51	.403E+03	1.4	1.20	4.88
.54	215.54	.446E+03	1.6	1.25	4.66
.57	215.57	.491E+03	1.8	1.30	4.47
.60	215.60	.538E+03	2.1	1.36	4.30

	<---- hydrograph ----> AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	<-pipe / channel-> MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 2 (0107)	3.63	.31	2.33	54.23	.27	.74
OUTFLOW: ID= 1 (0110)	3.63	.27	3.00	54.19	.25	.70

ADD HYD (0114)		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
1 + 2 = 3	ID1= 1 (0116):	.83	.089	2.75	57.62
	+ ID2= 2 (0110):	3.63	.267	3.00	54.19
	ID = 3 (0114):	4.45	.341	2.92	54.82

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB NASHYD (0102) ID= 1 DT=10.0 min	Area (ha)= 1.39	Curve Number (CN)= 84.0
	Ia (mm)= 4.00	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= .24	

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.167	2.22	1.667	8.42	3.167	10.74	4.67	3.38
.333	2.41	1.833	11.98	3.333	8.72	4.83	3.14
.500	2.65	2.000	19.90	3.500	7.31	5.00	2.93
.667	2.93	2.167	47.86	3.667	6.28	5.17	2.75
.833	3.29	2.333	135.62	3.833	5.50	5.33	2.59
1.000	3.75	2.500	57.60	4.000	4.89	5.50	2.44
1.167	4.36	2.667	29.73	4.167	4.40	5.67	2.32
1.333	5.21	2.833	19.18	4.333	4.00	5.83	2.20
1.500	6.45	3.000	13.86	4.500	3.67	6.00	2.10

Unit Hyd Qpeak (cms)= .223

PEAK FLOW (cms)= .171 (i)
TIME TO PEAK (hrs)= 2.500
RUNOFF VOLUME (mm)= 42.587
TOTAL RAINFALL (mm)= 76.131
RUNOFF COEFFICIENT = .559

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

ROUTE CHN (0111)	IN= 2---> OUT= 1	Routing time step (min)'= 5.00

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

Distance	Elevation	Manning	
.00	215.60	.0500	
3.00	215.00	.0500	Main Channel
3.76	215.00	.0500	
5.56	215.60	.0000	

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

DEPTH (m)	ELEV (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME (min)
.03	215.03	.701E+01	.0	.18	22.93
.06	215.06	.160E+02	.0	.29	14.14
.09	215.09	.270E+02	.0	.39	10.61
.13	215.13	.400E+02	.1	.48	8.65
.16	215.16	.550E+02	.1	.56	7.38
.19	215.19	.720E+02	.2	.64	6.48
.22	215.22	.909E+02	.3	.72	5.80
.25	215.25	.112E+03	.4	.79	5.27
.28	215.28	.135E+03	.5	.86	4.85
.32	215.32	.160E+03	.6	.93	4.50
.35	215.35	.187E+03	.7	.99	4.21
.38	215.38	.216E+03	.9	1.05	3.95
.41	215.41	.247E+03	1.1	1.12	3.74
.44	215.44	.280E+03	1.3	1.17	3.55
.47	215.47	.314E+03	1.6	1.23	3.38
.51	215.51	.351E+03	1.8	1.29	3.23
.54	215.54	.390E+03	2.1	1.35	3.09
.57	215.57	.431E+03	2.4	1.40	2.97
.60	215.60	.474E+03	2.8	1.46	2.86

	<---- hydrograph ----> AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	<-pipe / channel-> MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 2 (0102)	1.39	.17	2.50	42.59	.18	.62
OUTFLOW: ID= 1 (0111)	1.39	.16	2.58	42.51	.18	.61

ADD HYD (0117)		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
1 + 2 = 3	ID1= 1 (0114):	4.45	.341	2.92	54.82
	+ ID2= 2 (0111):	1.39	.159	2.58	42.51
	ID = 3 (0117):	5.85	.461	2.75	51.89

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB NASHYD (0105) ID= 1 DT=10.0 min	Area (ha)= 4.82	Curve Number (CN)= 66.0
	Ia (mm)= 5.00	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= .35	

Unit Hyd Qpeak (cms)= .522

PEAK FLOW (cms)= .257 (i)
TIME TO PEAK (hrs)= 2.667
RUNOFF VOLUME (mm)= 24.972
TOTAL RAINFALL (mm)= 76.131
RUNOFF COEFFICIENT = .328

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

ROUTE CHN (0113)	IN= 2---> OUT= 1	Routing time step (min)'= 5.00

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

Distance	Elevation	Manning	
.00	215.60	.0500	
1.80	215.00	.0500 / .0500	Main Channel
2.56	215.00	.0500 / .0500	Main Channel
4.36	215.60	.0500	

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

DEPTH (m)	ELEV (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME (min)
.03	215.03	.541E+01	.0	.15	22.38
.06	215.06	.120E+02	.0	.25	13.54
.09	215.09	.198E+02	.0	.33	10.01
.13	215.13	.288E+02	.1	.41	8.05
.16	215.16	.390E+02	.1	.49	6.79
.19	215.19	.504E+02	.1	.56	5.91
.22	215.22	.630E+02	.2	.63	5.25
.25	215.25	.768E+02	.3	.70	4.74
.28	215.28	.917E+02	.4	.77	4.33
.32	215.32	.108E+03	.4	.83	4.00
.35	215.35	.125E+03	.6	.90	3.72
.38	215.38	.144E+03	.7	.96	3.48
.41	215.41	.164E+03	.8	1.02	3.28
.44	215.44	.185E+03	1.0	1.08	3.10
.47	215.47	.207E+03	1.2	1.13	2.94
.51	215.51	.230E+03	1.4	1.19	2.80
.54	215.54	.255E+03	1.6	1.24	2.68

.57	215.57	.280E+03	1.8	1.30	2.57
.60	215.60	.307E+03	2.1	1.35	2.47

	<---- hydrograph ----> AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	<-pipe / channel-> MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 2 (0105)	4.82	.26	2.67	24.97	.25	.69
OUTFLOW: ID= 1 (0113)	4.82	.25	2.75	24.95	.24	.68

CALIB NASHYD (0112) ID= 1 DT=10.0 min	Area (ha)= 1.40	Curve Number (CN)= 75.0
	Ia (mm)= 5.00	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= .24	

Unit Hyd Qpeak (cms)= .222

PEAK FLOW (cms)= .123 (i)
TIME TO PEAK (hrs)= 2.500
RUNOFF VOLUME (mm)= 32.041
TOTAL RAINFALL (mm)= 76.131
RUNOFF COEFFICIENT = .421

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

ROUTE CHN (0109)	IN= 2---> OUT= 1	Routing time step (min)'= 5.00

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

Distance	Elevation	Manning	
.00	215.60	.0500	
1.80	215.00	.0500 / .0500	Main Channel
3.80	215.00	.0500	Main Channel
5.60	215.60	.0500	

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

DEPTH (m)	ELEV (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME (min)
.03	215.03	.813E+01	.0	.14	14.28
.06	215.06	.170E+02	.0	.23	8.87
.09	215.09	.266E+02	.1	.31	6.68
.13	215.13	.369E+02	.1	.38	5.45
.16	215.16	.480E+02	.2	.44	4.64
.19	215.19	.598E+02	.2	.50	4.07
.22	215.22	.724E+02	.3	.56	3.64
.25	215.25	.857E+02	.4	.62	3.30
.28	215.28	.997E+02	.5	.68	3.03
.32	215.32	.114E+03	.7	.73	2.80
.35	215.35	.130E+03	.8	.78	2.61
.38	215.38	.146E+03	1.0	.84	2.45
.41	215.41	.163E+03	1.2	.89	2.31
.44	215.44	.181E+03	1.4	.94	2.18
.47	215.47	.199E+03	1.6	.99	2.08
.51	215.51	.218E+03	1.8	1.04	1.98
.54	215.54	.238E+03	2.1	1.08	1.89
.57	215.57	.259E+03	2.4	1.13	1.81
.60	215.60	.280E+03	2.7	1.18	1.74

<---- hydrograph ----> <-pipe / channel->

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 2 (0112)	1.40	.12	2.50	32.04	.13	.39
OUTFLOW: ID= 1 (0109)	1.40	.12	2.58	31.99	.13	.38

ADD HYD (0103)		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
1 + 2 = 3	ID1= 1 (0113):	4.82	.252	2.75	24.95
	+ ID2= 2 (0109):	1.40	.119	2.58	31.99
	ID = 3 (0103):	6.22	.359	2.67	26.53

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0106)		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
1 + 2 = 3	ID1= 1 (0117):	5.85	.461	2.75	51.89
	+ ID2= 2 (0103):	6.22	.359	2.67	26.53
	ID = 3 (0106):	12.07	.819	2.67	38.82

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

** SIMULATION NUMBER: 6 **

CHICAGO STORM	IDF curve parameters: A=2507.000
Ptotal= 81.72 mm	B= 14.800
	C= .880

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

Duration of storm = 6.00 hrs
Storm time step = 10.00 min
Time to peak ratio = .38

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.17	2.25	1.67	8.85	3.17	11.36	4.67	3.47
.33	2.45	1.83	12.70	3.33	9.17	4.83	3.22
.50	2.70	2.00	21.34	3.50	7.66	5.00	3.00
.67	3.00	2.17	52.05	3.67	6.56	5.17	2.81
.83	3.38	2.33	148.61	3.83	5.72	5.33	2.64
1.00	3.86	2.50	62.77	4.00	5.07	5.50	2.49
1.17	4.51	2.67	32.11	4.17	4.55	5.67	2.36
1.33	5.41	2.83	20.54	4.33	4.12	5.83	2.24
1.50	6.73	3.00	14.75	4.50	3.77	6.00	2.13

CALIB

STANDHYD (0115)	Area (ha)= .83
ID= 1 DT= 5.0 min	Total Imp(%)= 33.00 Dir. Conn.(%)= 19.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	.27	.55
Dep. Storage	(mm)=	1.00	2.00
Average Slope	(%)=	2.00	3.00
Length	(m)=	74.30	275.00
Mannings n	=	.013	.250

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.083	2.25	1.583	8.85	3.083	11.36	4.58	3.47
.167	2.25	1.667	8.85	3.167	11.36	4.67	3.47
.250	2.45	1.750	12.70	3.250	9.17	4.75	3.22
.333	2.45	1.833	12.70	3.333	9.17	4.83	3.22
.417	2.70	1.917	21.34	3.417	7.66	4.92	3.00
.500	2.70	2.000	21.34	3.500	7.66	5.00	3.00
.583	3.00	2.083	52.05	3.583	6.56	5.08	2.81
.667	3.00	2.167	52.05	3.667	6.56	5.17	2.81
.750	3.38	2.250	148.61	3.750	5.72	5.25	2.64
.833	3.38	2.333	148.61	3.833	5.72	5.33	2.64
.917	3.86	2.417	62.78	3.917	5.07	5.42	2.49
1.000	3.86	2.500	62.77	4.000	5.07	5.50	2.49
1.083	4.51	2.583	32.11	4.083	4.55	5.58	2.36
1.167	4.51	2.667	32.11	4.167	4.55	5.67	2.36
1.250	5.41	2.750	20.54	4.250	4.12	5.75	2.24
1.333	5.41	2.833	20.54	4.333	4.12	5.83	2.24
1.417	6.73	2.917	14.75	4.417	3.77	5.92	2.13
1.500	6.73	3.000	14.75	4.500	3.77	6.00	2.13

			TOTALS
Max.Eff.Inten.(mm/hr)=	148.61	101.98	
over (min)	5.00	25.00	
Storage Coeff. (min)=	1.48 (ii)	21.20 (ii)	
Unit Hyd. Tpeak (min)=	5.00	25.00	
Unit Hyd. peak (cms)=	.33	.05	
PEAK FLOW (cms)=	.06	.09	.108 (iii)
TIME TO PEAK (hrs)=	2.33	2.67	2.67
RUNOFF VOLUME (mm)=	80.72	58.97	63.09
TOTAL RAINFALL (mm)=	81.72	81.72	81.72
RUNOFF COEFFICIENT =	.99	.72	.77

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 88.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ROUTE CHN (0116)	
IN= 2---> OUT= 1	Routing time step (min)'= 5.00

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

Distance	Elevation	Manning	
.00	215.60	.0500	
1.80	215.00	.0500 / .0500	Main Channel
2.56	215.00	.0500 / .0500	Main Channel
4.36	215.60	.0500	

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

DEPTH (m)	ELEV (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME (min)
.03	215.03	.676E+01	.0	.13	33.24
.06	215.06	.150E+02	.0	.21	19.61
.09	215.09	.248E+02	.0	.29	14.23
.13	215.13	.360E+02	.1	.37	11.28
.16	215.16	.488E+02	.1	.44	9.41
.19	215.19	.630E+02	.1	.51	8.11
.22	215.22	.787E+02	.2	.58	7.15
.25	215.25	.960E+02	.2	.65	6.41
.28	215.28	.115E+03	.3	.72	5.83
.32	215.32	.135E+03	.4	.78	5.35
.35	215.35	.157E+03	.5	.84	4.95
.38	215.38	.180E+03	.6	.90	4.62
.41	215.41	.205E+03	.8	.96	4.33
.44	215.44	.231E+03	.9	1.02	4.09
.47	215.47	.258E+03	1.1	1.08	3.87
.51	215.51	.288E+03	1.3	1.13	3.68
.54	215.54	.318E+03	1.5	1.19	3.51
.57	215.57	.350E+03	1.7	1.24	3.35
.60	215.60	.384E+03	2.0	1.30	3.22

<---- hydrograph ----> <-pipe / channel->

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 2 (0115)	.83	.11	2.67	63.09	.17	.48
OUTFLOW: ID= 1 (0116)	.83	.10	2.75	62.87	.17	.47

CALIB	
STANDHYD (0107)	Area (ha)= 3.63
ID= 1 DT= 5.0 min	Total Imp(%)= 29.40 Dir. Conn.(%)= 19.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	1.07	2.56
Dep. Storage	(mm)=	1.00	3.00
Average Slope	(%)=	2.00	3.00
Length	(m)=	155.50	440.00
Mannings n	=	.013	.250

			TOTALS
Max.Eff.Inten.(mm/hr)=	148.61	64.62	
over (min)	5.00	35.00	
Storage Coeff. (min)=	2.31 (ii)	33.68 (ii)	
Unit Hyd. Tpeak (min)=	5.00	35.00	
Unit Hyd. peak (cms)=	.30	.03	
PEAK FLOW (cms)=	.28	.29	.354 (iii)
TIME TO PEAK (hrs)=	2.33	2.83	2.33
RUNOFF VOLUME (mm)=	80.72	54.35	59.36
TOTAL RAINFALL (mm)=	81.72	81.72	81.72
RUNOFF COEFFICIENT =	.99	.67	.73

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

YOU SHOULD CONSIDER SPLITTING THE AREA.

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 86.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ROUTE CHN (0110)	
IN= 2---> OUT= 1	Routing time step (min)'= 5.00

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

Distance	Elevation	Manning	
.00	215.60	.0500	
1.80	215.00	.0500 / .0500	Main Channel
2.56	215.00	.0500 / .0500	Main Channel
4.36	215.60	.0500	

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

DEPTH (m)	ELEV (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME (min)
.03	215.03	.947E+01	.0	.15	38.53
.06	215.06	.210E+02	.0	.25	23.36
.09	215.09	.347E+02	.0	.34	17.30
.13	215.13	.504E+02	.1	.42	13.94
.16	215.16	.683E+02	.1	.50	11.77
.19	215.19	.882E+02	.1	.57	10.25
.22	215.22	.110E+03	.2	.64	9.11
.25	215.25	.134E+03	.3	.71	8.23
.28	215.28	.161E+03	.4	.78	7.53
.32	215.32	.189E+03	.5	.84	6.95
.35	215.35	.219E+03	.6	.90	6.47
.38	215.38	.252E+03	.7	.96	6.05
.41	215.41	.286E+03	.8	1.02	5.70
.44	215.44	.323E+03	1.0	1.08	5.39
.47	215.47	.362E+03	1.2	1.14	5.12
.51	215.51	.403E+03	1.4	1.20	4.88
.54	215.54	.446E+03	1.6	1.25	4.66
.57	215.57	.491E+03	1.8	1.30	4.47
.60	215.60	.538E+03	2.1	1.36	4.30

<---- hydrograph ----> <-pipe / channel->

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 2 (0107)	3.63	.35	2.33	59.36	.28	.77
OUTFLOW: ID= 1 (0110)	3.63	.31	2.92	59.31	.27	.74

ADD HYD (0114)		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
1 + 2 = 3	ID1= 1 (0116):	.83	.102	2.75	62.87
	+ ID2= 2 (0110):	3.63	.314	2.92	59.31
	ID = 3 (0114):	4.45	.405	2.83	59.97

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB					
NASHYD (0102)	Area (ha)= 1.39	Curve Number (CN)= 84.0			
ID= 1 DT=10.0 min	Ia (mm)= 4.00	# of Linear Res.(N)= 3.00			
	U.H. Tp(hrs)= .24				

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.167	2.25	1.667	8.85	3.167	11.36	4.67	3.47
.333	2.45	1.833	12.70	3.333	9.17	4.83	3.22
.500	2.70	2.000	21.34	3.500	7.66	5.00	3.00
.667	3.00	2.167	52.05	3.667	6.56	5.17	2.81
.833	3.38	2.333	148.61	3.833	5.72	5.33	2.64
1.000	3.86	2.500	62.78	4.000	5.07	5.50	2.49
1.167	4.51	2.667	32.11	4.167	4.55	5.67	2.36
1.333	5.41	2.833	20.54	4.333	4.12	5.83	2.24
1.500	6.73	3.000	14.75	4.500	3.77	6.00	2.13

Unit Hyd Qpeak (cms)= .223

PEAK FLOW (cms)= .194 (i)
TIME TO PEAK (hrs)= 2.500
RUNOFF VOLUME (mm)= 47.255
TOTAL RAINFALL (mm)= 81.724
RUNOFF COEFFICIENT = .578

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

ROUTE CHN (0111)	
IN= 2---> OUT= 1	Routing time step (min)'= 5.00

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

Distance	Elevation	Manning	
.00	215.60	.0500	
3.00	215.00	.0500	Main Channel
3.76	215.00	.0500	
5.56	215.60	.0000	

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

DEPTH (m)	ELEV (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME (min)
.03	215.03	.701E+01	.0	.18	22.93
.06	215.06	.160E+02	.0	.29	14.14
.09	215.09	.270E+02	.0	.39	10.61
.13	215.13	.400E+02	.1	.48	8.65
.16	215.16	.550E+02	.1	.56	7.38
.19	215.19	.720E+02	.2	.64	6.48
.22	215.22	.909E+02	.3	.72	5.80
.25	215.25	.112E+03	.4	.79	5.27
.28	215.28	.135E+03	.5	.86	4.85
.32	215.32	.160E+03	.6	.93	4.50
.35	215.35	.187E+03	.7	.99	4.21
.38	215.38	.216E+03	.9	1.05	3.95
.41	215.41	.247E+03	1.1	1.12	3.74
.44	215.44	.280E+03	1.3	1.17	3.55
.47	215.47	.314E+03	1.6	1.23	3.38

.51	215.51	.351E+03	1.8	1.29	3.23
.54	215.54	.390E+03	2.1	1.35	3.09
.57	215.57	.431E+03	2.4	1.40	2.97
.60	215.60	.474E+03	2.8	1.46	2.86

<---- hydrograph ----> <-pipe / channel->

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 2 (0102)	1.39	.19	2.50	47.26	.19	.65
OUTFLOW: ID= 1 (0111)	1.39	.18	2.58	47.18	.19	.64

ADD HYD (0117)				
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0114):	4.45	.405	2.83	59.97
+ ID2= 2 (0111):	1.39	.182	2.58	47.18
ID = 3 (0117):	5.85	.552	2.75	56.92

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB					
NASHYD (0105)	Area (ha)= 4.82	Curve Number (CN)= 66.0			
ID= 1 DT=10.0 min	Ia (mm)= 5.00	# of Linear Res.(N)= 3.00			
	U.H. Tp(hrs)= .35				

Unit Hyd Qpeak (cms)= .522

PEAK FLOW (cms)= .298 (i)
TIME TO PEAK (hrs)= 2.667
RUNOFF VOLUME (mm)= 28.272
TOTAL RAINFALL (mm)= 81.724
RUNOFF COEFFICIENT = .346

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

ROUTE CHN (0113)	
IN= 2---> OUT= 1	Routing time step (min)'= 5.00

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

Distance	Elevation	Manning	
.00	215.60	.0500	
1.80	215.00	.0500 / .0500	Main Channel
2.56	215.00	.0500 / .0500	Main Channel
4.36	215.60	.0500	

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

DEPTH (m)	ELEV (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME (min)
.03	215.03	.541E+01	.0	.15	22.38
.06	215.06	.120E+02	.0	.25	13.54
.09	215.09	.198E+02	.0	.33	10.01
.13	215.13	.288E+02	.1	.41	8.05
.16	215.16	.390E+02	.1	.49	6.79
.19	215.19	.504E+02	.1	.56	5.91

.22	215.22	.630E+02	.2	.63	5.25
.25	215.25	.768E+02	.3	.70	4.74
.28	215.28	.917E+02	.4	.77	4.33
.32	215.32	.108E+03	.4	.83	4.00
.35	215.35	.125E+03	.6	.90	3.72
.38	215.38	.144E+03	.7	.96	3.48
.41	215.41	.164E+03	.8	1.02	3.28
.44	215.44	.185E+03	1.0	1.08	3.10
.47	215.47	.207E+03	1.2	1.13	2.94
.51	215.51	.230E+03	1.4	1.19	2.80
.54	215.54	.255E+03	1.6	1.24	2.68
.57	215.57	.280E+03	1.8	1.30	2.57
.60	215.60	.307E+03	2.1	1.35	2.47

<---- hydrograph ----> <-pipe / channel->

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 2 (0105)	4.82	.30	2.67	28.27	.26	.72
OUTFLOW: ID= 1 (0113)	4.82	.29	2.75	28.25	.26	.72

CALIB					
NASHYD (0112)	Area (ha)= 1.40	Curve Number (CN)= 75.0			
ID= 1 DT=10.0 min	Ia (mm)= 5.00	# of Linear Res.(N)= 3.00			
	U.H. Tp(hrs)= .24				

Unit Hyd Qpeak (cms)= .222

PEAK FLOW (cms)= .141 (i)
TIME TO PEAK (hrs)= 2.500
RUNOFF VOLUME (mm)= 35.987
TOTAL RAINFALL (mm)= 81.724
RUNOFF COEFFICIENT = .440

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

ROUTE CHN (0109)	
IN= 2---> OUT= 1	Routing time step (min)'= 5.00

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

Distance	Elevation	Manning	
.00	215.60	.0500	
1.80	215.00	.0500 / .0500	Main Channel
3.80	215.00	.0500	Main Channel
5.60	215.60	.0500	

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

DEPTH (m)	ELEV (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME (min)
.03	215.03	.813E+01	.0	.14	14.28
.06	215.06	.170E+02	.0	.23	8.87
.09	215.09	.266E+02	.1	.31	6.68
.13	215.13	.369E+02	.1	.38	5.45
.16	215.16	.480E+02	.2	.44	4.64
.19	215.19	.598E+02	.2	.50	4.07
.22	215.22	.724E+02	.3	.56	3.64
.25	215.25	.857E+02	.4	.62	3.30
.28	215.28	.997E+02	.5	.68	3.03
.32	215.32	.114E+03	.7	.73	2.80

.35	215.35	.130E+03	.8	.78	2.61
.38	215.38	.146E+03	1.0	.84	2.45
.41	215.41	.163E+03	1.2	.89	2.31
.44	215.44	.181E+03	1.4	.94	2.18
.47	215.47	.199E+03	1.6	.99	2.08
.51	215.51	.218E+03	1.8	1.04	1.98
.54	215.54	.238E+03	2.1	1.08	1.89
.57	215.57	.259E+03	2.4	1.13	1.81
.60	215.60	.280E+03	2.7	1.18	1.74

<---- hydrograph ----> <-pipe / channel->

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 2 (0112)	1.40	.14	2.50	35.99	.14	.40
OUTFLOW: ID= 1 (0109)	1.40	.14	2.58	35.94	.14	.40

ADD HYD (0103)				
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0113):	4.82	.292	2.75	28.25
+ ID2= 2 (0109):	1.40	.137	2.58	35.94
ID = 3 (0103):	6.22	.416	2.67	29.98

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0106)				
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0117):	5.85	.552	2.75	56.92
+ ID2= 2 (0103):	6.22	.416	2.67	29.98
ID = 3 (0106):	12.07	.964	2.67	43.04

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

FINISH

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

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM, Version 2.0
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M  M  O   O   Licensed To: MJ Davenport

        OOO     T      T    H   H    Y    M   M   OOO                vo2-0057
```


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

Input filename: C:\Program Files\Visual OTTHYMO v2.0\voin.dat

Output filename: C:\visual otthymo files\3969\3969-All Scenarios\Post-Dev-Controlled.out
Summary filename: C:\visual otthymo files\3969\3969-All Scenarios\Post-Dev-Controlled.sum

DATE: 1/23/2019 TIME: 2:12:48 PM

USER:

COMMENTS: _____

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

| MASS STORM | Ptotal= 22.50 mm |

Filename: C:\visual otthymo files\4456\AES 1-hr.mst
Comments: AES 1 HOUR STORM DISTRIBUTION a=21min k=

Duration of storm = 1.00 hrs
Mass curve time step = 5.00 min

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.08	10.02	.33	69.93	.58	11.10	.83	.81
.17	30.00	.42	64.29	.67	4.62	.92	.30
.25	49.98	.50	27.03	.75	1.92	1.00	.03

| CALIB | STANDHYD (0115) | ID= 1 DT= 5.0 min |

Area (ha)= .83
Total Imp(%)= 33.00 Dir. Conn.(%)= 19.00

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	.27	.55
Dep. Storage (mm)=	1.00	2.00
Average Slope (%)=	2.00	3.00
Length (m)=	74.30	275.00
Mannings n =	.013	.250
Max.Eff.Inten.(mm/hr)=	69.93	14.12
over (min)	5.00	50.00
Storage Coeff. (min)=	2.00 (ii)	45.48 (ii)
Unit Hyd. Tpeak (min)=	5.00	50.00
Unit Hyd. peak (cms)=	.31	.02

		TOTALS
PEAK FLOW (cms)=	.03	.01 .030 (iii)
TIME TO PEAK (hrs)=	.33	1.17 .33
RUNOFF VOLUME (mm)=	21.50	8.78 11.16
TOTAL RAINFALL (mm)=	22.50	22.50 22.50
RUNOFF COEFFICIENT =	.96	.39 .50

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 88.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

| ROUTE CHN (0116) | IN= 2---> OUT= 1 |

Routing time step (min)'= 5.00

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

Distance	Elevation	Manning	
.00	215.60	.0500	
1.80	215.00	.0500 / .0500	Main Channel
2.56	215.00	.0500 / .0500	Main Channel
4.36	215.60	.0500	

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

DEPTH (m)	ELEV (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME (min)
.03	215.03	.676E+01	.0	.13	33.24
.06	215.06	.150E+02	.0	.21	19.61
.09	215.09	.248E+02	.0	.29	14.23
.13	215.13	.360E+02	.1	.37	11.28
.16	215.16	.488E+02	.1	.44	9.41
.19	215.19	.630E+02	.1	.51	8.11
.22	215.22	.787E+02	.2	.58	7.15
.25	215.25	.960E+02	.2	.65	6.41
.28	215.28	.115E+03	.3	.72	5.83
.32	215.32	.135E+03	.4	.78	5.35
.35	215.35	.157E+03	.5	.84	4.95
.38	215.38	.180E+03	.6	.90	4.62
.41	215.41	.205E+03	.8	.96	4.33
.44	215.44	.231E+03	.9	1.02	4.09
.47	215.47	.258E+03	1.1	1.08	3.87
.51	215.51	.288E+03	1.3	1.13	3.68
.54	215.54	.318E+03	1.5	1.19	3.51
.57	215.57	.350E+03	1.7	1.24	3.35

.60	215.60	.384E+03	2.0	1.30	3.22

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	<---- hydrograph ----> MAX DEPTH (m)	<-pipe / channel-> MAX VEL (m/s)
INFLOW : ID= 2 (0115)	.83	.03	.33	11.16	.10	.30
OUTFLOW: ID= 1 (0116)	.83	.02	.50	11.08	.07	.23

| CALIB | STANDHYD (0107) | ID= 1 DT= 5.0 min |

Area (ha)= 3.63
Total Imp(%)= 29.40 Dir. Conn.(%)= 19.00

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	1.07	2.56
Dep. Storage (mm)=	1.00	3.00
Average Slope (%)=	2.00	3.00
Length (m)=	155.50	440.00
Mannings n =	.013	.250
Max.Eff.Inten.(mm/hr)=	69.93	8.11
over (min)	5.00	80.00
Storage Coeff. (min)=	3.12 (ii)	75.07 (ii)
Unit Hyd. Tpeak (min)=	5.00	80.00
Unit Hyd. peak (cms)=	.27	.01

		TOTALS
PEAK FLOW (cms)=	.12	.03 .125 (iii)
TIME TO PEAK (hrs)=	.33	1.67 .42
RUNOFF VOLUME (mm)=	21.50	7.07 9.80
TOTAL RAINFALL (mm)=	22.50	22.50 22.50
RUNOFF COEFFICIENT =	.96	.31 .44

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 86.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

| ROUTE CHN (0110) | IN= 2---> OUT= 1 |

Routing time step (min)'= 5.00

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

Distance	Elevation	Manning	
.00	215.60	.0500	
1.80	215.00	.0500 / .0500	Main Channel
2.56	215.00	.0500 / .0500	Main Channel
4.36	215.60	.0500	

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

DEPTH (m)	ELEV (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME (min)
.03	215.03	.947E+01	.0	.15	38.53
.06	215.06	.210E+02	.0	.25	23.36
.09	215.09	.347E+02	.0	.34	17.30
.13	215.13	.504E+02	.1	.42	13.94

.16	215.16	.683E+02	.1	.50	11.77
.19	215.19	.882E+02	.1	.57	10.25
.22	215.22	.110E+03	.2	.64	9.11
.25	215.25	.134E+03	.3	.71	8.23
.28	215.28	.161E+03	.4	.78	7.53
.32	215.32	.189E+03	.5	.84	6.95
.35	215.35	.219E+03	.6	.90	6.47
.38	215.38	.252E+03	.7	.96	6.05
.41	215.41	.286E+03	.8	1.02	5.70
.44	215.44	.323E+03	1.0	1.08	5.39
.47	215.47	.362E+03	1.2	1.14	5.12
.51	215.51	.403E+03	1.4	1.20	4.88
.54	215.54	.446E+03	1.6	1.25	4.66
.57	215.57	.491E+03	1.8	1.30	4.47
.60	215.60	.538E+03	2.1	1.36	4.30

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	<---- hydrograph ----> MAX DEPTH (m)	<-pipe / channel-> MAX VEL (m/s)
INFLOW : ID= 2 (0107)	3.63	.13	.42	9.80	.18	.54
OUTFLOW: ID= 1 (0110)	3.63	.09	.50	9.79	.15	.48

| ADD HYD (0114) | 1 + 2 = 3 |

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0116):	.83	.018	.50	11.08
+ ID2= 2 (0110):	3.63	.089	.50	9.79
ID = 3 (0114):	4.45	.107	.50	10.03

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

| CALIB | NASHYD (0102) | ID= 1 DT=10.0 min |

Area (ha)= 1.39 Curve Number (CN)= 84.0
Ia (mm)= 4.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= .24

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.167	20.01	.500	45.66	.833	1.36		
.333	59.95	.667	7.86	1.000	.16		

Unit Hyd Qpeak (cms)= .223

PEAK FLOW (cms)= .034 (i)
TIME TO PEAK (hrs)= .500
RUNOFF VOLUME (mm)= 5.048
TOTAL RAINFALL (mm)= 22.500
RUNOFF COEFFICIENT = .224

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

ROUTE CHN (0111)
IN= 2---> OUT= 1

Routing time step (min)'= 5.00

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

Distance	Elevation	Manning	
.00	215.60	.0500	
3.00	215.00	.0500	Main Channel
3.76	215.00	.0500	
5.56	215.60	.0000	

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

DEPTH (m)	ELEV (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME (min)
.03	215.03	.701E+01	.0	.18	22.93
.06	215.06	.160E+02	.0	.29	14.14
.09	215.09	.270E+02	.0	.39	10.61
.13	215.13	.400E+02	.1	.48	8.65
.16	215.16	.550E+02	.1	.56	7.38
.19	215.19	.720E+02	.2	.64	6.48
.22	215.22	.909E+02	.3	.72	5.80
.25	215.25	.112E+03	.4	.79	5.27
.28	215.28	.135E+03	.5	.86	4.85
.32	215.32	.160E+03	.6	.93	4.50
.35	215.35	.187E+03	.7	.99	4.21
.38	215.38	.216E+03	.9	1.05	3.95
.41	215.41	.247E+03	1.1	1.12	3.74
.44	215.44	.280E+03	1.3	1.17	3.55
.47	215.47	.314E+03	1.6	1.23	3.38
.51	215.51	.351E+03	1.8	1.29	3.23
.54	215.54	.390E+03	2.1	1.35	3.09
.57	215.57	.431E+03	2.4	1.40	2.97
.60	215.60	.474E+03	2.8	1.46	2.86

	<---- hydrograph ---->				<-pipe / channel->	
	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 2 (0102)	1.39	.03	.50	5.05	.08	.35
OUTFLOW: ID= 1 (0111)	1.39	.03	.75	4.97	.08	.33

ADD HYD (0117)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0114):	4.45	.107	.50	10.03
+ ID2= 2 (0111):	1.39	.028	.75	4.97
ID = 3 (0117):	5.85	.120	.50	8.82

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB
NASHYD (0105)
ID= 1 DT=10.0 min

Area (ha)= 4.82 Curve Number (CN)= 66.0
Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= .35

Unit Hyd Qpeak (cms)= .522

PEAK FLOW (cms)= .038 (i)
TIME TO PEAK (hrs)= .667
RUNOFF VOLUME (mm)= 2.058
TOTAL RAINFALL (mm)= 22.500
RUNOFF COEFFICIENT = .091

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

ROUTE CHN (0113)
IN= 2---> OUT= 1

Routing time step (min)'= 5.00

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

Distance	Elevation	Manning	
.00	215.60	.0500	
1.80	215.00	.0500 / .0500	Main Channel
2.56	215.00	.0500 / .0500	Main Channel
4.36	215.60	.0500	

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

DEPTH (m)	ELEV (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME (min)
.03	215.03	.541E+01	.0	.15	22.38
.06	215.06	.120E+02	.0	.25	13.54
.09	215.09	.198E+02	.0	.33	10.01
.13	215.13	.288E+02	.1	.41	8.05
.16	215.16	.390E+02	.1	.49	6.79
.19	215.19	.504E+02	.1	.56	5.91
.22	215.22	.630E+02	.2	.63	5.25
.25	215.25	.768E+02	.3	.70	4.74
.28	215.28	.917E+02	.4	.77	4.33
.32	215.32	.108E+03	.4	.83	4.00
.35	215.35	.125E+03	.6	.90	3.72
.38	215.38	.144E+03	.7	.96	3.48
.41	215.41	.164E+03	.8	1.02	3.28
.44	215.44	.185E+03	1.0	1.08	3.10
.47	215.47	.207E+03	1.2	1.13	2.94
.51	215.51	.230E+03	1.4	1.19	2.80
.54	215.54	.255E+03	1.6	1.24	2.68
.57	215.57	.280E+03	1.8	1.30	2.57
.60	215.60	.307E+03	2.1	1.35	2.47

	<---- hydrograph ---->				<-pipe / channel->	
	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 2 (0105)	4.82	.04	.67	2.06	.10	.35
OUTFLOW: ID= 1 (0113)	4.82	.03	.83	2.03	.10	.34

CALIB
NASHYD (0112)
ID= 1 DT=10.0 min

Area (ha)= 1.40 Curve Number (CN)= 75.0
Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= .24

Unit Hyd Qpeak (cms)= .222

PEAK FLOW (cms)= .020 (i)
TIME TO PEAK (hrs)= .667
RUNOFF VOLUME (mm)= 2.957
TOTAL RAINFALL (mm)= 22.500

RUNOFF COEFFICIENT = .131

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

ROUTE CHN (0109)
IN= 2---> OUT= 1

Routing time step (min)'= 5.00

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

Distance	Elevation	Manning	
.00	215.60	.0500	
1.80	215.00	.0500 / .0500	Main Channel
3.80	215.00	.0500	Main Channel
5.60	215.60	.0500	

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

DEPTH (m)	ELEV (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME (min)
.03	215.03	.813E+01	.0	.14	14.28
.06	215.06	.170E+02	.0	.23	8.87
.09	215.09	.266E+02	.1	.31	6.68
.13	215.13	.369E+02	.1	.38	5.45
.16	215.16	.480E+02	.2	.44	4.64
.19	215.19	.598E+02	.2	.50	4.07
.22	215.22	.724E+02	.3	.56	3.64
.25	215.25	.857E+02	.4	.62	3.30
.28	215.28	.997E+02	.5	.68	3.03
.32	215.32	.114E+03	.7	.73	2.80
.35	215.35	.130E+03	.8	.78	2.61
.38	215.38	.146E+03	1.0	.84	2.45
.41	215.41	.163E+03	1.2	.89	2.31
.44	215.44	.181E+03	1.4	.94	2.18
.47	215.47	.199E+03	1.6	.99	2.08
.51	215.51	.218E+03	1.8	1.04	1.98
.54	215.54	.238E+03	2.1	1.08	1.89
.57	215.57	.259E+03	2.4	1.13	1.81
.60	215.60	.280E+03	2.7	1.18	1.74

	<---- hydrograph ---->				<-pipe / channel->	
	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 2 (0112)	1.40	.02	.67	2.96	.05	.17
OUTFLOW: ID= 1 (0109)	1.40	.02	.75	2.92	.04	.16

ADD HYD (0103)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0113):	4.82	.034	.83	2.03
+ ID2= 2 (0109):	1.40	.016	.75	2.92
ID = 3 (0103):	6.22	.049	.83	2.23

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0106)

1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0117):	5.85	.120	.50	8.82
+ ID2= 2 (0103):	6.22	.049	.83	2.23
ID = 3 (0106):	12.07	.137	.50	5.43

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

MASS STORM
Ptotal= 30.50 mm

Filename: C:\visual otthymo files\4456\AES 1-hr.mst
Comments: AES 1 HOUR STORM DISTRIBUTION a=21min k=

Duration of storm = 1.00 hrs
Mass curve time step = 5.00 min

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.08	13.58	.33	94.79	.58	15.04	.83	1.10
.17	40.66	.42	87.14	.67	6.26	.92	.40
.25	67.75	.50	36.64	.75	2.60	1.00	.04

CALIB
STANDHYD (0115)
ID= 1 DT= 5.0 min

Area (ha)= .83
Total Imp(%)= 33.00 Dir. Conn.(%)= 19.00

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	.27	.55
Dep. Storage (mm)=	1.00	2.00
Average Slope (%)=	2.00	3.00
Length (m)=	74.30	275.00
Mannings n =	.013	.250
Max.Eff.Inten.(mm/hr)=	94.79	29.46
over (min)	5.00	35.00
Storage Coeff. (min)=	1.77 (ii)	34.17 (ii)
Unit Hyd. Tpeak (min)=	5.00	35.00
Unit Hyd. peak (cms)=	.32	.03

		TOTALS
PEAK FLOW	(cms)= .04	.03 .044 (iii)
TIME TO PEAK	(hrs)= .33	.92 .42
RUNOFF VOLUME	(mm)= 29.50	14.47 17.30
TOTAL RAINFALL	(mm)= 30.50	30.50 30.50
RUNOFF COEFFICIENT	= .97	.47 .57

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 88.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

```
--------------------
| ROUTE CHN (0116) |
| IN= 2---> OUT= 1 |     Routing time step (min)'=  5.00
--------------------
               <------ DATA FOR SECTION (   1.1) ------>
              Distance      Elevation       Manning
                  .00         215.60          .0500
                 1.80         215.00      .0500 / .0500  Main Channel
                 2.56         215.00      .0500 / .0500  Main Channel
                 4.36         215.60          .0500

       <---------------------- TRAVEL TIME TABLE ----------------------->
        DEPTH     ELEV       VOLUME     FLOW RATE     VELOCITY    TRAV.TIME
         (m)       (m)      (cu.m.)       (cms)         (m/s)       (min)
         .03    215.03     .676E+01          .0            .13       33.24
         .06    215.06     .150E+02          .0            .21       19.61
         .09    215.09     .248E+02          .0            .29       14.23
         .13    215.13     .360E+02          .1            .37       11.28
         .16    215.16     .488E+02          .1            .44        9.41
         .19    215.19     .630E+02          .1            .51        8.11
         .22    215.22     .787E+02          .2            .58        7.15
         .25    215.25     .960E+02          .2            .65        6.41
         .28    215.28     .115E+03          .3            .72        5.83
         .32    215.32     .135E+03          .4            .78        5.35
         .35    215.35     .157E+03          .5            .84        4.95
         .38    215.38     .180E+03          .6            .90        4.62
         .41    215.41     .205E+03          .8            .96        4.33
         .44    215.44     .231E+03          .9           1.02        4.09
         .47    215.47     .258E+03         1.1           1.08        3.87
         .51    215.51     .288E+03         1.3           1.13        3.68
         .54    215.54     .318E+03         1.5           1.19        3.51
         .57    215.57     .350E+03         1.7           1.24        3.35
         .60    215.60     .384E+03         2.0           1.30        3.22

                                  <---- hydrograph ---->   <-pipe / channel->
                             AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                             (ha)    (cms)   (hrs)   (mm)       (m)      (m/s)
     INFLOW : ID= 2 (0115)     .83      .04     .42  17.30       .11       .34
     OUTFLOW: ID= 1 (0116)     .83      .03     .50  17.19       .10       .30


--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD  (0107) |   Area    (ha)=   3.63
|ID= 1 DT= 5.0 min |   Total Imp(%)=  29.40   Dir. Conn.(%)=  19.00
--------------------
                          IMPERVIOUS     PERVIOUS (i)
     Surface Area     (ha)=       1.07         2.56
     Dep. Storage     (mm)=       1.00         3.00
     Average Slope     (%)=       2.00         3.00
     Length            (m)=     155.50       440.00
     Mannings n           =       .013         .250

     Max.Eff.Inten.(mm/hr)=      94.79        13.96
           over (min)            5.00        65.00
     Storage Coeff.  (min)=      2.76 (ii)   60.68 (ii)
     Unit Hyd. Tpeak (min)=      5.00        65.00
     Unit Hyd. peak  (cms)=       .28          .02
                                                      *TOTALS*
     PEAK FLOW       (cms)=       .17          .06          .174 (iii)
     TIME TO PEAK    (hrs)=       .33         1.42           .33
     RUNOFF VOLUME    (mm)=     29.50        12.16         15.45
```



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     TOTAL RAINFALL   (mm)=      30.50        30.50          30.50
     RUNOFF COEFFICIENT   =        .97          .40            .51

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  86.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| ROUTE CHN (0110) |
| IN= 2---> OUT= 1 |     Routing time step (min)'=  5.00
--------------------
               <------ DATA FOR SECTION (   1.1) ------>
              Distance      Elevation       Manning
                  .00         215.60          .0500
                 1.80         215.00      .0500 / .0500  Main Channel
                 2.56         215.00      .0500 / .0500  Main Channel
                 4.36         215.60          .0500

       <---------------------- TRAVEL TIME TABLE ----------------------->
        DEPTH     ELEV       VOLUME     FLOW RATE     VELOCITY    TRAV.TIME
         (m)       (m)      (cu.m.)       (cms)         (m/s)       (min)
         .03    215.03     .947E+01          .0            .15       38.53
         .06    215.06     .210E+02          .0            .25       23.36
         .09    215.09     .347E+02          .0            .34       17.30
         .13    215.13     .504E+02          .1            .42       13.94
         .16    215.16     .683E+02          .1            .50       11.77
         .19    215.19     .882E+02          .1            .57       10.25
         .22    215.22     .110E+03          .2            .64        9.11
         .25    215.25     .134E+03          .3            .71        8.23
         .28    215.28     .161E+03          .4            .78        7.53
         .32    215.32     .189E+03          .5            .84        6.95
         .35    215.35     .219E+03          .6            .90        6.47
         .38    215.38     .252E+03          .7            .96        6.05
         .41    215.41     .286E+03          .8           1.02        5.70
         .44    215.44     .323E+03         1.0           1.08        5.39
         .47    215.47     .362E+03         1.2           1.14        5.12
         .51    215.51     .403E+03         1.4           1.20        4.88
         .54    215.54     .446E+03         1.6           1.25        4.66
         .57    215.57     .491E+03         1.8           1.30        4.47
         .60    215.60     .538E+03         2.1           1.36        4.30

                                  <---- hydrograph ---->   <-pipe / channel->
                             AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                             (ha)    (cms)   (hrs)   (mm)       (m)      (m/s)
     INFLOW : ID= 2 (0107)    3.63      .17      .33  15.45       .21       .60
     OUTFLOW: ID= 1 (0110)    3.63      .13      .50  15.43       .18       .55


--------------------------------------------------------------------------------
--------------------
| ADD HYD   (0114) |
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (0116):     .83    .030      .50    17.19
      + ID2= 2 (0110):    3.63    .130      .50    15.43
```



```
      ==========================================================
      ID = 3 (0114):     4.45    .160      .50    15.76

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD    (0102) |   Area    (ha)=   1.39   Curve Number   (CN)= 84.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   4.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=    .24

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

                          ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
               .167   27.12 |  .500   61.89 |  .833    1.85 |
               .333   81.27 |  .667   10.65 | 1.000     .22 |

     Unit Hyd Qpeak  (cms)=    .223

     PEAK FLOW       (cms)=    .064 (i)
     TIME TO PEAK    (hrs)=    .500
     RUNOFF VOLUME    (mm)=   9.250
     TOTAL RAINFALL   (mm)=  30.500
     RUNOFF COEFFICIENT   =    .303

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

--------------------------------------------------------------------------------
--------------------
| ROUTE CHN (0111) |
| IN= 2---> OUT= 1 |     Routing time step (min)'=  5.00
--------------------
               <------ DATA FOR SECTION (   1.1) ------>
              Distance      Elevation       Manning
                  .00         215.60          .0500
                 3.00         215.00          .0500      Main Channel
                 3.76         215.00          .0500
                 5.56         215.60          .0000

       <---------------------- TRAVEL TIME TABLE ----------------------->
        DEPTH     ELEV       VOLUME     FLOW RATE     VELOCITY    TRAV.TIME
         (m)       (m)      (cu.m.)       (cms)         (m/s)       (min)
         .03    215.03     .701E+01          .0            .18       22.93
         .06    215.06     .160E+02          .0            .29       14.14
         .09    215.09     .270E+02          .0            .39       10.61
         .13    215.13     .400E+02          .1            .48        8.65
         .16    215.16     .550E+02          .1            .56        7.38
         .19    215.19     .720E+02          .2            .64        6.48
         .22    215.22     .909E+02          .3            .72        5.80
         .25    215.25     .112E+03          .4            .79        5.27
         .28    215.28     .135E+03          .5            .86        4.85
         .32    215.32     .160E+03          .6            .93        4.50
         .35    215.35     .187E+03          .7            .99        4.21
         .38    215.38     .216E+03          .9           1.05        3.95
         .41    215.41     .247E+03         1.1           1.12        3.74
         .44    215.44     .280E+03         1.3           1.17        3.55
         .47    215.47     .314E+03         1.6           1.23        3.38
         .51    215.51     .351E+03         1.8           1.29        3.23
         .54    215.54     .390E+03         2.1           1.35        3.09
```



```
         .57    215.57     .431E+03         2.4           1.40        2.97
         .60    215.60     .474E+03         2.8           1.46        2.86

                                  <---- hydrograph ---->   <-pipe / channel->
                             AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                             (ha)    (cms)   (hrs)   (mm)       (m)      (m/s)
     INFLOW : ID= 2 (0102)    1.39      .06      .50   9.25       .11       .44
     OUTFLOW: ID= 1 (0111)    1.39      .06      .67   9.16       .11       .42


--------------------------------------------------------------------------------
--------------------
| ADD HYD   (0117) |
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (0114):     4.45    .160      .50    15.76
      + ID2= 2 (0111):     1.39    .055      .67     9.16
        ==========================================================
        ID = 3 (0117):     5.85    .191      .50    14.19

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD    (0105) |   Area    (ha)=   4.82   Curve Number   (CN)= 66.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=    .35

     Unit Hyd Qpeak  (cms)=    .522

     PEAK FLOW       (cms)=    .076 (i)
     TIME TO PEAK    (hrs)=    .667
     RUNOFF VOLUME    (mm)=   4.146
     TOTAL RAINFALL   (mm)=  30.500
     RUNOFF COEFFICIENT   =    .136

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

--------------------------------------------------------------------------------
--------------------
| ROUTE CHN (0113) |
| IN= 2---> OUT= 1 |     Routing time step (min)'=  5.00
--------------------
               <------ DATA FOR SECTION (   1.1) ------>
              Distance      Elevation       Manning
                  .00         215.60          .0500
                 1.80         215.00      .0500 / .0500  Main Channel
                 2.56         215.00      .0500 / .0500  Main Channel
                 4.36         215.60          .0500

       <---------------------- TRAVEL TIME TABLE ----------------------->
        DEPTH     ELEV       VOLUME     FLOW RATE     VELOCITY    TRAV.TIME
         (m)       (m)      (cu.m.)       (cms)         (m/s)       (min)
         .03    215.03     .541E+01          .0            .15       22.38
         .06    215.06     .120E+02          .0            .25       13.54
         .09    215.09     .198E+02          .0            .33       10.01
         .13    215.13     .288E+02          .1            .41        8.05
         .16    215.16     .390E+02          .1            .49        6.79
         .19    215.19     .504E+02          .1            .56        5.91
         .22    215.22     .630E+02          .2            .63        5.25
         .25    215.25     .768E+02          .3            .70        4.74
```

.28	215.28	.917E+02	.4	.77	4.33
.32	215.32	.108E+03	.4	.83	4.00
.35	215.35	.125E+03	.6	.90	3.72
.38	215.38	.144E+03	.7	.96	3.48
.41	215.41	.164E+03	.8	1.02	3.28
.44	215.44	.185E+03	1.0	1.08	3.10
.47	215.47	.207E+03	1.2	1.13	2.94
.51	215.51	.230E+03	1.4	1.19	2.80
.54	215.54	.255E+03	1.6	1.24	2.68
.57	215.57	.280E+03	1.8	1.30	2.57
.60	215.60	.307E+03	2.1	1.35	2.47

	<---- hydrograph ---->			<-pipe / channel->	
	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 2 (0105)	4.82	.08	.67	4.15	.14	.45
OUTFLOW: ID= 1 (0113)	4.82	.07	.75	4.12	.14	.43

CALIB			
NASHYD (0112)	Area (ha)=	1.40	Curve Number (CN)= 75.0
ID= 1 DT=10.0 min	Ia (mm)=	5.00	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)=	.24	

Unit Hyd Qpeak (cms)= .222

PEAK FLOW (cms)= .039 (i)
TIME TO PEAK (hrs)= .500
RUNOFF VOLUME (mm)= 5.823
TOTAL RAINFALL (mm)= 30.500
RUNOFF COEFFICIENT = .191

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

ROUTE CHN (0109)	
IN= 2---> OUT= 1	Routing time step (min)'= 5.00

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

Distance	Elevation	Manning	
.00	215.60	.0500	
1.80	215.00	.0500 / .0500	Main Channel
3.80	215.00	.0500	Main Channel
5.60	215.60	.0500	

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

DEPTH (m)	ELEV (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME (min)
.03	215.03	.813E+01	.0	.14	14.28
.06	215.06	.170E+02	.0	.23	8.87
.09	215.09	.266E+02	.1	.31	6.68
.13	215.13	.369E+02	.1	.38	5.45
.16	215.16	.480E+02	.2	.44	4.64
.19	215.19	.598E+02	.2	.50	4.07
.22	215.22	.724E+02	.3	.56	3.64
.25	215.25	.857E+02	.4	.62	3.30
.28	215.28	.997E+02	.5	.68	3.03
.32	215.32	.114E+03	.7	.73	2.80
.35	215.35	.130E+03	.8	.78	2.61
.38	215.38	.146E+03	1.0	.84	2.45

.41	215.41	.163E+03	1.2	.89	2.31
.44	215.44	.181E+03	1.4	.94	2.18
.47	215.47	.199E+03	1.6	.99	2.08
.51	215.51	.218E+03	1.8	1.04	1.98
.54	215.54	.238E+03	2.1	1.08	1.89
.57	215.57	.259E+03	2.4	1.13	1.81
.60	215.60	.280E+03	2.7	1.18	1.74

	<---- hydrograph ---->			<-pipe / channel->	
	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 2 (0112)	1.40	.04	.50	5.82	.07	.24
OUTFLOW: ID= 1 (0109)	1.40	.04	.67	5.78	.07	.24

ADD HYD (0103)				
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0113):	4.82	.071	.75	4.12
+ ID2= 2 (0109):	1.40	.036	.67	5.78
ID = 3 (0103):	6.22	.106	.75	4.49

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0106)				
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0117):	5.85	.191	.50	14.19
+ ID2= 2 (0103):	6.22	.106	.75	4.49
ID = 3 (0106):	12.07	.248	.58	9.19

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

** SIMULATION NUMBER: 3 **

MASS STORM	Filename: C:\visual otthymo files\4456\AES 1-hr.mst
Ptotal= 35.80 mm	Comments: AES 1 HOUR STORM DISTRIBUTION a=21min k=

Duration of storm = 1.00 hrs
Mass curve time step = 5.00 min

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.08	15.94	.33	111.27	.58	17.66	.83	1.29
.17	47.73	.42	102.29	.67	7.35	.92	.47
.25	79.52	.50	43.00	.75	3.05	1.00	.04

CALIB			
STANDHYD (0115)	Area (ha)=	.83	

.57	215.57	.350E+03	1.7	1.24	3.35
.60	215.60	.384E+03	2.0	1.30	3.22

	<---- hydrograph ---->				<-pipe / channel->	
	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 2 (0115)	.83	.06	.42	21.63	.13	.37
OUTFLOW: ID= 1 (0116)	.83	.04	.50	21.48	.11	.32

CALIB			
STANDHYD (0107)	Area (ha)=	3.63	
ID= 1 DT= 5.0 min	Total Imp(%)=	29.40	Dir. Conn.(%)= 19.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	1.07	2.56
Dep. Storage	(mm)=	1.00	3.00
Average Slope	(%)=	2.00	3.00
Length	(m)=	155.50	440.00
Mannings n	=	.013	.250
Max.Eff.Inten.(mm/hr)=		111.27	21.90
over (min)		5.00	55.00
Storage Coeff. (min)=		2.59 (ii)	50.95 (ii)
Unit Hyd. Tpeak (min)=		5.00	55.00
Unit Hyd. peak (cms)=		.29	.02
			TOTALS
PEAK FLOW	(cms)=	.20	.09 .208 (iii)
TIME TO PEAK	(hrs)=	.33	1.25 .42
RUNOFF VOLUME	(mm)=	34.80	15.91 19.49
TOTAL RAINFALL	(mm)=	35.80	35.80 35.80
RUNOFF COEFFICIENT	=	.97	.44 .54

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 86.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ROUTE CHN (0110)	
IN= 2---> OUT= 1	Routing time step (min)'= 5.00

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

Distance	Elevation	Manning	
.00	215.60	.0500	
1.80	215.00	.0500 / .0500	Main Channel
2.56	215.00	.0500 / .0500	Main Channel
4.36	215.60	.0500	

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

DEPTH (m)	ELEV (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME (min)
.03	215.03	.947E+01	.0	.15	38.53
.06	215.06	.210E+02	.0	.25	23.36
.09	215.09	.347E+02	.0	.34	17.30

.13	215.13	.360E+02	.1	.37	11.28
.16	215.16	.488E+02	.1	.44	9.41
.19	215.19	.630E+02	.1	.51	8.11
.22	215.22	.787E+02	.2	.58	7.15
.25	215.25	.960E+02	.2	.65	6.41
.28	215.28	.115E+03	.3	.72	5.83
.32	215.32	.135E+03	.4	.78	5.35
.35	215.35	.157E+03	.5	.84	4.95
.38	215.38	.180E+03	.6	.90	4.62
.41	215.41	.205E+03	.8	.96	4.33
.44	215.44	.231E+03	.9	1.02	4.09
.47	215.47	.258E+03	1.1	1.08	3.87
.51	215.51	.288E+03	1.3	1.13	3.68
.54	215.54	.318E+03	1.5	1.19	3.51

.13	215.13	.504E+02	.1	.42	13.94
.16	215.16	.683E+02	.1	.50	11.77
.19	215.19	.882E+02	.1	.57	10.25
.22	215.22	.110E+03	.2	.64	9.11
.25	215.25	.134E+03	.3	.71	8.23
.28	215.28	.161E+03	.4	.78	7.53
.32	215.32	.189E+03	.5	.84	6.95
.35	215.35	.219E+03	.6	.90	6.47
.38	215.38	.252E+03	.7	.96	6.05
.41	215.41	.286E+03	.8	1.02	5.70
.44	215.44	.323E+03	1.0	1.08	5.39
.47	215.47	.362E+03	1.2	1.14	5.12
.51	215.51	.403E+03	1.4	1.20	4.88
.54	215.54	.446E+03	1.6	1.25	4.66
.57	215.57	.491E+03	1.8	1.30	4.47
.60	215.60	.538E+03	2.1	1.36	4.30

	<---- hydrograph ---->				<-pipe / channel->	
	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 2 (0107)	3.63	.21	.42	19.49	.22	.65
OUTFLOW: ID= 1 (0110)	3.63	.16	.42	19.47	.20	.59

ADD HYD (0114)				
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0116):	.83	.040	.50	21.48
+ ID2= 2 (0110):	3.63	.161	.42	19.47
ID = 3 (0114):	4.45	.199	.50	19.84

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB					
NASHYD (0102)	Area	(ha)=	1.39	Curve Number	(CN)= 84.0
ID= 1 DT=10.0 min	Ia	(mm)=	4.00	# of Linear Res.(N)=	3.00
	U.H. Tp(hrs)=		.24		

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.167	31.83	.500	72.65	.833	2.17		
.333	95.39	.667	12.50	1.000	.26		

Unit Hyd Qpeak (cms)= .223

PEAK FLOW (cms)= .086 (i)
TIME TO PEAK (hrs)= .500
RUNOFF VOLUME (mm)= 12.441
TOTAL RAINFALL (mm)= 35.800
RUNOFF COEFFICIENT = .348

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

ROUTE CHN (0111)	
IN= 2---> OUT= 1	Routing time step (min)'= 5.00

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

Distance	Elevation	Manning	
.00	215.60	.0500	
3.00	215.00	.0500	Main Channel
3.76	215.00	.0500	
5.56	215.60	.0000	

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

DEPTH (m)	ELEV (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME (min)
.03	215.03	.701E+01	.0	.18	22.93
.06	215.06	.160E+02	.0	.29	14.14
.09	215.09	.270E+02	.0	.39	10.61
.13	215.13	.400E+02	.1	.48	8.65
.16	215.16	.550E+02	.1	.56	7.38
.19	215.19	.720E+02	.2	.64	6.48
.22	215.22	.909E+02	.3	.72	5.80
.25	215.25	.112E+03	.4	.79	5.27
.28	215.28	.135E+03	.5	.86	4.85
.32	215.32	.160E+03	.6	.93	4.50
.35	215.35	.187E+03	.7	.99	4.21
.38	215.38	.216E+03	.9	1.05	3.95
.41	215.41	.247E+03	1.1	1.12	3.74
.44	215.44	.280E+03	1.3	1.17	3.55
.47	215.47	.314E+03	1.6	1.23	3.38
.51	215.51	.351E+03	1.8	1.29	3.23
.54	215.54	.390E+03	2.1	1.35	3.09
.57	215.57	.431E+03	2.4	1.40	2.97
.60	215.60	.474E+03	2.8	1.46	2.86

	<---- hydrograph ---->				<-pipe / channel->	
	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 2 (0102)	1.39	.09	.50	12.44	.13	.50
OUTFLOW: ID= 1 (0111)	1.39	.08	.67	12.36	.13	.48

ADD HYD (0117)				
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0114):	4.45	.199	.50	19.84
+ ID2= 2 (0111):	1.39	.077	.67	12.36
ID = 3 (0117):	5.85	.247	.50	18.06

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB					
NASHYD (0105)	Area	(ha)=	4.82	Curve Number	(CN)= 66.0
ID= 1 DT=10.0 min	Ia	(mm)=	5.00	# of Linear Res.(N)=	3.00
	U.H. Tp(hrs)=		.35		

Unit Hyd Qpeak (cms)= .522

PEAK FLOW (cms)= .108 (i)
TIME TO PEAK (hrs)= .667
RUNOFF VOLUME (mm)= 5.850
TOTAL RAINFALL (mm)= 35.800
RUNOFF COEFFICIENT = .163

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

ROUTE CHN (0113)	
IN= 2---> OUT= 1	Routing time step (min)'= 5.00

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

Distance	Elevation	Manning	
.00	215.60	.0500	
1.80	215.00	.0500 / .0500	Main Channel
2.56	215.00	.0500 / .0500	Main Channel
4.36	215.60	.0500	

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

DEPTH (m)	ELEV (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME (min)
.03	215.03	.541E+01	.0	.15	22.38
.06	215.06	.120E+02	.0	.25	13.54
.09	215.09	.198E+02	.0	.33	10.01
.13	215.13	.288E+02	.1	.41	8.05
.16	215.16	.390E+02	.1	.49	6.79
.19	215.19	.504E+02	.1	.56	5.91
.22	215.22	.630E+02	.2	.63	5.25
.25	215.25	.768E+02	.3	.70	4.74
.28	215.28	.917E+02	.4	.77	4.33
.32	215.32	.108E+03	.4	.83	4.00
.35	215.35	.125E+03	.6	.90	3.72
.38	215.38	.144E+03	.7	.96	3.48
.41	215.41	.164E+03	.8	1.02	3.28
.44	215.44	.185E+03	1.0	1.08	3.10
.47	215.47	.207E+03	1.2	1.13	2.94
.51	215.51	.230E+03	1.4	1.19	2.80
.54	215.54	.255E+03	1.6	1.24	2.68
.57	215.57	.280E+03	1.8	1.30	2.57
.60	215.60	.307E+03	2.1	1.35	2.47

	<---- hydrograph ---->				<-pipe / channel->	
	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 2 (0105)	4.82	.11	.67	5.85	.17	.51
OUTFLOW: ID= 1 (0113)	4.82	.10	.75	5.83	.16	.50

CALIB					
NASHYD (0112)	Area	(ha)=	1.40	Curve Number	(CN)= 75.0
ID= 1 DT=10.0 min	Ia	(mm)=	5.00	# of Linear Res.(N)=	3.00
	U.H. Tp(hrs)=		.24		

Unit Hyd Qpeak (cms)= .222

PEAK FLOW (cms)= .055 (i)
TIME TO PEAK (hrs)= .500
RUNOFF VOLUME (mm)= 8.105

TOTAL RAINFALL (mm)= 35.800
RUNOFF COEFFICIENT = .226

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

ROUTE CHN (0109)	
IN= 2---> OUT= 1	Routing time step (min)'= 5.00

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

Distance	Elevation	Manning	
.00	215.60	.0500	
1.80	215.00	.0500 / .0500	Main Channel
3.80	215.00	.0500	Main Channel
5.60	215.60	.0500	

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

DEPTH (m)	ELEV (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME (min)
.03	215.03	.813E+01	.0	.14	14.28
.06	215.06	.170E+02	.0	.23	8.87
.09	215.09	.266E+02	.1	.31	6.68
.13	215.13	.369E+02	.1	.38	5.45
.16	215.16	.480E+02	.2	.44	4.64
.19	215.19	.598E+02	.2	.50	4.07
.22	215.22	.724E+02	.3	.56	3.64
.25	215.25	.857E+02	.4	.62	3.30
.28	215.28	.997E+02	.5	.68	3.03
.32	215.32	.114E+03	.7	.73	2.80
.35	215.35	.130E+03	.8	.78	2.61
.38	215.38	.146E+03	1.0	.84	2.45
.41	215.41	.163E+03	1.2	.89	2.31
.44	215.44	.181E+03	1.4	.94	2.18
.47	215.47	.199E+03	1.6	.99	2.08
.51	215.51	.218E+03	1.8	1.04	1.98
.54	215.54	.238E+03	2.1	1.08	1.89
.57	215.57	.259E+03	2.4	1.13	1.81
.60	215.60	.280E+03	2.7	1.18	1.74

	<---- hydrograph ---->				<-pipe / channel->	
	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 2 (0112)	1.40	.06	.50	8.11	.08	.28
OUTFLOW: ID= 1 (0109)	1.40	.05	.67	8.07	.08	.27

ADD HYD (0103)				
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0113):	4.82	.102	.75	5.83
+ ID2= 2 (0109):	1.40	.052	.67	8.07
ID = 3 (0103):	6.22	.151	.75	6.33

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0106)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
	ID1= 1 (0117):	5.85	.247	.50	18.06
	+ ID2= 2 (0103):	6.22	.151	.75	6.33
	ID = 3 (0106):	12.07	.347	.67	12.01

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

MASS STORM	Filename: C:\visual otthymo files\4456\AES 1-hr.mst
Ptotal= 42.50 mm	Comments: AES 1 HOUR STORM DISTRIBUTION a=21min k=

Duration of storm = 1.00 hrs
Mass curve time step = 5.00 min

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.08	18.92	.33	132.09	.58	20.96	.83	1.53
.17	56.66	.42	121.43	.67	8.72	.92	.56
.25	94.40	.50	51.05	.75	3.62	1.00	.05

CALIB	
STANDHYD (0115)	Area (ha)= .83
ID= 1 DT= 5.0 min	Total Imp(%)= 33.00 Dir. Conn.(%)= 19.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	.27	.55
Dep. Storage	(mm)=	1.00	2.00
Average Slope	(%)=	2.00	3.00
Length	(m)=	74.30	275.00
Mannings n	=	.013	.250
Max.Eff.Inten.(mm/hr)=		132.09	64.88
over (min)		5.00	30.00
Storage Coeff. (min)=		1.55 (ii)	25.18 (ii)
Unit Hyd. Tpeak (min)=		5.00	30.00
Unit Hyd. peak (cms)=		.33	.04
			TOTALS
PEAK FLOW	(cms)=	.06	.05 .069 (iii)
TIME TO PEAK	(hrs)=	.33	.83 .42
RUNOFF VOLUME	(mm)=	41.50	24.01 27.31
TOTAL RAINFALL	(mm)=	42.50	42.50 42.50
RUNOFF COEFFICIENT	=	.98	.56 .64

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 88.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

RUNOFF VOLUME	(mm)=	41.50	20.95 24.85
TOTAL RAINFALL	(mm)=	42.50	42.50 42.50
RUNOFF COEFFICIENT	=	.98	.49 .58

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 86.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ROUTE CHN (0110)	
IN= 2---> OUT= 1	Routing time step (min)'= 5.00

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

Distance	Elevation	Manning	
.00	215.60	.0500	
1.80	215.00	.0500 / .0500	Main Channel
2.56	215.00	.0500 / .0500	Main Channel
4.36	215.60	.0500	

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

DEPTH (m)	ELEV (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME (min)
.03	215.03	.947E+01	.0	.15	38.53
.06	215.06	.210E+02	.0	.25	23.36
.09	215.09	.347E+02	.0	.34	17.30
.13	215.13	.504E+02	.1	.42	13.94
.16	215.16	.683E+02	.1	.50	11.77
.19	215.19	.882E+02	.1	.57	10.25
.22	215.22	.110E+03	.2	.64	9.11
.25	215.25	.134E+03	.3	.71	8.23
.28	215.28	.161E+03	.4	.78	7.53
.32	215.32	.189E+03	.5	.84	6.95
.35	215.35	.219E+03	.6	.90	6.47
.38	215.38	.252E+03	.7	.96	6.05
.41	215.41	.286E+03	.8	1.02	5.70
.44	215.44	.323E+03	1.0	1.08	5.39
.47	215.47	.362E+03	1.2	1.14	5.12
.51	215.51	.403E+03	1.4	1.20	4.88
.54	215.54	.446E+03	1.6	1.25	4.66
.57	215.57	.491E+03	1.8	1.30	4.47
.60	215.60	.538E+03	2.1	1.36	4.30

<---- hydrograph ----> <-pipe / channel->

		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	MAX DEPTH (m)	MAX VEL (m/s)
INFLOW :	ID= 2 (0107)	3.63	.26	.42	24.85	.25	.69
OUTFLOW:	ID= 1 (0110)	3.63	.20	.42	24.82	.22	.64

ADD HYD (0114)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
	ID1= 1 (0116):	.83	.054	.83	27.10

ROUTE CHN (0116)	
IN= 2---> OUT= 1	Routing time step (min)'= 5.00

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

Distance	Elevation	Manning	
.00	215.60	.0500	
1.80	215.00	.0500 / .0500	Main Channel
2.56	215.00	.0500 / .0500	Main Channel
4.36	215.60	.0500	

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

DEPTH (m)	ELEV (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME (min)
.03	215.03	.676E+01	.0	.13	33.24
.06	215.06	.150E+02	.0	.21	19.61
.09	215.09	.248E+02	.0	.29	14.23
.13	215.13	.360E+02	.1	.37	11.28
.16	215.16	.488E+02	.1	.44	9.41
.19	215.19	.630E+02	.1	.51	8.11
.22	215.22	.787E+02	.2	.58	7.15
.25	215.25	.960E+02	.2	.65	6.41
.28	215.28	.115E+03	.3	.72	5.83
.32	215.32	.135E+03	.4	.78	5.35
.35	215.35	.157E+03	.5	.84	4.95
.38	215.38	.180E+03	.6	.90	4.62
.41	215.41	.205E+03	.8	.96	4.33
.44	215.44	.231E+03	.9	1.02	4.09
.47	215.47	.258E+03	1.1	1.08	3.87
.51	215.51	.288E+03	1.3	1.13	3.68
.54	215.54	.318E+03	1.5	1.19	3.51
.57	215.57	.350E+03	1.7	1.24	3.35
.60	215.60	.384E+03	2.0	1.30	3.22

<---- hydrograph ----> <-pipe / channel->

		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	MAX DEPTH (m)	MAX VEL (m/s)
INFLOW :	ID= 2 (0115)	.83	.07	.42	27.31	.14	.40
OUTFLOW:	ID= 1 (0116)	.83	.05	.83	27.10	.13	.37

CALIB	
STANDHYD (0107)	Area (ha)= 3.63
ID= 1 DT= 5.0 min	Total Imp(%)= 29.40 Dir. Conn.(%)= 19.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	1.07	2.56
Dep. Storage	(mm)=	1.00	3.00
Average Slope	(%)=	2.00	3.00
Length	(m)=	155.50	440.00
Mannings n	=	.013	.250
Max.Eff.Inten.(mm/hr)=		132.09	35.82
over (min)		5.00	45.00
Storage Coeff. (min)=		2.42 (ii)	42.14 (ii)
Unit Hyd. Tpeak (min)=		5.00	45.00
Unit Hyd. peak (cms)=		.30	.03
			TOTALS
PEAK FLOW	(cms)=	.24	.14 .257 (iii)
TIME TO PEAK	(hrs)=	.33	1.08 .42

+ ID2= 2 (0110):		3.63	.204	.42	24.82
ID = 3 (0114):		4.45	.254	.50	25.25

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB	
NASHYD (0102)	Area (ha)= 1.39 Curve Number (CN)= 84.0
ID= 1 DT=10.0 min	Ia (mm)= 4.00 # of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= .24

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.167	37.79	.500	86.24	.833	2.58		
.333	113.25	.667	14.84	1.000	.31		

Unit Hyd Qpeak	(cms)=	.223
PEAK FLOW	(cms)=	.117 (i)
TIME TO PEAK	(hrs)=	.500
RUNOFF VOLUME	(mm)=	16.829
TOTAL RAINFALL	(mm)=	42.500
RUNOFF COEFFICIENT	=	.396

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

ROUTE CHN (0111)	
IN= 2---> OUT= 1	Routing time step (min)'= 5.00

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

Distance	Elevation	Manning	
.00	215.60	.0500	
3.00	215.00	.0500	Main Channel
3.76	215.00	.0500	
5.56	215.60	.0000	

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

DEPTH (m)	ELEV (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME (min)
.03	215.03	.701E+01	.0	.18	22.93
.06	215.06	.160E+02	.0	.29	14.14
.09	215.09	.270E+02	.0	.39	10.61
.13	215.13	.400E+02	.1	.48	8.65
.16	215.16	.550E+02	.1	.56	7.38
.19	215.19	.720E+02	.2	.64	6.48
.22	215.22	.909E+02	.3	.72	5.80
.25	215.25	.112E+03	.4	.79	5.27
.28	215.28	.135E+03	.5	.86	4.85
.32	215.32	.160E+03	.6	.93	4.50
.35	215.35	.187E+03	.7	.99	4.21
.38	215.38	.216E+03	.9	1.05	3.95
.41	215.41	.247E+03	1.1	1.12	3.74
.44	215.44	.280E+03	1.3	1.17	3.55
.47	215.47	.314E+03	1.6	1.23	3.38
.51	215.51	.351E+03	1.8	1.29	3.23

.54	215.54	.390E+03	2.1	1.35	3.09
.57	215.57	.431E+03	2.4	1.40	2.97
.60	215.60	.474E+03	2.8	1.46	2.86

	<---- hydrograph ---->				<-pipe / channel->	
	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 2 (0102)	1.39	.12	.50	16.83	.15	.55
OUTFLOW: ID= 1 (0111)	1.39	.11	.67	16.76	.15	.53

ADD HYD (0117)				
1 + 2 = 3		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
	ID1= 1 (0114):	4.45	.254	.50	25.25
	+ ID2= 2 (0111):	1.39	.106	.67	16.76
	ID = 3 (0117):	5.85	.326	.50	23.22

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB NASHYD (0105) ID= 1 DT=10.0 min	Area (ha)= 4.82	Curve Number (CN)= 66.0
	Ia (mm)= 5.00	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= .35	

Unit Hyd Qpeak (cms)= .522

PEAK FLOW (cms)= .153 (i)
TIME TO PEAK (hrs)= .667
RUNOFF VOLUME (mm)= 8.327
TOTAL RAINFALL (mm)= 42.500
RUNOFF COEFFICIENT = .196

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

ROUTE CHN (0113) | IN= 2---> OUT= 1 | Routing time step (min)'= 5.00

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

Distance	Elevation	Manning	
.00	215.60	.0500	
1.80	215.00	.0500 / .0500	Main Channel
2.56	215.00	.0500 / .0500	Main Channel
4.36	215.60	.0500	

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

DEPTH (m)	ELEV (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME (min)
.03	215.03	.541E+01	.0	.15	22.38
.06	215.06	.120E+02	.0	.25	13.54
.09	215.09	.198E+02	.0	.33	10.01
.13	215.13	.288E+02	.1	.41	8.05
.16	215.16	.390E+02	.1	.49	6.79
.19	215.19	.504E+02	.1	.56	5.91
.22	215.22	.630E+02	.2	.63	5.25

.25	215.25	.768E+02	.3	.70	4.74
.28	215.28	.917E+02	.4	.77	4.33
.32	215.32	.108E+03	.4	.83	4.00
.35	215.35	.125E+03	.6	.90	3.72
.38	215.38	.144E+03	.7	.96	3.48
.41	215.41	.164E+03	.8	1.02	3.28
.44	215.44	.185E+03	1.0	1.08	3.10
.47	215.47	.207E+03	1.2	1.13	2.94
.51	215.51	.230E+03	1.4	1.19	2.80
.54	215.54	.255E+03	1.6	1.24	2.68
.57	215.57	.280E+03	1.8	1.30	2.57
.60	215.60	.307E+03	2.1	1.35	2.47

	<---- hydrograph ---->				<-pipe / channel->	
	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 2 (0105)	4.82	.15	.67	8.33	.20	.58
OUTFLOW: ID= 1 (0113)	4.82	.15	.75	8.30	.19	.57

CALIB NASHYD (0112) ID= 1 DT=10.0 min	Area (ha)= 1.40	Curve Number (CN)= 75.0
	Ia (mm)= 5.00	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= .24	

Unit Hyd Qpeak (cms)= .222

PEAK FLOW (cms)= .078 (i)
TIME TO PEAK (hrs)= .500
RUNOFF VOLUME (mm)= 11.357
TOTAL RAINFALL (mm)= 42.500
RUNOFF COEFFICIENT = .267

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

ROUTE CHN (0109) | IN= 2---> OUT= 1 | Routing time step (min)'= 5.00

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

Distance	Elevation	Manning	
.00	215.60	.0500	
1.80	215.00	.0500 / .0500	Main Channel
3.80	215.00	.0500	Main Channel
5.60	215.60	.0500	

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

DEPTH (m)	ELEV (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME (min)
.03	215.03	.813E+01	.0	.14	14.28
.06	215.06	.170E+02	.0	.23	8.87
.09	215.09	.266E+02	.1	.31	6.68
.13	215.13	.369E+02	.1	.38	5.45
.16	215.16	.480E+02	.2	.44	4.64
.19	215.19	.598E+02	.2	.50	4.07
.22	215.22	.724E+02	.3	.56	3.64
.25	215.25	.857E+02	.4	.62	3.30
.28	215.28	.997E+02	.5	.68	3.03
.32	215.32	.114E+03	.7	.73	2.80
.35	215.35	.130E+03	.8	.78	2.61

.38	215.38	.146E+03	1.0	.84	2.45
.41	215.41	.163E+03	1.2	.89	2.31
.44	215.44	.181E+03	1.4	.94	2.18
.47	215.47	.199E+03	1.6	.99	2.08
.51	215.51	.218E+03	1.8	1.04	1.98
.54	215.54	.238E+03	2.1	1.08	1.89
.57	215.57	.259E+03	2.4	1.13	1.81
.60	215.60	.280E+03	2.7	1.18	1.74

	<---- hydrograph ---->				<-pipe / channel->	
	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 2 (0112)	1.40	.08	.50	11.36	.10	.32
OUTFLOW: ID= 1 (0109)	1.40	.07	.67	11.31	.10	.32

ADD HYD (0103)					
1 + 2 = 3		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
	ID1= 1 (0113):	4.82	.147	.75	8.30
	+ ID2= 2 (0109):	1.40	.075	.67	11.31
	ID = 3 (0103):	6.22	.216	.75	8.98

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0106)					
1 + 2 = 3		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
	ID1= 1 (0117):	5.85	.326	.50	23.22
	+ ID2= 2 (0103):	6.22	.216	.75	8.98
	ID = 3 (0106):	12.07	.491	.67	15.88

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

MASS STORM Ptotal= 47.40 mm	Filename: C:\visual otthymo files\4456\AES 1-hr.mst
	Comments: AES 1 HOUR STORM DISTRIBUTION a=21min k=

Duration of storm = 1.00 hrs
Mass curve time step = 5.00 min

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.08	21.10	.33	147.32	.58	23.38	.83	1.71
.17	63.19	.42	135.43	.67	9.73	.92	.63
.25	105.28	.50	56.94	.75	4.04	1.00	.06

CALIB

STANDHYD (0115) ID= 1 DT= 5.0 min	Area (ha)= .83	
	Total Imp(%)= 33.00	Dir. Conn.(%)= 19.00

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	.27	.55
Dep. Storage (mm)=	1.00	2.00
Average Slope (%)=	2.00	3.00
Length (m)=	74.30	275.00
Mannings n =	.013	.250

			TOTALS
Max.Eff.Inten.(mm/hr)=	147.32	75.84	
over (min)	5.00	25.00	
Storage Coeff. (min)=	1.49 (ii)	23.68 (ii)	
Unit Hyd. Tpeak (min)=	5.00	25.00	
Unit Hyd. peak (cms)=	.33	.05	
PEAK FLOW (cms)=	.06	.07	.084 (iii)
TIME TO PEAK (hrs)=	.33	.75	.42
RUNOFF VOLUME (mm)=	46.40	28.13	31.59
TOTAL RAINFALL (mm)=	47.40	47.40	47.40
RUNOFF COEFFICIENT =	.98	.59	.67

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 88.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ROUTE CHN (0116) | IN= 2---> OUT= 1 | Routing time step (min)'= 5.00

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

Distance	Elevation	Manning	
.00	215.60	.0500	
1.80	215.00	.0500 / .0500	Main Channel
2.56	215.00	.0500 / .0500	Main Channel
4.36	215.60	.0500	

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

DEPTH (m)	ELEV (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME (min)
.03	215.03	.676E+01	.0	.13	33.24
.06	215.06	.150E+02	.0	.21	19.61
.09	215.09	.248E+02	.0	.29	14.23
.13	215.13	.360E+02	.1	.37	11.28
.16	215.16	.488E+02	.1	.44	9.41
.19	215.19	.630E+02	.1	.51	8.11
.22	215.22	.787E+02	.2	.58	7.15
.25	215.25	.960E+02	.2	.65	6.41
.28	215.28	.115E+03	.3	.72	5.83
.32	215.32	.135E+03	.4	.78	5.35
.35	215.35	.157E+03	.5	.84	4.95
.38	215.38	.180E+03	.6	.90	4.62
.41	215.41	.205E+03	.8	.96	4.33
.44	215.44	.231E+03	.9	1.02	4.09
.47	215.47	.258E+03	1.1	1.08	3.87
.51	215.51	.288E+03	1.3	1.13	3.68

.54	215.54	.318E+03	1.5	1.19	3.51
.57	215.57	.350E+03	1.7	1.24	3.35
.60	215.60	.384E+03	2.0	1.30	3.22

	<---- hydrograph ---->				<-pipe / channel->	
	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 2 (0115)	.83	.08	.42	31.59	.16	.44
OUTFLOW: ID= 1 (0116)	.83	.07	.75	31.37	.14	.40

CALIB	
STANDHYD (0107)	Area (ha)= 3.63
ID= 1 DT= 5.0 min	Total Imp(%)= 29.40 Dir. Conn.(%)= 19.00

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	1.07	2.56
Dep. Storage (mm)=	1.00	3.00
Average Slope (%)=	2.00	3.00
Length (m)=	155.50	440.00
Mannings n =	.013	.250
Max.Eff.Inten.(mm/hr)=	147.32	42.43
over (min)	5.00	40.00
Storage Coeff. (min)=	2.32 (ii)	39.44 (ii)
Unit Hyd. Tpeak (min)=	5.00	40.00
Unit Hyd. peak (cms)=	.30	.03

		TOTALS
PEAK FLOW (cms)=	.27	.18 .295 (iii)
TIME TO PEAK (hrs)=	.33	1.00 .42
RUNOFF VOLUME (mm)=	46.40	24.82 28.91
TOTAL RAINFALL (mm)=	47.40	47.40 47.40
RUNOFF COEFFICIENT =	.98	.52 .61

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 86.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ROUTE CHN (0110)	
IN= 2---> OUT= 1	Routing time step (min)'= 5.00

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

Distance	Elevation	Manning	
.00	215.60	.0500	
1.80	215.00	.0500 / .0500	Main Channel
2.56	215.00	.0500 / .0500	Main Channel
4.36	215.60	.0500	

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

DEPTH (m)	ELEV (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME (min)
.03	215.03	.947E+01	.0	.15	38.53
.06	215.06	.210E+02	.0	.25	23.36

.09	215.09	.347E+02	.0	.34	17.30
.13	215.13	.504E+02	.1	.42	13.94
.16	215.16	.683E+02	.1	.50	11.77
.19	215.19	.882E+02	.1	.57	10.25
.22	215.22	.110E+03	.2	.64	9.11
.25	215.25	.134E+03	.3	.71	8.23
.28	215.28	.161E+03	.4	.78	7.53
.32	215.32	.189E+03	.5	.84	6.95
.35	215.35	.219E+03	.6	.90	6.47
.38	215.38	.252E+03	.7	.96	6.05
.41	215.41	.286E+03	.8	1.02	5.70
.44	215.44	.323E+03	1.0	1.08	5.39
.47	215.47	.362E+03	1.2	1.14	5.12
.51	215.51	.403E+03	1.4	1.20	4.88
.54	215.54	.446E+03	1.6	1.25	4.66
.57	215.57	.491E+03	1.8	1.30	4.47
.60	215.60	.538E+03	2.1	1.36	4.30

	<---- hydrograph ---->				<-pipe / channel->	
	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 2 (0107)	3.63	.29	.42	28.91	.26	.73
OUTFLOW: ID= 1 (0110)	3.63	.24	.42	28.88	.24	.67

ADD HYD (0114)				
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0116):	.83	.070	.75	31.37
+ ID2= 2 (0110):	3.63	.236	.42	28.88
ID = 3 (0114):	4.45	.301	.50	29.34

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB			
NASHYD (0102)	Area (ha)= 1.39	Curve Number (CN)= 84.0	
ID= 1 DT=10.0 min	Ia (mm)= 4.00	# of Linear Res.(N)= 3.00	
	U.H. Tp(hrs)= .24		

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

---- TRANSFORMED HYETOGRAPH ----							
TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.167	42.15	.500	96.18	.833	2.87		
.333	126.30	.667	16.55	1.000	.34		

Unit Hyd Qpeak (cms)= .223

PEAK FLOW (cms)= .141 (i)
TIME TO PEAK (hrs)= .500
RUNOFF VOLUME (mm)= 20.244
TOTAL RAINFALL (mm)= 47.400
RUNOFF COEFFICIENT = .427

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

.03	215.03	.701E+01	.0	.18	22.93
.06	215.06	.160E+02	.0	.29	14.14
.09	215.09	.270E+02	.0	.39	10.61
.13	215.13	.400E+02	.1	.48	8.65
.16	215.16	.550E+02	.1	.56	7.38
.19	215.19	.720E+02	.2	.64	6.48
.22	215.22	.909E+02	.3	.72	5.80
.25	215.25	.112E+03	.4	.79	5.27
.28	215.28	.135E+03	.5	.86	4.85
.32	215.32	.160E+03	.6	.93	4.50
.35	215.35	.187E+03	.7	.99	4.21
.38	215.38	.216E+03	.9	1.05	3.95
.41	215.41	.247E+03	1.1	1.12	3.74
.44	215.44	.280E+03	1.3	1.17	3.55
.47	215.47	.314E+03	1.6	1.23	3.38
.51	215.51	.351E+03	1.8	1.29	3.23
.54	215.54	.390E+03	2.1	1.35	3.09
.57	215.57	.431E+03	2.4	1.40	2.97
.60	215.60	.474E+03	2.8	1.46	2.86

	<---- hydrograph ---->				<-pipe / channel->	
	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 2 (0102)	1.39	.14	.50	20.24	.17	.58
OUTFLOW: ID= 1 (0111)	1.39	.13	.67	20.16	.16	.57

ADD HYD (0117)				
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0114):	4.45	.301	.50	29.34
+ ID2= 2 (0111):	1.39	.129	.67	20.16
ID = 3 (0117):	5.85	.393	.50	27.16

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB			
NASHYD (0105)	Area (ha)= 4.82	Curve Number (CN)= 66.0	
ID= 1 DT=10.0 min	Ia (mm)= 5.00	# of Linear Res.(N)= 3.00	
	U.H. Tp(hrs)= .35		

Unit Hyd Qpeak (cms)= .522

PEAK FLOW (cms)= .190 (i)
TIME TO PEAK (hrs)= .667
RUNOFF VOLUME (mm)= 10.345
TOTAL RAINFALL (mm)= 47.400
RUNOFF COEFFICIENT = .218

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

ROUTE CHN (0113)	
IN= 2---> OUT= 1	Routing time step (min)'= 5.00

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

Distance	Elevation	Manning	
.00	215.60	.0500	
1.80	215.00	.0500 / .0500	Main Channel
2.56	215.00	.0500 / .0500	Main Channel
4.36	215.60	.0500	

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

DEPTH (m)	ELEV (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME (min)
.03	215.03	.541E+01	.0	.15	22.38
.06	215.06	.120E+02	.0	.25	13.54
.09	215.09	.198E+02	.0	.33	10.01
.13	215.13	.288E+02	.1	.41	8.05
.16	215.16	.390E+02	.1	.49	6.79
.19	215.19	.504E+02	.1	.56	5.91
.22	215.22	.630E+02	.2	.63	5.25
.25	215.25	.768E+02	.3	.70	4.74
.28	215.28	.917E+02	.4	.77	4.33
.32	215.32	.108E+03	.4	.83	4.00
.35	215.35	.125E+03	.6	.90	3.72
.38	215.38	.144E+03	.7	.96	3.48
.41	215.41	.164E+03	.8	1.02	3.28
.44	215.44	.185E+03	1.0	1.08	3.10
.47	215.47	.207E+03	1.2	1.13	2.94
.51	215.51	.230E+03	1.4	1.19	2.80
.54	215.54	.255E+03	1.6	1.24	2.68
.57	215.57	.280E+03	1.8	1.30	2.57
.60	215.60	.307E+03	2.1	1.35	2.47

	<---- hydrograph ---->				<-pipe / channel->	
	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 2 (0105)	4.82	.19	.67	10.34	.22	.62
OUTFLOW: ID= 1 (0113)	4.82	.18	.75	10.32	.21	.61

CALIB			
NASHYD (0112)	Area (ha)= 1.40	Curve Number (CN)= 75.0	
ID= 1 DT=10.0 min	Ia (mm)= 5.00	# of Linear Res.(N)= 3.00	
	U.H. Tp(hrs)= .24		

Unit Hyd Qpeak (cms)= .222

PEAK FLOW (cms)= .096 (i)
TIME TO PEAK (hrs)= .500

```
 RUNOFF VOLUME    (mm)=  13.959
 TOTAL RAINFALL   (mm)=  47.400
 RUNOFF COEFFICIENT   =    .294

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

ROUTE CHN (0109)
IN= 2---> OUT= 1

Routing time step (min)'= 5.00

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

Distance	Elevation	Manning	
.00	215.60	.0500	
1.80	215.00	.0500 / .0500	Main Channel
3.80	215.00	.0500	Main Channel
5.60	215.60	.0500	

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

DEPTH (m)	ELEV (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME (min)
.03	215.03	.813E+01	.0	.14	14.28
.06	215.06	.170E+02	.0	.23	8.87
.09	215.09	.266E+02	.1	.31	6.68
.13	215.13	.369E+02	.1	.38	5.45
.16	215.16	.480E+02	.2	.44	4.64
.19	215.19	.598E+02	.2	.50	4.07
.22	215.22	.724E+02	.3	.56	3.64
.25	215.25	.857E+02	.4	.62	3.30
.28	215.28	.997E+02	.5	.68	3.03
.32	215.32	.114E+03	.7	.73	2.80
.35	215.35	.130E+03	.8	.78	2.61
.38	215.38	.146E+03	1.0	.84	2.45
.41	215.41	.163E+03	1.2	.89	2.31
.44	215.44	.181E+03	1.4	.94	2.18
.47	215.47	.199E+03	1.6	.99	2.08
.51	215.51	.218E+03	1.8	1.04	1.98
.54	215.54	.238E+03	2.1	1.08	1.89
.57	215.57	.259E+03	2.4	1.13	1.81
.60	215.60	.280E+03	2.7	1.18	1.74

<---- hydrograph ----> <-pipe / channel->

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 2 (0112)	1.40	.10	.50	13.96	.11	.35
OUTFLOW: ID= 1 (0109)	1.40	.09	.67	13.92	.11	.34

ADD HYD (0103)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0113):	4.82	.183	.75	10.32
+ ID2= 2 (0109):	1.40	.091	.67	13.92
ID = 3 (0103):	6.22	.267	.75	11.13

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0106)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0117):	5.85	.393	.50	27.16
+ ID2= 2 (0103):	6.22	.267	.75	11.13
ID = 3 (0106):	12.07	.616	.67	18.90

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```
 ****************************
 ** SIMULATION NUMBER:   6 **
 ****************************
```

MASS STORM
Ptotal= 52.40 mm

```
 Filename: C:\visual otthymo files\4456\AES 1-hr.mst
 Comments: AES 1 HOUR STORM DISTRIBUTION a=21min k=

 Duration of storm    =  1.00 hrs
 Mass curve time step =  5.00 min
```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.08	23.33	.33	162.86	.58	25.84	.83	1.89
.17	69.86	.42	149.72	.67	10.75	.92	.69
.25	116.39	.50	62.94	.75	4.46	1.00	.06

CALIB
STANDHYD (0115)
ID= 1 DT= 5.0 min

```
 Area    (ha)=    .83
 Total Imp(%)=  33.00   Dir. Conn.(%)=  19.00
```

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	.27	.55
Dep. Storage	(mm)=	1.00	2.00
Average Slope	(%)=	2.00	3.00
Length	(m)=	74.30	275.00
Mannings n	=	.013	.250
Max.Eff.Inten.(mm/hr)=		162.86	102.33
over (min)		5.00	25.00
Storage Coeff. (min)=		1.43 (ii)	21.12 (ii)
Unit Hyd. Tpeak (min)=		5.00	25.00
Unit Hyd. peak (cms)=		.33	.05

		TOTALS
PEAK FLOW	(cms)=	.07	.09	.096 (iii)
TIME TO PEAK	(hrs)=	.33	.75	.42
RUNOFF VOLUME	(mm)=	51.40	32.43	36.02
TOTAL RAINFALL	(mm)=	52.40	52.40	52.40
RUNOFF COEFFICIENT	=	.98	.62	.69

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  88.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
```

ROUTE CHN (0116)
IN= 2---> OUT= 1

Routing time step (min)'= 5.00

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

Distance	Elevation	Manning	
.00	215.60	.0500	
1.80	215.00	.0500 / .0500	Main Channel
2.56	215.00	.0500 / .0500	Main Channel
4.36	215.60	.0500	

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

DEPTH (m)	ELEV (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME (min)
.03	215.03	.676E+01	.0	.13	33.24
.06	215.06	.150E+02	.0	.21	19.61
.09	215.09	.248E+02	.0	.29	14.23
.13	215.13	.360E+02	.1	.37	11.28
.16	215.16	.488E+02	.1	.44	9.41
.19	215.19	.630E+02	.1	.51	8.11
.22	215.22	.787E+02	.2	.58	7.15
.25	215.25	.960E+02	.2	.65	6.41
.28	215.28	.115E+03	.3	.72	5.83
.32	215.32	.135E+03	.4	.78	5.35
.35	215.35	.157E+03	.5	.84	4.95
.38	215.38	.180E+03	.6	.90	4.62
.41	215.41	.205E+03	.8	.96	4.33
.44	215.44	.231E+03	.9	1.02	4.09
.47	215.47	.258E+03	1.1	1.08	3.87
.51	215.51	.288E+03	1.3	1.13	3.68
.54	215.54	.318E+03	1.5	1.19	3.51
.57	215.57	.350E+03	1.7	1.24	3.35
.60	215.60	.384E+03	2.0	1.30	3.22

<---- hydrograph ----> <-pipe / channel->

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 2 (0115)	.83	.10	.42	36.02	.17	.46
OUTFLOW: ID= 1 (0116)	.83	.09	.75	35.82	.16	.44

CALIB
STANDHYD (0107)
ID= 1 DT= 5.0 min

```
 Area    (ha)=   3.63
 Total Imp(%)=  29.40   Dir. Conn.(%)=  19.00
```

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	1.07	2.56
Dep. Storage	(mm)=	1.00	3.00
Average Slope	(%)=	2.00	3.00
Length	(m)=	155.50	440.00
Mannings n	=	.013	.250
Max.Eff.Inten.(mm/hr)=		162.86	55.84
over (min)		5.00	40.00
Storage Coeff. (min)=		2.23 (ii)	38.48 (ii)
Unit Hyd. Tpeak (min)=		5.00	40.00
Unit Hyd. peak (cms)=		.30	.03

		TOTALS
PEAK FLOW	(cms)=	.30	.22	.331 (iii)

TIME TO PEAK	(hrs)=	.33	1.00	.42
RUNOFF VOLUME	(mm)=	51.40	28.88	33.15
TOTAL RAINFALL	(mm)=	52.40	52.40	52.40
RUNOFF COEFFICIENT	=	.98	.55	.63

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  86.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
```

ROUTE CHN (0110)
IN= 2---> OUT= 1

Routing time step (min)'= 5.00

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

Distance	Elevation	Manning	
.00	215.60	.0500	
1.80	215.00	.0500 / .0500	Main Channel
2.56	215.00	.0500 / .0500	Main Channel
4.36	215.60	.0500	

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

DEPTH (m)	ELEV (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME (min)
.03	215.03	.947E+01	.0	.15	38.53
.06	215.06	.210E+02	.0	.25	23.36
.09	215.09	.347E+02	.0	.34	17.30
.13	215.13	.504E+02	.1	.42	13.94
.16	215.16	.683E+02	.1	.50	11.77
.19	215.19	.882E+02	.1	.57	10.25
.22	215.22	.110E+03	.2	.64	9.11
.25	215.25	.134E+03	.3	.71	8.23
.28	215.28	.161E+03	.4	.78	7.53
.32	215.32	.189E+03	.5	.84	6.95
.35	215.35	.219E+03	.6	.90	6.47
.38	215.38	.252E+03	.7	.96	6.05
.41	215.41	.286E+03	.8	1.02	5.70
.44	215.44	.323E+03	1.0	1.08	5.39
.47	215.47	.362E+03	1.2	1.14	5.12
.51	215.51	.403E+03	1.4	1.20	4.88
.54	215.54	.446E+03	1.6	1.25	4.66
.57	215.57	.491E+03	1.8	1.30	4.47
.60	215.60	.538E+03	2.1	1.36	4.30

<---- hydrograph ----> <-pipe / channel->

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 2 (0107)	3.63	.33	.42	33.15	.28	.75
OUTFLOW: ID= 1 (0110)	3.63	.27	.42	33.11	.25	.71

ADD HYD (0114)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)

ID1= 1 (0116):	.83	.086	.75	35.82
+ ID2= 2 (0110):	3.63	.270	.42	33.11
ID = 3 (0114):	4.45	.346	.50	33.62

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB			
NASHYD (0102)	Area (ha)=	1.39	Curve Number (CN)= 84.0
ID= 1 DT=10.0 min	Ia (mm)=	4.00	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)=	.24	

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.167	46.59	.500	106.33	.833	3.18		
.333	139.63	.667	18.30	1.000	.38		

Unit Hyd Qpeak (cms)= .223

PEAK FLOW (cms)= .166 (i)
TIME TO PEAK (hrs)= .500
RUNOFF VOLUME (mm)= 23.876
TOTAL RAINFALL (mm)= 52.400
RUNOFF COEFFICIENT = .456

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

ROUTE CHN (0111)	
IN= 2---> OUT= 1	Routing time step (min)'= 5.00

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

Distance	Elevation	Manning	
.00	215.60	.0500	
3.00	215.00	.0500	Main Channel
3.76	215.00	.0500	
5.56	215.60	.0000	

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

DEPTH (m)	ELEV (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME (min)
.03	215.03	.701E+01	.0	.18	22.93
.06	215.06	.160E+02	.0	.29	14.14
.09	215.09	.270E+02	.0	.39	10.61
.13	215.13	.400E+02	.1	.48	8.65
.16	215.16	.550E+02	.1	.56	7.38
.19	215.19	.720E+02	.2	.64	6.48
.22	215.22	.909E+02	.3	.72	5.80
.25	215.25	.112E+03	.4	.79	5.27
.28	215.28	.135E+03	.5	.86	4.85
.32	215.32	.160E+03	.6	.93	4.50
.35	215.35	.187E+03	.7	.99	4.21
.38	215.38	.216E+03	.9	1.05	3.95
.41	215.41	.247E+03	1.1	1.12	3.74
.44	215.44	.280E+03	1.3	1.17	3.55
.47	215.47	.314E+03	1.6	1.23	3.38

.51	215.51	.351E+03	1.8	1.29	3.23
.54	215.54	.390E+03	2.1	1.35	3.09
.57	215.57	.431E+03	2.4	1.40	2.97
.60	215.60	.474E+03	2.8	1.46	2.86

	<---- hydrograph ----> AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	<-pipe / channel-> MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 2 (0102)	1.39	.17	.50	23.88	.18	.62
OUTFLOW: ID= 1 (0111)	1.39	.15	.67	23.79	.17	.60

ADD HYD (0117)				
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0114):	4.45	.346	.50	33.62
+ ID2= 2 (0111):	1.39	.153	.67	23.79
ID = 3 (0117):	5.85	.459	.50	31.27

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB			
NASHYD (0105)	Area (ha)=	4.82	Curve Number (CN)= 66.0
ID= 1 DT=10.0 min	Ia (mm)=	5.00	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)=	.35	

Unit Hyd Qpeak (cms)= .522

PEAK FLOW (cms)= .231 (i)
TIME TO PEAK (hrs)= .667
RUNOFF VOLUME (mm)= 12.566
TOTAL RAINFALL (mm)= 52.400
RUNOFF COEFFICIENT = .240

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

ROUTE CHN (0113)	
IN= 2---> OUT= 1	Routing time step (min)'= 5.00

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

Distance	Elevation	Manning	
.00	215.60	.0500	
1.80	215.00	.0500 / .0500	Main Channel
2.56	215.00	.0500 / .0500	Main Channel
4.36	215.60	.0500	

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

DEPTH (m)	ELEV (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME (min)
.03	215.03	.541E+01	.0	.15	22.38
.06	215.06	.120E+02	.0	.25	13.54
.09	215.09	.198E+02	.0	.33	10.01
.13	215.13	.288E+02	.1	.41	8.05
.16	215.16	.390E+02	.1	.49	6.79
.19	215.19	.504E+02	.1	.56	5.91

.22	215.22	.630E+02	.2	.63	5.25
.25	215.25	.768E+02	.3	.70	4.74
.28	215.28	.917E+02	.4	.77	4.33
.32	215.32	.108E+03	.4	.83	4.00
.35	215.35	.125E+03	.6	.90	3.72
.38	215.38	.144E+03	.7	.96	3.48
.41	215.41	.164E+03	.8	1.02	3.28
.44	215.44	.185E+03	1.0	1.08	3.10
.47	215.47	.207E+03	1.2	1.13	2.94
.51	215.51	.230E+03	1.4	1.19	2.80
.54	215.54	.255E+03	1.6	1.24	2.68
.57	215.57	.280E+03	1.8	1.30	2.57
.60	215.60	.307E+03	2.1	1.35	2.47

	<---- hydrograph ----> AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	<-pipe / channel-> MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 2 (0105)	4.82	.23	.67	12.57	.24	.66
OUTFLOW: ID= 1 (0113)	4.82	.22	.75	12.54	.23	.66

CALIB			
NASHYD (0112)	Area (ha)=	1.40	Curve Number (CN)= 75.0
ID= 1 DT=10.0 min	Ia (mm)=	5.00	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)=	.24	

Unit Hyd Qpeak (cms)= .222

PEAK FLOW (cms)= .115 (i)
TIME TO PEAK (hrs)= .500
RUNOFF VOLUME (mm)= 16.785
TOTAL RAINFALL (mm)= 52.400
RUNOFF COEFFICIENT = .320

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

ROUTE CHN (0109)	
IN= 2---> OUT= 1	Routing time step (min)'= 5.00

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

Distance	Elevation	Manning	
.00	215.60	.0500	
1.80	215.00	.0500 / .0500	Main Channel
3.80	215.00	.0500	Main Channel
5.60	215.60	.0500	

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

DEPTH (m)	ELEV (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME (min)
.03	215.03	.813E+01	.0	.14	14.28
.06	215.06	.170E+02	.0	.23	8.87
.09	215.09	.266E+02	.1	.31	6.68
.13	215.13	.369E+02	.1	.38	5.45
.16	215.16	.480E+02	.2	.44	4.64
.19	215.19	.598E+02	.2	.50	4.07
.22	215.22	.724E+02	.3	.56	3.64
.25	215.25	.857E+02	.4	.62	3.30
.28	215.28	.997E+02	.5	.68	3.03
.32	215.32	.114E+03	.7	.73	2.80

.35	215.35	.130E+03	.8	.78	2.61
.38	215.38	.146E+03	1.0	.84	2.45
.41	215.41	.163E+03	1.2	.89	2.31
.44	215.44	.181E+03	1.4	.94	2.18
.47	215.47	.199E+03	1.6	.99	2.08
.51	215.51	.218E+03	1.8	1.04	1.98
.54	215.54	.238E+03	2.1	1.08	1.89
.57	215.57	.259E+03	2.4	1.13	1.81
.60	215.60	.280E+03	2.7	1.18	1.74

	<---- hydrograph ----> AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	<-pipe / channel-> MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 2 (0112)	1.40	.12	.50	16.78	.13	.38
OUTFLOW: ID= 1 (0109)	1.40	.11	.67	16.74	.12	.37

ADD HYD (0103)				
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0113):	4.82	.223	.75	12.54
+ ID2= 2 (0109):	1.40	.111	.67	16.74
ID = 3 (0103):	6.22	.323	.67	13.48

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0106)				
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0117):	5.85	.459	.50	31.27
+ ID2= 2 (0103):	6.22	.323	.67	13.48
ID = 3 (0106):	12.07	.741	.67	22.11

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

FINISH

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

  OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM, Version 2.0
 O   O    T      T    H   H   Y Y   MM MM  O   O
 O   O    T      T    H   H    Y    M   M  O   O   Licensed To: MJ Davenport

  OOO     T      T    H   H    Y    M   M   OOO                vo2-0057
```


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

Input filename: C:\Program Files\Visual OTTHYMO v2.0\voin.dat

Output filename: C:\visual otthymo files\3969\3969-All Scenarios\Post-Dev-Controlled.out
Summary filename: C:\visual otthymo files\3969\3969-All Scenarios\Post-Dev-Controlled.sum

DATE: 1/23/2019 TIME: 2:14:28 PM

USER:

COMMENTS: _____

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

| MASS STORM | Ptotal= 38.40 mm |

Filename: C:\visual otthymo files\4456\SCS II 6-hr.mst
Comments: SCS 6 HOUR TYPE II STORM DISTRIBUTION

Duration of storm = 6.00 hrs
Mass curve time step = 10.00 min

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.17	1.61	1.67	3.92	3.17	8.52	4.67	2.30
.33	1.38	1.83	3.69	3.33	8.29	4.83	2.30
.50	1.61	2.00	3.92	3.50	8.52	5.00	2.30
.67	2.30	2.17	4.61	3.67	3.92	5.17	1.61
.83	2.30	2.33	4.61	3.83	3.69	5.33	1.38
1.00	2.30	2.50	4.61	4.00	3.92	5.50	1.61
1.17	2.30	2.67	23.04	4.17	3.00	5.67	1.61
1.33	2.30	2.83	41.47	4.33	3.23	5.83	1.38
1.50	2.30	3.00	59.90	4.50	3.00	6.00	1.61

CALIB STANDHYD (0115) ID= 1 DT= 5.0 min	Area (ha)= .83 Total Imp(%)= 33.00 Dir. Conn.(%)= 19.00

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	.27	.55
Dep. Storage (mm)=	1.00	2.00
Average Slope (%)=	2.00	3.00
Length (m)=	74.30	275.00
Mannings n =	.013	.250

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.083	1.61	1.583	3.92	3.083	8.53	4.58	2.30
.167	1.61	1.667	3.92	3.167	8.52	4.67	2.30
.250	1.38	1.750	3.69	3.250	8.29	4.75	2.30
.333	1.38	1.833	3.69	3.333	8.29	4.83	2.30
.417	1.61	1.917	3.92	3.417	8.52	4.92	2.30
.500	1.61	2.000	3.92	3.500	8.52	5.00	2.30
.583	2.30	2.083	4.61	3.583	3.92	5.08	1.61
.667	2.30	2.167	4.61	3.667	3.92	5.17	1.61
.750	2.30	2.250	4.61	3.750	3.69	5.25	1.38
.833	2.30	2.333	4.61	3.833	3.69	5.33	1.38
.917	2.30	2.417	4.61	3.917	3.92	5.42	1.61
1.000	2.30	2.500	4.61	4.000	3.92	5.50	1.61
1.083	2.30	2.583	23.04	4.083	3.00	5.58	1.61
1.167	2.30	2.667	23.04	4.167	3.00	5.67	1.61
1.250	2.30	2.750	41.47	4.250	3.23	5.75	1.38
1.333	2.30	2.833	41.47	4.333	3.23	5.83	1.38
1.417	2.30	2.917	59.90	4.417	3.00	5.92	1.61
1.500	2.30	3.000	59.90	4.500	3.00	6.00	1.61

			TOTALS
Max.Eff.Inten.(mm/hr)=	59.90	25.36	
over (min)	5.00	40.00	
Storage Coeff. (min)=	2.13 (ii)	36.53 (ii)	
Unit Hyd. Tpeak (min)=	5.00	40.00	
Unit Hyd. peak (cms)=	.31	.03	
PEAK FLOW (cms)=	.03	.02	.035 (iii)
TIME TO PEAK (hrs)=	3.00	3.50	3.00
RUNOFF VOLUME (mm)=	37.40	20.65	23.80
TOTAL RAINFALL (mm)=	38.40	38.40	38.40
RUNOFF COEFFICIENT =	.97	.54	.62

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 88.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ROUTE CHN (0116) IN= 2---> OUT= 1	Routing time step (min)'= 5.00

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

Distance	Elevation	Manning	
.00	215.60	.0500	
1.80	215.00	.0500 / .0500	Main Channel
2.56	215.00	.0500 / .0500	Main Channel
4.36	215.60	.0500	

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

DEPTH (m)	ELEV (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME (min)
.03	215.03	.676E+01	.0	.13	33.24
.06	215.06	.150E+02	.0	.21	19.61
.09	215.09	.248E+02	.0	.29	14.23
.13	215.13	.360E+02	.1	.37	11.28
.16	215.16	.488E+02	.1	.44	9.41
.19	215.19	.630E+02	.1	.51	8.11
.22	215.22	.787E+02	.2	.58	7.15
.25	215.25	.960E+02	.2	.65	6.41
.28	215.28	.115E+03	.3	.72	5.83
.32	215.32	.135E+03	.4	.78	5.35
.35	215.35	.157E+03	.5	.84	4.95
.38	215.38	.180E+03	.6	.90	4.62
.41	215.41	.205E+03	.8	.96	4.33
.44	215.44	.231E+03	.9	1.02	4.09
.47	215.47	.258E+03	1.1	1.08	3.87
.51	215.51	.288E+03	1.3	1.13	3.68
.54	215.54	.318E+03	1.5	1.19	3.51
.57	215.57	.350E+03	1.7	1.24	3.35
.60	215.60	.384E+03	2.0	1.30	3.22

<---- hydrograph ----> <-pipe / channel->

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 2 (0115)	.83	.03	3.00	23.80	.10	.31
OUTFLOW: ID= 1 (0116)	.83	.03	3.58	23.70	.09	.27

CALIB STANDHYD (0107) ID= 1 DT= 5.0 min	Area (ha)= 3.63 Total Imp(%)= 29.40 Dir. Conn.(%)= 19.00

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	1.07	2.56
Dep. Storage (mm)=	1.00	3.00
Average Slope (%)=	2.00	3.00
Length (m)=	155.50	440.00
Mannings n =	.013	.250

			TOTALS
Max.Eff.Inten.(mm/hr)=	59.90	14.73	
over (min)	5.00	60.00	
Storage Coeff. (min)=	3.32 (ii)	59.99 (ii)	
Unit Hyd. Tpeak (min)=	5.00	60.00	
Unit Hyd. peak (cms)=	.26	.02	
PEAK FLOW (cms)=	.11	.06	.126 (iii)
TIME TO PEAK (hrs)=	3.00	3.92	3.00
RUNOFF VOLUME (mm)=	37.40	17.83	21.54
TOTAL RAINFALL (mm)=	38.40	38.40	38.40

RUNOFF COEFFICIENT =	.97	.46 .56

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 86.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ROUTE CHN (0110) IN= 2---> OUT= 1	Routing time step (min)'= 5.00

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

Distance	Elevation	Manning	
.00	215.60	.0500	
1.80	215.00	.0500 / .0500	Main Channel
2.56	215.00	.0500 / .0500	Main Channel
4.36	215.60	.0500	

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

DEPTH (m)	ELEV (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME (min)
.03	215.03	.947E+01	.0	.15	38.53
.06	215.06	.210E+02	.0	.25	23.36
.09	215.09	.347E+02	.0	.34	17.30
.13	215.13	.504E+02	.1	.42	13.94
.16	215.16	.683E+02	.1	.50	11.77
.19	215.19	.882E+02	.1	.57	10.25
.22	215.22	.110E+03	.2	.64	9.11
.25	215.25	.134E+03	.3	.71	8.23
.28	215.28	.161E+03	.4	.78	7.53
.32	215.32	.189E+03	.5	.84	6.95
.35	215.35	.219E+03	.6	.90	6.47
.38	215.38	.252E+03	.7	.96	6.05
.41	215.41	.286E+03	.8	1.02	5.70
.44	215.44	.323E+03	1.0	1.08	5.39
.47	215.47	.362E+03	1.2	1.14	5.12
.51	215.51	.403E+03	1.4	1.20	4.88
.54	215.54	.446E+03	1.6	1.25	4.66
.57	215.57	.491E+03	1.8	1.30	4.47
.60	215.60	.538E+03	2.1	1.36	4.30

<---- hydrograph ----> <-pipe / channel->

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 2 (0107)	3.63	.13	3.00	21.54	.18	.54
OUTFLOW: ID= 1 (0110)	3.63	.10	3.00	21.52	.16	.50

ADD HYD (0114) 1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0116):	.83	.025	3.58	23.70
+ ID2= 2 (0110):	3.63	.097	3.00	21.52

ID = 3 (0114): 4.45 .120 3.00 21.93

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB	
NASHYD (0102)	Area (ha)= 1.39 Curve Number (CN)= 84.0
ID= 1 DT=10.0 min	Ia (mm)= 4.00 # of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= .24

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.167	1.61	1.667	3.92	3.167	8.52	4.67	2.30
.333	1.38	1.833	3.69	3.333	8.29	4.83	2.30
.500	1.61	2.000	3.92	3.500	8.52	5.00	2.30
.667	2.30	2.167	4.61	3.667	3.92	5.17	1.61
.833	2.30	2.333	4.61	3.833	3.69	5.33	1.38
1.000	2.30	2.500	4.61	4.000	3.92	5.50	1.61
1.167	2.30	2.667	23.04	4.167	3.00	5.67	1.61
1.333	2.30	2.833	41.47	4.333	3.23	5.83	1.38
1.500	2.30	3.000	59.90	4.500	3.00	6.00	1.61

Unit Hyd Qpeak (cms)= .223

PEAK FLOW (cms)= .058 (i)
TIME TO PEAK (hrs)= 3.000
RUNOFF VOLUME (mm)= 14.101
TOTAL RAINFALL (mm)= 38.400
RUNOFF COEFFICIENT = .367

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

ROUTE CHN (0111)	
IN= 2---> OUT= 1	Routing time step (min)'= 5.00

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

Distance	Elevation	Manning	
.00	215.60	.0500	
3.00	215.00	.0500	Main Channel
3.76	215.00	.0500	
5.56	215.60	.0000	

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

DEPTH (m)	ELEV (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME (min)
.03	215.03	.701E+01	.0	.18	22.93
.06	215.06	.160E+02	.0	.29	14.14
.09	215.09	.270E+02	.0	.39	10.61
.13	215.13	.400E+02	.1	.48	8.65
.16	215.16	.550E+02	.1	.56	7.38
.19	215.19	.720E+02	.2	.64	6.48
.22	215.22	.909E+02	.3	.72	5.80
.25	215.25	.112E+03	.4	.79	5.27
.28	215.28	.135E+03	.5	.86	4.85
.32	215.32	.160E+03	.6	.93	4.50
.35	215.35	.187E+03	.7	.99	4.21

.38	215.38	.216E+03	.9	1.05	3.95	
.41	215.41	.247E+03	1.1	1.12	3.74	
.44	215.44	.280E+03	1.3	1.17	3.55	
.47	215.47	.314E+03	1.6	1.23	3.38	
.51	215.51	.351E+03	1.8	1.29	3.23	
.54	215.54	.390E+03	2.1	1.35	3.09	
.57	215.57	.431E+03	2.4	1.40	2.97	
.60	215.60	.474E+03	2.8	1.46	2.86	

<---- hydrograph ----> <-pipe / channel->

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 2 (0102)	1.39	.06	3.00	14.10	.11	.43
OUTFLOW: ID= 1 (0111)	1.39	.05	3.17	14.02	.10	.41

ADD HYD (0117)				
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0114):	4.45	.120	3.00	21.93
+ ID2= 2 (0111):	1.39	.051	3.17	14.02
ID = 3 (0117):	5.85	.159	3.08	20.04

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB	
NASHYD (0105)	Area (ha)= 4.82 Curve Number (CN)= 66.0
ID= 1 DT=10.0 min	Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= .35

Unit Hyd Qpeak (cms)= .522

PEAK FLOW (cms)= .071 (i)
TIME TO PEAK (hrs)= 3.167
RUNOFF VOLUME (mm)= 6.771
TOTAL RAINFALL (mm)= 38.400
RUNOFF COEFFICIENT = .176

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

ROUTE CHN (0113)	
IN= 2---> OUT= 1	Routing time step (min)'= 5.00

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

Distance	Elevation	Manning	
.00	215.60	.0500	
1.80	215.00	.0500 / .0500	Main Channel
2.56	215.00	.0500 / .0500	Main Channel
4.36	215.60	.0500	

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

DEPTH (m)	ELEV (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME (min)
.03	215.03	.541E+01	.0	.15	22.38
.06	215.06	.120E+02	.0	.25	13.54

.09	215.09	.198E+02	.0	.33	10.01	
.13	215.13	.288E+02	.1	.41	8.05	
.16	215.16	.390E+02	.1	.49	6.79	
.19	215.19	.504E+02	.1	.56	5.91	
.22	215.22	.630E+02	.2	.63	5.25	
.25	215.25	.768E+02	.3	.70	4.74	
.28	215.28	.917E+02	.4	.77	4.33	
.32	215.32	.108E+03	.4	.83	4.00	
.35	215.35	.125E+03	.6	.90	3.72	
.38	215.38	.144E+03	.7	.96	3.48	
.41	215.41	.164E+03	.8	1.02	3.28	
.44	215.44	.185E+03	1.0	1.08	3.10	
.47	215.47	.207E+03	1.2	1.13	2.94	
.51	215.51	.230E+03	1.4	1.19	2.80	
.54	215.54	.255E+03	1.6	1.24	2.68	
.57	215.57	.280E+03	1.8	1.30	2.57	
.60	215.60	.307E+03	2.1	1.35	2.47	

<---- hydrograph ----> <-pipe / channel->

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 2 (0105)	4.82	.07	3.17	6.77	.14	.44
OUTFLOW: ID= 1 (0113)	4.82	.07	3.33	6.75	.13	.43

CALIB	
NASHYD (0112)	Area (ha)= 1.40 Curve Number (CN)= 75.0
ID= 1 DT=10.0 min	Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= .24

Unit Hyd Qpeak (cms)= .222

PEAK FLOW (cms)= .037 (i)
TIME TO PEAK (hrs)= 3.000
RUNOFF VOLUME (mm)= 9.322
TOTAL RAINFALL (mm)= 38.400
RUNOFF COEFFICIENT = .243

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

ROUTE CHN (0109)	
IN= 2---> OUT= 1	Routing time step (min)'= 5.00

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

Distance	Elevation	Manning	
.00	215.60	.0500	
1.80	215.00	.0500 / .0500	Main Channel
3.80	215.00	.0500	Main Channel
5.60	215.60	.0500	

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

DEPTH (m)	ELEV (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME (min)
.03	215.03	.813E+01	.0	.14	14.28
.06	215.06	.170E+02	.0	.23	8.87
.09	215.09	.266E+02	.1	.31	6.68
.13	215.13	.369E+02	.1	.38	5.45
.16	215.16	.480E+02	.2	.44	4.64
.19	215.19	.598E+02	.2	.50	4.07

.22	215.22	.724E+02	.3	.56	3.64	
.25	215.25	.857E+02	.4	.62	3.30	
.28	215.28	.997E+02	.5	.68	3.03	
.32	215.32	.114E+03	.7	.73	2.80	
.35	215.35	.130E+03	.8	.78	2.61	
.38	215.38	.146E+03	1.0	.84	2.45	
.41	215.41	.163E+03	1.2	.89	2.31	
.44	215.44	.181E+03	1.4	.94	2.18	
.47	215.47	.199E+03	1.6	.99	2.08	
.51	215.51	.218E+03	1.8	1.04	1.98	
.54	215.54	.238E+03	2.1	1.08	1.89	
.57	215.57	.259E+03	2.4	1.13	1.81	
.60	215.60	.280E+03	2.7	1.18	1.74	

<---- hydrograph ----> <-pipe / channel->

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 2 (0112)	1.40	.04	3.00	9.32	.07	.24
OUTFLOW: ID= 1 (0109)	1.40	.03	3.17	9.28	.06	.23

ADD HYD (0103)				
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0113):	4.82	.068	3.33	6.75
+ ID2= 2 (0109):	1.40	.033	3.17	9.28
ID = 3 (0103):	6.22	.100	3.25	7.31

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0106)				
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0117):	5.85	.159	3.08	20.04
+ ID2= 2 (0103):	6.22	.100	3.25	7.31
ID = 3 (0106):	12.07	.232	3.08	13.48

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

MASS STORM	Filename: C:\visual otthymo files\4456\SCS II 6-hr.mst
Ptotal= 50.50 mm	Comments: SCS 6 HOUR TYPE II STORM DISTRIBUTION

Duration of storm = 6.00 hrs
Mass curve time step = 10.00 min

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.17	2.12	1.67	5.15	3.17	11.21	4.67	3.03
.33	1.82	1.83	4.85	3.33	10.91	4.83	3.03

.50	2.12	2.00	5.15	3.50	11.21	5.00	3.03
.67	3.03	2.17	6.06	3.67	5.15	5.17	2.12
.83	3.03	2.33	6.06	3.83	4.85	5.33	1.82
1.00	3.03	2.50	6.06	4.00	5.15	5.50	2.12
1.17	3.03	2.67	30.30	4.17	3.94	5.67	2.12
1.33	3.03	2.83	54.54	4.33	4.24	5.83	1.82
1.50	3.03	3.00	78.78	4.50	3.94	6.00	2.12

CALIB			
STANDHYD (0115)	Area (ha)=	.83	
ID= 1 DT= 5.0 min	Total Imp(%)=	33.00	Dir. Conn.(%)= 19.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	.27	.55
Dep. Storage	(mm)=	1.00	2.00
Average Slope	(%)=	2.00	3.00
Length	(m)=	74.30	275.00
Mannings n	=	.013	.250

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.083	2.12	1.583	5.15	3.083	11.21	4.58	3.03
.167	2.12	1.667	5.15	3.167	11.21	4.67	3.03
.250	1.82	1.750	4.85	3.250	10.91	4.75	3.03
.333	1.82	1.833	4.85	3.333	10.91	4.83	3.03
.417	2.12	1.917	5.15	3.417	11.21	4.92	3.03
.500	2.12	2.000	5.15	3.500	11.21	5.00	3.03
.583	3.03	2.083	6.06	3.583	5.15	5.08	2.12
.667	3.03	2.167	6.06	3.667	5.15	5.17	2.12
.750	3.03	2.250	6.06	3.750	4.85	5.25	1.82
.833	3.03	2.333	6.06	3.833	4.85	5.33	1.82
.917	3.03	2.417	6.06	3.917	5.15	5.42	2.12
1.000	3.03	2.500	6.06	4.000	5.15	5.50	2.12
1.083	3.03	2.583	30.30	4.083	3.94	5.58	2.12
1.167	3.03	2.667	30.30	4.167	3.94	5.67	2.12
1.250	3.03	2.750	54.54	4.250	4.24	5.75	1.82
1.333	3.03	2.833	54.54	4.333	4.24	5.83	1.82
1.417	3.03	2.917	78.78	4.417	3.94	5.92	2.12
1.500	3.03	3.000	78.78	4.500	3.94	6.00	2.12

			TOTALS
Max.Eff.Inten.(mm/hr)=	78.78	42.77	
over (min)	5.00	30.00	
Storage Coeff. (min)=	1.91 (ii)	29.82 (ii)	
Unit Hyd. Tpeak (min)=	5.00	30.00	
Unit Hyd. peak (cms)=	.32	.04	
PEAK FLOW (cms)=	.03	.04	.055 (iii)
TIME TO PEAK (hrs)=	3.00	3.33	3.00
RUNOFF VOLUME (mm)=	49.50	30.79	34.32
TOTAL RAINFALL (mm)=	50.50	50.50	50.50
RUNOFF COEFFICIENT =	.98	.61	.68

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:

CN* = 88.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ROUTE CHN (0116)			
IN= 2---> OUT= 1	Routing time step (min)'=	5.00	

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

Distance	Elevation	Manning	
.00	215.60	.0500	
1.80	215.00	.0500 / .0500	Main Channel
2.56	215.00	.0500 / .0500	Main Channel
4.36	215.60	.0500	

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

DEPTH (m)	ELEV (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME (min)
.03	215.03	.676E+01	.0	.13	33.24
.06	215.06	.150E+02	.0	.21	19.61
.09	215.09	.248E+02	.0	.29	14.23
.13	215.13	.360E+02	.1	.37	11.28
.16	215.16	.488E+02	.1	.44	9.41
.19	215.19	.630E+02	.1	.51	8.11
.22	215.22	.787E+02	.2	.58	7.15
.25	215.25	.960E+02	.2	.65	6.41
.28	215.28	.115E+03	.3	.72	5.83
.32	215.32	.135E+03	.4	.78	5.35
.35	215.35	.157E+03	.5	.84	4.95
.38	215.38	.180E+03	.6	.90	4.62
.41	215.41	.205E+03	.8	.96	4.33
.44	215.44	.231E+03	.9	1.02	4.09
.47	215.47	.258E+03	1.1	1.08	3.87
.51	215.51	.288E+03	1.3	1.13	3.68
.54	215.54	.318E+03	1.5	1.19	3.51
.57	215.57	.350E+03	1.7	1.24	3.35
.60	215.60	.384E+03	2.0	1.30	3.22

<---- hydrograph ----> <-pipe / channel->

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 2 (0115)	.83	.06	3.00	34.32	.13	.37
OUTFLOW: ID= 1 (0116)	.83	.04	3.42	34.18	.11	.33

CALIB			
STANDHYD (0107)	Area (ha)=	3.63	
ID= 1 DT= 5.0 min	Total Imp(%)=	29.40	Dir. Conn.(%)= 19.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	1.07	2.56
Dep. Storage	(mm)=	1.00	3.00
Average Slope	(%)=	2.00	3.00
Length	(m)=	155.50	440.00
Mannings n	=	.013	.250

Max.Eff.Inten.(mm/hr)=	78.78	26.97	
over (min)	5.00	50.00	
Storage Coeff. (min)=	2.98 (ii)	47.47 (ii)	

Unit Hyd. Tpeak (min)=	5.00	50.00		
Unit Hyd. peak (cms)=	.28	.02		
PEAK FLOW (cms)=	.15	.11		.182 (iii)
TIME TO PEAK (hrs)=	3.00	3.67		3.00
RUNOFF VOLUME (mm)=	49.50	27.32		31.53
TOTAL RAINFALL (mm)=	50.50	50.50		50.50
RUNOFF COEFFICIENT =	.98	.54		.62

TOTALS

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 86.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ROUTE CHN (0110)			
IN= 2---> OUT= 1	Routing time step (min)'=	5.00	

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

Distance	Elevation	Manning	
.00	215.60	.0500	
1.80	215.00	.0500 / .0500	Main Channel
2.56	215.00	.0500 / .0500	Main Channel
4.36	215.60	.0500	

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

DEPTH (m)	ELEV (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME (min)
.03	215.03	.947E+01	.0	.15	38.53
.06	215.06	.210E+02	.0	.25	23.36
.09	215.09	.347E+02	.0	.34	17.30
.13	215.13	.504E+02	.1	.42	13.94
.16	215.16	.683E+02	.1	.50	11.77
.19	215.19	.882E+02	.1	.57	10.25
.22	215.22	.110E+03	.2	.64	9.11
.25	215.25	.134E+03	.3	.71	8.23
.28	215.28	.161E+03	.4	.78	7.53
.32	215.32	.189E+03	.5	.84	6.95
.35	215.35	.219E+03	.6	.90	6.47
.38	215.38	.252E+03	.7	.96	6.05
.41	215.41	.286E+03	.8	1.02	5.70
.44	215.44	.323E+03	1.0	1.08	5.39
.47	215.47	.362E+03	1.2	1.14	5.12
.51	215.51	.403E+03	1.4	1.20	4.88
.54	215.54	.446E+03	1.6	1.25	4.66
.57	215.57	.491E+03	1.8	1.30	4.47
.60	215.60	.538E+03	2.1	1.36	4.30

<---- hydrograph ----> <-pipe / channel->

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 2 (0107)	3.63	.18	3.00	31.53	.21	.61
OUTFLOW: ID= 1 (0110)	3.63	.14	3.00	31.50	.19	.57

ADD HYD (0114)				
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0116):	.83	.043	3.42	34.18
+ ID2= 2 (0110):	3.63	.143	3.00	31.50
ID = 3 (0114):	4.45	.183	3.00	32.00

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB				
NASHYD (0102)	Area (ha)=	1.39	Curve Number (CN)=	84.0
ID= 1 DT=10.0 min	Ia (mm)=	4.00	# of Linear Res.(N)=	3.00
	U.H. Tp(hrs)=	.24		

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.167	2.12	1.667	5.15	3.167	11.21	4.67	3.03
.333	1.82	1.833	4.85	3.333	10.91	4.83	3.03
.500	2.12	2.000	5.15	3.500	11.21	5.00	3.03
.667	3.03	2.167	6.06	3.667	5.15	5.17	2.12
.833	3.03	2.333	6.06	3.833	4.85	5.33	1.82
1.000	3.03	2.500	6.06	4.000	5.15	5.50	2.12
1.167	3.03	2.667	30.30	4.167	3.94	5.67	2.12
1.333	3.03	2.833	54.54	4.333	4.24	5.83	1.82
1.500	3.03	3.000	78.78	4.500	3.94	6.00	2.12

Unit Hyd Qpeak (cms)= .223

PEAK FLOW (cms)= .095 (i)
TIME TO PEAK (hrs)= 3.000
RUNOFF VOLUME (mm)= 22.480
TOTAL RAINFALL (mm)= 50.500
RUNOFF COEFFICIENT = .445

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

ROUTE CHN (0111)			
IN= 2---> OUT= 1	Routing time step (min)'=	5.00	

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

Distance	Elevation	Manning	
.00	215.60	.0500	
3.00	215.00	.0500	Main Channel
3.76	215.00	.0500	
5.56	215.60	.0000	

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

DEPTH (m)	ELEV (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME (min)
.03	215.03	.701E+01	.0	.18	22.93
.06	215.06	.160E+02	.0	.29	14.14
.09	215.09	.270E+02	.0	.39	10.61
.13	215.13	.400E+02	.1	.48	8.65

.16	215.16	.550E+02	.1	.56	7.38
.19	215.19	.720E+02	.2	.64	6.48
.22	215.22	.909E+02	.3	.72	5.80
.25	215.25	.112E+03	.4	.79	5.27
.28	215.28	.135E+03	.5	.86	4.85
.32	215.32	.160E+03	.6	.93	4.50
.35	215.35	.187E+03	.7	.99	4.21
.38	215.38	.216E+03	.9	1.05	3.95
.41	215.41	.247E+03	1.1	1.12	3.74
.44	215.44	.280E+03	1.3	1.17	3.55
.47	215.47	.314E+03	1.6	1.23	3.38
.51	215.51	.351E+03	1.8	1.29	3.23
.54	215.54	.390E+03	2.1	1.35	3.09
.57	215.57	.431E+03	2.4	1.40	2.97
.60	215.60	.474E+03	2.8	1.46	2.86

	<---- hydrograph ---->			<-pipe / channel->	
	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 2 (0102)	1.39	.09	3.00	22.48	.14	.51
OUTFLOW: ID= 1 (0111)	1.39	.09	3.17	22.40	.13	.49

ADD HYD (0117)				
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0114):	4.45	.183	3.00	32.00
+ ID2= 2 (0111):	1.39	.086	3.17	22.40
ID = 3 (0117):	5.85	.256	3.08	29.71

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB				
NASHYD (0105)	Area (ha)=	4.82	Curve Number (CN)=	66.0
ID= 1 DT=10.0 min	Ia (mm)=	5.00	# of Linear Res.(N)=	3.00
	U.H. Tp(hrs)=	.35		

Unit Hyd Qpeak (cms)= .522

PEAK FLOW (cms)= .126 (i)
TIME TO PEAK (hrs)= 3.167
RUNOFF VOLUME (mm)= 11.703
TOTAL RAINFALL (mm)= 50.500
RUNOFF COEFFICIENT = .232

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

ROUTE CHN (0113)	
IN= 2---> OUT= 1	Routing time step (min)'= 5.00

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

Distance	Elevation	Manning	
.00	215.60	.0500	
1.80	215.00	.0500 / .0500	Main Channel
2.56	215.00	.0500 / .0500	Main Channel

4.36	215.60	.0500			

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

DEPTH (m)	ELEV (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME (min)
.03	215.03	.541E+01	.0	.15	22.38
.06	215.06	.120E+02	.0	.25	13.54
.09	215.09	.198E+02	.0	.33	10.01
.13	215.13	.288E+02	.1	.41	8.05
.16	215.16	.390E+02	.1	.49	6.79
.19	215.19	.504E+02	.1	.56	5.91
.22	215.22	.630E+02	.2	.63	5.25
.25	215.25	.768E+02	.3	.70	4.74
.28	215.28	.917E+02	.4	.77	4.33
.32	215.32	.108E+03	.4	.83	4.00
.35	215.35	.125E+03	.6	.90	3.72
.38	215.38	.144E+03	.7	.96	3.48
.41	215.41	.164E+03	.8	1.02	3.28
.44	215.44	.185E+03	1.0	1.08	3.10
.47	215.47	.207E+03	1.2	1.13	2.94
.51	215.51	.230E+03	1.4	1.19	2.80
.54	215.54	.255E+03	1.6	1.24	2.68
.57	215.57	.280E+03	1.8	1.30	2.57
.60	215.60	.307E+03	2.1	1.35	2.47

	<---- hydrograph ---->			<-pipe / channel->	
	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 2 (0105)	4.82	.13	3.17	11.70	.18	.54
OUTFLOW: ID= 1 (0113)	4.82	.12	3.25	11.68	.17	.53

CALIB				
NASHYD (0112)	Area (ha)=	1.40	Curve Number (CN)=	75.0
ID= 1 DT=10.0 min	Ia (mm)=	5.00	# of Linear Res.(N)=	3.00
	U.H. Tp(hrs)=	.24		

Unit Hyd Qpeak (cms)= .222

PEAK FLOW (cms)= .064 (i)
TIME TO PEAK (hrs)= 3.000
RUNOFF VOLUME (mm)= 15.692
TOTAL RAINFALL (mm)= 50.500
RUNOFF COEFFICIENT = .311

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

ROUTE CHN (0109)	
IN= 2---> OUT= 1	Routing time step (min)'= 5.00

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

Distance	Elevation	Manning	
.00	215.60	.0500	
1.80	215.00	.0500 / .0500	Main Channel
3.80	215.00	.0500	Main Channel
5.60	215.60	.0500	

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

DEPTH	ELEV	VOLUME	FLOW RATE	VELOCITY	TRAV.TIME

(m)	(m)	(cu.m.)	(cms)	(m/s)	(min)
.03	215.03	.813E+01	.0	.14	14.28
.06	215.06	.170E+02	.0	.23	8.87
.09	215.09	.266E+02	.1	.31	6.68
.13	215.13	.369E+02	.1	.38	5.45
.16	215.16	.480E+02	.2	.44	4.64
.19	215.19	.598E+02	.2	.50	4.07
.22	215.22	.724E+02	.3	.56	3.64
.25	215.25	.857E+02	.4	.62	3.30
.28	215.28	.997E+02	.5	.68	3.03
.32	215.32	.114E+03	.7	.73	2.80
.35	215.35	.130E+03	.8	.78	2.61
.38	215.38	.146E+03	1.0	.84	2.45
.41	215.41	.163E+03	1.2	.89	2.31
.44	215.44	.181E+03	1.4	.94	2.18
.47	215.47	.199E+03	1.6	.99	2.08
.51	215.51	.218E+03	1.8	1.04	1.98
.54	215.54	.238E+03	2.1	1.08	1.89
.57	215.57	.259E+03	2.4	1.13	1.81
.60	215.60	.280E+03	2.7	1.18	1.74

	<---- hydrograph ---->			<-pipe / channel->	
	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 2 (0112)	1.40	.06	3.00	15.69	.09	.30
OUTFLOW: ID= 1 (0109)	1.40	.06	3.17	15.64	.09	.29

ADD HYD (0103)				
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0113):	4.82	.121	3.25	11.68
+ ID2= 2 (0109):	1.40	.060	3.17	15.64
ID = 3 (0103):	6.22	.177	3.25	12.57

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0106)				
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0117):	5.85	.256	3.08	29.71
+ ID2= 2 (0103):	6.22	.177	3.25	12.57
ID = 3 (0106):	12.07	.404	3.08	20.88

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

MASS STORM	Filename: C:\visual otthymo files\4456\SCS II 6-hr.mst
Ptotal= 58.60 mm	Comments: SCS 6 HOUR TYPE II STORM DISTRIBUTION

Duration of storm = 6.00 hrs
Mass curve time step = 10.00 min

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.17	2.46	1.67	5.98	3.17	13.01	4.67	3.52
.33	2.11	1.83	5.63	3.33	12.66	4.83	3.52
.50	2.46	2.00	5.98	3.50	13.01	5.00	3.52
.67	3.52	2.17	7.03	3.67	5.98	5.17	2.46
.83	3.52	2.33	7.03	3.83	5.63	5.33	2.11
1.00	3.52	2.50	7.03	4.00	5.98	5.50	2.46
1.17	3.52	2.67	35.16	4.17	4.57	5.67	2.46
1.33	3.52	2.83	63.29	4.33	4.92	5.83	2.11
1.50	3.52	3.00	91.42	4.50	4.57	6.00	2.46

CALIB			
STANDHYD (0115)	Area (ha)=	.83	
ID= 1 DT= 5.0 min	Total Imp(%)=	33.00	Dir. Conn.(%)= 19.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	.27	.55
Dep. Storage	(mm)=	1.00	2.00
Average Slope	(%)=	2.00	3.00
Length	(m)=	74.30	275.00
Mannings n	=	.013	.250

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.083	2.46	1.583	5.98	3.083	13.01	4.58	3.52
.167	2.46	1.667	5.98	3.167	13.01	4.67	3.52
.250	2.11	1.750	5.63	3.250	12.66	4.75	3.52
.333	2.11	1.833	5.63	3.333	12.66	4.83	3.52
.417	2.46	1.917	5.98	3.417	13.01	4.92	3.52
.500	2.46	2.000	5.98	3.500	13.01	5.00	3.52
.583	3.52	2.083	7.03	3.583	5.98	5.08	2.46
.667	3.52	2.167	7.03	3.667	5.98	5.17	2.46
.750	3.52	2.250	7.03	3.750	5.63	5.25	2.11
.833	3.52	2.333	7.03	3.833	5.63	5.33	2.11
.917	3.52	2.417	7.03	3.917	5.98	5.42	2.46
1.000	3.52	2.500	7.03	4.000	5.98	5.50	2.46
1.083	3.52	2.583	35.16	4.083	4.57	5.58	2.46
1.167	3.52	2.667	35.16	4.167	4.57	5.67	2.46
1.250	3.52	2.750	63.29	4.250	4.92	5.75	2.11
1.333	3.52	2.833	63.29	4.333	4.92	5.83	2.11
1.417	3.52	2.917	91.42	4.417	4.57	5.92	2.46
1.500	3.52	3.000	91.42	4.500	4.57	6.00	2.46

Max.Eff.Inten.(mm/hr)=		91.42	59.44	
	over (min)	5.00	30.00	
Storage Coeff. (min)=		1.80 (ii)	26.27 (ii)	
Unit Hyd. Tpeak (min)=		5.00	30.00	
Unit Hyd. peak (cms)=		.32	.04	
				TOTALS
PEAK FLOW	(cms)=	.04	.05	.068 (iii)
TIME TO PEAK	(hrs)=	3.00	3.33	3.00
RUNOFF VOLUME	(mm)=	57.60	37.89	41.61
TOTAL RAINFALL	(mm)=	58.60	58.60	58.60

```
     RUNOFF COEFFICIENT   =        .98          .65           .71

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  88.0     Ia = Dep. Storage   (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
--------------------
| ROUTE CHN (0116) |
| IN= 2---> OUT= 1 |     Routing time step (min)'=  5.00
--------------------
               <------ DATA FOR SECTION (   1.1) ------>
               Distance      Elevation       Manning
                   .00         215.60          .0500
                 1.80          215.00     .0500 / .0500  Main Channel
                 2.56          215.00     .0500 / .0500  Main Channel
                 4.36          215.60          .0500

      <---------------------- TRAVEL TIME TABLE ----------------------->
       DEPTH    ELEV      VOLUME    FLOW RATE    VELOCITY   TRAV.TIME
         (m)     (m)     (cu.m.)      (cms)        (m/s)      (min)
         .03   215.03    .676E+01        .0          .13      33.24
         .06   215.06    .150E+02        .0          .21      19.61
         .09   215.09    .248E+02        .0          .29      14.23
         .13   215.13    .360E+02        .1          .37      11.28
         .16   215.16    .488E+02        .1          .44       9.41
         .19   215.19    .630E+02        .1          .51       8.11
         .22   215.22    .787E+02        .2          .58       7.15
         .25   215.25    .960E+02        .2          .65       6.41
         .28   215.28    .115E+03        .3          .72       5.83
         .32   215.32    .135E+03        .4          .78       5.35
         .35   215.35    .157E+03        .5          .84       4.95
         .38   215.38    .180E+03        .6          .90       4.62
         .41   215.41    .205E+03        .8          .96       4.33
         .44   215.44    .231E+03        .9         1.02       4.09
         .47   215.47    .258E+03       1.1         1.08       3.87
         .51   215.51    .288E+03       1.3         1.13       3.68
         .54   215.54    .318E+03       1.5         1.19       3.51
         .57   215.57    .350E+03       1.7         1.24       3.35
         .60   215.60    .384E+03       2.0         1.30       3.22

                                 <---- hydrograph ---->   <-pipe / channel->
                           AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                           (ha)    (cms)   (hrs)   (mm)       (m)      (m/s)
     INFLOW : ID= 2 (0115)     .83      .07    3.00  41.61       .14       .40
     OUTFLOW: ID= 1 (0116)     .83      .06    3.42  41.44       .13       .38

-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD  (0107) |   Area    (ha)=   3.63
|ID= 1 DT= 5.0 min |   Total Imp(%)=  29.40   Dir. Conn.(%)=  19.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.07         2.56
     Dep. Storage     (mm)=       1.00         3.00
```



```
     Average Slope     (%)=       2.00         3.00
     Length            (m)=     155.50       440.00
     Mannings n           =       .013         .250

     Max.Eff.Inten.(mm/hr)=      91.42        36.55
                over (min)        5.00        45.00
     Storage Coeff.  (min)=       2.80 (ii)   42.21 (ii)
     Unit Hyd. Tpeak (min)=       5.00        45.00
     Unit Hyd. peak  (cms)=        .28          .03
                                                      *TOTALS*
     PEAK FLOW       (cms)=        .17          .15          .225 (iii)
     TIME TO PEAK    (hrs)=       3.00         3.58         3.00
     RUNOFF VOLUME    (mm)=      57.60        34.06        38.53
     TOTAL RAINFALL   (mm)=      58.60        58.60        58.60
     RUNOFF COEFFICIENT   =        .98          .58          .66

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  86.0     Ia = Dep. Storage   (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
--------------------
| ROUTE CHN (0110) |
| IN= 2---> OUT= 1 |     Routing time step (min)'=  5.00
--------------------
               <------ DATA FOR SECTION (   1.1) ------>
               Distance      Elevation       Manning
                   .00         215.60          .0500
                 1.80          215.00     .0500 / .0500  Main Channel
                 2.56          215.00     .0500 / .0500  Main Channel
                 4.36          215.60          .0500

      <---------------------- TRAVEL TIME TABLE ----------------------->
       DEPTH    ELEV      VOLUME    FLOW RATE    VELOCITY   TRAV.TIME
         (m)     (m)     (cu.m.)      (cms)        (m/s)      (min)
         .03   215.03    .947E+01        .0          .15      38.53
         .06   215.06    .210E+02        .0          .25      23.36
         .09   215.09    .347E+02        .0          .34      17.30
         .13   215.13    .504E+02        .1          .42      13.94
         .16   215.16    .683E+02        .1          .50      11.77
         .19   215.19    .882E+02        .1          .57      10.25
         .22   215.22    .110E+03        .2          .64       9.11
         .25   215.25    .134E+03        .3          .71       8.23
         .28   215.28    .161E+03        .4          .78       7.53
         .32   215.32    .189E+03        .5          .84       6.95
         .35   215.35    .219E+03        .6          .90       6.47
         .38   215.38    .252E+03        .7          .96       6.05
         .41   215.41    .286E+03        .8         1.02       5.70
         .44   215.44    .323E+03       1.0         1.08       5.39
         .47   215.47    .362E+03       1.2         1.14       5.12
         .51   215.51    .403E+03       1.4         1.20       4.88
         .54   215.54    .446E+03       1.6         1.25       4.66
         .57   215.57    .491E+03       1.8         1.30       4.47
         .60   215.60    .538E+03       2.1         1.36       4.30

                                 <---- hydrograph ---->   <-pipe / channel->
                           AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
```



```
                           (ha)    (cms)   (hrs)   (mm)       (m)      (m/s)
     INFLOW : ID= 2 (0107)    3.63      .22    3.00  38.53       .23       .66
     OUTFLOW: ID= 1 (0110)    3.63      .18    3.00  38.50       .21       .61

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--------------------
| ADD HYD   (0114) |
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
         ID1= 1 (0116):      .83     .057     3.42    41.44
       + ID2= 2 (0110):     3.63     .179     3.00    38.50
         ==========================================
         ID = 3 (0114):     4.45     .229     3.00    39.04

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD    (0102) |   Area    (ha)=   1.39   Curve Number   (CN)= 84.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   4.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=    .24

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

                        ---- TRANSFORMED HYETOGRAPH ----
     TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
      hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
     .167    2.46 | 1.667    5.98 | 3.167   13.01 | 4.667    3.52
     .333    2.11 | 1.833    5.63 | 3.333   12.66 | 4.833    3.52
     .500    2.46 | 2.000    5.98 | 3.500   13.01 | 5.000    3.52
     .667    3.52 | 2.167    7.03 | 3.667    5.98 | 5.17     2.46
     .833    3.52 | 2.333    7.03 | 3.833    5.63 | 5.33     2.11
    1.000    3.52 | 2.500    7.03 | 4.000    5.98 | 5.50     2.46
    1.167    3.52 | 2.667   35.16 | 4.167    4.57 | 5.67     2.46
    1.333    3.52 | 2.833   63.29 | 4.333    4.92 | 5.83     2.11
    1.500    3.52 | 3.000   91.42 | 4.500    4.57 | 6.00     2.46

     Unit Hyd Qpeak  (cms)=    .223

     PEAK FLOW       (cms)=    .122 (i)
     TIME TO PEAK    (hrs)=   3.000
     RUNOFF VOLUME    (mm)=  28.556
     TOTAL RAINFALL   (mm)=  58.600
     RUNOFF COEFFICIENT   =    .487

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

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--------------------
| ROUTE CHN (0111) |
| IN= 2---> OUT= 1 |     Routing time step (min)'=  5.00
--------------------
               <------ DATA FOR SECTION (   1.1) ------>
               Distance      Elevation       Manning
                   .00         215.60          .0500
                 3.00          215.00          .0500      Main Channel
                 3.76          215.00          .0500
                 5.56          215.60          .0000
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      <---------------------- TRAVEL TIME TABLE ----------------------->
       DEPTH    ELEV      VOLUME    FLOW RATE    VELOCITY   TRAV.TIME
         (m)     (m)     (cu.m.)      (cms)        (m/s)      (min)
         .03   215.03    .701E+01        .0          .18      22.93
         .06   215.06    .160E+02        .0          .29      14.14
         .09   215.09    .270E+02        .0          .39      10.61
         .13   215.13    .400E+02        .1          .48       8.65
         .16   215.16    .550E+02        .1          .56       7.38
         .19   215.19    .720E+02        .2          .64       6.48
         .22   215.22    .909E+02        .3          .72       5.80
         .25   215.25    .112E+03        .4          .79       5.27
         .28   215.28    .135E+03        .5          .86       4.85
         .32   215.32    .160E+03        .6          .93       4.50
         .35   215.35    .187E+03        .7          .99       4.21
         .38   215.38    .216E+03        .9         1.05       3.95
         .41   215.41    .247E+03       1.1         1.12       3.74
         .44   215.44    .280E+03       1.3         1.17       3.55
         .47   215.47    .314E+03       1.6         1.23       3.38
         .51   215.51    .351E+03       1.8         1.29       3.23
         .54   215.54    .390E+03       2.1         1.35       3.09
         .57   215.57    .431E+03       2.4         1.40       2.97
         .60   215.60    .474E+03       2.8         1.46       2.86

                                 <---- hydrograph ---->   <-pipe / channel->
                           AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                           (ha)    (cms)   (hrs)   (mm)       (m)      (m/s)
     INFLOW : ID= 2 (0102)    1.39      .12    3.00  28.56       .16       .56
     OUTFLOW: ID= 1 (0111)    1.39      .11    3.17  28.48       .15       .54

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--------------------
| ADD HYD   (0117) |
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
         ID1= 1 (0114):     4.45     .229     3.00    39.04
       + ID2= 2 (0111):     1.39     .111     3.17    28.48
         ==========================================
         ID = 3 (0117):     5.85     .329     3.08    36.53

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| CALIB            |
| NASHYD    (0105) |   Area    (ha)=   4.82   Curve Number   (CN)= 66.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=    .35

     Unit Hyd Qpeak  (cms)=    .522

     PEAK FLOW       (cms)=    .169 (i)
     TIME TO PEAK    (hrs)=   3.167
     RUNOFF VOLUME    (mm)=  15.528
     TOTAL RAINFALL   (mm)=  58.600
     RUNOFF COEFFICIENT   =    .265

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

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--------------------
| ROUTE CHN (0113) |
```

| IN= 2---> OUT= 1 | Routing time step (min)'= 5.00

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

Distance	Elevation	Manning	
.00	215.60	.0500	
1.80	215.00	.0500 / .0500	Main Channel
2.56	215.00	.0500 / .0500	Main Channel
4.36	215.60	.0500	

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

DEPTH (m)	ELEV (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME (min)
.03	215.03	.541E+01	.0	.15	22.38
.06	215.06	.120E+02	.0	.25	13.54
.09	215.09	.198E+02	.0	.33	10.01
.13	215.13	.288E+02	.1	.41	8.05
.16	215.16	.390E+02	.1	.49	6.79
.19	215.19	.504E+02	.1	.56	5.91
.22	215.22	.630E+02	.2	.63	5.25
.25	215.25	.768E+02	.3	.70	4.74
.28	215.28	.917E+02	.4	.77	4.33
.32	215.32	.108E+03	.4	.83	4.00
.35	215.35	.125E+03	.6	.90	3.72
.38	215.38	.144E+03	.7	.96	3.48
.41	215.41	.164E+03	.8	1.02	3.28
.44	215.44	.185E+03	1.0	1.08	3.10
.47	215.47	.207E+03	1.2	1.13	2.94
.51	215.51	.230E+03	1.4	1.19	2.80
.54	215.54	.255E+03	1.6	1.24	2.68
.57	215.57	.280E+03	1.8	1.30	2.57
.60	215.60	.307E+03	2.1	1.35	2.47

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 2 (0105)	4.82	.17	3.17	15.53	.20	.59
OUTFLOW: ID= 1 (0113)	4.82	.16	3.25	15.50	.20	.59

CALIB	
NASHYD (0112)	Area (ha)= 1.40 Curve Number (CN)= 75.0
ID= 1 DT=10.0 min	Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= .24

Unit Hyd Qpeak (cms)= .222

PEAK FLOW (cms)= .084 (i)
TIME TO PEAK (hrs)= 3.000
RUNOFF VOLUME (mm)= 20.501
TOTAL RAINFALL (mm)= 58.600
RUNOFF COEFFICIENT = .350

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

ROUTE CHN (0109)	
IN= 2---> OUT= 1	Routing time step (min)'= 5.00

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

Distance	Elevation	Manning

.00	215.60	.0500	
1.80	215.00	.0500 / .0500	Main Channel
3.80	215.00	.0500	Main Channel
5.60	215.60	.0500	

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

DEPTH (m)	ELEV (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME (min)
.03	215.03	.813E+01	.0	.14	14.28
.06	215.06	.170E+02	.0	.23	8.87
.09	215.09	.266E+02	.1	.31	6.68
.13	215.13	.369E+02	.1	.38	5.45
.16	215.16	.480E+02	.2	.44	4.64
.19	215.19	.598E+02	.2	.50	4.07
.22	215.22	.724E+02	.3	.56	3.64
.25	215.25	.857E+02	.4	.62	3.30
.28	215.28	.997E+02	.5	.68	3.03
.32	215.32	.114E+03	.7	.73	2.80
.35	215.35	.130E+03	.8	.78	2.61
.38	215.38	.146E+03	1.0	.84	2.45
.41	215.41	.163E+03	1.2	.89	2.31
.44	215.44	.181E+03	1.4	.94	2.18
.47	215.47	.199E+03	1.6	.99	2.08
.51	215.51	.218E+03	1.8	1.04	1.98
.54	215.54	.238E+03	2.1	1.08	1.89
.57	215.57	.259E+03	2.4	1.13	1.81
.60	215.60	.280E+03	2.7	1.18	1.74

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 2 (0112)	1.40	.08	3.00	20.50	.11	.33
OUTFLOW: ID= 1 (0109)	1.40	.08	3.17	20.45	.10	.32

ADD HYD (0103)				
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0113):	4.82	.163	3.25	15.50
+ ID2= 2 (0109):	1.40	.080	3.17	20.45
ID = 3 (0103):	6.22	.238	3.25	16.62

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0106)				
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0117):	5.85	.329	3.08	36.53
+ ID2= 2 (0103):	6.22	.238	3.25	16.62
ID = 3 (0106):	12.07	.534	3.08	26.27

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

****

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

MASS STORM	Filename: C:\visual otthymo files\4456\SCS II 6-hr.mst
Ptotal= 68.70 mm	Comments: SCS 6 HOUR TYPE II STORM DISTRIBUTION

Duration of storm = 6.00 hrs
Mass curve time step = 10.00 min

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.17	2.89	1.67	7.01	3.17	15.25	4.67	4.12
.33	2.47	1.83	6.60	3.33	14.84	4.83	4.12
.50	2.89	2.00	7.01	3.50	15.25	5.00	4.12
.67	4.12	2.17	8.24	3.67	7.01	5.17	2.89
.83	4.12	2.33	8.24	3.83	6.60	5.33	2.47
1.00	4.12	2.50	8.24	4.00	7.01	5.50	2.89
1.17	4.12	2.67	41.22	4.17	5.36	5.67	2.89
1.33	4.12	2.83	74.20	4.33	5.77	5.83	2.47
1.50	4.12	3.00	107.17	4.50	5.36	6.00	2.89

CALIB	
STANDHYD (0115)	Area (ha)= .83
ID= 1 DT= 5.0 min	Total Imp(%)= 33.00 Dir. Conn.(%)= 19.00

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	.27	.55
Dep. Storage (mm)=	1.00	2.00
Average Slope (%)=	2.00	3.00
Length (m)=	74.30	275.00
Mannings n =	.013	.250

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.083	2.89	1.583	7.01	3.083	15.25	4.58	4.12
.167	2.89	1.667	7.01	3.167	15.25	4.67	4.12
.250	2.47	1.750	6.60	3.250	14.84	4.75	4.12
.333	2.47	1.833	6.60	3.333	14.84	4.83	4.12
.417	2.89	1.917	7.01	3.417	15.25	4.92	4.12
.500	2.89	2.000	7.01	3.500	15.25	5.00	4.12
.583	4.12	2.083	8.24	3.583	7.01	5.08	2.89
.667	4.12	2.167	8.24	3.667	7.01	5.17	2.89
.750	4.12	2.250	8.24	3.750	6.60	5.25	2.47
.833	4.12	2.333	8.24	3.833	6.60	5.33	2.47
.917	4.12	2.417	8.24	3.917	7.01	5.42	2.89
1.000	4.12	2.500	8.24	4.000	7.01	5.50	2.89
1.083	4.12	2.583	41.22	4.083	5.36	5.58	2.89
1.167	4.12	2.667	41.22	4.167	5.36	5.67	2.89
1.250	4.12	2.750	74.20	4.250	5.77	5.75	2.47
1.333	4.12	2.833	74.20	4.333	5.77	5.83	2.47
1.417	4.12	2.917	107.17	4.417	5.36	5.92	2.89
1.500	4.12	3.000	107.17	4.500	5.36	6.00	2.89

Max.Eff.Inten.(mm/hr)=	107.17	73.77
over (min)	5.00	25.00
Storage Coeff. (min)=	1.69 (ii)	24.13 (ii)

Unit Hyd. Tpeak (min)=	5.00	25.00
Unit Hyd. peak (cms)=	.32	.05

			TOTALS
PEAK FLOW (cms)=	.05	.07	.092 (iii)
TIME TO PEAK (hrs)=	3.00	3.25	3.00
RUNOFF VOLUME (mm)=	67.70	46.97	50.90
TOTAL RAINFALL (mm)=	68.70	68.70	68.70
RUNOFF COEFFICIENT =	.99	.68	.74

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 88.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ROUTE CHN (0116)	
IN= 2---> OUT= 1	Routing time step (min)'= 5.00

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

Distance	Elevation	Manning	
.00	215.60	.0500	
1.80	215.00	.0500 / .0500	Main Channel
2.56	215.00	.0500 / .0500	Main Channel
4.36	215.60	.0500	

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

DEPTH (m)	ELEV (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME (min)
.03	215.03	.676E+01	.0	.13	33.24
.06	215.06	.150E+02	.0	.21	19.61
.09	215.09	.248E+02	.0	.29	14.23
.13	215.13	.360E+02	.1	.37	11.28
.16	215.16	.488E+02	.1	.44	9.41
.19	215.19	.630E+02	.1	.51	8.11
.22	215.22	.787E+02	.2	.58	7.15
.25	215.25	.960E+02	.2	.65	6.41
.28	215.28	.115E+03	.3	.72	5.83
.32	215.32	.135E+03	.4	.78	5.35
.35	215.35	.157E+03	.5	.84	4.95
.38	215.38	.180E+03	.6	.90	4.62
.41	215.41	.205E+03	.8	.96	4.33
.44	215.44	.231E+03	.9	1.02	4.09
.47	215.47	.258E+03	1.1	1.08	3.87
.51	215.51	.288E+03	1.3	1.13	3.68
.54	215.54	.318E+03	1.5	1.19	3.51
.57	215.57	.350E+03	1.7	1.24	3.35
.60	215.60	.384E+03	2.0	1.30	3.22

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 2 (0115)	.83	.09	3.00	50.90	.16	.45
OUTFLOW: ID= 1 (0116)	.83	.08	3.33	50.70	.15	.41

```
| CALIB                |
| STANDHYD  (0107) |   Area    (ha)=   3.63
|ID= 1 DT= 5.0 min |   Total Imp(%)=  29.40   Dir. Conn.(%)=  19.00
-------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.07         2.56
     Dep. Storage     (mm)=       1.00         3.00
     Average Slope     (%)=       2.00         3.00
     Length            (m)=     155.50       440.00
     Mannings n             =      .013         .250

     Max.Eff.Inten.(mm/hr)=     107.17        50.61
               over (min)          5.00        40.00
     Storage Coeff.  (min)=       2.63 (ii)   37.22 (ii)
     Unit Hyd. Tpeak (min)=       5.00        40.00
     Unit Hyd. peak  (cms)=        .29          .03
                                                      *TOTALS*
     PEAK FLOW       (cms)=        .20          .21          .286 (iii)
     TIME TO PEAK    (hrs)=       3.00         3.50         3.00
     RUNOFF VOLUME    (mm)=      67.70        42.76        47.50
     TOTAL RAINFALL   (mm)=      68.70        68.70        68.70
     RUNOFF COEFFICIENT   =        .99          .62          .69

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  86.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
-------------------
| ROUTE CHN (0110) |
| IN= 2---> OUT= 1 |     Routing time step (min)'=  5.00
-------------------
               <------ DATA FOR SECTION (   1.1) ------>
               Distance      Elevation       Manning
                    .00         215.60         .0500
                   1.80         215.00     .0500 / .0500  Main Channel
                   2.56         215.00     .0500 / .0500  Main Channel
                   4.36         215.60         .0500

          <---------------------- TRAVEL TIME TABLE ---------------------->
           DEPTH     ELEV      VOLUME     FLOW RATE     VELOCITY    TRAV.TIME
            (m)       (m)     (cu.m.)       (cms)         (m/s)       (min)
            .03    215.03    .947E+01          .0           .15       38.53
            .06    215.06    .210E+02          .0           .25       23.36
            .09    215.09    .347E+02          .0           .34       17.30
            .13    215.13    .504E+02          .1           .42       13.94
            .16    215.16    .683E+02          .1           .50       11.77
            .19    215.19    .882E+02          .1           .57       10.25
            .22    215.22    .110E+03          .2           .64        9.11
            .25    215.25    .134E+03          .3           .71        8.23
            .28    215.28    .161E+03          .4           .78        7.53
            .32    215.32    .189E+03          .5           .84        6.95
            .35    215.35    .219E+03          .6           .90        6.47
            .38    215.38    .252E+03          .7           .96        6.05
            .41    215.41    .286E+03          .8          1.02        5.70
            .44    215.44    .323E+03         1.0          1.08        5.39
            .47    215.47    .362E+03         1.2          1.14        5.12
```



```
            .51    215.51    .403E+03         1.4          1.20        4.88
            .54    215.54    .446E+03         1.6          1.25        4.66
            .57    215.57    .491E+03         1.8          1.30        4.47
            .60    215.60    .538E+03         2.1          1.36        4.30

                                    <---- hydrograph ---->   <-pipe / channel->
                                AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                                (ha)    (cms)   (hrs)   (mm)       (m)      (m/s)
    INFLOW : ID= 2 (0107)     3.63      .29    3.00  47.50        .26       .72
    OUTFLOW: ID= 1 (0110)     3.63      .23    3.00  47.46        .23       .67


--------------------------------------------------------------------------------
-------------------
| ADD HYD   (0114) |
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)    (cms)    (hrs)      (mm)
         ID1= 1 (0116):      .83     .075     3.33     50.70
       + ID2= 2 (0110):     3.63     .231     3.00     47.46
         ========================================================
         ID = 3 (0114):     4.45     .299     3.00     48.06

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
-------------------
| CALIB                |
| NASHYD    (0102) |   Area    (ha)=   1.39   Curve Number   (CN)= 84.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   4.00   # of Linear Res.(N)= 3.00
-------------------   U.H. Tp(hrs)=    .24

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

                                ---- TRANSFORMED HYETOGRAPH ----
          TIME     RAIN |  TIME     RAIN |  TIME     RAIN |  TIME     RAIN
           hrs    mm/hr |   hrs    mm/hr |   hrs    mm/hr |   hrs    mm/hr
          .167     2.89 | 1.667     7.01 | 3.167    15.25 | 4.667     4.12
          .333     2.47 | 1.833     6.60 | 3.333    14.84 | 4.833     4.12
          .500     2.89 | 2.000     7.01 | 3.500    15.25 | 5.000     4.12
          .667     4.12 | 2.167     8.24 | 3.667     7.01 | 5.167     2.89
          .833     4.12 | 2.333     8.24 | 3.833     6.60 | 5.333     2.47
         1.000     4.12 | 2.500     8.24 | 4.000     7.01 | 5.500     2.89
         1.167     4.12 | 2.667    41.22 | 4.167     5.36 | 5.667     2.89
         1.333     4.12 | 2.833    74.20 | 4.333     5.77 | 5.833     2.47
         1.500     4.12 | 3.000   107.17 | 4.500     5.36 | 6.00      2.89

    Unit Hyd Qpeak  (cms)=    .223

    PEAK FLOW       (cms)=    .157 (i)
    TIME TO PEAK    (hrs)=   3.000
    RUNOFF VOLUME    (mm)=  36.516
    TOTAL RAINFALL   (mm)=  68.700
    RUNOFF COEFFICIENT   =    .532

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

--------------------------------------------------------------------------------
-------------------
| ROUTE CHN (0111) |
| IN= 2---> OUT= 1 |     Routing time step (min)'=  5.00
-------------------
```



```
               <------ DATA FOR SECTION (   1.1) ------>
               Distance      Elevation       Manning
                    .00         215.60         .0500
                  3.00          215.00         .0500      Main Channel
                  3.76          215.00         .0500
                  5.56          215.60         .0000

          <---------------------- TRAVEL TIME TABLE ---------------------->
           DEPTH     ELEV      VOLUME     FLOW RATE     VELOCITY    TRAV.TIME
            (m)       (m)     (cu.m.)       (cms)         (m/s)       (min)
            .03    215.03    .701E+01          .0           .18       22.93
            .06    215.06    .160E+02          .0           .29       14.14
            .09    215.09    .270E+02          .0           .39       10.61
            .13    215.13    .400E+02          .1           .48        8.65
            .16    215.16    .550E+02          .1           .56        7.38
            .19    215.19    .720E+02          .2           .64        6.48
            .22    215.22    .909E+02          .3           .72        5.80
            .25    215.25    .112E+03          .4           .79        5.27
            .28    215.28    .135E+03          .5           .86        4.85
            .32    215.32    .160E+03          .6           .93        4.50
            .35    215.35    .187E+03          .7           .99        4.21
            .38    215.38    .216E+03          .9          1.05        3.95
            .41    215.41    .247E+03         1.1          1.12        3.74
            .44    215.44    .280E+03         1.3          1.17        3.55
            .47    215.47    .314E+03         1.6          1.23        3.38
            .51    215.51    .351E+03         1.8          1.29        3.23
            .54    215.54    .390E+03         2.1          1.35        3.09
            .57    215.57    .431E+03         2.4          1.40        2.97
            .60    215.60    .474E+03         2.8          1.46        2.86

                                    <---- hydrograph ---->   <-pipe / channel->
                                AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                                (ha)    (cms)   (hrs)   (mm)       (m)      (m/s)
    INFLOW : ID= 2 (0102)     1.39      .16    3.00  36.52        .17       .60
    OUTFLOW: ID= 1 (0111)     1.39      .14    3.17  36.43        .17       .59


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-------------------
| ADD HYD   (0117) |
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)    (cms)    (hrs)      (mm)
         ID1= 1 (0114):     4.45     .299     3.00     48.06
       + ID2= 2 (0111):     1.39     .144     3.17     36.43
         ========================================================
         ID = 3 (0117):     5.85     .436     3.08     45.29

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
-------------------
| CALIB                |
| NASHYD    (0105) |   Area    (ha)=   4.82   Curve Number   (CN)= 66.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
-------------------   U.H. Tp(hrs)=    .35

    Unit Hyd Qpeak  (cms)=    .522

    PEAK FLOW       (cms)=    .228 (i)
    TIME TO PEAK    (hrs)=   3.167
    RUNOFF VOLUME    (mm)=  20.792
    TOTAL RAINFALL   (mm)=  68.700
```



```
    RUNOFF COEFFICIENT   =    .303

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

--------------------------------------------------------------------------------
-------------------
| ROUTE CHN (0113) |
| IN= 2---> OUT= 1 |     Routing time step (min)'=  5.00
-------------------
               <------ DATA FOR SECTION (   1.1) ------>
               Distance      Elevation       Manning
                    .00         215.60         .0500
                   1.80         215.00     .0500 / .0500  Main Channel
                   2.56         215.00     .0500 / .0500  Main Channel
                   4.36         215.60         .0500

          <---------------------- TRAVEL TIME TABLE ---------------------->
           DEPTH     ELEV      VOLUME     FLOW RATE     VELOCITY    TRAV.TIME
            (m)       (m)     (cu.m.)       (cms)         (m/s)       (min)
            .03    215.03    .541E+01          .0           .15       22.38
            .06    215.06    .120E+02          .0           .25       13.54
            .09    215.09    .198E+02          .0           .33       10.01
            .13    215.13    .288E+02          .1           .41        8.05
            .16    215.16    .390E+02          .1           .49        6.79
            .19    215.19    .504E+02          .1           .56        5.91
            .22    215.22    .630E+02          .2           .63        5.25
            .25    215.25    .768E+02          .3           .70        4.74
            .28    215.28    .917E+02          .4           .77        4.33
            .32    215.32    .108E+03          .4           .83        4.00
            .35    215.35    .125E+03          .6           .90        3.72
            .38    215.38    .144E+03          .7           .96        3.48
            .41    215.41    .164E+03          .8          1.02        3.28
            .44    215.44    .185E+03         1.0          1.08        3.10
            .47    215.47    .207E+03         1.2          1.13        2.94
            .51    215.51    .230E+03         1.4          1.19        2.80
            .54    215.54    .255E+03         1.6          1.24        2.68
            .57    215.57    .280E+03         1.8          1.30        2.57
            .60    215.60    .307E+03         2.1          1.35        2.47

                                    <---- hydrograph ---->   <-pipe / channel->
                                AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                                (ha)    (cms)   (hrs)   (mm)       (m)      (m/s)
    INFLOW : ID= 2 (0105)     4.82      .23    3.17  20.79        .23       .66
    OUTFLOW: ID= 1 (0113)     4.82      .22    3.25  20.77        .23       .65


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-------------------
| CALIB                |
| NASHYD    (0112) |   Area    (ha)=   1.40   Curve Number   (CN)= 75.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
-------------------   U.H. Tp(hrs)=    .24

    Unit Hyd Qpeak  (cms)=    .222

    PEAK FLOW       (cms)=    .112 (i)
    TIME TO PEAK    (hrs)=   3.000
    RUNOFF VOLUME    (mm)=  26.984
    TOTAL RAINFALL   (mm)=  68.700
    RUNOFF COEFFICIENT   =    .393

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

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-------------------
| ROUTE CHN (0109) |
| IN= 2---> OUT= 1 |     Routing time step (min)'=  5.00
-------------------
                <------ DATA FOR SECTION (   1.1) ------>
                Distance      Elevation       Manning
                    .00         215.60          .0500
                   1.80         215.00     .0500 / .0500  Main Channel
                   3.80         215.00          .0500     Main Channel
                   5.60         215.60          .0500

      <---------------------- TRAVEL TIME TABLE ----------------------->
       DEPTH    ELEV      VOLUME    FLOW RATE    VELOCITY   TRAV.TIME
        (m)      (m)     (cu.m.)      (cms)        (m/s)      (min)
        .03   215.03    .813E+01         .0          .14      14.28
        .06   215.06    .170E+02         .0          .23       8.87
        .09   215.09    .266E+02         .1          .31       6.68
        .13   215.13    .369E+02         .1          .38       5.45
        .16   215.16    .480E+02         .2          .44       4.64
        .19   215.19    .598E+02         .2          .50       4.07
        .22   215.22    .724E+02         .3          .56       3.64
        .25   215.25    .857E+02         .4          .62       3.30
        .28   215.28    .997E+02         .5          .68       3.03
        .32   215.32    .114E+03         .7          .73       2.80
        .35   215.35    .130E+03         .8          .78       2.61
        .38   215.38    .146E+03        1.0          .84       2.45
        .41   215.41    .163E+03        1.2          .89       2.31
        .44   215.44    .181E+03        1.4          .94       2.18
        .47   215.47    .199E+03        1.6          .99       2.08
        .51   215.51    .218E+03        1.8         1.04       1.98
        .54   215.54    .238E+03        2.1         1.08       1.89
        .57   215.57    .259E+03        2.4         1.13       1.81
        .60   215.60    .280E+03        2.7         1.18       1.74

                                  <---- hydrograph ---->   <-pipe / channel->
                            AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                            (ha)    (cms)   (hrs)   (mm)      (m)       (m/s)
     INFLOW : ID= 2 (0112)  1.40     .11    3.00  26.98       .13        .37
     OUTFLOW: ID= 1 (0109)  1.40     .11    3.17  26.94       .12        .37
```

```
-------------------
| ADD HYD   (0103) |
|  1 +  2 =  3     |          AREA    QPEAK    TPEAK     R.V.
-------------------           (ha)    (cms)    (hrs)     (mm)
         ID1= 1 (0113):     4.82     .222     3.25    20.77
       + ID2= 2 (0109):     1.40     .107     3.17    26.94
         ================================================
         ID = 3 (0103):     6.22     .320     3.25    22.16

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

```
-------------------
| ADD HYD   (0106) |
|  1 +  2 =  3     |          AREA    QPEAK    TPEAK     R.V.
-------------------           (ha)    (cms)    (hrs)     (mm)
         ID1= 1 (0117):     5.85     .436     3.08    45.29
       + ID2= 2 (0103):     6.22     .320     3.25    22.16
```



```
         ================================================
         ID = 3 (0106):    12.07     .723     3.08    33.37

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

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

-------------------
| MASS STORM       |    Filename: C:\visual otthymo files\4456\SCS II 6-hr.mst
| Ptotal= 76.30 mm |    Comments: SCS 6 HOUR TYPE II STORM DISTRIBUTION
-------------------
                         Duration of storm    =  6.00 hrs
                         Mass curve time step = 10.00 min

                TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
                 .17    3.20 |  1.67    7.78 |  3.17   16.94 |  4.67    4.58
                 .33    2.75 |  1.83    7.32 |  3.33   16.48 |  4.83    4.58
                 .50    3.20 |  2.00    7.78 |  3.50   16.94 |  5.00    4.58
                 .67    4.58 |  2.17    9.16 |  3.67    7.78 |  5.17    3.20
                 .83    4.58 |  2.33    9.16 |  3.83    7.32 |  5.33    2.75
                1.00    4.58 |  2.50    9.16 |  4.00    7.78 |  5.50    3.20
                1.17    4.58 |  2.67   45.78 |  4.17    5.95 |  5.67    3.20
                1.33    4.58 |  2.83   82.40 |  4.33    6.41 |  5.83    2.75
                1.50    4.58 |  3.00  119.03 |  4.50    5.95 |  6.00    3.20
```

```
-------------------
| CALIB            |
| STANDHYD  (0115) |    Area     (ha)=    .83
|ID= 1 DT= 5.0 min |    Total Imp(%)=  33.00   Dir. Conn.(%)=  19.00
-------------------
                                IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=          .27           .55
     Dep. Storage     (mm)=         1.00          2.00
     Average Slope     (%)=         2.00          3.00
     Length            (m)=        74.30        275.00
     Mannings n           =         .013          .250

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

                          ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
                .083    3.20 | 1.583    7.78 | 3.083   16.94 |  4.58    4.58
                .167    3.20 | 1.667    7.78 | 3.167   16.94 |  4.67    4.58
                .250    2.75 | 1.750    7.32 | 3.250   16.48 |  4.75    4.58
                .333    2.75 | 1.833    7.32 | 3.333   16.48 |  4.83    4.58
                .417    3.20 | 1.917    7.78 | 3.417   16.94 |  4.92    4.58
                .500    3.20 | 2.000    7.78 | 3.500   16.94 |  5.00    4.58
                .583    4.58 | 2.083    9.16 | 3.583    7.78 |  5.08    3.20
                .667    4.58 | 2.167    9.16 | 3.667    7.78 |  5.17    3.20
                .750    4.58 | 2.250    9.16 | 3.750    7.32 |  5.25    2.75
                .833    4.58 | 2.333    9.16 | 3.833    7.32 |  5.33    2.75
                .917    4.58 | 2.417    9.16 | 3.917    7.78 |  5.42    3.20
               1.000    4.58 | 2.500    9.16 | 4.000    7.78 |  5.50    3.20
               1.083    4.58 | 2.583   45.78 | 4.083    5.95 |  5.58    3.20
               1.167    4.58 | 2.667   45.78 | 4.167    5.95 |  5.67    3.20
               1.250    4.58 | 2.750   82.40 | 4.250    6.41 |  5.75    2.75
```



```
               1.333    4.58 | 2.833   82.40 | 4.333    6.41 |  5.83    2.75
               1.417    4.58 | 2.917  119.03 | 4.417    5.95 |  5.92    3.20
               1.500    4.58 | 3.000  119.03 | 4.500    5.95 |  6.00    3.20

     Max.Eff.Inten.(mm/hr)=     119.03        84.71
               over (min)          5.00         25.00
     Storage Coeff.  (min)=     1.62 (ii)    22.85 (ii)
     Unit Hyd. Tpeak (min)=        5.00         25.00
     Unit Hyd. peak  (cms)=         .32           .05
                                                          *TOTALS*
     PEAK FLOW       (cms)=         .05           .08          .106 (iii)
     TIME TO PEAK    (hrs)=        3.00          3.25          3.00
     RUNOFF VOLUME    (mm)=       75.30         53.94         57.98
     TOTAL RAINFALL   (mm)=       76.30         76.30         76.30
     RUNOFF COEFFICIENT   =         .99           .71           .76

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  88.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
```

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-------------------
| ROUTE CHN (0116) |
| IN= 2---> OUT= 1 |     Routing time step (min)'=  5.00
-------------------
                <------ DATA FOR SECTION (   1.1) ------>
                Distance      Elevation       Manning
                    .00         215.60          .0500
                   1.80         215.00     .0500 / .0500  Main Channel
                   2.56         215.00     .0500 / .0500  Main Channel
                   4.36         215.60          .0500

      <---------------------- TRAVEL TIME TABLE ----------------------->
       DEPTH    ELEV      VOLUME    FLOW RATE    VELOCITY   TRAV.TIME
        (m)      (m)     (cu.m.)      (cms)        (m/s)      (min)
        .03   215.03    .676E+01         .0          .13       33.24
        .06   215.06    .150E+02         .0          .21       19.61
        .09   215.09    .248E+02         .0          .29       14.23
        .13   215.13    .360E+02         .1          .37       11.28
        .16   215.16    .488E+02         .1          .44        9.41
        .19   215.19    .630E+02         .1          .51        8.11
        .22   215.22    .787E+02         .2          .58        7.15
        .25   215.25    .960E+02         .2          .65        6.41
        .28   215.28    .115E+03         .3          .72        5.83
        .32   215.32    .135E+03         .4          .78        5.35
        .35   215.35    .157E+03         .5          .84        4.95
        .38   215.38    .180E+03         .6          .90        4.62
        .41   215.41    .205E+03         .8          .96        4.33
        .44   215.44    .231E+03         .9         1.02        4.09
        .47   215.47    .258E+03        1.1         1.08        3.87
        .51   215.51    .288E+03        1.3         1.13        3.68
        .54   215.54    .318E+03        1.5         1.19        3.51
        .57   215.57    .350E+03        1.7         1.24        3.35
        .60   215.60    .384E+03        2.0         1.30        3.22

                                  <---- hydrograph ---->   <-pipe / channel->
                            AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
```



```
                            (ha)    (cms)   (hrs)   (mm)      (m)       (m/s)
     INFLOW : ID= 2 (0115)   .83      .11    3.00  57.98       .17        .47
     OUTFLOW: ID= 1 (0116)   .83      .09    3.33  57.79       .16        .45
```

```
-------------------
| CALIB            |
| STANDHYD  (0107) |    Area     (ha)=   3.63
|ID= 1 DT= 5.0 min |    Total Imp(%)=  29.40   Dir. Conn.(%)=  19.00
-------------------
                                IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=         1.07          2.56
     Dep. Storage     (mm)=         1.00          3.00
     Average Slope     (%)=         2.00          3.00
     Length            (m)=       155.50        440.00
     Mannings n           =         .013          .250

     Max.Eff.Inten.(mm/hr)=      119.03         58.72
               over (min)          5.00         40.00
     Storage Coeff.  (min)=      2.52 (ii)    35.12 (ii)
     Unit Hyd. Tpeak (min)=         5.00         40.00
     Unit Hyd. peak  (cms)=          .29           .03
                                                          *TOTALS*
     PEAK FLOW       (cms)=          .23           .25          .327 (iii)
     TIME TO PEAK    (hrs)=         3.00          3.50          3.00
     RUNOFF VOLUME    (mm)=        75.30         49.48         54.38
     TOTAL RAINFALL   (mm)=        76.30         76.30         76.30
     RUNOFF COEFFICIENT   =          .99           .65           .71

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  86.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
```

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-------------------
| ROUTE CHN (0110) |
| IN= 2---> OUT= 1 |     Routing time step (min)'=  5.00
-------------------
                <------ DATA FOR SECTION (   1.1) ------>
                Distance      Elevation       Manning
                    .00         215.60          .0500
                   1.80         215.00     .0500 / .0500  Main Channel
                   2.56         215.00     .0500 / .0500  Main Channel
                   4.36         215.60          .0500

      <---------------------- TRAVEL TIME TABLE ----------------------->
       DEPTH    ELEV      VOLUME    FLOW RATE    VELOCITY   TRAV.TIME
        (m)      (m)     (cu.m.)      (cms)        (m/s)      (min)
        .03   215.03    .947E+01         .0          .15       38.53
        .06   215.06    .210E+02         .0          .25       23.36
        .09   215.09    .347E+02         .0          .34       17.30
        .13   215.13    .504E+02         .1          .42       13.94
        .16   215.16    .683E+02         .1          .50       11.77
        .19   215.19    .882E+02         .1          .57       10.25
        .22   215.22    .110E+03         .2          .64        9.11
        .25   215.25    .134E+03         .3          .71        8.23
```

.28	215.28	.161E+03	.4	.78	7.53
.32	215.32	.189E+03	.5	.84	6.95
.35	215.35	.219E+03	.6	.90	6.47
.38	215.38	.252E+03	.7	.96	6.05
.41	215.41	.286E+03	.8	1.02	5.70
.44	215.44	.323E+03	1.0	1.08	5.39
.47	215.47	.362E+03	1.2	1.14	5.12
.51	215.51	.403E+03	1.4	1.20	4.88
.54	215.54	.446E+03	1.6	1.25	4.66
.57	215.57	.491E+03	1.8	1.30	4.47
.60	215.60	.538E+03	2.1	1.36	4.30

	<---- hydrograph ---->				<-pipe / channel->	
	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 2 (0107)	3.63	.33	3.00	54.38	.27	.75
OUTFLOW: ID= 1 (0110)	3.63	.27	3.58	54.34	.25	.71

ADD HYD (0114)		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
1 + 2 = 3	ID1= 1 (0116):	.83	.088	3.33	57.79
	+ ID2= 2 (0110):	3.63	.272	3.58	54.34
	ID = 3 (0114):	4.45	.347	3.00	54.98

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB					
NASHYD (0102)	Area	(ha)=	1.39	Curve Number	(CN)= 84.0
ID= 1 DT=10.0 min	Ia	(mm)=	4.00	# of Linear Res.(N)=	3.00
	U.H. Tp(hrs)=		.24		

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.167	3.20	1.667	7.78	3.167	16.94	4.67	4.58
.333	2.75	1.833	7.32	3.333	16.48	4.83	4.58
.500	3.20	2.000	7.78	3.500	16.94	5.00	4.58
.667	4.58	2.167	9.16	3.667	7.78	5.17	3.20
.833	4.58	2.333	9.16	3.833	7.32	5.33	2.75
1.000	4.58	2.500	9.16	4.000	7.78	5.50	3.20
1.167	4.58	2.667	45.78	4.167	5.95	5.67	3.20
1.333	4.58	2.833	82.40	4.333	6.41	5.83	2.75
1.500	4.58	3.000	119.03	4.500	5.95	6.00	3.20

Unit Hyd Qpeak (cms)= .223

PEAK FLOW (cms)= .184 (i)
TIME TO PEAK (hrs)= 3.000
RUNOFF VOLUME (mm)= 42.727
TOTAL RAINFALL (mm)= 76.300
RUNOFF COEFFICIENT = .560

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

ROUTE CHN (0111)		
IN= 2---> OUT= 1	Routing time step (min)'=	5.00

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

Distance	Elevation	Manning	
.00	215.60	.0500	
3.00	215.00	.0500	Main Channel
3.76	215.00	.0500	
5.56	215.60	.0000	

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

DEPTH (m)	ELEV (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME (min)
.03	215.03	.701E+01	.0	.18	22.93
.06	215.06	.160E+02	.0	.29	14.14
.09	215.09	.270E+02	.0	.39	10.61
.13	215.13	.400E+02	.1	.48	8.65
.16	215.16	.550E+02	.1	.56	7.38
.19	215.19	.720E+02	.2	.64	6.48
.22	215.22	.909E+02	.3	.72	5.80
.25	215.25	.112E+03	.4	.79	5.27
.28	215.28	.135E+03	.5	.86	4.85
.32	215.32	.160E+03	.6	.93	4.50
.35	215.35	.187E+03	.7	.99	4.21
.38	215.38	.216E+03	.9	1.05	3.95
.41	215.41	.247E+03	1.1	1.12	3.74
.44	215.44	.280E+03	1.3	1.17	3.55
.47	215.47	.314E+03	1.6	1.23	3.38
.51	215.51	.351E+03	1.8	1.29	3.23
.54	215.54	.390E+03	2.1	1.35	3.09
.57	215.57	.431E+03	2.4	1.40	2.97
.60	215.60	.474E+03	2.8	1.46	2.86

	<---- hydrograph ---->				<-pipe / channel->	
	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 2 (0102)	1.39	.18	3.00	42.73	.19	.64
OUTFLOW: ID= 1 (0111)	1.39	.17	3.17	42.65	.18	.62

ADD HYD (0117)		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
1 + 2 = 3	ID1= 1 (0114):	4.45	.347	3.00	54.98
	+ ID2= 2 (0111):	1.39	.169	3.17	42.65
	ID = 3 (0117):	5.85	.511	3.08	52.04

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB					
NASHYD (0105)	Area	(ha)=	4.82	Curve Number	(CN)= 66.0
ID= 1 DT=10.0 min	Ia	(mm)=	5.00	# of Linear Res.(N)=	3.00
	U.H. Tp(hrs)=		.35		

Unit Hyd Qpeak (cms)= .522

PEAK FLOW (cms)= .277 (i)
TIME TO PEAK (hrs)= 3.167
RUNOFF VOLUME (mm)= 25.070
TOTAL RAINFALL (mm)= 76.300
RUNOFF COEFFICIENT = .329

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

ROUTE CHN (0113)		
IN= 2---> OUT= 1	Routing time step (min)'=	5.00

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

Distance	Elevation	Manning	
.00	215.60	.0500	
1.80	215.00	.0500 / .0500	Main Channel
2.56	215.00	.0500 / .0500	Main Channel
4.36	215.60	.0500	

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

DEPTH (m)	ELEV (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME (min)
.03	215.03	.541E+01	.0	.15	22.38
.06	215.06	.120E+02	.0	.25	13.54
.09	215.09	.198E+02	.0	.33	10.01
.13	215.13	.288E+02	.1	.41	8.05
.16	215.16	.390E+02	.1	.49	6.79
.19	215.19	.504E+02	.1	.56	5.91
.22	215.22	.630E+02	.2	.63	5.25
.25	215.25	.768E+02	.3	.70	4.74
.28	215.28	.917E+02	.4	.77	4.33
.32	215.32	.108E+03	.4	.83	4.00
.35	215.35	.125E+03	.6	.90	3.72
.38	215.38	.144E+03	.7	.96	3.48
.41	215.41	.164E+03	.8	1.02	3.28
.44	215.44	.185E+03	1.0	1.08	3.10
.47	215.47	.207E+03	1.2	1.13	2.94
.51	215.51	.230E+03	1.4	1.19	2.80
.54	215.54	.255E+03	1.6	1.24	2.68
.57	215.57	.280E+03	1.8	1.30	2.57
.60	215.60	.307E+03	2.1	1.35	2.47

	<---- hydrograph ---->				<-pipe / channel->	
	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 2 (0105)	4.82	.28	3.17	25.07	.26	.71
OUTFLOW: ID= 1 (0113)	4.82	.27	3.25	25.05	.25	.70

CALIB					
NASHYD (0112)	Area	(ha)=	1.40	Curve Number	(CN)= 75.0
ID= 1 DT=10.0 min	Ia	(mm)=	5.00	# of Linear Res.(N)=	3.00
	U.H. Tp(hrs)=		.24		

Unit Hyd Qpeak (cms)= .222

PEAK FLOW (cms)= .134 (i)

TIME TO PEAK (hrs)= 3.000
RUNOFF VOLUME (mm)= 32.159
TOTAL RAINFALL (mm)= 76.300
RUNOFF COEFFICIENT = .421

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

ROUTE CHN (0109)		
IN= 2---> OUT= 1	Routing time step (min)'=	5.00

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

Distance	Elevation	Manning	
.00	215.60	.0500	
1.80	215.00	.0500 / .0500	Main Channel
3.80	215.00	.0500	Main Channel
5.60	215.60	.0500	

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

DEPTH (m)	ELEV (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME (min)
.03	215.03	.813E+01	.0	.14	14.28
.06	215.06	.170E+02	.0	.23	8.87
.09	215.09	.266E+02	.1	.31	6.68
.13	215.13	.369E+02	.1	.38	5.45
.16	215.16	.480E+02	.2	.44	4.64
.19	215.19	.598E+02	.2	.50	4.07
.22	215.22	.724E+02	.3	.56	3.64
.25	215.25	.857E+02	.4	.62	3.30
.28	215.28	.997E+02	.5	.68	3.03
.32	215.32	.114E+03	.7	.73	2.80
.35	215.35	.130E+03	.8	.78	2.61
.38	215.38	.146E+03	1.0	.84	2.45
.41	215.41	.163E+03	1.2	.89	2.31
.44	215.44	.181E+03	1.4	.94	2.18
.47	215.47	.199E+03	1.6	.99	2.08
.51	215.51	.218E+03	1.8	1.04	1.98
.54	215.54	.238E+03	2.1	1.08	1.89
.57	215.57	.259E+03	2.4	1.13	1.81
.60	215.60	.280E+03	2.7	1.18	1.74

	<---- hydrograph ---->				<-pipe / channel->	
	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 2 (0112)	1.40	.13	3.00	32.16	.14	.40
OUTFLOW: ID= 1 (0109)	1.40	.13	3.08	32.11	.13	.39

ADD HYD (0103)		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
1 + 2 = 3	ID1= 1 (0113):	4.82	.271	3.25	25.05
	+ ID2= 2 (0109):	1.40	.129	3.08	32.11
	ID = 3 (0103):	6.22	.387	3.25	26.63

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0106)		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
1 + 2 = 3	ID1= 1 (0117):	5.85	.511	3.08	52.04
	+ ID2= 2 (0103):	6.22	.387	3.25	26.63
	ID = 3 (0106):	12.07	.861	3.08	38.95

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

****
** SIMULATION NUMBER: 6 **
****

MASS STORM	Ptotal= 83.80 mm

Filename: C:\visual otthymo files\4456\SCS II 6-hr.mst
Comments: SCS 6 HOUR TYPE II STORM DISTRIBUTION

Duration of storm = 6.00 hrs
Mass curve time step = 10.00 min

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.17	3.52	1.67	8.55	3.17	18.60	4.67	5.03
.33	3.02	1.83	8.04	3.33	18.10	4.83	5.03
.50	3.52	2.00	8.55	3.50	18.60	5.00	5.03
.67	5.03	2.17	10.06	3.67	8.55	5.17	3.52
.83	5.03	2.33	10.06	3.83	8.04	5.33	3.02
1.00	5.03	2.50	10.06	4.00	8.55	5.50	3.52
1.17	5.03	2.67	50.28	4.17	6.54	5.67	3.52
1.33	5.03	2.83	90.50	4.33	7.04	5.83	3.02
1.50	5.03	3.00	130.73	4.50	6.54	6.00	3.52

CALIB	STANDHYD (0115)	ID= 1 DT= 5.0 min

Area (ha)= .83
Total Imp(%)= 33.00 Dir. Conn.(%)= 19.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	.27	.55
Dep. Storage	(mm)=	1.00	2.00
Average Slope	(%)=	2.00	3.00
Length	(m)=	74.30	275.00
Mannings n	=	.013	.250

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.083	3.52	1.583	8.55	3.083	18.60	4.58	5.03
.167	3.52	1.667	8.55	3.167	18.60	4.67	5.03
.250	3.02	1.750	8.04	3.250	18.10	4.75	5.03
.333	3.02	1.833	8.04	3.333	18.10	4.83	5.03
.417	3.52	1.917	8.55	3.417	18.60	4.92	5.03
.500	3.52	2.000	8.55	3.500	18.60	5.00	5.03
.583	5.03	2.083	10.06	3.583	8.55	5.08	3.52
.667	5.03	2.167	10.06	3.667	8.55	5.17	3.52

.750	5.03	2.250	10.06	3.750	8.04	5.25	3.02
.833	5.03	2.333	10.06	3.833	8.04	5.33	3.02
.917	5.03	2.417	10.06	3.917	8.55	5.42	3.52
1.000	5.03	2.500	10.06	4.000	8.55	5.50	3.52
1.083	5.03	2.583	50.28	4.083	6.54	5.58	3.52
1.167	5.03	2.667	50.28	4.167	6.54	5.67	3.52
1.250	5.03	2.750	90.50	4.250	7.04	5.75	3.02
1.333	5.03	2.833	90.50	4.333	7.04	5.83	3.02
1.417	5.03	2.917	130.73	4.417	6.54	5.92	3.52
1.500	5.03	3.000	130.73	4.500	6.54	6.00	3.52

			TOTALS
Max.Eff.Inten.(mm/hr)=	130.73	109.46	
over (min)	5.00	25.00	
Storage Coeff. (min)=	1.56 (ii)	20.72 (ii)	
Unit Hyd. Tpeak (min)=	5.00	25.00	
Unit Hyd. peak (cms)=	.33	.05	
PEAK FLOW (cms)=	.06	.10	.122 (iii)
TIME TO PEAK (hrs)=	3.00	3.25	3.00
RUNOFF VOLUME (mm)=	82.80	60.90	65.05
TOTAL RAINFALL (mm)=	83.80	83.80	83.80
RUNOFF COEFFICIENT =	.99	.73	.78

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 88.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ROUTE CHN (0116)	IN= 2---> OUT= 1

Routing time step (min)'= 5.00

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

Distance	Elevation	Manning	
.00	215.60	.0500	
1.80	215.00	.0500 / .0500	Main Channel
2.56	215.00	.0500 / .0500	Main Channel
4.36	215.60	.0500	

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

DEPTH (m)	ELEV (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME (min)
.03	215.03	.676E+01	.0	.13	33.24
.06	215.06	.150E+02	.0	.21	19.61
.09	215.09	.248E+02	.0	.29	14.23
.13	215.13	.360E+02	.1	.37	11.28
.16	215.16	.488E+02	.1	.44	9.41
.19	215.19	.630E+02	.1	.51	8.11
.22	215.22	.787E+02	.2	.58	7.15
.25	215.25	.960E+02	.2	.65	6.41
.28	215.28	.115E+03	.3	.72	5.83
.32	215.32	.135E+03	.4	.78	5.35
.35	215.35	.157E+03	.5	.84	4.95
.38	215.38	.180E+03	.6	.90	4.62
.41	215.41	.205E+03	.8	.96	4.33
.44	215.44	.231E+03	.9	1.02	4.09
.47	215.47	.258E+03	1.1	1.08	3.87

.51	215.51	.288E+03	1.3	1.13	3.68
.54	215.54	.318E+03	1.5	1.19	3.51
.57	215.57	.350E+03	1.7	1.24	3.35
.60	215.60	.384E+03	2.0	1.30	3.22

<---- hydrograph ----> <-pipe / channel->

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 2 (0115)	.83	.12	3.00	65.05	.18	.50
OUTFLOW: ID= 1 (0116)	.83	.10	3.33	64.83	.17	.47

CALIB	STANDHYD (0107)	ID= 1 DT= 5.0 min

Area (ha)= 3.63
Total Imp(%)= 29.40 Dir. Conn.(%)= 19.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	1.07	2.56
Dep. Storage	(mm)=	1.00	3.00
Average Slope	(%)=	2.00	3.00
Length	(m)=	155.50	440.00
Mannings n	=	.013	.250

			TOTALS
Max.Eff.Inten.(mm/hr)=	130.73	74.94	
over (min)	5.00	35.00	
Storage Coeff. (min)=	2.43 (ii)	31.99 (ii)	
Unit Hyd. Tpeak (min)=	5.00	35.00	
Unit Hyd. peak (cms)=	.30	.03	
PEAK FLOW (cms)=	.25	.31	.391 (iii)
TIME TO PEAK (hrs)=	3.00	3.42	3.00
RUNOFF VOLUME (mm)=	82.80	56.23	61.27
TOTAL RAINFALL (mm)=	83.80	83.80	83.80
RUNOFF COEFFICIENT =	.99	.67	.73

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 86.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ROUTE CHN (0110)	IN= 2---> OUT= 1

Routing time step (min)'= 5.00

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

Distance	Elevation	Manning	
.00	215.60	.0500	
1.80	215.00	.0500 / .0500	Main Channel
2.56	215.00	.0500 / .0500	Main Channel
4.36	215.60	.0500	

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

DEPTH (m)	ELEV (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME (min)
.03	215.03	.947E+01	.0	.15	38.53

.06	215.06	.210E+02	.0	.25	23.36
.09	215.09	.347E+02	.0	.34	17.30
.13	215.13	.504E+02	.1	.42	13.94
.16	215.16	.683E+02	.1	.50	11.77
.19	215.19	.882E+02	.1	.57	10.25
.22	215.22	.110E+03	.2	.64	9.11
.25	215.25	.134E+03	.3	.71	8.23
.28	215.28	.161E+03	.4	.78	7.53
.32	215.32	.189E+03	.5	.84	6.95
.35	215.35	.219E+03	.6	.90	6.47
.38	215.38	.252E+03	.7	.96	6.05
.41	215.41	.286E+03	.8	1.02	5.70
.44	215.44	.323E+03	1.0	1.08	5.39
.47	215.47	.362E+03	1.2	1.14	5.12
.51	215.51	.403E+03	1.4	1.20	4.88
.54	215.54	.446E+03	1.6	1.25	4.66
.57	215.57	.491E+03	1.8	1.30	4.47
.60	215.60	.538E+03	2.1	1.36	4.30

<---- hydrograph ----> <-pipe / channel->

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 2 (0107)	3.63	.39	3.00	61.27	.30	.80
OUTFLOW: ID= 1 (0110)	3.63	.33	3.50	61.22	.28	.76

ADD HYD (0114)		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
1 + 2 = 3	ID1= 1 (0116):	.83	.103	3.33	64.83
	+ ID2= 2 (0110):	3.63	.334	3.50	61.22
	ID = 3 (0114):	4.45	.423	3.50	61.89

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB	NASHYD (0102)	ID= 1 DT=10.0 min

Area (ha)= 1.39 Curve Number (CN)= 84.0
Ia (mm)= 4.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= .24

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.167	3.52	1.667	8.55	3.167	18.60	4.67	5.03
.333	3.02	1.833	8.04	3.333	18.10	4.83	5.03
.500	3.52	2.000	8.55	3.500	18.60	5.00	5.03
.667	5.03	2.167	10.06	3.667	8.55	5.17	3.52
.833	5.03	2.333	10.06	3.833	8.04	5.33	3.02
1.000	5.03	2.500	10.06	4.000	8.55	5.50	3.52
1.167	5.03	2.667	50.28	4.167	6.54	5.67	3.52
1.333	5.03	2.833	90.50	4.333	7.04	5.83	3.02
1.500	5.03	3.000	130.73	4.500	6.54	6.00	3.52

Unit Hyd Qpeak (cms)= .223

```
     PEAK FLOW       (cms)=    .212 (i)
     TIME TO PEAK    (hrs)=   3.000
     RUNOFF VOLUME    (mm)=  49.006
     TOTAL RAINFALL   (mm)=  83.800
     RUNOFF COEFFICIENT   =    .585

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

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--------------------
| ROUTE CHN (0111) |
| IN= 2---> OUT= 1 |     Routing time step (min)'=  5.00
--------------------
               <------ DATA FOR SECTION (   1.1) ------>
               Distance      Elevation       Manning
                    .00         215.60         .0500
                   3.00         215.00         .0500      Main Channel
                   3.76         215.00         .0500
                   5.56         215.60         .0000

      <---------------------- TRAVEL TIME TABLE ----------------------->
       DEPTH    ELEV      VOLUME    FLOW RATE    VELOCITY   TRAV.TIME
         (m)     (m)     (cu.m.)      (cms)        (m/s)      (min)
         .03  215.03    .701E+01         .0          .18      22.93
         .06  215.06    .160E+02         .0          .29      14.14
         .09  215.09    .270E+02         .0          .39      10.61
         .13  215.13    .400E+02         .1          .48       8.65
         .16  215.16    .550E+02         .1          .56       7.38
         .19  215.19    .720E+02         .2          .64       6.48
         .22  215.22    .909E+02         .3          .72       5.80
         .25  215.25    .112E+03         .4          .79       5.27
         .28  215.28    .135E+03         .5          .86       4.85
         .32  215.32    .160E+03         .6          .93       4.50
         .35  215.35    .187E+03         .7          .99       4.21
         .38  215.38    .216E+03         .9         1.05       3.95
         .41  215.41    .247E+03        1.1         1.12       3.74
         .44  215.44    .280E+03        1.3         1.17       3.55
         .47  215.47    .314E+03        1.6         1.23       3.38
         .51  215.51    .351E+03        1.8         1.29       3.23
         .54  215.54    .390E+03        2.1         1.35       3.09
         .57  215.57    .431E+03        2.4         1.40       2.97
         .60  215.60    .474E+03        2.8         1.46       2.86

                                  <---- hydrograph ---->   <-pipe / channel->
                           AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                           (ha)    (cms)   (hrs)   (mm)       (m)       (m/s)
     INFLOW : ID= 2 (0102)    1.39      .21    3.00  49.01       .20       .67
     OUTFLOW: ID= 1 (0111)    1.39      .20    3.17  48.92       .19       .65


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--------------------
| ADD HYD   (0117) |
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
         ID1= 1 (0114):     4.45     .423     3.50    61.89
       + ID2= 2 (0111):     1.39     .196     3.17    48.92
         ================================================
         ID = 3 (0117):     5.85     .612     3.08    58.80

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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-------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD    (0105) |   Area    (ha)=   4.82   Curve Number   (CN)= 66.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=    .35

     Unit Hyd Qpeak  (cms)=    .522

     PEAK FLOW       (cms)=    .327 (i)
     TIME TO PEAK    (hrs)=   3.167
     RUNOFF VOLUME    (mm)=  29.527
     TOTAL RAINFALL   (mm)=  83.800
     RUNOFF COEFFICIENT   =    .352

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

-------------------------------------------------------------------------------
--------------------
| ROUTE CHN (0113) |
| IN= 2---> OUT= 1 |     Routing time step (min)'=  5.00
--------------------
               <------ DATA FOR SECTION (   1.1) ------>
               Distance      Elevation       Manning
                    .00         215.60         .0500
                   1.80         215.00     .0500 / .0500  Main Channel
                   2.56         215.00     .0500 / .0500  Main Channel
                   4.36         215.60         .0500

      <---------------------- TRAVEL TIME TABLE ----------------------->
       DEPTH    ELEV      VOLUME    FLOW RATE    VELOCITY   TRAV.TIME
         (m)     (m)     (cu.m.)      (cms)        (m/s)      (min)
         .03  215.03    .541E+01         .0          .15      22.38
         .06  215.06    .120E+02         .0          .25      13.54
         .09  215.09    .198E+02         .0          .33      10.01
         .13  215.13    .288E+02         .1          .41       8.05
         .16  215.16    .390E+02         .1          .49       6.79
         .19  215.19    .504E+02         .1          .56       5.91
         .22  215.22    .630E+02         .2          .63       5.25
         .25  215.25    .768E+02         .3          .70       4.74
         .28  215.28    .917E+02         .4          .77       4.33
         .32  215.32    .108E+03         .4          .83       4.00
         .35  215.35    .125E+03         .6          .90       3.72
         .38  215.38    .144E+03         .7          .96       3.48
         .41  215.41    .164E+03         .8         1.02       3.28
         .44  215.44    .185E+03        1.0         1.08       3.10
         .47  215.47    .207E+03        1.2         1.13       2.94
         .51  215.51    .230E+03        1.4         1.19       2.80
         .54  215.54    .255E+03        1.6         1.24       2.68
         .57  215.57    .280E+03        1.8         1.30       2.57
         .60  215.60    .307E+03        2.1         1.35       2.47

                                  <---- hydrograph ---->   <-pipe / channel->
                           AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                           (ha)    (cms)   (hrs)   (mm)       (m)       (m/s)
     INFLOW : ID= 2 (0105)    4.82      .33    3.17  29.53       .27       .75
     OUTFLOW: ID= 1 (0113)    4.82      .32    3.25  29.50       .27       .74


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| CALIB            |
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| NASHYD    (0112) |   Area    (ha)=   1.40   Curve Number   (CN)= 75.0
|ID= 1 DT=10.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=    .24

     Unit Hyd Qpeak  (cms)=    .222

     PEAK FLOW       (cms)=    .157 (i)
     TIME TO PEAK    (hrs)=   3.000
     RUNOFF VOLUME    (mm)=  37.478
     TOTAL RAINFALL   (mm)=  83.800
     RUNOFF COEFFICIENT   =    .447

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

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--------------------
| ROUTE CHN (0109) |
| IN= 2---> OUT= 1 |     Routing time step (min)'=  5.00
--------------------
               <------ DATA FOR SECTION (   1.1) ------>
               Distance      Elevation       Manning
                    .00         215.60         .0500
                   1.80         215.00     .0500 / .0500  Main Channel
                   3.80         215.00         .0500      Main Channel
                   5.60         215.60         .0500

      <---------------------- TRAVEL TIME TABLE ----------------------->
       DEPTH    ELEV      VOLUME    FLOW RATE    VELOCITY   TRAV.TIME
         (m)     (m)     (cu.m.)      (cms)        (m/s)      (min)
         .03  215.03    .813E+01         .0          .14      14.28
         .06  215.06    .170E+02         .0          .23       8.87
         .09  215.09    .266E+02         .1          .31       6.68
         .13  215.13    .369E+02         .1          .38       5.45
         .16  215.16    .480E+02         .2          .44       4.64
         .19  215.19    .598E+02         .2          .50       4.07
         .22  215.22    .724E+02         .3          .56       3.64
         .25  215.25    .857E+02         .4          .62       3.30
         .28  215.28    .997E+02         .5          .68       3.03
         .32  215.32    .114E+03         .7          .73       2.80
         .35  215.35    .130E+03         .8          .78       2.61
         .38  215.38    .146E+03        1.0          .84       2.45
         .41  215.41    .163E+03        1.2          .89       2.31
         .44  215.44    .181E+03        1.4          .94       2.18
         .47  215.47    .199E+03        1.6          .99       2.08
         .51  215.51    .218E+03        1.8         1.04       1.98
         .54  215.54    .238E+03        2.1         1.08       1.89
         .57  215.57    .259E+03        2.4         1.13       1.81
         .60  215.60    .280E+03        2.7         1.18       1.74

                                  <---- hydrograph ---->   <-pipe / channel->
                           AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                           (ha)    (cms)   (hrs)   (mm)       (m)       (m/s)
     INFLOW : ID= 2 (0112)    1.40      .16    3.00  37.48       .15       .42
     OUTFLOW: ID= 1 (0109)    1.40      .15    3.08  37.44       .15       .42


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--------------------
| ADD HYD   (0103) |
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
         ID1= 1 (0113):     4.82     .320     3.25    29.50
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       + ID2= 2 (0109):     1.40     .152     3.08    37.44
         ================================================
         ID = 3 (0103):     6.22     .456     3.17    31.29

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| ADD HYD   (0106) |
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
         ID1= 1 (0117):     5.85     .612     3.08    58.80
       + ID2= 2 (0103):     6.22     .456     3.17    31.29
         ================================================
         ID = 3 (0106):    12.07    1.030     3.08    44.62

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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 FINISH
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