MISSISSAUGA BUS RAPID TRANSIT
WEST: WINSTON CHURCHILL BOULEVARD TO ERIN MILLS PARKWAY

DRAINAGE AND STORMWATER MANAGEMENT
DRAFT PRELIMINARY DESIGN REPORT

McCormick Rankin Corporation
June 2008

TABLE OF CONTENTS

LIST OF TABLES

LIST OF EXHIBITS

LIST OF APPENDICES

1.0 INTRODUCTION

The City of Mississauga and GO Transit propose to develop a bus-only grade-separated busway in support of GO Transit's inter-regional bus services, Mississauga Transit's bus services, and the MTO's High Occupancy Vehicle lanes on the highway. This Preliminary Drainage and Stormwater Management report addresses the section of the proposed works (BRT west) between Winston Churchill Boulevard and Erin Mills Parkway, which will include two transit stations with parking facilities and approximately 1.5 km of busway.

The following report provides a preliminary design for the BRT drainage system and recommendations for stormwater management measures. The proposed design and recommendations are based on an evaluation of the existing drainage systems, including that of the adjacent Highway 403, and the proposed BRT profile. Areas contributing drainage to the BRT corridor have been delineated, design/evaluation criteria have been defined based on the current policy framework and hydrologic calculations and modeling have been completed to quantify flow contributions during various return period rainfall events.

2.0 STUDY AREA

BRT west is located within the hydro corridor north of Highway 403 and extends from Winston Churchill Boulevard to Erin Mills Parkway (see Exhibit 1). It is located within the limits of the Credit Valley Conservation Authority (CVC) and is within the catchment areas of Sawmill and Mullett Creeks, however there are no creek crossings within this section.

3.0 PURPOSE AND OBJECTIVE

Construction of the BRT will progress over the next several years. The purpose of this study is to identify existing and future drainage features and provide a preliminary and conceptual description of preferred locations and methods for stormwater management.

The key objective of this study is to develop a water resources management conceptual plan consistent with the recommendations of the 1992 Environmental Assessment (EA) and the 2004 EA Addendum, the current policies of the Credit Valley Conservation Authority (CVC), the City of Mississauga, Go Transit and MTO.

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4.0 REVIEW OF BACKGROUND INFORMATION

4.1 Field Reconnaissance

Field inspections of the existing drainage features including culverts, water courses, sewer intakes and existing stormwater management facilities were conducted by the study team to observe the condition of the existing drainage systems and confirm the accuracy of topographic mapping and background information.

4.2 Background Studies and Information

Information reviewed as a part of this study includes:

- *Mississauga Transitway Environmental Assessment Report,* McCormick Rankin Corporation, January 1992;
- *Mississauga Transitway EA Addendum*, McCormick Rankin Corporation, October 2004;
- *Stormwater Management Design Brief Erin Mills Neighbourhood 408 Plan 21T-94025*, Earth Tech Canada Inc., August 2000;
- *Drainage and Stormwater Management Report – Highway 403 Widening from Highway 407 to Highway 401,* Winter Environmental Consulting, October 2001;
- *Highway 403 - Culvert Investigation Report from Highway 407 to Highway 401,* Winter Environmental Consulting, November 2000;
- MTO contract drawings Highway 403 – Contract 2003-2012, The Green Galloway Group Inc.;
- *City of Mississauga Development Requirements Manual*, Transportation and Works Department, January 2002;
- *MTO Highway Drainage Design Standards,* January 2008;
- *MOE Stormwater Management Planning and Design Manual,* March 2003;
- *Soil Survey of Ontario - Soil Map of Peel County*, Soil Survey Report No.18;
- OBM mapping and aerial photographs; and
- *Mississauga Storm Sewer Network,* Transportation and Works Department, 2003

5.0 DESIGN CRITERIA

5.1 Hydraulic Criteria

Based on discussions with City of Mississauga staff, the drainage system for the BRT is to be designed based on the *MTO Highway Drainage Design Standards* for a freeway. As such, the design criteria for this preliminary design are as follows:

- Minor system to be designed for the 10 year event;
- Major system to be designed for the 100 year event;
- Either an overland flow route (swale, ditch or realigned watercourse) or a storm sewer shall convey external runoff from the point of interception to the receiving watercourse. The capacity of this flow route shall be sufficient to convey the major system design flow; and
- Minimum culvert sizes are as follows:
  - 800 mm minimum diameter for circular culverts
  - 800 mm minimum rise for elliptical or arch culverts
  - 900 mm minimum rise for box culverts.

The criteria identified above allow for the preliminary design of conveyance systems within and external to the BRT and preliminary sizing of stormwater management measures. At the Final Design Stage, additional criteria/standards identified within the *MTO Highway Drainage Design Standards* must be applied to complete the detailed design of the BRT drainage system including but not limited to: storm sewer sizing, catchbasin spacing, bridge deck drainage, sag and spread analyses, and ditch and culvert sizing.

5.2 Stormwater Management Criteria

MTO requires that quantity control be provided for any new development prior to discharging to the Highway 403 drainage system. Furthermore, due to capacity restrictions, quantity control must be provided prior to discharging to any municipal sewer. As such, water quantity control is to be provided by reducing proposed conditions peak flows to existing rates for all storms up to and including the 100 year event.

In accordance with CVC requirements, Enhanced water quality control must be provided for any new development. Enhanced control is defined by the MOE Guidelines as requiring 80% or greater removal of suspended solids.

6.0 EXISTING CONDITIONS

The proposed BRT west lies within the hydro corridor. Surrounding land use varies from residential development, highway infrastructure and hydro corridor. Terrain is gently undulating and generally slopes from north to south. Based on the Soil Survey mapping, soils within the study area are predominantly clay loam consisting of shale and limestone with good to imperfect drainage.

6.1 Existing Drainage Conditions

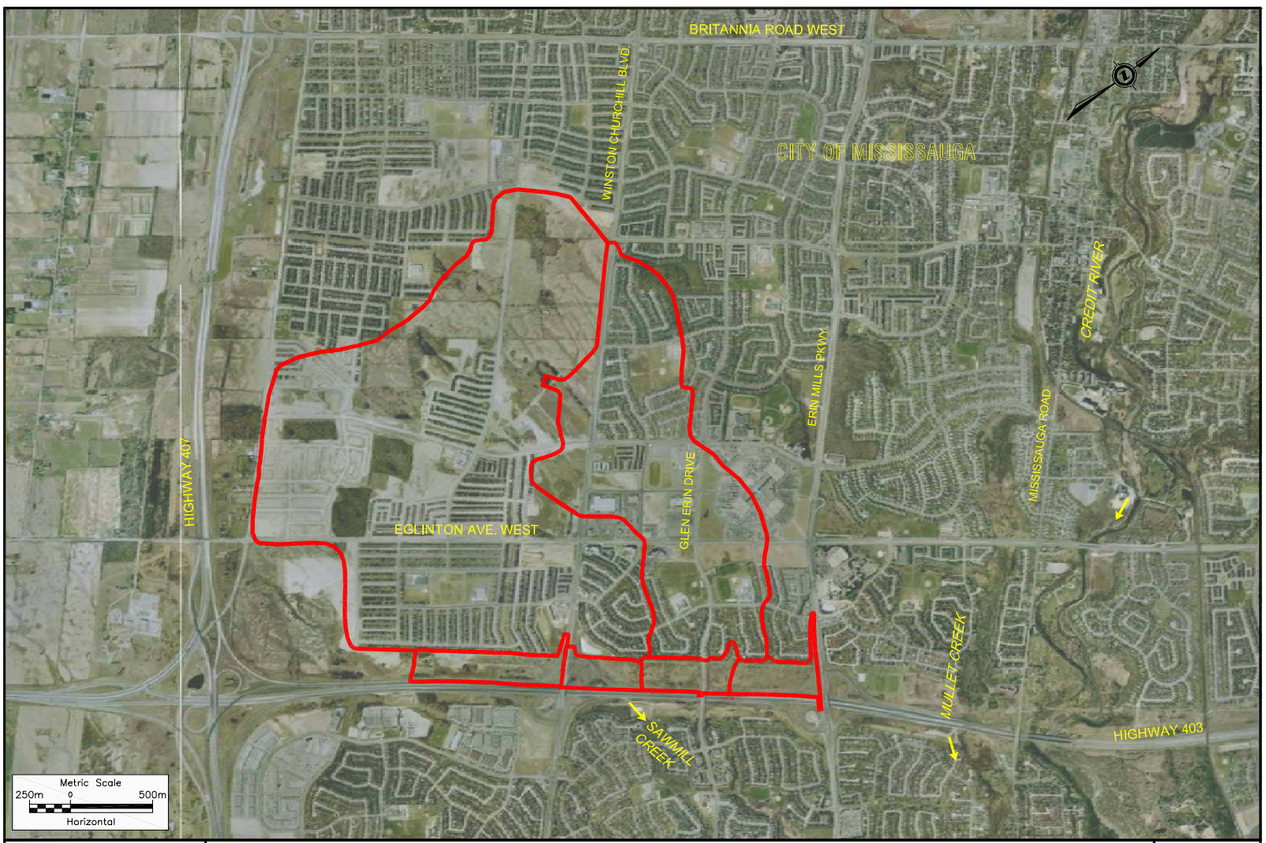
Exhibits 2 to 4 illustrate the drainage areas in the vicinity of the BRT west project limits. The existing drainage system consists primarily of open ditches, culverts and storm sewers. Three outlet points (Outlets 1, 2 and 3) were identified and the contributing drainage areas were divided according to these three outlet points. A summary of the three outlet points and their contributing drainage areas are summarized below:

- **Outlet 1 - twin 1200 mm diameter pipes (Outlet 1A) and Twin 2590 mm diameter trunk sewer (Outlet 1B):** Twin 1200 mm diameter pipes (Outlet 1A) cross Highway 403 just east of Winston Churchill Boulevard. The contributing drainage area to Outlet 1A is approximately 31.0 ha and consists entirely of Highway 403 and Hydro corridor areas. Runoff generated from the portion of this area located north of Highway 403 (21.2 ha - Catchments 1-1 to 1-3 on Exhibit 3) is conveyed by side ditches and culverts under the highway ramps to the upstream end of the twin 1200 mm pipes. Minor event runoff from this area combines with runoff from Highway 403 (9.80 ha – Catchment MTO 103) and is conveyed through the twin 1200 mm pipes to a ditch on the south side of Highway 403. The ditch runs easterly to MTO Pond 2 and discharge from this facility is conveyed to Sawmill Creek through twin 2590 mm diameter storm trunk sewer (Outlet 1B). The twin 1200 mm pipes have adequate capacity to convey major event runoff from Catchments 1-1 to 1-3 and the existing MTO Pond 2 is sized to accommodate major event flows from these areas; however the preliminary review of existing grades at the twin pipes inlet indicates that major event runoff from Catchments 1-1 to 1-3 continues eastward via ditch and culvert to Outlet 1B along with all runoff from Catchment 1-4. Major event runoff conditions for Catchments 1-1 to 1-3 will be confirmed at the detailed design stage. As a part of this preliminary study, it has been confirmed that the twin pipes and MTO Pond 2 have capacity for major flows from these areas, but it is assumed that they are conveyed to Outlet 1B.

- **Outlet 2 - twin 2400 mm diameter pipes:** Twin 2400 mm pipes run southerly and cross Highway 403 just east of Glen Erin Drive and ultimately discharge to Sawmill Creek. The approximate contributing drainage area to the twin pipes is 201 ha which includes a portion of the Highway 403 and Hydro corridors in addition to approximately 189 ha of residential lands north of the study area. Runoff generated within the Hydro corridor to the west and east of Glen Erin Drive is conveyed by natural watercourses, ditches and a culvert under Glen Erin Drive to a catchbasin and an inlet structure that discharge to the twin 2400 mm

pipes just north Highway 403.

- **Outlet 3 - culvert at Erin Mills Parkway:** This culvert conveys runoff from approximately 11.80 ha of Highway 403 and Hydro corridor lands. Runoff generated within the area west of Erin Mills Parkway is conveyed to Outlet 3 via side ditches and a culvert under the ramp located west of Erin Mills Parkway. Outflow from Outlet 3 is ultimately conveyed to Mullett Creek, east of Erin Mills Parkway, by highway ramp culverts and side ditches.



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MRC	DRAINAGE AREAS BRT WEST MISSISSAUGA BRT	EXHIBIT 2

LEGEND

- CATCHMENT BOUNDARY
- EXISTING CULVERT
- EXISTING STORM SEWER
- EXISTING DITCH/SWALE
- FLOW DIRECTION
- 1-1 / 14.6 ha — CATCHMENT ID / CATCHMENT AREA

1.0 / 410.5 ha

2.0 / 189.2 ha

1-1 / 14.6 ha

1-2 / 2.4 ha

1-3 / 4.2 ha

1-4 / 5.3 ha

2-1 / 7.3 ha

MTO 103 / 9.8 ha

HIGHWAY 403

WINSTON CHURCHILL BLVD

TWIN-2590mmø STM SEWERS

EXIST. CONC. 1500mm INLET

EXIST. CB

OUTLET 1B

INV. 168.50

TWIN-1220mm DIAM. HDPE

TWIN-2590mm STM SEWERS

INV. 167.97

OUTLET 1A

SAW MILL CREEK SWM FACILITY

MTO-HWY 403 SWM POND 2 (DRAINAGE AREA=26.90 ha)

Metric Scale
50m 0 100m
Horizontal

MRC

EXISTING CONDITIONS DRAINAGE MOSAIC - MAP 1

BRT WEST MISSISSAUGA

EXHIBIT 3

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2.0
189.2 ha

2-1
7.3 ha

2-2
4.6 ha

3-1
8.6 ha

3-2
3.2 ha

GLEN ERIN DRIVE

ERIN MILLS PARKWAY

EXISTING TWIN 2400mmø STM SEWERS

EXIST. INLET

EXIST. CB

TWIN-2590mmø STM SEWERS

OUTLET 2

OUTLET 3

HIGHWAY 403

SAW MILL CREEK

MULLETT CREEK SWM FACILITY

MULLETT CREEK

LEGEND

- CATCHMENT BOUNDARY
- EXISTING CULVERT
- EXISTING STORM SEWER
- EXISTING DITCH/SWALE
- FLOW DIRECTION
- 3-1 / 8.6 ha — CATCHMENT ID / CATCHMENT AREA

Metric Scale
50m 0 100m
Horizontal

MRC

EXISTING CONDITIONS DRAINAGE MOSAIC - MAP 2

BRT WEST MISSISSAUGA

EXHIBIT
4

7.0 PROPOSED CONDITIONS

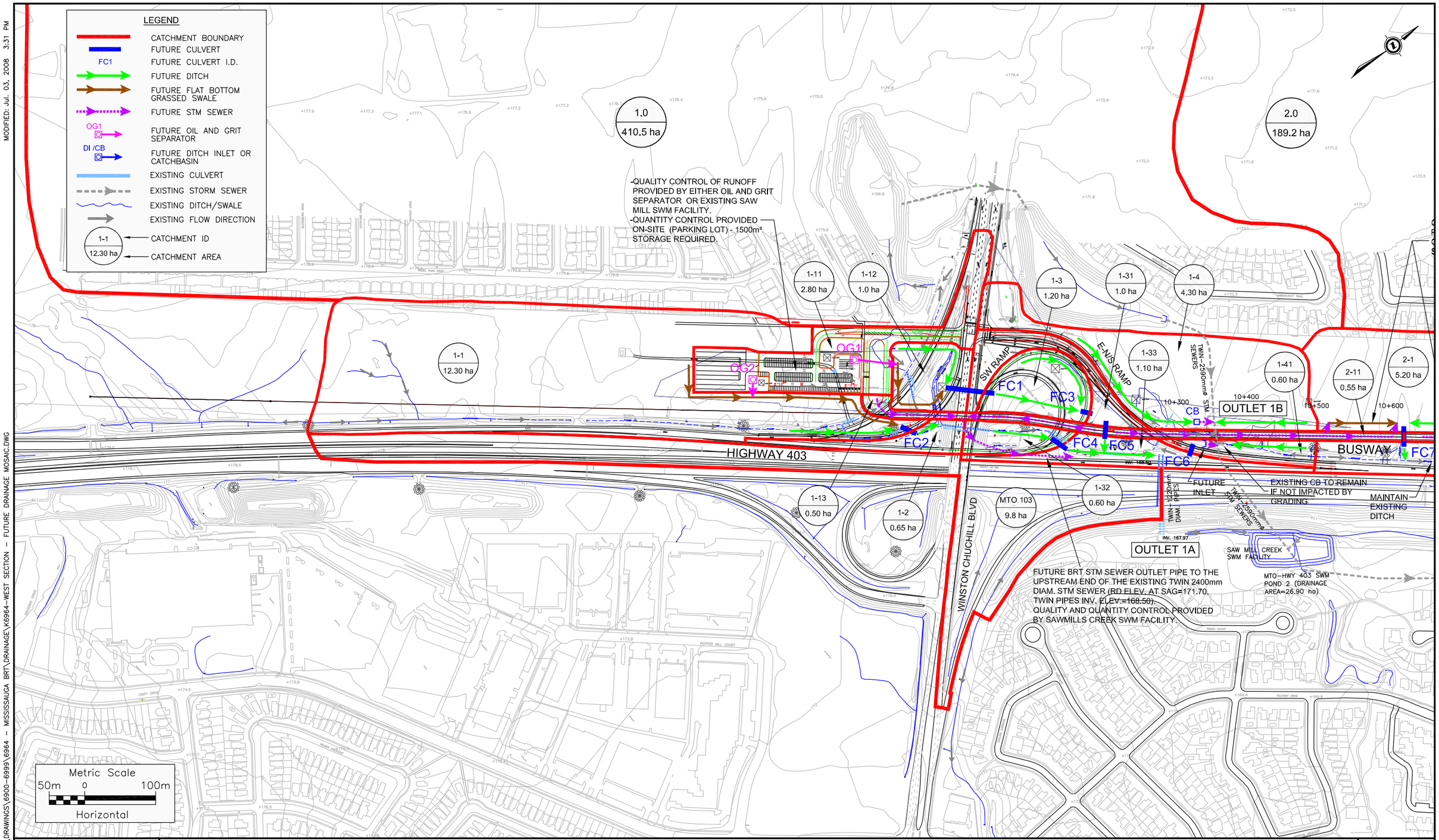
The BRT west consists of stations (platforms, parking lots, access roads, passenger pick up / drop off areas, access paths) in the northwest quadrant of both the Erin Mills Parkway and Winston Churchill Boulevard interchanges with Highway 403, connected by a two lane two-way bus-only roadway over a distance of approximately 1.5 km. The initial development of the BRT stations will provide 100 spaces for Park and Ride/carpool use, with additional grading to accommodate another 100 parking spaces if demand warrants more capacity.

The 1.5 km busway link between the BRT Stations will provide grade-separated crossings of all roadways and interchange ramps. It will pass under the N-W interchange ramp at Winston Churchill Boulevard, Winston Churchill Boulevard itself, and Glen Erin Drive and it will pass over the S-W loop ramp and the E-N/S exit ramp at the Winston Churchill Boulevard interchange. Other than at road crossings, the busway will be constructed essentially at-grade.

The busway will be comprised of two 3.75m bus-only lanes, with an additional 2.75m paved maintenance strip adjacent to each lane. Where below-grade, the busway will largely be in open cut. However, in sections where there is a constrained right-of-way, retaining walls will be implemented to reduce the required width of the busway, creating an open trench. This configuration will be most predominant where the busway crosses the Winston Churchill Boulevard interchange.

7.1 Proposed Drainage Conditions

The proposed modifications to the existing drainage system include new ditches and culverts, flat bottom grassed swales, oil and grit separators, storm sewers and a new stormwater management facility located to the west of Erin Mills Parkway. These modifications are discussed in the following sections and illustrated on Exhibits 5 and 6. Per the hydraulic criteria identified in Section 5.1, all new culverts and ditches will be designed to convey the 100 year event. Additionally, catchbasin spacing and storm sewer sizing at sags within the BRT corridor must be sufficient to capture the 100 year event. A preliminary sizing estimate of all new culverts is provided in Section 10 of this report; however storm sewer sizing and catchbasin spacing will be designed at the detailed design stage and hence are not presented here within.



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FUTURE CONDITIONS DRAINAGE MOSAIC - MAP 1

MISSISSAUGA WEST BRT

EXHIBIT

5

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2.0
189.2 ha

QUANTITY CONTROL STORAGE PROVIDED IN FLAT BOTTOM GRASSED SWALES (PROVIDE 600m³ SWALE STORAGE)

ALTERNATIVES TO TREAT STORM RUNOFF FROM PARKING LOT:
ALT. 1: STORMWATER MANAGEMENT FACILITY (0.40 ha SURFACE AREA)
ALT. 2: OIL AND GRIT SEPARATOR AND 2600m³ OF PARKING LOT UNDERGROUND STORAGE

FUTURE SWM FACILITY
SURFACE AREA = 0.40 ha
% IMP. = 85%
TOP ELEV = 164.00 ±
BOTTOM = ELEV = 161.00 ±

GLEN ERIN DRIVE

ERIN MILLS PARKWAY

2-11
0.55 ha

2-1
5.20 ha

2-13
0.72 ha

2-2
3.40 ha

3-1
3.30 ha

3-11
3.90 ha

FUTURE INLET

DI

10+600
10+700
10+800
10+900
11+000
11+100
11+300

BUSWAY

FC7

FC8

FC9

OG

EXIST. CB

EXIST. INLET

REMAIN
D BY

MAINTAIN EXISTING DITCH

2-12
2.70 ha

MAINTAIN EXISTING DITCH, CB AND INLET

EXISTING TWIN 2400mmø STM SEWERS

PROVIDE 300m³ PIPE STORAGE

MAINTAIN EXISTING DITCH

HIGHWAY 403

3-2
4.40 ha

OUTLET 2

OUTLET 3

TO SAWMILL CREEK

TO MULLETT CREEK

SAW MILL CREEK

MULLETT CREEK

MULLETT CREEK SWM FACILITY

Metric Scale
50m 0 100m
Horizontal

LEGEND

- CATCHMENT BOUNDARY
- FUTURE CULVERT
- FC1 — FUTURE CULVERT I.D.
- FUTURE DITCH
- FUTURE FLAT BOTTOM GRASSED SWALE
- FUTURE STM SEWER
- OG1 — FUTURE OIL AND GRIT SEPARATOR
- DI /CB — FUTURE DITCH INLET OR CATCHBASIN
- EXISTING CULVERT
- EXISTING STORM SEWER
- EXISTING DITCH/SWALE
- EXISTING FLOW DIRECTION
- 3-11 / 3.90 ha — CATCHMENT ID / CATCHMENT AREA

MRC

FUTURE CONDITIONS DRAINAGE MOSAIC - MAP 2

MISSISSAUGA WEST BRT

EXHIBIT
6

Runoff generated under proposed conditions will be conveyed to the same three outlets utilized under existing conditions.

7.1.1 *Outlet 1 - Twin 1200 mm Pipes (Outlet 1A) & Twin 2590 mm Trunk Sewer (Outlet 1B)*

The proposed BRT works in this area include a parking lot adjacent to Winston Churchill Boulevard and approximately 350 metres of the new BRT. The location of the E-NS, S-W, and N-W ramps at Winston Churchill Boulevard will be adjusted to accommodate the BRT.

The proposed drainage conditions to this outlet will not vary greatly from those under existing conditions, however the drainage area will decrease from 36.30 ha to 35.25 ha as a portion of the BRT within the existing catchment area will drain eastward to Outlet 2 under proposed conditions. Runoff will continue to be conveyed primarily by a series of side ditches and culverts under the highway ramps to Outlets 1A and 1B, as under existing conditions. Six new culverts (FC1 to FC6 on Exhibit 5) will be installed to replace existing culverts that must be relocated due to the new ramp locations.

Major and minor event runoff from the proposed parking area will be controlled on-site to existing rates via parking lot storage and discharged to Outlet 1 through flat bottomed grass swales, ditches and culverts. BRT drainage (minor and major) will be collected by a new storm sewer at the sag under Winston Churchill Boulevard and conveyed to Outlet 1.

As discussed in Section 6.1, major event runoff conditions for Catchments draining to the twin 1200 mm pipes must be confirmed. For the purposes of this preliminary study, it has been assumed that the twin 1200 mm pipes that represent Outlet 1A will only collect minor event runoff from north of Highway 401. Major event runoff will continue eastward to Outlet 1B. All runoff collected by Outlet 1A will discharge to the ditch and MTO Pond 2 on the south side of Highway Highway 403 as under existing conditions. Discharge from this facility will continue to be conveyed to Sawmill Creek through twin 2590 mm diameter storm trunk sewers. It should be noted that the twin 1200 mm pipes and MTO Pond 2 have adequate capacity for major event flows from Catchments 1-1 to 1-33 under proposed conditions if the quantity control measures identified above and discussed in Section 9.1 are implemented.

Details of the proposed stormwater management measures for the area discharging to Outlet 1 are discussed in Section 9.1.

7.1.2 *Outlet 2 - Twin 2400 mm Diameter Pipes*

The proposed BRT works in this area consist of approximately 970 metres of the BRT. The modifications to the existing drainage system will include a new culvert across the BRT, ditches, flat bottom grassed swales and storm sewers. As with Outlet 1, proposed drainage conditions to Outlet 2 will not be greatly altered from those under existing

conditions. The drainage area will increase slightly from 11.90 ha to 12.57 ha to accommodate portions of the BRT that lie within the existing Outlets 1 and 3 drainage areas. New ditches and one new culvert (FC7) will be installed to convey runoff from north of the BRT to the existing ditch and culvert system south of the BRT that discharges to Outlet 2. Minor event runoff from approximately 0.55 ha of the will be collected by the BRT storm sewer system and discharged to a flat bottom grass swale and the new culvert. Minor event runoff from the remaining BRT area and major event runoff from the entire BRT area will be conveyed by storm sewer and sheet flow, respectively to the sag just east of the twin 2400 mm diameter pipes and then discharged to Outlet 2. Proposed conditions flows will be controlled to existing rates prior to discharging to Outlet 2 via a combination of pipe and surface storage. Details of these controls along with quality control measures are discussed in Section 9.2.

7.1.3 *Outlet 3 - Culvert at Erin Mills Parkway*

The proposed works in this area consist of a approximately 200 m of the BRT and a new parking lot to the west of Erin Mills Parkway. The new parking lot will require the relocation of the S-W ramp at Erin Mills Parkway. The drainage area will decrease to 11.6 ha under proposed conditions (existing = 11.80 ha) due to the conveyance of runoff from the portion of the BRT within the existing Outlet 3 catchment area to Outlet 2. Modifications to the existing drainage system will include a new culvert across the BRT (FC8) and a second new culvert across the new S-W ramp at Erin Mills Parkway (FC9) New diversion ditches will be constructed along the perimeter of the parking lot and along the north edge of the BRT to prevent runoff from external areas from entering the BRT system. These ditches will direct flows to FC8 and the existing Highway 403 ditch and then eastward to FC9 and Outlet 3. Drainage from the parking lot will be controlled to existing rates via a new stormwater management pond and/or parking lot storage prior to discharging to FC9 and Outlet 3. Details of these quantity control measures along with the proposed quality control measures for this area are discussed in Section 9.3.

8.0 HYDROLOGIC ANALYSIS

A hydrologic analysis was completed using SWMHYMO to provide a basis for assessment of flow conditions within the BRT west tributary area and the response to various rainfall events under existing and proposed development conditions. Consistent with the *Drainage and Stormwater Management Report – Highway 403 Widening from Highway 407 to Highway 401,* the 12 hour SCS rainfall distribution was used for the 2 year to 100 year storm events. The 4 hour Chicago distribution was used for the 25 mm event. The rainfall depths associated with the various storm return intervals are listed in Table 1 and were developed from the IDF parameters for Toronto Pearson International Airport. Summaries of the parameters used within the existing and proposed conditions models are provided in Appendices A and B, respectively.

Table 1: Design Storm Rainfall Depth Summary

Storm Event Return Interval (years)	Rainfall Depth (mm)
25 mm	25
2	43.80
10	72.70
50	97.90
100	108.60

As a part of this analysis, a stage-storage-discharge relationship for MTO Pond 2 was developed based on the details provided within the *Drainage and Stormwater Management Report – Highway 403 Widening from Highway 407 to Highway 401* and the drawings for MTO Contract No.2003-2012. Calculations for this stage-storage-discharge relationship are provided in Appendix C.

The model results are provided in Appendices A and B and summarized in Table 2. The proposed conditions model includes preliminary stage-storage-discharge relationships of the quantity control measures discussed below in Section 9. As illustrated in the table below, the proposed flows generally match those of existing conditions. "Fine-tuning" of the stage-storage-discharge" relationships will be completed at the final design stage to ensure that proposed flow rates match, or are below, existing rates.

Table 2: SWMHYMO Output Summary

Storm Event	Flow (m^3/s)							
	Outlet 1A		Outlet 1B		Outlet 2		Outlet 3	
	Existing	Proposed	Existing	Proposed	Existing	Proposed	Existing	Proposed
25 mm	1.19	1.14	0.05	0.04	0.08	0.11	0.11	0.12
2 year	1.06	1.07	0.13	0.18	0.22	0.24	0.25	0.25
10 year	1.70	1.70	0.72	0.73	0.58	0.56	0.61	0.59
50 year	2.27	2.27	1.35	1.30	0.94	0.93	0.98	0.91
100 year	2.51	2.51	1.63	1.55	1.11	1.09	1.14	1.05

9.0 PRELIMINARY STORMWATER MANAGEMENT PLAN

The preliminary stormwater management plan has been designed to meet the water quality and quantity control criteria identified in Section 5.2, above. The following discussion presents the preliminary design of the recommended measures for each outlet location.

9.1 Outlet 1 - Twin 1200 mm Pipes (Outlet 1A) & Twin 2590 mm Trunk Sewer (Outlet 1B)

The recommended stormwater management measures for the area draining to Outlet 1 are as follows:

- Water quantity control for the parking lot area will be provided by parking lot storage. Based on the results of the hydrologic modeling, approximately 1,500 m^3 of storage is required with a maximum discharge rate of 0.15 m^3/s during the 100 year event in order to match existing flow rates at Outlet 1. In the event that sufficient storage cannot be provided within the parking lot, additional storage can be provided within the proposed flat bottom grass swales located immediately downstream of the parking lot.
- Enhanced water quality control will be provided for the proposed parking lot via a treatment train consisting of one or more oil/grit separators (OGS) and flat bottom swales. Alternatively, the required water quality control for the parking lot can be provided by the Existing MTO Pond 2 (see Stormwater Quality Volumetric Requirements calculations in Appendix C).
- Water quantity and enhanced water quality control for the approximate 350 m of BRT within this catchment area will be provided by the existing MTO Pond 2. The proposed parking lot storage has been designed to slightly over-control runoff from the parking lot such that runoff from the BRT can be conveyed to Outlet 2 uncontrolled without increasing flow rates to that outlet. As previously discussed, a stage-storage-discharge relationship for MTO Pond 2 was developed for this study based on the details provided within the *Drainage and Stormwater Management Report – Highway 403 Widening from Highway 407 to Highway 401* and the drawings for MTO Contract No.2003-2012. Based on this assessment, the existing MTO Pond 2 has adequate capacity to provide the required water quantity and quality control for the approximate 350 m of BRT within this catchment area. MTO Pond 2 also has adequate capacity to provide the required quality control for the parking lot if the OGS and flat bottom grass swale treatment train is not deemed the preferred alternative. The MTO Pond 2 stage-storage-discharge relationship and a summary of its water quality requirements under existing and proposed conditions are provided in Appendix C.

9.2 Outlet 2 - Twin 2400 mm Diameter Pipes

The recommended stormwater management measures for the area draining to Outlet 2 are as follows:

- Enhanced water quantity control for approximately 350 m of BRT west of FC7 will be provided by a flat bottom grass swale.
- Quantity control for this reach of the BRT will be provided by attenuation storage within the flat bottom grass swale. Additional attenuation storage will be provided within the proposed ditch that runs westward along the north edge of the BRT for the undeveloped area within the Hydro corridor (Catchment 2-1) that will drain to FC7 to ensure there is no increase in downstream flows. Based on the hydrologic analysis, the combined volume requirement for the ditch and swale is approximately 600 m^3 with a maximum discharge rate of 0.38 m^3/s during the 100 year event.
- Enhanced water quality control for the remaining BRT area will be provided by an OGS. Quantity control for this area will be provided via pipe storage within the BRT right-of-way. Approximately 300 m^3 of pipe storage with a maximum discharge rate of 0.14 m^3/s during the 100 year event will be required to match existing flow rates at Outlet 2.

9.3 Outlet 3 – Culvert at Erin Mills Parkway

The recommended stormwater management measures for the area draining to Outlet 3 are as follows:

- Enhanced water quality control and water quantity control will be provided for the proposed parking lot by a wet pond stormwater management facility located between the Erin Mills Parkway / Highway 403 interchange and the parking lot. The pond will require approximately 0.40 ha of land and will provide a total volume of approximately 5,000 m^3 (1,260 m^3 of permanent pool, 2,850 m^3 of extended detention and attenuation storage, and 900 m^3 of freeboard) to meet the quality and quantity control requirements. The facility will discharge to the proposed new culvert, FC10.
- Alternatively, water quality and quantity control can be provided by one or more OGS units and parking lot storage, respectively. Approximately 2,600 m^3 of parking lot storage will be required to meet the quantity control requirement. If this option is chosen, the OGS units should be designed to outlet to flat bottom grass swales to provide additional cleansing of runoff.

10.0 PRELIMINARY ASSESSMENT OF PROPOSED CULVERTS

The hydrologic modeling was used to estimate 100 year peak flows to each of the 9 proposed new culverts. As grading of the BRT has not been finalized, sizing of the culverts must be completed at the detailed design stage. In the meantime, the hydraulic criteria presented in Section 5.1 can be used as a guide.

Table 3: Proposed Culvert Assessment Summary

Proposed Culvert ID	Estimated 100 Year Flow (m^3/s)
FC1 (1)	0.30
FC2 (2)	0.67
FC3	0.50
FC4	0.71
FC5	0.68
FC6	0.97
FC7	0.40
FC8	0.30
FC9	0.15

Notes:
(1) Assumes all flow from parking lot is conveyed to FC1.
(2) Assumes no flow from parking lot is conveyed to FC2

11.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the preceding report, the following conclusions can be made:

- BRT west will consist of two stations with associated parking areas and approximately 1.5 km of busway
- Three outlets have been identified under existing drainage conditions within the BRT west area including:
  1. twin 1200 mm diameter pipes (Outlet 1A) and Twin 2590 mm diameter trunk sewer (Outlet 1B);
  2. twin 2400 mm diameter pipes east of Glen Erin Drive; and
  3. culvert at Erin Mills Parkway.
- The same three outlets will be utilized under proposed drainage conditions and the existing drainage regime will not be greatly altered under proposed conditions
- Existing peak flow rates at each outlet will not be exceeded under proposed conditions
- Enhanced water quality control will be provided for all new development
- Construction of the BRT west will require installation of 9 new culverts and relocation of several ditches to maintain existing drainage across the BRT and the Highway 403 interchanges at Winston Churchill Boulevard and Erin Mills Parkway.

The principal recommendations of this report are:

- on-site controls such as parking lot storage be implemented to minimize the land requirement of stormwater management facilities;
- oil grit separators be used in combination with flat bottom grass swales to provide a treatment train and ensure that Enhanced water quality control is provided;
- details of major event runoff conditions for Catchments 1-1 to 1-3 that drain to Outlet 1 must be confirmed. This preliminary study assumes that major flows from these catchments drain to Outlet 1B (twin 2590 mm trunk sewer), however it has been confirmed that the twin 1200 mm pipes and MTO Pond 2 have adequate capacity to accommodate these flows.
- at the detailed design stage, catchbasin spacing and storm sewer sizing within the BRT be designed in accordance with the *MTO Highway Drainage Design Standards;* and
- sizing of each of the 10 proposed new culverts be re-examined at the final design stage as parking lot grading may require that additional flow be directed to some of them

All of which is respectfully submitted,
McCormick Rankin Corporation

Kate Macnaughton, P.Eng.

APPENDIX A
EXISTING CONDITIONS SWMHYMO MODELING

Summary of Hydrologic Modelling Parameters
Existing Conditions BRT WEST

Subcatchment I.D.	Instantaneous Unit Hydrograph Classification	Drainage Area (ha)	Imperviousness (%) Direct	+ Indirect	= Total	SCS Curve Number	Initial Abstraction (mm) Pervious	Impervious	Manning's 'n' Pervious	Impervious	Time to Peak (hours)	Number of Linear Reservoirs	Flow Length (m) Pervious	Impervious	Slope (%) Pervious	Impervious
1.1	Nash	14.6	5	0	5	80	6.5	n/a	n/a	n/a	1.1	3	n/a	n/a	n/a	n/a
1.2	Nash	2.4	15	0	15	82	6.0	n/a	n/a	n/a	0.2	3	n/a	n/a	n/a	n/a
1.3	Standard	4.20	20	0	20	79	5.0	2.0	0.35	0.015	n/a	n/a	40	167	2.00	1.00
1.4	Nash	5.30	0	0	0	79	6.8	n/a	n/a	n/a	0.3	3	n/a	n/a	n/a	n/a
2.1	Nash	7.30	5	0	5	80	6.5	n/a	n/a	n/a	0.6	3	n/a	n/a	n/a	n/a
2.2	Nash	4.60	5	0	5	80	6.5	n/a	n/a	n/a	0.2	3	n/a	n/a	n/a	n/a
3.1	Nash	8.60	2	0	2	79	6.7	n/a	n/a	n/a	0.5	3	n/a	n/a	n/a	n/a
3.2	Standard	3.20	20	0	20	79	5.0	2.0	0.35	0.015	n/a	n/a	5	1,000	2.00	1.00
MTO103	Standard	9.80	80	0	80	79	5.0	2.0	0.35	0.015	n/a	n/a	40	256	2.00	1.00

Notes:
Catchment MTO103 represents the portion of Catchment 103 identified in *Highway 403 Drainage and SWM Report,* (Winter Environmental Consulting, October 2001) that drains to the MTO Sawmill Creek SWM facility that is not accounted for in the catchments identified for this study.


```
00001> 2
00002> ********************************************************************************
00003> * MISSISSAUGA BRT - WEST                                          JOB: 06964 *
00004> * Proposed CONDITIONS TO OUTLET #1                                           *
00005> ********************************************************************************
00006> *                                                                              *
00007> * - 2, 10, 50 and 100yr, 12hr Design Storms (SCS)                             *
00008> * - 25 mm 4 hr Chicago                                                        *
00009> * - Rainfall depths estimated based on Toronto Pearson                        *
00010> *   west of and including Toronto                                             *
00011> *                                                    K. Macnaughton          *
00012> *                                                    As of: June 27, 2008    *
00013> ********************************************************************************
00014> *
00015> *
00016> START              TIME= 0   METOUT= 0  NSTORM=1  NRUN="001"
00017>                    CHIC25mm.stm
00018> *
00019> READ STORM         STORM_FILENAME="STORM.001"
00020> *
00021> CALIB STANDHYD     ID=1  NHYD=["1.11"], DT=[2](min), AREA=[2.8](ha),
00022>                    XIMP=[0.99], TIMP=[0.99], DWF=[0](cms), LOSS=[2],
00023>                    SCS curve number CN=[98],
00024>                    Pervious   surfaces: IAper=[5](mm), SLPP=[2](%),
00025>                                         LGP=[40](m), MNP=[.35], SCP=[0](min),
00026>                    Impervious surfaces: IAimp=[2](mm), SLPI=[1](%),
00027>                                         LGI=[137](m), MNI=[.015], SCI=[0](min),
00028>                    RAINFALL=[ ,  ,  ,  ,](mm/hr) ,  END=-1
00029> *
00030> COMPUTE VOLUME     ID=1 STRATE=-100  RELRATE=0.0
00031>
00032> *%------------------------------
00033> * Parking lot storage
00034> *%------------------------------
00035> ROUTE RESERVOIR    IDout=[2],  NHYD=["710"],  IDin=[1],
00036>                    RDT=[2](min),
00037>                          TABLE of ( OUTFLOW-STORAGE ) values
00038>                                   (cms) - (ha-m)
00039>                                [   0.0 ,  0.0 ]
00040>                                [  0.025, 0.0250]
00041>                                [  0.10, 0.0500]
00042>                                [  0.15, 0.1500]
00043>                                [  0.20, 0.2000]
00044>                                [  -1  ,  -1  ]  (max twenty pts)
00045>                    IDovf=[], NHYDovf=["*"]
00046> *
00047> CALIB NASHYD      ID=1  NHYD=["1.12"], DT=[2 ]min, AREA=[1.0](ha),
00048>                    DWF=[0](cms),  CN/C=[80], IA=[6.5](mm),
00049>                    N=[3], TP=[0.2]hrs,
00050>                    RAINFALL=[ ,  ,  ,  ,](mm/hr),  END=-1
00051> *
00052> ADD HYD           IDsum=[10], NHYD=["810"], IDs to add=[1,2]
00053> *
00054> CALIB NASHYD      ID=1  NHYD=["1.2"], DT=[2 ]min, AREA=[1.2](ha),
00055>                    DWF=[0](cms),  CN/C=[80], IA=[6.5](mm),
00056>                    N=[3], TP=[0.1]hrs,
00057>                    RAINFALL=[ ,  ,  ,  ,](mm/hr),  END=-1
00058> *
00059> ADD HYD           IDsum=[9], NHYD=["820"], IDs to add=[1,10]
00060> *
00061> CALIB NASHYD      ID=1  NHYD=["1.31"], DT=[2 ]min, AREA=[1.0](ha),
00062>                    DWF=[0](cms),  CN/C=[80], IA=[6.5](mm),
00063>                    N=[3], TP=[0.1]hrs,
00064>                    RAINFALL=[ ,  ,  ,  ,](mm/hr),  END=-1
00065> *
00066> ADD HYD           IDsum=[10], NHYD=["830"], IDs to add=[1,9]
00067> *
00068> CALIB NASHYD      ID=1  NHYD=["1.33"], DT=[2 ]min, AREA=[1.1](ha),
00069>                    DWF=[0](cms),  CN/C=[82], IA=[6.5](mm),
00070>                    N=[3], TP=[0.2]hrs,
00071>                    RAINFALL=[ ,  ,  ,  ,](mm/hr),  END=-1
00072> *
00073> ADD HYD           IDsum=[9], NHYD=["840"], IDs to add=[1,10]
00074> *
00075> CALIB NASHYD      ID=1  NHYD=["1.1"], DT=[2 ]min, AREA=[12.3](ha),
00076>                    DWF=[0](cms),  CN/C=[80], IA=[6.5](mm),
00077>                    N=[3], TP=[1.1]hrs,
00078>                    RAINFALL=[ ,  ,  ,  ,](mm/hr),  END=-1
00079> *
00080> CALIB NASHYD      ID=2  NHYD=["1.2"], DT=[2 ]min, AREA=[.65](ha),
00081>                    DWF=[0](cms),  CN/C=[80], IA=[6.5](mm),
00082>                    N=[3], TP=[0.3]hrs,
00083>                    RAINFALL=[ ,  ,  ,  ,](mm/hr),  END=-1
00084> *
00085> ADD HYD           IDsum=[10], NHYD=["850"], IDs to add=[1,2]
00086> *
00087> CALIB NASHYD      ID=1  NHYD=["1.32"], DT=[2 ]min, AREA=[.60](ha),
00088>                    DWF=[0](cms),  CN/C=[80], IA=[6.5](mm),
00089>                    N=[3], TP=[0.2]hrs,
00090>                    RAINFALL=[ ,  ,  ,  ,](mm/hr),  END=-1
00091> *
00092> ADD HYD           IDsum=[8], NHYD=["860"], IDs to add=[1,10]
00093> *
00094> ADD HYD           IDsum=[10], NHYD=["870"], IDs to add=[9,8]
00095> *
00096> *%------------------------------------------------------------------------------
00097> * Majors to Outlet 1B
00098> * Minors to MTO Hwy 403 Twin Culverts - Same flow assumed as for existing condit
00099> *%------------------------------------------------------------------------------
00100> COMPUTE DUALHYD     IDin=[10], CINLET=[0.252](cms), NINLET=[1],
00101>                    MAJID=[7], MajNHYD=["870.1"],
00102>                    MINID=[8], MinNHYD=["870.2"],
00103>                    TMJSTO=[0](cu-m)
00104> *
00105> CALIB NASHYD      ID=1  NHYD=["1.4"], DT=[2 ]min, AREA=[4.3](ha),
00106>                    DWF=[0](cms),  CN/C=[79], IA=[6.8](mm),
00107>                    N=[3], TP=[0.3]hrs,
00108>                    RAINFALL=[ ,  ,  ,  ,](mm/hr),  END=-1
00109> *
00110> CALIB NASHYD      ID=2  NHYD=["1.41"], DT=[2 ]min, AREA=[0.6](ha),
00111>                    DWF=[0](cms),  CN/C=[80], IA=[6.5](mm),
00112>                    N=[3], TP=[0.1]hrs,
00113>                    RAINFALL=[ ,  ,  ,  ,](mm/hr),  END=-1
00114> *
00115> *%-------------------------
00116> * Total to Outlet 1B
00117> *%-------------------------
00118> *
00119> ADD HYD           IDsum=[10], NHYD=["875"], IDs to add=[1,2,7]
00120> *
00121> CALIB STANDHYD     ID=1  NHYD=["MTO103"], DT=[2](min), AREA=[9.8](ha),
00122>                    XIMP=[0.8], TIMP=[0.8], DWF=[0](cms), LOSS=[2],
00123>                    SCS curve number CN=[79],
00124>                    Pervious   surfaces: IAper=[5](mm), SLPP=[2](%),
00125>                                         LGP=[40](m), MNP=[.35], SCP=[0](min),
00126>                    Impervious surfaces: IAimp=[2](mm), SLPI=[1](%),
00127>                                         LGI=[256](m), MNI=[.015], SCI=[0](min),
00128>                    RAINFALL=[ ,  ,  ,  ,](mm/hr) ,  END=-1
00129> *
00130> ADD HYD           IDsum=[9], NHYD=["890"], IDs to add=[8,1]
00131> *
00132> *COMPUTE VOLUME     ID=9 STRATE=-100  RELRATE=0.0
00133> *
00134> *%--------------------------------
00135> * Existing Sawmill Creek MTO Pond
00136> *%--------------------------------
00137> ROUTE RESERVOIR    IDout=[1],  NHYD=["700"],  IDin=[9],
00138>                    RDT=[2](min),
00139>                          TABLE of ( OUTFLOW-STORAGE ) values
00140>                                   (cms) - (ha-m)
00141>                                [   0.0 ,  0.0 ]
00142>                                [  0.008, 0.2389]
00143>                                [  2.863, 0.6631]
00144>                                [  3.937, 0.8236]
00145>                                [  -1  ,  -1  ]  (max twenty pts)
00146>                    IDovf=[2], NHYDovf=["701"]
00147>
00148> *
00149> *COMPUTE VOLUME     ID=2 STRATE=-100  RELRATE=0.0
00150>
00151> START              TIME= 0   METOUT= 0  NSTORM=1  NRUN=008
00152>                    12hrscs2.stm
00153> *
00154> START              TIME= 0   METOUT= 0  NSTORM=1  NRUN=009
00155>                    12hscs10.stm
00156> *
00157> START              TIME= 0   METOUT= 0  NSTORM=1  NRUN=010
00158>                    12hscs50.stm
00159> *
00160> START              TIME= 0   METOUT= 0  NSTORM=1  NRUN=011
00161>                    12scsh.stm
00162>
00163> *
00164> FINISH
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 SSSSS  W   W  M   M  H   H  Y   Y  M   M   OOO        999    999  ---------
 S       W W W  MM MM  H   H   Y Y   MM MM  O   O      9   9  9   9
 SSSSS  W W W  M M M  HHHHH    Y    M M M  O   O  ##  9   9  9   9 Ver. 4.02
     S   W W   M   M  H   H    Y    M   M  O   O      9999   9999 July 1999
 SSSSS   W W   M   M  H   H    Y    M   M   OOO          9      9 ---------
                                                    9   9  9   9 # 4313781
       StormWater Management HYdrologic Model         999    999  ---------

 ***************************************************************************
 ************************* SWMHYMO-99 Ver/4.02 *****************************
 *******  A single event and continuous hydrologic simulation model  *******
 *******      based on the principles of HYMO and its successors     *******
 *******                   OTTHYMO-83 and OTTHYMO-89.                *******
 ***************************************************************************
 ******* Distributed by:  J.F. Sabourin and Associates Inc.          *******
 *******                  Ottawa,  Ontario: (613) 727-5199           *******
 *******                  Gatineau, Quebec: (819) 243-6858           *******
 *******                  E-Mail: swmhymo@jfsa.Com                   *******
 ***************************************************************************

 +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
 +++++++ Licensed user: McCormick Rankin Corporation                 +++++++
 +++++++                Kitchener              SERIAL#:4313781       +++++++
 +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

 ***************************************************************************
 *******              ++++++ PROGRAM ARRAY DIMENSIONS ++++++         *******
 *******              Maximum value for ID numbers  :    10          *******
 *******              Max. number of rainfall points:  15000         *******
 *******              Max. number of flow points    :  15000         *******
 ***************************************************************************


 ******************     D E T A I L E D   O U T P U T     *****************
 ***************************************************************************
 *       DATE: 2008-07-03     TIME: 10:33:53     RUN COUNTER: 000198      *
 ***************************************************************************
 * Input   filename: K:\Projects\6900-6-1\6964-M-1\21-HYD-1\ExWEST1.dat   *
 * Output  filename: K:\Projects\6900-6-1\6964-M-1\21-HYD-1\ExWEST1.out   *
 * Summary filename: K:\Projects\6900-6-1\6964-M-1\21-HYD-1\ExWEST1.sum   *
 * User comments:                                                          *
 * 1:_____________________________________________________________________*
 * 2:_____________________________________________________________________*
 * 3:_____________________________________________________________________*
 ***************************************************************************

 ------------------------------------------------------------------------------
 001:0001----------------------------------------------------------------------
 ******************************************************************************
 * MISSISSAUGA BRT - WEST                                              JOB: 06964
 * EXISTING CONDITIONS TO OUTLET 1                                             *
 ******************************************************************************
 *                                                                             *
 * - 2, 10, 50 and 100yr, 12hr Design Storms (SCS)                             *
 * - 25 mm 4 hr Chicago                                                        *
 * - Rainfall depths from Pearson International IDF Parameters                 *
 *                                                           K. Macnaughton    *
 *                                                           As of: June 24, 2008 *
 ******************************************************************************
 *
 *
 --------------------
 | START              |   Project  dir.: K:\Projects\6900-6-1\6964-M-1\21-HYD-1\
 ---------------------   Rainfall dir.: K:\Projects\6900-6-1\6964-M-1\21-HYD-1\
     TZERO =    .00 hrs on       0
     METOUT=    2 (output = METRIC)
     NRUN  = 001
     NSTORM=    1
            #  1=CHIC25mm.stm
 ------------------------------------------------------------------------------
 001:0002----------------------------------------------------------------------
 *
 --------------------
 | READ STORM         |     Filename: K:\Projects\6900-6-1\6964-M-1\21-HYD-1\C
 | Ptotal=  25.00 mm|     Comments: 25mm, 4hr Chicago Storm
 --------------------
                     TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
                      hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
                      .17   1.423 |   1.17   3.859 |   2.17   5.294 |   3.17   1.977
                      .33   1.574 |   1.33   5.821 |   2.33   4.057 |   3.33   1.805
                      .50   1.769 |   1.50  13.337 |   2.50   3.314 |   3.50   1.664
                      .67   2.028 |   1.67  61.503 |   2.67   2.817 |   3.67   1.545
                      .83   2.389 |   1.83  15.650 |   2.83   2.459 |   3.83   1.444
                     1.00   2.933 |   2.00   7.793 |   3.00   2.189 |   4.00   1.356

 ------------------------------------------------------------------------------
 001:0003----------------------------------------------------------------------
 *
 ---------------------
 | CALIB NASHYD        |    Area     (ha)=   14.60   Curve Number    (CN)=80.00
 | 01:1.1     DT= 2.00 |    Ia       (mm)=   6.500   # of Linear Res.(N)= 3.00
 ---------------------     U.H. Tp(hrs)=   1.100

      Unit Hyd Qpeak  (cms)=      .507

      PEAK FLOW       (cms)=      .061 (i)
      TIME TO PEAK    (hrs)=     3.167
      RUNOFF VOLUME    (mm)=     4.174
      TOTAL RAINFALL   (mm)=    25.000
      RUNOFF COEFFICIENT   =      .167

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

 ------------------------------------------------------------------------------
 001:0004----------------------------------------------------------------------
 *
 ---------------------
 | CALIB NASHYD        |    Area     (ha)=    2.40   Curve Number    (CN)=82.00
 | 02:1.2     DT= 2.00 |    Ia       (mm)=   6.000   # of Linear Res.(N)= 3.00
 ---------------------     U.H. Tp(hrs)=    .200

      Unit Hyd Qpeak  (cms)=      .458

      PEAK FLOW       (cms)=      .036 (i)
      TIME TO PEAK    (hrs)=     1.900
      RUNOFF VOLUME    (mm)=     4.829
      TOTAL RAINFALL   (mm)=    25.000
      RUNOFF COEFFICIENT   =      .193

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

 ------------------------------------------------------------------------------
 001:0005----------------------------------------------------------------------
 *
 --------------------
 | ADD HYD (800    ) | ID: NHYD       AREA      QPEAK    TPEAK    R.V.     DWF
 --------------------                 (ha)      (cms)    (hrs)    (mm)    (cms)
                      ID1 01:1.1      14.60      .061     3.17    4.17     .000
                     +ID2 02:1.2       2.40      .036     1.90    4.83     .000
                      ====================================================
                      SUM 10:800      17.00      .068     3.07    4.27     .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ------------------------------------------------------------------------------
 001:0006----------------------------------------------------------------------
 *
 ---------------------
 | CALIB STANDHYD      |    Area     (ha)=    4.20
 | 01:1.3     DT= 2.00 |    Total Imp(%)=   20.00   Dir. Conn.(%)=   20.00
 ---------------------
                                      IMPERVIOUS    PERVIOUS (i)
      Surface Area      (ha)=            .84           3.36
      Dep. Storage      (mm)=           2.00           5.00
      Average Slope      (%)=           1.00           2.00
      Length             (m)=         167.00          40.00
      Mannings n            =           .015           .350

      Max.eff.Inten.(mm/hr)=           61.50           5.21
                 over (min)            4.00          32.00
      Storage Coeff.  (min)=           4.60 (ii)     32.76 (ii)
      Unit Hyd. Tpeak (min)=           4.00          32.00
      Unit Hyd. peak  (cms)=            .25            .03
                                                                *TOTALS*
      PEAK FLOW       (cms)=            .13            .03          .129 (iii)
      TIME TO PEAK    (hrs)=           1.67           2.20         1.667
      RUNOFF VOLUME    (mm)=          23.00           4.57         8.256
      TOTAL RAINFALL   (mm)=          25.00          25.00        25.000
      RUNOFF COEFFICIENT   =            .92            .18          .330

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN* =  79.0    Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
             THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 ------------------------------------------------------------------------------
 001:0007----------------------------------------------------------------------
 *
 --------------------
 | ADD HYD (810    ) | ID: NHYD       AREA      QPEAK    TPEAK    R.V.     DWF
 --------------------                 (ha)      (cms)    (hrs)    (mm)    (cms)
                      ID1 10:800      17.00      .068     3.07    4.27     .000
                     +ID2 01:1.3       4.20      .129     1.67    8.26     .000
                      ====================================================
                      SUM 09:810      21.20      .143     1.67    5.06     .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ------------------------------------------------------------------------------
 001:0008----------------------------------------------------------------------
 *
 ---------------------
 | COMPUTE DUALHYD     |    Average inlet capacities   [CINLET] =     .252  (cms)
 | TotalHyd 09:810     |    Number of inlets in system [NINLET] =       1
 ---------------------     Total minor system capacity          =     .252  (cms)
                            Total major system storage [TMJSTO] =        0.(cu.m.)

                        ID: NHYD        AREA      QPEAK     TPEAK      R.V.      DWF
                                        (ha)      (cms)     (hrs)      (mm)     (cms)
      TOTAL HYD.    09:810             21.20       .143     1.667     5.057      .000
      ============================================================================
      MAJOR SYST    07:810.1             .00       .000      .000      .000      .000
      MINOR SYST    08:810.2           21.20       .143     1.667     5.057      .000

      NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ------------------------------------------------------------------------------
 001:0009----------------------------------------------------------------------
 *
 ---------------------
 | CALIB NASHYD        |    Area     (ha)=    5.30   Curve Number    (CN)=79.00
 | 01:1.4     DT= 2.00 |    Ia       (mm)=   6.800   # of Linear Res.(N)= 3.00
 ---------------------     U.H. Tp(hrs)=    .300

      Unit Hyd Qpeak  (cms)=      .675

      PEAK FLOW       (cms)=      .048 (i)
      TIME TO PEAK    (hrs)=     2.033
      RUNOFF VOLUME    (mm)=     3.864
      TOTAL RAINFALL   (mm)=    25.000
      RUNOFF COEFFICIENT   =      .155

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

 ------------------------------------------------------------------------------
 001:0010----------------------------------------------------------------------
 *
 --------------------
 | ADD HYD (820    ) | ID: NHYD       AREA      QPEAK    TPEAK    R.V.     DWF
 --------------------                 (ha)      (cms)    (hrs)    (mm)    (cms)
                      ID1 01:1.4       5.30      .048     2.03    3.86     .000
                     +ID2 07:810.1      .00      .000      .00     .00     .000 **DRY**
                      ====================================================
                      SUM 10:820       5.30      .048     2.03    3.86     .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ------------------------------------------------------------------------------
 001:0011----------------------------------------------------------------------
 *
 ---------------------
 | CALIB STANDHYD      |    Area     (ha)=    9.80
 | 01:MTO103 DT= 2.00 |    Total Imp(%)=   80.00   Dir. Conn.(%)=   80.00
 ---------------------
                                      IMPERVIOUS    PERVIOUS (i)
      Surface Area      (ha)=           7.84           1.96
      Dep. Storage      (mm)=           2.00           5.00
      Average Slope      (%)=           1.00           2.00
      Length             (m)=         256.00          40.00
      Mannings n            =           .015           .350

      Max.eff.Inten.(mm/hr)=           61.50           5.01
                 over (min)            6.00          34.00
      Storage Coeff.  (min)=           5.94 (ii)     34.55 (ii)
      Unit Hyd. Tpeak (min)=           6.00          34.00
      Unit Hyd. peak  (cms)=            .19            .03
                                                                *TOTALS*
      PEAK FLOW       (cms)=           1.05            .01         1.049 (iii)
      TIME TO PEAK    (hrs)=           1.70           2.27         1.700
      RUNOFF VOLUME    (mm)=          23.00           4.57        19.314
      TOTAL RAINFALL   (mm)=          25.00          25.00        25.000
      RUNOFF COEFFICIENT   =            .92            .18          .773

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN* =  79.0    Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
             THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 ------------------------------------------------------------------------------
 001:0012----------------------------------------------------------------------
 *
 --------------------
 | ADD HYD (830    ) | ID: NHYD       AREA      QPEAK    TPEAK    R.V.     DWF
 --------------------                 (ha)      (cms)    (hrs)    (mm)    (cms)
                      ID1 01:MTO103    9.80     1.049     1.70   19.31     .000
                     +ID2 08:810.2    21.20      .143     1.67    5.06     .000
```



```
                      ====================================================
                      SUM 09:830      31.00     1.190     1.70    9.56     .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ------------------------------------------------------------------------------
 001:0013----------------------------------------------------------------------
 *
 --------------------
 | COMPUTE VOLUME     |
 | ID:09  (830    )   |              DISCHARGE       TIME
 --------------------                  (cms)        (hrs)
               START CONTROLLING AT      .000          .967
               INFLOW HYD. PEAKS AT     1.190         1.700
               STOP  CONTROLLING AT      .000        10.133

               REQUIRED STORAGE VOLUME (ha.m.)=      .2965
               TOTAL HYDROGRAPH VOLUME (ha.m.)=      .2965
               % OF HYDROGRAPH TO STORE        =   99.9997

               NOTE:  Storage was computed to reduce the Inflow

 ------------------------------------------------------------------------------
 001:0014----------------------------------------------------------------------
 *
 * Existing Sawmill Creek MTO Pond
 --------------------
 | ROUTE RESERVOIR     |     Requested routing time step =  2.0 min.
 |  IN>09:(830    )    |
 | OUT<07:(700    )    |     =========  OUTLFOW STORAGE TABLE  =========
 ---------------------       OUTFLOW     STORAGE   |  OUTFLOW     STORAGE
                              (cms)     (ha.m.)    |   (cms)     (ha.m.)
                               .000   .0000E+00    |   2.863   .6631E+00
                               .008   .2389E+00    |   3.937   .8236E+00

      ROUTING RESULTS               AREA      QPEAK       TPEAK         R.V.
      --------------------          (ha)      (cms)       (hrs)         (mm)
      INFLOW >09: (830    )        31.00      1.190       1.700        9.564
      OUTFLOW<07: (700    )        31.00       .088       4.067        9.544
     OVERFLOW<02: (701    )          .00       .000        .000         .000

                    TOTAL NUMBER OF SIMULATED OVERFLOWS  =          0
                    CUMULATIVE TIME OF OVERFLOWS  (hours)=        .00
                    PERCENTAGE OF TIME OVERFLOWING     (%)=        .00


                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=     7.433
                    TIME SHIFT OF PEAK FLOW          (min)=   142.00
                    MAXIMUM  STORAGE   USED          (ha.m.)=.2509E+00

 ------------------------------------------------------------------------------
 001:0015----------------------------------------------------------------------
 *
 --------------------
 | COMPUTE VOLUME     |
 | ID:02  (701    )   |              DISCHARGE       TIME
 --------------------                  (cms)        (hrs)
       *** WARNING: No storage required, RelRate > Inflow Qp.
 ------------------------------------------------------------------------------
 001:0016----------------------------------------------------------------------
 *
   ** END OF RUN :    7

 ******************************************************************************





 --------------------
 | START              |   Project  dir.: K:\Projects\6900-6-1\6964-M-1\21-HYD-1\
 ---------------------   Rainfall dir.: K:\Projects\6900-6-1\6964-M-1\21-HYD-1\
     TZERO =    .00 hrs on       0
     METOUT=    2 (output = METRIC)
     NRUN  = 008
     NSTORM=    1
            #  1=12hrscs2.stm
 ------------------------------------------------------------------------------
 008:0002----------------------------------------------------------------------
 ******************************************************************************
 * MISSISSAUGA BRT - WEST                                              JOB: 06964
 * EXISTING CONDITIONS TO OUTLET 1                                             *
 ******************************************************************************
 *                                                                             *
 * - 2, 10, 50 and 100yr, 12hr Design Storms (SCS)                             *
 * - 25 mm 4 hr Chicago                                                        *
 * - Rainfall depths from Pearson International IDF Parameters                 *
 *                                                           K. Macnaughton    *
 *                                                           As of: June 24, 2008 *
 ******************************************************************************
 *
 *
 ------------------------------------------------------------------------------
 008:0002----------------------------------------------------------------------
 *
 --------------------
 | READ STORM         |     Filename: K:\Projects\6900-6-1\6964-M-1\21-HYD-1\1
 | Ptotal=  43.80 mm|     Comments: 2 Yr-12hr SCS
 --------------------
                     TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
                      hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
                      .17   1.314 |   3.17   1.752 |   6.17   9.548 |   9.17   1.314
                      .33   1.314 |   3.33   1.752 |   6.33   9.548 |   9.33   1.314
                      .50   1.314 |   3.50   1.752 |   6.50   9.548 |   9.50   1.314
                      .67    .613 |   3.67   1.752 |   6.67   4.205 |   9.67   1.051
                      .83    .613 |   3.83   1.752 |   6.83   4.205 |   9.83   1.051
                     1.00    .613 |   4.00   1.752 |   7.00   4.205 |  10.00   1.051
                     1.17   1.139 |   4.17   2.365 |   7.17   2.803 |  10.17   1.489
                     1.33   1.139 |   4.33   2.365 |   7.33   2.803 |  10.33   1.489
                     1.50   1.139 |   4.50   2.365 |   7.50   2.803 |  10.50   1.489
                     1.67   1.139 |   4.67   2.978 |   7.67   2.453 |  10.67    .964
                     1.83   1.139 |   4.83   2.978 |   7.83   2.453 |  10.83    .964
                     2.00   1.139 |   5.00   2.978 |   8.00   2.453 |  11.00    .964
                     2.17   1.489 |   5.17   4.730 |   8.17   1.927 |  11.17    .876
                     2.33   1.489 |   5.33   4.730 |   8.33   1.927 |  11.33    .876
                     2.50   1.489 |   5.50   4.730 |   8.50   1.927 |  11.50    .876
                     2.67   1.314 |   5.67  37.493 |   8.67   2.015 |  11.67    .876
                     2.83   1.314 |   5.83  37.493 |   8.83   2.015 |  11.83    .876
                     3.00   1.314 |   6.00  37.493 |   9.00   2.015 |  12.00    .876

 ------------------------------------------------------------------------------
 008:0003----------------------------------------------------------------------
 *
 ---------------------
 | CALIB NASHYD        |    Area     (ha)=   14.60   Curve Number    (CN)=80.00
 | 01:1.1     DT= 2.00 |    Ia       (mm)=   6.500   # of Linear Res.(N)= 3.00
 ---------------------     U.H. Tp(hrs)=   1.100

      Unit Hyd Qpeak  (cms)=      .507

      PEAK FLOW       (cms)=      .165 (i)
      TIME TO PEAK    (hrs)=     7.233
      RUNOFF VOLUME    (mm)=    13.802
      TOTAL RAINFALL   (mm)=    43.799
      RUNOFF COEFFICIENT   =      .315

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

 ------------------------------------------------------------------------------
 008:0004----------------------------------------------------------------------
 *
 ---------------------
 | CALIB NASHYD        |    Area     (ha)=    2.40   Curve Number    (CN)=82.00
 | 02:1.2     DT= 2.00 |    Ia       (mm)=   6.000   # of Linear Res.(N)= 3.00
 ---------------------     U.H. Tp(hrs)=    .200

      Unit Hyd Qpeak  (cms)=      .458

      PEAK FLOW       (cms)=      .086 (i)
      TIME TO PEAK    (hrs)=     6.067
      RUNOFF VOLUME    (mm)=    15.272
      TOTAL RAINFALL   (mm)=    43.799
      RUNOFF COEFFICIENT   =      .349

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

 ------------------------------------------------------------------------------
 008:0005----------------------------------------------------------------------
 *
 --------------------
 | ADD HYD (800    ) | ID: NHYD       AREA      QPEAK    TPEAK    R.V.     DWF
 --------------------                 (ha)      (cms)    (hrs)    (mm)    (cms)
                      ID1 01:1.1      14.60      .165     7.23   13.80     .000
                     +ID2 02:1.2       2.40      .086     6.07   15.27     .000
                      ====================================================
                      SUM 10:800      17.00      .180     7.13   14.01     .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ------------------------------------------------------------------------------
 008:0006----------------------------------------------------------------------
 *
 ---------------------
 | CALIB STANDHYD      |    Area     (ha)=    4.20
 | 01:1.3     DT= 2.00 |    Total Imp(%)=   20.00   Dir. Conn.(%)=   20.00
 ---------------------
                                      IMPERVIOUS    PERVIOUS (i)
      Surface Area      (ha)=            .84           3.36
      Dep. Storage      (mm)=           2.00           5.00
      Average Slope      (%)=           1.00           2.00
      Length             (m)=         167.00          40.00
      Mannings n            =           .015           .350

      Max.eff.Inten.(mm/hr)=           37.49          12.70
                 over (min)            6.00          26.00
      Storage Coeff.  (min)=           5.61 (ii)     25.32 (ii)
      Unit Hyd. Tpeak (min)=           6.00          26.00
      Unit Hyd. peak  (cms)=            .20            .04
                                                                *TOTALS*
      PEAK FLOW       (cms)=            .09            .07          .133 (iii)
      TIME TO PEAK    (hrs)=           6.00           6.33         6.033
      RUNOFF VOLUME    (mm)=          41.80          14.16        19.687
      TOTAL RAINFALL   (mm)=          43.80          43.80        43.799
      RUNOFF COEFFICIENT   =            .95            .32          .449

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN* =  79.0    Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
             THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 ------------------------------------------------------------------------------
 008:0007----------------------------------------------------------------------
 *
 --------------------
 | ADD HYD (810    ) | ID: NHYD       AREA      QPEAK    TPEAK    R.V.     DWF
 --------------------                 (ha)      (cms)    (hrs)    (mm)    (cms)
                      ID1 10:800      17.00      .180     7.13   14.01     .000
                     +ID2 01:1.3       4.20      .133     6.03   19.69     .000
                      ====================================================
                      SUM 09:810      21.20      .252     6.07   15.13     .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ------------------------------------------------------------------------------
 008:0008----------------------------------------------------------------------
 *
 ---------------------
 | COMPUTE DUALHYD     |    Average inlet capacities   [CINLET] =     .252  (cms)
 | TotalHyd 09:810     |    Number of inlets in system [NINLET] =       1
 ---------------------     Total minor system capacity          =     .252  (cms)
                            Total major system storage [TMJSTO] =        0.(cu.m.)

                        ID: NHYD        AREA      QPEAK     TPEAK      R.V.      DWF
                                        (ha)      (cms)     (hrs)      (mm)     (cms)
      TOTAL HYD.    09:810             21.20       .252     6.067    15.134      .000
      ============================================================================
      MAJOR SYST    07:810.1             .00       .000     6.067    15.134      .000
      MINOR SYST    08:810.2           21.20       .252     6.067    15.134      .000

      NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ------------------------------------------------------------------------------
 008:0009----------------------------------------------------------------------
 *
 ---------------------
 | CALIB NASHYD        |    Area     (ha)=    5.30   Curve Number    (CN)=79.00
 | 01:1.4     DT= 2.00 |    Ia       (mm)=   6.800   # of Linear Res.(N)= 3.00
 ---------------------     U.H. Tp(hrs)=    .300

      Unit Hyd Qpeak  (cms)=      .675

      PEAK FLOW       (cms)=      .129 (i)
      TIME TO PEAK    (hrs)=     6.200
      RUNOFF VOLUME    (mm)=    13.098
      TOTAL RAINFALL   (mm)=    43.799
      RUNOFF COEFFICIENT   =      .299

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

 ------------------------------------------------------------------------------
 008:0010----------------------------------------------------------------------
 *
 --------------------
 | ADD HYD (820    ) | ID: NHYD       AREA      QPEAK    TPEAK    R.V.     DWF
 --------------------                 (ha)      (cms)    (hrs)    (mm)    (cms)
                      ID1 01:1.4       5.30      .129     6.20   13.10     .000
                     +ID2 07:810.1      .00      .000     6.07   15.13     .000
                      ====================================================
                      SUM 10:820       5.30      .129     6.20   13.10     .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ------------------------------------------------------------------------------
 008:0011----------------------------------------------------------------------
 *
 ---------------------
 | CALIB STANDHYD      |    Area     (ha)=    9.80
 | 01:MTO103 DT= 2.00 |    Total Imp(%)=   80.00   Dir. Conn.(%)=   80.00
 ---------------------
```

```
                                 IMPERVIOUS   PERVIOUS (i)
     Surface Area      (ha)=        7.84        1.96
     Dep. Storage      (mm)=        2.00        5.00
     Average Slope      (%)=        1.00        2.00
     Length             (m)=      256.00       40.00
     Mannings n            =        .015        .350

     Max.eff.Inten.(mm/hr)=        37.49       12.29
                over (min)          8.00       28.00
     Storage Coeff.  (min)=         7.24 (ii)  27.22 (ii)
     Unit Hyd. Tpeak (min)=         8.00       28.00
     Unit Hyd. peak  (cms)=          .15         .04
                                                          *TOTALS*
     PEAK FLOW        (cms)=         .80         .04         .821 (iii)
     TIME TO PEAK     (hrs)=        6.00        6.37        6.000
     RUNOFF VOLUME     (mm)=       41.80       14.16       36.271
     TOTAL RAINFALL    (mm)=       43.80       43.80       43.799
     RUNOFF COEFFICIENT   =          .95         .32         .828

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  79.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 ---------------------------------------------------------------------------
 008:0012-------------------------------------------------------------------
 *
 --------------------
 | ADD HYD (830    ) | ID: NHYD      AREA    QPEAK   TPEAK   R.V.    DWF
 --------------------                (ha)    (cms)   (hrs)   (mm)   (cms)
                     ID1 01:MTO103    9.80     .821    6.00  36.27    .000
                    +ID2 08:810.2    21.20     .252    6.07  15.13    .000
                     ====================================================
                     SUM 09:830      31.00    1.062    6.00  21.82    .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ---------------------------------------------------------------------------
 008:0013-------------------------------------------------------------------
 *
 --------------------
 | COMPUTE VOLUME    |
 | ID:09  (830    )  |               DISCHARGE      TIME
 --------------------                  (cms)        (hrs)
            START CONTROLLING AT        .000        1.900
            INFLOW HYD. PEAKS AT       1.062        6.000
            STOP  CONTROLLING AT        .000       17.600

            REQUIRED STORAGE VOLUME (ha.m.)=    .6763
            TOTAL HYDROGRAPH VOLUME (ha.m.)=    .6763
            % OF HYDROGRAPH TO STORE       =  99.9997

            NOTE:  Storage was computed to reduce the Inflow

 ---------------------------------------------------------------------------
 008:0014-------------------------------------------------------------------
 *
 * Existing Sawmill Creek MTO Pond
 ---------------------
 | ROUTE RESERVOIR    |    Requested routing time step =  2.0 min.
 |   IN>09:(830    )  |
 | OUT<07:(700    )   |    =========  OUTLFOW STORAGE TABLE  =========
 ---------------------      OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                             (cms)     (ha.m.)   |   (cms)     (ha.m.)
                              .000  .0000E+00    |   2.863  .6631E+00
                              .008  .2389E+00    |   3.937  .8236E+00

      ROUTING RESULTS              AREA     QPEAK     TPEAK       R.V.
      --------------------         (ha)     (cms)     (hrs)       (mm)
      INFLOW >09: (830    )       31.00     1.062     6.000     21.817
      OUTFLOW<07: (700    )       31.00      .381     6.767     21.794
     OVERFLOW<02: (701    )         .00      .000      .000       .000

                    TOTAL NUMBER OF SIMULATED OVERFLOWS  =          0
                    CUMULATIVE TIME OF OVERFLOWS  (hours)=        .00
                    PERCENTAGE OF TIME OVERFLOWING    (%)=        .00


                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=   35.906
                    TIME SHIFT OF PEAK FLOW         (min)=    46.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=.2944E+00

 ---------------------------------------------------------------------------
 008:0015-------------------------------------------------------------------
 *
 --------------------
 | COMPUTE VOLUME    |
 | ID:02  (701    )  |               DISCHARGE      TIME
 --------------------                  (cms)        (hrs)
       *** WARNING: No storage required, RelRate > Inflow Qp.
 ---------------------------------------------------------------------------
 008:0016-------------------------------------------------------------------
 *
 ---------------------------------------------------------------------------
 008:0002-------------------------------------------------------------------
 *
   ** END OF RUN :    8

 ***************************************************************************





 --------------------
 | START              |   Project  dir.: K:\Projects\6900-6-1\6964-M-1\21-HYD-1\
 --------------------     Rainfall dir.: K:\Projects\6900-6-1\6964-M-1\21-HYD-1\
     TZERO =    .00 hrs on       0
     METOUT=    2 (output = METRIC)
     NRUN  = 009
     NSTORM=    1
            #  1=12hscs10.stm
 ---------------------------------------------------------------------------
 009:0002-------------------------------------------------------------------
 ***************************************************************************
 * MISSISSAUGA BRT - WEST                                          JOB: 06964
 * EXISTING CONDITIONS TO OUTLET 1                                          *
 ***************************************************************************
 *                                                                          *
 * - 2, 10, 50 and 100yr, 12hr Design Storms (SCS)                          *
 * - 25 mm 4 hr Chicago                                                     *
 * - Rainfall depths from Pearson International IDF Parameters              *
 *                                                     K. Macnaughton       *
 *                                                     As of: June 24, 2008 *
 ***************************************************************************
 *
 *
 ---------------------------------------------------------------------------
 009:0002-------------------------------------------------------------------
 *
 --------------------
 | READ STORM         |   Filename: K:\Projects\6900-6-1\6964-M-1\21-HYD-1\1
 | Ptotal=  72.70 mm|     Comments: 10 Yr-12hr SCS
 --------------------
```

```
                  TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
                   .17   2.181 |  3.17   2.908 |  6.17  15.849 |  9.17   2.181
                   .33   2.181 |  3.33   2.908 |  6.33  15.849 |  9.33   2.181
                   .50   2.181 |  3.50   2.908 |  6.50  15.849 |  9.50   2.181
                   .67   1.018 |  3.67   2.908 |  6.67   6.979 |  9.67   1.745
                   .83   1.018 |  3.83   2.908 |  6.83   6.979 |  9.83   1.745
                  1.00   1.018 |  4.00   2.908 |  7.00   6.979 | 10.00   1.745
                  1.17   1.890 |  4.17   3.926 |  7.17   4.653 | 10.17   2.472
                  1.33   1.890 |  4.33   3.926 |  7.33   4.653 | 10.33   2.472
                  1.50   1.890 |  4.50   3.926 |  7.50   4.653 | 10.50   2.472
                  1.67   1.890 |  4.67   4.944 |  7.67   4.071 | 10.67   1.599
                  1.83   1.890 |  4.83   4.944 |  7.83   4.071 | 10.83   1.599
                  2.00   1.890 |  5.00   4.944 |  8.00   4.071 | 11.00   1.599
                  2.17   2.472 |  5.17   7.852 |  8.17   3.199 | 11.17   1.454
                  2.33   2.472 |  5.33   7.852 |  8.33   3.199 | 11.33   1.454
                  2.50   2.472 |  5.50   7.852 |  8.50   3.199 | 11.50   1.454
                  2.67   2.181 |  5.67  62.231 |  8.67   3.344 | 11.67   1.454
                  2.83   2.181 |  5.83  62.231 |  8.83   3.344 | 11.83   1.454
                  3.00   2.181 |  6.00  62.231 |  9.00   3.344 | 12.00   1.454

 ---------------------------------------------------------------------------
 009:0003-------------------------------------------------------------------
 *
 ---------------------
 | CALIB NASHYD       |   Area     (ha)=   14.60   Curve Number   (CN)=80.00
 | 01:1.1   DT= 2.00  |   Ia       (mm)=   6.500   # of Linear Res.(N)= 3.00
 ---------------------    U.H. Tp(hrs)=    1.100

      Unit Hyd Qpeak  (cms)=      .507

      PEAK FLOW       (cms)=      .421 (i)
      TIME TO PEAK    (hrs)=     7.167
      RUNOFF VOLUME    (mm)=    33.789
      TOTAL RAINFALL   (mm)=    72.700
      RUNOFF COEFFICIENT   =      .465

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

 ---------------------------------------------------------------------------
 009:0004-------------------------------------------------------------------
 *
 ---------------------
 | CALIB NASHYD       |   Area     (ha)=    2.40   Curve Number   (CN)=82.00
 | 02:1.2   DT= 2.00  |   Ia       (mm)=   6.000   # of Linear Res.(N)= 3.00
 ---------------------    U.H. Tp(hrs)=     .200

      Unit Hyd Qpeak  (cms)=      .458

      PEAK FLOW       (cms)=      .211 (i)
      TIME TO PEAK    (hrs)=     6.067
      RUNOFF VOLUME    (mm)=    36.331
      TOTAL RAINFALL   (mm)=    72.700
      RUNOFF COEFFICIENT   =      .500

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

 ---------------------------------------------------------------------------
 009:0005-------------------------------------------------------------------
 *
 --------------------
 | ADD HYD (800    ) | ID: NHYD      AREA    QPEAK   TPEAK   R.V.    DWF
 --------------------                (ha)    (cms)   (hrs)   (mm)   (cms)
                     ID1 01:1.1      14.60     .421    7.17  33.79    .000
                    +ID2 02:1.2       2.40     .211    6.07  36.33    .000
                     ====================================================
                     SUM 10:800      17.00     .456    7.07  34.15    .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ---------------------------------------------------------------------------
 009:0006-------------------------------------------------------------------
 *
 ---------------------
 | CALIB STANDHYD     |   Area    (ha)=    4.20
 | 01:1.3   DT= 2.00  |   Total Imp(%)=   20.00   Dir. Conn.(%)=   20.00
 ---------------------
                                 IMPERVIOUS   PERVIOUS (i)
     Surface Area      (ha)=         .84        3.36
     Dep. Storage      (mm)=        2.00        5.00
     Average Slope      (%)=        1.00        2.00
     Length             (m)=      167.00       40.00
     Mannings n            =        .015        .350

     Max.eff.Inten.(mm/hr)=        62.23       34.39
                over (min)          4.00       18.00
     Storage Coeff.  (min)=         4.58 (ii)  17.81 (ii)
     Unit Hyd. Tpeak (min)=         4.00       18.00
     Unit Hyd. peak  (cms)=          .26         .06
                                                          *TOTALS*
     PEAK FLOW        (cms)=         .14         .22         .334 (iii)
     TIME TO PEAK     (hrs)=        6.00        6.17        6.000
     RUNOFF VOLUME     (mm)=       70.70       33.89       41.257
     TOTAL RAINFALL    (mm)=       72.70       72.70       72.700
     RUNOFF COEFFICIENT   =          .97         .47         .567

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  79.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 ---------------------------------------------------------------------------
 009:0007-------------------------------------------------------------------
 *
 --------------------
 | ADD HYD (810    ) | ID: NHYD      AREA    QPEAK   TPEAK   R.V.    DWF
 --------------------                (ha)    (cms)   (hrs)   (mm)   (cms)
                     ID1 10:800      17.00     .456    7.07  34.15    .000
                    +ID2 01:1.3       4.20     .334    6.00  41.26    .000
                     ====================================================
                     SUM 09:810      21.20     .649    6.03  35.56    .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ---------------------------------------------------------------------------
 009:0008-------------------------------------------------------------------
 *
 ---------------------
 | COMPUTE DUALHYD    |   Average inlet capacities    [CINLET] =     .252  (cms)
 | TotalHyd 09:810    |   Number of inlets in system  [NINLET] =       1
 ---------------------    Total minor system capacity          =     .252  (cms)
                          Total major system storage  [TMJSTO] =       0.(cu.m.)

                   ID: NHYD      AREA     QPEAK     TPEAK      R.V.       DWF
                                 (ha)     (cms)     (hrs)      (mm)     (cms)
      TOTAL HYD.   09:810       21.20      .649     6.033    35.556      .000
      =======================================================================
      MAJOR SYST   07:810.1      6.79      .397     6.033    35.556      .000
      MINOR SYST   08:810.2     14.41      .252     5.700    35.556      .000

      NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ---------------------------------------------------------------------------
 009:0009-------------------------------------------------------------------
```



```
 *
 ---------------------
 | CALIB NASHYD       |   Area     (ha)=    5.30   Curve Number   (CN)=79.00
 | 01:1.4   DT= 2.00  |   Ia       (mm)=   6.800   # of Linear Res.(N)= 3.00
 ---------------------    U.H. Tp(hrs)=     .300

      Unit Hyd Qpeak  (cms)=      .675

      PEAK FLOW       (cms)=      .338 (i)
      TIME TO PEAK    (hrs)=     6.167
      RUNOFF VOLUME    (mm)=    32.550
      TOTAL RAINFALL   (mm)=    72.700
      RUNOFF COEFFICIENT   =      .448

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

 ---------------------------------------------------------------------------
 009:0010-------------------------------------------------------------------
 *
 --------------------
 | ADD HYD (820    ) | ID: NHYD      AREA    QPEAK   TPEAK   R.V.    DWF
 --------------------                (ha)    (cms)   (hrs)   (mm)   (cms)
                     ID1 01:1.4       5.30     .338    6.17  32.55    .000
                    +ID2 07:810.1     6.79     .397    6.03  35.56    .000
                     ====================================================
                     SUM 10:820      12.09     .720    6.13  34.24    .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ---------------------------------------------------------------------------
 009:0011-------------------------------------------------------------------
 *
 ---------------------
 | CALIB STANDHYD     |   Area    (ha)=    9.80
 | 01:MTO103 DT= 2.00 |   Total Imp(%)=   80.00   Dir. Conn.(%)=   80.00
 ---------------------
                                 IMPERVIOUS   PERVIOUS (i)
     Surface Area      (ha)=        7.84        1.96
     Dep. Storage      (mm)=        2.00        5.00
     Average Slope      (%)=        1.00        2.00
     Length             (m)=      256.00       40.00
     Mannings n            =        .015        .350

     Max.eff.Inten.(mm/hr)=        62.23       33.75
                over (min)          6.00       20.00
     Storage Coeff.  (min)=         5.92 (ii)  19.25 (ii)
     Unit Hyd. Tpeak (min)=         6.00       20.00
     Unit Hyd. peak  (cms)=          .19         .06
                                                          *TOTALS*
     PEAK FLOW        (cms)=        1.34         .12        1.445 (iii)
     TIME TO PEAK     (hrs)=        6.00        6.20        6.000
     RUNOFF VOLUME     (mm)=       70.70       33.89       63.339
     TOTAL RAINFALL    (mm)=       72.70       72.70       72.700
     RUNOFF COEFFICIENT   =          .97         .47         .871

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  79.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 ---------------------------------------------------------------------------
 009:0012-------------------------------------------------------------------
 *
 --------------------
 | ADD HYD (830    ) | ID: NHYD      AREA    QPEAK   TPEAK   R.V.    DWF
 --------------------                (ha)    (cms)   (hrs)   (mm)   (cms)
                     ID1 01:MTO103    9.80    1.445    6.00  63.34    .000
                    +ID2 08:810.2    14.41     .252    5.70  35.56    .000
                     ====================================================
                     SUM 09:830      24.21    1.697    6.00  46.80    .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ---------------------------------------------------------------------------
 009:0013-------------------------------------------------------------------
 *
 --------------------
 | COMPUTE VOLUME    |
 | ID:09  (830    )  |               DISCHARGE      TIME
 --------------------                  (cms)        (hrs)
            START CONTROLLING AT        .000        1.200
            INFLOW HYD. PEAKS AT       1.697        6.000
            STOP  CONTROLLING AT        .000       17.667

            REQUIRED STORAGE VOLUME (ha.m.)=   1.1331
            TOTAL HYDROGRAPH VOLUME (ha.m.)=   1.1331
            % OF HYDROGRAPH TO STORE       =  99.9995

            NOTE:  Storage was computed to reduce the Inflow

 ---------------------------------------------------------------------------
 009:0014-------------------------------------------------------------------
 *
 * Existing Sawmill Creek MTO Pond
 ---------------------
 | ROUTE RESERVOIR    |    Requested routing time step =  2.0 min.
 |   IN>09:(830    )  |
 | OUT<07:(700    )   |    =========  OUTLFOW STORAGE TABLE  =========
 ---------------------      OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                             (cms)     (ha.m.)   |   (cms)     (ha.m.)
                              .000  .0000E+00    |   2.863  .6631E+00
                              .008  .2389E+00    |   3.937  .8236E+00

      ROUTING RESULTS              AREA     QPEAK     TPEAK       R.V.
      --------------------         (ha)     (cms)     (hrs)       (mm)
      INFLOW >09: (830    )       24.21     1.697     6.000     46.803
      OUTFLOW<07: (700    )       24.21      .894     6.200     46.775
     OVERFLOW<02: (701    )         .00      .000      .000       .000

                    TOTAL NUMBER OF SIMULATED OVERFLOWS  =          0
                    CUMULATIVE TIME OF OVERFLOWS  (hours)=        .00
                    PERCENTAGE OF TIME OVERFLOWING    (%)=        .00


                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=   52.681
                    TIME SHIFT OF PEAK FLOW         (min)=    12.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=.3707E+00

 ---------------------------------------------------------------------------
 009:0015-------------------------------------------------------------------
 *
 --------------------
 | COMPUTE VOLUME    |
 | ID:02  (701    )  |               DISCHARGE      TIME
 --------------------                  (cms)        (hrs)
       *** WARNING: No storage required, RelRate > Inflow Qp.
 ---------------------------------------------------------------------------
 009:0016-------------------------------------------------------------------
 *
 ---------------------------------------------------------------------------
 009:0002-------------------------------------------------------------------
 *
 ---------------------------------------------------------------------------
 009:0002-------------------------------------------------------------------
```

```
 *
   ** END OF RUN :    9

 ***************************************************************************





 --------------------
 | START              |   Project  dir.: K:\Projects\6900-6-1\6964-M-1\21-HYD-1\
 --------------------     Rainfall dir.: K:\Projects\6900-6-1\6964-M-1\21-HYD-1\
     TZERO =    .00 hrs on       0
     METOUT=    2 (output = METRIC)
     NRUN  = 010
     NSTORM=    1
            #  1=12hscs50.stm
 ---------------------------------------------------------------------------
 010:0002-------------------------------------------------------------------
 ***************************************************************************
 * MISSISSAUGA BRT - WEST                                          JOB: 06964 *
 * EXISTING CONDITIONS TO OUTLET 1                                          *
 ***************************************************************************
 *                                                                          *
 * - 2, 10, 50 and 100yr, 12hr Design Storms (SCS)                          *
 * - 25 mm 4 hr Chicago                                                     *
 * - Rainfall depths from Pearson International IDF Parameters              *
 *                                                     K. Macnaughton       *
 *                                                     As of: June 24, 2008 *
 ***************************************************************************
 *
 *
 ---------------------------------------------------------------------------
 010:0002-------------------------------------------------------------------
 *
 --------------------
 | READ STORM         |   Filename: K:\Projects\6900-6-1\6964-M-1\21-HYD-1\1
 | Ptotal=  97.90 mm|     Comments: 50 Yr-12hr SCS
 --------------------
                  TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
                   .17   2.937 |  3.17   3.916 |  6.17  21.342 |  9.17   2.937
                   .33   2.937 |  3.33   3.916 |  6.33  21.342 |  9.33   2.937
                   .50   2.937 |  3.50   3.916 |  6.50  21.342 |  9.50   2.937
                   .67   1.371 |  3.67   3.916 |  6.67   9.398 |  9.67   2.350
                   .83   1.371 |  3.83   3.916 |  6.83   9.398 |  9.83   2.350
                  1.00   1.371 |  4.00   3.916 |  7.00   9.398 | 10.00   2.350
                  1.17   2.545 |  4.17   5.287 |  7.17   6.266 | 10.17   3.329
                  1.33   2.545 |  4.33   5.287 |  7.33   6.266 | 10.33   3.329
                  1.50   2.545 |  4.50   5.287 |  7.50   6.266 | 10.50   3.329
                  1.67   2.545 |  4.67   6.657 |  7.67   5.482 | 10.67   2.154
                  1.83   2.545 |  4.83   6.657 |  7.83   5.482 | 10.83   2.154
                  2.00   2.545 |  5.00   6.657 |  8.00   5.482 | 11.00   2.154
                  2.17   3.329 |  5.17  10.573 |  8.17   4.308 | 11.17   1.958
                  2.33   3.329 |  5.33  10.573 |  8.33   4.308 | 11.33   1.958
                  2.50   3.329 |  5.50  10.573 |  8.50   4.308 | 11.50   1.958
                  2.67   2.937 |  5.67  83.802 |  8.67   4.503 | 11.67   1.958
                  2.83   2.937 |  5.83  83.802 |  8.83   4.503 | 11.83   1.958
                  3.00   2.937 |  6.00  83.802 |  9.00   4.503 | 12.00   1.958

 ---------------------------------------------------------------------------
 010:0003-------------------------------------------------------------------
 *
 ---------------------
 | CALIB NASHYD       |   Area     (ha)=   14.60   Curve Number   (CN)=80.00
 | 01:1.1   DT= 2.00  |   Ia       (mm)=   6.500   # of Linear Res.(N)= 3.00
 ---------------------    U.H. Tp(hrs)=    1.100

      Unit Hyd Qpeak  (cms)=      .507

      PEAK FLOW       (cms)=      .681 (i)
      TIME TO PEAK    (hrs)=     7.133
      RUNOFF VOLUME    (mm)=    53.931
      TOTAL RAINFALL   (mm)=    97.900
      RUNOFF COEFFICIENT   =      .551

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

 ---------------------------------------------------------------------------
 010:0004-------------------------------------------------------------------
 *
 ---------------------
 | CALIB NASHYD       |   Area     (ha)=    2.40   Curve Number   (CN)=82.00
 | 02:1.2   DT= 2.00  |   Ia       (mm)=   6.000   # of Linear Res.(N)= 3.00
 ---------------------    U.H. Tp(hrs)=     .200

      Unit Hyd Qpeak  (cms)=      .458

      PEAK FLOW       (cms)=      .334 (i)
      TIME TO PEAK    (hrs)=     6.067
      RUNOFF VOLUME    (mm)=    57.198
      TOTAL RAINFALL   (mm)=    97.900
      RUNOFF COEFFICIENT   =      .584

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

 ---------------------------------------------------------------------------
 010:0005-------------------------------------------------------------------
 *
 --------------------
 | ADD HYD (800    ) | ID: NHYD      AREA    QPEAK   TPEAK   R.V.    DWF
 --------------------                (ha)    (cms)   (hrs)   (mm)   (cms)
                     ID1 01:1.1      14.60     .681    7.13  53.93    .000
                    +ID2 02:1.2       2.40     .334    6.07  57.20    .000
                     ====================================================
                     SUM 10:800      17.00     .735    7.03  54.39    .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ---------------------------------------------------------------------------
 010:0006-------------------------------------------------------------------
 *
 ---------------------
 | CALIB STANDHYD     |   Area    (ha)=    4.20
 | 01:1.3   DT= 2.00  |   Total Imp(%)=   20.00   Dir. Conn.(%)=   20.00
 ---------------------
                                 IMPERVIOUS   PERVIOUS (i)
     Surface Area      (ha)=         .84        3.36
     Dep. Storage      (mm)=        2.00        5.00
     Average Slope      (%)=        1.00        2.00
     Length             (m)=      167.00       40.00
     Mannings n            =        .015        .350

     Max.eff.Inten.(mm/hr)=        83.80       56.01
                over (min)          4.00       14.00
     Storage Coeff.  (min)=         4.06 (ii)  14.95 (ii)
     Unit Hyd. Tpeak (min)=         4.00       14.00
     Unit Hyd. peak  (cms)=          .28         .08
                                                          *TOTALS*
     PEAK FLOW        (cms)=         .20         .39         .560 (iii)
     TIME TO PEAK     (hrs)=        6.00        6.10        6.000
     RUNOFF VOLUME     (mm)=       95.90       53.80       62.219
     TOTAL RAINFALL    (mm)=       97.90       97.90       97.900
     RUNOFF COEFFICIENT   =          .98         .55         .636
```

```
      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN* =  79.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

----------------------------------------------------------------------------
010:0007--------------------------------------------------------------------
*
--------------------
| ADD HYD (810    ) | ID: NHYD      AREA     QPEAK   TPEAK   R.V.    DWF
--------------------                 (ha)     (cms)   (hrs)   (mm)   (cms)
                    ID1 10:800       17.00     .735    7.03  54.39    .000
                   +ID2 01:1.3        4.20     .560    6.00  62.22    .000
                    ==================================================
                    SUM 09:810       21.20    1.083    6.03  55.94    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

----------------------------------------------------------------------------
010:0008--------------------------------------------------------------------
*
----------------------
| COMPUTE DUALHYD     |    Average inlet capacities   [CINLET] =    .252  (cms)
| TotalHyd 09:810     |    Number of inlets in system [NINLET] =      1
----------------------     Total minor system capacity         =    .252  (cms)
                           Total major system storage [TMJSTO] =      0. (cu.m.)

                     ID: NHYD        AREA      QPEAK      TPEAK     R.V.      DWF
                                     (ha)      (cms)      (hrs)     (mm)     (cms)
      TOTAL HYD.   09:810           21.20      1.083      6.033   55.943     .000
      ==========================================================================
      MAJOR SYST   07:810.1         10.28       .831      6.033   55.943     .000
      MINOR SYST   08:810.2         10.92       .252      5.600   55.943     .000

      NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

----------------------------------------------------------------------------
010:0009--------------------------------------------------------------------
*
----------------------
| CALIB NASHYD        |    Area     (ha)=    5.30   Curve Number   (CN)=79.00
| 01:1.4    DT= 2.00  |    Ia       (mm)=   6.800   # of Linear Res.(N)= 3.00
----------------------    U.H. Tp(hrs)=    .300

      Unit Hyd Qpeak  (cms)=     .675

      PEAK FLOW       (cms)=     .552 (i)
      TIME TO PEAK    (hrs)=    6.167
      RUNOFF VOLUME    (mm)=   52.322
      TOTAL RAINFALL   (mm)=   97.900
      RUNOFF COEFFICIENT   =     .534

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

----------------------------------------------------------------------------
010:0010--------------------------------------------------------------------
*
--------------------
| ADD HYD (820    ) | ID: NHYD      AREA     QPEAK   TPEAK   R.V.    DWF
--------------------                 (ha)     (cms)   (hrs)   (mm)   (cms)
                    ID1 01:1.4        5.30     .552    6.17  52.32    .000
                   +ID2 07:810.1     10.28     .831    6.03  55.94    .000
                    ==================================================
                    SUM 10:820       15.58    1.349    6.10  54.71    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

----------------------------------------------------------------------------
010:0011--------------------------------------------------------------------
*
----------------------
| CALIB STANDHYD      |    Area     (ha)=    9.80
| 01:MTO103 DT= 2.00  |    Total Imp(%)=   80.00   Dir. Conn.(%)=   80.00
----------------------
                              IMPERVIOUS    PERVIOUS (i)
      Surface Area      (ha)=      7.84          1.96
      Dep. Storage      (mm)=      2.00          5.00
      Average Slope      (%)=      1.00          2.00
      Length             (m)=    256.00         40.00
      Mannings n            =      .015          .350

      Max.eff.Inten.(mm/hr)=      83.80         55.27
                over (min)         6.00         16.00
      Storage Coeff.  (min)=      5.25 (ii)    16.20 (ii)
      Unit Hyd. Tpeak (min)=      6.00         16.00
      Unit Hyd. peak  (cms)=       .20           .07
                                                               *TOTALS*
      PEAK FLOW        (cms)=      1.82           .22            2.014 (iii)
      TIME TO PEAK     (hrs)=      6.00          6.13            6.000
      RUNOFF VOLUME     (mm)=     95.90         53.80           87.480
      TOTAL RAINFALL    (mm)=     97.90         97.90           97.900
      RUNOFF COEFFICIENT    =       .98           .55             .894

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN* =  79.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

----------------------------------------------------------------------------
010:0012--------------------------------------------------------------------
*
--------------------
| ADD HYD (830    ) | ID: NHYD      AREA     QPEAK   TPEAK   R.V.    DWF
--------------------                 (ha)     (cms)   (hrs)   (mm)   (cms)
                    ID1 01:MTO103     9.80    2.014    6.00  87.48    .000
                   +ID2 08:810.2     10.92     .252    5.60  55.94    .000
                    ==================================================
                    SUM 09:830       20.72    2.266    6.00  70.86    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

----------------------------------------------------------------------------
010:0013--------------------------------------------------------------------
*
--------------------
| COMPUTE VOLUME    |
| ID:09  (830    )  |                 DISCHARGE      TIME
--------------------                    (cms)        (hrs)
             START CONTROLLING AT        .000          .867
             INFLOW HYD. PEAKS AT       2.266         6.000
             STOP  CONTROLLING AT        .000        17.700

             REQUIRED STORAGE VOLUME (ha.m.)=    1.4683
             TOTAL HYDROGRAPH VOLUME (ha.m.)=    1.4683
             % OF HYDROGRAPH TO STORE       =   99.9997

             NOTE:  Storage was computed to reduce the Inflow

----------------------------------------------------------------------------
010:0014--------------------------------------------------------------------
*
* Existing Sawmill Creek MTO Pond
--------------------
| ROUTE RESERVOIR    |     Requested routing time step =  2.0 min.
|  IN>09:(830    )   |
| OUT<07:(700    )   |     =========  OUTLFOW STORAGE TABLE  =========
--------------------       OUTFLOW     STORAGE   |   OUTFLOW     STORAGE
                            (cms)      (ha.m.)   |    (cms)      (ha.m.)
                             .000   .0000E+00    |    2.863   .6631E+00
                             .008   .2389E+00    |    3.937   .8236E+00

       ROUTING RESULTS              AREA       QPEAK      TPEAK        R.V.
       --------------------         (ha)       (cms)      (hrs)        (mm)
       INFLOW >09: (830    )       20.72       2.266      6.000      70.857
      OUTFLOW<07: (700    )        20.72       1.419      6.133      70.824
     OVERFLOW<02: (701    )          .00        .000       .000        .000

                    TOTAL NUMBER OF SIMULATED OVERFLOWS  =          0
                    CUMULATIVE TIME OF OVERFLOWS  (hours)=        .00
                    PERCENTAGE OF TIME OVERFLOWING    (%)=        .00


                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=    62.625
                    TIME SHIFT OF PEAK FLOW          (min)=      8.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=.4486E+00

----------------------------------------------------------------------------
010:0015--------------------------------------------------------------------
*
--------------------
| COMPUTE VOLUME    |
| ID:02  (701    )  |                 DISCHARGE      TIME
--------------------                    (cms)        (hrs)
      *** WARNING: No storage required, RelRate > Inflow Qp.
----------------------------------------------------------------------------
010:0016--------------------------------------------------------------------
*
----------------------------------------------------------------------------
010:0002--------------------------------------------------------------------
*
----------------------------------------------------------------------------
010:0002--------------------------------------------------------------------
*
----------------------------------------------------------------------------
010:0002--------------------------------------------------------------------
*
  ** END OF RUN :  10

****************************************************************************






--------------------
| START              |   Project  dir.: K:\Projects\6900-6~1\6964-M~1\21-HYD~1\
--------------------     Rainfall dir.: K:\Projects\6900-6~1\6964-M~1\21-HYD~1\
    TZERO =    .00 hrs on         0
    METOUT=   2 (output = METRIC)
    NRUN  = 011
    NSTORM=    1
            #  1=12scsh.stm
----------------------------------------------------------------------------
011:0002--------------------------------------------------------------------
****************************************************************************
* MISSISSAUGA BRT - WEST                                          JOB: 06964  *
* EXISTING CONDITIONS TO OUTLET 1                                           *
****************************************************************************
*                                                                           *
* - 2, 10, 50 and 100yr, 12hr Design Storms (SCS)                           *
* - 25 mm 4 hr Chicago                                                      *
* - Rainfall depths from Pearson International IDF Parameters               *
*                                                          K. Macnaughton   *
*                                                       As of: June 24, 2008 *
****************************************************************************
*
*
----------------------------------------------------------------------------
011:0002--------------------------------------------------------------------
*
--------------------
| READ STORM         |    Filename: K:\Projects\6900-6~1\6964-M~1\21-HYD~1\1
| Ptotal= 108.60 mm|      Comments: 100 Yr-12hr SCS
--------------------
```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
.17	3.258	3.17	4.344	6.17	23.675	9.17	3.258
.33	3.258	3.33	4.344	6.33	23.675	9.33	3.258
.50	3.258	3.50	4.344	6.50	23.675	9.50	3.258
.67	1.520	3.67	4.344	6.67	10.426	9.67	2.606
.83	1.520	3.83	4.344	6.83	10.426	9.83	2.606
1.00	1.520	4.00	4.344	7.00	10.426	10.00	2.606
1.17	2.824	4.17	5.864	7.17	6.950	10.17	3.692
1.33	2.824	4.33	5.864	7.33	6.950	10.33	3.692
1.50	2.824	4.50	5.864	7.50	6.950	10.50	3.692
1.67	2.824	4.67	7.385	7.67	6.082	10.67	2.389
1.83	2.824	4.83	7.385	7.83	6.082	10.83	2.389
2.00	2.824	5.00	7.385	8.00	6.082	11.00	2.389
2.17	3.692	5.17	11.729	8.17	4.778	11.17	2.172
2.33	3.692	5.33	11.729	8.33	4.778	11.33	2.172
2.50	3.692	5.50	11.729	8.50	4.778	11.50	2.172
2.67	3.258	5.67	92.962	8.67	4.996	11.67	2.172
2.83	3.258	5.83	92.962	8.83	4.996	11.83	2.172
3.00	3.258	6.00	92.962	9.00	4.996	12.00	2.172

```
----------------------------------------------------------------------------
011:0003--------------------------------------------------------------------
*
----------------------
| CALIB NASHYD        |    Area     (ha)=   14.60   Curve Number   (CN)=80.00
| 01:1.1    DT= 2.00  |    Ia       (mm)=   6.500   # of Linear Res.(N)= 3.00
----------------------    U.H. Tp(hrs)=   1.100

      Unit Hyd Qpeak  (cms)=     .507

      PEAK FLOW       (cms)=     .798 (i)
      TIME TO PEAK    (hrs)=    7.100
      RUNOFF VOLUME    (mm)=   62.949
      TOTAL RAINFALL   (mm)=  108.600
      RUNOFF COEFFICIENT   =     .580

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

----------------------------------------------------------------------------
011:0004--------------------------------------------------------------------
*
----------------------
| CALIB NASHYD        |    Area     (ha)=    2.40   Curve Number   (CN)=82.00
| 02:1.2    DT= 2.00  |    Ia       (mm)=   6.000   # of Linear Res.(N)= 3.00
----------------------    U.H. Tp(hrs)=    .200

      Unit Hyd Qpeak  (cms)=     .458

      PEAK FLOW       (cms)=     .389 (i)
      TIME TO PEAK    (hrs)=    6.067
      RUNOFF VOLUME    (mm)=   66.475
      TOTAL RAINFALL   (mm)=  108.600
      RUNOFF COEFFICIENT   =     .612
```



```

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

----------------------------------------------------------------------------
011:0005--------------------------------------------------------------------
*
--------------------
| ADD HYD (800    ) | ID: NHYD      AREA     QPEAK   TPEAK   R.V.    DWF
--------------------                 (ha)     (cms)   (hrs)   (mm)   (cms)
                    ID1 01:1.1       14.60     .798    7.10  62.95    .000
                   +ID2 02:1.2        2.40     .389    6.07  66.48    .000
                    ==================================================
                    SUM 10:800       17.00     .860    7.03  63.45    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

----------------------------------------------------------------------------
011:0006--------------------------------------------------------------------
*
----------------------
| CALIB STANDHYD      |    Area     (ha)=    4.20
| 01:1.3    DT= 2.00  |    Total Imp(%)=   20.00   Dir. Conn.(%)=   20.00
----------------------
                              IMPERVIOUS    PERVIOUS (i)
      Surface Area      (ha)=       .84          3.36
      Dep. Storage      (mm)=      2.00          5.00
      Average Slope      (%)=      1.00          2.00
      Length             (m)=    167.00         40.00
      Mannings n            =      .015          .350

      Max.eff.Inten.(mm/hr)=      92.96         65.04
                over (min)         4.00         14.00
      Storage Coeff.  (min)=      3.90 (ii)    14.16 (ii)
      Unit Hyd. Tpeak (min)=      4.00         14.00
      Unit Hyd. peak  (cms)=       .28           .08
                                                               *TOTALS*
      PEAK FLOW        (cms)=       .22           .46             .654 (iii)
      TIME TO PEAK     (hrs)=      6.00          6.10            6.000
      RUNOFF VOLUME     (mm)=    106.60         62.72           71.498
      TOTAL RAINFALL    (mm)=    108.60        108.60          108.600
      RUNOFF COEFFICIENT    =       .98           .58             .658

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN* =  79.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

----------------------------------------------------------------------------
011:0007--------------------------------------------------------------------
*
--------------------
| ADD HYD (810    ) | ID: NHYD      AREA     QPEAK   TPEAK   R.V.    DWF
--------------------                 (ha)     (cms)   (hrs)   (mm)   (cms)
                    ID1 10:800       17.00     .860    7.03  63.45    .000
                   +ID2 01:1.3        4.20     .654    6.00  71.50    .000
                    ==================================================
                    SUM 09:810       21.20    1.273    6.03  65.04    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

----------------------------------------------------------------------------
011:0008--------------------------------------------------------------------
*
----------------------
| COMPUTE DUALHYD     |    Average inlet capacities   [CINLET] =    .252  (cms)
| TotalHyd 09:810     |    Number of inlets in system [NINLET] =      1
----------------------     Total minor system capacity         =    .252  (cms)
                           Total major system storage [TMJSTO] =      0. (cu.m.)

                     ID: NHYD        AREA      QPEAK      TPEAK     R.V.      DWF
                                     (ha)      (cms)      (hrs)     (mm)     (cms)
      TOTAL HYD.   09:810           21.20      1.273      6.033   65.042     .000
      ==========================================================================
      MAJOR SYST   07:810.1         11.25      1.021      6.033   65.042     .000
      MINOR SYST   08:810.2          9.95       .252      5.567   65.042     .000

      NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

----------------------------------------------------------------------------
011:0009--------------------------------------------------------------------
*
----------------------
| CALIB NASHYD        |    Area     (ha)=    5.30   Curve Number   (CN)=79.00
| 01:1.4    DT= 2.00  |    Ia       (mm)=   6.800   # of Linear Res.(N)= 3.00
----------------------    U.H. Tp(hrs)=    .300

      Unit Hyd Qpeak  (cms)=     .675

      PEAK FLOW       (cms)=     .648 (i)
      TIME TO PEAK    (hrs)=    6.133
      RUNOFF VOLUME    (mm)=   61.205
      TOTAL RAINFALL   (mm)=  108.600
      RUNOFF COEFFICIENT   =     .564

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

----------------------------------------------------------------------------
011:0010--------------------------------------------------------------------
*
--------------------
| ADD HYD (820    ) | ID: NHYD      AREA     QPEAK   TPEAK   R.V.    DWF
--------------------                 (ha)     (cms)   (hrs)   (mm)   (cms)
                    ID1 01:1.4        5.30     .648    6.13  61.21    .000
                   +ID2 07:810.1     11.25    1.021    6.03  65.04    .000
                    ==================================================
                    SUM 10:820       16.55    1.629    6.10  63.81    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

----------------------------------------------------------------------------
011:0011--------------------------------------------------------------------
*
----------------------
| CALIB STANDHYD      |    Area     (ha)=    9.80
| 01:MTO103 DT= 2.00  |    Total Imp(%)=   80.00   Dir. Conn.(%)=   80.00
----------------------
                              IMPERVIOUS    PERVIOUS (i)
      Surface Area      (ha)=      7.84          1.96
      Dep. Storage      (mm)=      2.00          5.00
      Average Slope      (%)=      1.00          2.00
      Length             (m)=    256.00         40.00
      Mannings n            =      .015          .350

      Max.eff.Inten.(mm/hr)=      92.96         64.25
                over (min)         6.00         16.00
      Storage Coeff.  (min)=      5.04 (ii)    15.35 (ii)
      Unit Hyd. Tpeak (min)=      6.00         16.00
      Unit Hyd. peak  (cms)=       .21           .07
                                                               *TOTALS*
      PEAK FLOW        (cms)=      2.02           .26            2.255 (iii)
      TIME TO PEAK     (hrs)=      6.00          6.10            6.000
      RUNOFF VOLUME     (mm)=    106.60         62.72           97.824
      TOTAL RAINFALL    (mm)=    108.60        108.60          108.600
      RUNOFF COEFFICIENT    =       .98           .58             .901

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN* =  79.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

----------------------------------------------------------------------------
011:0012--------------------------------------------------------------------
*
--------------------
| ADD HYD (830    ) | ID: NHYD      AREA     QPEAK   TPEAK   R.V.    DWF
--------------------                 (ha)     (cms)   (hrs)   (mm)   (cms)
                    ID1 01:MTO103     9.80    2.255    6.00  97.82    .000
                   +ID2 08:810.2      9.95     .252    5.57  65.04    .000
                    ==================================================
                    SUM 09:830       19.75    2.507    6.00  81.31    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

----------------------------------------------------------------------------
011:0013--------------------------------------------------------------------
*
--------------------
| COMPUTE VOLUME    |
| ID:09  (830    )  |                 DISCHARGE      TIME
--------------------                    (cms)        (hrs)
             START CONTROLLING AT        .000          .733
             INFLOW HYD. PEAKS AT       2.507         6.000
             STOP  CONTROLLING AT        .000        17.700

             REQUIRED STORAGE VOLUME (ha.m.)=    1.6059
             TOTAL HYDROGRAPH VOLUME (ha.m.)=    1.6059
             % OF HYDROGRAPH TO STORE       =   99.9997

             NOTE:  Storage was computed to reduce the Inflow

----------------------------------------------------------------------------
011:0014--------------------------------------------------------------------
*
* Existing Sawmill Creek MTO Pond
--------------------
| ROUTE RESERVOIR    |     Requested routing time step =  2.0 min.
|  IN>09:(830    )   |
| OUT<07:(700    )   |     =========  OUTLFOW STORAGE TABLE  =========
--------------------       OUTFLOW     STORAGE   |   OUTFLOW     STORAGE
                            (cms)      (ha.m.)   |    (cms)      (ha.m.)
                             .000   .0000E+00    |    2.863   .6631E+00
                             .008   .2389E+00    |    3.937   .8236E+00

       ROUTING RESULTS              AREA       QPEAK      TPEAK        R.V.
       --------------------         (ha)       (cms)      (hrs)        (mm)
       INFLOW >09: (830    )       19.75       2.507      6.000      81.309
      OUTFLOW<07: (700    )        19.75       1.631      6.133      81.274
     OVERFLOW<02: (701    )          .00        .000       .000        .000

                    TOTAL NUMBER OF SIMULATED OVERFLOWS  =          0
                    CUMULATIVE TIME OF OVERFLOWS  (hours)=        .00
                    PERCENTAGE OF TIME OVERFLOWING    (%)=        .00


                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=    65.081
                    TIME SHIFT OF PEAK FLOW          (min)=      8.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=.4807E+00

----------------------------------------------------------------------------
011:0015--------------------------------------------------------------------
*
--------------------
| COMPUTE VOLUME    |
| ID:02  (701    )  |                 DISCHARGE      TIME
--------------------                    (cms)        (hrs)
      *** WARNING: No storage required, RelRate > Inflow Qp.
----------------------------------------------------------------------------
011:0016--------------------------------------------------------------------
*
----------------------------------------------------------------------------
011:0002--------------------------------------------------------------------
*
----------------------------------------------------------------------------
011:0002--------------------------------------------------------------------
*
----------------------------------------------------------------------------
011:0002--------------------------------------------------------------------
*
----------------------------------------------------------------------------
011:0002--------------------------------------------------------------------
*
      FINISH
----------------------------------------------------------------------------
****************************************************************************
     WARNINGS / ERRORS / NOTES
     -------------------------
 001:0015 COMPUTE VOLUME
      *** WARNING: No storage required, RelRate > Inflow Qp.
      *** WARNING: No storage required, RelRate > Inflow Qp.
      *** WARNING: No storage required, RelRate > Inflow Qp.
      *** WARNING: No storage required, RelRate > Inflow Qp.
      *** WARNING: No storage required, RelRate > Inflow Qp.
   Simulation ended on 2008-07-03      at 10:33:55
============================================================================
```

```
2     Metric units
*#*************************************************************************
*#  Project Name: BRT WEST                              JOB NUMBER: [6964]  *
*#  Date         : JUNE-25-2008                                             *
*#  Modeller     : [jrm]                                                    *
*#  Company      : McCormick Rankin Corporation                             *
*#  License #    : 4313781                                                  *
*#                                                                          *
*#                                                                          *
*#              EXISTING DRAINAGE CONDITIONS TO OUTLET 2                    *
*#       25 mm 4 hour - Chicago and 12 hour SCS 2 to 100 Year Storms        *
*#                                                                          *
*#*************************************************************************
*#*************************************************************************
*
*
START                 TIME= 0   METOUT= 0  NSTORM=1  NRUN="001"
                      CHIC25mm.stm
*
READ STORM            STORM_FILENAME="STORM.001"

*%************************************************************************|
*                            ** EXISTING PEAK FLOWS **
*%************************************************************************|
*
CALIB NASHYD          ID=[1], NHYD=["2.1"], DT=[2]min, AREA=[7.30](ha),
                      DWF=[0.00](cms),  CN/C=[80], IA=[6.5](mm),
                      N=[3], TP=[0.60]hrs,
                      END=-1

COMPUTE VOLUME        ID=[1], STRATE=[-100](cms), RELRATE=[0](cms)
*
*
CALIB NASHYD          ID=[2], NHYD=["2.2"], DT=[2]min, AREA=[4.60](ha),
                      DWF=[0.00](cms),  CN/C=[80], IA=[6.5](mm),
                      N=[3], TP=[0.20]hrs,
                      END=-1
*
*
*---------------------------------------------------------------------------
*  "OUT2" IS THE FLOW THAT ENTERS THE EXISTING TWIN 2400mm DIAM. STORM SEWER
*---------------------------------------------------------------------------
*
*
ADD HYD               IDsum=[7], NHYD=["OUT2"],
                      IDs to add=1,2
*
*
COMPUTE VOLUME        ID=2 STRATE=-100  RELRATE=0.0
*
*
START                 TIME= 0   METOUT= 0  NSTORM=1  NRUN=008
                      12hrscs2.stm
*
START                 TIME= 0   METOUT= 0  NSTORM=1  NRUN=009
                      12hscs10.stm
*
START                 TIME= 0   METOUT= 0  NSTORM=1  NRUN=010
                      12hscs50.stm
*
START                 TIME= 0   METOUT= 0  NSTORM=1  NRUN=011
                      12scsh.stm

*
FINISH
```



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

 SSSSS  W   W  M   M  H   H  Y   Y  M   M   OOO       999   999  =========
 S      W W W  MM MM  H   H   Y Y   MM MM  O   O     9   9 9   9
 SSSSS  W W W  M M M  HHHHH    Y    M M M  O   O  ## 9   9 9   9 Ver. 4.02
     S   W W   M   M  H   H    Y    M   M  O   O      9999  9999 July 1999
 SSSSS   W W   M   M  H   H    Y    M   M   OOO          9     9 =========
                                                     9   9 9   9 # 4313781
      StormWater Management HYdrologic Model          999   999  =========

 **************************************************************************
 ************************* SWMHYMO-99 Ver/4.02 ****************************
 *******  A single event and continuous hydrologic simulation model  *******
 *******     based on the principles of HYMO and its successors     *******
 *******                OTTHYMO-83 and OTTHYMO-89.                  *******
 **************************************************************************
 ******* Distributed by:  J.F. Sabourin and Associates Inc.          *******
 *******                  Ottawa,  Ontario: (613) 727-5199          *******
 *******                  Gatineau, Quebec: (819) 243-6858          *******
 *******                  E-Mail: swmhymo@jfsa.Com                  *******
 **************************************************************************

 ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
 +++++++ Licensed user: McCormick Rankin Corporation                +++++++
 +++++++                Kitchener                 SERIAL#:4313781   +++++++
 ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

 **************************************************************************
 *******             ++++++ PROGRAM ARRAY DIMENSIONS ++++++         *******
 *******             Maximum value for ID numbers  :      10        *******
 *******             Max. number of rainfall points:  15000         *******
 *******             Max. number of flow points    :  15000         *******
 **************************************************************************


 *******************   D E T A I L E D   O U T P U T   *******************
 **************************************************************************
 *      DATE: 2008-07-03     TIME: 10:35:25     RUN COUNTER: 000199       *
 **************************************************************************
 * Input   filename: K:\Projects\6900-6~1\6964-M~1\21-HYD~1\EXWest2.dat    *
 * Output  filename: K:\Projects\6900-6~1\6964-M~1\21-HYD~1\EXWest2.out    *
 * Summary filename: K:\Projects\6900-6~1\6964-M~1\21-HYD~1\EXWest2.sum    *
 * User comments:                                                          *
 * 1:______________________________________________________________________*
 * 2:______________________________________________________________________*
 * 3:______________________________________________________________________*
 **************************************************************************

----------------------------------------------------------------------------
001:0001--------------------------------------------------------------------
*#**************************************************************************
*#  Project Name: BRT WEST                              JOB NUMBER: [6964]  *
*#  Date         : JUNE-25-2008                                             *
*#  Modeller     : [jrm]                                                    *
*#  Company      : McCormick Rankin Corporation                             *
*#  License #    : 4313781                                                  *
*#                                                                          *
*#                                                                          *
*#              EXISTING DRAINAGE CONDITIONS TO OUTLET 2                    *
*#       25 mm 4 hour - Chicago and 12 hour SCS 2 to 100 Year Storms        *
*#                                                                          *
*#**************************************************************************
*#**************************************************************************
*
*
--------------------
| START             |  Project  dir.: K:\Projects\6900-6~1\6964-M~1\21-HYD~1\
--------------------   Rainfall dir.: K:\Projects\6900-6~1\6964-M~1\21-HYD~1\
    TZERO =   .00 hrs on       0
    METOUT=   2 (output = METRIC)
    NRUN  = 001
    NSTORM=   1
          #  1=CHIC25mm.stm
----------------------------------------------------------------------------
001:0002--------------------------------------------------------------------
*
--------------------
| READ STORM         |    Filename: K:\Projects\6900-6-1\6964-M-1\21-HYD-1\C
| Ptotal=  25.00 mm|    Comments: 25mm, 4hr Chicago Storm
--------------------
               TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
                .17   1.423 |  1.17   3.859 |  2.17   5.294 |  3.17   1.977
                .33   1.574 |  1.33   5.821 |  2.33   4.057 |  3.33   1.805
                .50   1.769 |  1.50  13.337 |  2.50   3.314 |  3.50   1.664
                .67   2.028 |  1.67  61.503 |  2.67   2.817 |  3.67   1.545
                .83   2.389 |  1.83  15.650 |  2.83   2.459 |  3.83   1.444
               1.00   2.933 |  2.00   7.793 |  3.00   2.189 |  4.00   1.356

----------------------------------------------------------------------------
001:0003--------------------------------------------------------------------
*                            ** EXISTING PEAK FLOWS **
*
---------------------
| CALIB NASHYD        |  Area     (ha)=    7.30  Curve Number   (CN)=80.00
| 01:2.1    DT= 2.00 |  Ia       (mm)=   6.500  # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=     .600

     Unit Hyd Qpeak  (cms)=     .465

     PEAK FLOW       (cms)=     .046 (i)
     TIME TO PEAK    (hrs)=    2.467
     RUNOFF VOLUME    (mm)=    4.174
     TOTAL RAINFALL   (mm)=   25.000
     RUNOFF COEFFICIENT   =     .167

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

----------------------------------------------------------------------------
001:0004--------------------------------------------------------------------
--------------------
| COMPUTE VOLUME     |
| ID:01  (2.1   )    |                DISCHARGE     TIME
--------------------                    (cms)       (hrs)
          START CONTROLLING AT           .000       1.500
          INFLOW HYD. PEAKS AT           .046       2.467
          STOP  CONTROLLING AT           .000        .000

          REQUIRED STORAGE VOLUME (ha.m.)=     .0305
          TOTAL HYDROGRAPH VOLUME (ha.m.)=     .0305
          % OF HYDROGRAPH TO STORE       =   99.9995

          NOTE:  Storage was computed to reduce the Inflow

----------------------------------------------------------------------------
001:0005--------------------------------------------------------------------
*
*
---------------------
| CALIB NASHYD        |  Area     (ha)=    4.60  Curve Number   (CN)=80.00
| 02:2.2    DT= 2.00 |  Ia       (mm)=   6.500  # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=     .200

     Unit Hyd Qpeak  (cms)=     .878

     PEAK FLOW       (cms)=     .059 (i)
     TIME TO PEAK    (hrs)=    1.900
     RUNOFF VOLUME    (mm)=    4.174
     TOTAL RAINFALL   (mm)=   25.000
     RUNOFF COEFFICIENT   =     .167

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

----------------------------------------------------------------------------
001:0006--------------------------------------------------------------------
*
*
*---------------------------------------------------------------------------
*  "OUT2" IS THE FLOW THAT ENTERS THE EXISTING TWIN 2400mm DIAM. STORM SEWER
*---------------------------------------------------------------------------
*
*
--------------------
| ADD HYD (OUT2  ) | ID: NHYD      AREA     QPEAK   TPEAK   R.V.    DWF
--------------------                (ha)     (cms)   (hrs)   (mm)   (cms)
                  ID1 01:2.1       7.30      .046    2.47   4.17    .000
                 +ID2 02:2.2       4.60      .059    1.90   4.17    .000
                  ====================================================
                  SUM 07:OUT2     11.90      .082    2.00   4.17    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

----------------------------------------------------------------------------
001:0007--------------------------------------------------------------------
*
*
--------------------
| COMPUTE VOLUME     |
| ID:02  (2.2   )    |                DISCHARGE     TIME
--------------------                    (cms)       (hrs)
          START CONTROLLING AT           .000       1.500
          INFLOW HYD. PEAKS AT           .059       1.900
          STOP  CONTROLLING AT           .000        .000

          REQUIRED STORAGE VOLUME (ha.m.)=     .0192
          TOTAL HYDROGRAPH VOLUME (ha.m.)=     .0192
          % OF HYDROGRAPH TO STORE       =   99.9993

          NOTE:  Storage was computed to reduce the Inflow

----------------------------------------------------------------------------
001:0008--------------------------------------------------------------------
*
*
  ** END OF RUN :    7

****************************************************************************





--------------------
| START             |  Project  dir.: K:\Projects\6900-6~1\6964-M~1\21-HYD~1\
--------------------   Rainfall dir.: K:\Projects\6900-6~1\6964-M~1\21-HYD~1\
    TZERO =   .00 hrs on       0
    METOUT=   2 (output = METRIC)
    NRUN  = 008
    NSTORM=   1
          #  1=12hrscs2.stm
----------------------------------------------------------------------------
008:0002--------------------------------------------------------------------
*#**************************************************************************
*#  Project Name: BRT WEST                              JOB NUMBER: [6964]  *
*#  Date         : JUNE-25-2008                                             *
*#  Modeller     : [jrm]                                                    *
*#  Company      : McCormick Rankin Corporation                             *
*#  License #    : 4313781                                                  *
*#                                                                          *
*#                                                                          *
*#              EXISTING DRAINAGE CONDITIONS TO OUTLET 2                    *
*#       25 mm 4 hour - Chicago and 12 hour SCS 2 to 100 Year Storms        *
*#                                                                          *
*#**************************************************************************
*#**************************************************************************
*
*
----------------------------------------------------------------------------
008:0002--------------------------------------------------------------------
*
--------------------
| READ STORM         |    Filename: K:\Projects\6900-6-1\6964-M-1\21-HYD-1\1
| Ptotal=  43.80 mm|    Comments: 2 Yr-12hr SCS
--------------------
               TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
                .17   1.314 |  3.17   1.752 |  6.17   9.548 |  9.17   1.314
                .33   1.314 |  3.33   1.752 |  6.33   9.548 |  9.33   1.314
                .50   1.314 |  3.50   1.752 |  6.50   9.548 |  9.50   1.314
                .67    .613 |  3.67   1.752 |  6.67   4.205 |  9.67   1.051
                .83    .613 |  3.83   1.752 |  6.83   4.205 |  9.83   1.051
               1.00    .613 |  4.00   1.752 |  7.00   4.205 | 10.00   1.051
               1.17   1.139 |  4.17   2.365 |  7.17   2.803 | 10.17   1.489
               1.33   1.139 |  4.33   2.365 |  7.33   2.803 | 10.33   1.489
               1.50   1.139 |  4.50   2.365 |  7.50   2.803 | 10.50   1.489
               1.67   1.139 |  4.67   2.978 |  7.67   2.453 | 10.67    .964
               1.83   1.139 |  4.83   2.978 |  7.83   2.453 | 10.83    .964
               2.00   1.139 |  5.00   2.978 |  8.00   2.453 | 11.00    .964
               2.17   1.489 |  5.17   4.730 |  8.17   1.927 | 11.17    .876
               2.33   1.489 |  5.33   4.730 |  8.33   1.927 | 11.33    .876
               2.50   1.489 |  5.50   4.730 |  8.50   1.927 | 11.50    .876
               2.67   1.314 |  5.67  37.493 |  8.67   2.015 | 11.67    .876
               2.83   1.314 |  5.83  37.493 |  8.83   2.015 | 11.83    .876
               3.00   1.314 |  6.00  37.493 |  9.00   2.015 | 12.00    .876

----------------------------------------------------------------------------
008:0003--------------------------------------------------------------------
*                            ** EXISTING PEAK FLOWS **
*
---------------------
| CALIB NASHYD        |  Area     (ha)=    7.30  Curve Number   (CN)=80.00
| 01:2.1    DT= 2.00 |  Ia       (mm)=   6.500  # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=     .600

     Unit Hyd Qpeak  (cms)=     .465

     PEAK FLOW       (cms)=     .124 (i)
     TIME TO PEAK    (hrs)=    6.600
     RUNOFF VOLUME    (mm)=   13.802
     TOTAL RAINFALL   (mm)=   43.799
     RUNOFF COEFFICIENT   =     .315

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

----------------------------------------------------------------------------
008:0004--------------------------------------------------------------------
--------------------
| COMPUTE VOLUME     |
| ID:01  (2.1   )    |                DISCHARGE     TIME
--------------------                    (cms)       (hrs)
```

```
          START CONTROLLING AT      .000        4.500
          INFLOW HYD. PEAKS AT      .124        6.600
          STOP  CONTROLLING AT      .000         .000

          REQUIRED STORAGE VOLUME (ha.m.)=     .1008
          TOTAL HYDROGRAPH VOLUME (ha.m.)=     .1008
          % OF HYDROGRAPH TO STORE         =  99.9996

          NOTE:  Storage was computed to reduce the Inflow

-----------------------------------------------------------------------------
008:0005---------------------------------------------------------------------
*
*
----------------------
| CALIB NASHYD         |   Area     (ha)=    4.60   Curve Number   (CN)=80.00
| 02:2.2     DT= 2.00  |   Ia       (mm)=   6.500   # of Linear Res.(N)= 3.00
----------------------    U.H. Tp(hrs)=     .200

     Unit Hyd Qpeak  (cms)=      .878

     PEAK FLOW        (cms)=      .147 (i)
     TIME TO PEAK     (hrs)=    6.067
     RUNOFF VOLUME     (mm)=   13.802
     TOTAL RAINFALL    (mm)=   43.799
     RUNOFF COEFFICIENT   =      .315

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

-----------------------------------------------------------------------------
008:0006---------------------------------------------------------------------
*
*
*----------------------------------------------------------------------------
*  "OUT2" IS THE FLOW THAT ENTERS THE EXISTING TWIN 2400mm DIAM. STORM SEWER
*----------------------------------------------------------------------------
*
*
--------------------
| ADD HYD (OUT2  ) | ID: NHYD      AREA     QPEAK   TPEAK   R.V.    DWF
--------------------                (ha)     (cms)   (hrs)   (mm)   (cms)
                  ID1 01:2.1        7.30      .124    6.60  13.80    .000
                 +ID2 02:2.2        4.60      .147    6.07  13.80    .000
                  ====================================================
                  SUM 07:OUT2      11.90      .221    6.13  13.80    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-----------------------------------------------------------------------------
008:0007---------------------------------------------------------------------
*
*
--------------------
| COMPUTE VOLUME    |
| ID:02  (2.2   )   |                DISCHARGE      TIME
--------------------                   (cms)       (hrs)
          START CONTROLLING AT      .000        4.500
          INFLOW HYD. PEAKS AT      .147        6.067
          STOP  CONTROLLING AT      .000         .000

          REQUIRED STORAGE VOLUME (ha.m.)=     .0635
          TOTAL HYDROGRAPH VOLUME (ha.m.)=     .0635
          % OF HYDROGRAPH TO STORE         =  99.9996

          NOTE:  Storage was computed to reduce the Inflow

-----------------------------------------------------------------------------
008:0008---------------------------------------------------------------------
*
*
-----------------------------------------------------------------------------
008:0002---------------------------------------------------------------------
*
  ** END OF RUN :   8

*****************************************************************************





--------------------
| START              |  Project  dir.: K:\Projects\6900-6-1\6964-M-1\21-HYD-1\
--------------------    Rainfall dir.: K:\Projects\6900-6-1\6964-M-1\21-HYD-1\
   TZERO =    .00 hrs on      0
   METOUT=    2 (output = METRIC)
   NRUN   = 009
   NSTORM=    1
          #  1=12hscs10.stm
-----------------------------------------------------------------------------
009:0002---------------------------------------------------------------------
*#****************************************************************************
*#  Project Name: BRT WEST                                JOB NUMBER: [6964]  *
*#  Date         : JUNE-25-2008                                                *
*#  Modeller     : [jrm]                                                       *
*#  Company      : McCormick Rankin Corporation                                *
*#  License #    : 4313781                                                     *
*#                                                                             *
*#                                                                             *
*#                EXISTING DRAINAGE CONDITIONS TO OUTLET 2                     *
*#        25 mm 4 hour - Chicago and 12 hour SCS 2 to 100 Year Storms          *
*#                                                                             *
*#****************************************************************************
*#****************************************************************************
*
*
-----------------------------------------------------------------------------
009:0002---------------------------------------------------------------------
*
--------------------
| READ STORM         |    Filename: K:\Projects\6900-6-1\6964-M-1\21-HYD-1\1
| Ptotal=  72.70 mm|    Comments: 10 Yr-12hr SCS
--------------------
              TIME     RAIN |   TIME     RAIN |   TIME     RAIN |   TIME    RAIN
               hrs    mm/hr |    hrs    mm/hr |    hrs    mm/hr |    hrs   mm/hr
               .17    2.181 |   3.17    2.908 |   6.17   15.849 |   9.17   2.181
               .33    2.181 |   3.33    2.908 |   6.33   15.849 |   9.33   2.181
               .50    2.181 |   3.50    2.908 |   6.50   15.849 |   9.50   2.181
               .67    1.018 |   3.67    2.908 |   6.67    6.979 |   9.67   1.745
               .83    1.018 |   3.83    2.908 |   6.83    6.979 |   9.83   1.745
              1.00    1.018 |   4.00    2.908 |   7.00    6.979 |  10.00   1.745
              1.17    1.890 |   4.17    3.926 |   7.17    4.653 |  10.17   2.472
              1.33    1.890 |   4.33    3.926 |   7.33    4.653 |  10.33   2.472
              1.50    1.890 |   4.50    3.926 |   7.50    4.653 |  10.50   2.472
              1.67    1.890 |   4.67    4.944 |   7.67    4.071 |  10.67   1.599
              1.83    1.890 |   4.83    4.944 |   7.83    4.071 |  10.83   1.599
              2.00    1.890 |   5.00    4.944 |   8.00    4.071 |  11.00   1.599
              2.17    2.472 |   5.17    7.852 |   8.17    3.199 |  11.17   1.454
              2.33    2.472 |   5.33    7.852 |   8.33    3.199 |  11.33   1.454
              2.50    2.472 |   5.50    7.852 |   8.50    3.199 |  11.50   1.454
              2.67    2.181 |   5.67   62.231 |   8.67    3.344 |  11.67   1.454
              2.83    2.181 |   5.83   62.231 |   8.83    3.344 |  11.83   1.454
              3.00    2.181 |   6.00   62.231 |   9.00    3.344 |  12.00   1.454

-----------------------------------------------------------------------------
009:0003---------------------------------------------------------------------
*                            ** EXISTING PEAK FLOWS **
*
----------------------
| CALIB NASHYD         |   Area     (ha)=    7.30   Curve Number   (CN)=80.00
| 01:2.1     DT= 2.00  |   Ia       (mm)=   6.500   # of Linear Res.(N)= 3.00
----------------------    U.H. Tp(hrs)=     .600

     Unit Hyd Qpeak  (cms)=      .465

     PEAK FLOW        (cms)=      .318 (i)
     TIME TO PEAK     (hrs)=    6.567
     RUNOFF VOLUME     (mm)=   33.789
     TOTAL RAINFALL    (mm)=   72.700
     RUNOFF COEFFICIENT   =      .465

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

-----------------------------------------------------------------------------
009:0004---------------------------------------------------------------------
--------------------
| COMPUTE VOLUME    |
| ID:01  (2.1   )   |                DISCHARGE      TIME
--------------------                   (cms)       (hrs)
          START CONTROLLING AT      .000        3.233
          INFLOW HYD. PEAKS AT      .318        6.567
          STOP  CONTROLLING AT      .000         .000

          REQUIRED STORAGE VOLUME (ha.m.)=     .2467
          TOTAL HYDROGRAPH VOLUME (ha.m.)=     .2467
          % OF HYDROGRAPH TO STORE         =  99.9997

          NOTE:  Storage was computed to reduce the Inflow

-----------------------------------------------------------------------------
009:0005---------------------------------------------------------------------
*
*
----------------------
| CALIB NASHYD         |   Area     (ha)=    4.60   Curve Number   (CN)=80.00
| 02:2.2     DT= 2.00  |   Ia       (mm)=   6.500   # of Linear Res.(N)= 3.00
----------------------    U.H. Tp(hrs)=     .200

     Unit Hyd Qpeak  (cms)=      .878

     PEAK FLOW        (cms)=      .374 (i)
     TIME TO PEAK     (hrs)=    6.067
     RUNOFF VOLUME     (mm)=   33.789
     TOTAL RAINFALL    (mm)=   72.700
     RUNOFF COEFFICIENT   =      .465

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

-----------------------------------------------------------------------------
009:0006---------------------------------------------------------------------
*
*
*----------------------------------------------------------------------------
*  "OUT2" IS THE FLOW THAT ENTERS THE EXISTING TWIN 2400mm DIAM. STORM SEWER
*----------------------------------------------------------------------------
*
*
--------------------
| ADD HYD (OUT2  ) | ID: NHYD      AREA     QPEAK   TPEAK   R.V.    DWF
--------------------                (ha)     (cms)   (hrs)   (mm)   (cms)
                  ID1 01:2.1        7.30      .318    6.57  33.79    .000
                 +ID2 02:2.2        4.60      .374    6.07  33.79    .000
                  ====================================================
                  SUM 07:OUT2      11.90      .578    6.13  33.79    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-----------------------------------------------------------------------------
009:0007---------------------------------------------------------------------
*
*
--------------------
| COMPUTE VOLUME    |
| ID:02  (2.2   )   |                DISCHARGE      TIME
--------------------                   (cms)       (hrs)
          START CONTROLLING AT      .000        3.233
          INFLOW HYD. PEAKS AT      .374        6.067
          STOP  CONTROLLING AT      .000         .000

          REQUIRED STORAGE VOLUME (ha.m.)=     .1554
          TOTAL HYDROGRAPH VOLUME (ha.m.)=     .1554
          % OF HYDROGRAPH TO STORE         =  99.9996

          NOTE:  Storage was computed to reduce the Inflow

-----------------------------------------------------------------------------
009:0008---------------------------------------------------------------------
*
*
-----------------------------------------------------------------------------
009:0002---------------------------------------------------------------------
*
-----------------------------------------------------------------------------
009:0002---------------------------------------------------------------------
*
  ** END OF RUN :   9

*****************************************************************************





--------------------
| START              |  Project  dir.: K:\Projects\6900-6-1\6964-M-1\21-HYD-1\
--------------------    Rainfall dir.: K:\Projects\6900-6-1\6964-M-1\21-HYD-1\
   TZERO =    .00 hrs on      0
   METOUT=    2 (output = METRIC)
   NRUN   = 010
   NSTORM=    1
          #  1=12hscs50.stm
-----------------------------------------------------------------------------
010:0002---------------------------------------------------------------------
*#****************************************************************************
*#  Project Name: BRT WEST                                JOB NUMBER: [6964]  *
*#  Date         : JUNE-25-2008                                                *
*#  Modeller     : [jrm]                                                       *
*#  Company      : McCormick Rankin Corporation                                *
*#  License #    : 4313781                                                     *
*#                                                                             *
*#                                                                             *
*#                EXISTING DRAINAGE CONDITIONS TO OUTLET 2                     *
*#        25 mm 4 hour - Chicago and 12 hour SCS 2 to 100 Year Storms          *
*#                                                                             *
*#****************************************************************************
*#****************************************************************************
*
*
-----------------------------------------------------------------------------
010:0002---------------------------------------------------------------------
```



```
*
--------------------
| READ STORM         |    Filename: K:\Projects\6900-6-1\6964-M-1\21-HYD-1\1
| Ptotal=  97.90 mm|    Comments: 50 Yr-12hr SCS
--------------------
              TIME     RAIN |   TIME     RAIN |   TIME     RAIN |   TIME    RAIN
               hrs    mm/hr |    hrs    mm/hr |    hrs    mm/hr |    hrs   mm/hr
               .17    2.937 |   3.17    3.916 |   6.17   21.342 |   9.17   2.937
               .33    2.937 |   3.33    3.916 |   6.33   21.342 |   9.33   2.937
               .50    2.937 |   3.50    3.916 |   6.50   21.342 |   9.50   2.937
               .67    1.371 |   3.67    3.916 |   6.67    9.398 |   9.67   2.350
               .83    1.371 |   3.83    3.916 |   6.83    9.398 |   9.83   2.350
              1.00    1.371 |   4.00    3.916 |   7.00    9.398 |  10.00   2.350
              1.17    2.545 |   4.17    5.287 |   7.17    6.266 |  10.17   3.329
              1.33    2.545 |   4.33    5.287 |   7.33    6.266 |  10.33   3.329
              1.50    2.545 |   4.50    5.287 |   7.50    6.266 |  10.50   3.329
              1.67    2.545 |   4.67    6.657 |   7.67    5.482 |  10.67   2.154
              1.83    2.545 |   4.83    6.657 |   7.83    5.482 |  10.83   2.154
              2.00    2.545 |   5.00    6.657 |   8.00    5.482 |  11.00   2.154
              2.17    3.329 |   5.17   10.573 |   8.17    4.308 |  11.17   1.958
              2.33    3.329 |   5.33   10.573 |   8.33    4.308 |  11.33   1.958
              2.50    3.329 |   5.50   10.573 |   8.50    4.308 |  11.50   1.958
              2.67    2.937 |   5.67   83.802 |   8.67    4.503 |  11.67   1.958
              2.83    2.937 |   5.83   83.802 |   8.83    4.503 |  11.83   1.958
              3.00    2.937 |   6.00   83.802 |   9.00    4.503 |  12.00   1.958

-----------------------------------------------------------------------------
010:0003---------------------------------------------------------------------
*                            ** EXISTING PEAK FLOWS **
*
----------------------
| CALIB NASHYD         |   Area     (ha)=    7.30   Curve Number   (CN)=80.00
| 01:2.1     DT= 2.00  |   Ia       (mm)=   6.500   # of Linear Res.(N)= 3.00
----------------------    U.H. Tp(hrs)=     .600

     Unit Hyd Qpeak  (cms)=      .465

     PEAK FLOW        (cms)=      .515 (i)
     TIME TO PEAK     (hrs)=    6.533
     RUNOFF VOLUME     (mm)=   53.931
     TOTAL RAINFALL    (mm)=   97.900
     RUNOFF COEFFICIENT   =      .551

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

-----------------------------------------------------------------------------
010:0004---------------------------------------------------------------------
--------------------
| COMPUTE VOLUME    |
| ID:01  (2.1   )   |                DISCHARGE      TIME
--------------------                   (cms)       (hrs)
          START CONTROLLING AT      .000        2.533
          INFLOW HYD. PEAKS AT      .515        6.533
          STOP  CONTROLLING AT      .000         .000

          REQUIRED STORAGE VOLUME (ha.m.)=     .3937
          TOTAL HYDROGRAPH VOLUME (ha.m.)=     .3937
          % OF HYDROGRAPH TO STORE         =  99.9996

          NOTE:  Storage was computed to reduce the Inflow

-----------------------------------------------------------------------------
010:0005---------------------------------------------------------------------
*
*
----------------------
| CALIB NASHYD         |   Area     (ha)=    4.60   Curve Number   (CN)=80.00
| 02:2.2     DT= 2.00  |   Ia       (mm)=   6.500   # of Linear Res.(N)= 3.00
----------------------    U.H. Tp(hrs)=     .200

     Unit Hyd Qpeak  (cms)=      .878

     PEAK FLOW        (cms)=      .602 (i)
     TIME TO PEAK     (hrs)=    6.067
     RUNOFF VOLUME     (mm)=   53.931
     TOTAL RAINFALL    (mm)=   97.900
     RUNOFF COEFFICIENT   =      .551

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

-----------------------------------------------------------------------------
010:0006---------------------------------------------------------------------
*
*
*----------------------------------------------------------------------------
*  "OUT2" IS THE FLOW THAT ENTERS THE EXISTING TWIN 2400mm DIAM. STORM SEWER
*----------------------------------------------------------------------------
*
*
--------------------
| ADD HYD (OUT2  ) | ID: NHYD      AREA     QPEAK   TPEAK   R.V.    DWF
--------------------                (ha)     (cms)   (hrs)   (mm)   (cms)
                  ID1 01:2.1        7.30      .515    6.53  53.93    .000
                 +ID2 02:2.2        4.60      .602    6.07  53.93    .000
                  ====================================================
                  SUM 07:OUT2      11.90      .942    6.13  53.93    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-----------------------------------------------------------------------------
010:0007---------------------------------------------------------------------
*
*
--------------------
| COMPUTE VOLUME    |
| ID:02  (2.2   )   |                DISCHARGE      TIME
--------------------                   (cms)       (hrs)
          START CONTROLLING AT      .000        2.533
          INFLOW HYD. PEAKS AT      .602        6.067
          STOP  CONTROLLING AT      .000         .000

          REQUIRED STORAGE VOLUME (ha.m.)=     .2481
          TOTAL HYDROGRAPH VOLUME (ha.m.)=     .2481
          % OF HYDROGRAPH TO STORE         =  99.9997

          NOTE:  Storage was computed to reduce the Inflow

-----------------------------------------------------------------------------
010:0008---------------------------------------------------------------------
*
*
-----------------------------------------------------------------------------
010:0002---------------------------------------------------------------------
*
-----------------------------------------------------------------------------
010:0002---------------------------------------------------------------------
*
-----------------------------------------------------------------------------
010:0002---------------------------------------------------------------------
*
  ** END OF RUN :   10

*****************************************************************************





--------------------
| START              |  Project  dir.: K:\Projects\6900-6-1\6964-M-1\21-HYD-1\
--------------------    Rainfall dir.: K:\Projects\6900-6-1\6964-M-1\21-HYD-1\
   TZERO =    .00 hrs on      0
   METOUT=    2 (output = METRIC)
   NRUN   = 011
   NSTORM=    1
          #  1=12scsh.stm
-----------------------------------------------------------------------------
011:0002---------------------------------------------------------------------
*#****************************************************************************
*#  Project Name: BRT WEST                                JOB NUMBER: [6964]  *
*#  Date         : JUNE-25-2008                                                *
*#  Modeller     : [jrm]                                                       *
*#  Company      : McCormick Rankin Corporation                                *
*#  License #    : 4313781                                                     *
*#                                                                             *
*#                                                                             *
*#                EXISTING DRAINAGE CONDITIONS TO OUTLET 2                     *
*#        25 mm 4 hour - Chicago and 12 hour SCS 2 to 100 Year Storms          *
*#                                                                             *
*#****************************************************************************
*#****************************************************************************
*
*
-----------------------------------------------------------------------------
011:0002---------------------------------------------------------------------
*
--------------------
| READ STORM         |    Filename: K:\Projects\6900-6-1\6964-M-1\21-HYD-1\1
| Ptotal= 108.60 mm|    Comments: 100 Yr-12hr SCS
--------------------
              TIME     RAIN |   TIME     RAIN |   TIME     RAIN |   TIME    RAIN
               hrs    mm/hr |    hrs    mm/hr |    hrs    mm/hr |    hrs   mm/hr
               .17    3.258 |   3.17    4.344 |   6.17   23.675 |   9.17   3.258
               .33    3.258 |   3.33    4.344 |   6.33   23.675 |   9.33   3.258
               .50    3.258 |   3.50    4.344 |   6.50   23.675 |   9.50   3.258
               .67    1.520 |   3.67    4.344 |   6.67   10.426 |   9.67   2.606
               .83    1.520 |   3.83    4.344 |   6.83   10.426 |   9.83   2.606
              1.00    1.520 |   4.00    4.344 |   7.00   10.426 |  10.00   2.606
              1.17    2.824 |   4.17    5.864 |   7.17    6.950 |  10.17   3.692
              1.33    2.824 |   4.33    5.864 |   7.33    6.950 |  10.33   3.692
              1.50    2.824 |   4.50    5.864 |   7.50    6.950 |  10.50   3.692
              1.67    2.824 |   4.67    7.385 |   7.67    6.082 |  10.67   2.389
              1.83    2.824 |   4.83    7.385 |   7.83    6.082 |  10.83   2.389
              2.00    2.824 |   5.00    7.385 |   8.00    6.082 |  11.00   2.389
              2.17    3.692 |   5.17   11.729 |   8.17    4.778 |  11.17   2.172
              2.33    3.692 |   5.33   11.729 |   8.33    4.778 |  11.33   2.172
              2.50    3.692 |   5.50   11.729 |   8.50    4.778 |  11.50   2.172
              2.67    3.258 |   5.67   92.962 |   8.67    4.996 |  11.67   2.172
              2.83    3.258 |   5.83   92.962 |   8.83    4.996 |  11.83   2.172
              3.00    3.258 |   6.00   92.962 |   9.00    4.996 |  12.00   2.172

-----------------------------------------------------------------------------
011:0003---------------------------------------------------------------------
*                            ** EXISTING PEAK FLOWS **
*
----------------------
| CALIB NASHYD         |   Area     (ha)=    7.30   Curve Number   (CN)=80.00
| 01:2.1     DT= 2.00  |   Ia       (mm)=   6.500   # of Linear Res.(N)= 3.00
----------------------    U.H. Tp(hrs)=     .600

     Unit Hyd Qpeak  (cms)=      .465

     PEAK FLOW        (cms)=      .604 (i)
     TIME TO PEAK     (hrs)=    6.533
     RUNOFF VOLUME     (mm)=   62.949
     TOTAL RAINFALL    (mm)=  108.600
     RUNOFF COEFFICIENT   =      .580

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

-----------------------------------------------------------------------------
011:0004---------------------------------------------------------------------
--------------------
| COMPUTE VOLUME    |
| ID:01  (2.1   )   |                DISCHARGE      TIME
--------------------                   (cms)       (hrs)
          START CONTROLLING AT      .000        2.333
          INFLOW HYD. PEAKS AT      .604        6.533
          STOP  CONTROLLING AT      .000         .000

          REQUIRED STORAGE VOLUME (ha.m.)=     .4595
          TOTAL HYDROGRAPH VOLUME (ha.m.)=     .4595
          % OF HYDROGRAPH TO STORE         =  99.9996

          NOTE:  Storage was computed to reduce the Inflow

-----------------------------------------------------------------------------
011:0005---------------------------------------------------------------------
*
*
----------------------
| CALIB NASHYD         |   Area     (ha)=    4.60   Curve Number   (CN)=80.00
| 02:2.2     DT= 2.00  |   Ia       (mm)=   6.500   # of Linear Res.(N)= 3.00
----------------------    U.H. Tp(hrs)=     .200

     Unit Hyd Qpeak  (cms)=      .878

     PEAK FLOW        (cms)=      .704 (i)
     TIME TO PEAK     (hrs)=    6.067
     RUNOFF VOLUME     (mm)=   62.949
     TOTAL RAINFALL    (mm)=  108.600
     RUNOFF COEFFICIENT   =      .580

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

-----------------------------------------------------------------------------
011:0006---------------------------------------------------------------------
*
*
*----------------------------------------------------------------------------
*  "OUT2" IS THE FLOW THAT ENTERS THE EXISTING TWIN 2400mm DIAM. STORM SEWER
*----------------------------------------------------------------------------
*
*
--------------------
| ADD HYD (OUT2  ) | ID: NHYD      AREA     QPEAK   TPEAK   R.V.    DWF
--------------------                (ha)     (cms)   (hrs)   (mm)   (cms)
                  ID1 01:2.1        7.30      .604    6.53  62.95    .000
                 +ID2 02:2.2        4.60      .704    6.07  62.95    .000
                  ====================================================
                  SUM 07:OUT2      11.90     1.105    6.13  62.95    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-----------------------------------------------------------------------------
011:0007---------------------------------------------------------------------
*
*
--------------------
| COMPUTE VOLUME    |
```

```
00811> | ID:02  (2.2    ) |            DISCHARGE      TIME
00812> --------------------              (cms)       (hrs)
00813>            START CONTROLLING AT      .000      2.333
00814>            INFLOW HYD. PEAKS AT      .704      6.067
00815>            STOP  CONTROLLING AT      .000       .000
00816>
00817>            REQUIRED STORAGE VOLUME (ha.m.)=     .2896
00818>            TOTAL HYDROGRAPH VOLUME (ha.m.)=     .2896
00819>            % OF HYDROGRAPH TO STORE       =  99.9997
00820>
00821>            NOTE:  Storage was computed to reduce the Inflow
00822>
00823> ----------------------------------------------------------------------------
00824> 011:0008----------------------------------------------------------------------
00825> *
00826> *
00827> ----------------------------------------------------------------------------
00828> 011:0002----------------------------------------------------------------------
00829> *
00830> ----------------------------------------------------------------------------
00831> 011:0002----------------------------------------------------------------------
00832> *
00833> ----------------------------------------------------------------------------
00834> 011:0002----------------------------------------------------------------------
00835> *
00836> ----------------------------------------------------------------------------
00837> 011:0002----------------------------------------------------------------------
00838> *
00839>       FINISH
00840> ----------------------------------------------------------------------------
00841> ****************************************************************************
00842>      WARNINGS / ERRORS / NOTES
00843>      -------------------------
00844>    Simulation ended on 2008-07-03     at 10:35:26
00845> ============================================================================
00846>
```



```
00001> 2     Metric units
00002> *****************************************************************************
00003> *#  Project Name: BRT WEST - Outlet 3                    JOB NUMBER: [6964]  *
00004> *#  Date        : JUNE-25-2008                                                *
00005> *#  Modeller    : [jrm]                                                       *
00006> *#  Company     : McCormick Rankin Corporation                                *
00007> *#  License #   : 4313781                                                     *
00008> *#                                                                           *
00009> *#                                                                           *
00010> *#              EXISTING DRAINAGE CONDITIONS TO OUTLET 3                     *
00011> *#       25 mm 4 hour - Chicago and 12 hour SCS 2 to 100 Year Storms         *
00012> *#                                                                           *
00013> *#***************************************************************************
00014> *#***************************************************************************
00015> *
00016> *
00017> START              TIME= 0   METOUT= 0  NSTORM=1  NRUN="001"
00018>                    CHIC25mm.stm
00019> *
00020> READ STORM         STORM_FILENAME="STORM.001"
00021> *
00022>
00023> *
00024> *
00025> CALIB NASHYD       ID=[1], NHYD=["3.1"], DT=[2]min, AREA=[8.60](ha),
00026>                    DWF=[0.00](cms),  CN/C=[79], IA=[6.70](mm),
00027>                    N=[3], TP=[0.50]hrs,
00028>                    END=-1
00029> *
00030> CALIB STANDHYD     ID=[2], NHYD=["3.2"], DT=[2](min), AREA=[3.2](ha),
00031>                    XIMP=[0.20], TIMP=[0.20], DWF=[0](cms), LOSS=[2],
00032>                    SCS curve number CN=[79],
00033>                    Pervious   surfaces: IAper=[5.0](mm), SLPP=[2.0](%),
00034>                                         LGP=[5](m), MNP=[0.35], SCP=[0](min),
00035>                    Impervious surfaces: IAimp=[2](mm), SLPI=[1.0](%),
00036>                                         LGI=[1000](m), MNI=[0.015], SCI=[0](min
00037>                    END=-1
00038> *
00039> ADD HYD           IDsum=[9], NHYD=["OUT3"],
00040>                    IDs to add=1,2
00041>
00042> START              TIME= 0   METOUT= 0  NSTORM=1  NRUN=008
00043>                    12hrscs2.stm
00044> *
00045> START              TIME= 0   METOUT= 0  NSTORM=1  NRUN=009
00046>                    12hscs10.stm
00047> *
00048> START              TIME= 0   METOUT= 0  NSTORM=1  NRUN=010
00049>                    12hscs50.stm
00050> *
00051> START              TIME= 0   METOUT= 0  NSTORM=1  NRUN=011
00052>                    12scsh.stm
00053>
00054> *
00055> FINISH
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-------------------------------------------------------------------------------------
 SSSSS  W   W  M   M  H   H  Y   Y  M   M   OOO        999    999  =========
 S      W W W  MM MM  H   H   Y Y   MM MM  O   O      9   9  9   9
 SSSSS  W W W  M M M  HHHHH    Y    M M M  O   O  ##  9   9  9   9 Ver. 4.02
     S   W W   M   M  H   H    Y    M   M  O   O       9999   9999 July 1999
 SSSSS   W W   M   M  H   H    Y    M   M   OOO           9      9 =========
                                                      9   9  9   9 # 4313781
      StormWater Management HYdrologic Model           999    999  =========

 ***********************************************************************
 ************************* SWMHYMO-99 Ver/4.02 *************************
 *******  A single event and continuous hydrologic simulation model  *******
 *******     based on the principles of HYMO and its successors      *******
 *******                OTTHYMO-83 and OTTHYMO-89.                   *******
 ***********************************************************************
 ******* Distributed by:  J.F. Sabourin and Associates Inc.           *******
 *******                  Ottawa,  Ontario: (613) 727-5199           *******
 *******                  Gatineau, Quebec: (819) 243-6858           *******
 *******                  E-Mail: swmhymo@jfsa.Com                   *******
 ***********************************************************************

 +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
 +++++++ Licensed user: McCormick Rankin Corporation                 +++++++
 +++++++                Kitchener              SERIAL#:4313781       +++++++
 +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

 ***********************************************************************
 *******             ++++++ PROGRAM ARRAY DIMENSIONS ++++++          *******
 *******             Maximum value for ID numbers   :    10          *******
 *******             Max. number of rainfall points:  15000          *******
 *******             Max. number of flow points     :  15000         *******
 ***********************************************************************


 ********************   D E T A I L E D   O U T P U T   ******************
 ***********************************************************************
 *       DATE: 2008-07-03      TIME: 10:38:22      RUN COUNTER: 000200     *
 ***********************************************************************
 * Input   filename: K:\Projects\6900-6-1\6964-M-1\21-HYD-1\EXWest3.dat   *
 * Output  filename: K:\Projects\6900-6-1\6964-M-1\21-HYD-1\EXWest3.out   *
 * Summary filename: K:\Projects\6900-6-1\6964-M-1\21-HYD-1\EXWest3.sum   *
 * User comments:                                                         *
 * 1:_____________________________________________________________________*
 * 2:_____________________________________________________________________*
 * 3:_____________________________________________________________________*
 ***********************************************************************

--------------------------------------------------------------------------------
001:0001------------------------------------------------------------------------
*#***************************************************************************
*#  Project Name: BRT WEST - Outlet 3                        JOB NUMBER: [6964]  *
*#  Date         : JUNE-25-2008                                                  *
*#  Modeller     : [jrm]                                                         *
*#  Company      : McCormick Rankin Corporation                                  *
*#  License #    : 4313781                                                       *
*#                                                                               *
*#                                                                               *
*#                  EXISTING DRAINAGE CONDITIONS TO OUTLET 3                     *
*#        25 mm 4 hour - Chicago and 12 hour SCS 2 to 100 Year Storms            *
*#                                                                               *
*#***************************************************************************
*#***************************************************************************
*
*
-------------------
| START              |  Project  dir.: K:\Projects\6900-6-1\6964-M-1\21-HYD-1\
--------------------  Rainfall dir.: K:\Projects\6900-6-1\6964-M-1\21-HYD-1\
    TZERO =   .00 hrs on      0
    METOUT=   2 (output = METRIC)
    NRUN  = 001
    NSTORM=   1
           #  1=CHIC25mm.stm
--------------------------------------------------------------------------------
001:0002------------------------------------------------------------------------
*
-------------------
| READ STORM         |   Filename: K:\Projects\6900-6-1\6964-M-1\21-HYD-1\C
| Ptotal=  25.00 mm|   Comments: 25mm, 4hr Chicago Storm
-------------------
              TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
               hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
               .17   1.423 |  1.17   3.859 |  2.17   5.294 |  3.17   1.977
               .33   1.574 |  1.33   5.821 |  2.33   4.057 |  3.33   1.805
               .50   1.769 |  1.50  13.337 |  2.50   3.314 |  3.50   1.664
               .67   2.028 |  1.67  61.503 |  2.67   2.817 |  3.67   1.545
               .83   2.389 |  1.83  15.650 |  2.83   2.459 |  3.83   1.444
              1.00   2.933 |  2.00   7.793 |  3.00   2.189 |  4.00   1.356

--------------------------------------------------------------------------------
001:0003------------------------------------------------------------------------
*
*
*
---------------------
| CALIB NASHYD        |   Area    (ha)=    8.60   Curve Number    (CN)=79.00
| 01:3.1    DT= 2.00 |   Ia      (mm)=   6.700   # of Linear Res.(N)= 3.00
---------------------    U.H. Tp(hrs)=    .500

     Unit Hyd Qpeak  (cms)=     .657

     PEAK FLOW       (cms)=     .057 (i)
     TIME TO PEAK    (hrs)=    2.333
     RUNOFF VOLUME    (mm)=    3.902
     TOTAL RAINFALL   (mm)=   25.000
     RUNOFF COEFFICIENT   =     .156

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

--------------------------------------------------------------------------------
001:0004------------------------------------------------------------------------
*
---------------------
| CALIB STANDHYD      |   Area    (ha)=    3.20
| 02:3.2    DT= 2.00 |   Total Imp(%)=   20.00   Dir. Conn.(%)=   20.00
---------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .64          2.56
     Dep. Storage     (mm)=       2.00          5.00
     Average Slope     (%)=       1.00          2.00
     Length            (m)=    1000.00          5.00
     Mannings n           =       .015          .350

     Max.eff.Inten.(mm/hr)=      44.31          6.51
                over (min)       16.00         22.00
     Storage Coeff.  (min)=      15.35 (ii)    22.75 (ii)
     Unit Hyd. Tpeak (min)=      16.00         22.00
     Unit Hyd. peak  (cms)=        .07           .05
                                                           *TOTALS*
     PEAK FLOW       (cms)=        .05           .03          .071 (iii)
     TIME TO PEAK    (hrs)=       1.87          2.00         1.900
     RUNOFF VOLUME    (mm)=      23.00          4.57         8.256
     TOTAL RAINFALL   (mm)=      25.00         25.00        25.000
     RUNOFF COEFFICIENT   =        .92           .18          .330

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  79.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
001:0005------------------------------------------------------------------------
*
--------------------
| ADD HYD (OUT3  ) | ID: NHYD     AREA     QPEAK   TPEAK   R.V.    DWF
--------------------               (ha)     (cms)   (hrs)   (mm)   (cms)
                  ID1 01:3.1        8.60      .057    2.33   3.90    .000
                 +ID2 02:3.2        3.20      .071    1.90   8.26    .000
                  ====================================================
                  SUM 09:OUT3      11.80      .109    2.03   5.08    .000

  NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
001:0006------------------------------------------------------------------------
  ** END OF RUN :    7

********************************************************************************





--------------------
| START              |  Project  dir.: K:\Projects\6900-6-1\6964-M-1\21-HYD-1\
--------------------  Rainfall dir.: K:\Projects\6900-6-1\6964-M-1\21-HYD-1\
    TZERO =   .00 hrs on      0
    METOUT=   2 (output = METRIC)
    NRUN  = 008
    NSTORM=   1
           #  1=12hrscs2.stm
--------------------------------------------------------------------------------
008:0002------------------------------------------------------------------------
*#***************************************************************************
*#  Project Name: BRT WEST - Outlet 3                        JOB NUMBER: [6964]  *
*#  Date         : JUNE-25-2008                                                  *
*#  Modeller     : [jrm]                                                         *
*#  Company      : McCormick Rankin Corporation                                  *
*#  License #    : 4313781                                                       *
*#                                                                               *
*#                                                                               *
*#                  EXISTING DRAINAGE CONDITIONS TO OUTLET 3                     *
*#        25 mm 4 hour - Chicago and 12 hour SCS 2 to 100 Year Storms            *
*#                                                                               *
*#***************************************************************************
*#***************************************************************************
*
*
--------------------------------------------------------------------------------
008:0002------------------------------------------------------------------------
*
-------------------
| READ STORM         |   Filename: K:\Projects\6900-6-1\6964-M-1\21-HYD-1\1
| Ptotal=  43.80 mm|   Comments: 2 Yr-12hr SCS
-------------------
              TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
               hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
               .17   1.314 |  3.17   1.752 |  6.17   9.548 |  9.17   1.314
               .33   1.314 |  3.33   1.752 |  6.33   9.548 |  9.33   1.314
               .50   1.314 |  3.50   1.752 |  6.50   9.548 |  9.50   1.314
               .67    .613 |  3.67   1.752 |  6.67   4.205 |  9.67   1.051
               .83    .613 |  3.83   1.752 |  6.83   4.205 |  9.83   1.051
              1.00    .613 |  4.00   1.752 |  7.00   4.205 | 10.00   1.051
              1.17   1.139 |  4.17   2.365 |  7.17   2.803 | 10.17   1.489
              1.33   1.139 |  4.33   2.365 |  7.33   2.803 | 10.33   1.489
              1.50   1.139 |  4.50   2.365 |  7.50   2.803 | 10.50   1.489
              1.67   1.139 |  4.67   2.978 |  7.67   2.453 | 10.67    .964
              1.83   1.139 |  4.83   2.978 |  7.83   2.453 | 10.83    .964
              2.00   1.139 |  5.00   2.978 |  8.00   2.453 | 11.00    .964
              2.17   1.489 |  5.17   4.730 |  8.17   1.927 | 11.17    .876
              2.33   1.489 |  5.33   4.730 |  8.33   1.927 | 11.33    .876
              2.50   1.489 |  5.50   4.730 |  8.50   1.927 | 11.50    .876
              2.67   1.314 |  5.67  37.493 |  8.67   2.015 | 11.67    .876
              2.83   1.314 |  5.83  37.493 |  8.83   2.015 | 11.83    .876
              3.00   1.314 |  6.00  37.493 |  9.00   2.015 | 12.00    .876

--------------------------------------------------------------------------------
008:0003------------------------------------------------------------------------
*
*
*
---------------------
| CALIB NASHYD        |   Area    (ha)=    8.60   Curve Number    (CN)=79.00
| 01:3.1    DT= 2.00 |   Ia      (mm)=   6.700   # of Linear Res.(N)= 3.00
---------------------    U.H. Tp(hrs)=    .500

     Unit Hyd Qpeak  (cms)=     .657

     PEAK FLOW       (cms)=     .155 (i)
     TIME TO PEAK    (hrs)=    6.467
     RUNOFF VOLUME    (mm)=   13.156
     TOTAL RAINFALL   (mm)=   43.799
     RUNOFF COEFFICIENT   =     .300

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

--------------------------------------------------------------------------------
008:0004------------------------------------------------------------------------
*
---------------------
| CALIB STANDHYD      |   Area    (ha)=    3.20
| 02:3.2    DT= 2.00 |   Total Imp(%)=   20.00   Dir. Conn.(%)=   20.00
---------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .64          2.56
     Dep. Storage     (mm)=       2.00          5.00
     Average Slope     (%)=       1.00          2.00
     Length            (m)=    1000.00          5.00
     Mannings n           =       .015          .350

     Max.eff.Inten.(mm/hr)=      37.49         13.50
                over (min)       16.00         22.00
     Storage Coeff.  (min)=      16.41 (ii)    21.93 (ii)
     Unit Hyd. Tpeak (min)=      16.00         22.00
     Unit Hyd. peak  (cms)=        .07           .05
                                                           *TOTALS*
     PEAK FLOW       (cms)=        .05           .06          .110 (iii)
     TIME TO PEAK    (hrs)=       6.07          6.23         6.167
     RUNOFF VOLUME    (mm)=      41.80         14.16        19.687
     TOTAL RAINFALL   (mm)=      43.80         43.80        43.799
     RUNOFF COEFFICIENT   =        .95           .32          .449

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  79.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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



```
008:0005------------------------------------------------------------------------
*
--------------------
| ADD HYD (OUT3  ) | ID: NHYD     AREA     QPEAK   TPEAK   R.V.    DWF
--------------------               (ha)     (cms)   (hrs)   (mm)   (cms)
                  ID1 01:3.1        8.60      .155    6.47  13.16    .000
                 +ID2 02:3.2        3.20      .110    6.17  19.69    .000
                  ====================================================
                  SUM 09:OUT3      11.80      .246    6.30  14.93    .000

  NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
008:0006------------------------------------------------------------------------
--------------------------------------------------------------------------------
008:0002------------------------------------------------------------------------
*
  ** END OF RUN :    8

********************************************************************************





--------------------
| START              |  Project  dir.: K:\Projects\6900-6-1\6964-M-1\21-HYD-1\
--------------------  Rainfall dir.: K:\Projects\6900-6-1\6964-M-1\21-HYD-1\
    TZERO =   .00 hrs on      0
    METOUT=   2 (output = METRIC)
    NRUN  = 009
    NSTORM=   1
           #  1=12hscs10.stm
--------------------------------------------------------------------------------
009:0002------------------------------------------------------------------------
*#***************************************************************************
*#  Project Name: BRT WEST - Outlet 3                        JOB NUMBER: [6964]  *
*#  Date         : JUNE-25-2008                                                  *
*#  Modeller     : [jrm]                                                         *
*#  Company      : McCormick Rankin Corporation                                  *
*#  License #    : 4313781                                                       *
*#                                                                               *
*#                                                                               *
*#                  EXISTING DRAINAGE CONDITIONS TO OUTLET 3                     *
*#        25 mm 4 hour - Chicago and 12 hour SCS 2 to 100 Year Storms            *
*#                                                                               *
*#***************************************************************************
*#***************************************************************************
*
*
--------------------------------------------------------------------------------
009:0002------------------------------------------------------------------------
*
-------------------
| READ STORM         |   Filename: K:\Projects\6900-6-1\6964-M-1\21-HYD-1\1
| Ptotal=  72.70 mm|   Comments: 10 Yr-12hr SCS
-------------------
              TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
               hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
               .17   2.181 |  3.17   2.908 |  6.17  15.849 |  9.17   2.181
               .33   2.181 |  3.33   2.908 |  6.33  15.849 |  9.33   2.181
               .50   2.181 |  3.50   2.908 |  6.50  15.849 |  9.50   2.181
               .67   1.018 |  3.67   2.908 |  6.67   6.979 |  9.67   1.745
               .83   1.018 |  3.83   2.908 |  6.83   6.979 |  9.83   1.745
              1.00   1.018 |  4.00   2.908 |  7.00   6.979 | 10.00   1.745
              1.17   1.890 |  4.17   3.926 |  7.17   4.653 | 10.17   2.472
              1.33   1.890 |  4.33   3.926 |  7.33   4.653 | 10.33   2.472
              1.50   1.890 |  4.50   3.926 |  7.50   4.653 | 10.50   2.472
              1.67   1.890 |  4.67   4.944 |  7.67   4.071 | 10.67   1.599
              1.83   1.890 |  4.83   4.944 |  7.83   4.071 | 10.83   1.599
              2.00   1.890 |  5.00   4.944 |  8.00   4.071 | 11.00   1.599
              2.17   2.472 |  5.17   7.852 |  8.17   3.199 | 11.17   1.454
              2.33   2.472 |  5.33   7.852 |  8.33   3.199 | 11.33   1.454
              2.50   2.472 |  5.50   7.852 |  8.50   3.199 | 11.50   1.454
              2.67   2.181 |  5.67  62.231 |  8.67   3.344 | 11.67   1.454
              2.83   2.181 |  5.83  62.231 |  8.83   3.344 | 11.83   1.454
              3.00   2.181 |  6.00  62.231 |  9.00   3.344 | 12.00   1.454

--------------------------------------------------------------------------------
009:0003------------------------------------------------------------------------
*
*
*
---------------------
| CALIB NASHYD        |   Area    (ha)=    8.60   Curve Number    (CN)=79.00
| 01:3.1    DT= 2.00 |   Ia      (mm)=   6.700   # of Linear Res.(N)= 3.00
---------------------    U.H. Tp(hrs)=    .500

     Unit Hyd Qpeak  (cms)=     .657

     PEAK FLOW       (cms)=     .403 (i)
     TIME TO PEAK    (hrs)=    6.433
     RUNOFF VOLUME    (mm)=   32.625
     TOTAL RAINFALL   (mm)=   72.700
     RUNOFF COEFFICIENT   =     .449

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

--------------------------------------------------------------------------------
009:0004------------------------------------------------------------------------
*
---------------------
| CALIB STANDHYD      |   Area    (ha)=    3.20
| 02:3.2    DT= 2.00 |   Total Imp(%)=   20.00   Dir. Conn.(%)=   20.00
---------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .64          2.56
     Dep. Storage     (mm)=       2.00          5.00
     Average Slope     (%)=       1.00          2.00
     Length            (m)=    1000.00          5.00
     Mannings n           =       .015          .350

     Max.eff.Inten.(mm/hr)=      62.23         34.39
                over (min)       14.00         18.00
     Storage Coeff.  (min)=      13.40 (ii)    17.20 (ii)
     Unit Hyd. Tpeak (min)=      14.00         18.00
     Unit Hyd. peak  (cms)=        .08           .06
                                                           *TOTALS*
     PEAK FLOW       (cms)=        .09           .17          .260 (iii)
     TIME TO PEAK    (hrs)=       6.03          6.17         6.100
     RUNOFF VOLUME    (mm)=      70.70         33.89        41.257
     TOTAL RAINFALL   (mm)=      72.70         72.70        72.700
     RUNOFF COEFFICIENT   =        .97           .47          .567

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  79.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
009:0005------------------------------------------------------------------------
*
--------------------
| ADD HYD (OUT3  ) | ID: NHYD     AREA     QPEAK   TPEAK   R.V.    DWF
--------------------               (ha)     (cms)   (hrs)   (mm)   (cms)
                  ID1 01:3.1        8.60      .403    6.43  32.62    .000
                 +ID2 02:3.2        3.20      .260    6.10  41.26    .000
                  ====================================================
                  SUM 09:OUT3      11.80      .610    6.23  34.97    .000

  NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
009:0006------------------------------------------------------------------------
--------------------------------------------------------------------------------
009:0002------------------------------------------------------------------------
*
--------------------------------------------------------------------------------
009:0002------------------------------------------------------------------------
*
  ** END OF RUN :    9

********************************************************************************





--------------------
| START              |  Project  dir.: K:\Projects\6900-6-1\6964-M-1\21-HYD-1\
--------------------  Rainfall dir.: K:\Projects\6900-6-1\6964-M-1\21-HYD-1\
    TZERO =   .00 hrs on      0
    METOUT=   2 (output = METRIC)
    NRUN  = 010
    NSTORM=   1
           #  1=12hscs50.stm
--------------------------------------------------------------------------------
010:0002------------------------------------------------------------------------
*#***************************************************************************
*#  Project Name: BRT WEST - Outlet 3                        JOB NUMBER: [6964]  *
*#  Date         : JUNE-25-2008                                                  *
*#  Modeller     : [jrm]                                                         *
*#  Company      : McCormick Rankin Corporation                                  *
*#  License #    : 4313781                                                       *
*#                                                                               *
*#                                                                               *
*#                  EXISTING DRAINAGE CONDITIONS TO OUTLET 3                     *
*#        25 mm 4 hour - Chicago and 12 hour SCS 2 to 100 Year Storms            *
*#                                                                               *
*#***************************************************************************
*#***************************************************************************
*
*
--------------------------------------------------------------------------------
010:0002------------------------------------------------------------------------
*
-------------------
| READ STORM         |   Filename: K:\Projects\6900-6-1\6964-M-1\21-HYD-1\1
| Ptotal=  97.90 mm|   Comments: 50 Yr-12hr SCS
-------------------
              TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
               hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
               .17   2.937 |  3.17   3.916 |  6.17  21.342 |  9.17   2.937
               .33   2.937 |  3.33   3.916 |  6.33  21.342 |  9.33   2.937
               .50   2.937 |  3.50   3.916 |  6.50  21.342 |  9.50   2.937
               .67   1.371 |  3.67   3.916 |  6.67   9.398 |  9.67   2.350
               .83   1.371 |  3.83   3.916 |  6.83   9.398 |  9.83   2.350
              1.00   1.371 |  4.00   3.916 |  7.00   9.398 | 10.00   2.350
              1.17   2.545 |  4.17   5.287 |  7.17   6.266 | 10.17   3.329
              1.33   2.545 |  4.33   5.287 |  7.33   6.266 | 10.33   3.329
              1.50   2.545 |  4.50   5.287 |  7.50   6.266 | 10.50   3.329
              1.67   2.545 |  4.67   6.657 |  7.67   5.482 | 10.67   2.154
              1.83   2.545 |  4.83   6.657 |  7.83   5.482 | 10.83   2.154
              2.00   2.545 |  5.00   6.657 |  8.00   5.482 | 11.00   2.154
              2.17   3.329 |  5.17  10.573 |  8.17   4.308 | 11.17   1.958
              2.33   3.329 |  5.33  10.573 |  8.33   4.308 | 11.33   1.958
              2.50   3.329 |  5.50  10.573 |  8.50   4.308 | 11.50   1.958
              2.67   2.937 |  5.67  83.802 |  8.67   4.503 | 11.67   1.958
              2.83   2.937 |  5.83  83.802 |  8.83   4.503 | 11.83   1.958
              3.00   2.937 |  6.00  83.802 |  9.00   4.503 | 12.00   1.958

--------------------------------------------------------------------------------
010:0003------------------------------------------------------------------------
*
*
*
---------------------
| CALIB NASHYD        |   Area    (ha)=    8.60   Curve Number    (CN)=79.00
| 01:3.1    DT= 2.00 |   Ia      (mm)=   6.700   # of Linear Res.(N)= 3.00
---------------------    U.H. Tp(hrs)=    .500

     Unit Hyd Qpeak  (cms)=     .657

     PEAK FLOW       (cms)=     .659 (i)
     TIME TO PEAK    (hrs)=    6.400
     RUNOFF VOLUME    (mm)=   52.403
     TOTAL RAINFALL   (mm)=   97.900
     RUNOFF COEFFICIENT   =     .535

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

--------------------------------------------------------------------------------
010:0004------------------------------------------------------------------------
*
---------------------
| CALIB STANDHYD      |   Area    (ha)=    3.20
| 02:3.2    DT= 2.00 |   Total Imp(%)=   20.00   Dir. Conn.(%)=   20.00
---------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .64          2.56
     Dep. Storage     (mm)=       2.00          5.00
     Average Slope     (%)=       1.00          2.00
     Length            (m)=    1000.00          5.00
     Mannings n           =       .015          .350

     Max.eff.Inten.(mm/hr)=      83.80         55.27
                over (min)       12.00         16.00
     Storage Coeff.  (min)=      11.89 (ii)    15.04 (ii)
     Unit Hyd. Tpeak (min)=      12.00         16.00
     Unit Hyd. peak  (cms)=        .09           .07
                                                           *TOTALS*
     PEAK FLOW       (cms)=        .13           .29          .418 (iii)
     TIME TO PEAK    (hrs)=       6.03          6.10         6.067
     RUNOFF VOLUME    (mm)=      95.90         53.80        62.219
     TOTAL RAINFALL   (mm)=      97.90         97.90        97.900
     RUNOFF COEFFICIENT   =        .98           .55          .636

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  79.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
010:0005------------------------------------------------------------------------
*
--------------------
| ADD HYD (OUT3  ) | ID: NHYD     AREA     QPEAK   TPEAK   R.V.    DWF
--------------------               (ha)     (cms)   (hrs)   (mm)   (cms)
```

```
                    ID1 01:3.1        8.60     .659    6.40  52.40    .000
                   +ID2 02:3.2        3.20     .418    6.07  62.22    .000
                    ==========================================================
                    SUM 09:OUT3       11.80     .977    6.20  55.07    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ** END OF RUN :  10

| START           |  Project dir.: K:\Projects\6900-6-1\6964-M-1\21-HYD-1\
 -----------------  Rainfall dir.: K:\Projects\6900-6-1\6964-M-1\21-HYD-1\
     TZERO =    .00 hrs on      0
     METOUT=    2 (output = METRIC)
     NRUN  = 011
     NSTORM=    1
          #  1=12scsh.stm

011:0002
*#*************************************************************************
*#  Project Name: BRT WEST - Outlet 3                    JOB NUMBER: [6964]  *
*#  Date        : JUNE-25-2008                                               *
*#  Modeller    : [jrm]                                                      *
*#  Company     : McCormick Rankin Corporation                               *
*#  License #   : 4313781                                                   *
*#                                                                           *
*#                                                                           *
*#                    EXISTING DRAINAGE CONDITIONS TO OUTLET 3               *
*#          25 mm 4 hour - Chicago and 12 hour SCS 2 to 100 Year Storms      *
*#                                                                           *
*#*************************************************************************
*#*************************************************************************

011:0002

| READ STORM       |    Filename: K:\Projects\6900-6-1\6964-M-1\21-HYD-1\1
| Ptotal= 108.60 mm|    Comments: 100 Yr-12hr SCS
 ------------------

                TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
                 hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
                 .17   3.258 |   3.17   4.344 |   6.17  23.675 |   9.17   3.258
                 .33   3.258 |   3.33   4.344 |   6.33  23.675 |   9.33   3.258
                 .50   3.258 |   3.50   4.344 |   6.50  23.675 |   9.50   3.258
                 .67   1.520 |   3.67   4.344 |   6.67  10.426 |   9.67   2.606
                 .83   1.520 |   3.83   4.344 |   6.83  10.426 |   9.83   2.606
                1.00   1.520 |   4.00   4.344 |   7.00  10.426 |  10.00   2.606
                1.17   2.824 |   4.17   5.864 |   7.17   6.950 |  10.17   3.692
                1.33   2.824 |   4.33   5.864 |   7.33   6.950 |  10.33   3.692
                1.50   2.824 |   4.50   5.864 |   7.50   6.950 |  10.50   3.692
                1.67   2.824 |   4.67   7.385 |   7.67   6.082 |  10.67   2.389
                1.83   2.824 |   4.83   7.385 |   7.83   6.082 |  10.83   2.389
                2.00   2.824 |   5.00   7.385 |   8.00   6.082 |  11.00   2.389
                2.17   3.692 |   5.17  11.729 |   8.17   4.778 |  11.17   2.172
                2.33   3.692 |   5.33  11.729 |   8.33   4.778 |  11.33   2.172
                2.50   3.692 |   5.50  11.729 |   8.50   4.778 |  11.50   2.172
                2.67   3.258 |   5.67  92.962 |   8.67   4.996 |  11.67   2.172
                2.83   3.258 |   5.83  92.962 |   8.83   4.996 |  11.83   2.172
                3.00   3.258 |   6.00  92.962 |   9.00   4.996 |  12.00   2.172

011:0003

| CALIB NASHYD      |   Area     (ha)=    8.60   Curve Number    (CN)=79.00
| 01:3.1    DT= 2.00 |   Ia       (mm)=   6.700   # of Linear Res.(N)= 3.00
 ------------------   U.H. Tp(hrs)=    .500

     Unit Hyd Qpeak  (cms)=      .657

     PEAK FLOW       (cms)=      .774 (i)
     TIME TO PEAK    (hrs)=    6.400
     RUNOFF VOLUME    (mm)=   61.289
     TOTAL RAINFALL   (mm)=  108.600
     RUNOFF COEFFICIENT   =      .564

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

011:0004

| CALIB STANDHYD    |   Area     (ha)=    3.20
| 02:3.2    DT= 2.00 |   Total Imp(%)=   20.00   Dir. Conn.(%)=   20.00
 ------------------

                                IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=          .64          2.56
     Dep. Storage     (mm)=         2.00          5.00
     Average Slope     (%)=         1.00          2.00
     Length            (m)=      1000.00          5.00
     Mannings n          =         .015          .350

     Max.eff.Inten.(mm/hr)=        92.96         65.04
               over (min)          12.00         14.00
     Storage Coeff.  (min)=        11.41 (ii)    14.36 (ii)
     Unit Hyd. Tpeak (min)=        12.00         14.00
     Unit Hyd. peak  (cms)=          .10           .08
                                                          *TOTALS*
     PEAK FLOW       (cms)=          .15           .35          .497 (iii)
     TIME TO PEAK    (hrs)=         6.03          6.10         6.067
     RUNOFF VOLUME    (mm)=       106.60         62.72        71.498
     TOTAL RAINFALL   (mm)=       108.60        108.60       108.600
     RUNOFF COEFFICIENT   =          .98           .58          .658

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  79.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

011:0005

| ADD HYD (OUT3  ) | ID: NHYD     AREA     QPEAK   TPEAK   R.V.    DWF
 ------------------                (ha)     (cms)   (hrs)   (mm)    (cms)
                    ID1 01:3.1      8.60     .774    6.40  61.29    .000
                   +ID2 02:3.2      3.20     .497    6.07  71.50    .000
                    ==========================================================
                    SUM 09:OUT3    11.80    1.139    6.17  64.06    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

011:0002

011:0002

011:0002

011:0002

011:0002

      FINISH

*************************************************************************

    WARNINGS / ERRORS / NOTES
    -------------------------
  Simulation ended on 2008-07-03     at 10:38:23
*************************************************************************
```

APPENDIX B
PROPOSED CONDITIONS SWMHYMO MODELING

Summary of Hydrologic Modelling Parameters
Proposed Conditions BRT WEST

Subcatchment I.D.	Instantaneous Unit Hydrograph Classification	Drainage Area (ha)	Imperviousness (%) Direct	+	Indirect	=	Total	SCS Curve Number	Initial Abstraction (mm) Pervious	Impervious	Manning's 'n' Pervious	Impervious	Time to Peak (hours)	Number of Linear Reservoirs	Flow Length (m) Pervious	Impervious	Slope (%) Pervious	Impervious
1.10	Nash	12.3	5	+	0	=	5	80	6.5	n/a	n/a	n/a	1.1	3	n/a	n/a	n/a	n/a
1.11	Standard	2.8	99	+	0	=	99	79	5.0	2.0	0.35	0.015	n/a	n/a	40	137	2.00	1.00
1.12	Nash	1.00	5	+	0	=	5	80	6.5	n/a	n/a	n/a	0.2	3	n/a	n/a	n/a	n/a
1.13	Standard	0.50	99	+	0	=	99	79	5.0	2.0	0.35	0.015	n/a	n/a	5	330	2.00	1.00
1.20	Nash	0.65	5	+	0	=	5	80	6.5	n/a	n/a	n/a	0.3	3	n/a	n/a	n/a	n/a
1.30	Nash	1.20	5	+	0	=	5	80	6.5	n/a	n/a	n/a	0.1	3	n/a	n/a	n/a	n/a
1.31	Nash	1.00	5	+	0	=	5	80	6.5	n/a	n/a	n/a	0.1	3	n/a	n/a	n/a	n/a
1.32	Nash	0.60	5	+	0	=	5	80	6.5	n/a	n/a	n/a	0.2	3	n/a	n/a	n/a	n/a
1.33	Nash	1.10	15	+	0	=	15	82	6.0	n/a	n/a	n/a	0.2	3	n/a	n/a	n/a	n/a
1.40	Nash	4.30	0	+	0	=	0	79	6.8	n/a	n/a	n/a	0.3	3	n/a	n/a	n/a	n/a
1.41	Nash	0.60	5	+	0	=	5	80	6.5	n/a	n/a	n/a	0.1	3	n/a	n/a	n/a	n/a
2.10	Nash	5.20	2	+	0	=	2	79	6.7	n/a	n/a	n/a	0.5	3	n/a	n/a	n/a	n/a
2.11	Standard	0.55	99	+	0	=	99	79	5.0	2.0	0.35	0.015	n/a	n/a	40	61	2.00	1.00
2.12	Nash	2.70	15	+	0	=	15	82	6.0	n/a	n/a	n/a	0.5	3	n/a	n/a	n/a	n/a
2.13	Standard	0.72	99	+	0	=	99	79	5.0	2.0	0.35	0.015	n/a	n/a	5	550	2.00	1.00
2.20	Nash	3.40	0	+	0	=	0	79	6.8	n/a	n/a	n/a	0.2	3	n/a	n/a	n/a	n/a
3.10	Nash	3.30	0	+	0	=	0	79	6.8	n/a	n/a	n/a	0.5	3	n/a	n/a	n/a	n/a
3.11	Standard	3.90	99	+	0	=	99	79	5.0	2.0	0.35	0.015	n/a	n/a	5	40	2.00	1.00
3.20	Standard	4.40	20	+	0	=	20	79	5.0	2.0	0.35	0.015	n/a	n/a	5	1,000	2.00	1.00
MTO103	Standard	9.80	70	+	0	=	70	79	5.0	2.0	0.35	0.015	n/a	n/a	40	256	2.00	1.00

Notes:
Catchment MTO103 represents the portion of Catchment 103 identified in *Highway 403 Drainage and SWM Report,* (Winter Environmental Consulting, October 2001) that drains to the MTO Sawmill Creek SWM facility that is not accounted for in the catchments identified for this study.

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

 SSSSS  W   W  M   M  H   H  Y   Y  M   M   OOO        999    999  =========
 S      W W W  MM MM  H   H   Y Y   MM MM  O   O      9   9  9   9
 SSSSS  W W W  M M M  HHHHH    Y    M M M  O   O  ##  9   9  9   9 Ver. 4.02
     S   W W   M   M  H   H    Y    M   M  O   O       9999   9999 July 1999
 SSSSS   W W   M   M  H   H    Y    M   M   OOO           9      9 =========
                                                      9   9  9   9 # 4313781
       StormWater Management HYdrologic Model          999    999  =========

 *************************************************************************
 ************************* SWMHYMO-99 Ver/4.02 ***************************
 *******  A single event and continuous hydrologic simulation model *******
 *******       based on the principles of HYMO and its successors  *******
 *******                OTTHYMO-83 and OTTHYMO-89.                 *******
 *************************************************************************
 ******* Distributed by:  J.F. Sabourin and Associates Inc.         *******
 *******                  Ottawa, Ontario: (613) 727-5199          *******
 *******                  Gatineau, Quebec: (819) 243-6858         *******
 *******                  E-Mail: swmhymo@jfsa.Com                 *******
 *************************************************************************


 +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
 +++++++ Licensed user: McCormick Rankin Corporation                +++++++
 +++++++                Kitchener             SERIAL#:4313781       +++++++
 +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

 *************************************************************************
 *******                ++++++ PROGRAM ARRAY DIMENSIONS ++++++     *******
 *******                Maximum value for ID numbers  :    10      *******
 *******                Max. number of rainfall points:  15000     *******
 *******                Max. number of flow points    :  15000     *******
 *************************************************************************


 *******************   D E T A I L E D   O U T P U T   *******************
 *************************************************************************
 *     DATE: 2008-07-03      TIME: 10:39:19      RUN COUNTER: 000201     *
 *************************************************************************
 * Input   filename: K:\Projects\6900-6-1\6964-M-1\21-HYD-1\PDWest1.dat  *
 * Output  filename: K:\Projects\6900-6-1\6964-M-1\21-HYD-1\PDWest1.out  *
 * Summary filename: K:\Projects\6900-6-1\6964-M-1\21-HYD-1\PDWest1.sum  *
 * User comments:                                                        *
 * 1:____________________________________________________________________*
 * 2:____________________________________________________________________*
 * 3:____________________________________________________________________*
 *************************************************************************

 ---------------------------------------------------------------------------
 001:0001-------------------------------------------------------------------
 ***************************************************************************
 * MISSISSAUGA BRT - WEST                                          JOB: 06964
 * Proposed CONDITIONS TO OUTLET #1                                        *
 ***************************************************************************
 *                                                                         *
 * - 2, 10, 50 and 100yr, 12hr Design Storms (SCS)                         *
 * - 25 mm 4 hr Chicago                                                    *
 * - Rainfall depths estimated based on Toronto Pearson                    *
 *   west of and including Toronto                                         *
 *                                                     K. Macnaughton      *
 *                                                     As of: June 27, 2008 *
 ***************************************************************************
 *
 *
 --------------------
 | START              |  Project  dir.: K:\Projects\6900-6-1\6964-M-1\21-HYD-1\
 --------------------   Rainfall dir.: K:\Projects\6900-6-1\6964-M-1\21-HYD-1\
    TZERO =   .00 hrs on       0
    METOUT=   2 (output = METRIC)
    NRUN  = 001
    NSTORM=   1
            #  1=CHIC25mm.stm
 ---------------------------------------------------------------------------
 001:0002-------------------------------------------------------------------
 *
 --------------------
 | READ STORM         |    Filename: K:\Projects\6900-6-1\6964-M-1\21-HYD-1\C
 | Ptotal=  25.00 mm|    Comments: 25mm, 4hr Chicago Storm
 --------------------
                 TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
                  .17   1.423 |  1.17   3.859 |  2.17   5.294 |  3.17   1.977
                  .33   1.574 |  1.33   5.821 |  2.33   4.057 |  3.33   1.805
                  .50   1.769 |  1.50  13.337 |  2.50   3.314 |  3.50   1.664
                  .67   2.028 |  1.67  61.503 |  2.67   2.817 |  3.67   1.545
                  .83   2.389 |  1.83  15.650 |  2.83   2.459 |  3.83   1.444
                 1.00   2.933 |  2.00   7.793 |  3.00   2.189 |  4.00   1.356

 ---------------------------------------------------------------------------
 001:0003-------------------------------------------------------------------
 *
 ----------------------
 | CALIB STANDHYD      |   Area    (ha)=    2.80
 | 01:1.11   DT= 2.00 |   Total Imp(%)=   99.00   Dir. Conn.(%)=   99.00
 ----------------------
                                IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=        2.77          .03
     Dep. Storage      (mm)=        2.00         5.00
     Average Slope      (%)=        1.00         2.00
     Length             (m)=      137.00        40.00
     Mannings n            =        .015         .350

     Max.eff.Inten.(mm/hr)=        61.50        31.17
               over (min)           4.00        18.00
     Storage Coeff.  (min)=         4.08 (ii)   17.85 (ii)
     Unit Hyd. Tpeak (min)=         4.00        18.00
     Unit Hyd. peak  (cms)=          .28          .06
                                                            *TOTALS*
     PEAK FLOW       (cms)=          .43          .00          .430 (iii)
     TIME TO PEAK    (hrs)=         1.67         1.93         1.667
     RUNOFF VOLUME    (mm)=        23.00        15.88        22.929
     TOTAL RAINFALL   (mm)=        25.00        25.00        25.000
     RUNOFF COEFFICIENT   =          .92          .64          .917

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  98.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 ---------------------------------------------------------------------------
 001:0004-------------------------------------------------------------------
 *
 --------------------
 | COMPUTE VOLUME     |
 | ID:01  (1.11  )    |            DISCHARGE       TIME
 --------------------                 (cms)        (hrs)
           START CONTROLLING AT        .000         .967
           INFLOW HYD. PEAKS AT        .430        1.667
           STOP  CONTROLLING AT        .000         .000

           REQUIRED STORAGE VOLUME (ha.m.)=     .0642
           TOTAL HYDROGRAPH VOLUME (ha.m.)=     .0642
           % OF HYDROGRAPH TO STORE       =   99.9996

           NOTE:  Storage was computed to reduce the Inflow

 ---------------------------------------------------------------------------
 001:0005-------------------------------------------------------------------
 * Parking lot storage
 --------------------
 | ROUTE RESERVOIR    |     Requested routing time step =  2.0 min.
 |  IN>01:(1.11  )    |
 | OUT<02:(710   )    |     =========  OUTLFOW STORAGE TABLE  =========
 --------------------       OUTFLOW     STORAGE   |  OUTFLOW    STORAGE
                             (cms)      (ha.m.)   |   (cms)     (ha.m.)
                              .000   .0000E+00    |    .150   .1500E+00
                              .025   .2500E-01    |    .200   .2000E+00
                              .100   .5000E-01    |    .000   .0000E+00

     ROUTING RESULTS              AREA      QPEAK      TPEAK       R.V.
     --------------------         (ha)      (cms)      (hrs)       (mm)
     INFLOW >01: (1.11  )         2.80       .430      1.667     22.929
     OUTFLOW<02: (710   )         2.80       .069      2.000     22.928

                     PEAK   FLOW   REDUCTION [Qout/Qin](%)=   16.134
                     TIME SHIFT OF PEAK FLOW         (min)=    20.00
                     MAXIMUM  STORAGE   USED       (ha.m.)=.3978E-01

 ---------------------------------------------------------------------------
 001:0006-------------------------------------------------------------------
 *
 ---------------------
 | CALIB NASHYD        |   Area    (ha)=    1.00   Curve Number   (CN)=80.00
 | 01:1.12   DT= 2.00 |   Ia      (mm)=   6.500   # of Linear Res.(N)= 3.00
 ---------------------    U.H. Tp(hrs)=    .200

     Unit Hyd Qpeak  (cms)=      .191

     PEAK FLOW       (cms)=      .013 (i)
     TIME TO PEAK    (hrs)=     1.900
     RUNOFF VOLUME    (mm)=     4.173
     TOTAL RAINFALL   (mm)=    25.000
     RUNOFF COEFFICIENT   =      .167

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

 ---------------------------------------------------------------------------
 001:0007-------------------------------------------------------------------
 *
 --------------------
 | ADD HYD (810   ) | ID: NHYD      AREA       QPEAK    TPEAK    R.V.    DWF
 --------------------                (ha)       (cms)    (hrs)    (mm)   (cms)
                 ID1 01:1.12         1.00        .013     1.90    4.17    .000
                +ID2 02:710          2.80        .069     2.00   22.93    .000
                 ====================================================
                 SUM 10:810          3.80        .081     1.97   17.99    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ---------------------------------------------------------------------------
 001:0008-------------------------------------------------------------------
 *
 ---------------------
 | CALIB NASHYD        |   Area    (ha)=    1.20   Curve Number   (CN)=80.00
 | 01:1.3    DT= 2.00 |   Ia      (mm)=   6.500   # of Linear Res.(N)= 3.00
 ---------------------    U.H. Tp(hrs)=    .100

     Unit Hyd Qpeak  (cms)=      .458

     PEAK FLOW       (cms)=      .022 (i)
     TIME TO PEAK    (hrs)=     1.733
     RUNOFF VOLUME    (mm)=     4.174
     TOTAL RAINFALL   (mm)=    25.000
     RUNOFF COEFFICIENT   =      .167

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

 ---------------------------------------------------------------------------
 001:0009-------------------------------------------------------------------
 *
 --------------------
 | ADD HYD (820   ) | ID: NHYD      AREA       QPEAK    TPEAK    R.V.    DWF
 --------------------                (ha)       (cms)    (hrs)    (mm)   (cms)
                 ID1 01:1.3          1.20        .022     1.73    4.17    .000
                +ID2 10:810          3.80        .081     1.97   17.99    .000
                 ====================================================
                 SUM 09:820          5.00        .095     1.90   14.68    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ---------------------------------------------------------------------------
 001:0010-------------------------------------------------------------------
 *
 ---------------------
 | CALIB NASHYD        |   Area    (ha)=    1.00   Curve Number   (CN)=80.00
 | 01:1.31   DT= 2.00 |   Ia      (mm)=   6.500   # of Linear Res.(N)= 3.00
 ---------------------    U.H. Tp(hrs)=    .100

     Unit Hyd Qpeak  (cms)=      .382

     PEAK FLOW       (cms)=      .019 (i)
     TIME TO PEAK    (hrs)=     1.733
     RUNOFF VOLUME    (mm)=     4.174
     TOTAL RAINFALL   (mm)=    25.000
     RUNOFF COEFFICIENT   =      .167

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

 ---------------------------------------------------------------------------
 001:0011-------------------------------------------------------------------
 *
 --------------------
 | ADD HYD (830   ) | ID: NHYD      AREA       QPEAK    TPEAK    R.V.    DWF
 --------------------                (ha)       (cms)    (hrs)    (mm)   (cms)
                 ID1 01:1.31         1.00        .019     1.73    4.17    .000
                +ID2 09:820          5.00        .095     1.90   14.68    .000
                 ====================================================
                 SUM 10:830          6.00        .109     1.87   12.93    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ---------------------------------------------------------------------------
 001:0012-------------------------------------------------------------------
 *
 ---------------------
 | CALIB NASHYD        |   Area    (ha)=    1.10   Curve Number   (CN)=82.00
 | 01:1.33   DT= 2.00 |   Ia      (mm)=   6.500   # of Linear Res.(N)= 3.00
 ---------------------    U.H. Tp(hrs)=    .200

     Unit Hyd Qpeak  (cms)=      .210

     PEAK FLOW       (cms)=      .016 (i)
     TIME TO PEAK    (hrs)=     1.900
     RUNOFF VOLUME    (mm)=     4.609
     TOTAL RAINFALL   (mm)=    25.000
     RUNOFF COEFFICIENT   =      .184

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

```



```
 ---------------------------------------------------------------------------
 001:0013-------------------------------------------------------------------
 *
 --------------------
 | ADD HYD (840   ) | ID: NHYD      AREA       QPEAK    TPEAK    R.V.    DWF
 --------------------                (ha)       (cms)    (hrs)    (mm)   (cms)
                 ID1 01:1.33         1.10        .016     1.90    4.61    .000
                +ID2 10:830          6.00        .109     1.87   12.93    .000
                 ====================================================
                 SUM 09:840          7.10        .125     1.87   11.64    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ---------------------------------------------------------------------------
 001:0014-------------------------------------------------------------------
 *
 ---------------------
 | CALIB NASHYD        |   Area    (ha)=   12.30   Curve Number   (CN)=80.00
 | 01:1.1    DT= 2.00 |   Ia      (mm)=   6.500   # of Linear Res.(N)= 3.00
 ---------------------    U.H. Tp(hrs)=   1.100

     Unit Hyd Qpeak  (cms)=      .427

     PEAK FLOW       (cms)=      .052 (i)
     TIME TO PEAK    (hrs)=     3.167
     RUNOFF VOLUME    (mm)=     4.174
     TOTAL RAINFALL   (mm)=    25.000
     RUNOFF COEFFICIENT   =      .167

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

 ---------------------------------------------------------------------------
 001:0015-------------------------------------------------------------------
 *
 ---------------------
 | CALIB NASHYD        |   Area    (ha)=     .65   Curve Number   (CN)=80.00
 | 02:1.2    DT= 2.00 |   Ia      (mm)=   6.500   # of Linear Res.(N)= 3.00
 ---------------------    U.H. Tp(hrs)=    .300

     Unit Hyd Qpeak  (cms)=      .083

     PEAK FLOW       (cms)=      .006 (i)
     TIME TO PEAK    (hrs)=     2.033
     RUNOFF VOLUME    (mm)=     4.173
     TOTAL RAINFALL   (mm)=    25.000
     RUNOFF COEFFICIENT   =      .167

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

 ---------------------------------------------------------------------------
 001:0016-------------------------------------------------------------------
 *
 --------------------
 | ADD HYD (850   ) | ID: NHYD      AREA       QPEAK    TPEAK    R.V.    DWF
 --------------------                (ha)       (cms)    (hrs)    (mm)   (cms)
                 ID1 01:1.1         12.30        .052     3.17    4.17    .000
                +ID2 02:1.2           .65        .006     2.03    4.17    .000
                 ====================================================
                 SUM 10:850         12.95        .054     3.13    4.17    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ---------------------------------------------------------------------------
 001:0017-------------------------------------------------------------------
 *
 ---------------------
 | CALIB NASHYD        |   Area    (ha)=     .60   Curve Number   (CN)=80.00
 | 01:1.32   DT= 2.00 |   Ia      (mm)=   6.500   # of Linear Res.(N)= 3.00
 ---------------------    U.H. Tp(hrs)=    .200

     Unit Hyd Qpeak  (cms)=      .115

     PEAK FLOW       (cms)=      .008 (i)
     TIME TO PEAK    (hrs)=     1.900
     RUNOFF VOLUME    (mm)=     4.173
     TOTAL RAINFALL   (mm)=    25.000
     RUNOFF COEFFICIENT   =      .167

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

 ---------------------------------------------------------------------------
 001:0018-------------------------------------------------------------------
 *
 --------------------
 | ADD HYD (860   ) | ID: NHYD      AREA       QPEAK    TPEAK    R.V.    DWF
 --------------------                (ha)       (cms)    (hrs)    (mm)   (cms)
                 ID1 01:1.32          .60        .008     1.90    4.17    .000
                +ID2 10:850         12.95        .054     3.13    4.17    .000
                 ====================================================
                 SUM 08:860         13.55        .055     3.10    4.17    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ---------------------------------------------------------------------------
 001:0019-------------------------------------------------------------------
 *
 --------------------
 | ADD HYD (870   ) | ID: NHYD      AREA       QPEAK    TPEAK    R.V.    DWF
 --------------------                (ha)       (cms)    (hrs)    (mm)   (cms)
                 ID1 09:840          7.10        .125     1.87   11.64    .000
                +ID2 08:860         13.55        .055     3.10    4.17    .000
                 ====================================================
                 SUM 10:870         20.65        .145     1.90    6.74    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ---------------------------------------------------------------------------
 001:0020-------------------------------------------------------------------
 *
 * Majors to Outlet 1B
 * Minors to MTO Hwy 403 Twin Culverts - Same flow assumed as for existing condit
 ---------------------
 | COMPUTE DUALHYD     |    Average inlet capacities   [CINLET] =     .252  (cms)
 | TotalHyd 10:870     |    Number of inlets in system [NINLET] =       1
 ---------------------      Total minor system capacity         =     .252  (cms)
                            Total major system storage [TMJSTO] =      0.(cu.m.)

                   ID: NHYD        AREA      QPEAK      TPEAK      R.V.      DWF
                                   (ha)      (cms)      (hrs)      (mm)     (cms)
     TOTAL HYD.   10:870          20.65       .145      1.900     6.740      .000
     =========================================================================
     MAJOR SYST   07:870.1          .00       .000       .000      .000      .000
     MINOR SYST   08:870.2        20.65       .145      1.900     6.740      .000

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ---------------------------------------------------------------------------
 001:0021-------------------------------------------------------------------
 *
 ---------------------
 | CALIB NASHYD        |   Area    (ha)=    4.30   Curve Number   (CN)=79.00
 | 01:1.4    DT= 2.00 |   Ia      (mm)=   6.800   # of Linear Res.(N)= 3.00
 ---------------------    U.H. Tp(hrs)=    .300

     Unit Hyd Qpeak  (cms)=      .547

     PEAK FLOW       (cms)=      .039 (i)
     TIME TO PEAK    (hrs)=     2.033
     RUNOFF VOLUME    (mm)=     3.864
     TOTAL RAINFALL   (mm)=    25.000
     RUNOFF COEFFICIENT   =      .155

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

 ---------------------------------------------------------------------------
 001:0022-------------------------------------------------------------------
 *
 ---------------------
 | CALIB NASHYD        |   Area    (ha)=     .60   Curve Number   (CN)=80.00
 | 02:1.41   DT= 2.00 |   Ia      (mm)=   6.500   # of Linear Res.(N)= 3.00
 ---------------------    U.H. Tp(hrs)=    .100

     Unit Hyd Qpeak  (cms)=      .229

     PEAK FLOW       (cms)=      .011 (i)
     TIME TO PEAK    (hrs)=     1.733
     RUNOFF VOLUME    (mm)=     4.173
     TOTAL RAINFALL   (mm)=    25.000
     RUNOFF COEFFICIENT   =      .167

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

 ---------------------------------------------------------------------------
 001:0023-------------------------------------------------------------------
 *
 * Total to Outlet 1B
 *
 --------------------
 | ADD HYD (875   ) | ID: NHYD      AREA       QPEAK    TPEAK    R.V.    DWF
 --------------------                (ha)       (cms)    (hrs)    (mm)   (cms)
                 ID1 01:1.4          4.30        .039     2.03    3.86    .000
                +ID2 02:1.41          .60        .011     1.73    4.17    .000
                +ID3 07:870.1         .00        .000      .00     .00    .000 **DRY**
                 ====================================================
                 SUM 10:875          4.90        .044     2.00    3.90    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ---------------------------------------------------------------------------
 001:0024-------------------------------------------------------------------
 *
 ----------------------
 | CALIB STANDHYD      |   Area    (ha)=    9.80
 | 01:MTO103 DT= 2.00 |   Total Imp(%)=   80.00   Dir. Conn.(%)=   80.00
 ----------------------
                                IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=        7.84         1.96
     Dep. Storage      (mm)=        2.00         5.00
     Average Slope      (%)=        1.00         2.00
     Length             (m)=      256.00        40.00
     Mannings n            =        .015         .350

     Max.eff.Inten.(mm/hr)=        61.50         5.01
               over (min)           6.00        34.00
     Storage Coeff.  (min)=         5.94 (ii)   34.55 (ii)
     Unit Hyd. Tpeak (min)=         6.00        34.00
     Unit Hyd. peak  (cms)=          .19          .03
                                                            *TOTALS*
     PEAK FLOW       (cms)=         1.05          .01         1.049 (iii)
     TIME TO PEAK    (hrs)=         1.70         2.27         1.700
     RUNOFF VOLUME    (mm)=        23.00         4.57        19.314
     TOTAL RAINFALL   (mm)=        25.00        25.00        25.000
     RUNOFF COEFFICIENT   =          .92          .18          .773

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  79.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 ---------------------------------------------------------------------------
 001:0025-------------------------------------------------------------------
 *
 --------------------
 | ADD HYD (890   ) | ID: NHYD      AREA       QPEAK    TPEAK    R.V.    DWF
 --------------------                (ha)       (cms)    (hrs)    (mm)   (cms)
                 ID1 08:870.2       20.65        .145     1.90    6.74    .000
                +ID2 01:MTO103       9.80       1.049     1.70   19.31    .000
                 ====================================================
                 SUM 09:890         30.45       1.144     1.70   10.79    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ---------------------------------------------------------------------------
 001:0026-------------------------------------------------------------------
 *
 *COMPUTE VOLUME       ID=9 STRATE=-100  RELRATE=0.0
 *
 * Existing Sawmill Creek MTO Pond
 --------------------
 | ROUTE RESERVOIR    |     Requested routing time step =  2.0 min.
 |  IN>09:(890   )    |
 | OUT<01:(700   )    |     =========  OUTLFOW STORAGE TABLE  =========
 --------------------       OUTFLOW     STORAGE   |  OUTFLOW    STORAGE
                             (cms)      (ha.m.)   |   (cms)     (ha.m.)
                              .000   .0000E+00    |   2.863   .6631E+00
                              .008   .2389E+00    |   3.937   .8236E+00

     ROUTING RESULTS              AREA      QPEAK      TPEAK       R.V.
     --------------------         (ha)      (cms)      (hrs)       (mm)
     INFLOW >09: (890   )        30.45      1.144      1.700     10.787
     OUTFLOW<01: (700   )        30.45       .108      4.033     10.765
    OVERFLOW<02: (701   )          .00       .000       .000       .000

                     TOTAL NUMBER OF SIMULATED OVERFLOWS  =        0
                     CUMULATIVE TIME OF OVERFLOWS  (hours)=      .00
                     PERCENTAGE OF TIME OVERFLOWING    (%)=      .00


                     PEAK   FLOW   REDUCTION [Qout/Qin](%)=    9.431
                     TIME SHIFT OF PEAK FLOW         (min)=   140.00
                     MAXIMUM  STORAGE   USED       (ha.m.)=.2538E+00

 ---------------------------------------------------------------------------
 001:0027-------------------------------------------------------------------
 *
 *COMPUTE VOLUME       ID=2 STRATE=-100  RELRATE=0.0
   ** END OF RUN :    7

 ***************************************************************************





 --------------------
 | START              |  Project  dir.: K:\Projects\6900-6-1\6964-M-1\21-HYD-1\
 --------------------   Rainfall dir.: K:\Projects\6900-6-1\6964-M-1\21-HYD-1\
    TZERO =   .00 hrs on       0
    METOUT=   2 (output = METRIC)
```

```
     NRUN  = 008
     NSTORM=   1
          #  1=12hrscs2.stm
--------------------------------------------------------------------------
008:0002------------------------------------------------------------------
**************************************************************************
* MISSISSAUGA BRT - WEST                                          JOB: 06964
* Proposed CONDITIONS TO OUTLET #1                                       *
**************************************************************************
*                                                                        *
* - 2, 10, 50 and 100yr, 12hr Design Storms (SCS)                        *
* - 25 mm 4 hr Chicago                                                   *
* - Rainfall depths estimated based on Toronto Pearson                   *
*   west of and including Toronto                                        *
*                                                    K. Macnaughton      *
*                                                    As of: June 27, 2008 *
**************************************************************************
*
*
--------------------------------------------------------------------------
008:0002------------------------------------------------------------------
*
--------------------
| READ STORM        |     Filename: K:\Projects\6900-6-1\6964-M-1\21-HYD-1\1
| Ptotal=  43.80 mm|     Comments: 2 Yr-12hr SCS
--------------------
                  TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
                   .17   1.314 |  3.17   1.752 |  6.17   9.548 |  9.17   1.314
                   .33   1.314 |  3.33   1.752 |  6.33   9.548 |  9.33   1.314
                   .50   1.314 |  3.50   1.752 |  6.50   9.548 |  9.50   1.314
                   .67    .613 |  3.67   1.752 |  6.67   4.205 |  9.67   1.051
                   .83    .613 |  3.83   1.752 |  6.83   4.205 |  9.83   1.051
                  1.00    .613 |  4.00   1.752 |  7.00   4.205 | 10.00   1.051
                  1.17   1.139 |  4.17   2.365 |  7.17   2.803 | 10.17   1.489
                  1.33   1.139 |  4.33   2.365 |  7.33   2.803 | 10.33   1.489
                  1.50   1.139 |  4.50   2.365 |  7.50   2.803 | 10.50   1.489
                  1.67   1.139 |  4.67   2.978 |  7.67   2.453 | 10.67    .964
                  1.83   1.139 |  4.83   2.978 |  7.83   2.453 | 10.83    .964
                  2.00   1.139 |  5.00   2.978 |  8.00   2.453 | 11.00    .964
                  2.17   1.489 |  5.17   4.730 |  8.17   1.927 | 11.17    .876
                  2.33   1.489 |  5.33   4.730 |  8.33   1.927 | 11.33    .876
                  2.50   1.489 |  5.50   4.730 |  8.50   1.927 | 11.50    .876
                  2.67   1.314 |  5.67  37.493 |  8.67   2.015 | 11.67    .876
                  2.83   1.314 |  5.83  37.493 |  8.83   2.015 | 11.83    .876
                  3.00   1.314 |  6.00  37.493 |  9.00   2.015 | 12.00    .876

--------------------------------------------------------------------------
008:0003------------------------------------------------------------------
*
---------------------
| CALIB STANDHYD     |    Area    (ha)=    2.80
| 01:1.11   DT= 2.00 |    Total Imp(%)=   99.00   Dir. Conn.(%)=   99.00
---------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.77          .03
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     137.00        40.00
     Mannings n           =       .015         .350

     Max.eff.Inten.(mm/hr)=      37.49        35.58
               over (min)         4.00        18.00
     Storage Coeff.  (min)=       4.98 (ii)   18.04 (ii)
     Unit Hyd. Tpeak (min)=       4.00        18.00
     Unit Hyd. peak  (cms)=        .24          .06
                                                        *TOTALS*
     PEAK FLOW       (cms)=        .29          .00        .290 (iii)
     TIME TO PEAK    (hrs)=       6.00         6.13       6.000
     RUNOFF VOLUME    (mm)=      41.80        34.23      41.724
     TOTAL RAINFALL   (mm)=      43.80        43.80      43.799
     RUNOFF COEFFICIENT   =        .95          .78        .953

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  98.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------
008:0004------------------------------------------------------------------
*
--------------------
| COMPUTE VOLUME    |
| ID:01  (1.11  )   |              DISCHARGE      TIME
--------------------                 (cms)        (hrs)
           START CONTROLLING AT      .000         1.900
           INFLOW HYD. PEAKS AT      .290         6.000
           STOP  CONTROLLING AT      .000          .000

           REQUIRED STORAGE VOLUME (ha.m.)=      .1168
           TOTAL HYDROGRAPH VOLUME (ha.m.)=      .1168
           % OF HYDROGRAPH TO STORE        =   99.9996

           NOTE:  Storage was computed to reduce the Inflow

--------------------------------------------------------------------------
008:0005------------------------------------------------------------------
* Parking lot storage
--------------------
| ROUTE RESERVOIR   |     Requested routing time step =  2.0 min.
|  IN>01:(1.11  )   |
| OUT<02:(710   )   |     =========  OUTLFOW STORAGE TABLE  =========
--------------------      OUTFLOW     STORAGE   |  OUTFLOW    STORAGE
                           (cms)      (ha.m.)   |   (cms)     (ha.m.)
                            .000   .0000E+00    |     .150   .1500E+00
                            .025   .2500E-01    |     .200   .2000E+00
                            .100   .5000E-01    |     .000   .0000E+00

     ROUTING RESULTS              AREA      QPEAK      TPEAK       R.V.
     --------------------         (ha)      (cms)      (hrs)       (mm)
     INFLOW >01: (1.11  )         2.80       .290      6.000     41.724
     OUTFLOW<02: (710   )         2.80       .102      6.200     41.723

               PEAK   FLOW   REDUCTION [Qout/Qin](%)=   35.253
               TIME SHIFT OF PEAK FLOW          (min)=   12.00
               MAXIMUM  STORAGE   USED       (ha.m.)=.5432E-01

--------------------------------------------------------------------------
008:0006------------------------------------------------------------------
*
---------------------
| CALIB NASHYD       |    Area    (ha)=    1.00   Curve Number   (CN)=80.00
| 01:1.12   DT= 2.00 |    Ia      (mm)=   6.500   # of Linear Res.(N)= 3.00
---------------------     U.H. Tp(hrs)=    .200

     Unit Hyd Qpeak  (cms)=      .191

     PEAK FLOW       (cms)=      .032 (i)
     TIME TO PEAK    (hrs)=     6.067
     RUNOFF VOLUME    (mm)=    13.802
     TOTAL RAINFALL   (mm)=    43.799
     RUNOFF COEFFICIENT   =      .315

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


--------------------------------------------------------------------------
008:0007------------------------------------------------------------------
*
--------------------
| ADD HYD (810   ) | ID: NHYD      AREA      QPEAK   TPEAK   R.V.    DWF
--------------------                (ha)     (cms)   (hrs)   (mm)   (cms)
                   ID1 01:1.12      1.00      .032    6.07  13.80    .000
                  +ID2 02:710       2.80      .102    6.20  41.72    .000
                   ==================================================
                   SUM 10:810       3.80      .134    6.10  34.38    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------
008:0008------------------------------------------------------------------
*
---------------------
| CALIB NASHYD       |    Area    (ha)=    1.20   Curve Number   (CN)=80.00
| 01:1.3    DT= 2.00 |    Ia      (mm)=   6.500   # of Linear Res.(N)= 3.00
---------------------     U.H. Tp(hrs)=    .100

     Unit Hyd Qpeak  (cms)=      .458

     PEAK FLOW       (cms)=      .048 (i)
     TIME TO PEAK    (hrs)=     6.000
     RUNOFF VOLUME    (mm)=    13.802
     TOTAL RAINFALL   (mm)=    43.799
     RUNOFF COEFFICIENT   =      .315

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

--------------------------------------------------------------------------
008:0009------------------------------------------------------------------
*
--------------------
| ADD HYD (820   ) | ID: NHYD      AREA      QPEAK   TPEAK   R.V.    DWF
--------------------                (ha)     (cms)   (hrs)   (mm)   (cms)
                   ID1 01:1.3       1.20      .048    6.00  13.80    .000
                  +ID2 10:810       3.80      .134    6.10  34.38    .000
                   ==================================================
                   SUM 09:820       5.00      .178    6.03  29.44    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------
008:0010------------------------------------------------------------------
*
---------------------
| CALIB NASHYD       |    Area    (ha)=    1.00   Curve Number   (CN)=80.00
| 01:1.31   DT= 2.00 |    Ia      (mm)=   6.500   # of Linear Res.(N)= 3.00
---------------------     U.H. Tp(hrs)=    .100

     Unit Hyd Qpeak  (cms)=      .382

     PEAK FLOW       (cms)=      .040 (i)
     TIME TO PEAK    (hrs)=     6.000
     RUNOFF VOLUME    (mm)=    13.802
     TOTAL RAINFALL   (mm)=    43.799
     RUNOFF COEFFICIENT   =      .315

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

--------------------------------------------------------------------------
008:0011------------------------------------------------------------------
*
--------------------
| ADD HYD (830   ) | ID: NHYD      AREA      QPEAK   TPEAK   R.V.    DWF
--------------------                (ha)     (cms)   (hrs)   (mm)   (cms)
                   ID1 01:1.31      1.00      .040    6.00  13.80    .000
                  +ID2 09:820       5.00      .178    6.03  29.44    .000
                   ==================================================
                   SUM 10:830       6.00      .218    6.03  26.83    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------
008:0012------------------------------------------------------------------
*
---------------------
| CALIB NASHYD       |    Area    (ha)=    1.10   Curve Number   (CN)=82.00
| 01:1.33   DT= 2.00 |    Ia      (mm)=   6.500   # of Linear Res.(N)= 3.00
---------------------     U.H. Tp(hrs)=    .200

     Unit Hyd Qpeak  (cms)=      .210

     PEAK FLOW       (cms)=      .038 (i)
     TIME TO PEAK    (hrs)=     6.067
     RUNOFF VOLUME    (mm)=    14.950
     TOTAL RAINFALL   (mm)=    43.799
     RUNOFF COEFFICIENT   =      .341

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

--------------------------------------------------------------------------
008:0013------------------------------------------------------------------
*
--------------------
| ADD HYD (840   ) | ID: NHYD      AREA      QPEAK   TPEAK   R.V.    DWF
--------------------                (ha)     (cms)   (hrs)   (mm)   (cms)
                   ID1 01:1.33      1.10      .038    6.07  14.95    .000
                  +ID2 10:830       6.00      .218    6.03  26.83    .000
                   ==================================================
                   SUM 09:840       7.10      .255    6.03  24.99    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------
008:0014------------------------------------------------------------------
*
---------------------
| CALIB NASHYD       |    Area    (ha)=   12.30   Curve Number   (CN)=80.00
| 01:1.1    DT= 2.00 |    Ia      (mm)=   6.500   # of Linear Res.(N)= 3.00
---------------------     U.H. Tp(hrs)=   1.100

     Unit Hyd Qpeak  (cms)=      .427

     PEAK FLOW       (cms)=      .139 (i)
     TIME TO PEAK    (hrs)=     7.233
     RUNOFF VOLUME    (mm)=    13.802
     TOTAL RAINFALL   (mm)=    43.799
     RUNOFF COEFFICIENT   =      .315

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

--------------------------------------------------------------------------
008:0015------------------------------------------------------------------
*
---------------------
| CALIB NASHYD       |    Area    (ha)=     .65   Curve Number   (CN)=80.00
| 02:1.2    DT= 2.00 |    Ia      (mm)=   6.500   # of Linear Res.(N)= 3.00
---------------------     U.H. Tp(hrs)=    .300

     Unit Hyd Qpeak  (cms)=      .083

```



```
     PEAK FLOW       (cms)=      .017 (i)
     TIME TO PEAK    (hrs)=     6.167
     RUNOFF VOLUME    (mm)=    13.801
     TOTAL RAINFALL   (mm)=    43.799
     RUNOFF COEFFICIENT   =      .315

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

--------------------------------------------------------------------------
008:0016------------------------------------------------------------------
*
--------------------
| ADD HYD (850   ) | ID: NHYD      AREA      QPEAK   TPEAK   R.V.    DWF
--------------------                (ha)     (cms)   (hrs)   (mm)   (cms)
                   ID1 01:1.1      12.30      .139    7.23  13.80    .000
                  +ID2 02:1.2        .65      .017    6.17  13.80    .000
                   ==================================================
                   SUM 10:850      12.95      .144    7.20  13.80    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------
008:0017------------------------------------------------------------------
*
---------------------
| CALIB NASHYD       |    Area    (ha)=     .60   Curve Number   (CN)=80.00
| 01:1.32   DT= 2.00 |    Ia      (mm)=   6.500   # of Linear Res.(N)= 3.00
---------------------     U.H. Tp(hrs)=    .200

     Unit Hyd Qpeak  (cms)=      .115

     PEAK FLOW       (cms)=      .019 (i)
     TIME TO PEAK    (hrs)=     6.067
     RUNOFF VOLUME    (mm)=    13.801
     TOTAL RAINFALL   (mm)=    43.799
     RUNOFF COEFFICIENT   =      .315

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

--------------------------------------------------------------------------
008:0018------------------------------------------------------------------
*
--------------------
| ADD HYD (860   ) | ID: NHYD      AREA      QPEAK   TPEAK   R.V.    DWF
--------------------                (ha)     (cms)   (hrs)   (mm)   (cms)
                   ID1 01:1.32       .60      .019    6.07  13.80    .000
                  +ID2 10:850      12.95      .144    7.20  13.80    .000
                   ==================================================
                   SUM 08:860      13.55      .147    7.17  13.80    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------
008:0019------------------------------------------------------------------
*
--------------------
| ADD HYD (870   ) | ID: NHYD      AREA      QPEAK   TPEAK   R.V.    DWF
--------------------                (ha)     (cms)   (hrs)   (mm)   (cms)
                   ID1 09:840       7.10      .255    6.03  24.99    .000
                  +ID2 08:860      13.55      .147    7.17  13.80    .000
                   ==================================================
                   SUM 10:870      20.65      .316    6.03  17.65    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------
008:0020------------------------------------------------------------------
*
* Majors to Outlet 1B
* Minors to MTO Hwy 403 Twin Culverts - Same flow assumed as for existing condit
---------------------
| COMPUTE DUALHYD    |    Average inlet capacities   [CINLET] -     .252  (cms)
| TotalHyd 10:870    |    Number of inlets in system [NINLET] -       1
---------------------     Total minor system capacity          -     .252  (cms)
                          Total major system storage [TMJSTO] -       0.(cu.m.)

                  ID: NHYD        AREA      QPEAK      TPEAK      R.V.      DWF
                                  (ha)      (cms)      (hrs)      (mm)     (cms)
     TOTAL HYD.   10:870         20.65       .316      6.033    17.649      .000
     ==========================================================================
     MAJOR SYST   07:870.1         .58       .064      6.033    17.649      .000
     MINOR SYST   08:870.2       20.07       .252      5.933    17.649      .000

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------
008:0021------------------------------------------------------------------
*
---------------------
| CALIB NASHYD       |    Area    (ha)=    4.30   Curve Number   (CN)=79.00
| 01:1.4    DT= 2.00 |    Ia      (mm)=   6.800   # of Linear Res.(N)= 3.00
---------------------     U.H. Tp(hrs)=    .300

     Unit Hyd Qpeak  (cms)=      .547

     PEAK FLOW       (cms)=      .104 (i)
     TIME TO PEAK    (hrs)=     6.200
     RUNOFF VOLUME    (mm)=    13.098
     TOTAL RAINFALL   (mm)=    43.799
     RUNOFF COEFFICIENT   =      .299

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

--------------------------------------------------------------------------
008:0022------------------------------------------------------------------
*
---------------------
| CALIB NASHYD       |    Area    (ha)=     .60   Curve Number   (CN)=80.00
| 02:1.41   DT= 2.00 |    Ia      (mm)=   6.500   # of Linear Res.(N)= 3.00
---------------------     U.H. Tp(hrs)=    .100

     Unit Hyd Qpeak  (cms)=      .229

     PEAK FLOW       (cms)=      .024 (i)
     TIME TO PEAK    (hrs)=     6.000
     RUNOFF VOLUME    (mm)=    13.802
     TOTAL RAINFALL   (mm)=    43.799
     RUNOFF COEFFICIENT   =      .315

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

--------------------------------------------------------------------------
008:0023------------------------------------------------------------------
*
* Total to Outlet 1B
*
--------------------
| ADD HYD (875   ) | ID: NHYD      AREA      QPEAK   TPEAK   R.V.    DWF
--------------------                (ha)     (cms)   (hrs)   (mm)   (cms)
                   ID1 01:1.4       4.30      .104    6.20  13.10    .000
                  +ID2 02:1.41       .60      .024    6.00  13.80    .000
                  +ID3 07:870.1      .58      .064    6.03  17.65    .000
                   ==================================================
                   SUM 10:875       5.48      .180    6.07  13.66    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------
008:0024------------------------------------------------------------------
*
---------------------
| CALIB STANDHYD     |    Area    (ha)=    9.80
| 01:MTO103 DT= 2.00 |    Total Imp(%)=   80.00   Dir. Conn.(%)=   80.00
---------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       7.84         1.96
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     256.00        40.00
     Mannings n           =       .015         .350

     Max.eff.Inten.(mm/hr)=      37.49        12.29
               over (min)         8.00        28.00
     Storage Coeff.  (min)=       7.24 (ii)   27.22 (ii)
     Unit Hyd. Tpeak (min)=       8.00        28.00
     Unit Hyd. peak  (cms)=        .15          .04
                                                        *TOTALS*
     PEAK FLOW       (cms)=        .80          .04        .821 (iii)
     TIME TO PEAK    (hrs)=       6.00         6.37       6.000
     RUNOFF VOLUME    (mm)=      41.80        14.16      36.271
     TOTAL RAINFALL   (mm)=      43.80        43.80      43.799
     RUNOFF COEFFICIENT   =        .95          .32        .828

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  79.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------
008:0025------------------------------------------------------------------
*
--------------------
| ADD HYD (890   ) | ID: NHYD      AREA      QPEAK   TPEAK   R.V.    DWF
--------------------                (ha)     (cms)   (hrs)   (mm)   (cms)
                   ID1 08:870.2    20.07      .252    5.93  17.65    .000
                  +ID2 01:MTO103    9.80      .821    6.00  36.27    .000
                   ==================================================
                   SUM 09:890      29.87     1.073    6.00  23.76    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------
008:0026------------------------------------------------------------------
*
*COMPUTE VOLUME      ID=9 STRATE=-100  RELRATE=0.0
*
* Existing Sawmill Creek MTO Pond
--------------------
| ROUTE RESERVOIR   |     Requested routing time step =  2.0 min.
|  IN>09:(890   )   |
| OUT<01:(700   )   |     =========  OUTLFOW STORAGE TABLE  =========
--------------------      OUTFLOW     STORAGE   |  OUTFLOW    STORAGE
                           (cms)      (ha.m.)   |   (cms)     (ha.m.)
                            .000   .0000E+00    |    2.863   .6631E+00
                            .008   .2389E+00    |    3.937   .8236E+00

     ROUTING RESULTS              AREA      QPEAK      TPEAK       R.V.
     --------------------         (ha)      (cms)      (hrs)       (mm)
     INFLOW >09: (890   )        29.87      1.073      6.000     23.759
     OUTFLOW<01: (700   )        29.87       .395      6.767     23.735
    OVERFLOW<02: (701   )          .00       .000       .000       .000

               TOTAL NUMBER OF SIMULATED OVERFLOWS  =          0
               CUMULATIVE TIME OF OVERFLOWS  (hours)=        .00
               PERCENTAGE OF TIME OVERFLOWING    (%)=        .00


               PEAK   FLOW   REDUCTION [Qout/Qin](%)=   36.844
               TIME SHIFT OF PEAK FLOW          (min)=   46.00
               MAXIMUM  STORAGE   USED       (ha.m.)=.2965E+00

--------------------------------------------------------------------------
008:0027------------------------------------------------------------------
*
*COMPUTE VOLUME      ID=2 STRATE=-100  RELRATE=0.0
--------------------------------------------------------------------------
008:0002------------------------------------------------------------------
*
   ** END OF RUN :   8

**************************************************************************





--------------------
| START             |  Project  dir.: K:\Projects\6900-6-1\6964-M-1\21-HYD-1\
--------------------   Rainfall dir.: K:\Projects\6900-6-1\6964-M-1\21-HYD-1\
   TZERO =    .00 hrs on        0
   METOUT=    2 (output = METRIC)
   NRUN  = 009
   NSTORM=    1
          #  1=12hscs10.stm
--------------------------------------------------------------------------
009:0002------------------------------------------------------------------
**************************************************************************
* MISSISSAUGA BRT - WEST                                       JOB: 06964  *
* Proposed CONDITIONS TO OUTLET #1                                       *
**************************************************************************
*                                                                        *
* - 2, 10, 50 and 100yr, 12hr Design Storms (SCS)                        *
* - 25 mm 4 hr Chicago                                                   *
* - Rainfall depths estimated based on Toronto Pearson                   *
*   west of and including Toronto                                        *
*                                                    K. Macnaughton      *
*                                                    As of: June 27, 2008 *
**************************************************************************
*
*
--------------------------------------------------------------------------
009:0002------------------------------------------------------------------
*
--------------------
| READ STORM        |     Filename: K:\Projects\6900-6-1\6964-M-1\21-HYD-1\1
| Ptotal=  72.70 mm|     Comments: 10 Yr-12hr SCS
--------------------
                  TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
                   .17   2.181 |  3.17   2.908 |  6.17  15.849 |  9.17   2.181
                   .33   2.181 |  3.33   2.908 |  6.33  15.849 |  9.33   2.181
                   .50   2.181 |  3.50   2.908 |  6.50  15.849 |  9.50   2.181
                   .67   1.018 |  3.67   2.908 |  6.67   6.979 |  9.67   1.745
                   .83   1.018 |  3.83   2.908 |  6.83   6.979 |  9.83   1.745
                  1.00   1.018 |  4.00   2.908 |  7.00   6.979 | 10.00   1.745
                  1.17   1.890 |  4.17   3.926 |  7.17   4.653 | 10.17   2.472
                  1.33   1.890 |  4.33   3.926 |  7.33   4.653 | 10.33   2.472
                  1.50   1.890 |  4.50   3.926 |  7.50   4.653 | 10.50   2.472
                  1.67   1.890 |  4.67   4.944 |  7.67   4.071 | 10.67   1.599
```

```
                  1.83   1.890 |   4.83   4.944 |   7.83   4.071 |  10.83   1.599
                  2.00   1.890 |   5.00   4.944 |   8.00   4.071 |  11.00   1.599
                  2.17   2.472 |   5.17   7.852 |   8.17   3.199 |  11.17   1.454
                  2.33   2.472 |   5.33   7.852 |   8.33   3.199 |  11.33   1.454
                  2.50   2.472 |   5.50   7.852 |   8.50   3.199 |  11.50   1.454
                  2.67   2.181 |   5.67  62.231 |   8.67   3.344 |  11.67   1.454
                  2.83   2.181 |   5.83  62.231 |   8.83   3.344 |  11.83   1.454
                  3.00   2.181 |   6.00  62.231 |   9.00   3.344 |  12.00   1.454

--------------------------------------------------------------------------------
009:0003------------------------------------------------------------------------
*
--------------------
| CALIB STANDHYD     |   Area    (ha)=    2.80
| 01:1.11   DT= 2.00 |   Total Imp(%)=   99.00   Dir. Conn.(%)=   99.00
--------------------
                                IMPERVIOUS    PERVIOUS (i)
      Surface Area      (ha)=      2.77          .03
      Dep. Storage      (mm)=      2.00         5.00
      Average Slope     (%)=       1.00         2.00
      Length            (m)=     137.00        40.00
      Mannings n           =       .015         .350

      Max.eff.Inten.(mm/hr)=      62.23        61.21
                 over (min)        4.00        14.00
      Storage Coeff.  (min)=       4.06 (ii)   14.58 (ii)
      Unit Hyd. Tpeak (min)=       4.00        14.00
      Unit Hyd. peak  (cms)=        .28          .08
                                                            *TOTALS*
      PEAK FLOW        (cms)=       .48          .00          .483 (iii)
      TIME TO PEAK     (hrs)=      6.00         6.07         6.000
      RUNOFF VOLUME     (mm)=     70.70        62.89        70.622
      TOTAL RAINFALL    (mm)=     72.70        72.70        72.700
      RUNOFF COEFFICIENT   =        .97          .87          .971

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  98.0    Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
009:0004------------------------------------------------------------------------
*
-------------------
| COMPUTE VOLUME    |
| ID:01  (1.11  )   |                DISCHARGE       TIME
-------------------                    (cms)         (hrs)
            START CONTROLLING AT        .000         1.200
            INFLOW HYD. PEAKS AT        .483         6.000
            STOP  CONTROLLING AT        .000          .000

            REQUIRED STORAGE VOLUME (ha.m.)=       .1977
            TOTAL HYDROGRAPH VOLUME (ha.m.)=       .1977
            % OF HYDROGRAPH TO STORE        =    99.9996

            NOTE:  Storage was computed to reduce the Inflow

--------------------------------------------------------------------------------
009:0005------------------------------------------------------------------------
* Parking lot storage
-------------------
| ROUTE RESERVOIR   |    Requested routing time step =  2.0 min.
|  IN>01:(1.11  )   |
| OUT<02:(710   )   |    =========  OUTLFOW STORAGE TABLE  =========
-------------------       OUTFLOW    STORAGE    |  OUTFLOW    STORAGE
                           (cms)     (ha.m.)    |   (cms)     (ha.m.)
                            .000  .0000E+00     |     .150  .1500E+00
                            .025  .2500E-01     |     .200  .2000E+00
                            .100  .5000E-01     |     .000  .0000E+00

      ROUTING RESULTS             AREA      QPEAK      TPEAK        R.V.
      --------------------        (ha)      (cms)      (hrs)        (mm)
      INFLOW >01: (1.11  )        2.80       .483      6.000      70.622
      OUTFLOW<02: (710   )        2.80       .123      6.500      70.622

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=   25.421
                  TIME SHIFT OF PEAK FLOW          (min)=   30.00
                  MAXIMUM  STORAGE   USED        (ha.m.)=.9539E-01

--------------------------------------------------------------------------------
009:0006------------------------------------------------------------------------
*
--------------------
| CALIB NASHYD       |   Area     (ha)=     1.00   Curve Number    (CN)=80.00
| 01:1.12   DT= 2.00 |   Ia       (mm)=    6.500   # of Linear Res.(N)= 3.00
--------------------     U.H. Tp(hrs)=      .200

      Unit Hyd Qpeak  (cms)=       .191

      PEAK FLOW        (cms)=       .081 (i)
      TIME TO PEAK     (hrs)=      6.067
      RUNOFF VOLUME     (mm)=     33.789
      TOTAL RAINFALL    (mm)=     72.700
      RUNOFF COEFFICIENT   =        .465

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

--------------------------------------------------------------------------------
009:0007------------------------------------------------------------------------
*
-------------------
| ADD HYD (810   ) | ID: NHYD      AREA       QPEAK    TPEAK    R.V.     DWF
-------------------                (ha)       (cms)    (hrs)    (mm)    (cms)
                   ID1 01:1.12     1.00        .081     6.07   33.79     .000
                  +ID2 02:710      2.80        .123     6.50   70.62     .000
                   ====================================================
                   SUM 10:810      3.80        .201     6.07   60.93     .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
009:0008------------------------------------------------------------------------
*
--------------------
| CALIB NASHYD       |   Area     (ha)=     1.20   Curve Number    (CN)=80.00
| 01:1.3    DT= 2.00 |   Ia       (mm)=    6.500   # of Linear Res.(N)= 3.00
--------------------     U.H. Tp(hrs)=      .100

      Unit Hyd Qpeak  (cms)=       .458

      PEAK FLOW        (cms)=       .117 (i)
      TIME TO PEAK     (hrs)=      6.000
      RUNOFF VOLUME     (mm)=     33.789
      TOTAL RAINFALL    (mm)=     72.700
      RUNOFF COEFFICIENT   =        .465

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

--------------------------------------------------------------------------------
009:0009------------------------------------------------------------------------
*
-------------------
| ADD HYD (820   ) | ID: NHYD      AREA       QPEAK    TPEAK    R.V.     DWF
-------------------                (ha)       (cms)    (hrs)    (mm)    (cms)
                   ID1 01:1.3      1.20        .117     6.00   33.79     .000
                  +ID2 10:810      3.80        .201     6.07   60.93     .000
                   ====================================================
                   SUM 09:820      5.00        .312     6.03   54.42     .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
009:0010------------------------------------------------------------------------
*
--------------------
| CALIB NASHYD       |   Area     (ha)=     1.00   Curve Number    (CN)=80.00
| 01:1.31   DT= 2.00 |   Ia       (mm)=    6.500   # of Linear Res.(N)= 3.00
--------------------     U.H. Tp(hrs)=      .100

      Unit Hyd Qpeak  (cms)=       .382

      PEAK FLOW        (cms)=       .098 (i)
      TIME TO PEAK     (hrs)=      6.000
      RUNOFF VOLUME     (mm)=     33.789
      TOTAL RAINFALL    (mm)=     72.700
      RUNOFF COEFFICIENT   =        .465

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

--------------------------------------------------------------------------------
009:0011------------------------------------------------------------------------
*
-------------------
| ADD HYD (830   ) | ID: NHYD      AREA       QPEAK    TPEAK    R.V.     DWF
-------------------                (ha)       (cms)    (hrs)    (mm)    (cms)
                   ID1 01:1.31     1.00        .098     6.00   33.79     .000
                  +ID2 09:820      5.00        .312     6.03   54.42     .000
                   ====================================================
                   SUM 10:830      6.00        .409     6.00   50.98     .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
009:0012------------------------------------------------------------------------
*
--------------------
| CALIB NASHYD       |   Area     (ha)=     1.10   Curve Number    (CN)=82.00
| 01:1.33   DT= 2.00 |   Ia       (mm)=    6.500   # of Linear Res.(N)= 3.00
--------------------     U.H. Tp(hrs)=      .200

      Unit Hyd Qpeak  (cms)=       .210

      PEAK FLOW        (cms)=       .096 (i)
      TIME TO PEAK     (hrs)=      6.067
      RUNOFF VOLUME     (mm)=     35.935
      TOTAL RAINFALL    (mm)=     72.700
      RUNOFF COEFFICIENT   =        .494

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

--------------------------------------------------------------------------------
009:0013------------------------------------------------------------------------
*
-------------------
| ADD HYD (840   ) | ID: NHYD      AREA       QPEAK    TPEAK    R.V.     DWF
-------------------                (ha)       (cms)    (hrs)    (mm)    (cms)
                   ID1 01:1.33     1.10        .096     6.07   35.93     .000
                  +ID2 10:830      6.00        .409     6.00   50.98     .000
                   ====================================================
                   SUM 09:840      7.10        .502     6.03   48.65     .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
009:0014------------------------------------------------------------------------
*
--------------------
| CALIB NASHYD       |   Area     (ha)=    12.30   Curve Number    (CN)=80.00
| 01:1.1    DT= 2.00 |   Ia       (mm)=    6.500   # of Linear Res.(N)= 3.00
--------------------     U.H. Tp(hrs)=     1.100

      Unit Hyd Qpeak  (cms)=       .427

      PEAK FLOW        (cms)=       .355 (i)
      TIME TO PEAK     (hrs)=      7.167
      RUNOFF VOLUME     (mm)=     33.789
      TOTAL RAINFALL    (mm)=     72.700
      RUNOFF COEFFICIENT   =        .465

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

--------------------------------------------------------------------------------
009:0015------------------------------------------------------------------------
*
--------------------
| CALIB NASHYD       |   Area     (ha)=      .65   Curve Number    (CN)=80.00
| 02:1.2    DT= 2.00 |   Ia       (mm)=    6.500   # of Linear Res.(N)= 3.00
--------------------     U.H. Tp(hrs)=      .300

      Unit Hyd Qpeak  (cms)=       .083

      PEAK FLOW        (cms)=       .043 (i)
      TIME TO PEAK     (hrs)=      6.167
      RUNOFF VOLUME     (mm)=     33.789
      TOTAL RAINFALL    (mm)=     72.700
      RUNOFF COEFFICIENT   =        .465

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

--------------------------------------------------------------------------------
009:0016------------------------------------------------------------------------
*
-------------------
| ADD HYD (850   ) | ID: NHYD      AREA       QPEAK    TPEAK    R.V.     DWF
-------------------                (ha)       (cms)    (hrs)    (mm)    (cms)
                   ID1 01:1.1     12.30        .355     7.17   33.79     .000
                  +ID2 02:1.2       .65        .043     6.17   33.79     .000
                   ====================================================
                   SUM 10:850     12.95        .366     7.10   33.79     .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
009:0017------------------------------------------------------------------------
*
--------------------
| CALIB NASHYD       |   Area     (ha)=      .60   Curve Number    (CN)=80.00
| 01:1.32   DT= 2.00 |   Ia       (mm)=    6.500   # of Linear Res.(N)= 3.00
--------------------     U.H. Tp(hrs)=      .200

      Unit Hyd Qpeak  (cms)=       .115

      PEAK FLOW        (cms)=       .049 (i)
      TIME TO PEAK     (hrs)=      6.067
      RUNOFF VOLUME     (mm)=     33.789
      TOTAL RAINFALL    (mm)=     72.700
      RUNOFF COEFFICIENT   =        .465

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



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--------------------------------------------------------------------------------
009:0018------------------------------------------------------------------------
*
-------------------
| ADD HYD (860   ) | ID: NHYD      AREA       QPEAK    TPEAK    R.V.     DWF
-------------------                (ha)       (cms)    (hrs)    (mm)    (cms)
                   ID1 01:1.32      .60        .049     6.07   33.79     .000
                  +ID2 10:850     12.95        .366     7.10   33.79     .000
                   ====================================================
                   SUM 08:860     13.55        .374     7.10   33.79     .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
009:0019------------------------------------------------------------------------
*
-------------------
| ADD HYD (870   ) | ID: NHYD      AREA       QPEAK    TPEAK    R.V.     DWF
-------------------                (ha)       (cms)    (hrs)    (mm)    (cms)
                   ID1 09:840      7.10        .502     6.03   48.65     .000
                  +ID2 08:860     13.55        .374     7.10   33.79     .000
                   ====================================================
                   SUM 10:870     20.65        .682     6.03   38.90     .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
009:0020------------------------------------------------------------------------
*
* Majors to Outlet 1B
* Minors to MTO Hwy 403 Twin Culverts - Same flow assumed as for existing condit
--------------------
| COMPUTE DUALHYD      |   Average inlet capacities   [CINLET] =     .252  (cms)
| TotalHyd 10:870      |   Number of inlets in system [NINLET] =      1
--------------------       Total minor system capacity          =     .252  (cms)
                           Total major system storage [TMJSTO] =       0.(cu.m.)

                   ID: NHYD         AREA       QPEAK      TPEAK       R.V.       DWF
                                    (ha)       (cms)      (hrs)       (mm)      (cms)
      TOTAL HYD.   10:870          20.65        .682      6.033     38.898       .000
      ========================================================================
      MAJOR SYST   07:870.1         6.86        .430      6.033     38.898       .000
      MINOR SYST   08:870.2        13.79        .252      5.700     38.898       .000

      NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
009:0021------------------------------------------------------------------------
*
--------------------
| CALIB NASHYD       |   Area     (ha)=     4.30   Curve Number    (CN)=79.00
| 01:1.4    DT= 2.00 |   Ia       (mm)=    6.800   # of Linear Res.(N)= 3.00
--------------------     U.H. Tp(hrs)=      .300

      Unit Hyd Qpeak  (cms)=       .547

      PEAK FLOW        (cms)=       .274 (i)
      TIME TO PEAK     (hrs)=      6.167
      RUNOFF VOLUME     (mm)=     32.550
      TOTAL RAINFALL    (mm)=     72.700
      RUNOFF COEFFICIENT   =        .448

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

--------------------------------------------------------------------------------
009:0022------------------------------------------------------------------------
*
--------------------
| CALIB NASHYD       |   Area     (ha)=      .60   Curve Number    (CN)=80.00
| 02:1.41   DT= 2.00 |   Ia       (mm)=    6.500   # of Linear Res.(N)= 3.00
--------------------     U.H. Tp(hrs)=      .100

      Unit Hyd Qpeak  (cms)=       .229

      PEAK FLOW        (cms)=       .059 (i)
      TIME TO PEAK     (hrs)=      6.000
      RUNOFF VOLUME     (mm)=     33.789
      TOTAL RAINFALL    (mm)=     72.700
      RUNOFF COEFFICIENT   =        .465

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

--------------------------------------------------------------------------------
009:0023------------------------------------------------------------------------
*
* Total to Outlet 1B
*
-------------------
| ADD HYD (875   ) | ID: NHYD      AREA       QPEAK    TPEAK    R.V.     DWF
-------------------                (ha)       (cms)    (hrs)    (mm)    (cms)
                   ID1 01:1.4      4.30        .274     6.17   32.55     .000
                  +ID2 02:1.41      .60        .059     6.00   33.79     .000
                  +ID3 07:870.1    6.86        .430     6.03   38.90     .000
                   ====================================================
                   SUM 10:875     11.76        .733     6.07   36.32     .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
009:0024------------------------------------------------------------------------
*
--------------------
| CALIB STANDHYD     |   Area    (ha)=    9.80
| 01:MTO103 DT= 2.00 |   Total Imp(%)=   80.00   Dir. Conn.(%)=   80.00
--------------------
                                IMPERVIOUS    PERVIOUS (i)
      Surface Area      (ha)=      7.84         1.96
      Dep. Storage      (mm)=      2.00         5.00
      Average Slope     (%)=       1.00         2.00
      Length            (m)=     256.00        40.00
      Mannings n           =       .015         .350

      Max.eff.Inten.(mm/hr)=      62.23        33.75
                 over (min)        6.00        20.00
      Storage Coeff.  (min)=       5.92 (ii)   19.25 (ii)
      Unit Hyd. Tpeak (min)=       6.00        20.00
      Unit Hyd. peak  (cms)=        .19          .06
                                                            *TOTALS*
      PEAK FLOW        (cms)=      1.34          .12         1.445 (iii)
      TIME TO PEAK     (hrs)=      6.00         6.20         6.000
      RUNOFF VOLUME     (mm)=     70.70        33.89        63.339
      TOTAL RAINFALL    (mm)=     72.70        72.70        72.700
      RUNOFF COEFFICIENT   =        .97          .47          .871

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  79.0    Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
009:0025------------------------------------------------------------------------
*
-------------------
| ADD HYD (890   ) | ID: NHYD      AREA       QPEAK    TPEAK    R.V.     DWF
-------------------                (ha)       (cms)    (hrs)    (mm)    (cms)
                   ID1 08:870.2   13.79        .252     5.70   38.90     .000
                  +ID2 01:MTO103   9.80       1.445     6.00   63.34     .000
                   ====================================================
                   SUM 09:890     23.59       1.697     6.00   49.05     .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
009:0026------------------------------------------------------------------------
*
*COMPUTE VOLUME      ID=9 STRATE=-100  RELRATE=0.0
*
* Existing Sawmill Creek MTO Pond
--------------------
| ROUTE RESERVOIR    |    Requested routing time step =  2.0 min.
|  IN>09:(890   )    |
| OUT<01:(700   )    |    =========  OUTLFOW STORAGE TABLE  =========
--------------------       OUTFLOW    STORAGE    |  OUTFLOW    STORAGE
                            (cms)     (ha.m.)    |   (cms)     (ha.m.)
                             .000  .0000E+00     |    2.863  .6631E+00
                             .008  .2389E+00     |    3.937  .8236E+00

      ROUTING RESULTS             AREA      QPEAK      TPEAK        R.V.
      --------------------        (ha)      (cms)      (hrs)        (mm)
      INFLOW >09: (890   )       23.59      1.697      6.000      49.052
      OUTFLOW<01: (700   )       23.59       .898      6.200      49.022
     OVERFLOW<02: (701   )         .00       .000       .000        .000

                  TOTAL NUMBER OF SIMULATED OVERFLOWS  =        0
                  CUMULATIVE TIME OF OVERFLOWS  (hours)=      .00
                  PERCENTAGE OF TIME OVERFLOWING    (%)=      .00


                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=   52.907
                  TIME SHIFT OF PEAK FLOW          (min)=   12.00
                  MAXIMUM  STORAGE   USED        (ha.m.)=.3712E+00

--------------------------------------------------------------------------------
009:0027------------------------------------------------------------------------
*
*COMPUTE VOLUME      ID=2 STRATE=-100  RELRATE=0.0
--------------------------------------------------------------------------------
009:0002------------------------------------------------------------------------
*
--------------------------------------------------------------------------------
009:0002------------------------------------------------------------------------
*
   ** END OF RUN :   9

********************************************************************************






--------------------
| START              |  Project  dir.: K:\Projects\6900-6-1\6964-M-1\21-HYD-1\
--------------------    Rainfall dir.: K:\Projects\6900-6-1\6964-M-1\21-HYD-1\
     TZERO =    .00 hrs on       0
     METOUT=   2 (output = METRIC)
     NRUN  = 010
     NSTORM=   1
            #  1=12hscs50.stm
--------------------------------------------------------------------------------
010:0002------------------------------------------------------------------------
********************************************************************************
* MISSISSAUGA BRT - WEST                                               JOB: 06964 *
* Proposed CONDITIONS TO OUTLET #1                                               *
********************************************************************************
*                                                                              *
* - 2, 10, 50 and 100yr, 12hr Design Storms (SCS)                              *
* - 25 mm 4 hr Chicago                                                         *
* - Rainfall depths estimated based on Toronto Pearson                         *
*   west of and including Toronto                                              *
*                                                        K. Macnaughton        *
*                                                        As of: June 27, 2008  *
********************************************************************************
*
*
--------------------------------------------------------------------------------
010:0002------------------------------------------------------------------------
*
--------------------
| READ STORM         |    Filename: K:\Projects\6900-6-1\6964-M-1\21-HYD-1\1
| Ptotal=  97.90 mm|      Comments: 50 Yr-12hr SCS
--------------------
                   TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
                    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
                    .17   2.937 |   3.17   3.916 |   6.17  21.342 |   9.17   2.937
                    .33   2.937 |   3.33   3.916 |   6.33  21.342 |   9.33   2.937
                    .50   2.937 |   3.50   3.916 |   6.50  21.342 |   9.50   2.937
                    .67   1.371 |   3.67   3.916 |   6.67   9.398 |   9.67   2.350
                    .83   1.371 |   3.83   3.916 |   6.83   9.398 |   9.83   2.350
                   1.00   1.371 |   4.00   3.916 |   7.00   9.398 |  10.00   2.350
                   1.17   2.545 |   4.17   5.287 |   7.17   6.266 |  10.17   3.329
                   1.33   2.545 |   4.33   5.287 |   7.33   6.266 |  10.33   3.329
                   1.50   2.545 |   4.50   5.287 |   7.50   6.266 |  10.50   3.329
                   1.67   2.545 |   4.67   6.657 |   7.67   5.482 |  10.67   2.154
                   1.83   2.545 |   4.83   6.657 |   7.83   5.482 |  10.83   2.154
                   2.00   2.545 |   5.00   6.657 |   8.00   5.482 |  11.00   2.154
                   2.17   3.329 |   5.17  10.573 |   8.17   4.308 |  11.17   1.958
                   2.33   3.329 |   5.33  10.573 |   8.33   4.308 |  11.33   1.958
                   2.50   3.329 |   5.50  10.573 |   8.50   4.308 |  11.50   1.958
                   2.67   2.937 |   5.67  83.802 |   8.67   4.503 |  11.67   1.958
                   2.83   2.937 |   5.83  83.802 |   8.83   4.503 |  11.83   1.958
                   3.00   2.937 |   6.00  83.802 |   9.00   4.503 |  12.00   1.958

--------------------------------------------------------------------------------
010:0003------------------------------------------------------------------------
*
--------------------
| CALIB STANDHYD     |   Area    (ha)=    2.80
| 01:1.11   DT= 2.00 |   Total Imp(%)=   99.00   Dir. Conn.(%)=   99.00
--------------------
                                IMPERVIOUS    PERVIOUS (i)
      Surface Area      (ha)=      2.77          .03
      Dep. Storage      (mm)=      2.00         5.00
      Average Slope     (%)=       1.00         2.00
      Length            (m)=     137.00        40.00
      Mannings n           =       .015         .350

      Max.eff.Inten.(mm/hr)=      83.80        83.09
                 over (min)        4.00        12.00
      Storage Coeff.  (min)=       3.61 (ii)   12.91 (ii)
      Unit Hyd. Tpeak (min)=       4.00        12.00
      Unit Hyd. peak  (cms)=        .30          .09
                                                            *TOTALS*
      PEAK FLOW        (cms)=       .65          .01          .651 (iii)
      TIME TO PEAK     (hrs)=      6.00         6.03         6.000
      RUNOFF VOLUME     (mm)=     95.90        87.99        95.821
      TOTAL RAINFALL    (mm)=     97.90        97.90        97.900
      RUNOFF COEFFICIENT   =        .98          .90          .979

```

```
        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  98.0    Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------
010:0004----------------------------------------------------------------
*
--------------------
| COMPUTE VOLUME    |
| ID:01  (1.11  )   |              DISCHARGE      TIME
--------------------                 (cms)        (hrs)
            START CONTROLLING AT      .000         .867
            INFLOW HYD. PEAKS AT      .651        6.000
            STOP  CONTROLLING AT      .000         .000

            REQUIRED STORAGE VOLUME (ha.m.)=     .2683
            TOTAL HYDROGRAPH VOLUME (ha.m.)=     .2683
            % OF HYDROGRAPH TO STORE        =  99.9996

            NOTE:  Storage was computed to reduce the Inflow

------------------------------------------------------------------------
010:0005----------------------------------------------------------------
* Parking lot storage
---------------------
| ROUTE RESERVOIR    |    Requested routing time step =  2.0 min.
|  IN>01:(1.11  )    |
| OUT<02:(710   )    |    =========  OUTLFOW STORAGE TABLE  =========
---------------------     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                           (cms)     (ha.m.)   |   (cms)     (ha.m.)
                            .000  .0000E+00    |     .150  .1500E+00
                            .025  .2500E-01    |     .200  .2000E+00
                            .100  .5000E-01    |     .000  .0000E+00

     ROUTING RESULTS              AREA      QPEAK      TPEAK        R.V.
     --------------------         (ha)      (cms)      (hrs)        (mm)
     INFLOW >01: (1.11  )         2.80       .651      6.000      95.821
     OUTFLOW<02: (710   )         2.80       .142      6.533      95.821

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=   21.835
                  TIME SHIFT OF PEAK FLOW         (min)=    32.00
                  MAXIMUM  STORAGE   USED        (ha.m.)=.1342E+00

------------------------------------------------------------------------
010:0006----------------------------------------------------------------
*
----------------------
| CALIB NASHYD         |   Area     (ha)=    1.00   Curve Number    (CN)=80.00
| 01:1.12   DT= 2.00   |   Ia       (mm)=   6.500   # of Linear Res.(N)= 3.00
----------------------     U.H. Tp(hrs)=     .200

     Unit Hyd Qpeak  (cms)=      .191

     PEAK FLOW        (cms)=      .131 (i)
     TIME TO PEAK     (hrs)=     6.067
     RUNOFF VOLUME     (mm)=    53.931
     TOTAL RAINFALL    (mm)=    97.900
     RUNOFF COEFFICIENT    =      .551

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

------------------------------------------------------------------------
010:0007----------------------------------------------------------------
*
--------------------
| ADD HYD (810    ) | ID: NHYD      AREA      QPEAK    TPEAK   R.V.     DWF
--------------------                (ha)      (cms)    (hrs)   (mm)    (cms)
                    ID1 01:1.12      1.00       .131     6.07  53.93    .000
                   +ID2 02:710       2.80       .142     6.53  95.82    .000
                    ====================================================
                    SUM 10:810       3.80       .268     6.07  84.80    .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------
010:0008----------------------------------------------------------------
*
----------------------
| CALIB NASHYD         |   Area     (ha)=    1.20   Curve Number    (CN)=80.00
| 01:1.3    DT= 2.00   |   Ia       (mm)=   6.500   # of Linear Res.(N)= 3.00
----------------------     U.H. Tp(hrs)=     .100

     Unit Hyd Qpeak  (cms)=      .458

     PEAK FLOW        (cms)=      .186 (i)
     TIME TO PEAK     (hrs)=     6.000
     RUNOFF VOLUME     (mm)=    53.931
     TOTAL RAINFALL    (mm)=    97.900
     RUNOFF COEFFICIENT    =      .551

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

------------------------------------------------------------------------
010:0009----------------------------------------------------------------
*
--------------------
| ADD HYD (820    ) | ID: NHYD      AREA      QPEAK    TPEAK   R.V.     DWF
--------------------                (ha)      (cms)    (hrs)   (mm)    (cms)
                    ID1 01:1.3       1.20       .186     6.00  53.93    .000
                   +ID2 10:810       3.80       .268     6.07  84.80    .000
                    ====================================================
                    SUM 09:820       5.00       .444     6.03  77.39    .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------
010:0010----------------------------------------------------------------
*
----------------------
| CALIB NASHYD         |   Area     (ha)=    1.00   Curve Number    (CN)=80.00
| 01:1.31   DT= 2.00   |   Ia       (mm)=   6.500   # of Linear Res.(N)= 3.00
----------------------     U.H. Tp(hrs)=     .100

     Unit Hyd Qpeak  (cms)=      .382

     PEAK FLOW        (cms)=      .155 (i)
     TIME TO PEAK     (hrs)=     6.000
     RUNOFF VOLUME     (mm)=    53.931
     TOTAL RAINFALL    (mm)=    97.900
     RUNOFF COEFFICIENT    =      .551

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

------------------------------------------------------------------------
010:0011----------------------------------------------------------------
*
--------------------
| ADD HYD (830    ) | ID: NHYD      AREA      QPEAK    TPEAK   R.V.     DWF
--------------------                (ha)      (cms)    (hrs)   (mm)    (cms)
                    ID1 01:1.31      1.00       .155     6.00  53.93    .000
                   +ID2 09:820       5.00       .444     6.03  77.39    .000
                    ====================================================
                    SUM 10:830       6.00       .599     6.00  73.48    .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------
010:0012----------------------------------------------------------------
*
----------------------
| CALIB NASHYD         |   Area     (ha)=    1.10   Curve Number    (CN)=82.00
| 01:1.33   DT= 2.00   |   Ia       (mm)=   6.500   # of Linear Res.(N)= 3.00
----------------------     U.H. Tp(hrs)=     .200

     Unit Hyd Qpeak  (cms)=      .210

     PEAK FLOW        (cms)=      .152 (i)
     TIME TO PEAK     (hrs)=     6.067
     RUNOFF VOLUME     (mm)=    56.769
     TOTAL RAINFALL    (mm)=    97.900
     RUNOFF COEFFICIENT    =      .580

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

------------------------------------------------------------------------
010:0013----------------------------------------------------------------
*
--------------------
| ADD HYD (840    ) | ID: NHYD      AREA      QPEAK    TPEAK   R.V.     DWF
--------------------                (ha)      (cms)    (hrs)   (mm)    (cms)
                    ID1 01:1.33      1.10       .152     6.07  56.77    .000
                   +ID2 10:830       6.00       .599     6.00  73.48    .000
                    ====================================================
                    SUM 09:840       7.10       .745     6.00  70.89    .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------
010:0014----------------------------------------------------------------
*
----------------------
| CALIB NASHYD         |   Area     (ha)=   12.30   Curve Number    (CN)=80.00
| 01:1.1    DT= 2.00   |   Ia       (mm)=   6.500   # of Linear Res.(N)= 3.00
----------------------     U.H. Tp(hrs)=    1.100

     Unit Hyd Qpeak  (cms)=      .427

     PEAK FLOW        (cms)=      .574 (i)
     TIME TO PEAK     (hrs)=     7.133
     RUNOFF VOLUME     (mm)=    53.931
     TOTAL RAINFALL    (mm)=    97.900
     RUNOFF COEFFICIENT    =      .551

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

------------------------------------------------------------------------
010:0015----------------------------------------------------------------
*
----------------------
| CALIB NASHYD         |   Area     (ha)=     .65   Curve Number    (CN)=80.00
| 02:1.2    DT= 2.00   |   Ia       (mm)=   6.500   # of Linear Res.(N)= 3.00
----------------------     U.H. Tp(hrs)=     .300

     Unit Hyd Qpeak  (cms)=      .083

     PEAK FLOW        (cms)=      .070 (i)
     TIME TO PEAK     (hrs)=     6.133
     RUNOFF VOLUME     (mm)=    53.931
     TOTAL RAINFALL    (mm)=    97.900
     RUNOFF COEFFICIENT    =      .551

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

------------------------------------------------------------------------
010:0016----------------------------------------------------------------
*
--------------------
| ADD HYD (850    ) | ID: NHYD      AREA      QPEAK    TPEAK   R.V.     DWF
--------------------                (ha)      (cms)    (hrs)   (mm)    (cms)
                    ID1 01:1.1      12.30       .574     7.13  53.93    .000
                   +ID2 02:1.2        .65       .070     6.13  53.93    .000
                    ====================================================
                    SUM 10:850      12.95       .592     7.07  53.93    .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------
010:0017----------------------------------------------------------------
*
----------------------
| CALIB NASHYD         |   Area     (ha)=     .60   Curve Number    (CN)=80.00
| 01:1.32   DT= 2.00   |   Ia       (mm)=   6.500   # of Linear Res.(N)= 3.00
----------------------     U.H. Tp(hrs)=     .200

     Unit Hyd Qpeak  (cms)=      .115

     PEAK FLOW        (cms)=      .079 (i)
     TIME TO PEAK     (hrs)=     6.067
     RUNOFF VOLUME     (mm)=    53.931
     TOTAL RAINFALL    (mm)=    97.900
     RUNOFF COEFFICIENT    =      .551

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

------------------------------------------------------------------------
010:0018----------------------------------------------------------------
*
--------------------
| ADD HYD (860    ) | ID: NHYD      AREA      QPEAK    TPEAK   R.V.     DWF
--------------------                (ha)      (cms)    (hrs)   (mm)    (cms)
                    ID1 01:1.32       .60       .079     6.07  53.93    .000
                   +ID2 10:850      12.95       .592     7.07  53.93    .000
                    ====================================================
                    SUM 08:860      13.55       .605     7.07  53.93    .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------
010:0019----------------------------------------------------------------
*
--------------------
| ADD HYD (870    ) | ID: NHYD      AREA      QPEAK    TPEAK   R.V.     DWF
--------------------                (ha)      (cms)    (hrs)   (mm)    (cms)
                    ID1 09:840       7.10       .745     6.00  70.89    .000
                   +ID2 08:860      13.55       .605     7.07  53.93    .000
                    ====================================================
                    SUM 10:870      20.65      1.054     6.03  59.76    .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------
010:0020----------------------------------------------------------------
*
* Majors to Outlet 1B
* Minors to MTO Hwy 403 Twin Culverts - Same flow assumed as for existing condit
----------------------
| COMPUTE DUALHYD      |   Average inlet capacities    [CINLET] =     .252  (cms)
| TotalHyd 10:870      |   Number of inlets in system [NINLET] =        1
```



```
----------------------     Total minor system capacity          =     .252  (cms)
                           Total major system storage [TMJSTO] =        0.(cu.m.)

                   ID: NHYD        AREA      QPEAK      TPEAK      R.V.      DWF
                                   (ha)      (cms)      (hrs)      (mm)     (cms)
     TOTAL HYD.    10:870         20.65      1.054      6.033    59.762     .000
     ==========================================================================
     MAJOR SYST    07:870.1        9.89       .802      6.033    59.762     .000
     MINOR SYST    08:870.2       10.76       .252      5.600    59.762     .000

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------
010:0021----------------------------------------------------------------
*
----------------------
| CALIB NASHYD         |   Area     (ha)=    4.30   Curve Number    (CN)=79.00
| 01:1.4    DT= 2.00   |   Ia       (mm)=   6.800   # of Linear Res.(N)= 3.00
----------------------     U.H. Tp(hrs)=     .300

     Unit Hyd Qpeak  (cms)=      .547

     PEAK FLOW        (cms)=      .448 (i)
     TIME TO PEAK     (hrs)=     6.167
     RUNOFF VOLUME     (mm)=    52.322
     TOTAL RAINFALL    (mm)=    97.900
     RUNOFF COEFFICIENT    =      .534

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

------------------------------------------------------------------------
010:0022----------------------------------------------------------------
*
----------------------
| CALIB NASHYD         |   Area     (ha)=     .60   Curve Number    (CN)=80.00
| 02:1.41   DT= 2.00   |   Ia       (mm)=   6.500   # of Linear Res.(N)= 3.00
----------------------     U.H. Tp(hrs)=     .100

     Unit Hyd Qpeak  (cms)=      .229

     PEAK FLOW        (cms)=      .093 (i)
     TIME TO PEAK     (hrs)=     6.000
     RUNOFF VOLUME     (mm)=    53.931
     TOTAL RAINFALL    (mm)=    97.900
     RUNOFF COEFFICIENT    =      .551

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

------------------------------------------------------------------------
010:0023----------------------------------------------------------------
*
* Total to Outlet 1B
*
--------------------
| ADD HYD (875    ) | ID: NHYD      AREA      QPEAK    TPEAK   R.V.     DWF
--------------------                (ha)      (cms)    (hrs)   (mm)    (cms)
                    ID1 01:1.4       4.30       .448     6.17  52.32    .000
                   +ID2 02:1.41       .60       .093     6.00  53.93    .000
                   +ID3 07:870.1     9.89       .802     6.03  59.76    .000
                    ====================================================
                    SUM 10:875      14.79      1.299     6.07  57.36    .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------
010:0024----------------------------------------------------------------
*
----------------------
| CALIB STANDHYD       |   Area     (ha)=    9.80
| 01:MTO103 DT= 2.00   |   Total Imp(%)=   80.00   Dir. Conn.(%)=   80.00
----------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=      7.84          1.96
     Dep. Storage      (mm)=      2.00          5.00
     Average Slope      (%)=      1.00          2.00
     Length             (m)=    256.00         40.00
     Mannings n            =      .015          .350

     Max.eff.Inten.(mm/hr)=      83.80         55.27
                over (min)        6.00         16.00
     Storage Coeff.  (min)=       5.25 (ii)    16.20 (ii)
     Unit Hyd. Tpeak (min)=       6.00         16.00
     Unit Hyd. peak  (cms)=        .20           .07
                                                          *TOTALS*
     PEAK FLOW        (cms)=      1.82           .22        2.014 (iii)
     TIME TO PEAK     (hrs)=      6.00          6.13        6.000
     RUNOFF VOLUME     (mm)=     95.90         53.80       87.480
     TOTAL RAINFALL    (mm)=     97.90         97.90       97.900
     RUNOFF COEFFICIENT    =       .98           .55         .894

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  79.0    Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------
010:0025----------------------------------------------------------------
*
--------------------
| ADD HYD (890    ) | ID: NHYD      AREA      QPEAK    TPEAK   R.V.     DWF
--------------------                (ha)      (cms)    (hrs)   (mm)    (cms)
                    ID1 08:870.2    10.76       .252     5.60  59.76    .000
                   +ID2 01:MTO103    9.80      2.014     6.00  87.48    .000
                    ====================================================
                    SUM 09:890      20.56      2.266     6.00  72.97    .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------
010:0026----------------------------------------------------------------
*
*COMPUTE VOLUME        ID=9 STRATE=-100  RELRATE=0.0
*
* Existing Sawmill Creek MTO Pond
---------------------
| ROUTE RESERVOIR    |    Requested routing time step =  2.0 min.
|  IN>09:(890   )    |
| OUT<01:(700   )    |    =========  OUTLFOW STORAGE TABLE  =========
---------------------     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                           (cms)     (ha.m.)   |   (cms)     (ha.m.)
                            .000  .0000E+00    |    2.863  .6631E+00
                            .008  .2389E+00    |    3.937  .8236E+00

     ROUTING RESULTS              AREA      QPEAK      TPEAK        R.V.
     --------------------         (ha)      (cms)      (hrs)        (mm)
     INFLOW >09: (890   )        20.56      2.266      6.000      72.971
     OUTFLOW<01: (700   )        20.56      1.427      6.133      72.936
    OVERFLOW<02: (701   )          .00       .000       .000        .000

                  TOTAL NUMBER OF SIMULATED OVERFLOWS  =          0
                  CUMULATIVE TIME OF OVERFLOWS  (hours)=        .00
                  PERCENTAGE OF TIME OVERFLOWING    (%)=        .00


                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=   62.968
                  TIME SHIFT OF PEAK FLOW         (min)=     8.00
                  MAXIMUM  STORAGE   USED        (ha.m.)=.4498E+00

------------------------------------------------------------------------
010:0027----------------------------------------------------------------
*
*COMPUTE VOLUME        ID=2 STRATE=-100  RELRATE=0.0
------------------------------------------------------------------------
010:0002----------------------------------------------------------------
*
------------------------------------------------------------------------
010:0002----------------------------------------------------------------
*
------------------------------------------------------------------------
010:0002----------------------------------------------------------------
*
  ** END OF RUN :  10

************************************************************************





--------------------
| START              |  Project  dir.: K:\Projects\6900-6-1\6964-M-1\21-HYD-1\
--------------------    Rainfall dir.: K:\Projects\6900-6-1\6964-M-1\21-HYD-1\
    TZERO =    .00 hrs on       0
    METOUT=   2 (output = METRIC)
    NRUN  = 011
    NSTORM=   1
           #  1=12scsh.stm
------------------------------------------------------------------------
011:0002----------------------------------------------------------------
************************************************************************
* MISSISSAUGA BRT - WEST                                      JOB: 06964  *
* Proposed CONDITIONS TO OUTLET #1                                      *
************************************************************************
*                                                                      *
* - 2, 10, 50 and 100yr, 12hr Design Storms (SCS)                      *
* - 25 mm 4 hr Chicago                                                 *
* - Rainfall depths estimated based on Toronto Pearson                 *
*   west of and including Toronto                                      *
*                                                    K. Macnaughton    *
*                                                    As of: June 27, 2008  *
************************************************************************
*
*
------------------------------------------------------------------------
011:0002----------------------------------------------------------------
*
--------------------
| READ STORM         |    Filename: K:\Projects\6900-6-1\6964-M-1\21-HYD-1\1
| Ptotal= 108.60 mm  |    Comments: 100 Yr-12hr SCS
--------------------
                     TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
                      hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
                      .17   3.258 |   3.17   4.344 |   6.17  23.675 |   9.17   3.258
                      .33   3.258 |   3.33   4.344 |   6.33  23.675 |   9.33   3.258
                      .50   3.258 |   3.50   4.344 |   6.50  23.675 |   9.50   3.258
                      .67   1.520 |   3.67   4.344 |   6.67  10.426 |   9.67   2.606
                      .83   1.520 |   3.83   4.344 |   6.83  10.426 |   9.83   2.606
                     1.00   1.520 |   4.00   4.344 |   7.00  10.426 |  10.00   2.606
                     1.17   2.824 |   4.17   5.864 |   7.17   6.950 |  10.17   3.692
                     1.33   2.824 |   4.33   5.864 |   7.33   6.950 |  10.33   3.692
                     1.50   2.824 |   4.50   5.864 |   7.50   6.950 |  10.50   3.692
                     1.67   2.824 |   4.67   7.385 |   7.67   6.082 |  10.67   2.389
                     1.83   2.824 |   4.83   7.385 |   7.83   6.082 |  10.83   2.389
                     2.00   2.824 |   5.00   7.385 |   8.00   6.082 |  11.00   2.389
                     2.17   3.692 |   5.17  11.729 |   8.17   4.778 |  11.17   2.172
                     2.33   3.692 |   5.33  11.729 |   8.33   4.778 |  11.33   2.172
                     2.50   3.692 |   5.50  11.729 |   8.50   4.778 |  11.50   2.172
                     2.67   3.258 |   5.67  92.962 |   8.67   4.996 |  11.67   2.172
                     2.83   3.258 |   5.83  92.962 |   8.83   4.996 |  11.83   2.172
                     3.00   3.258 |   6.00  92.962 |   9.00   4.996 |  12.00   2.172

------------------------------------------------------------------------
011:0003----------------------------------------------------------------
*
----------------------
| CALIB STANDHYD       |   Area     (ha)=    2.80
| 01:1.11   DT= 2.00   |   Total Imp(%)=   99.00   Dir. Conn.(%)=   99.00
----------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=      2.77           .03
     Dep. Storage      (mm)=      2.00          5.00
     Average Slope      (%)=      1.00          2.00
     Length             (m)=    137.00         40.00
     Mannings n            =      .015          .350

     Max.eff.Inten.(mm/hr)=      92.96         92.32
                over (min)        4.00         12.00
     Storage Coeff.  (min)=       3.46 (ii)    12.38 (ii)
     Unit Hyd. Tpeak (min)=       4.00         12.00
     Unit Hyd. peak  (cms)=        .31           .09
                                                          *TOTALS*
     PEAK FLOW        (cms)=       .72           .01         .722 (iii)
     TIME TO PEAK     (hrs)=      6.00          6.03        6.000
     RUNOFF VOLUME     (mm)=    106.60         98.66      106.521
     TOTAL RAINFALL    (mm)=    108.60        108.60      108.600
     RUNOFF COEFFICIENT    =       .98           .91         .981

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  98.0    Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------
011:0004----------------------------------------------------------------
*
--------------------
| COMPUTE VOLUME    |
| ID:01  (1.11  )   |              DISCHARGE      TIME
--------------------                 (cms)        (hrs)
            START CONTROLLING AT      .000         .733
            INFLOW HYD. PEAKS AT      .722        6.000
            STOP  CONTROLLING AT      .000         .000

            REQUIRED STORAGE VOLUME (ha.m.)=     .2983
            TOTAL HYDROGRAPH VOLUME (ha.m.)=     .2983
            % OF HYDROGRAPH TO STORE        =  99.9996

            NOTE:  Storage was computed to reduce the Inflow

------------------------------------------------------------------------
011:0005----------------------------------------------------------------
* Parking lot storage
---------------------
| ROUTE RESERVOIR    |    Requested routing time step =  2.0 min.
|  IN>01:(1.11  )    |
| OUT<02:(710   )    |    =========  OUTLFOW STORAGE TABLE  =========
---------------------     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                           (cms)     (ha.m.)   |   (cms)     (ha.m.)
```

```
                              .000  .0000E+00  |     .150  .1500E+00
                              .025  .2500E-01  |     .200  .2000E+00
                              .100  .5000E-01  |     .000  .0000E+00

    ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
    --------------------       (ha)     (cms)     (hrs)       (mm)
    INFLOW >01: (1.11  )       2.80      .722     6.000    106.521
    OUTFLOW<02: (710   )       2.80      .150     6.533    106.520

                 PEAK   FLOW    REDUCTION [Qout/Qin](%)=   20.833
                 TIME SHIFT OF PEAK FLOW          (min)=    32.00
                 MAXIMUM  STORAGE   USED       (ha.m.)=.1505E+00

--------------------------------------------------------------------------------
011:0006------------------------------------------------------------------------
*
---------------------
| CALIB NASHYD        |   Area    (ha)=    1.00   Curve Number   (CN)=80.00
| 01:1.12   DT= 2.00  |   Ia      (mm)=   6.500   # of Linear Res.(N)= 3.00
---------------------     U.H. Tp(hrs)=    .200

    Unit Hyd Qpeak  (cms)=      .191

    PEAK FLOW       (cms)=      .153 (i)
    TIME TO PEAK    (hrs)=    6.067
    RUNOFF VOLUME    (mm)=   62.949
    TOTAL RAINFALL   (mm)=  108.600
    RUNOFF COEFFICIENT   =      .580

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

--------------------------------------------------------------------------------
011:0007------------------------------------------------------------------------
*
--------------------
| ADD HYD (810   ) | ID: NHYD     AREA     QPEAK   TPEAK   R.V.    DWF
--------------------              (ha)     (cms)   (hrs)   (mm)   (cms)
               ID1 01:1.12        1.00      .153    6.07  62.95    .000
              +ID2 02:710         2.80      .150    6.53 106.52    .000
               ==================================================
               SUM 10:810         3.80      .297    6.07  95.05    .000

  NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
011:0008------------------------------------------------------------------------
*
---------------------
| CALIB NASHYD        |   Area    (ha)=    1.20   Curve Number   (CN)=80.00
| 01:1.3    DT= 2.00  |   Ia      (mm)=   6.500   # of Linear Res.(N)= 3.00
---------------------     U.H. Tp(hrs)=    .100

    Unit Hyd Qpeak  (cms)=      .458

    PEAK FLOW       (cms)=      .216 (i)
    TIME TO PEAK    (hrs)=    6.000
    RUNOFF VOLUME    (mm)=   62.949
    TOTAL RAINFALL   (mm)=  108.600
    RUNOFF COEFFICIENT   =      .580

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

--------------------------------------------------------------------------------
011:0009------------------------------------------------------------------------
*
--------------------
| ADD HYD (820   ) | ID: NHYD     AREA     QPEAK   TPEAK   R.V.    DWF
--------------------              (ha)     (cms)   (hrs)   (mm)   (cms)
               ID1 01:1.3         1.20      .216    6.00  62.95    .000
              +ID2 10:810         3.80      .297    6.07  95.05    .000
               ==================================================
               SUM 09:820         5.00      .502    6.00  87.35    .000

  NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
011:0010------------------------------------------------------------------------
*
---------------------
| CALIB NASHYD        |   Area    (ha)=    1.00   Curve Number   (CN)=80.00
| 01:1.31   DT= 2.00  |   Ia      (mm)=   6.500   # of Linear Res.(N)= 3.00
---------------------     U.H. Tp(hrs)=    .100

    Unit Hyd Qpeak  (cms)=      .382

    PEAK FLOW       (cms)=      .180 (i)
    TIME TO PEAK    (hrs)=    6.000
    RUNOFF VOLUME    (mm)=   62.949
    TOTAL RAINFALL   (mm)=  108.600
    RUNOFF COEFFICIENT   =      .580

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

--------------------------------------------------------------------------------
011:0011------------------------------------------------------------------------
*
--------------------
| ADD HYD (830   ) | ID: NHYD     AREA     QPEAK   TPEAK   R.V.    DWF
--------------------              (ha)     (cms)   (hrs)   (mm)   (cms)
               ID1 01:1.31        1.00      .180    6.00  62.95    .000
              +ID2 09:820         5.00      .502    6.00  87.35    .000
               ==================================================
               SUM 10:830         6.00      .682    6.00  83.28    .000

  NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
011:0012------------------------------------------------------------------------
*
---------------------
| CALIB NASHYD        |   Area    (ha)=    1.10   Curve Number   (CN)=82.00
| 01:1.33   DT= 2.00  |   Ia      (mm)=   6.500   # of Linear Res.(N)= 3.00
---------------------     U.H. Tp(hrs)=    .200

    Unit Hyd Qpeak  (cms)=      .210

    PEAK FLOW       (cms)=      .177 (i)
    TIME TO PEAK    (hrs)=    6.067
    RUNOFF VOLUME    (mm)=   66.037
    TOTAL RAINFALL   (mm)=  108.600
    RUNOFF COEFFICIENT   =      .608

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

--------------------------------------------------------------------------------
011:0013------------------------------------------------------------------------
*
--------------------
| ADD HYD (840   ) | ID: NHYD     AREA     QPEAK   TPEAK   R.V.    DWF
--------------------              (ha)     (cms)   (hrs)   (mm)   (cms)
               ID1 01:1.33        1.10      .177    6.07  66.04    .000
              +ID2 10:830         6.00      .682    6.00  83.28    .000
               ==================================================
               SUM 09:840         7.10      .853    6.00  80.61    .000

  NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
011:0014------------------------------------------------------------------------
*
---------------------
| CALIB NASHYD        |   Area    (ha)=   12.30   Curve Number   (CN)=80.00
| 01:1.1    DT= 2.00  |   Ia      (mm)=   6.500   # of Linear Res.(N)= 3.00
---------------------     U.H. Tp(hrs)=   1.100

    Unit Hyd Qpeak  (cms)=      .427

    PEAK FLOW       (cms)=      .673 (i)
    TIME TO PEAK    (hrs)=    7.100
    RUNOFF VOLUME    (mm)=   62.949
    TOTAL RAINFALL   (mm)=  108.600
    RUNOFF COEFFICIENT   =      .580

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

--------------------------------------------------------------------------------
011:0015------------------------------------------------------------------------
*
---------------------
| CALIB NASHYD        |   Area    (ha)=     .65   Curve Number   (CN)=80.00
| 02:1.2    DT= 2.00  |   Ia      (mm)=   6.500   # of Linear Res.(N)= 3.00
---------------------     U.H. Tp(hrs)=    .300

    Unit Hyd Qpeak  (cms)=      .083

    PEAK FLOW       (cms)=      .082 (i)
    TIME TO PEAK    (hrs)=    6.133
    RUNOFF VOLUME    (mm)=   62.949
    TOTAL RAINFALL   (mm)=  108.600
    RUNOFF COEFFICIENT   =      .580

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

--------------------------------------------------------------------------------
011:0016------------------------------------------------------------------------
*
--------------------
| ADD HYD (850   ) | ID: NHYD     AREA     QPEAK   TPEAK   R.V.    DWF
--------------------              (ha)     (cms)   (hrs)   (mm)   (cms)
               ID1 01:1.1        12.30      .673    7.10  62.95    .000
              +ID2 02:1.2          .65      .082    6.13  62.95    .000
               ==================================================
               SUM 10:850        12.95      .693    7.07  62.95    .000

  NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
011:0017------------------------------------------------------------------------
*
---------------------
| CALIB NASHYD        |   Area    (ha)=     .60   Curve Number   (CN)=80.00
| 01:1.32   DT= 2.00  |   Ia      (mm)=   6.500   # of Linear Res.(N)= 3.00
---------------------     U.H. Tp(hrs)=    .200

    Unit Hyd Qpeak  (cms)=      .115

    PEAK FLOW       (cms)=      .092 (i)
    TIME TO PEAK    (hrs)=    6.067
    RUNOFF VOLUME    (mm)=   62.949
    TOTAL RAINFALL   (mm)=  108.600
    RUNOFF COEFFICIENT   =      .580

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

--------------------------------------------------------------------------------
011:0018------------------------------------------------------------------------
*
--------------------
| ADD HYD (860   ) | ID: NHYD     AREA     QPEAK   TPEAK   R.V.    DWF
--------------------              (ha)     (cms)   (hrs)   (mm)   (cms)
               ID1 01:1.32         .60      .092    6.07  62.95    .000
              +ID2 10:850        12.95      .693    7.07  62.95    .000
               ==================================================
               SUM 08:860        13.55      .709    7.03  62.95    .000

  NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
011:0019------------------------------------------------------------------------
*
--------------------
| ADD HYD (870   ) | ID: NHYD     AREA     QPEAK   TPEAK   R.V.    DWF
--------------------              (ha)     (cms)   (hrs)   (mm)   (cms)
               ID1 09:840         7.10      .853    6.00  80.61    .000
              +ID2 08:860        13.55      .709    7.03  62.95    .000
               ==================================================
               SUM 10:870        20.65     1.221    6.03  69.02    .000

  NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
011:0020------------------------------------------------------------------------
*
* Majors to Outlet 1B
* Minors to MTO Hwy 403 Twin Culverts - Same flow assumed as for existing condit
---------------------
| COMPUTE DUALHYD     |   Average inlet capacities   [CINLET] =    .252  (cms)
| TotalHyd 10:870     |   Number of inlets in system [NINLET] =       1
---------------------     Total minor system capacity         =    .252  (cms)
                          Total major system storage [TMJSTO] =       0.(cu.m.)

               ID: NHYD         AREA     QPEAK      TPEAK     R.V.      DWF
                                (ha)     (cms)      (hrs)     (mm)     (cms)
    TOTAL HYD.   10:870        20.65     1.221      6.033   69.021     .000
    ======================================================================
    MAJOR SYST   07:870.1      10.76      .969      6.033   69.021     .000
    MINOR SYST   08:870.2       9.89      .252      5.600   69.022     .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
011:0021------------------------------------------------------------------------
*
---------------------
| CALIB NASHYD        |   Area    (ha)=    4.30   Curve Number   (CN)=79.00
| 01:1.4    DT= 2.00  |   Ia      (mm)=   6.800   # of Linear Res.(N)= 3.00
---------------------     U.H. Tp(hrs)=    .300

    Unit Hyd Qpeak  (cms)=      .547

    PEAK FLOW       (cms)=      .526 (i)
    TIME TO PEAK    (hrs)=    6.133
    RUNOFF VOLUME    (mm)=   61.205
    TOTAL RAINFALL   (mm)=  108.600
    RUNOFF COEFFICIENT   =      .564

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

--------------------------------------------------------------------------------
011:0022------------------------------------------------------------------------
```



```
*
---------------------
| CALIB NASHYD        |   Area    (ha)=     .60   Curve Number   (CN)=80.00
| 02:1.41   DT= 2.00  |   Ia      (mm)=   6.500   # of Linear Res.(N)= 3.00
---------------------     U.H. Tp(hrs)=    .100

    Unit Hyd Qpeak  (cms)=      .229

    PEAK FLOW       (cms)=      .108 (i)
    TIME TO PEAK    (hrs)=    6.000
    RUNOFF VOLUME    (mm)=   62.949
    TOTAL RAINFALL   (mm)=  108.600
    RUNOFF COEFFICIENT   =      .580

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

--------------------------------------------------------------------------------
011:0023------------------------------------------------------------------------
*
* Total to Outlet 1B
*
--------------------
| ADD HYD (875   ) | ID: NHYD     AREA     QPEAK   TPEAK   R.V.    DWF
--------------------              (ha)     (cms)   (hrs)   (mm)   (cms)
               ID1 01:1.4         4.30      .526    6.13  61.21    .000
              +ID2 02:1.41         .60      .108    6.00  62.95    .000
              +ID3 07:870.1      10.76      .969    6.03  69.02    .000
               ==================================================
               SUM 10:875        15.66     1.552    6.07  66.64    .000

  NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
011:0024------------------------------------------------------------------------
*
---------------------
| CALIB STANDHYD      |   Area    (ha)=    9.80
| 01:MTO103 DT= 2.00  |   Total Imp(%)=   80.00   Dir. Conn.(%)=   80.00
---------------------
                              IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=       7.84          1.96
    Dep. Storage     (mm)=       2.00          5.00
    Average Slope     (%)=       1.00          2.00
    Length            (m)=     256.00         40.00
    Mannings n           =       .015          .350

    Max.eff.Inten.(mm/hr)=      92.96         64.25
              over (min)        6.00         16.00
    Storage Coeff.  (min)=       5.04 (ii)    15.35 (ii)
    Unit Hyd. Tpeak (min)=       6.00         16.00
    Unit Hyd. peak  (cms)=        .21           .07
                                                          *TOTALS*
    PEAK FLOW       (cms)=       2.02           .26          2.255 (iii)
    TIME TO PEAK    (hrs)=       6.00          6.10          6.000
    RUNOFF VOLUME    (mm)=     106.60         62.72         97.824
    TOTAL RAINFALL   (mm)=     108.60        108.60        108.600
    RUNOFF COEFFICIENT   =        .98           .58           .901

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN* =  79.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
011:0025------------------------------------------------------------------------
*
--------------------
| ADD HYD (890   ) | ID: NHYD     AREA     QPEAK   TPEAK   R.V.    DWF
--------------------              (ha)     (cms)   (hrs)   (mm)   (cms)
               ID1 08:870.2       9.89      .252    5.60  69.02    .000
              +ID2 01:MTO103      9.80     2.255    6.00  97.82    .000
               ==================================================
               SUM 09:890        19.69     2.507    6.00  83.36    .000

  NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
011:0026------------------------------------------------------------------------
*
*COMPUTE VOLUME      ID=9 STRATE=-100  RELRATE=0.0
*
* Existing Sawmill Creek MTO Pond
---------------------
| ROUTE RESERVOIR     |    Requested routing time step =  2.0 min.
|   IN>09:(890   )    |
| OUT<01:(700   )     |    =========  OUTLFOW STORAGE TABLE  =========
---------------------      OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                            (cms)     (ha.m.)   |   (cms)     (ha.m.)
                             .000  .0000E+00    |   2.863  .6631E+00
                             .008  .2389E+00    |   3.937  .8236E+00

    ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
    --------------------       (ha)     (cms)     (hrs)       (mm)
    INFLOW >09: (890   )      19.69     2.507     6.000     83.360
    OUTFLOW<01: (700   )      19.69     1.641     6.133     83.324
   OVERFLOW<02: (701   )        .00      .000      .000       .000

                 TOTAL NUMBER OF SIMULATED OVERFLOWS  =        0
                 CUMULATIVE TIME OF OVERFLOWS  (hours)=      .00
                 PERCENTAGE OF TIME OVERFLOWING    (%)=      .00


                 PEAK   FLOW    REDUCTION [Qout/Qin](%)=   65.450
                 TIME SHIFT OF PEAK FLOW          (min)=     8.00
                 MAXIMUM  STORAGE   USED       (ha.m.)=.4821E+00

--------------------------------------------------------------------------------
011:0027------------------------------------------------------------------------
*
*COMPUTE VOLUME      ID=2 STRATE=-100  RELRATE=0.0
--------------------------------------------------------------------------------
011:0002------------------------------------------------------------------------
*
--------------------------------------------------------------------------------
011:0002------------------------------------------------------------------------
*
--------------------------------------------------------------------------------
011:0002------------------------------------------------------------------------
*
--------------------------------------------------------------------------------
011:0002------------------------------------------------------------------------
*
      FINISH
--------------------------------------------------------------------------------
********************************************************************************
     WARNINGS / ERRORS / NOTES
     -------------------------
   Simulation ended on 2008-07-03     at 10:39:21
--------------------------------------------------------------------------------
```

```
2     Metric units
*#*****************************************************************************
*#  Project Name: BRT WEST - Outlet 2                          JOB NUMBER: [6964]  *
*#  Date        : JUNE-25-2008                                                     *
*#  Modeller    : [jrm]                                                            *
*#  Company     : McCormick Rankin Corporation                                     *
*#  License #   : 4313781                                                          *
*#                                                                                 *
*#                                                                                 *
*#                   FUTURE DRAINAGE CONDITIONS TO OUTLET 2                        *
*#        25 mm 4 hour - Chicago and 12 hour SCS 2 to 100 Year Storms              *
*#                                                                                 *
*#*****************************************************************************
*#*****************************************************************************
*
*
START                 TIME= 0   METOUT= 0  NSTORM=1  NRUN="001"
                      CHIC25mm.stm
*
READ STORM            STORM_FILENAME="STORM.001"

*
*%*****************************************************************************|
*                          ** FUTURE CONTROLLED PEAK FLOWS **
*%*****************************************************************************|
*
CALIB NASHYD          ID=[1], NHYD=["2.1"], DT=[2]min, AREA=[5.20](ha),
                      DWF=[0.00](cms),  CN/C=[79], IA=[6.70](mm),
                      N=[3], TP=[0.50]hrs,
                      END=-1

COMPUTE VOLUME        ID=[1], STRATE=[-100](cms), RELRATE=[0](cms)

*
*%-----------------------------------------------------------------------
* Attenuation storage in ditch for Catchment 2.1 to offset peak flows
*%-----------------------------------------------------------------------
ROUTE RESERVOIR       IDout=[5],   NHYD=["700"],  IDin=[1],
                      RDT=[2](min),
                            TABLE of ( OUTFLOW-STORAGE ) values
                                        (cms) - (ha-m)
                                     [   0.0 ,  0.0 ]
                                     [  0.40, 0.0600]
                                     [   -1  ,  -1  ]  (max twenty pts)
                            IDovf=[], NHYDovf=[""]

*
*
CALIB STANDHYD        ID=[2], NHYD=["2.11"], DT=[2](min), AREA=[0.55](ha),
                      XIMP=[0.99], TIMP=[0.99], DWF=[0](cms), LOSS=[2],
                      SCS curve number CN=[99],
                      Pervious   surfaces: IAper=[5.0](mm), SLPP=[2.0](%),
                                           LGP=[5](m), MNP=[0.35], SCP=[0](min),
                      Impervious surfaces: IAimp=[2](mm), SLPI=[1.0](%),
                                           LGI=[390](m), MNI=[0.015], SCI=[0](min)
                      END=-1
COMPUTE DUALHYD       IDin=[2], CINLET=[.092](cms), NINLET=[1],
                      MAJID=[3], MajNHYD=["2.111"],
                      MINID=[4], MinNHYD=["2.112"],
                      TMJSTO=[0 ](cu-m)
COMPUTE VOLUME        ID=[4], STRATE=[-100](cms), RELRATE=[0](cms)
*
*
*---------------------------------------------------------------------------
*                        "FC8" IS THE FLOW AT NEW CULVERT FC8
*---------------------------------------------------------------------------
*
*
ADD HYD               IDsum=[10], NHYD=["FC8"],
                      IDs to add=5,4
*
*
*****************************************************************************
*
CALIB NASHYD          ID=[1], NHYD=["2.12"], DT=[2]min, AREA=[2.70](ha),
                      DWF=[0.00](cms),  CN/C=[82], IA=[6.00](mm),
                      N=[3], TP=[0.50]hrs,
                      END=-1
*
*---------------------------------------------------------------------------
*              "CB1" IS THE FLOW AT THE EXISTING CB TO THE THE EXISTING
*                             TWIN 2400mm DIAM. STORM SEWER
*---------------------------------------------------------------------------
*
ADD HYD               IDsum=[9], NHYD=["CB1"],
                      IDs to add=1,10
*
*
*****************************************************************************
*****************************************************************************
*
*
CALIB STANDHYD        ID=[1], NHYD=["2.13"], DT=[2](min), AREA=[0.72](ha),
                      XIMP=[0.99], TIMP=[0.99], DWF=[0](cms), LOSS=[2],
                      SCS curve number CN=[79],
                      Pervious   surfaces: IAper=[5.0](mm), SLPP=[2.0](%),
                                           LGP=[5](m), MNP=[0.35], SCP=[0](min),
                      Impervious surfaces: IAimp=[2](mm), SLPI=[1.0](%),
                                           LGI=[550](m), MNI=[0.015], SCI=[0](min)
                      END=-1
*
ADD HYD               IDsum=[10], NHYD=["800"],
                      IDs to add=1,3

*
*%--------------------------------------------------------------
* Pipe and/or ditch storage Catchment 2.13
*%--------------------------------------------------------------
ROUTE RESERVOIR       IDout=[1],   NHYD=["710"],  IDin=[10],
                      RDT=[2](min),
                            TABLE of ( OUTFLOW-STORAGE ) values
                                        (cms) - (ha-m)
                                     [   0.0 ,  0.0 ]
                                     [  0.050, 0.0200]
                                     [  0.150, 0.0300]
                                     [   -1  ,  -1  ]  (max twenty pts)
                            IDovf=[], NHYDovf=[""]
*
*
CALIB NASHYD          ID=[2], NHYD=["2.2"], DT=[2]min, AREA=[3.40](ha),
                      DWF=[0.00](cms),  CN/C=[79], IA=[6.80](mm),
                      N=[3], TP=[0.20]hrs,
                      END=-1
*
ADD HYD               IDsum=[10], NHYD=["810"],
                      IDs to add=1,2
*
*---------------------------------------------------------------------------
*                 "Out2" IS THE TOTAL FLOW TO OUTLET #2
*---------------------------------------------------------------------------
*
ADD HYD               IDsum=[10], NHYD=["OUT2"],
                      IDs to add=9,10


START                 TIME= 0   METOUT= 0  NSTORM=1  NRUN=008
                      12hrscs2.stm
*
START                 TIME= 0   METOUT= 0  NSTORM=1  NRUN=009
                      12hscs10.stm
*
START                 TIME= 0   METOUT= 0  NSTORM=1  NRUN=010
                      12hscs50.stm
*
START                 TIME= 0   METOUT= 0  NSTORM=1  NRUN=011
                      12scsh.stm

*
FINISH
```



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

 SSSSS  W   W  M   M  H   H  Y   Y  M   M   OOO        999    999  =========
 S      W W W  MM MM  H   H   Y Y   MM MM  O   O      9   9  9   9
 SSSSS  W W W  M M M  HHHHH    Y    M M M  O   O  ## 9   9  9   9 Ver. 4.02
     S   W W   M   M  H   H    Y    M   M  O   O      9999   9999 July 1999
 SSSSS   W W   M   M  H   H    Y    M   M   OOO          9      9 =========
                                                    9   9  9   9 # 4313781
       StormWater Management HYdrologic Model        999    999  =========

 *************************************************************************
 ************************** SWMHYMO-99 Ver/4.02 **************************
 *******  A single event and continuous hydrologic simulation model  *******
 *******     based on the principles of HYMO and its successors     *******
 *******                 OTTHYMO-83 and OTTHYMO-89.                 *******
 *************************************************************************
 ******* Distributed by:  J.F. Sabourin and Associates Inc.           *******
 *******                  Ottawa,  Ontario: (613) 727-5199           *******
 *******                  Gatineau, Quebec: (819) 243-6858           *******
 *******                  E-Mail: swmhymo@jfsa.Com                   *******
 *************************************************************************

 +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
 +++++++ Licensed user: McCormick Rankin Corporation                +++++++
 +++++++                Kitchener              SERIAL#:4313781      +++++++
 +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

 *************************************************************************
 *******            ++++++ PROGRAM ARRAY DIMENSIONS ++++++           *******
 *******            Maximum value for ID numbers   :    10           *******
 *******            Max. number of rainfall points:  15000           *******
 *******            Max. number of flow points    :  15000           *******
 *************************************************************************


 ********************  D E T A I L E D   O U T P U T  ********************
 *************************************************************************
 *      DATE: 2008-07-03     TIME: 10:49:28     RUN COUNTER: 000204      *
 *************************************************************************
 * Input   filename: K:\Projects\6900-6-1\6964-M-1\21-HYD-1\PDWest2.dat   *
 * Output  filename: K:\Projects\6900-6-1\6964-M-1\21-HYD-1\PDWest2.out   *
 * Summary filename: K:\Projects\6900-6-1\6964-M-1\21-HYD-1\PDWest2.sum   *
 * User comments:                                                         *
 * 1:_____________________________________________________________________*
 * 2:_____________________________________________________________________*
 * 3:_____________________________________________________________________*
 *************************************************************************

-------------------------------------------------------------------------------
001:0001-----------------------------------------------------------------------
*#*****************************************************************************
*#  Project Name: BRT WEST - Outlet 2                          JOB NUMBER: [6964]  *
*#  Date        : JUNE-25-2008                                                     *
*#  Modeller    : [jrm]                                                            *
*#  Company     : McCormick Rankin Corporation                                     *
*#  License #   : 4313781                                                          *
*#                                                                                 *
*#                                                                                 *
*#                   FUTURE DRAINAGE CONDITIONS TO OUTLET 2                        *
*#        25 mm 4 hour - Chicago and 12 hour SCS 2 to 100 Year Storms              *
*#                                                                                 *
*#*****************************************************************************
*#*****************************************************************************
*
*
--------------------
| START            |  Project  dir.: K:\Projects\6900-6-1\6964-M-1\21-HYD-1\
--------------------  Rainfall dir.: K:\Projects\6900-6-1\6964-M-1\21-HYD-1\
    TZERO =    .00 hrs on      0
    METOUT=    2 (output = METRIC)
    NRUN  = 001
    NSTORM=    1
           #  1=CHIC25mm.stm
-------------------------------------------------------------------------------
001:0002-----------------------------------------------------------------------
*
--------------------
| READ STORM       |    Filename: K:\Projects\6900-6-1\6964-M-1\21-HYD-1\C
| Ptotal=  25.00 mm|    Comments: 25mm, 4hr Chicago Storm
--------------------
                 TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
                  hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
                  .17   1.423 |   1.17   3.859 |   2.17   5.294 |   3.17   1.977
                  .33   1.574 |   1.33   5.821 |   2.33   4.057 |   3.33   1.805
                  .50   1.769 |   1.50  13.337 |   2.50   3.314 |   3.50   1.664
                  .67   2.028 |   1.67  61.503 |   2.67   2.817 |   3.67   1.545
                  .83   2.389 |   1.83  15.650 |   2.83   2.459 |   3.83   1.444
                 1.00   2.933 |   2.00   7.793 |   3.00   2.189 |   4.00   1.356

-------------------------------------------------------------------------------
001:0003-----------------------------------------------------------------------
*
*                       ** FUTURE CONTROLLED PEAK FLOWS **
*
-----------------------
| CALIB NASHYD        |   Area     (ha)=     5.20   Curve Number   (CN)=79.00
| 01:2.1    DT= 2.00  |   Ia       (mm)=    6.700   # of Linear Res.(N)= 3.00
-----------------------   U.H. Tp(hrs)=      .500

     Unit Hyd Qpeak  (cms)=      .397

     PEAK FLOW       (cms)=      .035 (i)
     TIME TO PEAK    (hrs)=     2.333
     RUNOFF VOLUME    (mm)=     3.902
     TOTAL RAINFALL   (mm)=    25.000
     RUNOFF COEFFICIENT   =      .156

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

-------------------------------------------------------------------------------
001:0004-----------------------------------------------------------------------
--------------------
| COMPUTE VOLUME   |
| ID:01  (2.1   )  |              DISCHARGE      TIME
--------------------                (cms)       (hrs)
           START CONTROLLING AT      .000       1.500
           INFLOW HYD. PEAKS AT      .035       2.333
           STOP  CONTROLLING AT      .000        .000

           REQUIRED STORAGE VOLUME (ha.m.)=     .0203
           TOTAL HYDROGRAPH VOLUME (ha.m.)=     .0203
           % OF HYDROGRAPH TO STORE       =   99.9994

           NOTE:  Storage was computed to reduce the Inflow

-------------------------------------------------------------------------------
001:0005-----------------------------------------------------------------------
*
* Attenuation storage in ditch for Catchment 2.1 to offset peak flows
---------------------
| ROUTE RESERVOIR   |    Requested routing time step =  2.0 min.
|  IN>01:(2.1    )  |
| OUT<05:(700    )  |    =========  OUTLFOW STORAGE TABLE  =========
---------------------    OUTFLOW    STORAGE  |  OUTFLOW    STORAGE
                          (cms)     (ha.m.)  |   (cms)     (ha.m.)
                           .000  .0000E+00   |     .400  .6000E-01

      ROUTING RESULTS             AREA     QPEAK     TPEAK       R.V.
      --------------------        (ha)     (cms)     (hrs)       (mm)
      INFLOW >01: (2.1    )       5.20      .035     2.333      3.902
      OUTFLOW<05: (700    )       5.20      .028     2.733      3.902

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=   80.195
                  TIME SHIFT OF PEAK FLOW        (min)=    24.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=.4167E-02

-------------------------------------------------------------------------------
001:0006-----------------------------------------------------------------------
*
*
-----------------------
| CALIB STANDHYD      |   Area      (ha)=      .55
| 02:2.11   DT= 2.00  |   Total Imp(%)=    99.00   Dir. Conn.(%)=   99.00
-----------------------
                                 IMPERVIOUS    PERVIOUS (i)
      Surface Area      (ha)=         .54          .01
      Dep. Storage      (mm)=        2.00         5.00
      Average Slope      (%)=        1.00         2.00
      Length             (m)=      390.00         5.00
      Mannings n            =        .015         .350

      Max.eff.Inten.(mm/hr)=        61.50        52.85
                 over (min)          8.00        10.00
      Storage Coeff.  (min)=         7.65 (ii)   10.85 (ii)
      Unit Hyd. Tpeak (min)=         8.00        10.00
      Unit Hyd. peak  (cms)=          .15          .11
                                                               *TOTALS*
      PEAK FLOW       (cms)=          .06          .00           .065 (iii)
      TIME TO PEAK    (hrs)=         1.73         1.77          1.733
      RUNOFF VOLUME    (mm)=        23.00        17.73         22.947
      TOTAL RAINFALL   (mm)=        25.00        25.00         25.000
      RUNOFF COEFFICIENT   =          .92          .71           .918

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  99.0     Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
001:0007-----------------------------------------------------------------------
-----------------------
| COMPUTE DUALHYD     |   Average inlet capacities   [CINLET] =     .092  (cms)
| TotalHyd 02:2.11    |   Number of inlets in system [NINLET] =      1
-----------------------   Total minor system capacity          =     .092  (cms)
                          Total major system storage [TMJSTO] =       0.(cu.m.)

                     ID: NHYD        AREA      QPEAK      TPEAK      R.V.      DWF
                                     (ha)      (cms)      (hrs)      (mm)     (cms)
      TOTAL HYD.    02:2.11           .55       .065      1.733    22.947      .000
      ===========================================================================
      MAJOR SYST    03:2.111          .00       .000       .000      .000      .000
      MINOR SYST    04:2.112          .55       .065      1.733    22.947      .000

      NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
001:0008-----------------------------------------------------------------------
--------------------
| COMPUTE VOLUME   |
| ID:04  (2.112 )  |              DISCHARGE      TIME
--------------------                (cms)       (hrs)
           START CONTROLLING AT      .000        .967
           INFLOW HYD. PEAKS AT      .065       1.733
           STOP  CONTROLLING AT      .000       5.067

           REQUIRED STORAGE VOLUME (ha.m.)=     .0126
           TOTAL HYDROGRAPH VOLUME (ha.m.)=     .0126
           % OF HYDROGRAPH TO STORE       =   99.9997

           NOTE:  Storage was computed to reduce the Inflow

-------------------------------------------------------------------------------
001:0009-----------------------------------------------------------------------
*
*
*------------------------------------------------------------------------------
*                     "FC8" IS THE FLOW AT NEW CULVERT FC8
*------------------------------------------------------------------------------
*
*
--------------------
| ADD HYD (FC8   ) | ID: NHYD      AREA     QPEAK    TPEAK   R.V.     DWF
--------------------                (ha)     (cms)    (hrs)   (mm)    (cms)
               ID1 05:700           5.20      .028     2.73   3.90     .000
              +ID2 04:2.112          .55      .065     1.73  22.95     .000
               ==========================================================
               SUM 10:FC8           5.75      .065     1.73   5.72     .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
001:0010-----------------------------------------------------------------------
*
*
*******************************************************************************
*
-----------------------
| CALIB NASHYD        |   Area     (ha)=     2.70   Curve Number   (CN)=82.00
| 01:2.12   DT= 2.00  |   Ia       (mm)=    6.000   # of Linear Res.(N)= 3.00
-----------------------   U.H. Tp(hrs)=      .500

      Unit Hyd Qpeak  (cms)=      .206

      PEAK FLOW       (cms)=      .023 (i)
      TIME TO PEAK    (hrs)=     2.300
      RUNOFF VOLUME    (mm)=     4.829
      TOTAL RAINFALL   (mm)=    25.000
      RUNOFF COEFFICIENT   =      .193

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

-------------------------------------------------------------------------------
001:0011-----------------------------------------------------------------------
*
*------------------------------------------------------------------------------
*            "CB1" IS THE FLOW AT THE EXISTING CB TO THE THE EXISTING
*                          TWIN 2400mm DIAM. STORM SEWER
*------------------------------------------------------------------------------
*
--------------------
| ADD HYD (CB1   ) | ID: NHYD      AREA     QPEAK    TPEAK   R.V.     DWF
--------------------                (ha)     (cms)    (hrs)   (mm)    (cms)
               ID1 01:2.12          2.70      .023     2.30   4.83     .000
              +ID2 10:FC8           5.75      .065     1.73   5.72     .000
               ==========================================================
               SUM 09:CB1           8.45      .070     1.73   5.44     .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```

```
------------------------------------------------------------------------
001:0012----------------------------------------------------------------
*
*
************************************************************************
************************************************************************
*
*
---------------------
| CALIB STANDHYD     |   Area    (ha)=     .72
| 01:2.13   DT= 2.00 |   Total Imp(%)=   99.00   Dir. Conn.(%)=   99.00
---------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       .71          .01
     Dep. Storage     (mm)=      2.00         5.00
     Average Slope     (%)=      1.00         2.00
     Length            (m)=    550.00         5.00
     Mannings n           =      .015         .350

     Max.eff.Inten.(mm/hr)=     61.50         7.64
               over (min)      10.00        16.00
     Storage Coeff.  (min)=      9.40 (ii)   16.34 (ii)
     Unit Hyd. Tpeak (min)=     10.00        16.00
     Unit Hyd. peak  (cms)=       .12          .07
                                                          *TOTALS*
     PEAK FLOW       (cms)=       .08          .00          .076 (iii)
     TIME TO PEAK    (hrs)=      1.73         1.90         1.733
     RUNOFF VOLUME    (mm)=     23.00         4.57        22.816
     TOTAL RAINFALL   (mm)=     25.00        25.00        25.000
     RUNOFF COEFFICIENT   =       .92          .18          .913

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  79.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------
001:0013----------------------------------------------------------------
*
--------------------
| ADD HYD (800    ) | ID: NHYD     AREA     QPEAK    TPEAK   R.V.    DWF
--------------------                (ha)     (cms)    (hrs)   (mm)   (cms)
                   ID1 01:2.13       .72      .076     1.73  22.82    .000
                  +ID2 03:2.111      .00      .000      .00    .00    .000 **DRY**
                   =====================================================
                   SUM 10:800        .72      .076     1.73  22.82    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------
001:0014----------------------------------------------------------------
*
* Pipe and/or ditch storage Catchment 2.13
--------------------
| ROUTE RESERVOIR    |    Requested routing time step =  2.0 min.
|  IN>10:(800    )   |
| OUT<01:(710    )   |    =========  OUTLFOW STORAGE TABLE  =========
--------------------      OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                           (cms)     (ha.m.)   |   (cms)     (ha.m.)
                            .000   .0000E+00   |    .150   .3000E-01
                            .050   .2000E-01   |    .000   .0000E+00

     ROUTING RESULTS              AREA      QPEAK      TPEAK        R.V.
     --------------------         (ha)      (cms)      (hrs)        (mm)
     INFLOW >10: (800    )         .72       .076      1.733      22.816
     OUTFLOW<01: (710    )         .72       .021      2.167      22.815

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=   28.357
                   TIME SHIFT OF PEAK FLOW         (min)=   26.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=.8581E-02

------------------------------------------------------------------------
001:0015----------------------------------------------------------------
*
*
---------------------
| CALIB NASHYD       |   Area     (ha)=    3.40   Curve Number    (CN)=79.00
| 02:2.2    DT= 2.00 |   Ia       (mm)=   6.800   # of Linear Res.(N)= 3.00
---------------------    U.H. Tp(hrs)=     .200

     Unit Hyd Qpeak  (cms)=      .649

     PEAK FLOW       (cms)=      .040 (i)
     TIME TO PEAK    (hrs)=     1.900
     RUNOFF VOLUME    (mm)=     3.864
     TOTAL RAINFALL   (mm)=    25.000
     RUNOFF COEFFICIENT   =      .155

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

------------------------------------------------------------------------
001:0016----------------------------------------------------------------
*
--------------------
| ADD HYD (810    ) | ID: NHYD     AREA     QPEAK    TPEAK   R.V.    DWF
--------------------                (ha)     (cms)    (hrs)   (mm)   (cms)
                   ID1 01:710        .72      .021     2.17  22.82    .000
                  +ID2 02:2.2       3.40      .040     1.90   3.86    .000
                   =====================================================
                   SUM 10:810       4.12      .058     1.93   7.18    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------
001:0017----------------------------------------------------------------
*
*-----------------------------------------------------------------------
*                "Out2" IS THE TOTAL FLOW TO OUTLET #2
*-----------------------------------------------------------------------
*
--------------------
| ADD HYD (OUT2   ) | ID: NHYD     AREA     QPEAK    TPEAK   R.V.    DWF
--------------------                (ha)     (cms)    (hrs)   (mm)   (cms)
                   ID1 09:CB1       8.45      .070     1.73   5.44    .000
                  +ID2 10:OUT2      4.12      .058     1.93   7.18    .000
                   =====================================================
                   SUM 10:OUT2     12.57      .111     1.87   6.01    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------
001:0018----------------------------------------------------------------
   ** END OF RUN :    7

************************************************************************





--------------------
| START              |   Project  dir.: K:\Projects\6900-6~1\6964-M~1\21-HYD~1\
--------------------     Rainfall dir.: K:\Projects\6900-6~1\6964-M~1\21-HYD~1\
     TZERO =    .00 hrs on        0
     METOUT=    2 (output = METRIC)
     NRUN  = 008
     NSTORM=    1
            #  1=12hrscs2.stm
------------------------------------------------------------------------
008:0002----------------------------------------------------------------
*#**********************************************************************
*#  Project Name: BRT WEST - Outlet 2                   JOB NUMBER: [6964]  *
*#  Date         : JUNE-25-2008                                            *
*#  Modeller     : [jrm]                                                   *
*#  Company      : McCormick Rankin Corporation                            *
*#  License #    : 4313781                                                 *
*#                                                                         *
*#                                                                         *
*#                FUTURE DRAINAGE CONDITIONS TO OUTLET 2                   *
*#        25 mm 4 hour - Chicago and 12 hour SCS 2 to 100 Year Storms      *
*#                                                                         *
*#**********************************************************************
*#**********************************************************************
*
*
------------------------------------------------------------------------
008:0002----------------------------------------------------------------
*
--------------------
| READ STORM         |    Filename: K:\Projects\6900-6~1\6964-M~1\21-HYD~1\1
| Ptotal=  43.80 mm|      Comments: 2 Yr-12hr SCS
--------------------
                  TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
                   hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
                   .17   1.314 |   3.17   1.752 |   6.17   9.548 |   9.17   1.314
                   .33   1.314 |   3.33   1.752 |   6.33   9.548 |   9.33   1.314
                   .50   1.314 |   3.50   1.752 |   6.50   9.548 |   9.50   1.314
                   .67    .613 |   3.67   1.752 |   6.67   4.205 |   9.67   1.051
                   .83    .613 |   3.83   1.752 |   6.83   4.205 |   9.83   1.051
                  1.00    .613 |   4.00   1.752 |   7.00   4.205 |  10.00   1.051
                  1.17   1.139 |   4.17   2.365 |   7.17   2.803 |  10.17   1.489
                  1.33   1.139 |   4.33   2.365 |   7.33   2.803 |  10.33   1.489
                  1.50   1.139 |   4.50   2.365 |   7.50   2.803 |  10.50   1.489
                  1.67   1.139 |   4.67   2.978 |   7.67   2.453 |  10.67    .964
                  1.83   1.139 |   4.83   2.978 |   7.83   2.453 |  10.83    .964
                  2.00   1.139 |   5.00   2.978 |   8.00   2.453 |  11.00    .964
                  2.17   1.489 |   5.17   4.730 |   8.17   1.927 |  11.17    .876
                  2.33   1.489 |   5.33   4.730 |   8.33   1.927 |  11.33    .876
                  2.50   1.489 |   5.50   4.730 |   8.50   1.927 |  11.50    .876
                  2.67   1.314 |   5.67  37.493 |   8.67   2.015 |  11.67    .876
                  2.83   1.314 |   5.83  37.493 |   8.83   2.015 |  11.83    .876
                  3.00   1.314 |   6.00  37.493 |   9.00   2.015 |  12.00    .876

------------------------------------------------------------------------
008:0003----------------------------------------------------------------
*
*                      ** FUTURE CONTROLLED PEAK FLOWS **
*
---------------------
| CALIB NASHYD       |   Area     (ha)=    5.20   Curve Number    (CN)=79.00
| 01:2.1    DT= 2.00 |   Ia       (mm)=   6.700   # of Linear Res.(N)= 3.00
---------------------    U.H. Tp(hrs)=     .500

     Unit Hyd Qpeak  (cms)=      .397

     PEAK FLOW       (cms)=      .093 (i)
     TIME TO PEAK    (hrs)=     6.467
     RUNOFF VOLUME    (mm)=    13.156
     TOTAL RAINFALL   (mm)=    43.799
     RUNOFF COEFFICIENT   =      .300

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

------------------------------------------------------------------------
008:0004----------------------------------------------------------------
--------------------
| COMPUTE VOLUME     |
| ID:01  (2.1    )   |                 DISCHARGE       TIME
--------------------                     (cms)         (hrs)
            START CONTROLLING AT          .000         4.567
            INFLOW HYD. PEAKS AT          .093         6.467
            STOP  CONTROLLING AT          .000          .000

            REQUIRED STORAGE VOLUME (ha.m.)=     .0684
            TOTAL HYDROGRAPH VOLUME (ha.m.)=     .0684
            % OF HYDROGRAPH TO STORE         =  99.9996

            NOTE:  Storage was computed to reduce the Inflow

------------------------------------------------------------------------
008:0005----------------------------------------------------------------
*
* Attenuation storage in ditch for Catchment 2.1 to offset peak flows
--------------------
| ROUTE RESERVOIR    |    Requested routing time step =  2.0 min.
|  IN>01:(2.1    )   |
| OUT<05:(700    )   |    =========  OUTLFOW STORAGE TABLE  =========
--------------------      OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                           (cms)     (ha.m.)   |   (cms)     (ha.m.)
                            .000   .0000E+00   |    .400   .6000E-01

     ROUTING RESULTS              AREA      QPEAK      TPEAK        R.V.
     --------------------         (ha)      (cms)      (hrs)        (mm)
     INFLOW >01: (2.1    )        5.20       .093      6.467      13.156
     OUTFLOW<05: (700    )        5.20       .076      6.867      13.156

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=   81.559
                   TIME SHIFT OF PEAK FLOW         (min)=   24.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=.1143E-01

------------------------------------------------------------------------
008:0006----------------------------------------------------------------
*
*
---------------------
| CALIB STANDHYD     |   Area    (ha)=     .55
| 02:2.11   DT= 2.00 |   Total Imp(%)=   99.00   Dir. Conn.(%)=   99.00
---------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       .54          .01
     Dep. Storage     (mm)=      2.00         5.00
     Average Slope     (%)=      1.00         2.00
     Length            (m)=    390.00         5.00
     Mannings n           =      .015         .350

     Max.eff.Inten.(mm/hr)=     37.49        36.97
               over (min)      10.00        14.00
     Storage Coeff.  (min)=      9.33 (ii)   13.02 (ii)
     Unit Hyd. Tpeak (min)=     10.00        14.00
     Unit Hyd. peak  (cms)=       .12          .09
                                                          *TOTALS*
     PEAK FLOW       (cms)=       .05          .00          .054 (iii)
     TIME TO PEAK    (hrs)=      6.00         6.03         6.000
     RUNOFF VOLUME    (mm)=     41.80        36.39        41.745
     TOTAL RAINFALL   (mm)=     43.80        43.80        43.799
     RUNOFF COEFFICIENT   =       .95          .83          .953

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  99.0    Ia = Dep. Storage  (Above)
```



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

------------------------------------------------------------------------
008:0007----------------------------------------------------------------
---------------------
| COMPUTE DUALHYD    |   Average inlet capacities   [CINLET] =    .092  (cms)
| TotalHyd 02:2.11   |   Number of inlets in system [NINLET] =       1
---------------------    Total minor system capacity         =    .092  (cms)
                         Total major system storage [TMJSTO] =      0.(cu.m.)

                   ID: NHYD        AREA     QPEAK     TPEAK     R.V.      DWF
                                   (ha)     (cms)     (hrs)     (mm)     (cms)
     TOTAL HYD.    02:2.11          .55      .054     6.000   41.745     .000
     ========================================================================
     MAJOR SYST    03:2.111         .00      .000      .000     .000     .000
     MINOR SYST    04:2.112         .55      .054     6.000   41.745     .000

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------
008:0008----------------------------------------------------------------
--------------------
| COMPUTE VOLUME     |
| ID:04  (2.112 )    |                 DISCHARGE       TIME
--------------------                     (cms)         (hrs)
            START CONTROLLING AT          .000         1.900
            INFLOW HYD. PEAKS AT          .054         6.000
            STOP  CONTROLLING AT          .000        13.400

            REQUIRED STORAGE VOLUME (ha.m.)=     .0230
            TOTAL HYDROGRAPH VOLUME (ha.m.)=     .0230
            % OF HYDROGRAPH TO STORE         =  99.9996

            NOTE:  Storage was computed to reduce the Inflow

------------------------------------------------------------------------
008:0009----------------------------------------------------------------
*
*
*-----------------------------------------------------------------------
*                  "FC8" IS THE FLOW AT NEW CULVERT FC8
*-----------------------------------------------------------------------
*
*
--------------------
| ADD HYD (FC8    ) | ID: NHYD     AREA     QPEAK    TPEAK   R.V.    DWF
--------------------                (ha)     (cms)    (hrs)   (mm)   (cms)
                   ID1 05:700       5.20      .076     6.87  13.16    .000
                  +ID2 04:2.112      .55      .054     6.00  41.75    .000
                   =====================================================
                   SUM 10:FC8       5.75      .085     6.77  15.89    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------
008:0010----------------------------------------------------------------
*
*
************************************************************************
*
---------------------
| CALIB NASHYD       |   Area     (ha)=    2.70   Curve Number    (CN)=82.00
| 01:2.12   DT= 2.00 |   Ia       (mm)=   6.000   # of Linear Res.(N)= 3.00
---------------------    U.H. Tp(hrs)=     .500

     Unit Hyd Qpeak  (cms)=      .206

     PEAK FLOW       (cms)=      .057 (i)
     TIME TO PEAK    (hrs)=     6.467
     RUNOFF VOLUME    (mm)=    15.272
     TOTAL RAINFALL   (mm)=    43.799
     RUNOFF COEFFICIENT   =      .349

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

------------------------------------------------------------------------
008:0011----------------------------------------------------------------
*
*-----------------------------------------------------------------------
*          "CB1" IS THE FLOW AT THE EXISTING CB TO THE THE EXISTING
*                      TWIN 2400mm DIAM. STORM SEWER
*-----------------------------------------------------------------------
*
--------------------
| ADD HYD (CB1    ) | ID: NHYD     AREA     QPEAK    TPEAK   R.V.    DWF
--------------------                (ha)     (cms)    (hrs)   (mm)   (cms)
                   ID1 01:2.12      2.70      .057     6.47  15.27    .000
                  +ID2 10:FC8       5.75      .085     6.77  15.89    .000
                   =====================================================
                   SUM 09:CB1       8.45      .140     6.60  15.69    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------
008:0012----------------------------------------------------------------
*
*
************************************************************************
************************************************************************
*
*
---------------------
| CALIB STANDHYD     |   Area    (ha)=     .72
| 01:2.13   DT= 2.00 |   Total Imp(%)=   99.00   Dir. Conn.(%)=   99.00
---------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       .71          .01
     Dep. Storage     (mm)=      2.00         5.00
     Average Slope     (%)=      1.00         2.00
     Length            (m)=    550.00         5.00
     Mannings n           =      .015         .350

     Max.eff.Inten.(mm/hr)=     37.49        14.60
               over (min)      12.00        16.00
     Storage Coeff.  (min)=     11.46 (ii)   16.82 (ii)
     Unit Hyd. Tpeak (min)=     12.00        16.00
     Unit Hyd. peak  (cms)=       .10          .07
                                                          *TOTALS*
     PEAK FLOW       (cms)=       .07          .00          .067 (iii)
     TIME TO PEAK    (hrs)=      6.03         6.13         6.033
     RUNOFF VOLUME    (mm)=     41.80        14.16        41.523
     TOTAL RAINFALL   (mm)=     43.80        43.80        43.799
     RUNOFF COEFFICIENT   =       .95          .32          .948

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  79.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------
008:0013----------------------------------------------------------------
*
--------------------
| ADD HYD (800    ) | ID: NHYD     AREA     QPEAK    TPEAK   R.V.    DWF
--------------------                (ha)     (cms)    (hrs)   (mm)   (cms)
                   ID1 01:2.13       .72      .067     6.03  41.52    .000
                  +ID2 03:2.111      .00      .000      .00    .00    .000 **DRY**
                   =====================================================
                   SUM 10:800        .72      .067     6.03  41.52    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------
008:0014----------------------------------------------------------------
*
* Pipe and/or ditch storage Catchment 2.13
--------------------
| ROUTE RESERVOIR    |    Requested routing time step =  2.0 min.
|  IN>10:(800    )   |
| OUT<01:(710    )   |    =========  OUTLFOW STORAGE TABLE  =========
--------------------      OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                           (cms)     (ha.m.)   |   (cms)     (ha.m.)
                            .000   .0000E+00   |    .150   .3000E-01
                            .050   .2000E-01   |    .000   .0000E+00

     ROUTING RESULTS              AREA      QPEAK      TPEAK        R.V.
     --------------------         (ha)      (cms)      (hrs)        (mm)
     INFLOW >10: (800    )         .72       .067      6.033      41.523
     OUTFLOW<01: (710    )         .72       .028      6.433      41.523

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=   41.708
                   TIME SHIFT OF PEAK FLOW         (min)=   24.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=.1110E-01

------------------------------------------------------------------------
008:0015----------------------------------------------------------------
*
*
---------------------
| CALIB NASHYD       |   Area     (ha)=    3.40   Curve Number    (CN)=79.00
| 02:2.2    DT= 2.00 |   Ia       (mm)=   6.800   # of Linear Res.(N)= 3.00
---------------------    U.H. Tp(hrs)=     .200

     Unit Hyd Qpeak  (cms)=      .649

     PEAK FLOW       (cms)=      .102 (i)
     TIME TO PEAK    (hrs)=     6.067
     RUNOFF VOLUME    (mm)=    13.098
     TOTAL RAINFALL   (mm)=    43.799
     RUNOFF COEFFICIENT   =      .299

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

------------------------------------------------------------------------
008:0016----------------------------------------------------------------
*
--------------------
| ADD HYD (810    ) | ID: NHYD     AREA     QPEAK    TPEAK   R.V.    DWF
--------------------                (ha)     (cms)    (hrs)   (mm)   (cms)
                   ID1 01:710        .72      .028     6.43  41.52    .000
                  +ID2 02:2.2       3.40      .102     6.07  13.10    .000
                   =====================================================
                   SUM 10:810       4.12      .125     6.10  18.07    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------
008:0017----------------------------------------------------------------
*
*-----------------------------------------------------------------------
*                "Out2" IS THE TOTAL FLOW TO OUTLET #2
*-----------------------------------------------------------------------
*
--------------------
| ADD HYD (OUT2   ) | ID: NHYD     AREA     QPEAK    TPEAK   R.V.    DWF
--------------------                (ha)     (cms)    (hrs)   (mm)   (cms)
                   ID1 09:CB1       8.45      .140     6.60  15.69    .000
                  +ID2 10:OUT2      4.12      .125     6.10  18.07    .000
                   =====================================================
                   SUM 10:OUT2     12.57      .238     6.13  16.47    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------
008:0018----------------------------------------------------------------
------------------------------------------------------------------------
008:0002----------------------------------------------------------------
*
   ** END OF RUN :    8

************************************************************************






--------------------
| START              |   Project  dir.: K:\Projects\6900-6~1\6964-M~1\21-HYD~1\
--------------------     Rainfall dir.: K:\Projects\6900-6~1\6964-M~1\21-HYD~1\
     TZERO =    .00 hrs on        0
     METOUT=    2 (output = METRIC)
     NRUN  = 009
     NSTORM=    1
            #  1=12hscs10.stm
------------------------------------------------------------------------
009:0002----------------------------------------------------------------
*#**********************************************************************
*#  Project Name: BRT WEST - Outlet 2                   JOB NUMBER: [6964]  *
*#  Date         : JUNE-25-2008                                            *
*#  Modeller     : [jrm]                                                   *
*#  Company      : McCormick Rankin Corporation                            *
*#  License #    : 4313781                                                 *
*#                                                                         *
*#                                                                         *
*#                FUTURE DRAINAGE CONDITIONS TO OUTLET 2                   *
*#        25 mm 4 hour - Chicago and 12 hour SCS 2 to 100 Year Storms      *
*#                                                                         *
*#**********************************************************************
*#**********************************************************************
*
*
------------------------------------------------------------------------
009:0002----------------------------------------------------------------
*
--------------------
| READ STORM         |    Filename: K:\Projects\6900-6~1\6964-M~1\21-HYD~1\1
| Ptotal=  72.70 mm|      Comments: 10 Yr-12hr SCS
--------------------
                  TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
                   hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
                   .17   2.181 |   3.17   2.908 |   6.17  15.849 |   9.17   2.181
                   .33   2.181 |   3.33   2.908 |   6.33  15.849 |   9.33   2.181
                   .50   2.181 |   3.50   2.908 |   6.50  15.849 |   9.50   2.181
                   .67   1.018 |   3.67   2.908 |   6.67   6.979 |   9.67   1.745
                   .83   1.018 |   3.83   2.908 |   6.83   6.979 |   9.83   1.745
                  1.00   1.018 |   4.00   2.908 |   7.00   6.979 |  10.00   1.745
                  1.17   1.890 |   4.17   3.926 |   7.17   4.653 |  10.17   2.472
```

```
                      1.33   1.890 |   4.33   3.926 |   7.33   4.653 |  10.33   2.472
                      1.50   1.890 |   4.50   3.926 |   7.50   4.653 |  10.50   2.472
                      1.67   1.890 |   4.67   4.944 |   7.67   4.071 |  10.67   1.599
                      1.83   1.890 |   4.83   4.944 |   7.83   4.071 |  10.83   1.599
                      2.00   1.890 |   5.00   4.944 |   8.00   4.071 |  11.00   1.599
                      2.17   2.472 |   5.17   7.852 |   8.17   3.199 |  11.17   1.454
                      2.33   2.472 |   5.33   7.852 |   8.33   3.199 |  11.33   1.454
                      2.50   2.472 |   5.50   7.852 |   8.50   3.199 |  11.50   1.454
                      2.67   2.181 |   5.67  62.231 |   8.67   3.344 |  11.67   1.454
                      2.83   2.181 |   5.83  62.231 |   8.83   3.344 |  11.83   1.454
                      3.00   2.181 |   6.00  62.231 |   9.00   3.344 |  12.00   1.454

--------------------------------------------------------------------------------
009:0003------------------------------------------------------------------------
*
*                     ** FUTURE CONTROLLED PEAK FLOWS **
*
---------------------
| CALIB NASHYD        |   Area     (ha)=    5.20   Curve Number    (CN)=79.00
| 01:2.1     DT= 2.00 |   Ia       (mm)=   6.700   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=      .500

    Unit Hyd Qpeak  (cms)=      .397

    PEAK FLOW        (cms)=      .244 (i)
    TIME TO PEAK     (hrs)=     6.433
    RUNOFF VOLUME     (mm)=    32.625
    TOTAL RAINFALL    (mm)=    72.700
    RUNOFF COEFFICIENT   =      .449

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

--------------------------------------------------------------------------------
009:0004------------------------------------------------------------------------
--------------------
| COMPUTE VOLUME     |
| ID:01  (2.1    )   |               DISCHARGE      TIME
--------------------                   (cms)        (hrs)
          START CONTROLLING AT          .000        3.300
          INFLOW HYD. PEAKS AT          .244        6.433
          STOP  CONTROLLING AT          .000         .000

          REQUIRED STORAGE VOLUME (ha.m.)=       .1697
          TOTAL HYDROGRAPH VOLUME (ha.m.)=       .1697
          % OF HYDROGRAPH TO STORE         =   99.9996

          NOTE:  Storage was computed to reduce the Inflow

--------------------------------------------------------------------------------
009:0005------------------------------------------------------------------------
*
* Attenuation storage in ditch for Catchment 2.1 to offset peak flows
--------------------
| ROUTE RESERVOIR    |     Requested routing time step =  2.0 min.
|  IN>01:(2.1    )   |
| OUT<05:(700    )   |     =========  OUTLFOW STORAGE TABLE  =========
--------------------       OUTFLOW     STORAGE   |   OUTFLOW     STORAGE
                            (cms)      (ha.m.)   |    (cms)      (ha.m.)
                             .000   .0000E+00    |     .400   .6000E-01

    ROUTING RESULTS                AREA      QPEAK      TPEAK        R.V.
    --------------------           (ha)      (cms)      (hrs)        (mm)
    INFLOW >01: (2.1    )          5.20       .244      6.433      32.625
    OUTFLOW<05: (700    )          5.20       .198      6.833      32.625

                 PEAK   FLOW   REDUCTION [Qout/Qin](%)=   81.174
                 TIME SHIFT OF PEAK FLOW        (min)=    24.00
                 MAXIMUM  STORAGE   USED       (ha.m.)=.2967E-01

--------------------------------------------------------------------------------
009:0006------------------------------------------------------------------------
*
*
---------------------
| CALIB STANDHYD      |   Area     (ha)=      .55
| 02:2.11   DT= 2.00  |   Total Imp(%)=   99.00   Dir. Conn.(%)=   99.00
---------------------
                              IMPERVIOUS    PERVIOUS (i)
    Surface Area      (ha)=        .54          .01
    Dep. Storage      (mm)=       2.00         5.00
    Average Slope      (%)=       1.00         2.00
    Length             (m)=     390.00         5.00
    Mannings n            =       .015         .350

    Max.eff.Inten.(mm/hr)=       62.23        61.98
               over (min)         8.00        10.00
    Storage Coeff.  (min)=        7.61 (ii)   10.62 (ii)
    Unit Hyd. Tpeak (min)=        8.00        10.00
    Unit Hyd. peak  (cms)=         .15          .11
                                                           *TOTALS*
    PEAK FLOW        (cms)=        .09          .00          .092 (iii)
    TIME TO PEAK     (hrs)=       6.00         6.00         6.000
    RUNOFF VOLUME     (mm)=      70.70        65.23        70.646
    TOTAL RAINFALL    (mm)=      72.70        72.70        72.700
    RUNOFF COEFFICIENT    =        .97          .90          .972

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN* =  99.0     Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
009:0007------------------------------------------------------------------------
---------------------
| COMPUTE DUALHYD     |   Average inlet capacities    [CINLET] =     .092  (cms)
| TotalHyd 02:2.11    |   Number of inlets in system [NINLET] =        1
---------------------     Total minor system capacity            =     .092  (cms)
                          Total major system storage [TMJSTO] =        0.(cu.m.)

                 ID: NHYD          AREA      QPEAK      TPEAK      R.V.       DWF
                                   (ha)      (cms)      (hrs)      (mm)      (cms)
    TOTAL HYD.   02:2.11            .55       .092      6.000    70.646      .000
    =============================================================================
    MAJOR SYST   03:2.111           .00       .000      6.000    70.646      .000
    MINOR SYST   04:2.112           .55       .092      6.000    70.646      .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
009:0008------------------------------------------------------------------------
--------------------
| COMPUTE VOLUME     |
| ID:04  (2.112 )    |               DISCHARGE      TIME
--------------------                   (cms)        (hrs)
          START CONTROLLING AT          .000        1.200
          INFLOW HYD. PEAKS AT          .092        6.000
          STOP  CONTROLLING AT          .000       13.233

          REQUIRED STORAGE VOLUME (ha.m.)=       .0389
          TOTAL HYDROGRAPH VOLUME (ha.m.)=       .0389
          % OF HYDROGRAPH TO STORE         =   99.9996

          NOTE:  Storage was computed to reduce the Inflow

--------------------------------------------------------------------------------
009:0009------------------------------------------------------------------------
*
*
*-------------------------------------------------------------------------------
*                     "FC8" IS THE FLOW AT NEW CULVERT FC8
*-------------------------------------------------------------------------------
*
*
--------------------
| ADD HYD (FC8    ) | ID: NHYD       AREA      QPEAK    TPEAK   R.V.      DWF
--------------------                 (ha)      (cms)    (hrs)   (mm)     (cms)
                    ID1 05:700       5.20       .198     6.83  32.62      .000
                   +ID2 04:2.112      .55       .092     6.00  70.65      .000
                    =======================================================
                    SUM 10:FC8       5.75       .211     6.77  36.26      .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
009:0010------------------------------------------------------------------------
*
*
********************************************************************************
*
---------------------
| CALIB NASHYD        |   Area     (ha)=    2.70   Curve Number    (CN)=82.00
| 01:2.12    DT= 2.00 |   Ia       (mm)=   6.000   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=      .500

    Unit Hyd Qpeak  (cms)=      .206

    PEAK FLOW        (cms)=      .143 (i)
    TIME TO PEAK     (hrs)=     6.400
    RUNOFF VOLUME     (mm)=    36.331
    TOTAL RAINFALL    (mm)=    72.700
    RUNOFF COEFFICIENT   =      .500

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

--------------------------------------------------------------------------------
009:0011------------------------------------------------------------------------
*
*-------------------------------------------------------------------------------
*            "CB1" IS THE FLOW AT THE EXISTING CB TO THE THE EXISTING
*                       TWIN 2400mm DIAM. STORM SEWER
*-------------------------------------------------------------------------------
*
--------------------
| ADD HYD (CB1    ) | ID: NHYD       AREA      QPEAK    TPEAK   R.V.      DWF
--------------------                 (ha)      (cms)    (hrs)   (mm)     (cms)
                    ID1 01:2.12      2.70       .143     6.40  36.33      .000
                   +ID2 10:FC8       5.75       .211     6.77  36.26      .000
                    =======================================================
                    SUM 09:CB1       8.45       .343     6.57  36.28      .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
009:0012------------------------------------------------------------------------
*
*
********************************************************************************
********************************************************************************
*
*
---------------------
| CALIB STANDHYD      |   Area     (ha)=      .72
| 01:2.13   DT= 2.00  |   Total Imp(%)=   99.00   Dir. Conn.(%)=   99.00
---------------------
                              IMPERVIOUS    PERVIOUS (i)
    Surface Area      (ha)=        .71          .01
    Dep. Storage      (mm)=       2.00         5.00
    Average Slope      (%)=       1.00         2.00
    Length             (m)=     550.00         5.00
    Mannings n            =       .015         .350

    Max.eff.Inten.(mm/hr)=       62.23        35.60
               over (min)        10.00        14.00
    Storage Coeff.  (min)=        9.36 (ii)   13.11 (ii)
    Unit Hyd. Tpeak (min)=       10.00        14.00
    Unit Hyd. peak  (cms)=         .12          .08
                                                           *TOTALS*
    PEAK FLOW        (cms)=        .12          .00          .116 (iii)
    TIME TO PEAK     (hrs)=       6.00         6.10         6.000
    RUNOFF VOLUME     (mm)=      70.70        33.90        70.332
    TOTAL RAINFALL    (mm)=      72.70        72.70        72.700
    RUNOFF COEFFICIENT    =        .97          .47          .967

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN* =  79.0     Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
009:0013------------------------------------------------------------------------
*
--------------------
| ADD HYD (800    ) | ID: NHYD       AREA      QPEAK    TPEAK   R.V.      DWF
--------------------                 (ha)      (cms)    (hrs)   (mm)     (cms)
                    ID1 01:2.13       .72       .116     6.00  70.33      .000
                   +ID2 03:2.111      .00       .000     6.00  70.65      .000
                    =======================================================
                    SUM 10:800        .72       .117     6.00  70.33      .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
009:0014------------------------------------------------------------------------
*
* Pipe and/or ditch storage Catchment 2.13
--------------------
| ROUTE RESERVOIR    |     Requested routing time step =  2.0 min.
|  IN>10:(800    )   |
| OUT<01:(710    )   |     =========  OUTLFOW STORAGE TABLE  =========
--------------------       OUTFLOW     STORAGE   |   OUTFLOW     STORAGE
                            (cms)      (ha.m.)   |    (cms)      (ha.m.)
                             .000   .0000E+00    |     .150   .3000E-01
                             .050   .2000E-01    |     .000   .0000E+00

    ROUTING RESULTS                AREA      QPEAK      TPEAK        R.V.
    --------------------           (ha)      (cms)      (hrs)        (mm)
    INFLOW >10: (800    )           .72       .117      6.000      70.332
    OUTFLOW<01: (710    )           .72       .047      6.367      70.332

                 PEAK   FLOW   REDUCTION [Qout/Qin](%)=   40.334
                 TIME SHIFT OF PEAK FLOW        (min)=    22.00
                 MAXIMUM  STORAGE   USED       (ha.m.)=.1883E-01

--------------------------------------------------------------------------------
009:0015------------------------------------------------------------------------
*
*
--------------------
```



```
| CALIB NASHYD        |   Area     (ha)=    3.40   Curve Number    (CN)=79.00
| 02:2.2     DT= 2.00 |   Ia       (mm)=   6.800   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=      .200

    Unit Hyd Qpeak  (cms)=      .649

    PEAK FLOW        (cms)=      .265 (i)
    TIME TO PEAK     (hrs)=     6.067
    RUNOFF VOLUME     (mm)=    32.550
    TOTAL RAINFALL    (mm)=    72.700
    RUNOFF COEFFICIENT   =      .448

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

--------------------------------------------------------------------------------
009:0016------------------------------------------------------------------------
*
--------------------
| ADD HYD (810    ) | ID: NHYD       AREA      QPEAK    TPEAK   R.V.      DWF
--------------------                 (ha)      (cms)    (hrs)   (mm)     (cms)
                    ID1 01:710        .72       .047     6.37  70.33      .000
                   +ID2 02:2.2       3.40       .265     6.07  32.55      .000
                    =======================================================
                    SUM 10:810       4.12       .305     6.07  39.15      .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
009:0017------------------------------------------------------------------------
*
*-------------------------------------------------------------------------------
*           "Out2" IS THE TOTAL FLOW TO OUTLET #2
*-------------------------------------------------------------------------------
*
--------------------
| ADD HYD (OUT2   ) | ID: NHYD       AREA      QPEAK    TPEAK   R.V.      DWF
--------------------                 (ha)      (cms)    (hrs)   (mm)     (cms)
                    ID1 09:CB1       8.45       .343     6.57  36.28      .000
                   +ID2 10:OUT2      4.12       .305     6.07  39.15      .000
                    =======================================================
                    SUM 10:OUT2     12.57       .562     6.10  37.22      .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
009:0018------------------------------------------------------------------------
--------------------------------------------------------------------------------
009:0002------------------------------------------------------------------------
*
--------------------------------------------------------------------------------
009:0002------------------------------------------------------------------------
*
  ** END OF RUN :   9

********************************************************************************





--------------------
| START              |   Project  dir.: K:\Projects\6900-6-1\6964-M-1\21-HYD-1\
--------------------     Rainfall dir.: K:\Projects\6900-6-1\6964-M-1\21-HYD-1\
   TZERO =    .00 hrs on        0
   METOUT=   2 (output = METRIC)
   NRUN  = 010
   NSTORM=   1
         #  1=12hscs50.stm
--------------------------------------------------------------------------------
010:0002------------------------------------------------------------------------
*#******************************************************************************
*#  Project Name: BRT WEST - Outlet 2                        JOB NUMBER: [6964]  *
*#  Date          : JUNE-25-2008                                                 *
*#  Modeller      : [jrm]                                                        *
*#  Company       : McCormick Rankin Corporation                                 *
*#  License #     : 4313781                                                      *
*#                                                                               *
*#                                                                               *
*#                  FUTURE DRAINAGE CONDITIONS TO OUTLET 2                       *
*#       25 mm 4 hour - Chicago and 12 hour SCS 2 to 100 Year Storms             *
*#                                                                               *
*#******************************************************************************
*#******************************************************************************
*
*
--------------------------------------------------------------------------------
010:0002------------------------------------------------------------------------
*
--------------------
| READ STORM         |    Filename: K:\Projects\6900-6-1\6964-M-1\21-HYD-1\1
| Ptotal=  97.90 mm|      Comments: 50 Yr-12hr SCS
--------------------
                TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
                 hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
                 .17   2.937 |   3.17   3.916 |   6.17  21.342 |   9.17   2.937
                 .33   2.937 |   3.33   3.916 |   6.33  21.342 |   9.33   2.937
                 .50   2.937 |   3.50   3.916 |   6.50  21.342 |   9.50   2.937
                 .67   1.371 |   3.67   3.916 |   6.67   9.398 |   9.67   2.350
                 .83   1.371 |   3.83   3.916 |   6.83   9.398 |   9.83   2.350
                1.00   1.371 |   4.00   3.916 |   7.00   9.398 |  10.00   2.350
                1.17   2.545 |   4.17   5.287 |   7.17   6.266 |  10.17   3.329
                1.33   2.545 |   4.33   5.287 |   7.33   6.266 |  10.33   3.329
                1.50   2.545 |   4.50   5.287 |   7.50   6.266 |  10.50   3.329
                1.67   2.545 |   4.67   6.657 |   7.67   5.482 |  10.67   2.154
                1.83   2.545 |   4.83   6.657 |   7.83   5.482 |  10.83   2.154
                2.00   2.545 |   5.00   6.657 |   8.00   5.482 |  11.00   2.154
                2.17   3.329 |   5.17  10.573 |   8.17   4.308 |  11.17   1.958
                2.33   3.329 |   5.33  10.573 |   8.33   4.308 |  11.33   1.958
                2.50   3.329 |   5.50  10.573 |   8.50   4.308 |  11.50   1.958
                2.67   2.937 |   5.67  83.802 |   8.67   4.503 |  11.67   1.958
                2.83   2.937 |   5.83  83.802 |   8.83   4.503 |  11.83   1.958
                3.00   2.937 |   6.00  83.802 |   9.00   4.503 |  12.00   1.958

--------------------------------------------------------------------------------
010:0003------------------------------------------------------------------------
*
*                     ** FUTURE CONTROLLED PEAK FLOWS **
*
---------------------
| CALIB NASHYD        |   Area     (ha)=    5.20   Curve Number    (CN)=79.00
| 01:2.1     DT= 2.00 |   Ia       (mm)=   6.700   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=      .500

    Unit Hyd Qpeak  (cms)=      .397

    PEAK FLOW        (cms)=      .398 (i)
    TIME TO PEAK     (hrs)=     6.400
    RUNOFF VOLUME     (mm)=    52.403
    TOTAL RAINFALL    (mm)=    97.900
    RUNOFF COEFFICIENT   =      .535

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

--------------------------------------------------------------------------------
010:0004------------------------------------------------------------------------
--------------------
| COMPUTE VOLUME     |
| ID:01  (2.1    )   |               DISCHARGE      TIME
--------------------                   (cms)        (hrs)
          START CONTROLLING AT          .000        2.600
          INFLOW HYD. PEAKS AT          .398        6.400
          STOP  CONTROLLING AT          .000         .000

          REQUIRED STORAGE VOLUME (ha.m.)=       .2725
          TOTAL HYDROGRAPH VOLUME (ha.m.)=       .2725
          % OF HYDROGRAPH TO STORE         =   99.9996

          NOTE:  Storage was computed to reduce the Inflow

--------------------------------------------------------------------------------
010:0005------------------------------------------------------------------------
*
* Attenuation storage in ditch for Catchment 2.1 to offset peak flows
--------------------
| ROUTE RESERVOIR    |     Requested routing time step =  2.0 min.
|  IN>01:(2.1    )   |
| OUT<05:(700    )   |     =========  OUTLFOW STORAGE TABLE  =========
--------------------       OUTFLOW     STORAGE   |   OUTFLOW     STORAGE
                            (cms)      (ha.m.)   |    (cms)      (ha.m.)
                             .000   .0000E+00    |     .400   .6000E-01

    ROUTING RESULTS                AREA      QPEAK      TPEAK        R.V.
    --------------------           (ha)      (cms)      (hrs)        (mm)
    INFLOW >01: (2.1    )          5.20       .398      6.400      52.403
    OUTFLOW<05: (700    )          5.20       .322      6.800      52.403

                 PEAK   FLOW   REDUCTION [Qout/Qin](%)=   80.959
                 TIME SHIFT OF PEAK FLOW        (min)=    24.00
                 MAXIMUM  STORAGE   USED       (ha.m.)=.4838E-01

--------------------------------------------------------------------------------
010:0006------------------------------------------------------------------------
*
*
---------------------
| CALIB STANDHYD      |   Area     (ha)=      .55
| 02:2.11   DT= 2.00  |   Total Imp(%)=   99.00   Dir. Conn.(%)=   99.00
---------------------
                              IMPERVIOUS    PERVIOUS (i)
    Surface Area      (ha)=        .54          .01
    Dep. Storage      (mm)=       2.00         5.00
    Average Slope      (%)=       1.00         2.00
    Length             (m)=     390.00         5.00
    Mannings n            =       .015         .350

    Max.eff.Inten.(mm/hr)=       83.80        83.62
               over (min)         6.00        10.00
    Storage Coeff.  (min)=        6.76 (ii)    9.42 (ii)
    Unit Hyd. Tpeak (min)=        6.00        10.00
    Unit Hyd. peak  (cms)=         .17          .12
                                                           *TOTALS*
    PEAK FLOW        (cms)=        .12          .00          .126 (iii)
    TIME TO PEAK     (hrs)=       6.00         6.00         6.000
    RUNOFF VOLUME     (mm)=      95.90        90.40        95.845
    TOTAL RAINFALL    (mm)=      97.90        97.90        97.900
    RUNOFF COEFFICIENT    =        .98          .92          .979

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN* =  99.0     Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
010:0007------------------------------------------------------------------------
---------------------
| COMPUTE DUALHYD     |   Average inlet capacities    [CINLET] =     .092  (cms)
| TotalHyd 02:2.11    |   Number of inlets in system [NINLET] =        1
---------------------     Total minor system capacity            =     .092  (cms)
                          Total major system storage [TMJSTO] =        0.(cu.m.)

                 ID: NHYD          AREA      QPEAK      TPEAK      R.V.       DWF
                                   (ha)      (cms)      (hrs)      (mm)      (cms)
    TOTAL HYD.   02:2.11            .55       .126      6.000    95.845      .000
    =============================================================================
    MAJOR SYST   03:2.111           .04       .034      6.000    95.845      .000
    MINOR SYST   04:2.112           .51       .092      5.700    95.845      .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
010:0008------------------------------------------------------------------------
--------------------
| COMPUTE VOLUME     |
| ID:04  (2.112 )    |               DISCHARGE      TIME
--------------------                   (cms)        (hrs)
          START CONTROLLING AT          .000         .867
          INFLOW HYD. PEAKS AT          .092        5.700
          STOP  CONTROLLING AT          .000       13.200

          REQUIRED STORAGE VOLUME (ha.m.)=       .0491
          TOTAL HYDROGRAPH VOLUME (ha.m.)=       .0491
          % OF HYDROGRAPH TO STORE         =   99.9997

          NOTE:  Storage was computed to reduce the Inflow

--------------------------------------------------------------------------------
010:0009------------------------------------------------------------------------
*
*
*-------------------------------------------------------------------------------
*                     "FC8" IS THE FLOW AT NEW CULVERT FC8
*-------------------------------------------------------------------------------
*
*
--------------------
| ADD HYD (FC8    ) | ID: NHYD       AREA      QPEAK    TPEAK   R.V.      DWF
--------------------                 (ha)      (cms)    (hrs)   (mm)     (cms)
                    ID1 05:700       5.20       .322     6.80  52.40      .000
                   +ID2 04:2.112      .51       .092     5.70  95.84      .000
                    =======================================================
                    SUM 10:FC8       5.71       .339     6.77  56.30      .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
010:0010------------------------------------------------------------------------
*
*
********************************************************************************
*
---------------------
| CALIB NASHYD        |   Area     (ha)=    2.70   Curve Number    (CN)=82.00
| 01:2.12    DT= 2.00 |   Ia       (mm)=   6.000   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=      .500

    Unit Hyd Qpeak  (cms)=      .206

    PEAK FLOW        (cms)=      .228 (i)
    TIME TO PEAK     (hrs)=     6.400
```

```
      RUNOFF VOLUME    (mm)=   57.198
      TOTAL RAINFALL   (mm)=   97.900
      RUNOFF COEFFICIENT   =     .584

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

 ----------------------------------------------------------------------
 010:0011--------------------------------------------------------------
 *
 *---------------------------------------------------------------------
 *          "CB1" IS THE FLOW AT THE EXISTING CB TO THE THE EXISTING
 *                    TWIN 2400mm DIAM. STORM SEWER
 *---------------------------------------------------------------------
 *
 --------------------
 | ADD HYD (CB1    ) | ID: NHYD      AREA      QPEAK   TPEAK   R.V.    DWF
 --------------------                (ha)      (cms)   (hrs)   (mm)   (cms)
                  ID1 01:2.12        2.70      .228     6.40  57.20    .000
                 +ID2 10:FC8         5.71      .339     6.77  56.30    .000
                  ====================================================
                  SUM 09:CB1         8.41      .548     6.57  56.59    .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ----------------------------------------------------------------------
 010:0012--------------------------------------------------------------
 *
 *
 **********************************************************************
 **********************************************************************
 *
 *
 ---------------------
 | CALIB STANDHYD      |    Area     (ha)=      .72
 | 01:2.13    DT= 2.00 |    Total Imp(%)=    99.00   Dir. Conn.(%)=   99.00
 ---------------------
                                IMPERVIOUS    PERVIOUS (i)
      Surface Area      (ha)=        .71          .01
      Dep. Storage      (mm)=       2.00         5.00
      Average Slope      (%)=       1.00         2.00
      Length             (m)=     550.00         5.00
      Mannings n            =       .015         .350

      Max.eff.Inten.(mm/hr)=       83.80        56.71
                 over (min)         8.00        12.00
      Storage Coeff.  (min)=        8.31 (ii)   11.42 (ii)
      Unit Hyd. Tpeak (min)=        8.00        12.00
      Unit Hyd. peak  (cms)=         .14          .10
                                                            *TOTALS*
      PEAK FLOW        (cms)=        .16          .00          .161 (iii)
      TIME TO PEAK     (hrs)=       6.00         6.07         6.000
      RUNOFF VOLUME     (mm)=      95.90        53.80        95.479
      TOTAL RAINFALL    (mm)=      97.90        97.90        97.900
      RUNOFF COEFFICIENT    =        .98          .55          .975

         (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN* =  79.0     Ia = Dep. Storage  (Above)
        (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
             THAN THE STORAGE COEFFICIENT.
       (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 ----------------------------------------------------------------------
 010:0013--------------------------------------------------------------
 *
 --------------------
 | ADD HYD (800    ) | ID: NHYD      AREA      QPEAK   TPEAK   R.V.    DWF
 --------------------                (ha)      (cms)   (hrs)   (mm)   (cms)
                  ID1 01:2.13         .72      .161     6.00  95.48    .000
                 +ID2 03:2.111        .04      .034     6.00  95.84    .000
                  ====================================================
                  SUM 10:800          .76      .195     6.00  95.50    .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ----------------------------------------------------------------------
 010:0014--------------------------------------------------------------
 *
 * Pipe and/or ditch storage Catchment 2.13
 ---------------------
 | ROUTE RESERVOIR     |      Requested routing time step =  2.0 min.
 |  IN>10:(800    )    |
 | OUT<01:(710    )    |      =========  OUTLFOW STORAGE TABLE  =========
 ---------------------        OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                               (cms)     (ha.m.)   |   (cms)     (ha.m.)
                                .000   .0000E+00   |    .150   .3000E-01
                                .050   .2000E-01   |    .000   .0000E+00

      ROUTING RESULTS              AREA      QPEAK      TPEAK        R.V.
      --------------------         (ha)      (cms)      (hrs)        (mm)
      INFLOW >10: (800    )         .76       .195      6.000      95.497
      OUTFLOW<01: (710    )         .76       .106      6.167      95.497

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=   54.412
                    TIME SHIFT OF PEAK FLOW          (min)=   10.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=.2564E-01

 ----------------------------------------------------------------------
 010:0015--------------------------------------------------------------
 *
 *
 ---------------------
 | CALIB NASHYD        |    Area     (ha)=     3.40   Curve Number   (CN)=79.00
 | 02:2.2     DT= 2.00 |    Ia       (mm)=    6.800   # of Linear Res.(N)= 3.00
 ---------------------      U.H. Tp(hrs)=      .200

      Unit Hyd Qpeak  (cms)=      .649

      PEAK FLOW       (cms)=      .431 (i)
      TIME TO PEAK    (hrs)=     6.067
      RUNOFF VOLUME    (mm)=    52.322
      TOTAL RAINFALL   (mm)=    97.900
      RUNOFF COEFFICIENT   =      .534

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

 ----------------------------------------------------------------------
 010:0016--------------------------------------------------------------
 *
 --------------------
 | ADD HYD (810    ) | ID: NHYD      AREA      QPEAK   TPEAK   R.V.    DWF
 --------------------                (ha)      (cms)   (hrs)   (mm)   (cms)
                  ID1 01:710          .76      .106     6.17  95.50    .000
                 +ID2 02:2.2         3.40      .431     6.07  52.32    .000
                  ====================================================
                  SUM 10:810         4.16      .529     6.07  60.19    .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ----------------------------------------------------------------------
 010:0017--------------------------------------------------------------
 *
 *---------------------------------------------------------------------
 *               "Out2" IS THE TOTAL FLOW TO OUTLET #2
 *---------------------------------------------------------------------
 *
 --------------------
 | ADD HYD (OUT2   ) | ID: NHYD      AREA      QPEAK   TPEAK   R.V.    DWF
 --------------------                (ha)      (cms)   (hrs)   (mm)   (cms)
                  ID1 09:CB1         8.41      .548     6.57  56.59    .000
                 +ID2 10:OUT2        4.16      .529     6.07  60.19    .000
                  ====================================================
                  SUM 10:OUT2       12.57      .926     6.10  57.78    .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ----------------------------------------------------------------------
 010:0018--------------------------------------------------------------
 ----------------------------------------------------------------------
 010:0002--------------------------------------------------------------
 *
 ----------------------------------------------------------------------
 010:0002--------------------------------------------------------------
 *
 ----------------------------------------------------------------------
 010:0002--------------------------------------------------------------
 *
   ** END OF RUN :  10

 **********************************************************************





 --------------------
 | START              |   Project  dir.: K:\Projects\6900-6-1\6964-M-1\21-HYD-1\
 --------------------     Rainfall dir.: K:\Projects\6900-6-1\6964-M-1\21-HYD-1\
     TZERO =    .00 hrs on        0
     METOUT=    2 (output = METRIC)
     NRUN  = 011
     NSTORM=    1
              #  1-12scsh.stm
 ----------------------------------------------------------------------
 011:0002--------------------------------------------------------------
 *#********************************************************************
 *#  Project Name: BRT WEST - Outlet 2                   JOB NUMBER: [6964]  *
 *#  Date          : JUNE-25-2008                                            *
 *#  Modeller      : [jrm]                                                   *
 *#  Company       : McCormick Rankin Corporation                            *
 *#  License #     : 4313781                                                 *
 *#                                                                        *
 *#                                                                        *
 *#                  FUTURE DRAINAGE CONDITIONS TO OUTLET 2                *
 *#        25 mm 4 hour - Chicago and 12 hour SCS 2 to 100 Year Storms     *
 *#                                                                        *
 *#********************************************************************
 *#********************************************************************
 *
 *
 ----------------------------------------------------------------------
 011:0002--------------------------------------------------------------
 *
 --------------------
 | READ STORM          |     Filename: K:\Projects\6900-6-1\6964-M-1\21-HYD-1\1
 | Ptotal= 108.60 mm|        Comments: 100 Yr-12hr SCS
 --------------------
                     TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
                      hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
                      .17   3.258 |   3.17   4.344 |   6.17  23.675 |   9.17   3.258
                      .33   3.258 |   3.33   4.344 |   6.33  23.675 |   9.33   3.258
                      .50   3.258 |   3.50   4.344 |   6.50  23.675 |   9.50   3.258
                      .67   1.520 |   3.67   4.344 |   6.67  10.426 |   9.67   2.606
                      .83   1.520 |   3.83   4.344 |   6.83  10.426 |   9.83   2.606
                     1.00   1.520 |   4.00   4.344 |   7.00  10.426 |  10.00   2.606
                     1.17   2.824 |   4.17   5.864 |   7.17   6.950 |  10.17   3.692
                     1.33   2.824 |   4.33   5.864 |   7.33   6.950 |  10.33   3.692
                     1.50   2.824 |   4.50   5.864 |   7.50   6.950 |  10.50   3.692
                     1.67   2.824 |   4.67   7.385 |   7.67   6.082 |  10.67   2.389
                     1.83   2.824 |   4.83   7.385 |   7.83   6.082 |  10.83   2.389
                     2.00   2.824 |   5.00   7.385 |   8.00   6.082 |  11.00   2.389
                     2.17   3.692 |   5.17  11.729 |   8.17   4.778 |  11.17   2.172
                     2.33   3.692 |   5.33  11.729 |   8.33   4.778 |  11.33   2.172
                     2.50   3.692 |   5.50  11.729 |   8.50   4.778 |  11.50   2.172
                     2.67   3.258 |   5.67  92.962 |   8.67   4.996 |  11.67   2.172
                     2.83   3.258 |   5.83  92.962 |   8.83   4.996 |  11.83   2.172
                     3.00   3.258 |   6.00  92.962 |   9.00   4.996 |  12.00   2.172

 ----------------------------------------------------------------------
 011:0003--------------------------------------------------------------
 *
 *                      ** FUTURE CONTROLLED PEAK FLOWS **
 *
 ---------------------
 | CALIB NASHYD        |    Area     (ha)=     5.20   Curve Number   (CN)=79.00
 | 01:2.1     DT= 2.00 |    Ia       (mm)=    6.700   # of Linear Res.(N)= 3.00
 ---------------------      U.H. Tp(hrs)=      .500

      Unit Hyd Qpeak  (cms)=      .397

      PEAK FLOW       (cms)=      .468 (i)
      TIME TO PEAK    (hrs)=     6.400
      RUNOFF VOLUME    (mm)=    61.289
      TOTAL RAINFALL   (mm)=   108.600
      RUNOFF COEFFICIENT   =      .564

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

 ----------------------------------------------------------------------
 011:0004--------------------------------------------------------------
 --------------------
 | COMPUTE VOLUME     |
 | ID:01  (2.1    )   |                DISCHARGE      TIME
 --------------------                    (cms)       (hrs)
               START CONTROLLING AT       .000       2.400
               INFLOW HYD. PEAKS AT       .468       6.400
               STOP  CONTROLLING AT       .000        .000

               REQUIRED STORAGE VOLUME (ha.m.)=     .3187
               TOTAL HYDROGRAPH VOLUME (ha.m.)=     .3187
               % OF HYDROGRAPH TO STORE       =   99.9997

               NOTE:  Storage was computed to reduce the Inflow

 ----------------------------------------------------------------------
 011:0005--------------------------------------------------------------
 *
 * Attenuation storage in ditch for Catchment 2.1 to offset peak flows
 ---------------------
 | ROUTE RESERVOIR     |      Requested routing time step =  2.0 min.
 |  IN>01:(2.1    )    |
 | OUT<05:(700    )    |      =========  OUTLFOW STORAGE TABLE  =========
 ---------------------        OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                               (cms)     (ha.m.)   |   (cms)     (ha.m.)
                                .000   .0000E+00   |    .400   .6000E-01

      ROUTING RESULTS              AREA      QPEAK      TPEAK        R.V.
      --------------------         (ha)      (cms)      (hrs)        (mm)
      INFLOW >01: (2.1    )        5.20       .468      6.400      61.289
      OUTFLOW<05: (700    )        5.20       .379      6.800      61.289

```



```
                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=   80.903
                    TIME SHIFT OF PEAK FLOW          (min)=   24.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=.5681E-01

 ----------------------------------------------------------------------
 011:0006--------------------------------------------------------------
 *
 *
 ---------------------
 | CALIB STANDHYD      |    Area     (ha)=      .55
 | 02:2.11    DT= 2.00 |    Total Imp(%)=    99.00   Dir. Conn.(%)=   99.00
 ---------------------
                                IMPERVIOUS    PERVIOUS (i)
      Surface Area      (ha)=        .54          .01
      Dep. Storage      (mm)=       2.00         5.00
      Average Slope      (%)=       1.00         2.00
      Length             (m)=     390.00         5.00
      Mannings n            =       .015         .350

      Max.eff.Inten.(mm/hr)=       92.96        92.80
                 over (min)         6.00        10.00
      Storage Coeff.  (min)=        6.49 (ii)    9.04 (ii)
      Unit Hyd. Tpeak (min)=        6.00        10.00
      Unit Hyd. peak  (cms)=         .18          .12
                                                            *TOTALS*
      PEAK FLOW        (cms)=        .14          .00          .140 (iii)
      TIME TO PEAK     (hrs)=       6.00         6.00         6.000
      RUNOFF VOLUME     (mm)=     106.60       101.10       106.545
      TOTAL RAINFALL    (mm)=     108.60       108.60       108.600
      RUNOFF COEFFICIENT    =        .98          .93          .981

         (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN* =  99.0     Ia = Dep. Storage  (Above)
        (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
             THAN THE STORAGE COEFFICIENT.
       (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 ----------------------------------------------------------------------
 011:0007--------------------------------------------------------------
 ---------------------
 | COMPUTE DUALHYD     |    Average inlet capacities   [CINLET] =     .092  (cms)
 | TotalHyd 02:2.11    |    Number of inlets in system [NINLET] =       1
 ---------------------      Total minor system capacity         =     .092  (cms)
                            Total major system storage [TMJSTO] =       0.(cu.m.)

                        ID: NHYD        AREA      QPEAK     TPEAK      R.V.     DWF
                                        (ha)      (cms)     (hrs)      (mm)    (cms)
      TOTAL HYD.       02:2.11           .55       .140     6.000   106.545    .000
      ============================================================================
      MAJOR SYST       03:2.111          .05       .048     6.000   106.545    .000
      MINOR SYST       04:2.112          .50       .092     5.667   106.545    .000

      NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ----------------------------------------------------------------------
 011:0008--------------------------------------------------------------
 --------------------
 | COMPUTE VOLUME     |
 | ID:04  (2.112 )    |                DISCHARGE      TIME
 --------------------                    (cms)       (hrs)
               START CONTROLLING AT       .000        .733
               INFLOW HYD. PEAKS AT       .092       5.667
               STOP  CONTROLLING AT       .000      13.167

               REQUIRED STORAGE VOLUME (ha.m.)=     .0528
               TOTAL HYDROGRAPH VOLUME (ha.m.)=     .0528
               % OF HYDROGRAPH TO STORE       =   99.9996

               NOTE:  Storage was computed to reduce the Inflow

 ----------------------------------------------------------------------
 011:0009--------------------------------------------------------------
 *
 *
 *---------------------------------------------------------------------
 *                    "FC8" IS THE FLOW AT NEW CULVERT FC8
 *---------------------------------------------------------------------
 *
 *
 --------------------
 | ADD HYD (FC8    ) | ID: NHYD      AREA      QPEAK   TPEAK   R.V.    DWF
 --------------------                (ha)      (cms)   (hrs)   (mm)   (cms)
                  ID1 05:700         5.20      .379     6.80  61.29    .000
                 +ID2 04:2.112        .50      .092     5.67 106.54    .000
                  ====================================================
                  SUM 10:FC8         5.70      .397     6.77  65.23    .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ----------------------------------------------------------------------
 011:0010--------------------------------------------------------------
 *
 *
 **********************************************************************
 *
 ---------------------
 | CALIB NASHYD        |    Area     (ha)=     2.70   Curve Number   (CN)=82.00
 | 01:2.12    DT= 2.00 |    Ia       (mm)=    6.000   # of Linear Res.(N)= 3.00
 ---------------------      U.H. Tp(hrs)=      .500

      Unit Hyd Qpeak  (cms)=      .206

      PEAK FLOW       (cms)=      .266 (i)
      TIME TO PEAK    (hrs)=     6.367
      RUNOFF VOLUME    (mm)=    66.475
      TOTAL RAINFALL   (mm)=   108.600
      RUNOFF COEFFICIENT   =      .612

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

 ----------------------------------------------------------------------
 011:0011--------------------------------------------------------------
 *
 *---------------------------------------------------------------------
 *          "CB1" IS THE FLOW AT THE EXISTING CB TO THE THE EXISTING
 *                    TWIN 2400mm DIAM. STORM SEWER
 *---------------------------------------------------------------------
 *
 --------------------
 | ADD HYD (CB1    ) | ID: NHYD      AREA      QPEAK   TPEAK   R.V.    DWF
 --------------------                (ha)      (cms)   (hrs)   (mm)   (cms)
                  ID1 01:2.12        2.70      .266     6.37  66.48    .000
                 +ID2 10:FC8         5.70      .397     6.77  65.23    .000
                  ====================================================
                  SUM 09:CB1         8.40      .640     6.57  65.63    .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ----------------------------------------------------------------------
 011:0012--------------------------------------------------------------
 *
 *
 **********************************************************************
 **********************************************************************
 *
 *
 ---------------------
 | CALIB STANDHYD      |    Area     (ha)=      .72
 | 01:2.13    DT= 2.00 |    Total Imp(%)=    99.00   Dir. Conn.(%)=   99.00
 ---------------------
                                IMPERVIOUS    PERVIOUS (i)
      Surface Area      (ha)=        .71          .01
      Dep. Storage      (mm)=       2.00         5.00
      Average Slope      (%)=       1.00         2.00
      Length             (m)=     550.00         5.00
      Mannings n            =       .015         .350

      Max.eff.Inten.(mm/hr)=       92.96        66.49
                 over (min)         8.00        10.00
      Storage Coeff.  (min)=        7.97 (ii)   10.89 (ii)
      Unit Hyd. Tpeak (min)=        8.00        10.00
      Unit Hyd. peak  (cms)=         .14          .11
                                                            *TOTALS*
      PEAK FLOW        (cms)=        .18          .00          .179 (iii)
      TIME TO PEAK     (hrs)=       6.00         6.03         6.000
      RUNOFF VOLUME     (mm)=     106.60        62.72       106.161
      TOTAL RAINFALL    (mm)=     108.60       108.60       108.600
      RUNOFF COEFFICIENT    =        .98          .58          .978

         (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN* =  79.0     Ia = Dep. Storage  (Above)
        (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
             THAN THE STORAGE COEFFICIENT.
       (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 ----------------------------------------------------------------------
 011:0013--------------------------------------------------------------
 *
 --------------------
 | ADD HYD (800    ) | ID: NHYD      AREA      QPEAK   TPEAK   R.V.    DWF
 --------------------                (ha)      (cms)   (hrs)   (mm)   (cms)
                  ID1 01:2.13         .72      .179     6.00 106.16    .000
                 +ID2 03:2.111        .05      .048     6.00 106.55    .000
                  ====================================================
                  SUM 10:800          .77      .227     6.00 106.19    .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ----------------------------------------------------------------------
 011:0014--------------------------------------------------------------
 *
 * Pipe and/or ditch storage Catchment 2.13
 ---------------------
 | ROUTE RESERVOIR     |      Requested routing time step =  2.0 min.
 |  IN>10:(800    )    |
 | OUT<01:(710    )    |      =========  OUTLFOW STORAGE TABLE  =========
 ---------------------        OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                               (cms)     (ha.m.)   |   (cms)     (ha.m.)
                                .000   .0000E+00   |    .150   .3000E-01
                                .050   .2000E-01   |    .000   .0000E+00

      ROUTING RESULTS              AREA      QPEAK      TPEAK        R.V.
      --------------------         (ha)      (cms)      (hrs)        (mm)
      INFLOW >10: (800    )         .77       .227      6.000     106.188
      OUTFLOW<01: (710    )         .77       .135      6.133     106.188

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=   59.369
                    TIME SHIFT OF PEAK FLOW          (min)=    8.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=.2856E-01

 ----------------------------------------------------------------------
 011:0015--------------------------------------------------------------
 *
 *
 ---------------------
 | CALIB NASHYD        |    Area     (ha)=     3.40   Curve Number   (CN)=79.00
 | 02:2.2     DT= 2.00 |    Ia       (mm)=    6.800   # of Linear Res.(N)= 3.00
 ---------------------      U.H. Tp(hrs)=      .200

      Unit Hyd Qpeak  (cms)=      .649

      PEAK FLOW       (cms)=      .505 (i)
      TIME TO PEAK    (hrs)=     6.067
      RUNOFF VOLUME    (mm)=    61.205
      TOTAL RAINFALL   (mm)=   108.600
      RUNOFF COEFFICIENT   =      .564

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

 ----------------------------------------------------------------------
 011:0016--------------------------------------------------------------
 *
 --------------------
 | ADD HYD (810    ) | ID: NHYD      AREA      QPEAK   TPEAK   R.V.    DWF
 --------------------                (ha)      (cms)   (hrs)   (mm)   (cms)
                  ID1 01:710          .77      .135     6.13 106.19    .000
                 +ID2 02:2.2         3.40      .505     6.07  61.21    .000
                  ====================================================
                  SUM 10:810         4.17      .635     6.07  69.55    .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ----------------------------------------------------------------------
 011:0017--------------------------------------------------------------
 *
 *---------------------------------------------------------------------
 *               "Out2" IS THE TOTAL FLOW TO OUTLET #2
 *---------------------------------------------------------------------
 *
 --------------------
 | ADD HYD (OUT2   ) | ID: NHYD      AREA      QPEAK   TPEAK   R.V.    DWF
 --------------------                (ha)      (cms)   (hrs)   (mm)   (cms)
                  ID1 09:CB1         8.40      .640     6.57  65.63    .000
                 +ID2 10:OUT2        4.17      .635     6.07  69.55    .000
                  ====================================================
                  SUM 10:OUT2       12.57     1.090     6.10  66.93    .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ----------------------------------------------------------------------
 011:0018--------------------------------------------------------------
 ----------------------------------------------------------------------
 011:0002--------------------------------------------------------------
 *
 ----------------------------------------------------------------------
 011:0002--------------------------------------------------------------
 *
 ----------------------------------------------------------------------
 011:0002--------------------------------------------------------------
 *
 ----------------------------------------------------------------------
 011:0002--------------------------------------------------------------
 *
       FINISH
 ----------------------------------------------------------------------
 **********************************************************************
      WARNINGS / ERRORS / NOTES
      -------------------------
    Simulation ended on 2008-07-03     at 10:49:30
 ======================================================================
```

```
2     Metric units
*#*************************************************************************
*#  Project Name: BRT WEST - Outlet 3                    JOB NUMBER: [6964]  *
*#  Date          : JUNE-25-2008                                             *
*#  Modeller      : [jrm]                                                    *
*#  Company       : McCormick Rankin Corporation                             *
*#  License #     : 4313781                                                  *
*#                                                                           *
*#                                                                           *
*#                  FUTURE DRAINAGE CONDITIONS TO OUTLET 3                   *
*#        25 mm 4 hour - Chicago and 12 hour SCS 2 to 100 Year Storms        *
*#                                                                           *
*#*************************************************************************
*#*************************************************************************
*
*
START                TIME= 0   METOUT= 0  NSTORM=1  NRUN="001"
                     CHIC25mm.stm
*
READ STORM           STORM_FILENAME="STORM.001"
*
CALIB NASHYD         ID=[1], NHYD=["3.1"], DT=[2]min, AREA=[3.30](ha),
                     DWF=[0.00](cms),  CN/C=[79], IA=[6.80](mm),
                     N=[3], TP=[0.50]hrs,
                     END=-1
*
CALIB STANDHYD       ID=[2], NHYD=["3.11"], DT=[2](min), AREA=[3.90](ha),
                     XIMP=[0.99], TIMP=[0.99], DWF=[0](cms), LOSS=[2],
                     SCS curve number CN=[79],
                     Pervious   surfaces: IAper=[5.0](mm), SLPP=[2.0](%),
                                          LGP=[5](m), MNP=[0.35], SCP=[0](min),
                     Impervious surfaces: IAimp=[2](mm), SLPI=[1.0](%),
                                          LGI=[40](m), MNI=[0.015], SCI=[0](min),
                     END=-1
*#---------------------------------------------------------------------------
* Proposed pond storage for Erin Mills parking area
* PROVIDES ENHANCED WATER QUALITY CONTROL & QUANTITY CONTROL
*#-----------------------------------------------------------------------
ROUTE RESERVOIR      IDout=[3],   NHYD=["700"],  IDin=[2],
                     RDT=[2](min),
                           TABLE of ( OUTFLOW-STORAGE ) values
                                        (cms) - (ha-m)
                                      [   0.0 ,  0.0 ]
                                      [  0.003, 0.018]
                                      [  0.006, 0.0569]
                                      [  0.007, 0.0778]
                                      [  0.047, 0.0998]
                                      [  0.090, 0.1469]
                                      [  0.130, 0.2259]
                                      [  0.141, 0.2544]
                                      [  0.160, 0.3151]
                                      [   -1  ,  -1  ]  (max twenty pts)
                           IDovf=[], NHYDovf=[""]
*
ADD HYD              IDsum=[10], NHYD=["800"],
                     IDs to add=1,3
*
CALIB STANDHYD       ID=[4], NHYD=["3.2"], DT=[2](min), AREA=[4.4](ha),
                     XIMP=[0.20], TIMP=[0.20], DWF=[0](cms), LOSS=[2],
                     SCS curve number CN=[79],
                     Pervious   surfaces: IAper=[5.0](mm), SLPP=[2.0](%),
                                          LGP=[5](m), MNP=[0.35], SCP=[0](min),
                     Impervious surfaces: IAimp=[2](mm), SLPI=[1.0](%),
                                          LGI=[1000](m), MNI=[0.015], SCI=[0](min
                     END=-1
*
ADD HYD              IDsum=[9], NHYD=["OUT3"],
                     IDs to add=10,4
START                TIME= 0   METOUT= 0  NSTORM=1  NRUN=008
                     12hrscs2.stm
*
START                TIME= 0   METOUT= 0  NSTORM=1  NRUN=009
                     12hscs10.stm
*
START                TIME= 0   METOUT= 0  NSTORM=1  NRUN=010
                     12hscs50.stm
*
START                TIME= 0   METOUT= 0  NSTORM=1  NRUN=011
                     12scsh.stm
*
FINISH
```



```
=============================================================================
 SSSSS  W   W  M   M  H   H  Y   Y  M   M   OOO       999   999  ---------
 S      W W W  MM MM  H   H   Y Y   MM MM  O   O    9   9 9   9
 SSSSS  W W W  M M M  HHHHH    Y    M M M  O   O ## 9   9 9   9 Ver. 4.02
     S   W W   M   M  H   H    Y    M   M  O   O     9999  9999 July 1999
 SSSSS   W W   M   M  H   H    Y    M   M   OOO         9     9 =========
                                                    9   9 9   9 # 4313781
      StormWater Management HYdrologic Model         999   999  =========

 **************************************************************************
 ************************* SWMHYMO-99 Ver/4.02 ****************************
 *******  A single event and continuous hydrologic simulation model *******
 *******     based on the principles of HYMO and its successors     *******
 *******                  OTTHYMO-83 and OTTHYMO-89.                *******
 **************************************************************************
 ******* Distributed by:  J.F. Sabourin and Associates Inc.         *******
 *******                  Ottawa,  Ontario: (613) 727-5199          *******
 *******                  Gatineau, Quebec: (819) 243-6858          *******
 *******                  E-Mail: swmhymo@jfsa.Com                  *******
 **************************************************************************

 ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
 +++++++ Licensed user: McCormick Rankin Corporation                +++++++
 +++++++                Kitchener             SERIAL#:4313781       +++++++
 ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

 **************************************************************************
 *******             ++++++ PROGRAM ARRAY DIMENSIONS ++++++         *******
 *******             Maximum value for ID numbers  :     10         *******
 *******             Max. number of rainfall points:  15000         *******
 *******             Max. number of flow points    :  15000         *******
 **************************************************************************


 ********************  D E T A I L E D   O U T P U T  *******************
 **************************************************************************
 *     DATE: 2008-07-03     TIME: 11:33:15     RUN COUNTER: 000219        *
 **************************************************************************
 * Input   filename: K:\Projects\6900-6-1\6964-M-1\21-HYD-1\PDWest3.dat   *
 * Output  filename: K:\Projects\6900-6-1\6964-M-1\21-HYD-1\PDWest3.out   *
 * Summary filename: K:\Projects\6900-6-1\6964-M-1\21-HYD-1\PDWest3.sum   *
 * User comments:                                                         *
 * 1:_____________________________________________________________________*
 * 2:_____________________________________________________________________*
 * 3:_____________________________________________________________________*
 **************************************************************************

-----------------------------------------------------------------------------
001:0001---------------------------------------------------------------------
*#***************************************************************************
*#  Project Name: BRT WEST - Outlet 3                    JOB NUMBER: [6964]  *
*#  Date          : JUNE-25-2008                                             *
*#  Modeller      : [jrm]                                                    *
*#  Company       : McCormick Rankin Corporation                             *
*#  License #     : 4313781                                                  *
*#                                                                           *
*#                                                                           *
*#                  FUTURE DRAINAGE CONDITIONS TO OUTLET 3                   *
*#        25 mm 4 hour - Chicago and 12 hour SCS 2 to 100 Year Storms        *
*#                                                                           *
*#***************************************************************************
*#***************************************************************************
*
*
--------------------
| START             |  Project  dir.: K:\Projects\6900-6-1\6964-M-1\21-HYD-1\
--------------------   Rainfall dir.: K:\Projects\6900-6-1\6964-M-1\21-HYD-1\
    TZERO =   .00 hrs on       0
    METOUT=   2 (output = METRIC)
    NRUN  = 001
    NSTORM=   1
           #  1=CHIC25mm.stm
-----------------------------------------------------------------------------
001:0002---------------------------------------------------------------------
*
--------------------
| READ STORM        |    Filename: K:\Projects\6900-6-1\6964-M-1\21-HYD-1\C
| Ptotal=  25.00 mm|    Comments: 25mm, 4hr Chicago Storm
--------------------
                 TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
                  .17   1.423 |  1.17   3.859 |  2.17   5.294 |  3.17   1.977
                  .33   1.574 |  1.33   5.821 |  2.33   4.057 |  3.33   1.805
                  .50   1.769 |  1.50  13.337 |  2.50   3.314 |  3.50   1.664
                  .67   2.028 |  1.67  61.503 |  2.67   2.817 |  3.67   1.545
                  .83   2.389 |  1.83  15.650 |  2.83   2.459 |  3.83   1.444
                 1.00   2.933 |  2.00   7.793 |  3.00   2.189 |  4.00   1.356

-----------------------------------------------------------------------------
001:0003---------------------------------------------------------------------
*
---------------------
| CALIB NASHYD       |   Area     (ha)=    3.30   Curve Number   (CN)=79.00
| 01:3.1    DT= 2.00 |   Ia       (mm)=   6.800   # of Linear Res.(N)= 3.00
---------------------    U.H. Tp(hrs)=    .500

    Unit Hyd Qpeak  (cms)=     .252

    PEAK FLOW       (cms)=     .022 (i)
    TIME TO PEAK    (hrs)=    2.333
    RUNOFF VOLUME    (mm)=    3.864
    TOTAL RAINFALL   (mm)=   25.000
    RUNOFF COEFFICIENT   =     .155

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

-----------------------------------------------------------------------------
001:0004---------------------------------------------------------------------
*
---------------------
| CALIB STANDHYD     |   Area    (ha)=    3.90
| 02:3.11   DT= 2.00 |   Total Imp(%)=   99.00   Dir. Conn.(%)=   99.00
---------------------
                                 IMPERVIOUS    PERVIOUS (i)
    Surface Area      (ha)=         3.86           .04
    Dep. Storage      (mm)=         2.00          5.00
    Average Slope      (%)=         1.00          2.00
    Length             (m)=        40.00          5.00
    Mannings n           =          .015          .350

    Max.eff.Inten.(mm/hr)=         61.50         10.87
                over (min)          2.00          8.00
    Storage Coeff.  (min)=          1.95 (ii)     7.98 (ii)
    Unit Hyd. Tpeak (min)=          2.00          8.00
    Unit Hyd. peak  (cms)=           .54           .14
                                                           *TOTALS*
    PEAK FLOW       (cms)=           .66           .00       .657 (iii)
    TIME TO PEAK    (hrs)=          1.67          1.77      1.667
    RUNOFF VOLUME    (mm)=         23.00          4.57     22.816
    TOTAL RAINFALL   (mm)=         25.00         25.00     25.000
    RUNOFF COEFFICIENT   =           .92           .18       .913
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN* =  79.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-----------------------------------------------------------------------------
001:0005---------------------------------------------------------------------
*#---------------------------------------------------------------------------
* Proposed pond storage for Erin Mills parking area
* PROVIDES ENHANCED WATER QUALITY CONTROL & QUANTITY CONTROL
*#-----------------------------------------------------------------------
--------------------
| ROUTE RESERVOIR   |    Requested routing time step =  2.0 min.
|  IN>02:(3.11  )   |
| OUT<03:(700   )   |    =========  OUTLFOW STORAGE TABLE  =========
--------------------     OUTFLOW    STORAGE  |  OUTFLOW    STORAGE
                          (cms)     (ha.m.)  |   (cms)     (ha.m.)
                          .000   .0000E+00   |    .090   .1469E+00
                          .003   .1800E-01   |    .130   .2259E+00
                          .006   .5690E-01   |    .141   .2544E+00
                          .007   .7780E-01   |    .160   .3151E+00
                          .047   .9980E-01   |    .000   .0000E+00

      ROUTING RESULTS             AREA     QPEAK     TPEAK       R.V.
      -------------------         (ha)     (cms)     (hrs)       (mm)
      INFLOW >02: (3.11  )        3.90      .657     1.667     22.816
      OUTFLOW<03: (700   )        3.90      .013     4.000     22.814

                 PEAK   FLOW   REDUCTION [Qout/Qin](%)=     1.966
                 TIME SHIFT OF PEAK FLOW         (min)=    140.00
                 MAXIMUM  STORAGE   USED       (ha.m.)=.8106E-01

-----------------------------------------------------------------------------
001:0006---------------------------------------------------------------------
*
--------------------
| ADD HYD (800    ) | ID: NHYD     AREA      QPEAK   TPEAK   R.V.     DWF
--------------------                (ha)      (cms)   (hrs)   (mm)    (cms)
                      ID1 01:3.1     3.30       .022    2.33   3.86     .000
                     +ID2 03:700     3.90       .013    4.00  22.81     .000
                      ==================================================
                      SUM 10:800     7.20       .028    2.33  14.13     .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-----------------------------------------------------------------------------
001:0007---------------------------------------------------------------------
*
---------------------
| CALIB STANDHYD     |   Area    (ha)=    4.40
| 04:3.2    DT= 2.00 |   Total Imp(%)=   20.00   Dir. Conn.(%)=   20.00
---------------------
                                 IMPERVIOUS    PERVIOUS (i)
    Surface Area      (ha)=          .88          3.52
    Dep. Storage      (mm)=         2.00          5.00
    Average Slope      (%)=         1.00          2.00
    Length             (m)=      1000.00          5.00
    Mannings n           =          .015          .350

    Max.eff.Inten.(mm/hr)=         44.31          6.51
                over (min)         16.00         22.00
    Storage Coeff.  (min)=         15.35 (ii)    22.75 (ii)
    Unit Hyd. Tpeak (min)=         16.00         22.00
    Unit Hyd. peak  (cms)=           .07           .05
                                                           *TOTALS*
    PEAK FLOW       (cms)=           .07           .04       .098 (iii)
    TIME TO PEAK    (hrs)=          1.87          2.00      1.900
    RUNOFF VOLUME    (mm)=         23.00          4.57      8.256
    TOTAL RAINFALL   (mm)=         25.00         25.00     25.000
    RUNOFF COEFFICIENT   =           .92           .18       .330

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN* =  79.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-----------------------------------------------------------------------------
001:0008---------------------------------------------------------------------
*
--------------------
| ADD HYD (OUT3   ) | ID: NHYD     AREA      QPEAK   TPEAK   R.V.     DWF
--------------------                (ha)      (cms)   (hrs)   (mm)    (cms)
                      ID1 10:800     7.20       .028    2.33  14.13     .000
                     +ID2 04:3.2     4.40       .098    1.90   8.26     .000
                      ==================================================
                      SUM 09:OUT3   11.60       .116    1.93  11.90     .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-----------------------------------------------------------------------------
001:0009---------------------------------------------------------------------
  ** END OF RUN :    7

*****************************************************************************





--------------------
| START             |  Project  dir.: K:\Projects\6900-6-1\6964-M-1\21-HYD-1\
--------------------   Rainfall dir.: K:\Projects\6900-6-1\6964-M-1\21-HYD-1\
    TZERO =   .00 hrs on       0
    METOUT=   2 (output = METRIC)
    NRUN  = 008
    NSTORM=   1
           #  1=12hrscs2.stm
-----------------------------------------------------------------------------
008:0002---------------------------------------------------------------------
*#***************************************************************************
*#  Project Name: BRT WEST - Outlet 3                    JOB NUMBER: [6964]  *
*#  Date          : JUNE-25-2008                                             *
*#  Modeller      : [jrm]                                                    *
*#  Company       : McCormick Rankin Corporation                             *
*#  License #     : 4313781                                                  *
*#                                                                           *
*#                                                                           *
*#                  FUTURE DRAINAGE CONDITIONS TO OUTLET 3                   *
*#        25 mm 4 hour - Chicago and 12 hour SCS 2 to 100 Year Storms        *
*#                                                                           *
*#***************************************************************************
*#***************************************************************************
*
*
-----------------------------------------------------------------------------
008:0002---------------------------------------------------------------------
*
--------------------
| READ STORM        |    Filename: K:\Projects\6900-6-1\6964-M-1\21-HYD-1\1
| Ptotal=  43.80 mm|    Comments: 2 Yr-12hr SCS
--------------------
                 TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
```

```
                      .17   1.314 |  3.17   1.752 |  6.17   9.548 |  9.17   1.314
                      .33   1.314 |  3.33   1.752 |  6.33   9.548 |  9.33   1.314
                      .50   1.314 |  3.50   1.752 |  6.50   9.548 |  9.50   1.314
                      .67    .613 |  3.67   1.752 |  6.67   4.205 |  9.67   1.051
                      .83    .613 |  3.83   1.752 |  6.83   4.205 |  9.83   1.051
                     1.00    .613 |  4.00   1.752 |  7.00   4.205 | 10.00   1.051
                     1.17   1.139 |  4.17   2.365 |  7.17   2.803 | 10.17   1.489
                     1.33   1.139 |  4.33   2.365 |  7.33   2.803 | 10.33   1.489
                     1.50   1.139 |  4.50   2.365 |  7.50   2.803 | 10.50   1.489
                     1.67   1.139 |  4.67   2.978 |  7.67   2.453 | 10.67    .964
                     1.83   1.139 |  4.83   2.978 |  7.83   2.453 | 10.83    .964
                     2.00   1.139 |  5.00   2.978 |  8.00   2.453 | 11.00    .964
                     2.17   1.489 |  5.17   4.730 |  8.17   1.927 | 11.17    .876
                     2.33   1.489 |  5.33   4.730 |  8.33   1.927 | 11.33    .876
                     2.50   1.489 |  5.50   4.730 |  8.50   1.927 | 11.50    .876
                     2.67   1.314 |  5.67  37.493 |  8.67   2.015 | 11.67    .876
                     2.83   1.314 |  5.83  37.493 |  8.83   2.015 | 11.83    .876
                     3.00   1.314 |  6.00  37.493 |  9.00   2.015 | 12.00    .876

-----------------------------------------------------------------------------
008:0003---------------------------------------------------------------------
*
---------------------
| CALIB NASHYD      |   Area    (ha)=    3.30   Curve Number   (CN)=79.00
| 01:3.1   DT= 2.00 |   Ia      (mm)=   6.800   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=    .500

    Unit Hyd Qpeak  (cms)=     .252

    PEAK FLOW       (cms)=     .059 (i)
    TIME TO PEAK    (hrs)=    6.467
    RUNOFF VOLUME    (mm)=   13.098
    TOTAL RAINFALL   (mm)=   43.799
    RUNOFF COEFFICIENT   =     .299

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

-----------------------------------------------------------------------------
008:0004---------------------------------------------------------------------
*
---------------------
| CALIB STANDHYD    |   Area    (ha)=    3.90
| 02:3.11  DT= 2.00 |   Total Imp(%)=   99.00   Dir. Conn.(%)=   99.00
---------------------
                              IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=       3.86          .04
    Dep. Storage     (mm)=       2.00         5.00
    Average Slope     (%)=       1.00         2.00
    Length            (m)=      40.00         5.00
    Mannings n           =       .015         .350

    Max.eff.Inten.(mm/hr)=      37.49        15.93
              over (min)         2.00         8.00
    Storage Coeff.  (min)=       2.38 (ii)    7.55 (ii)
    Unit Hyd. Tpeak (min)=       2.00         8.00
    Unit Hyd. peak  (cms)=        .48          .15
                                                          *TOTALS*
    PEAK FLOW       (cms)=        .40          .00          .404 (iii)
    TIME TO PEAK    (hrs)=       6.00         6.03         6.000
    RUNOFF VOLUME    (mm)=      41.80        14.16        41.523
    TOTAL RAINFALL   (mm)=      43.80        43.80        43.799
    RUNOFF COEFFICIENT   =        .95          .32          .948

     (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
         CN* =  79.0    Ia = Dep. Storage  (Above)
    (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
         THAN THE STORAGE COEFFICIENT.
   (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-----------------------------------------------------------------------------
008:0005---------------------------------------------------------------------
*#---------------------------------------------------------------------------
* Proposed pond storage for Erin Mills parking area
* PROVIDES ENHANCED WATER QUALITY CONTROL & QUANTITY CONTROL
*#------------------------------------------------------------------
--------------------
| ROUTE RESERVOIR  |    Requested routing time step =  2.0 min.
|  IN>02:(3.11  )  |
| OUT<03:(700   )  |    =========  OUTLFOW STORAGE TABLE  =========
--------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                         (cms)    (ha.m.)   |   (cms)    (ha.m.)
                          .000  .0000E+00   |    .090  .1469E+00
                          .003  .1800E-01   |    .130  .2259E+00
                          .006  .5690E-01   |    .141  .2544E+00
                          .007  .7780E-01   |    .160  .3151E+00
                          .047  .9980E-01   |    .000  .0000E+00

    ROUTING RESULTS              AREA     QPEAK     TPEAK        R.V.
    -------------------           (ha)     (cms)     (hrs)        (mm)
    INFLOW >02: (3.11  )          3.90      .404     6.000      41.523
    OUTFLOW<03: (700   )          3.90      .055     6.567      41.522

                 PEAK   FLOW   REDUCTION [Qout/Qin](%)=   13.735
                 TIME SHIFT OF PEAK FLOW          (min)=   34.00
                 MAXIMUM  STORAGE   USED       (ha.m.)=.1090E+00

-----------------------------------------------------------------------------
008:0006---------------------------------------------------------------------
*
--------------------
| ADD HYD (800   ) | ID: NHYD     AREA      QPEAK   TPEAK   R.V.    DWF
--------------------               (ha)      (cms)   (hrs)   (mm)   (cms)
                ID1 01:3.1         3.30       .059    6.47  13.10    .000
               +ID2 03:700         3.90       .055    6.57  41.52    .000
                ====================================================
                SUM 10:800         7.20       .114    6.53  28.49    .000

  NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-----------------------------------------------------------------------------
008:0007---------------------------------------------------------------------
*
---------------------
| CALIB STANDHYD    |   Area    (ha)=    4.40
| 04:3.2   DT= 2.00 |   Total Imp(%)=   20.00   Dir. Conn.(%)=   20.00
---------------------
                              IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=        .88         3.52
    Dep. Storage     (mm)=       2.00         5.00
    Average Slope     (%)=       1.00         2.00
    Length            (m)=    1000.00         5.00
    Mannings n           =       .015         .350

    Max.eff.Inten.(mm/hr)=      37.49        13.50
              over (min)        16.00        22.00
    Storage Coeff.  (min)=      16.41 (ii)   21.93 (ii)
    Unit Hyd. Tpeak (min)=      16.00        22.00
    Unit Hyd. peak  (cms)=        .07          .05
                                                          *TOTALS*
    PEAK FLOW       (cms)=        .07          .08          .151 (iii)
    TIME TO PEAK    (hrs)=       6.07         6.23         6.167
    RUNOFF VOLUME    (mm)=      41.80        14.16        19.687
    TOTAL RAINFALL   (mm)=      43.80        43.80        43.799
    RUNOFF COEFFICIENT   =        .95          .32          .449

```

```
     (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
         CN* =  79.0    Ia = Dep. Storage  (Above)
    (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
         THAN THE STORAGE COEFFICIENT.
   (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-----------------------------------------------------------------------------
008:0008---------------------------------------------------------------------
*
--------------------
| ADD HYD (OUT3  ) | ID: NHYD     AREA      QPEAK   TPEAK   R.V.    DWF
--------------------               (ha)      (cms)   (hrs)   (mm)   (cms)
                ID1 10:800         7.20       .114    6.53  28.49    .000
               +ID2 04:3.2         4.40       .151    6.17  19.69    .000
                ====================================================
                SUM 09:OUT3       11.60       .250    6.23  25.15    .000

  NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-----------------------------------------------------------------------------
008:0009---------------------------------------------------------------------
-----------------------------------------------------------------------------
008:0002---------------------------------------------------------------------
*
 ** END OF RUN :   8

*****************************************************************************





--------------------
| START            |   Project  dir.: K:\Projects\6900-6~1\6964-M~1\21-HYD~1\
--------------------   Rainfall dir.: K:\Projects\6900-6~1\6964-M~1\21-HYD~1\
   TZERO =    .00 hrs on      0
   METOUT=   2 (output = METRIC)
   NRUN  = 009
   NSTORM=   1
          #  1=12hscs10.stm
-----------------------------------------------------------------------------
009:0002---------------------------------------------------------------------
*#****************************************************************************
*#  Project Name: BRT WEST - Outlet 3                      JOB NUMBER: [6964]  *
*#  Date         : JUNE-25-2008                                                *
*#  Modeller     : [jrm]                                                       *
*#  Company      : McCormick Rankin Corporation                                *
*#  License #    : 4313781                                                     *
*#                                                                             *
*#                                                                             *
*#                  FUTURE DRAINAGE CONDITIONS TO OUTLET 3                     *
*#       25 mm 4 hour - Chicago and 12 hour SCS 2 to 100 Year Storms           *
*#                                                                             *
*#****************************************************************************
*#****************************************************************************
*
*
-----------------------------------------------------------------------------
009:0002---------------------------------------------------------------------
*
--------------------
| READ STORM       |     Filename: K:\Projects\6900-6~1\6964-M~1\21-HYD-1\1
| Ptotal=  72.70 mm|     Comments: 10 Yr-12hr SCS
--------------------
                     TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                      hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
                      .17   2.181 |  3.17   2.908 |  6.17  15.849 |  9.17   2.181
                      .33   2.181 |  3.33   2.908 |  6.33  15.849 |  9.33   2.181
                      .50   2.181 |  3.50   2.908 |  6.50  15.849 |  9.50   2.181
                      .67   1.018 |  3.67   2.908 |  6.67   6.979 |  9.67   1.745
                      .83   1.018 |  3.83   2.908 |  6.83   6.979 |  9.83   1.745
                     1.00   1.018 |  4.00   2.908 |  7.00   6.979 | 10.00   1.745
                     1.17   1.890 |  4.17   3.926 |  7.17   4.653 | 10.17   2.472
                     1.33   1.890 |  4.33   3.926 |  7.33   4.653 | 10.33   2.472
                     1.50   1.890 |  4.50   3.926 |  7.50   4.653 | 10.50   2.472
                     1.67   1.890 |  4.67   4.944 |  7.67   4.071 | 10.67   1.599
                     1.83   1.890 |  4.83   4.944 |  7.83   4.071 | 10.83   1.599
                     2.00   1.890 |  5.00   4.944 |  8.00   4.071 | 11.00   1.599
                     2.17   2.472 |  5.17   7.852 |  8.17   3.199 | 11.17   1.454
                     2.33   2.472 |  5.33   7.852 |  8.33   3.199 | 11.33   1.454
                     2.50   2.472 |  5.50   7.852 |  8.50   3.199 | 11.50   1.454
                     2.67   2.181 |  5.67  62.231 |  8.67   3.344 | 11.67   1.454
                     2.83   2.181 |  5.83  62.231 |  8.83   3.344 | 11.83   1.454
                     3.00   2.181 |  6.00  62.231 |  9.00   3.344 | 12.00   1.454

-----------------------------------------------------------------------------
009:0003---------------------------------------------------------------------
*
---------------------
| CALIB NASHYD      |   Area    (ha)=    3.30   Curve Number   (CN)=79.00
| 01:3.1   DT= 2.00 |   Ia      (mm)=   6.800   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=    .500

    Unit Hyd Qpeak  (cms)=     .252

    PEAK FLOW       (cms)=     .154 (i)
    TIME TO PEAK    (hrs)=    6.433
    RUNOFF VOLUME    (mm)=   32.550
    TOTAL RAINFALL   (mm)=   72.700
    RUNOFF COEFFICIENT   =     .448

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

-----------------------------------------------------------------------------
009:0004---------------------------------------------------------------------
*
---------------------
| CALIB STANDHYD    |   Area    (ha)=    3.90
| 02:3.11  DT= 2.00 |   Total Imp(%)=   99.00   Dir. Conn.(%)=   99.00
---------------------
                              IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=       3.86          .04
    Dep. Storage     (mm)=       2.00         5.00
    Average Slope     (%)=       1.00         2.00
    Length            (m)=      40.00         5.00
    Mannings n           =       .015         .350

    Max.eff.Inten.(mm/hr)=      62.23        37.71
              over (min)         2.00         6.00
    Storage Coeff.  (min)=       1.94 (ii)    5.61 (ii)
    Unit Hyd. Tpeak (min)=       2.00         6.00
    Unit Hyd. peak  (cms)=        .55          .20
                                                          *TOTALS*
    PEAK FLOW       (cms)=        .67          .00          .671 (iii)
    TIME TO PEAK    (hrs)=       6.00         6.00         6.000
    RUNOFF VOLUME    (mm)=      70.70        33.90        70.332
    TOTAL RAINFALL   (mm)=      72.70        72.70        72.700
    RUNOFF COEFFICIENT   =        .97          .47          .967
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.

     (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
         CN* =  79.0    Ia = Dep. Storage  (Above)
    (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
         THAN THE STORAGE COEFFICIENT.
```



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

-----------------------------------------------------------------------------
009:0005---------------------------------------------------------------------
*#---------------------------------------------------------------------------
* Proposed pond storage for Erin Mills parking area
* PROVIDES ENHANCED WATER QUALITY CONTROL & QUANTITY CONTROL
*#------------------------------------------------------------------
--------------------
| ROUTE RESERVOIR  |    Requested routing time step =  2.0 min.
|  IN>02:(3.11  )  |
| OUT<03:(700   )  |    =========  OUTLFOW STORAGE TABLE  =========
--------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                         (cms)    (ha.m.)   |   (cms)    (ha.m.)
                          .000  .0000E+00   |    .090  .1469E+00
                          .003  .1800E-01   |    .130  .2259E+00
                          .006  .5690E-01   |    .141  .2544E+00
                          .007  .7780E-01   |    .160  .3151E+00
                          .047  .9980E-01   |    .000  .0000E+00

    ROUTING RESULTS              AREA     QPEAK     TPEAK        R.V.
    -------------------           (ha)     (cms)     (hrs)        (mm)
    INFLOW >02: (3.11  )          3.90      .671     6.000      70.332
    OUTFLOW<03: (700   )          3.90      .105     6.533      70.331

                 PEAK   FLOW   REDUCTION [Qout/Qin](%)=   15.695
                 TIME SHIFT OF PEAK FLOW          (min)=   32.00
                 MAXIMUM  STORAGE   USED       (ha.m.)=.1772E+00

-----------------------------------------------------------------------------
009:0006---------------------------------------------------------------------
*
--------------------
| ADD HYD (800   ) | ID: NHYD     AREA      QPEAK   TPEAK   R.V.    DWF
--------------------               (ha)      (cms)   (hrs)   (mm)   (cms)
                ID1 01:3.1         3.30       .154    6.43  32.55    .000
               +ID2 03:700         3.90       .105    6.53  70.33    .000
                ====================================================
                SUM 10:800         7.20       .258    6.43  53.01    .000

  NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-----------------------------------------------------------------------------
009:0007---------------------------------------------------------------------
*
---------------------
| CALIB STANDHYD    |   Area    (ha)=    4.40
| 04:3.2   DT= 2.00 |   Total Imp(%)=   20.00   Dir. Conn.(%)=   20.00
---------------------
                              IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=        .88         3.52
    Dep. Storage     (mm)=       2.00         5.00
    Average Slope     (%)=       1.00         2.00
    Length            (m)=    1000.00         5.00
    Mannings n           =       .015         .350

    Max.eff.Inten.(mm/hr)=      62.23        34.39
              over (min)        14.00        18.00
    Storage Coeff.  (min)=      13.40 (ii)   17.20 (ii)
    Unit Hyd. Tpeak (min)=      14.00        18.00
    Unit Hyd. peak  (cms)=        .08          .06
                                                          *TOTALS*
    PEAK FLOW       (cms)=        .13          .24          .358 (iii)
    TIME TO PEAK    (hrs)=       6.03         6.17         6.100
    RUNOFF VOLUME    (mm)=      70.70        33.89        41.257
    TOTAL RAINFALL   (mm)=      72.70        72.70        72.700
    RUNOFF COEFFICIENT   =        .97          .47          .567

     (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
         CN* =  79.0    Ia = Dep. Storage  (Above)
    (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
         THAN THE STORAGE COEFFICIENT.
   (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-----------------------------------------------------------------------------
009:0008---------------------------------------------------------------------
*
--------------------
| ADD HYD (OUT3  ) | ID: NHYD     AREA      QPEAK   TPEAK   R.V.    DWF
--------------------               (ha)      (cms)   (hrs)   (mm)   (cms)
                ID1 10:800         7.20       .258    6.43  53.01    .000
               +ID2 04:3.2         4.40       .358    6.10  41.26    .000
                ====================================================
                SUM 09:OUT3       11.60       .585    6.17  48.55    .000

  NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-----------------------------------------------------------------------------
009:0009---------------------------------------------------------------------
-----------------------------------------------------------------------------
009:0002---------------------------------------------------------------------
*
-----------------------------------------------------------------------------
009:0002---------------------------------------------------------------------
*
 ** END OF RUN :   9

*****************************************************************************





--------------------
| START            |   Project  dir.: K:\Projects\6900-6~1\6964-M~1\21-HYD~1\
--------------------   Rainfall dir.: K:\Projects\6900-6~1\6964-M~1\21-HYD~1\
   TZERO =    .00 hrs on      0
   METOUT=   2 (output = METRIC)
   NRUN  = 010
   NSTORM=   1
          #  1=12hscs50.stm
-----------------------------------------------------------------------------
010:0002---------------------------------------------------------------------
*#****************************************************************************
*#  Project Name: BRT WEST - Outlet 3                      JOB NUMBER: [6964]  *
*#  Date         : JUNE-25-2008                                                *
*#  Modeller     : [jrm]                                                       *
*#  Company      : McCormick Rankin Corporation                                *
*#  License #    : 4313781                                                     *
*#                                                                             *
*#                                                                             *
*#                  FUTURE DRAINAGE CONDITIONS TO OUTLET 3                     *
*#       25 mm 4 hour - Chicago and 12 hour SCS 2 to 100 Year Storms           *
*#                                                                             *
*#****************************************************************************
*#****************************************************************************
*
*
-----------------------------------------------------------------------------
010:0002---------------------------------------------------------------------
*
--------------------
| READ STORM       |     Filename: K:\Projects\6900-6~1\6964-M~1\21-HYD-1\1
| Ptotal=  97.90 mm|     Comments: 50 Yr-12hr SCS
--------------------
```

```
                     TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
                      hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
                      .17   2.937 |  3.17   3.916 |  6.17  21.342 |  9.17   2.937
                      .33   2.937 |  3.33   3.916 |  6.33  21.342 |  9.33   2.937
                      .50   2.937 |  3.50   3.916 |  6.50  21.342 |  9.50   2.937
                      .67   1.371 |  3.67   3.916 |  6.67   9.398 |  9.67   2.350
                      .83   1.371 |  3.83   3.916 |  6.83   9.398 |  9.83   2.350
                     1.00   1.371 |  4.00   3.916 |  7.00   9.398 | 10.00   2.350
                     1.17   2.545 |  4.17   5.287 |  7.17   6.266 | 10.17   3.329
                     1.33   2.545 |  4.33   5.287 |  7.33   6.266 | 10.33   3.329
                     1.50   2.545 |  4.50   5.287 |  7.50   6.266 | 10.50   3.329
                     1.67   2.545 |  4.67   6.657 |  7.67   5.482 | 10.67   2.154
                     1.83   2.545 |  4.83   6.657 |  7.83   5.482 | 10.83   2.154
                     2.00   2.545 |  5.00   6.657 |  8.00   5.482 | 11.00   2.154
                     2.17   3.329 |  5.17  10.573 |  8.17   4.308 | 11.17   1.958
                     2.33   3.329 |  5.33  10.573 |  8.33   4.308 | 11.33   1.958
                     2.50   3.329 |  5.50  10.573 |  8.50   4.308 | 11.50   1.958
                     2.67   2.937 |  5.67  83.802 |  8.67   4.503 | 11.67   1.958
                     2.83   2.937 |  5.83  83.802 |  8.83   4.503 | 11.83   1.958
                     3.00   2.937 |  6.00  83.802 |  9.00   4.503 | 12.00   1.958

-----------------------------------------------------------------------------
010:0003---------------------------------------------------------------------
*
---------------------
| CALIB NASHYD      |   Area    (ha)=    3.30   Curve Number   (CN)=79.00
| 01:3.1   DT= 2.00 |   Ia      (mm)=   6.800   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=    .500

    Unit Hyd Qpeak  (cms)=     .252

    PEAK FLOW       (cms)=     .252 (i)
    TIME TO PEAK    (hrs)=    6.400
    RUNOFF VOLUME    (mm)=   52.322
    TOTAL RAINFALL   (mm)=   97.900
    RUNOFF COEFFICIENT   =     .534

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

-----------------------------------------------------------------------------
010:0004---------------------------------------------------------------------
*
---------------------
| CALIB STANDHYD    |   Area    (ha)=    3.90
| 02:3.11  DT= 2.00 |   Total Imp(%)=   99.00   Dir. Conn.(%)=   99.00
---------------------
                              IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=       3.86          .04
    Dep. Storage     (mm)=       2.00         5.00
    Average Slope     (%)=       1.00         2.00
    Length            (m)=      40.00         5.00
    Mannings n           =       .015         .350

    Max.eff.Inten.(mm/hr)=      83.80        59.20
              over (min)         2.00         4.00
    Storage Coeff.  (min)=       1.72 (ii)    4.78 (ii)
    Unit Hyd. Tpeak (min)=       2.00         4.00
    Unit Hyd. peak  (cms)=        .58          .25
                                                          *TOTALS*
    PEAK FLOW       (cms)=        .90          .01          .905 (iii)
    TIME TO PEAK    (hrs)=       5.97         6.00         6.000
    RUNOFF VOLUME    (mm)=      95.90        53.80        95.479
    TOTAL RAINFALL   (mm)=      97.90        97.90        97.900
    RUNOFF COEFFICIENT   =        .98          .55          .975
     *** WARNING: Storage Coefficient is smaller than DT!
                  Use a smaller DT or a larger area.

     (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
         CN* =  79.0    Ia = Dep. Storage  (Above)
    (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
         THAN THE STORAGE COEFFICIENT.
   (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-----------------------------------------------------------------------------
010:0005---------------------------------------------------------------------
*#---------------------------------------------------------------------------
* Proposed pond storage for Erin Mills parking area
* PROVIDES ENHANCED WATER QUALITY CONTROL & QUANTITY CONTROL
*#------------------------------------------------------------------
--------------------
| ROUTE RESERVOIR  |    Requested routing time step =  2.0 min.
|  IN>02:(3.11  )  |
| OUT<03:(700   )  |    =========  OUTLFOW STORAGE TABLE  =========
--------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                         (cms)    (ha.m.)   |   (cms)    (ha.m.)
                          .000  .0000E+00   |    .090  .1469E+00
                          .003  .1800E-01   |    .130  .2259E+00
                          .006  .5690E-01   |    .141  .2544E+00
                          .007  .7780E-01   |    .160  .3151E+00
                          .047  .9980E-01   |    .000  .0000E+00

    ROUTING RESULTS              AREA     QPEAK     TPEAK        R.V.
    -------------------           (ha)     (cms)     (hrs)        (mm)
    INFLOW >02: (3.11  )          3.90      .905     6.000      95.479
    OUTFLOW<03: (700   )          3.90      .136     6.533      95.477

                 PEAK   FLOW   REDUCTION [Qout/Qin](%)=   14.986
                 TIME SHIFT OF PEAK FLOW          (min)=   32.00
                 MAXIMUM  STORAGE   USED       (ha.m.)=.2405E+00

-----------------------------------------------------------------------------
010:0006---------------------------------------------------------------------
*
--------------------
| ADD HYD (800   ) | ID: NHYD     AREA      QPEAK   TPEAK   R.V.    DWF
--------------------               (ha)      (cms)   (hrs)   (mm)   (cms)
                ID1 01:3.1         3.30       .252    6.40  52.32    .000
               +ID2 03:700         3.90       .136    6.53  95.48    .000
                ====================================================
                SUM 10:800         7.20       .386    6.40  75.70    .000

  NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-----------------------------------------------------------------------------
010:0007---------------------------------------------------------------------
*
---------------------
| CALIB STANDHYD    |   Area    (ha)=    4.40
| 04:3.2   DT= 2.00 |   Total Imp(%)=   20.00   Dir. Conn.(%)=   20.00
---------------------
                              IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=        .88         3.52
    Dep. Storage     (mm)=       2.00         5.00
    Average Slope     (%)=       1.00         2.00
    Length            (m)=    1000.00         5.00
    Mannings n           =       .015         .350

    Max.eff.Inten.(mm/hr)=      83.80        55.27
              over (min)        12.00        16.00
    Storage Coeff.  (min)=      11.89 (ii)   15.04 (ii)
    Unit Hyd. Tpeak (min)=      12.00        16.00
    Unit Hyd. peak  (cms)=        .09          .07
                                                          *TOTALS*
    PEAK FLOW       (cms)=        .18          .40          .575 (iii)
    TIME TO PEAK    (hrs)=       6.03         6.10         6.067
```

```
00811>      RUNOFF VOLUME     (mm)=      95.90        53.80        62.219
00812>      TOTAL RAINFALL    (mm)=      97.90        97.90        97.900
00813>      RUNOFF COEFFICIENT   =        .98          .55          .636
00814>
00815>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00816>            CN* =  79.0    Ia = Dep. Storage  (Above)
00817>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00818>            THAN THE STORAGE COEFFICIENT.
00819>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00820>
00821> ------------------------------------------------------------------------------
00822> 010:0008------------------------------------------------------------------------
00823> *
00824> ---------------------
00825> | ADD HYD (OUT)  ) | ID: NHYD     AREA     QPEAK   TPEAK   R.V.    DWF
00826> ---------------------              (ha)     (cms)   (hrs)   (mm)    (cms)
00827>                    ID1 10:800       7.20     .386    6.40  75.70    .000
00828>                   +ID2 04:3.2       4.40     .575    6.07  62.22    .000
00829>                    ==========================================================
00830>                    SUM 09:OUT3      11.60     .905    6.13  70.58    .000
00831>
00832>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00833>
00834> ------------------------------------------------------------------------------
00835> 010:0009------------------------------------------------------------------------
00836> ------------------------------------------------------------------------------
00837> 010:0002------------------------------------------------------------------------
00838> *
00839> ------------------------------------------------------------------------------
00840> 010:0002------------------------------------------------------------------------
00841> *
00842> ------------------------------------------------------------------------------
00843> 010:0002------------------------------------------------------------------------
00844> *
00845>  ** END OF RUN :  10
00846>
00847> ********************************************************************************
00848>
00849>
00850>
00851>
00852>
00853> --------------------
00854> | START            |   Project  dir.: K:\Projects\6900-6-1\6964-M-1\21-HYD-1\
00855> --------------------   Rainfall dir.: K:\Projects\6900-6-1\6964-M-1\21-HYD-1\
00856>     TZERO =    .00 hrs on      0
00857>     METOUT=   2 (output = METRIC)
00858>     NRUN  = 011
00859>     NSTORM=   1
00860>            #  1=12scsh.stm
00861> --------------------------------------------------------------------------------
00862> 011:0002------------------------------------------------------------------------
00863> *#*****************************************************************************
00864> *#  Project Name: BRT WEST - Outlet 3                    JOB NUMBER: [6964]  *
00865> *#  Date        : JUNE-25-2008                                                 *
00866> *#  Modeller    : [jrm]                                                        *
00867> *#  Company     : McCormick Rankin Corporation                                 *
00868> *#  License #   : 4313781                                                      *
00869> *#                                                                             *
00870> *#                                                                             *
00871> *#                    FUTURE DRAINAGE CONDITIONS TO OUTLET 3                   *
00872> *#        25 mm 4 hour - Chicago and 12 hour SCS 2 to 100 Year Storms          *
00873> *#                                                                             *
00874> *#*****************************************************************************
00875> *#*****************************************************************************
00876> *
00877> *
00878> ------------------------------------------------------------------------------
00879> 011:0002------------------------------------------------------------------------
00880> *
00881> ---------------------
00882> | READ STORM        |    Filename: K:\Projects\6900-6-1\6964-M-1\21-HYD-1\1
00883> | Ptotal= 108.60 mm|    Comments: 100 Yr-12hr SCS
00884> ---------------------
00885>                 TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
00886>                  hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
00887>                  .17   3.258 |   3.17   4.344 |   6.17  23.675 |   9.17   3.258
00888>                  .33   3.258 |   3.33   4.344 |   6.33  23.675 |   9.33   3.258
00889>                  .50   3.258 |   3.50   4.344 |   6.50  23.675 |   9.50   3.258
00890>                  .67   1.520 |   3.67   4.344 |   6.67  10.426 |   9.67   2.606
00891>                  .83   1.520 |   3.83   4.344 |   6.83  10.426 |   9.83   2.606
00892>                 1.00   1.520 |   4.00   4.344 |   7.00  10.426 |  10.00   2.606
00893>                 1.17   2.824 |   4.17   5.864 |   7.17   6.950 |  10.17   3.692
00894>                 1.33   2.824 |   4.33   5.864 |   7.33   6.950 |  10.33   3.692
00895>                 1.50   2.824 |   4.50   5.864 |   7.50   6.950 |  10.50   3.692
00896>                 1.67   2.824 |   4.67   7.385 |   7.67   6.082 |  10.67   2.389
00897>                 1.83   2.824 |   4.83   7.385 |   7.83   6.082 |  10.83   2.389
00898>                 2.00   2.824 |   5.00   7.385 |   8.00   6.082 |  11.00   2.389
00899>                 2.17   3.692 |   5.17  11.729 |   8.17   4.778 |  11.17   2.172
00900>                 2.33   3.692 |   5.33  11.729 |   8.33   4.778 |  11.33   2.172
00901>                 2.50   3.692 |   5.50  11.729 |   8.50   4.778 |  11.50   2.172
00902>                 2.67   3.258 |   5.67  92.962 |   8.67   4.996 |  11.67   2.172
00903>                 2.83   3.258 |   5.83  92.962 |   8.83   4.996 |  11.83   2.172
00904>                 3.00   3.258 |   6.00  92.962 |   9.00   4.996 |  12.00   2.172
00905>
00906> ------------------------------------------------------------------------------
00907> 011:0003------------------------------------------------------------------------
00908> *
00909> ----------------------
00910> | CALIB NASHYD       |   Area     (ha)=   3.30   Curve Number    (CN)=79.00
00911> | 01:3.1    DT= 2.00 |   Ia       (mm)=   6.800  # of Linear Res.(N)= 3.00
00912> ----------------------   U.H. Tp(hrs)=    .500
00913>
00914>      Unit Hyd Qpeak  (cms)=      .252
00915>
00916>      PEAK FLOW       (cms)=      .297 (i)
00917>      TIME TO PEAK    (hrs)=     6.400
00918>      RUNOFF VOLUME    (mm)=    61.205
00919>      TOTAL RAINFALL   (mm)=   108.600
00920>      RUNOFF COEFFICIENT   =      .564
00921>
00922>      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00923>
00924> ------------------------------------------------------------------------------
00925> 011:0004------------------------------------------------------------------------
00926> *
00927> ----------------------
00928> | CALIB STANDHYD     |   Area     (ha)=    3.90
00929> | 02:3.11   DT= 2.00 |   Total Imp(%)=   99.00   Dir. Conn.(%)=   99.00
00930> ----------------------
00931>                         IMPERVIOUS     PERVIOUS (i)
00932>      Surface Area     (ha)=      3.86          .04
00933>      Dep. Storage     (mm)=      2.00         5.00
00934>      Average Slope     (%)=      1.00         2.00
00935>      Length            (m)=     40.00         5.00
00936>      Mannings n           =       .015         .350
00937>
00938>      Max.eff.Inten.(mm/hr)=     92.96        68.41
00939>                 over (min)        2.00         4.00
00940>      Storage Coeff.  (min)=      1.65 (ii)    4.54 (ii)
00941>      Unit Hyd. Tpeak (min)=      2.00         4.00
00942>      Unit Hyd. peak  (cms)=       .60          .26
00943>                                                      *TOTALS*
00944>      PEAK FLOW       (cms)=      1.00          .01        1.004 (iii)
00945>      TIME TO PEAK    (hrs)=      5.97         6.00        6.000
00946>      RUNOFF VOLUME    (mm)=     106.60        62.72       106.161
00947>      TOTAL RAINFALL   (mm)=     108.60       108.60       108.600
00948>      RUNOFF COEFFICIENT   =        .98          .58          .977
00949>       *** WARNING: Storage Coefficient is smaller than DT!
00950>                    Use a smaller DT or a larger area.
00951>
00952>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00953>            CN* =  79.0    Ia = Dep. Storage  (Above)
00954>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00955>            THAN THE STORAGE COEFFICIENT.
00956>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00957>
00958> ------------------------------------------------------------------------------
00959> 011:0005------------------------------------------------------------------------
00960> *#*****************************************************************************
00961> * Proposed pond storage for Erin Mills parking area
00962> * PROVIDES ENHANCED WATER QUALITY CONTROL & QUANTITY CONTROL
00963> *#-----------------------------------------------------------------------------
00964> ---------------------
00965> | ROUTE RESERVOIR   |    Requested routing time step =  2.0 min.
00966> |  IN>02:(3.11  )   |
00967> | OUT<03:(700   )   |    ---------  OUTFLOW STORAGE TABLE  ---------
00968> ---------------------    OUTFLOW     STORAGE   |  OUTFLOW     STORAGE
00969>                            (cms)      (ha.m.)   |    (cms)     (ha.m.)
00970>                             .000   .0000E+00    |     .090   .1469E+00
00971>                             .003   .1800E-01    |     .130   .2259E+00
00972>                             .006   .5693E-01    |     .141   .2544E+00
00973>                             .007   .7780E-01    |     .160   .3151E+00
00974>                             .047   .9980E-01    |     .000   .0000E+00
00975>
00976>    ROUTING RESULTS            AREA     QPEAK     TPEAK      R.V.
00977>    ---------------           (ha)      (cms)     (hrs)       (mm)
00978>    INFLOW >02: (3.11  )      3.90      1.004     6.000     106.161
00979>    OUTFLOW<03: (700   )      3.90       .145     6.533     106.159
00980>
00981>                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=   14.461
00982>                    TIME SHIFT OF PEAK FLOW          (min)=   32.00
00983>                    MAXIMUM  STORAGE   USED        (ha.m.)=.2679E+00
00984>
00985> ------------------------------------------------------------------------------
00986> 011:0006------------------------------------------------------------------------
00987> *
00988> ---------------------
00989> | ADD HYD (800   ) | ID: NHYD     AREA     QPEAK   TPEAK   R.V.    DWF
00990> ---------------------              (ha)     (cms)   (hrs)   (mm)    (cms)
00991>                    ID1 01:3.1       3.30     .297    6.40  61.21    .000
00992>                   +ID2 03:700       3.90     .145    6.53 106.16    .000
00993>                    ==========================================================
00994>                    SUM 10:800        7.20     .440    6.40  85.56    .000
00995>
00996>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00997>
00998> ------------------------------------------------------------------------------
00999> 011:0007------------------------------------------------------------------------
01000> *
01001> ---------------------
01002> | CALIB STANDHYD    |   Area     (ha)=   4.40
01003> | 04:3.2    DT= 2.00 |   Total Imp(%)=  20.00   Dir. Conn.(%)=  20.00
01004> ---------------------
01005>                         IMPERVIOUS     PERVIOUS (i)
01006>      Surface Area     (ha)=       .88         3.52
01007>      Dep. Storage     (mm)=      2.00         5.00
01008>      Average Slope     (%)=      1.00         2.00
01009>      Length            (m)=   1000.00         5.00
01010>      Mannings n           =       .015         .350
01011>
01012>      Max.eff.Inten.(mm/hr)=     92.96        65.04
01013>                 over (min)       12.00        14.00
01014>      Storage Coeff.  (min)=     11.41 (ii)   14.36 (ii)
01015>      Unit Hyd. Tpeak (min)=     12.00        14.00
01016>      Unit Hyd. peak  (cms)=       .10          .08
01017>                                                      *TOTALS*
01018>      PEAK FLOW       (cms)=       .20          .48         .683 (iii)
01019>      TIME TO PEAK    (hrs)=      6.03         6.10        6.067
01020>      RUNOFF VOLUME    (mm)=     106.60        62.72       71.498
01021>      TOTAL RAINFALL   (mm)=     108.60       108.60       108.600
01022>      RUNOFF COEFFICIENT   =        .98          .58          .658
01023>
01024>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01025>            CN* =  79.0    Ia = Dep. Storage  (Above)
01026>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01027>            THAN THE STORAGE COEFFICIENT.
01028>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01029>
01030> ------------------------------------------------------------------------------
01031> 011:0008------------------------------------------------------------------------
01032> *
01033> ---------------------
01034> | ADD HYD (OUT3   ) | ID: NHYD     AREA     QPEAK   TPEAK   R.V.    DWF
01035> ---------------------              (ha)     (cms)   (hrs)   (mm)    (cms)
01036>                    ID1 10:800       7.20     .440    6.40  85.56    .000
01037>                   +ID2 04:3.2       4.40     .683    6.07  71.50    .000
01038>                    ==========================================================
01039>                    SUM 09:OUT3      11.60    1.059    6.10  80.22    .080
01040>
01041>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01042>
01043> ------------------------------------------------------------------------------
01044> 011:0009------------------------------------------------------------------------
01045> ------------------------------------------------------------------------------
01046> 011:0002------------------------------------------------------------------------
01047> *
01048> ------------------------------------------------------------------------------
01049> 011:0002------------------------------------------------------------------------
01050> *
01051> ------------------------------------------------------------------------------
01052> 011:0002------------------------------------------------------------------------
01053> *
01054> ------------------------------------------------------------------------------
01055> 011:0002------------------------------------------------------------------------
01056> *
01057>      FINISH
01058> ------------------------------------------------------------------------------
01059> ********************************************************************************
01060>     WARNINGS / ERRORS / NOTES
01061>     -------------------------
01062> 001:0004 CALIB STANDHYD
01063>      *** WARNING: Storage Coefficient is smaller than DT!
01064>                   Use a smaller DT or a larger area.
01065>      *** WARNING: Storage Coefficient is smaller than DT!
01066>                   Use a smaller DT or a larger area.
01067>      *** WARNING: Storage Coefficient is smaller than DT!
01068>                   Use a smaller DT or a larger area.
01069>      *** WARNING: Storage Coefficient is smaller than DT!
01070>                   Use a smaller DT or a larger area.
01071>  Simulation ended on 2008-07-03      at 11:33:16
01072> ================================================================================
01073>
```

APPENDIX C
PRELIMINARY STORMWATER MANAGEMENT CALCULATIONS

6964 - Mississauga BRT WEST

Retrofit of Existing MTO Pond 2 & Proposed Erin Mills Parkway Stormwater Management Facility

Stormwater Quality Volumetric Requirements

Pond	Type	Drainage Area (ha) Winter/MRC	Actual % Imp Winter/MRC	Assumed % Imp. Winter/MRC	MOE Control Level	Water Quality Unit Volume Requirments: Total Unit Volume (m^3/ha)	Permanent Pool (m^3/ha)	Extended Detention (m^3/ha)	Water Quality Volume Requirements: Permanent Pool (m^3) Winter/MRC	Extended Detention (m^3) Winter/MRC	Total MOE Volume (m^3) Winter/MRC	Water Quality Volumes Provided: Permanent Pool (m^3) Winter/MRC	Extended Detention (m^3) Winter/MRC	Total MOE Volume (m^3) Winter/MRC	Actual Provided Unit Volume (m^3/ha)
MTO Pond 2 Existing [1][2]	Wetpond	32.85 / 35.85	31 / 27	35.0	Enhanced	140.0	100.0	40	3,285 / 3,585	1,314 / 1,434	4,599 /5,019	3,980 / 4,049	1,820 / 2,389	5,800 /6,438	--
MTO Pond 2 Parking [3]	Wetpond	35.85	31.0	35.0	Enhanced	140.0	100.0	40	3,585	1,434	5,019	4,049	2,389	6,438	113
MTO Pond 2 No Parking [4]	Wetpond	33.05	26.0	35.0	Enhanced	140.0	100.0	40	3,305	1,322	4,627	4,049	2,389	6,438	122
Proposed Erin Mills	Wetpond	3.62	98.0	98.0	Enhanced	297.5	257.5	40	932	145	1,077	1,246	369	1,615	344

- Water quality unit volume requirements based on Table 3.1, Stormwater Management Planning & Design Manual (MOE, 2003)

(1) MTO Pond 2 Existing (Winter) is as of June 2008 and represents the future condition in the *Highway 403 Drainage and SWM Report*, Winter Environmental Consulting, October 2001

(2) MTO Pond 2 Existing (MRC) results are calculated based on a review of drawings and data presented in the *Highway 403 Drainage and SWM Report*, Winter Environmental Consulting, October 2001

(3) MTO Pond 2 Proposed Worst assumes that no quality control will be provided on-site for Winston Churchill parking area

(4) MTO Pond 2 Proposed Best assumes that quality control will be provided on-site for Winston Churchill parking area and therefore Drainage area and % impervious exclude this area

6964 - Mississauga BRT WEST

Stage-Storage-Discharge Summary - MTO Pond 2 - Existing Conditions

Stage (m)	Discharge (m^3/s)	Storage: Active (m^3)	Storage: Total (m^3)	Stage (m)	Forebays: Area (m^2)	Forebays: Incremental Volume (m^3)	Forebays: Accumulated Volume (m^3)	Main Pool (Excluding Forebay): Area (m^2)	Main Pool (Excluding Forebay): Incremental Volume (m^3)	Main Pool (Excluding Forebay): Accumulated Volume (m^3)	Storage: Sediment (m^3)	Storage: Total (m^3)	
165.50	0.000	0	0	165.50				1,120	0	0		0	
166.00	0.000	0	651	166.00				1,485	651	651		651	
166.50	0.000	0	1,985	166.50				3,850	1,334	1,985	0	1,985	
167.00	0.000	0	4,049	167.00				4,407	2,064	4,049	0	4,049	Permanent Pool
167.50	0.008	2,389	6,438	167.50				5,148	2,389	6,438	0	6,438	Outlet pipe
168.00	0.012	5,128	9,177	168.00				5,808	2,739	9,177	0	9,177	
168.25	2.863	6,631	10,680	168.25				6,217	1,503	10,680	0	10,680	Overflow weir
168.50	3.937	8,236	12,285	168.50				6,625	3,108	12,285	0	12,285	Top of pond

6964 - Mississauga BRT WEST

Detailed Outlet Structure Discharge Calculations

Elevation (m)	Discharge (m^3/s): Spillway: Weir 1	Spillway: Weir 2	Spillway: Total	Outlet Riser: Orifice 1	Outlet Riser: Weir 1	Outlet Riser: Outlet Pipe	Outlet Riser: Total	DICB	Total Discharge
165.50	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.000**
166.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.000**
166.50	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.000**
167.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.000**
167.50	0.000	0.000	0.000	0.008	0.000	0.000	0.008	0.000	**0.008**
168.00	0.000	0.000	0.000	0.012	0.000	?	0.012	0.000	**0.012**
168.25	0.000	0.000	0.000	0.013	0.000	2.850	2.863	0.000	**2.863**
168.50	1.023	0.000	1.023	0.014	0.000	2.900	2.914	0.000	**3.937**

Notes:

Outlet pipe flows adopted from *Highway 403 Drainage and SWM Report*, Winter Environmental Consulting, October 2001. MRC believes these flows are an overestimate. The outlet structure should be inspected and modified as required at the detailed design stage.

Parameters

Overflow Weir 1	
Crest Elevation	168.25 m
Crest Width	3 m
Slope (x:1)	10
Weir Coeff.	1.670
Weir Top Width (m	8.000
Overflow Weir 2	
Crest Elevation	99999 m
Crest Width	0 m
Slope (x:1)	0
Weir Coeff.	1.670
Weir Top Width (m	0.000
DICB	
T/G Invert	9999 m
CB Size	600 mm
by	600 mm
Grate Slope	4 :1
Area (m^2)	0.360
Perimeter (m)	2.400

Orifice 1	
Orifice Centre	167.0375 m
Orifice Invert	167.0 m
Orifice Diameter	75 mm
Orientation	Vertical
Weir 1	
Top of Weir Structure	99999.00 m
Weir Crest Invert	99999.00 m
Weir Dimensions (Height x Length)	0 mm Height
Side Walls	Vertical
Orifice 2	
Orifice Centre	9999.60 m
Orifice Invert	9999 m
Orifice Diameter	1200 mm
Orientation	Vertical

Perimeter	236 mm
Area	4,418 mm^2
Orifice Coeff.	0.6
Max Perimeter	0 mm
Max Open Area	0 mm^2
0 mm L	
Weir Coeff.	1.670
Perimeter	3,770 mm
Area	1,130,973 mm^2
Orifice Coeff.	0.6
Operates Above (m)	9999.00

6964 - Mississauga BRT WEST
Stage-Storage-Discharge Summary - Proposed Erin Mills Facility

Stage	Discharge	Storage		Stage	Forebays			Main Pool (Excluding Forebay)			Storage		Estimated Detention Time	
		Active	Total		Area	Incremental Volume	Accumulated Volume	Area	Incremental Volume	Accumulated Volume	Sediment	Total		
(m)	(m^3/s)	(m^3)	(m^3)	(m)	(m^2)	(m^3)	(m^3)	(m^2)	(m^3)	(m^3)	(m^3)	(m^3)	(hrs)	
0.00	0.000	0	0	0.00				0	0	0		0	0	
0.10	0.000	0	49	0.10				976	49	49		49	0	
0.20	0.000	0	150	0.20				1,054	102	150	0	150	0	
0.30	0.000	0	260	0.30		To be designed at final design stage		1,134	109	260	0	260	0	
0.40	0.000	0	377	0.40				1,216	118	377	0	377	0	
0.50	0.000	0	503	0.50				1,300	126	503	0	503	0	
0.60	0.000	0	637	0.60				1,386	134	637	0	637	0	
0.70	0.000	0	780	0.70				1,474	143	780	0	780	0	
0.80	0.000	0	932	0.80				1,564	152	932	0	932	0	
0.90	0.000	0	1,093	0.90				1,656	161	1,093	0	1,093	0	
1.00	0.000	0	1,264	1.00				1,750	170	1,264	0	1,264	0	PP
1.10	0.003	180	1,443	1.10				1,846	180	1,443	0	1,443	17	
1.20	0.005	389	1,633	1.20				1,944	190	1,633	0	1,633	28	ED
1.30	0.006	569	1,832	1.30				2,044	199	1,832	0	1,832	37	
1.40	0.007	778	2,042	1.40				2,146	210	2,042	0	2,042	46	
1.50	0.047	998	2,262	1.50				2,250	220	2,262	0	2,262	47	
1.60	0.072	1,228	2,492	1.60				2,356	230	2,492	0	2,492	48	
1.70	0.090	1,469	2,733	1.70				2,464	241	2,733	0	2,733	48	
1.80	0.105	1,721	2,985	1.80				2,574	252	2,985	0	2,985	49	
1.90	0.118	1,984	3,248	1.90				2,686	263	3,248	0	3,248	50	
2.00	0.130	2,259	3,522	2.00				2,800	274	3,522	0	3,522	50	
2.10	0.141	2,544	3,808	2.10				2,916	286	3,808	0	3,808	51	
2.20	0.150	2,842	4,105	2.20				3,034	298	4,105	0	4,105	51	
2.30	0.411	3,151	4,415	2.30				3,154	309	4,415	0	4,415	52	
2.40	0.993	3,473	4,736	2.40				3,276	322	4,736	0	4,736	52	
2.50	1.900	3,807	5,070	2.50				3,400	334	5,070	0	5,070	52	

6964 - Mississauga BRT WEST
Detailed Outlet Structure Discharge Calculations

Elevation	Discharge (m^3/s)								
	Spillway			Outlet Riser				DICB	Total
(m)	Weir 1	Weir 2	Total	Orifice 1	Weir 1	Orifice 2	Total		Discharge
0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.000**
0.10	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.000**
0.20	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.000**
0.30	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.000**
0.40	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.000**
0.50	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.000**
0.60	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.000**
0.70	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.000**
0.80	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.000**
0.90	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.000**
1.00	0.000	0.000	0.000	0.003	0.000	0.000	0.003	0.000	**0.003**
1.20	0.000	0.000	0.000	0.005	0.000	0.000	0.005	0.000	**0.005**
1.30	0.000	0.000	0.000	0.006	0.000	0.000	0.006	0.000	**0.006**
1.40	0.000	0.000	0.000	0.007	0.000	0.000	0.007	0.000	**0.007**
1.50	0.000	0.000	0.000	0.008	0.000	0.039	0.047	0.000	**0.047**
1.60	0.000	0.000	0.000	0.009	0.000	0.064	0.072	0.000	**0.072**
1.70	0.000	0.000	0.000	0.010	0.000	0.081	0.090	0.000	**0.090**
1.80	0.000	0.000	0.000	0.010	0.000	0.095	0.105	0.000	**0.105**
1.90	0.000	0.000	0.000	0.011	0.000	0.107	0.118	0.000	**0.118**
2.00	0.000	0.000	0.000	0.012	0.000	0.118	0.130	0.000	**0.130**
2.10	0.000	0.000	0.000	0.012	0.000	0.128	0.141	0.000	**0.141**
2.20	0.000	0.000	0.000	0.013	0.000	0.138	0.150	0.000	**0.150**
2.30	0.251	0.000	0.251	0.013	0.000	0.147	0.160	0.000	**0.411**
2.40	0.824	0.000	0.824	0.014	0.000	0.155	0.169	0.000	**0.993**
2.50	1.723	0.000	1.723	0.014	0.000	0.163	0.177	0.000	**1.900**

Parameters

Overflow Weir 1		Orifice 1	
Crest Elevation		Orifice Centre	Perimeter
2.2 m		1.0375 m	236 mm
Crest Width		Orifice Invert	Area
4 m		1.0 m	4,418 mm^2
Slope (x:1)	10	Orifice Diameter	Orifice Coeff.
Weir Coeff.	1.670	75 mm	0.6
Weir Top Width (m	10.000	Orientation	
Overflow Weir 2		Vertical	
Crest Elevation		**Weir 1**	
99999 m		Top of Weir Structure	Max Perimeter
Crest Width		99999.00 m	0 mm
0 m		Weir Crest Invert	Max Open Area
Slope (x:1)	0	99999.00 m	0 mm^2
Weir Coeff.	1.670	Weir Dimensions (Height x Length)	
Weir Top Width (m	0.000	0 mm Height	0 mm L
DICB		Side Walls	Weir Coeff.
T/G Invert		Vertical	1.670
9999 m		**Orifice 2**	
CB Size		Orifice Centre	Perimeter
600 mm		1.44 m	864 mm
by		Orifice Invert	Area
600 mm		1.3 m	59,396 mm^2
Grate Slope		Orifice Diameter	Orifice Coeff.
4 :1		275 mm	0.6
Area (m^2)	0.360	Orientation	Operates Above (m)
Perimeter (m)	2.400	Vertical	1.44

$$Q = CA\sqrt{2g\left(h_1 - h_1 + \frac{D}{2000}\right)} \qquad Q = CL(h_2 - h_1)^{1.5} + 1.268z(h_2 - h_1)^{2.5}$$

Where, h2 = elevation at stage 2 (m)
h1 = elevation at stage 1 (m)
D = orifice diameter (mm)
C = orifice coefficient
A = orifice open area (m^2)

h2 = elevation at stage 2 (m)
h1 = elevation at stage 1 (m)
L = weir crest length (m)
C = weir coefficient
z = weir side slope (z:1)