Stormwater Management Report

Windsor Solar Project

Prepared for:
Windsor Solar LP

Prepared by:
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February 19, 2016

Sign-off Sheet

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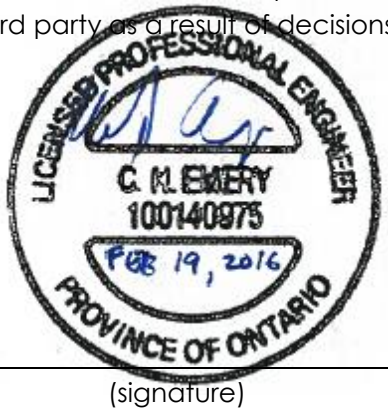

Prepared by _____
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Nick Emery, P.Eng.

Reviewed by _____
(signature)

Andy Sobchak, P.Eng.

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1.0 INTRODUCTION

The Windsor Solar Project is a proposed 50 MW renewable energy project located on the Windsor International Airport property in the City of Windsor, Ontario. A stormwater management report was previously prepared by Dillon Consulting for the proposed project as part of the Renewable Energy Approval process. As part of the detailed design for the proposed facility, Stantec Consulting Ltd. has been retained to verify the conclusions of the Dillon report, prepare a proposed stormwater management strategy, and assess the potential impacts of this proposed development on local surface water. Our approach and the technical analyses undertaken to date are detailed in the following pages of this report.

1.1 BACKGROUND INFORMATION

The site stormwater management strategy was prepared based on the following background information:

- *Windsor Solar Project Geotechnical Engineering Report*, prepared by LVM, August 13, 2014;
- Topographic Survey, prepared by Verhaegen, Stubberfield, Hartley, Brewer, Bezaire Inc., May 20, 2015;
- Topographic Survey, prepared by Surveyors On Site Inc., December 2015;
- *Windsor Solar Project Preliminary Stormwater Management Report*, prepared by Dillon Consulting, February 2015; and
- Proposed site plan, prepared by PCL, January 2016.

2.0 EXISTING CONDITIONS DRAINAGE

The subject site is located within the Windsor International Airport lands, and has historically been farmed for row crops. The existing site location is shown on Figure 1.

2.1 TOPOGRAPHY

Based on the results of the site topographic survey and available aerial photography, the existing site slopes very gently from west to east. The site slopes are nearly flat, with an average measured slope of approximately 0.2%. The slopes are interrupted by existing agricultural ditches and roadside ditches that intercept surface runoff and convey it to the Lappan Drain and the McGill Drain.

2.2 SOILS

Based on the information presented in the site geotechnical report, the site soils are comprised of a topsoil surface layer, measuring from 150 mm to 380 mm thick, overlying weathered silty clay till. Particle size distribution analysis results for the silty clay tills suggest these soils contain approximately 3% gravel, 26% – 29% sand, 35% - 38% silt, and 33% clay (LVM, 2014).

2.3 SITE VISIT

A site visit was completed on December 23, 2015 to identify the existing surface and drainage conditions prior to construction. A brief rainfall occurred immediately prior to the visit. Photographs presented in Appendix A reflect these conditions.

2.4 WATER BODIES

Runoff from most of the site is collected and conveyed by Municipal Drains - the Lappan Drain and the McGill Drain. As shown in the site visit photographs (Appendix A), both channels are heavily vegetated and standing water was observed in both during the December 23, 2015 site visit.

3.0 PROPOSED DEVELOPMENT

The Windsor Solar Project employs a low-impact approach to site development. The grading and civil engineering plans included in Appendix B show that the proposed grades will match existing grades wherever possible; existing drainage patterns are preserved wherever possible; roads will typically be constructed at grade to maintain existing drainage patterns; and site excavation will only occur to allow construction of the access road network and drainage features such as grassed swales.

Additionally, the proposed solar panel racking will be installed using helical piles, which means the invasive practices of coring, topsoil stripping and large-scale earthworks typically employed with rack and panel installation will not be required. Once the panels and racking are in place, all accessible areas will be scarified/aerated to alleviate soil compaction, and vegetation across the site will be promoted through drill seeding. The post-development hydrology will be significantly improved as the property transitions from active agricultural use with extended periods of bare soil to a permanent grassed meadow.

Runoff from the proposed development is conveyed to the Lappan Drain and McGill Drain by shallow grassed swales. The proposed swales are generally located on the upstream sides of the proposed access roads. Proposed access road culverts are designed to convey the design 5-year peak discharge. Entrance culverts are designed to convey the design 10-year peak discharge. The corresponding culvert design information is summarized in Appendix C.

4.0 IMPACT ASSESSMENTS

As demonstrated from the analysis results described below, the land use change from agriculture to meadow is expected to 1) improve the site's infiltration regime, 2) reduce runoff peak flow, and 3) mitigate the risk of erosion and sediment migration off the site.

4.1 RUNOFF QUANTITY (PEAK FLOW)

Hydrologic models were developed to calculate the peak runoff rates from the site under both existing and proposed conditions. The existing conditions drainage plan is shown on Figure 2 and the corresponding catchment areas were delineated based on available topographic mapping, aerial photography, site survey data, and site visit observations. The proposed conditions drainage plan is shown on Figure 3 and the corresponding catchment areas were delineated based on the proposed Windsor Solar Project grading plan.

The hydrologic models include the entire Lappan and McGill Drain catchment area upstream of the eastern Windsor Solar Project site boundary. Based on the site survey results, a secondary drainage outlet was also identified: A perched 600 mm diameter CSP culvert located approximately 400 m north of the 1600-mm-diameter CSP McGill Drain culvert at the eastern site boundary conveys stormwater from a small portion of the site to the neighboring agricultural land during severe storm events.

The Windsor Solar Project proposal increases site impervious coverage to approximately 5.65 ha, or 2.3% of the total site area, mainly in the form of roadways and substation platforms. As noted in *Hydrologic Response of Solar Farms* (Cook and McCuen; Journal of Hydrologic Engineering, May 2013), included in Appendix D for reference, solar panels suspended on racking above vegetated cover do not functionally contribute to site imperviousness and do not have "a significant effect on the runoff volumes, peaks or times to peak" of solar farm development sites.

Normally, increasing impervious coverage generates a corresponding increase in runoff peak flows. However, as the analysis in Appendix D details, existing bare soil/agricultural land use is being converted to grassed/vegetated land use under proposed conditions, which hydrologically improves the site and reduces expected peak runoff from existing pervious areas.

Comparing the existing and proposed condition hydrologic model results shows the impact of pervious cover change outweighs the impact of increasing the total impervious cover. The peak discharges at the two existing site outlets for the modelled design events are summarized in the following table. The results show that the post-development peak flows at the 1600 mm CSP culvert are less than the existing condition peak flows for all of the modelled design events. While the post-development peak flows are slightly higher than existing conditions at the 600 m diameter CSP culvert for three of the modelled design events, the calculated increase is negligible and unlikely to result in downstream negative impacts. Thus, formal quantity control measures for stormwater are not required.

Table 1 Calculated Peak Discharge Summary

Design Event	Peak Discharge at Existing 600 mm Diameter Culvert (cms)		Peak Discharge at Existing 1600 mm Diameter McGill Drain Culvert (cms)	
	Existing Condition	Proposed Condition	Existing Condition	Proposed Condition
2-year	0.03	0.04	3.36	3.10
5-year	0.06	0.07	4.84	4.49
10-year	0.09	0.09	5.76	5.36
25-year	0.12	0.13	6.81	6.60
50-year	0.14	0.14	7.60	7.52
100-year	0.15	0.15	8.34	8.29

4.2 RUNOFF QUALITY

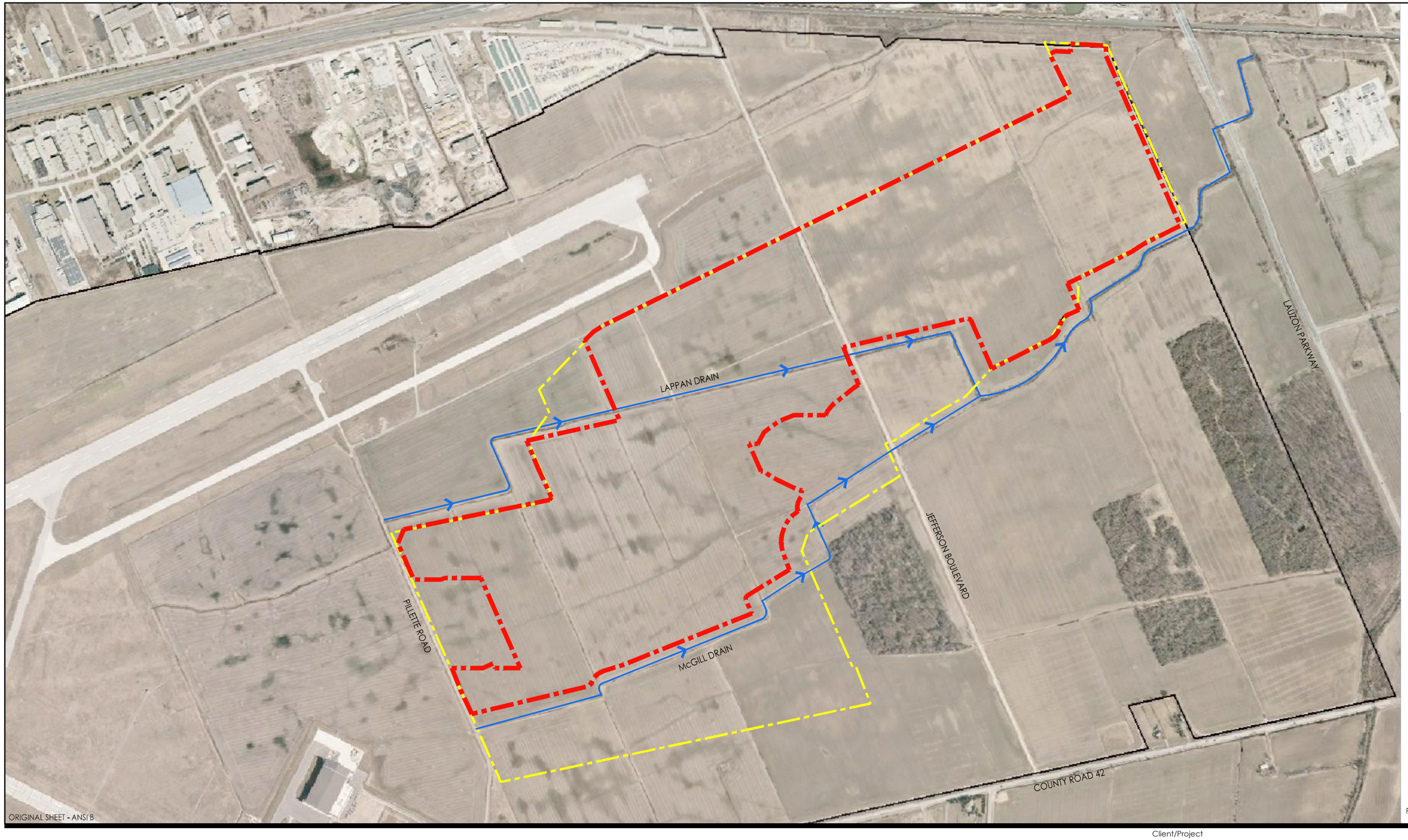
An added benefit of the Windsor Solar Project low-impact approach to site development is overland sheet flow drainage is largely maintained: concentration and channelization of runoff along roadsides is minimized and long, shallow-sloped flow paths over grass are promoted. This added contact with vegetation is expected to improve runoff quality draining from the site. As noted in *Control of Erosion – Fact Sheet* (Ontario Ministry of Agriculture and Food, October 1986) located in Appendix E, Moore, Fish and Arnold report, "Compared to continuous corn, hay or pasture crops reduce soil loss by about 90%." Table 3 of the fact sheet indicates hay-pasture and permanent pasture can provide an 87% and a 93% respective reduction in soil loss compared to corn and bean cultivation. Since the Windsor Solar Project site has been actively cultivated, implementation of the proposed drill seeding and vegetation program is expected to significantly improve its hydrologic characteristics, reduce erosion potential and achieve *Enhanced* water quality control.

Thus, formal quality control measures for stormwater are not required.

5.0 CONCLUSIONS & RECOMMENDATIONS

The Windsor Solar Project development plan is simple and low-impact. Large-scale earthworks are not being proposed and localized post-development grading will generally match the existing topography. Fundamentally, the plan proposes to change land use of the property from active agriculture to grassed meadow. The analyses contained within this report demonstrate this land use change improves local hydrology and there are no anticipated negative impacts on the Lappan Drain or McGill Drain.

FIGURES



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February 2016
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Legend

SITE BOUNDARY

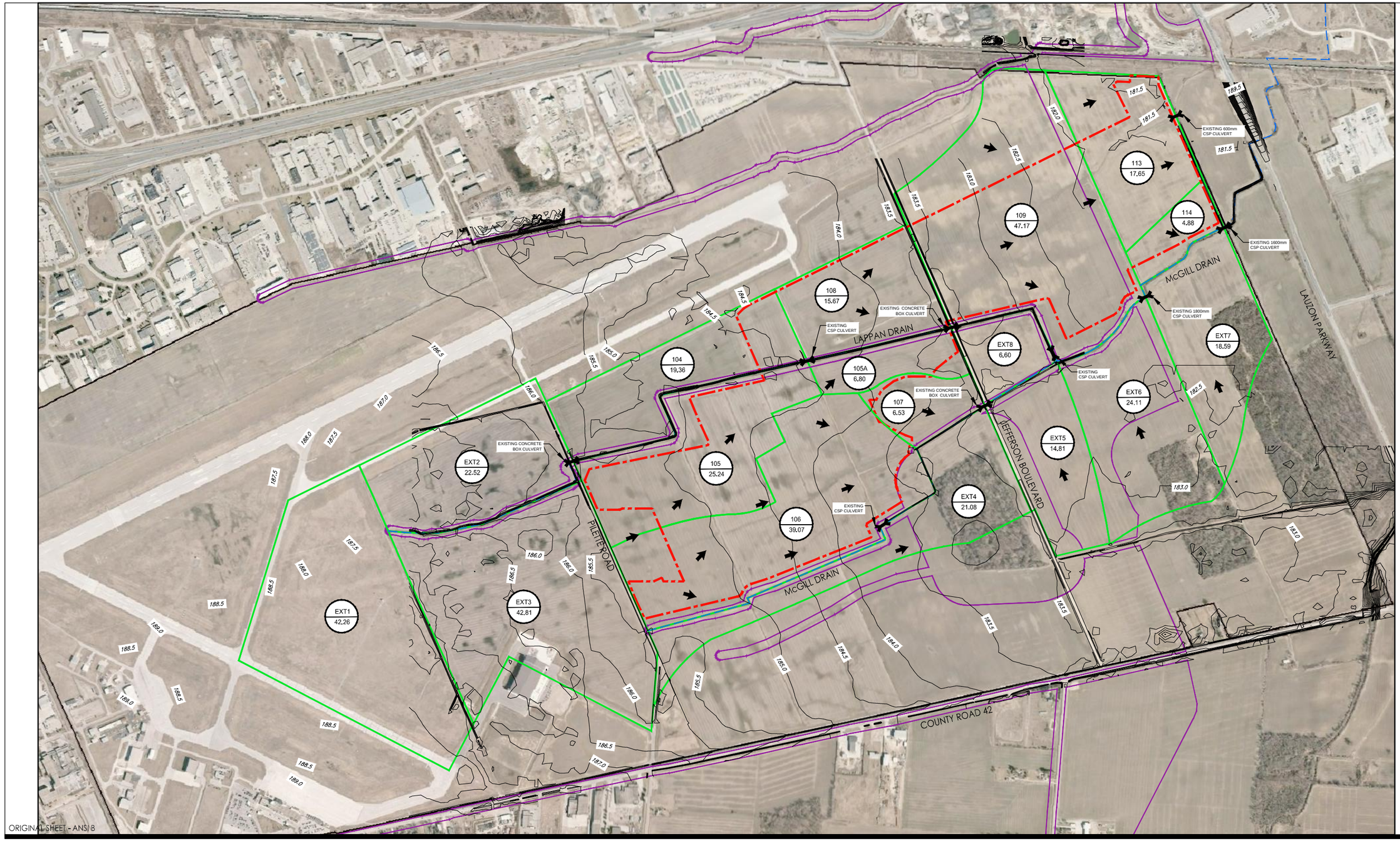
REA APPROVAL LIMIT

1:10,000 0 100 300 500m

Client/Project
WINDSOR SOLAR LP
WINDSOR SOLAR ENERGY PROJECT

Figure No.
1

Title
SITE LOCATION



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Legend

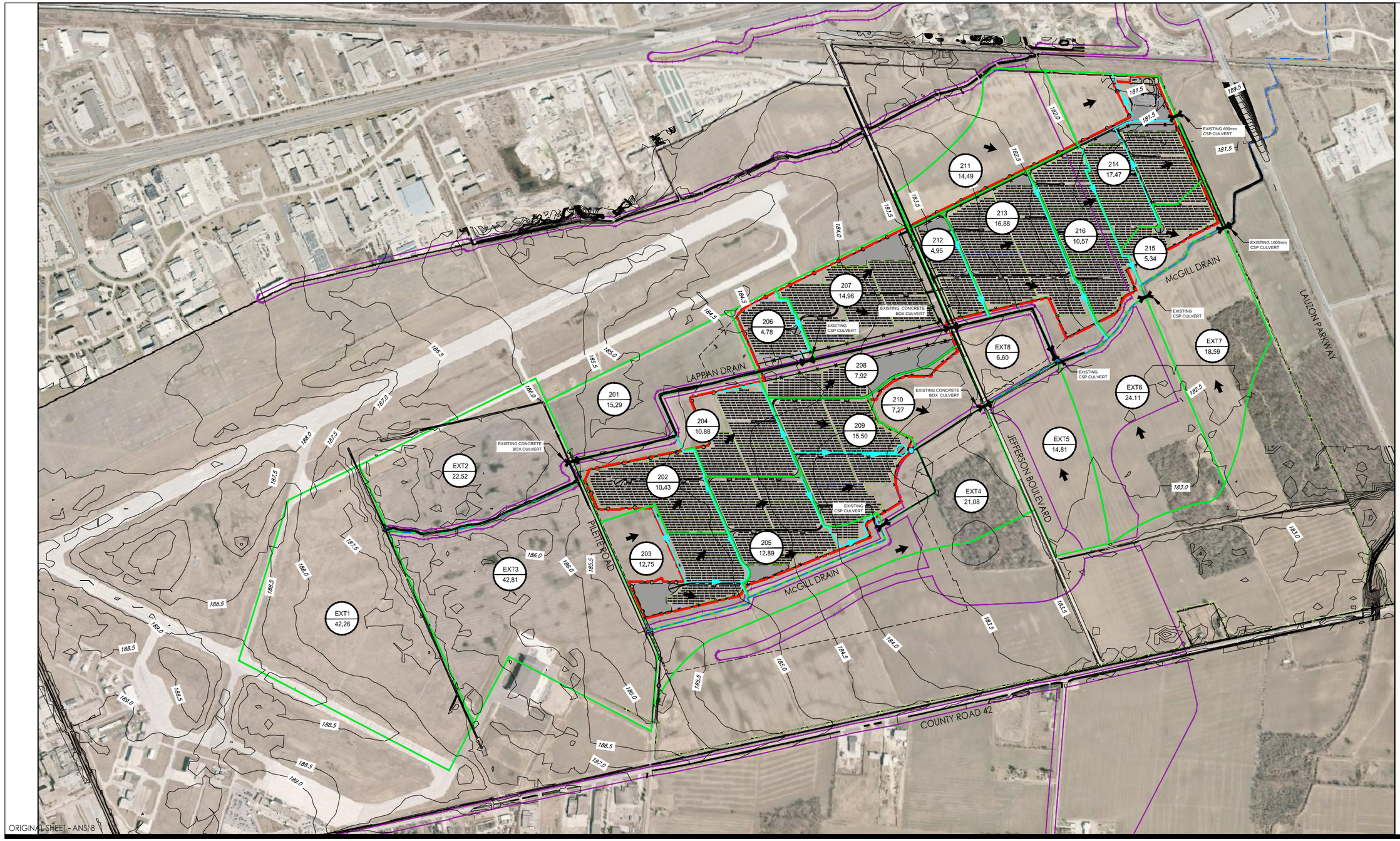
- SITE BOUNDARY
- STORM DRAINAGE AREA
- ERCA REGULATION LIMITS
- OVERLAND FLOW DIRECTION
- 205 / 4.76 — CATCHMENT ID / CATCHMENT AREA (ha)

1:12,500 — 0 125 375 625m

Client/Project
WINDSOR SOLAR LP
WINDSOR SOLAR ENERGY PROJECT

Figure No.
2

Title
EXISTING CONDITIONS DRAINAGE PLAN



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Legend

- SITE BOUNDARY
- STORM DRAINAGE AREA
- ERCA REGULATION LIMITS
- PROPOSED GRASSED SWALE
- OVERLAND FLOW DIRECTION
- CATCHMENT ID (205)
- CATCHMENT AREA (ha) (4.76)

1:12,500 — 0 125 375 625m

Client/Project
WINDSOR SOLAR LP
WINDSOR SOLAR ENERGY PROJECT

Figure No.
3

Title
PROPOSED CONDITIONS DRAINAGE PLAN

APPENDIX A
SITE PHOTOGRAPHS

Photo 1 – McGill Drain at Pilette Road, Looking East

Photo 2 – Lappan Drain, Looking West to Pilette Road

Photo 3 – Lappan Drain, Looking East

Photo 4 – Looking South from Lappan Drain

Photo 5 – Drainage Swale to Lappan Drain, Looking South

Photo 6 – Typical Ditch, Looking South

Photo 7 – Lappan Drain, Looking West

Photo 8 – Looking Northeast from Lappan Drain

Photo 9 – Ditch South of Runway, Looking South

Photo 10 – Roadside Ditch South of Runway, Looking West

Photo 11 – Roadside Ditch South of Runway Looking East

Photo 12 – Jefferson Boulevard Roadside Ditch, Looking South

Photo 13 – Lappan Drain, Looking North from McGill Drain

Photo 14 – Roadside Ditch at Eastern Site Boundary, Looking North

Photo 15 – Sediment Deposition in Culvert Near East Site Limit

Photo 16 – Looking West from Jefferson Boulevard

APPENDIX B
ENGINEERING DRAWINGS

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Legend

PROPOSED	EXISTING
	PROPERTY LINE
	PROJECT LOCATION BOUNDARY
	FENCE
	EX. CONTOUR 185.0

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Client/Project
WINDSOR SOLAR LP

WINDSOR SOLAR ENERGY PROJECT
50MW SOLAR FARM
Windsor, ON

Title
OVERALL SITE PLAN

Project No. 133560106
Scale 1:4000 (0, 40, 120, 200m)
Drawing No. C-010
Sheet
Revision B

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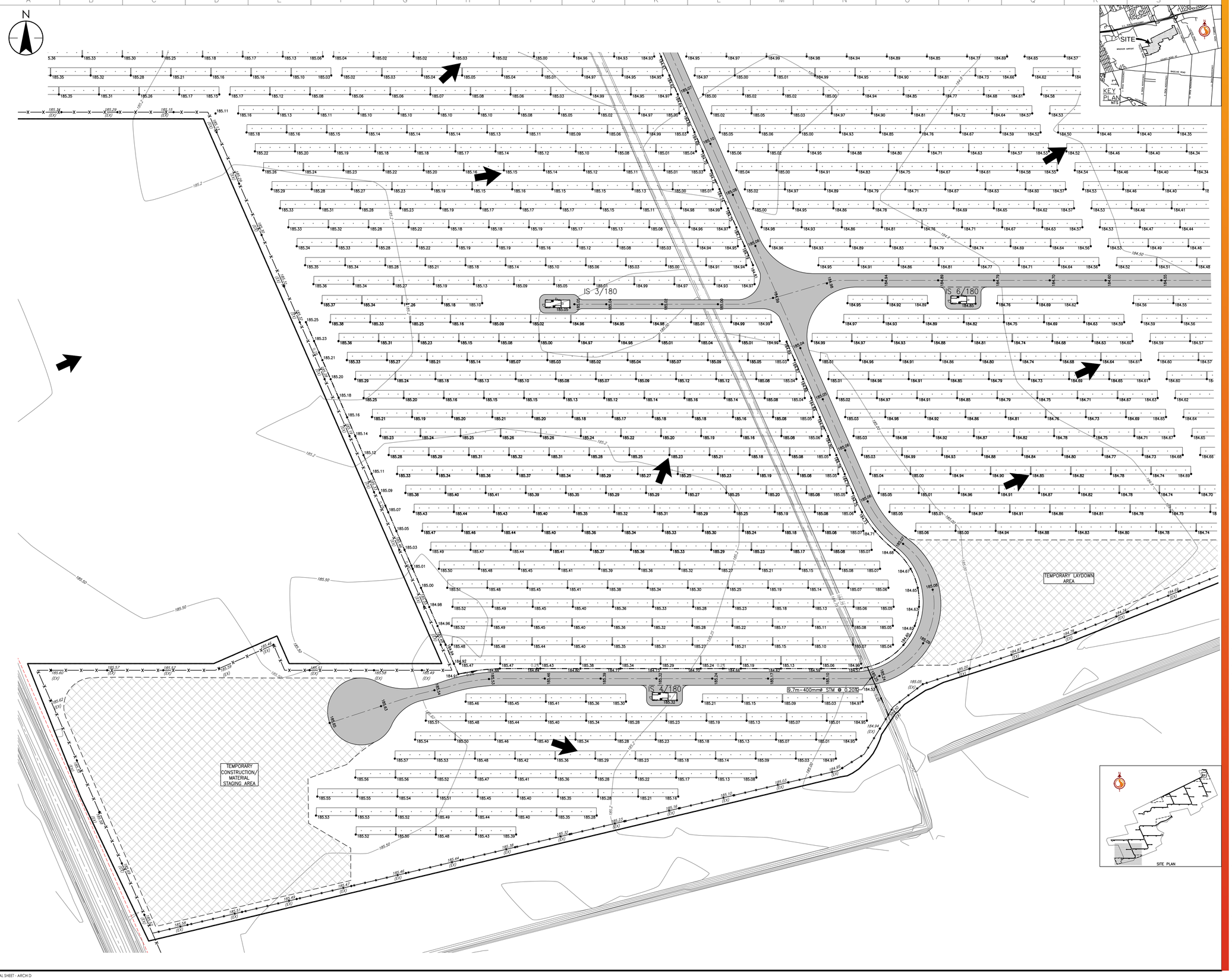

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Legend

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	DITCH	
	CONTOUR (0.25m INTERVALS)	184.5
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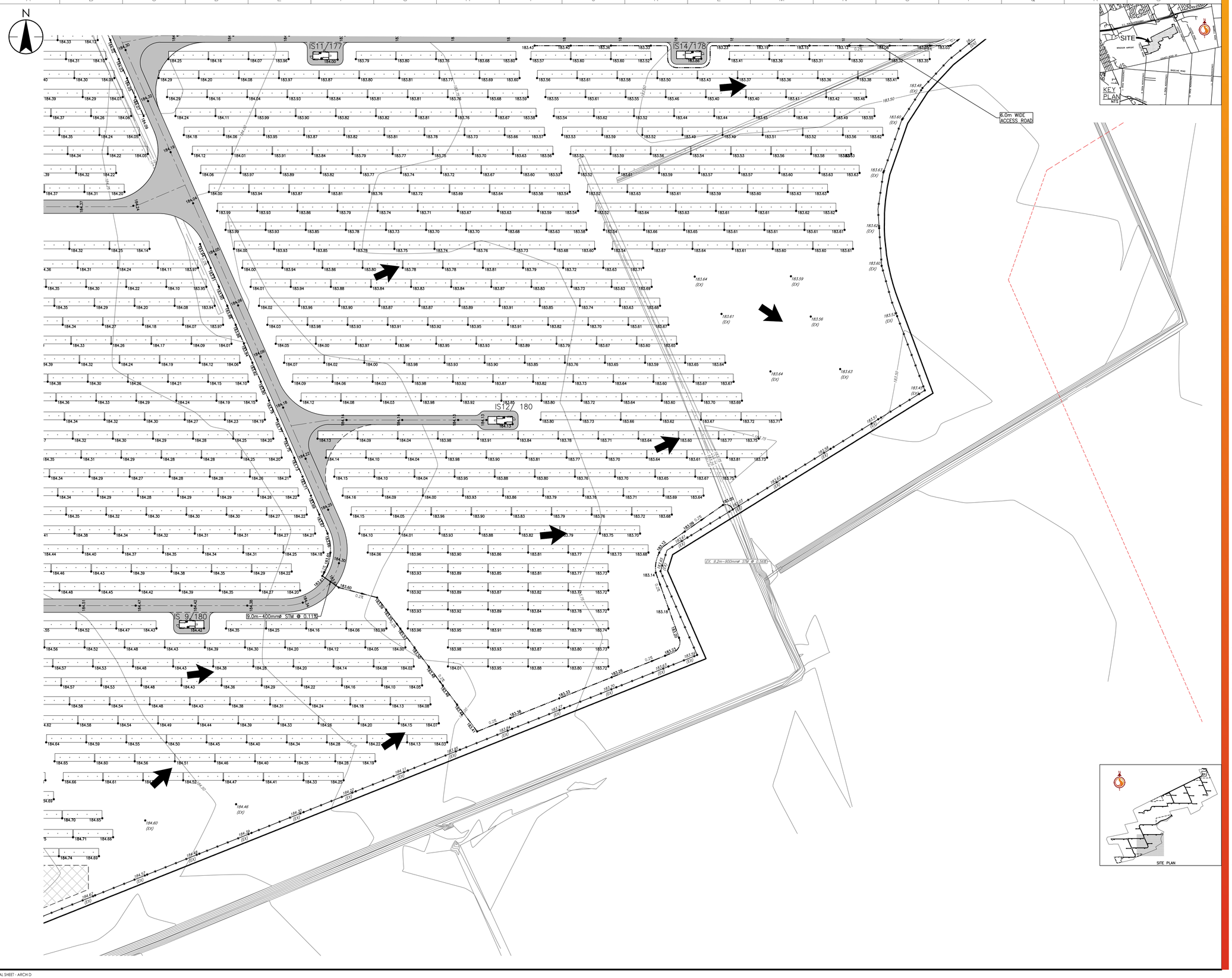

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File Name: 133560106_C-400GP.dwg		Dwn.	Chkd.	16.01.06
			Dsgn.	YY.MM.DD

Permit-Seal

PRELIMINARY
NOT FOR CONSTRUCTION

Client/Project
WINDSOR SOLAR LP

WINDSOR SOLAR ENERGY PROJECT
50MW SOLAR FARM
Windsor, ON

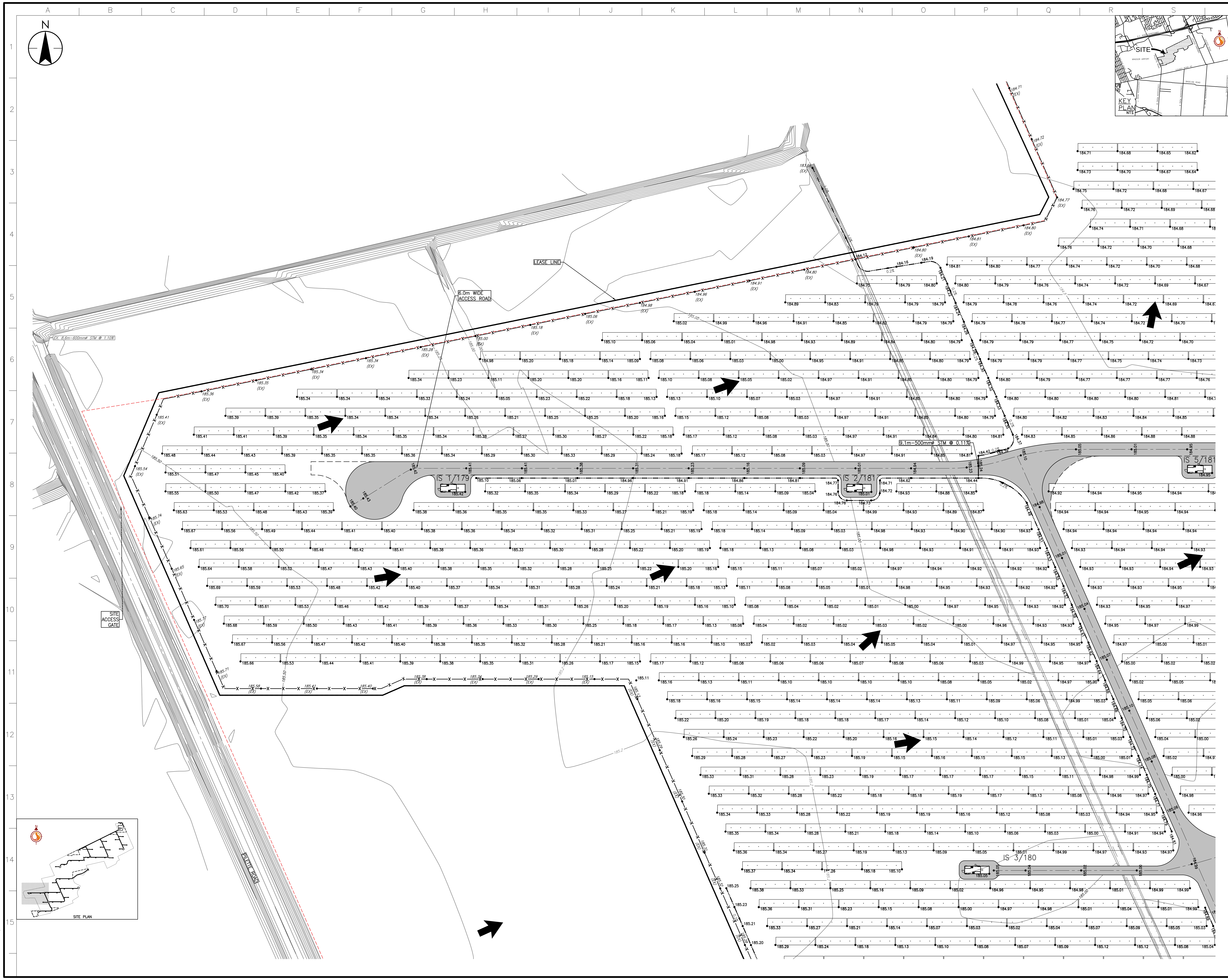
Title
GRADING PLAN

SITE PLAN

Project No.	Scale	Drawing No.	Sheet	Revision
133560106	1:750 (0 7.5 22.5 37.5m)	C-401		B

V:\01614\active\133560106\design\drawing\civil\sheet_files\133560106_C-400GP.dwg
2016/02/19 3:01 PM By: Miller, Jonathan

ORIGINAL SHEET - ARCH D



ORIGINAL SHEET - ARCH D

Stantec

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Tel. 519.579.4410
www.stantec.com

PCL
CONSTRUCTION LEADERS

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Legend

PROPOSED		EXISTING
187.00	ELEVATION	185.19 (EX)
	DITCH	
	CONTOUR (0.25m INTERVALS)	184.5
	PROPERTY LINE	
	PROJECT LOCATION BOUNDARY	
	FENCE	
	OVERLAND FLOW DIRECTION	

Revision	By	Appd.	YY.MM.DD
B. ISSUED FOR TENDER	JBM	DS	16.02.17
A. ISSUED FOR CLIENT REVIEW	JBM	DS	16.01.29

File Name: 133560106_C-400GP.dwg — Dwn. — Chkd. — Dsgn. — 16.01.06 (YY.MM.DD)

Permit-Seal

PRELIMINARY
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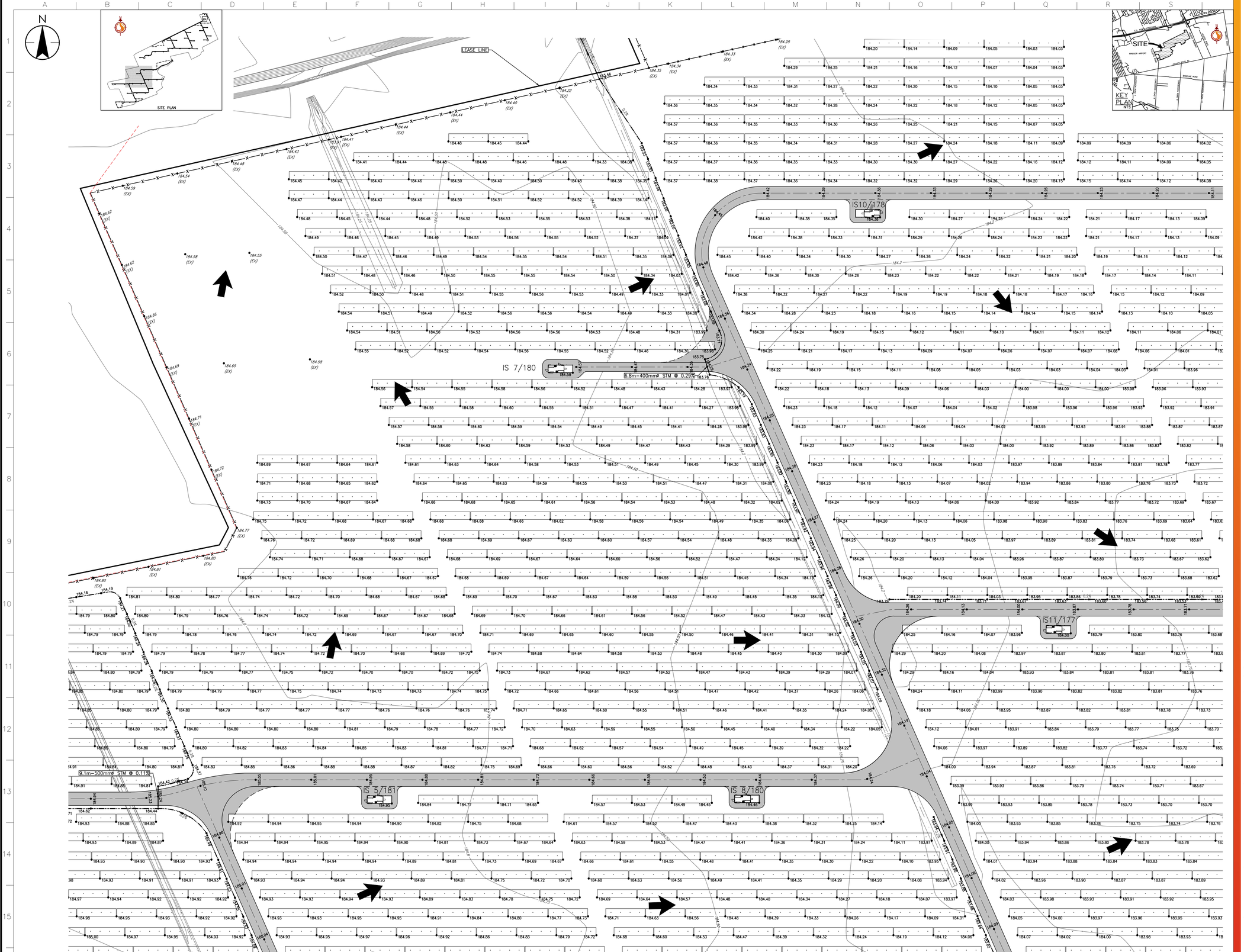
Client/Project
WINDSOR SOLAR LP

WINDSOR SOLAR ENERGY PROJECT
50MW SOLAR FARM
Windsor, ON

Title
GRADING PLAN

Project No. 133560106
Scale 1:750 (0 – 7.5 – 22.5 – 37.5m)

Drawing No. C-402
Sheet
Revision B



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187.00	ELEVATION	185.19 (EX)
	DITCH	
	CONTOUR (0.25m INTERVALS)	184.5
	PROPERTY LINE	
	PROJECT LOCATION BOUNDARY	
	FENCE	
	OVERLAND FLOW DIRECTION	

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A. ISSUED FOR CLIENT REVIEW	JBM	DS		16.01.29
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WINDSOR SOLAR LP

WINDSOR SOLAR ENERGY PROJECT
50MW SOLAR FARM
Windsor, ON

Title
GRADING PLAN

Project No.	Scale	Drawing No.	Sheet	Revision
133560106	1:750 (0 7.5 22.5 37.5m)	C-403		B

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2016/02/19 3:02 PM By: Miller, Jonathan

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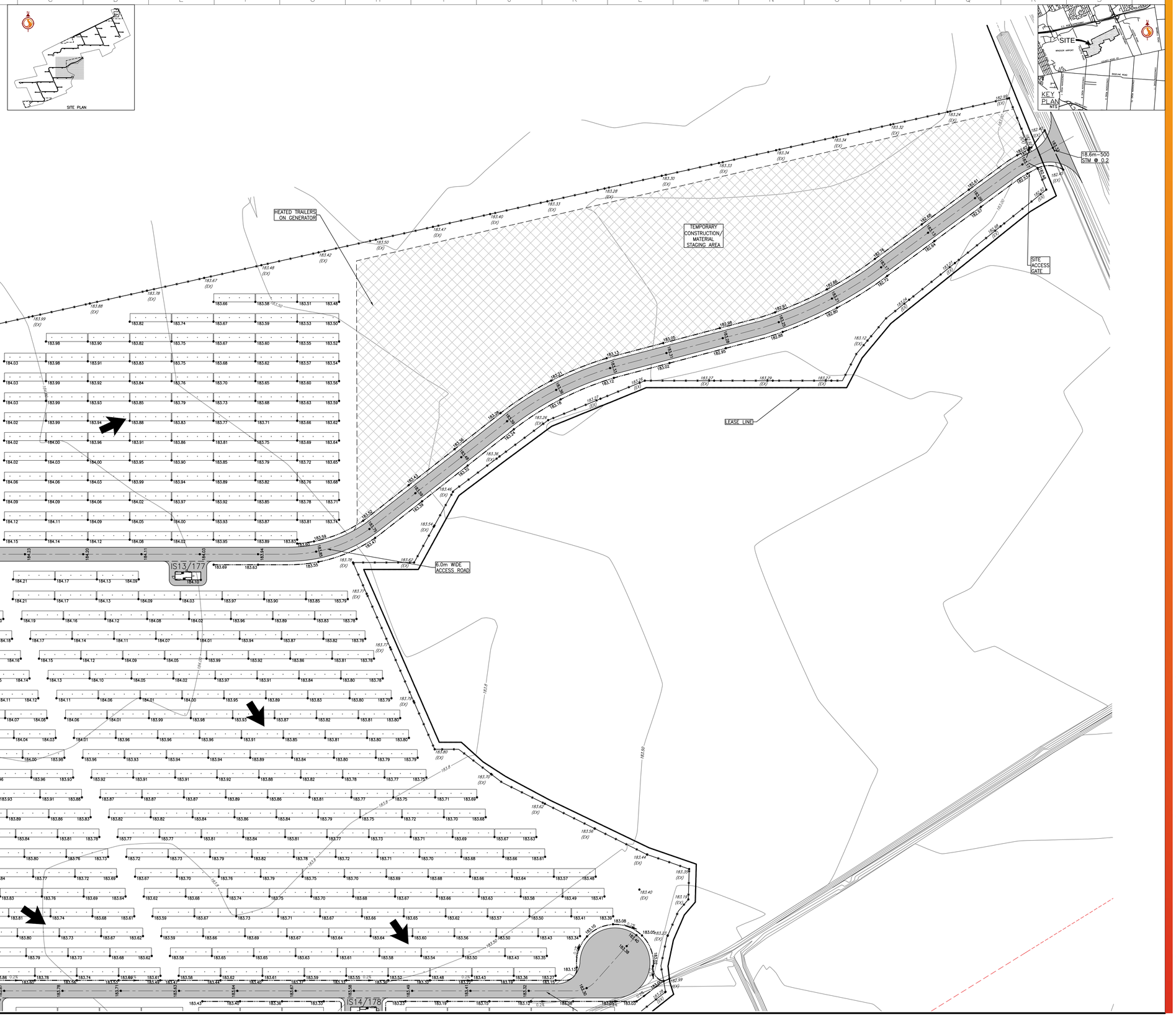

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	DITCH	
	CONTOUR (0.25m INTERVALS)	184.5
	PROPERTY LINE	
	PROJECT LOCATION BOUNDARY	
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Permit-Seal

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Client/Project
WINDSOR SOLAR LP

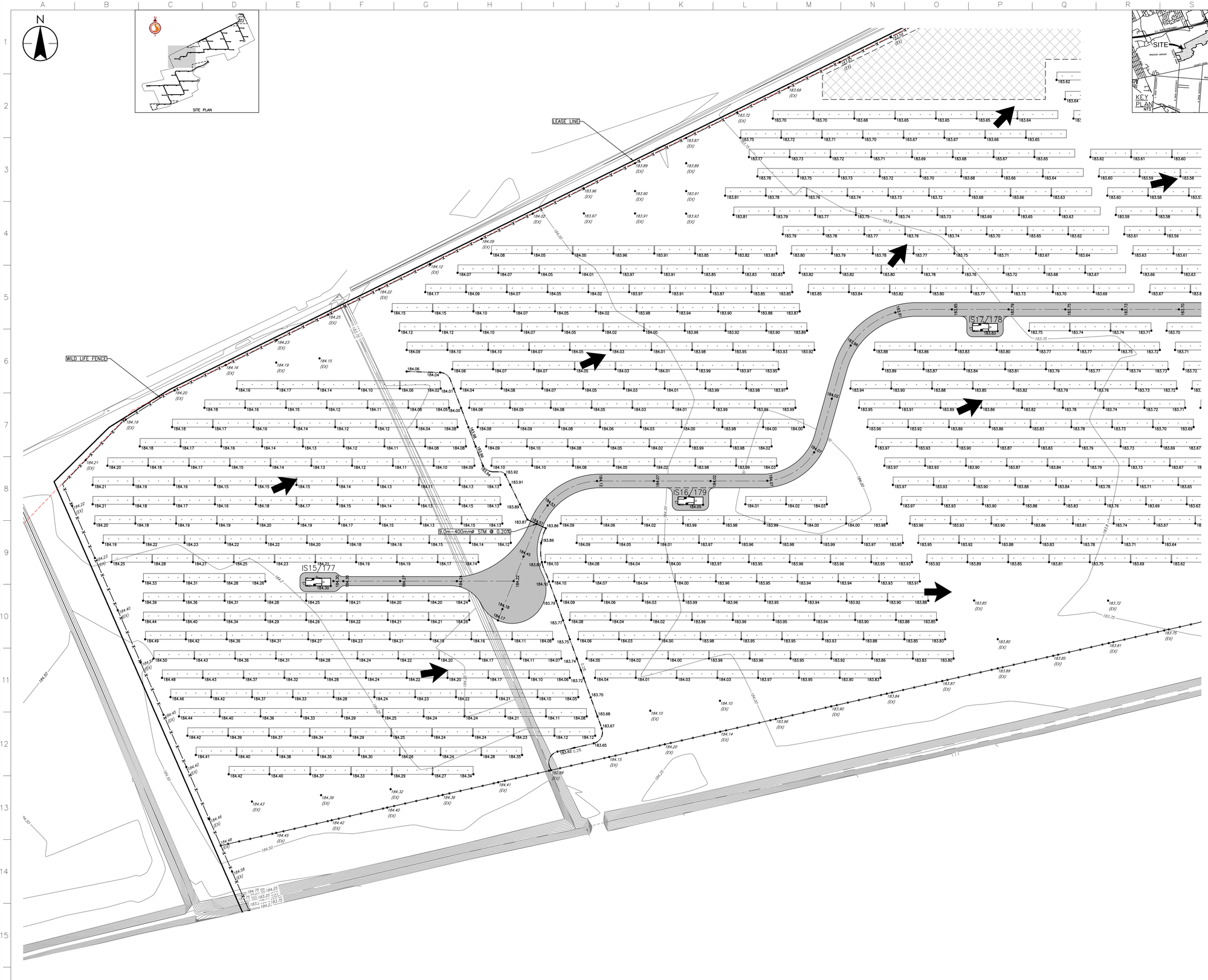
WINDSOR SOLAR ENERGY PROJECT
50MW SOLAR FARM
Windsor, ON

Title
GRADING PLAN

Project No.	Scale	Drawing No.	Sheet	Revision
133560106	1:750 (0 7.5 22.5 37.5m)	C-404		B

V:\01614\active\133560106\design\drawing\civil\sheet_files\133560106_C-400GP.dwg
2016/02/19 3:02 PM By: Miles, Jonathan

ORIGINAL SHEET - ARCH D



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	DITCH	
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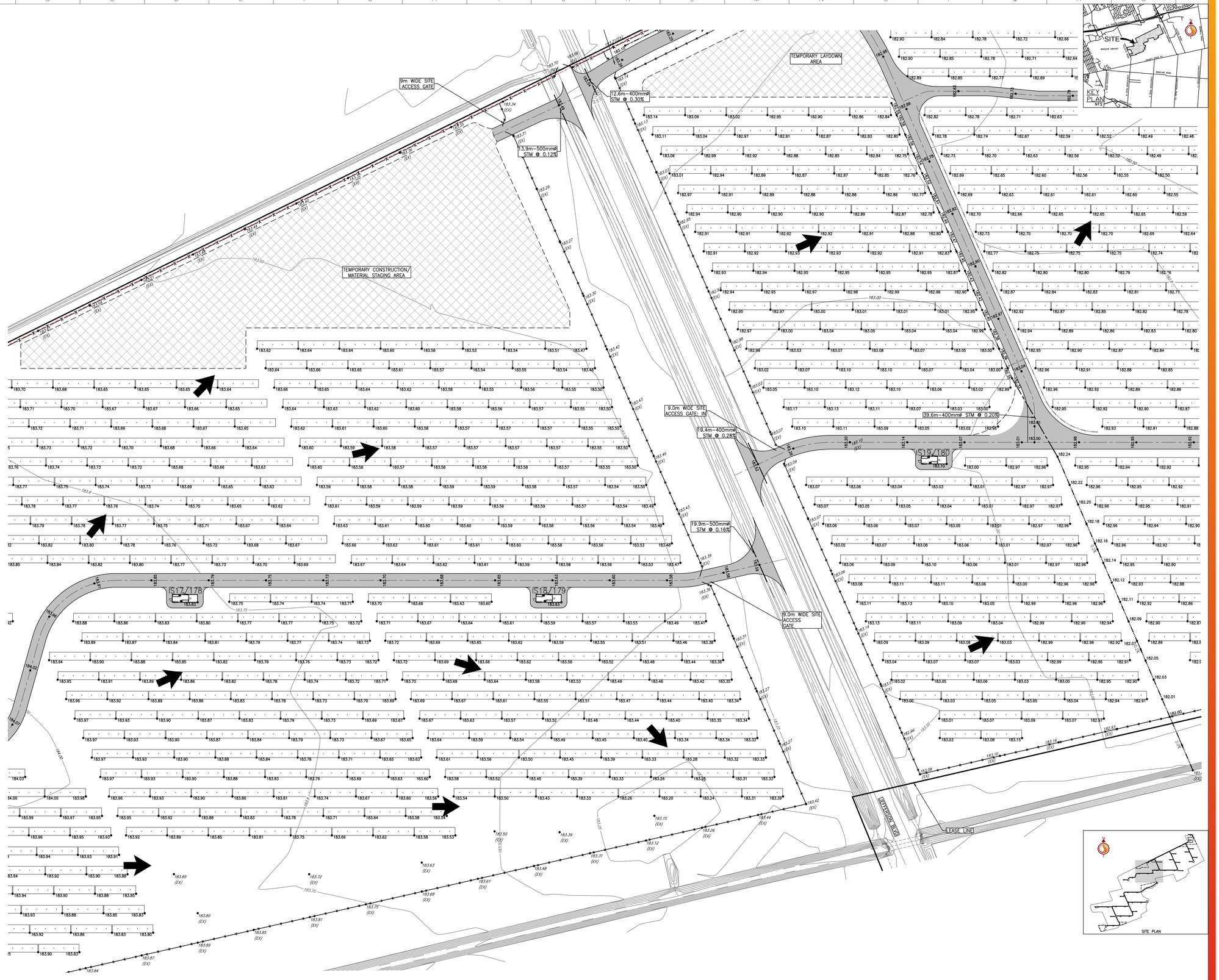
WINDSOR SOLAR LP

WINDSOR SOLAR ENERGY PROJECT
50MW SOLAR FARM
Windsor, ON

Title
GRADING PLAN

Project No.	Scale	Revision
133560106	1:750 (0 7.5 22.5 37.5m)	
Drawing No.	Sheet	
C-410		B

ORIGINAL SHEET - ARCH D



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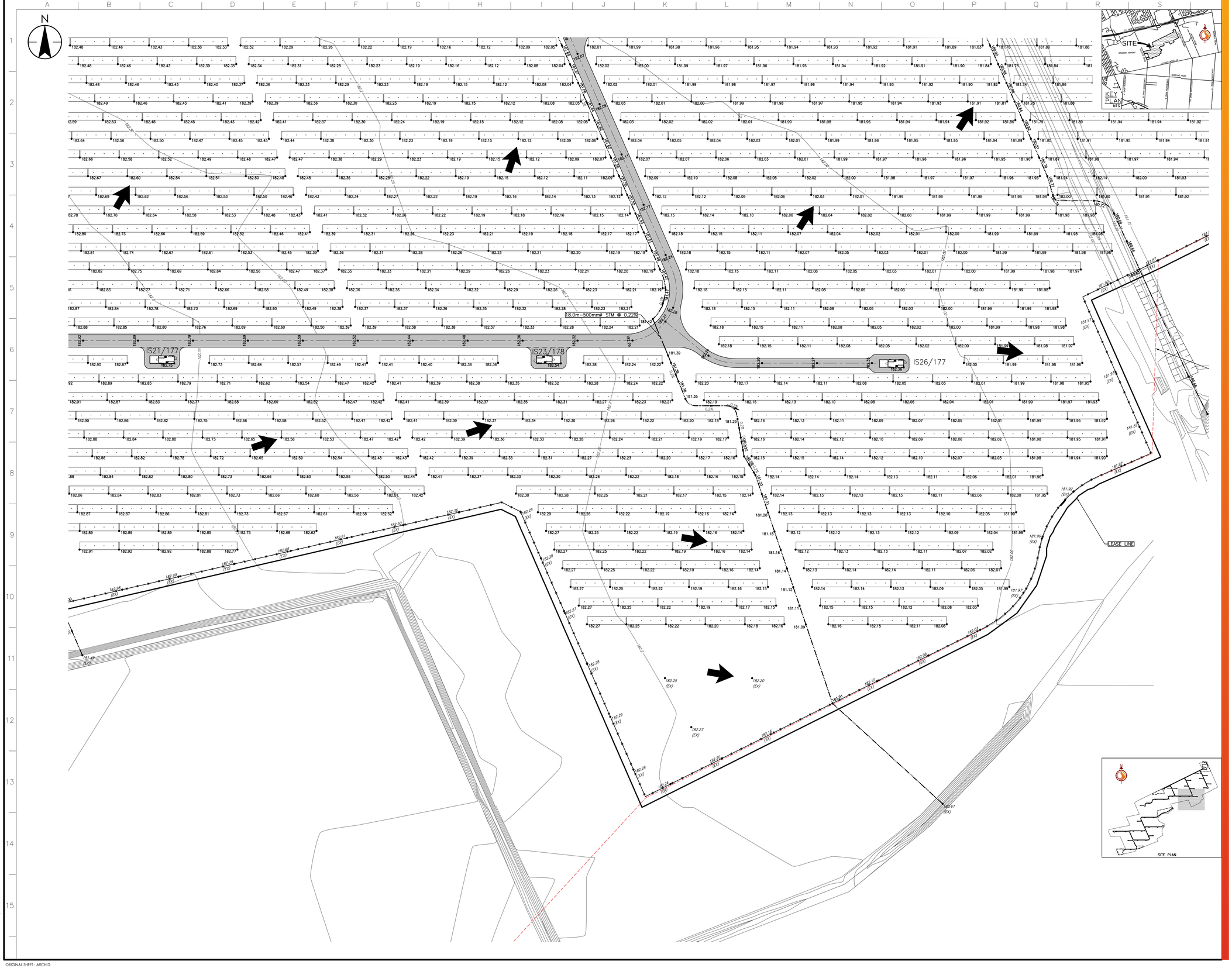

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Client/Project
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WINDSOR SOLAR ENERGY PROJECT
50MW SOLAR FARM
Windsor, ON

Title
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Drawing No.			
C-412			B

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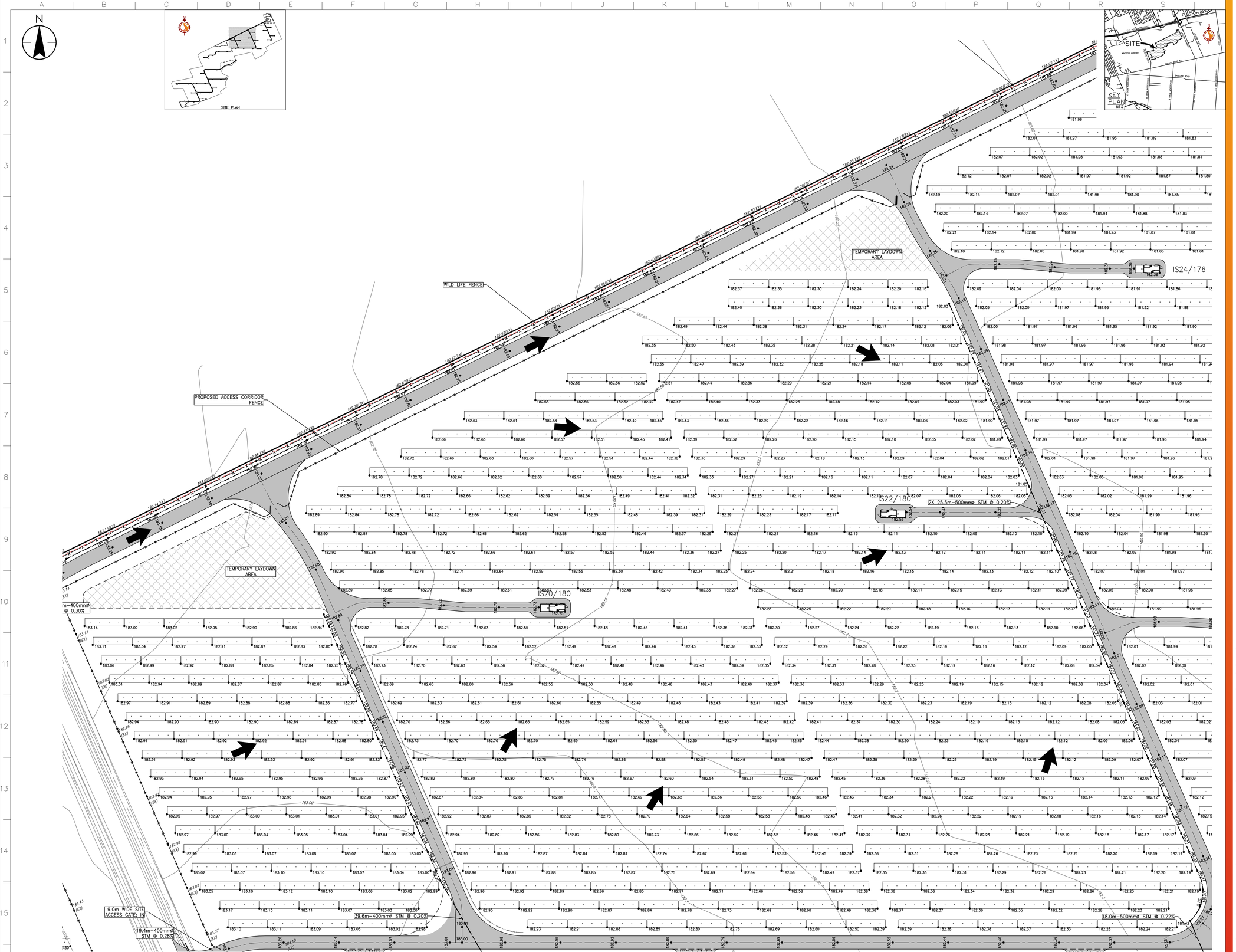

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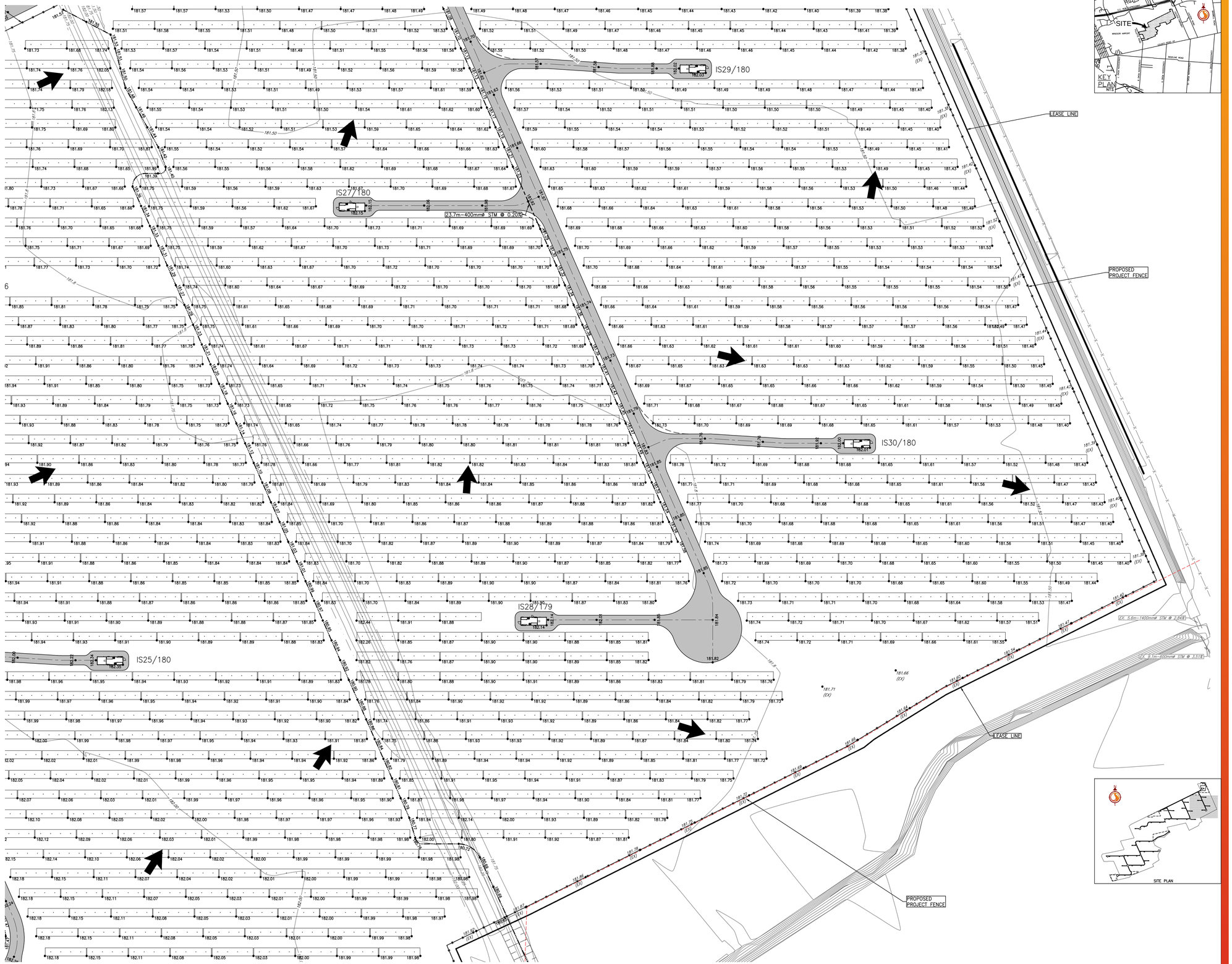

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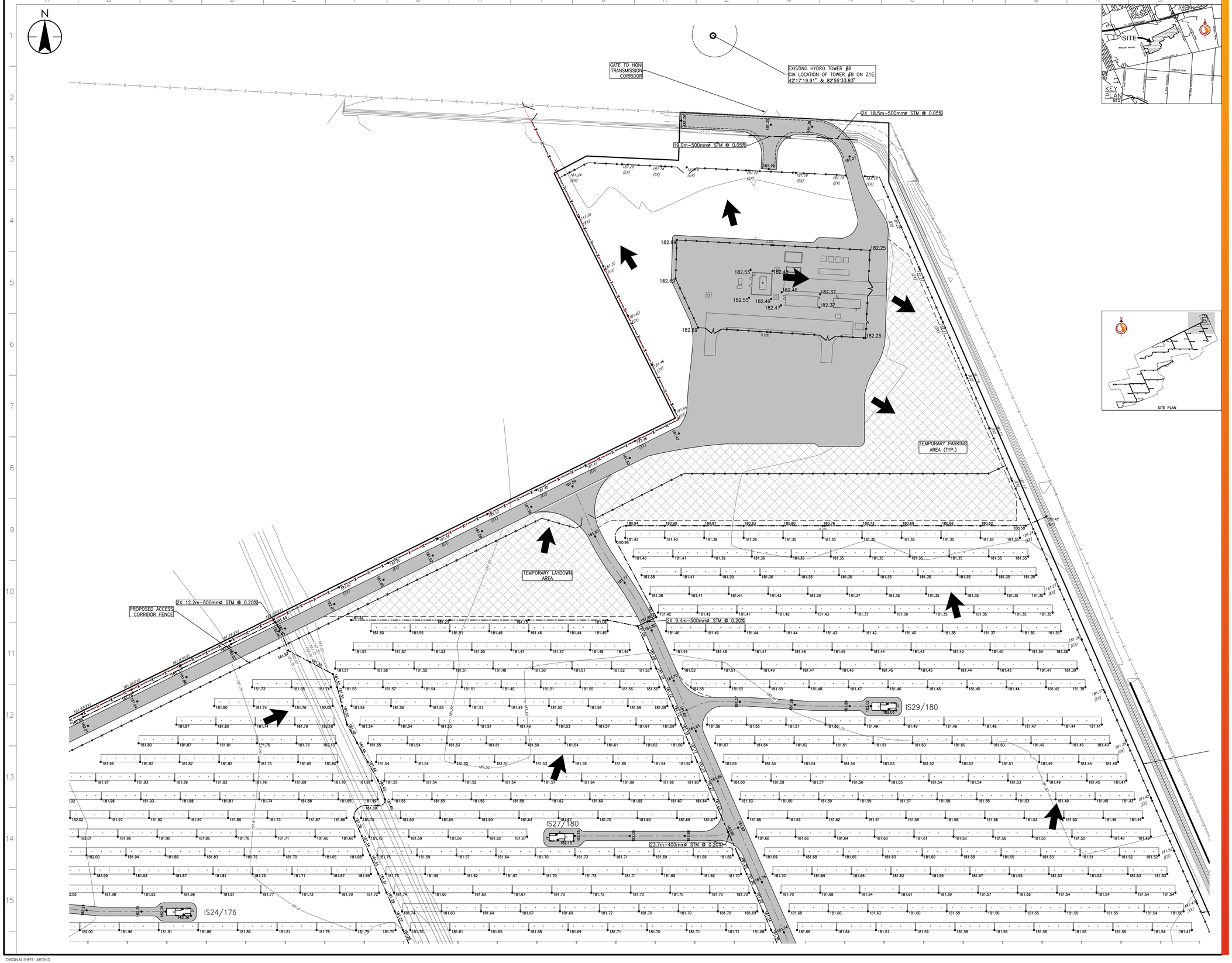

SITE PLAN

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Drawing No.	Sheet	
C-415		

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APPENDIX C
CULVERTS

Stantec

Memo

To:	Dan Santos Waterloo ON Office	From:	Nick Emery London ON Office
File:	1335-60106	Date:	February 19, 2016

Reference: Windsor Solar Project
Proposed Culvert Sizing

A hydrologic/hydraulic analysis was completed to select the proposed culvert diameters based on the available design information.

DESIGN FLOWS

The proposed access road culverts are designed to convey the calculated 5-year peak discharges and the entrance culverts are designed to convey the calculated 10-year peak discharges. These rainfall events were selected for the proposed culverts for the following reasons:

- These storms have been used for access road and entrance culvert designs on previous solar farm projects in Ontario.
- Since most off the low points on the proposed access roads are not substantially higher than the downstream ground elevations, the risk of significant damage caused by road overtopping is likely low.
- The proposed site drainage system is likely subject to high tailwater elevations due to the limited capacities of the McGill and Lappan Drain channels. Designing the proposed culverts to accommodate more severe design events is unlikely to significantly reduce temporary ponding depths on the WSP site because of the anticipated high tailwater elevations.

The design flow for each culvert was calculated using the Rational Method. The corresponding calculation documentation is presented in the attached table.

CULVERT DESIGN

Hydraulic calculations were performed using the FHWA HY-8 culvert analysis software. The water surface elevation at the upstream face of each culvert was calculated based on the design flow and the proposed culvert geometry. The water surface elevation on the downstream side of each culvert was assumed to be equal to normal depth. The resulting calculated upstream water surface elevation at each culvert is less than both the local access road overtopping elevation and the culvert obvert elevation.

Reference: Windsor Solar Project
Proposed Culvert Sizing

To reduce the possibility of blockage caused by debris, the minimum allowable culvert diameter is 400 mm. The proposed culvert sizes and corresponding design information are summarized in the attached table.

STANTEC CONSULTING LTD.

Nick Emery, P.Eng.
Water Resources Engineer
Phone: 519-675-6619
Fax: 519-645-6575
nick.emery@stantec.com

Attachment: Culvert Design Summary Table
HY-8 Culvert Analysis Report

c. Jonathan Miller (Stantec)
Darren Scott (Stantec)

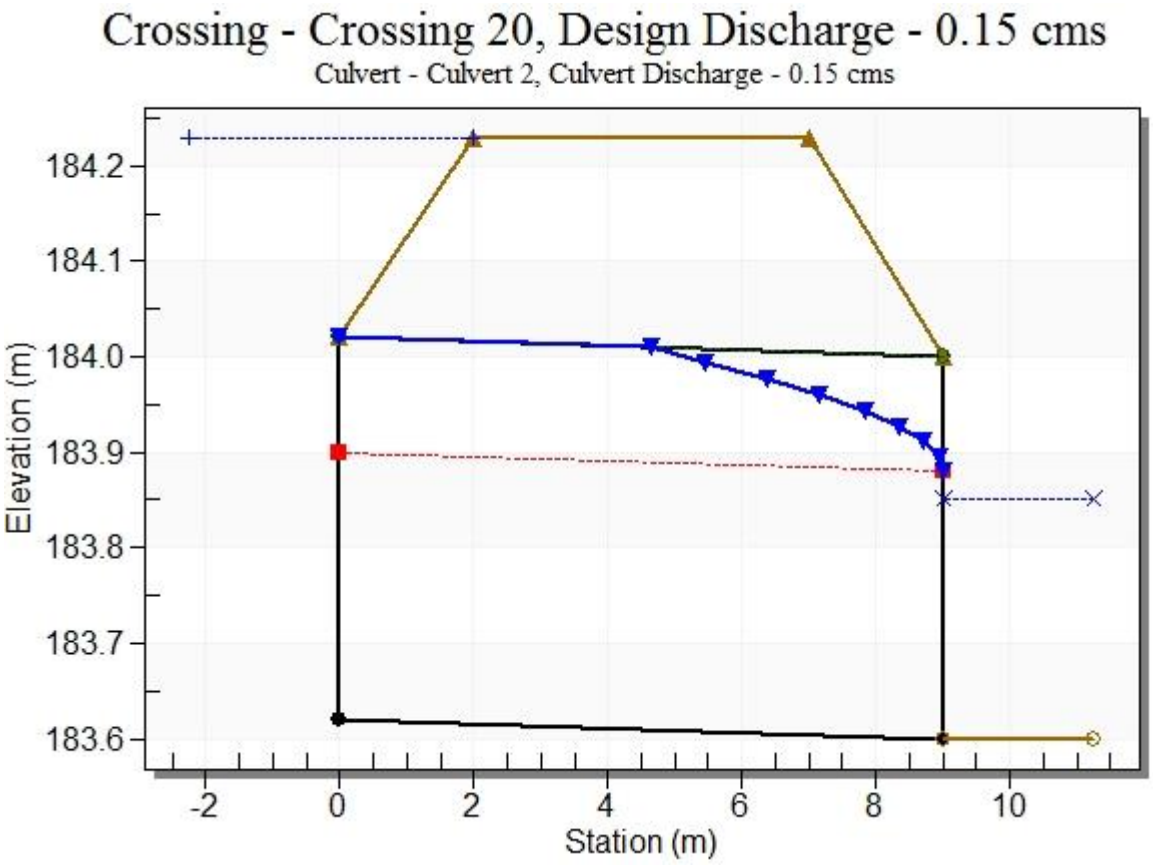
Windsor Solar Project
133560106
Culvert Design Summary

Culvert ID	Barrel Length[1] (m)	Upstream Invert Elev.[1] (m)	Downstream Invert Elev.[1] (m)	Road Overtopping Elev.[1] (m)	Approximate Drainage Area[2] (ha)	Flow Path Length[2] (m)	Upstream Slope[3] (%)	Runoff Coefficient	Time of Concentration[4] (hrs)	Design Storm Event	Rainfall Intensity[5] (mm/hr)	Peak Discharge[6] (cms)	Proposed Culvert Diameter (mm)	Proposed Culvert Material	No. of Culverts	Calculated Headwater Elev.[7] (m)	Freeboard[8] (m)	Pipe Embedment[9]
15	39.31	182.33	182.24	183.00	2.15	110	0.2	0.2	0.87	5-year	34.2	0.041	400	CSP	1	182.61	0.12	-
16	25.48	181.75	181.70	182.12	6.18	300	0.2	0.2	1.44	5-year	23.9	0.082	500	CSP	2	182.08	0.04	EMBEDDED 0.1 m
17	9.44	180.95	180.94	181.48	4.29	150	0.2	0.2	1.02	5-year	30.6	0.073	500	CSP	1	181.34	0.11	EMBEDDED 0.1 m
18	17.97	181.42	181.39	182.26	9.82	300	0.2	0.2	1.44	5-year	23.9	0.131	500	CSP	1	181.87	0.05	-
19	9.11	184.43	184.42	184.92	7.44	360	0.2	0.2	1.58	5-year	22.4	0.093	500	CSP	1	184.79	0.13	-
20	9.00	183.62	183.60	184.23	5.82	290	0.2	0.2	1.42	5-year	24.2	0.078	400	CSP	1	183.98	0.04	-
21	9.72	184.55	184.53	185.08	6.73	380	0.2	0.2	1.62	5-year	22.0	0.082	400	CSP	1	184.92	0.03	-
22	7.30	183.63	183.61	-	4.35	290	0.2	0.2	1.42	5-year	24.2	0.059	400	CSP	1	183.94	0.09	-
23	9.30	183.87	183.85	-	2.39	200	0.2	0.2	1.18	5-year	27.6	0.037	400	CSP	1	184.11	0.16	-
24	23.70	181.28	181.23	-	3.00	150	0.2	0.2	1.02	5-year	30.6	0.051	400	CSP	1	181.60	0.08	-
25	14.00	181.50	181.28	181.86	14.49	600	0.2	0.2	2.04	5-year	18.7	0.151	500	CSP	2	181.86	0.00	EMBEDDED 0.1 m
26	12.60	182.84	182.81	183.52	0.13	125	0.2	0.55	0.57	10-year	53.3	0.010	400	CSP	1	182.96	0.28	-
28	13.90	182.91	182.89	183.49	7.48	450	0.2	0.2	1.76	10-year	23.9	0.099	500	CSP	1	183.38	0.03	EMBEDDED 0.1 m
29	19.40	182.85	182.79	183.46	0.33	325	0.2	0.55	0.92	10-year	38.0	0.019	400	CSP	1	183.02	0.23	-
30	19.90	182.64	182.61	183.59	7.48	450	0.2	0.2	1.76	10-year	23.9	0.099	500	CSP	1	183.12	0.02	EMBEDDED 0.1 m
31	18.60	182.45	182.40	183.33	14.96	450	0.2	0.2	1.76	10-year	23.9	0.199	500	CSP	1	182.84	0.11	-
33	19.00	180.63	180.62	-	5.27	270	0.2	0.24	1.31	10-year	29.6	0.104	500	CSP	1	181.08	0.05	-
34	18.50	180.61	180.60	-	5.74	310	0.2	0.29	1.32	10-year	29.4	0.136	500	CSP	2	180.96	0.15	-

Notes:
[1] Value from proposed grading plans.
[2] Measured from proposed grading plans.
[3] Average site slope assumed for all drainage areas.
[4] Time of concentration calculated using the Airport Equation.
[5] Rainfall intensity calculated using the Environment Canada IDF curves for the Windsor Airport.
[6] Peak discharge calculated using the Rational Method.
[7] Headwater elevation calculated using the FHWA HY-8 culvert analysis software.
[8] Freeboard calculated by subtracting the minimum of either the road overtopping elevation or the upstream pipe obvert elevation from the calculated headwater elevation.
[9] Depth of embedment below the proposed ditch bottom. The depth of embedment is included in the proposed culvert invert elevations.

HY-8 Culvert Analysis Report

Water Surface Profile Plot for Culvert: Culvert 2



Site Data - Culvert 2

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 m

Inlet Elevation: 183.62 m

Outlet Station: 9.00 m

Outlet Elevation: 183.60 m

Number of Barrels: 1

Culvert Data Summary - Culvert 2

Barrel Shape: Circular

Barrel Diameter: 400.00 mm

Barrel Material: Corrugated Steel

Embedment: 0.00 mm

Barrel Manning's n: 0.0240

Culvert Type: Straight

Inlet Configuration: Thin Edge Projecting

Inlet Depression: NONE

Table 1 - Downstream Channel Rating Curve (Crossing: Crossing 20)

Flow (cms)	Water Surface Elev (m)	Depth (m)	Velocity (m/s)	Shear (Pa)	Froude Number
0.08	183.78	0.18	0.28	3.50	0.25
0.15	183.85	0.25	0.34	4.90	0.26

Tailwater Channel Data - Crossing 20

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 1.00 m

Side Slope (H:V): 3.00 (_:1)

Channel Slope: 0.0020

Channel Manning's n: 0.0400

Channel Invert Elevation: 183.60 m

Roadway Data for Crossing: Crossing 20

Roadway Profile Shape: Constant Roadway Elevation

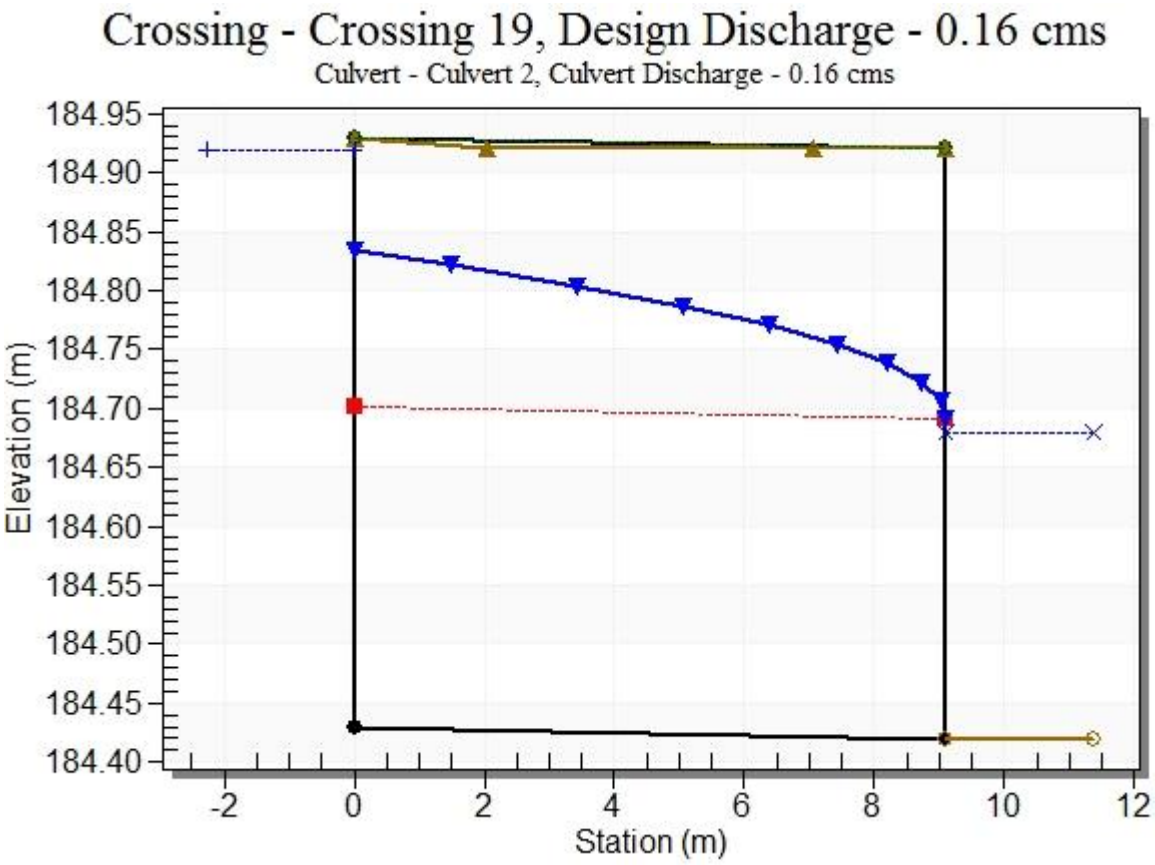
Crest Length: 10.00 m

Crest Elevation: 184.23 m

Roadway Surface: Gravel

Roadway Top Width: 5.00 m

Water Surface Profile Plot for Culvert: Culvert 2



Site Data - Culvert 2

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 m

Inlet Elevation: 184.43 m

Outlet Station: 9.11 m

Outlet Elevation: 184.42 m

Number of Barrels: 1

Culvert Data Summary - Culvert 2

Barrel Shape: Circular

Barrel Diameter: 500.00 mm

Barrel Material: Corrugated Steel

Embedment: 0.00 mm

Barrel Manning's n: 0.0240

Culvert Type: Straight

Inlet Configuration: Thin Edge Projecting

Inlet Depression: NONE

Table 2 - Downstream Channel Rating Curve (Crossing: Crossing 19)

Flow (cms)	Water Surface Elev (m)	Depth (m)	Velocity (m/s)	Shear (Pa)	Froude Number
0.09	184.62	0.20	0.30	3.83	0.25
0.16	184.68	0.26	0.35	5.07	0.26

Tailwater Channel Data - Crossing 19

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 1.00 m

Side Slope (H:V): 3.00 (_:1)

Channel Slope: 0.0020

Channel Manning's n: 0.0400

Channel Invert Elevation: 184.42 m

Roadway Data for Crossing: Crossing 19

Roadway Profile Shape: Constant Roadway Elevation

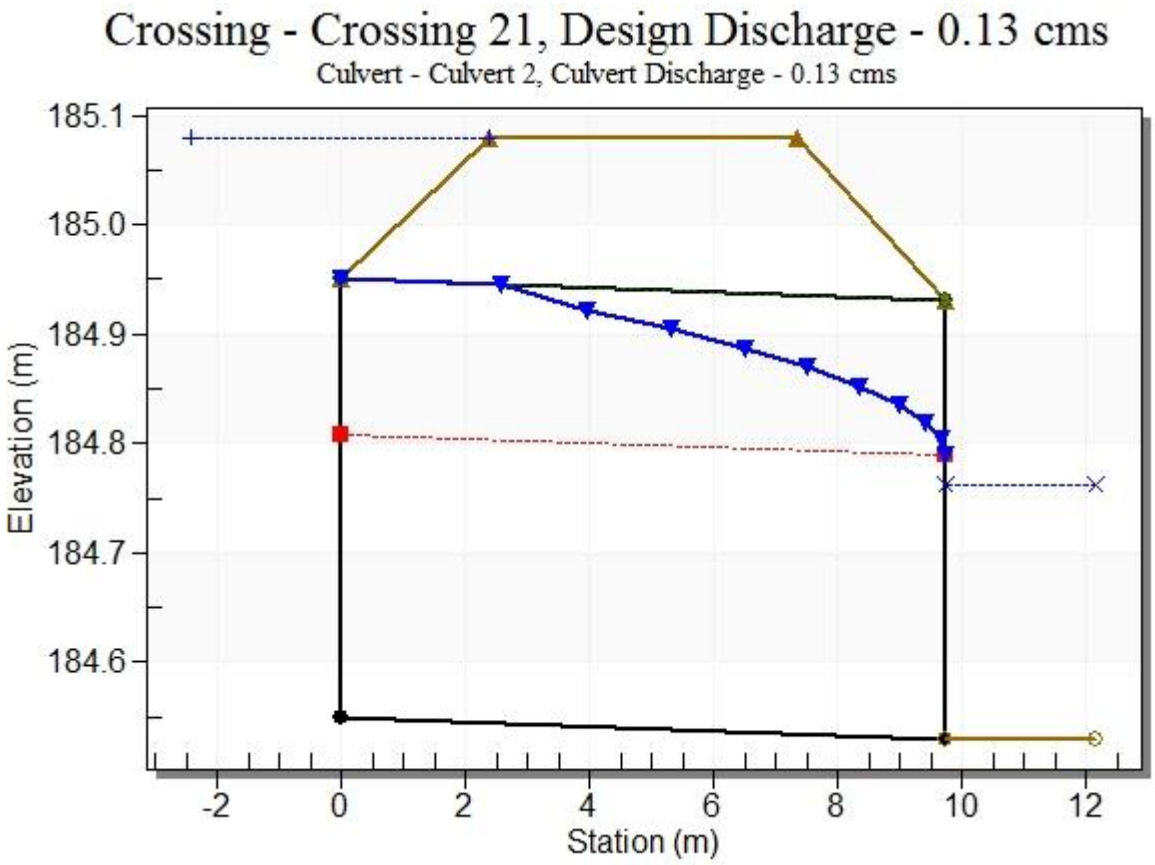
Crest Length: 10.00 m

Crest Elevation: 184.92 m

Roadway Surface: Gravel

Roadway Top Width: 5.00 m

Water Surface Profile Plot for Culvert: Culvert 2



Site Data - Culvert 2

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 m

Inlet Elevation: 184.55 m

Outlet Station: 9.72 m

Outlet Elevation: 184.53 m

Number of Barrels: 1

Culvert Data Summary - Culvert 2

Barrel Shape: Circular

Barrel Diameter: 400.00 mm

Barrel Material: Corrugated Steel

Embedment: 0.00 mm

Barrel Manning's n: 0.0240

Culvert Type: Straight

Inlet Configuration: Thin Edge Projecting

Inlet Depression: NONE

Table 3 - Downstream Channel Rating Curve (Crossing: Crossing 21)

Flow (cms)	Water Surface Elev (m)	Depth (m)	Velocity (m/s)	Shear (Pa)	Froude Number
0.08	184.71	0.18	0.29	3.59	0.25
0.13	184.76	0.23	0.33	4.56	0.26

Tailwater Channel Data - Crossing 21

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 1.00 m

Side Slope (H:V): 3.00 (_:1)

Channel Slope: 0.0020

Channel Manning's n: 0.0400

Channel Invert Elevation: 184.53 m

Roadway Data for Crossing: Crossing 21

Roadway Profile Shape: Constant Roadway Elevation

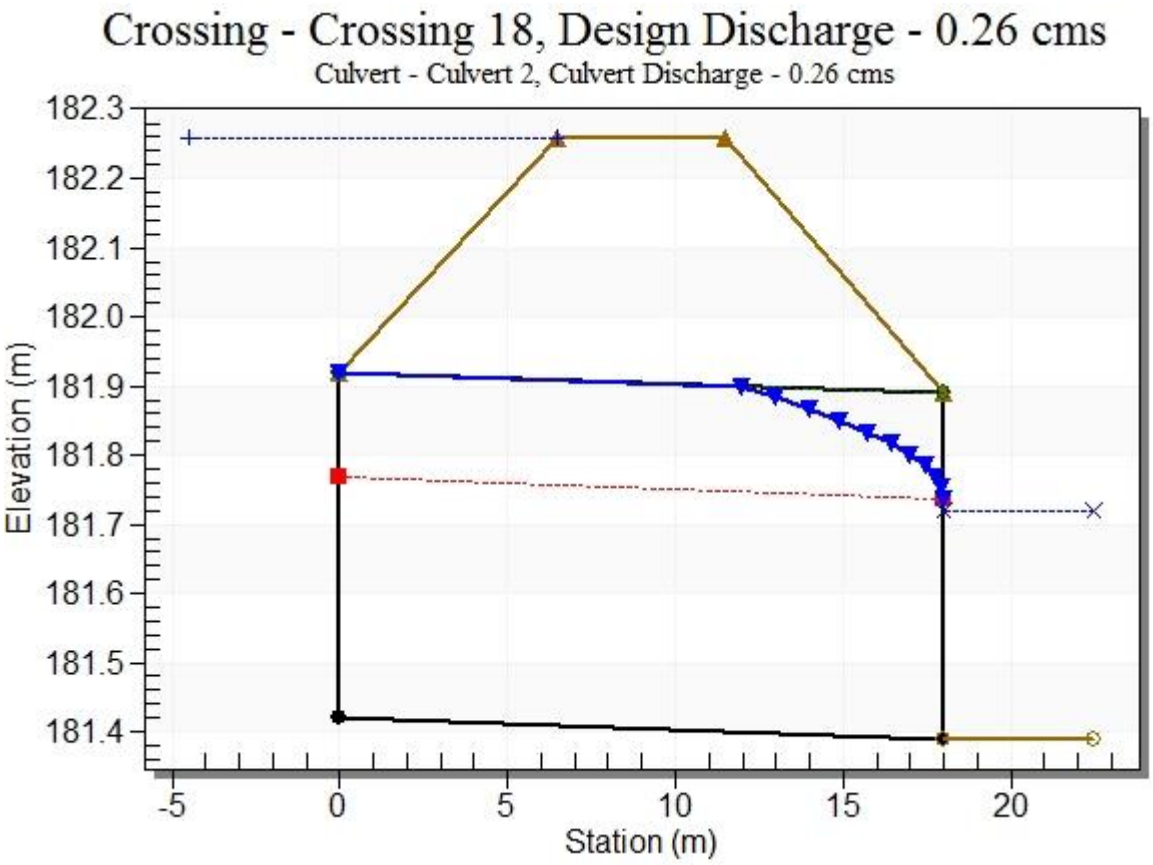
Crest Length: 10.00 m

Crest Elevation: 185.08 m

Roadway Surface: Gravel

Roadway Top Width: 5.00 m

Water Surface Profile Plot for Culvert: Culvert 2



Site Data - Culvert 2

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 m

Inlet Elevation: 181.42 m

Outlet Station: 17.97 m

Outlet Elevation: 181.39 m

Number of Barrels: 1

Culvert Data Summary - Culvert 2

Barrel Shape: Circular

Barrel Diameter: 500.00 mm

Barrel Material: Corrugated Steel

Embedment: 0.00 mm

Barrel Manning's n: 0.0240

Culvert Type: Straight

Inlet Configuration: Thin Edge Projecting

Inlet Depression: NONE

Table 4 - Downstream Channel Rating Curve (Crossing: Crossing 18)

Flow (cms)	Water Surface Elev (m)	Depth (m)	Velocity (m/s)	Shear (Pa)	Froude Number
0.13	181.62	0.23	0.33	4.58	0.26
0.26	181.72	0.33	0.40	6.45	0.27

Tailwater Channel Data - Crossing 18

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 1.00 m

Side Slope (H:V): 3.00 (_:1)

Channel Slope: 0.0020

Channel Manning's n: 0.0400

Channel Invert Elevation: 181.39 m

Roadway Data for Crossing: Crossing 18

Roadway Profile Shape: Constant Roadway Elevation

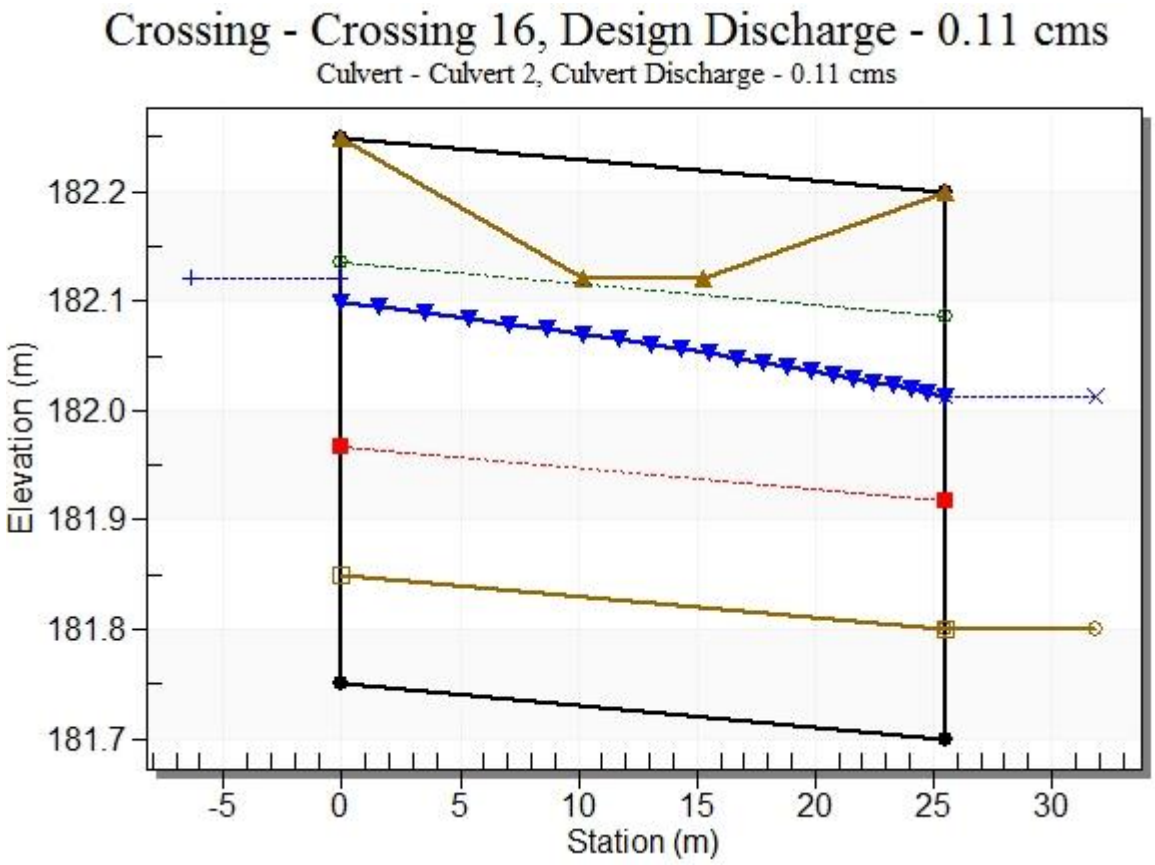
Crest Length: 10.00 m

Crest Elevation: 182.26 m

Roadway Surface: Gravel

Roadway Top Width: 5.00 m

Water Surface Profile Plot for Culvert: Culvert 2



Site Data - Culvert 2

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 m

Inlet Elevation: 181.75 m

Outlet Station: 25.48 m

Outlet Elevation: 181.70 m

Number of Barrels: 2

Culvert Data Summary - Culvert 2

Barrel Shape: Circular

Barrel Diameter: 500.00 mm

Barrel Material: Corrugated Steel

Embedment: 100.00 mm

Barrel Manning's n: 0.0240 (top and sides)

Manning's n: 0.0350 (bottom)

Culvert Type: Straight

Inlet Configuration: Thin Edge Projecting

Inlet Depression: NONE

Table 5 - Downstream Channel Rating Curve (Crossing: Crossing 16)

Flow (cms)	Water Surface Elev (m)	Depth (m)	Velocity (m/s)	Shear (Pa)	Froude Number
0.08	181.98	0.18	0.29	3.59	0.25
0.11	182.01	0.21	0.31	4.18	0.26

Tailwater Channel Data - Crossing 16

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 1.00 m

Side Slope (H:V): 3.00 (_:1)

Channel Slope: 0.0020

Channel Manning's n: 0.0400

Channel Invert Elevation: 181.80 m

Roadway Data for Crossing: Crossing 16

Roadway Profile Shape: Constant Roadway Elevation

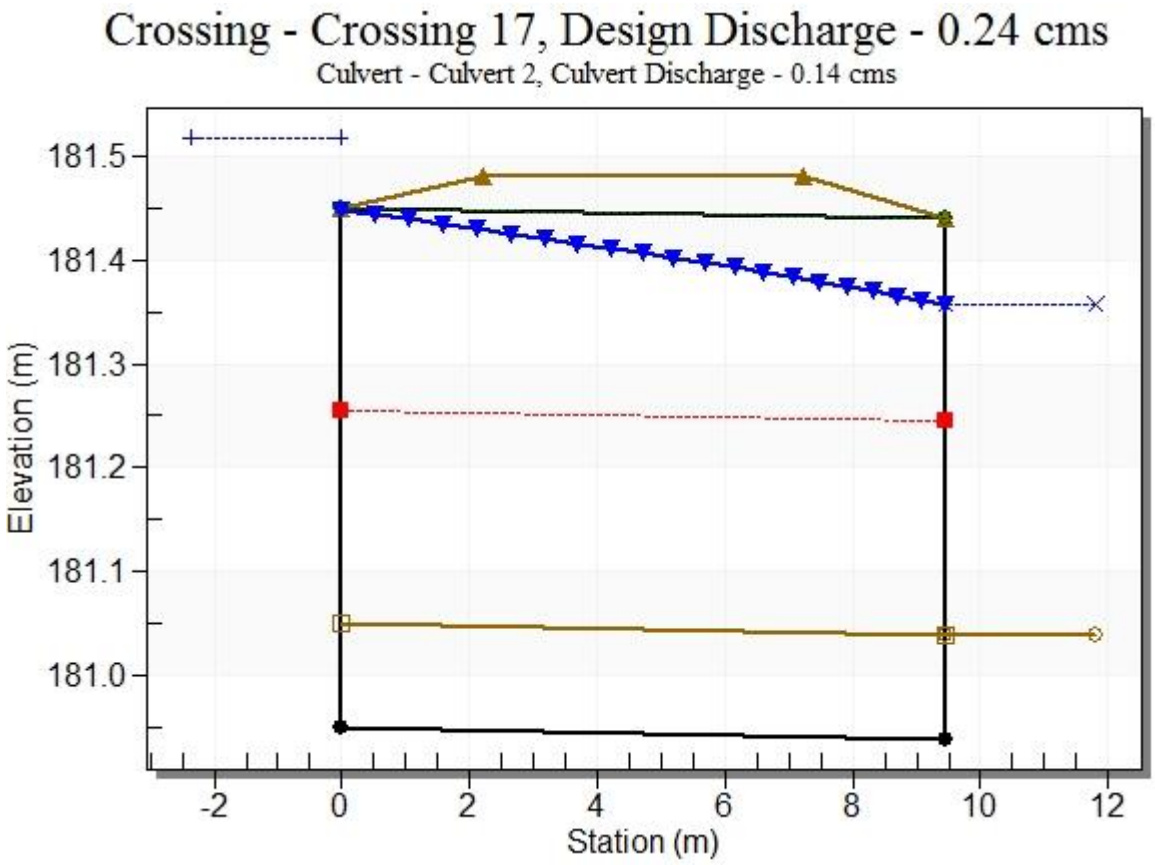
Crest Length: 10.00 m

Crest Elevation: 182.12 m

Roadway Surface: Gravel

Roadway Top Width: 5.00 m

Water Surface Profile Plot for Culvert: Culvert 2



Site Data - Culvert 2

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 m

Inlet Elevation: 180.95 m

Outlet Station: 9.44 m

Outlet Elevation: 180.94 m

Number of Barrels: 1

Culvert Data Summary - Culvert 2

Barrel Shape: Circular

Barrel Diameter: 500.00 mm

Barrel Material: Corrugated Steel

Embedment: 100.00 mm

Barrel Manning's n: 0.0240 (top and sides)

Manning's n: 0.0350 (bottom)

Culvert Type: Straight

Inlet Configuration: Thin Edge Projecting

Inlet Depression: NONE

Table 6 - Downstream Channel Rating Curve (Crossing: Crossing 17)

Flow (cms)	Water Surface Elev (m)	Depth (m)	Velocity (m/s)	Shear (Pa)	Froude Number
0.07	181.21	0.17	0.28	3.38	0.25
0.24	181.36	0.32	0.39	6.20	0.27

Tailwater Channel Data - Crossing 17

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 1.00 m

Side Slope (H:V): 3.00 (_:1)

Channel Slope: 0.0020

Channel Manning's n: 0.0400

Channel Invert Elevation: 181.04 m

Roadway Data for Crossing: Crossing 17

Roadway Profile Shape: Constant Roadway Elevation

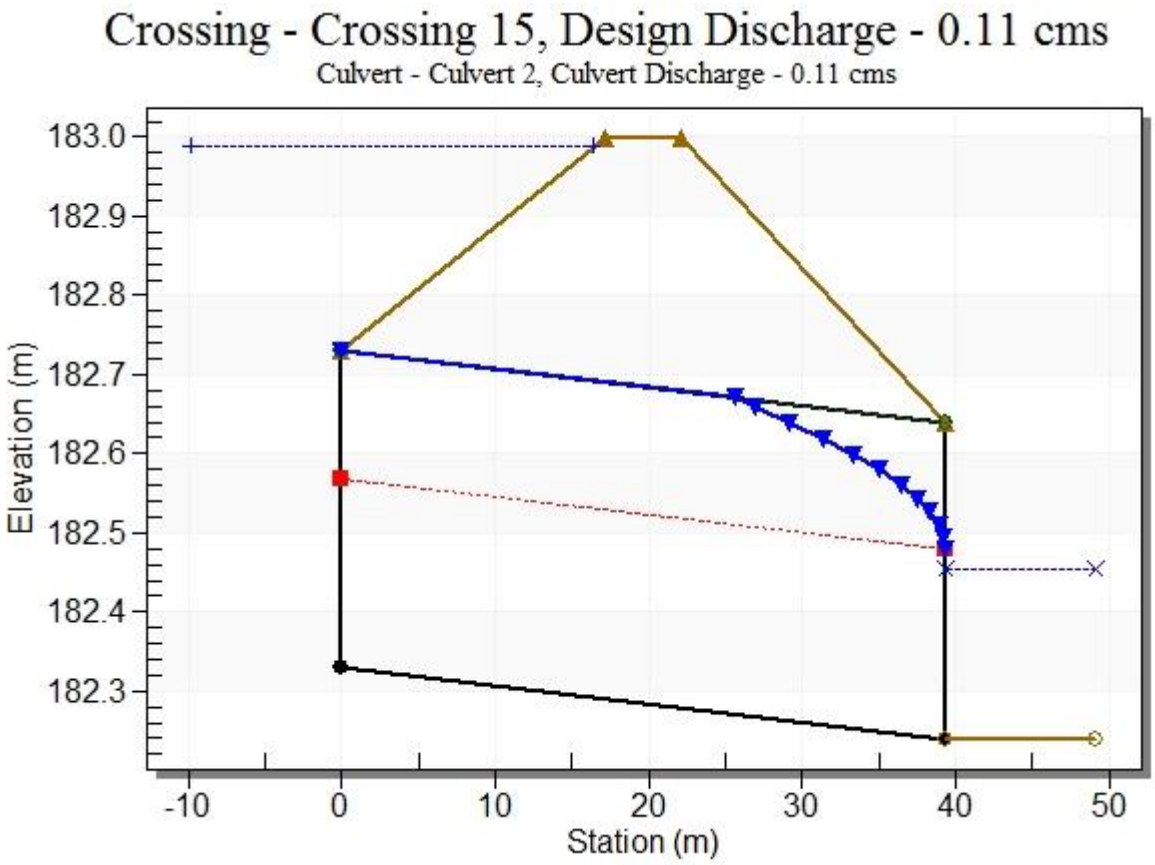
Crest Length: 10.00 m

Crest Elevation: 181.48 m

Roadway Surface: Gravel

Roadway Top Width: 5.00 m

Water Surface Profile Plot for Culvert: Culvert 2



Site Data - Culvert 2

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 m

Inlet Elevation: 182.33 m

Outlet Station: 39.31 m

Outlet Elevation: 182.24 m

Number of Barrels: 1

Culvert Data Summary - Culvert 2

Barrel Shape: Circular

Barrel Diameter: 400.00 mm

Barrel Material: Corrugated Steel

Embedment: 0.00 mm

Barrel Manning's n: 0.0240

Culvert Type: Straight

Inlet Configuration: Thin Edge Projecting

Inlet Depression: NONE

Table 7 - Downstream Channel Rating Curve (Crossing: Crossing 15)

Flow (cms)	Water Surface Elev (m)	Depth (m)	Velocity (m/s)	Shear (Pa)	Froude Number
0.04	182.37	0.13	0.24	2.47	0.24
0.11	182.45	0.21	0.31	4.18	0.26

Tailwater Channel Data - Crossing 15

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 1.00 m

Side Slope (H:V): 3.00 (_:1)

Channel Slope: 0.0020

Channel Manning's n: 0.0400

Channel Invert Elevation: 182.24 m

Roadway Data for Crossing: Crossing 15

Roadway Profile Shape: Constant Roadway Elevation

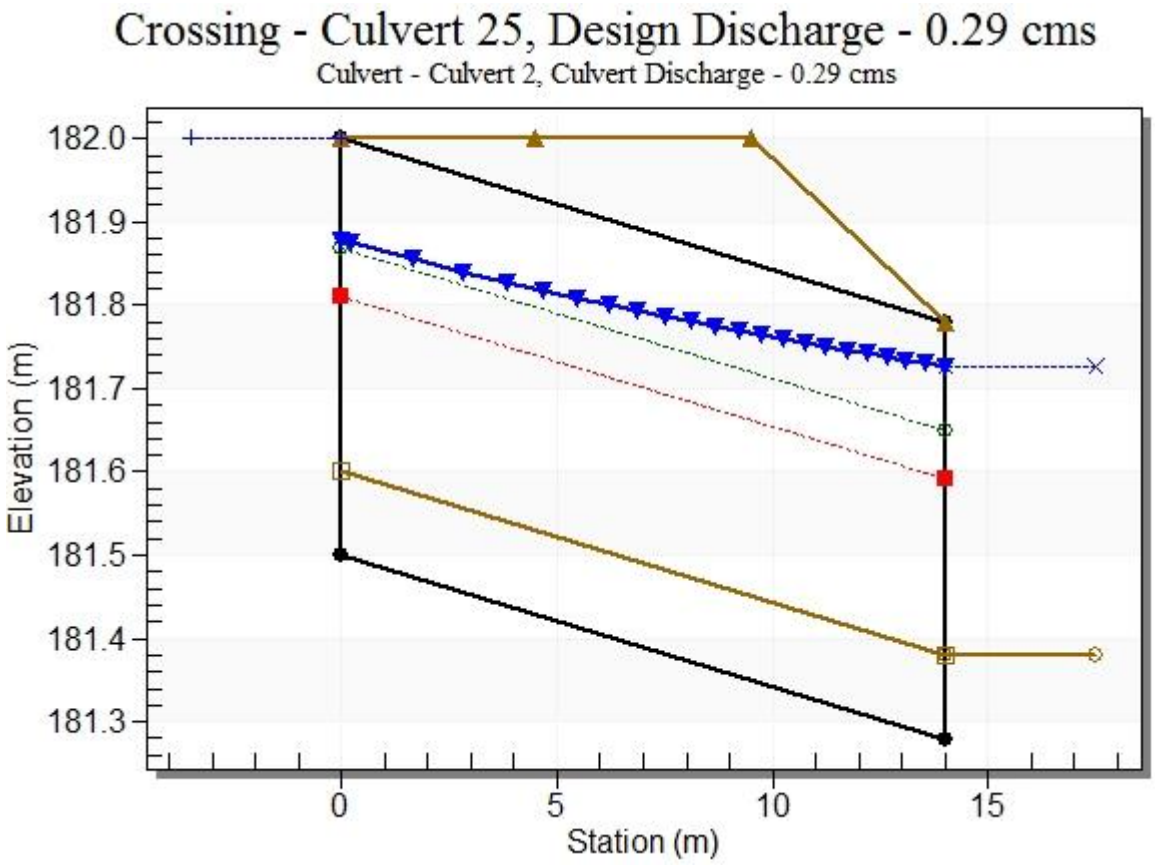
Crest Length: 10.00 m

Crest Elevation: 183.00 m

Roadway Surface: Gravel

Roadway Top Width: 5.00 m

Water Surface Profile Plot for Culvert: Culvert 2



Site Data - Culvert 2

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 m

Inlet Elevation: 181.50 m

Outlet Station: 14.00 m

Outlet Elevation: 181.28 m

Number of Barrels: 2

Culvert Data Summary - Culvert 2

Barrel Shape: Circular

Barrel Diameter: 500.00 mm

Barrel Material: Corrugated Steel

Embedment: 100.00 mm

Barrel Manning's n: 0.0240 (top and sides)

Manning's n: 0.0350 (bottom)

Culvert Type: Straight

Inlet Configuration: Thin Edge Projecting

Inlet Depression: NONE

Table 8 - Downstream Channel Rating Curve (Crossing: Culvert 25)

Flow (cms)	Water Surface Elev (m)	Depth (m)	Velocity (m/s)	Shear (Pa)	Froude Number
0.15	181.63	0.25	0.34	4.92	0.26
0.29	181.73	0.35	0.41	6.80	0.27

Tailwater Channel Data - Culvert 25

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 1.00 m

Side Slope (H:V): 3.00 (_:1)

Channel Slope: 0.0020

Channel Manning's n: 0.0400

Channel Invert Elevation: 181.38 m

Roadway Data for Crossing: Culvert 25

Roadway Profile Shape: Constant Roadway Elevation

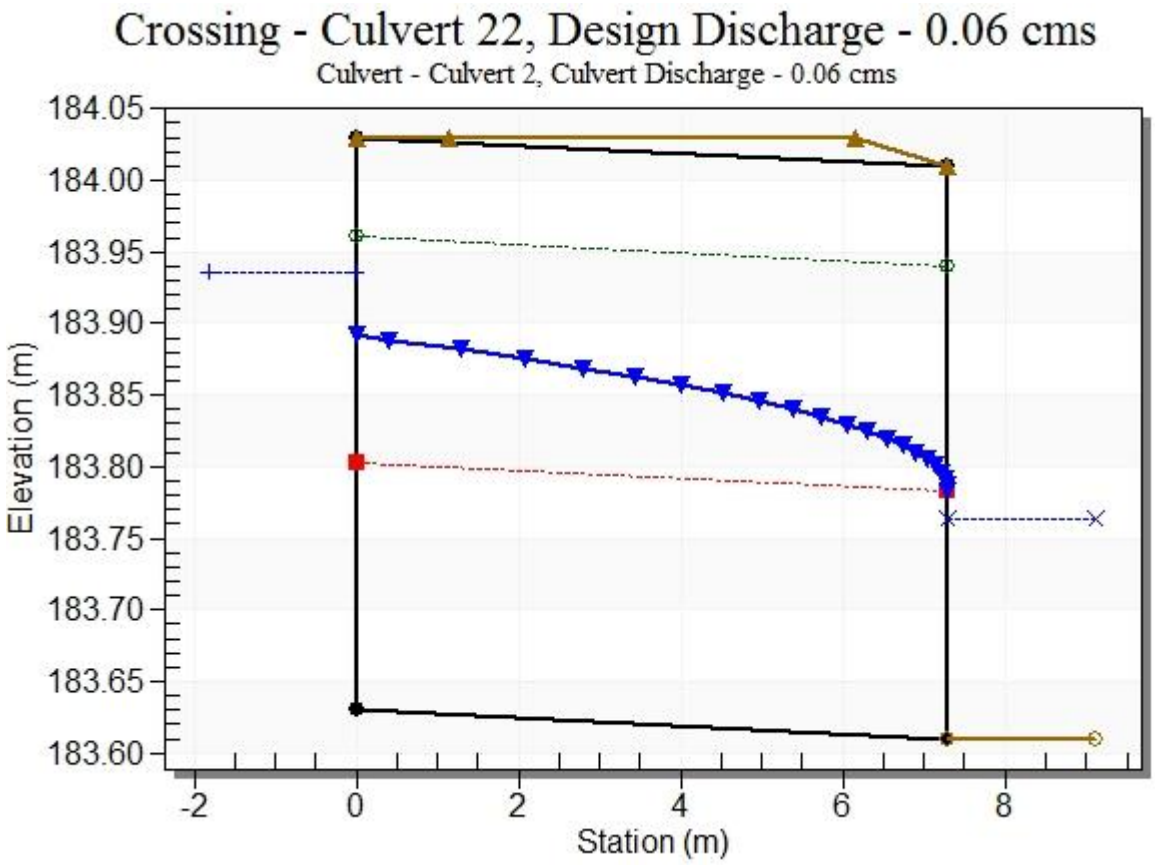
Crest Length: 10.00 m

Crest Elevation: 182.00 m

Roadway Surface: Gravel

Roadway Top Width: 5.00 m

Water Surface Profile Plot for Culvert: Culvert 2



Site Data - Culvert 2

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 m

Inlet Elevation: 183.63 m

Outlet Station: 7.30 m

Outlet Elevation: 183.61 m

Number of Barrels: 1

Culvert Data Summary - Culvert 2

Barrel Shape: Circular

Barrel Diameter: 400.00 mm

Barrel Material: Corrugated Steel

Embedment: 0.00 mm

Barrel Manning's n: 0.0240

Culvert Type: Straight

Inlet Configuration: Thin Edge Projecting

Inlet Depression: NONE

Table 9 - Downstream Channel Rating Curve (Crossing: Culvert 22)

Flow (cms)	Water Surface Elev (m)	Depth (m)	Velocity (m/s)	Shear (Pa)	Froude Number
0.06	183.76	0.15	0.26	3.01	0.25
0.06	183.76	0.15	0.26	3.01	0.25

Tailwater Channel Data - Culvert 22

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 1.00 m

Side Slope (H:V): 3.00 (_:1)

Channel Slope: 0.0020

Channel Manning's n: 0.0400

Channel Invert Elevation: 183.61 m

Roadway Data for Crossing: Culvert 22

Roadway Profile Shape: Constant Roadway Elevation

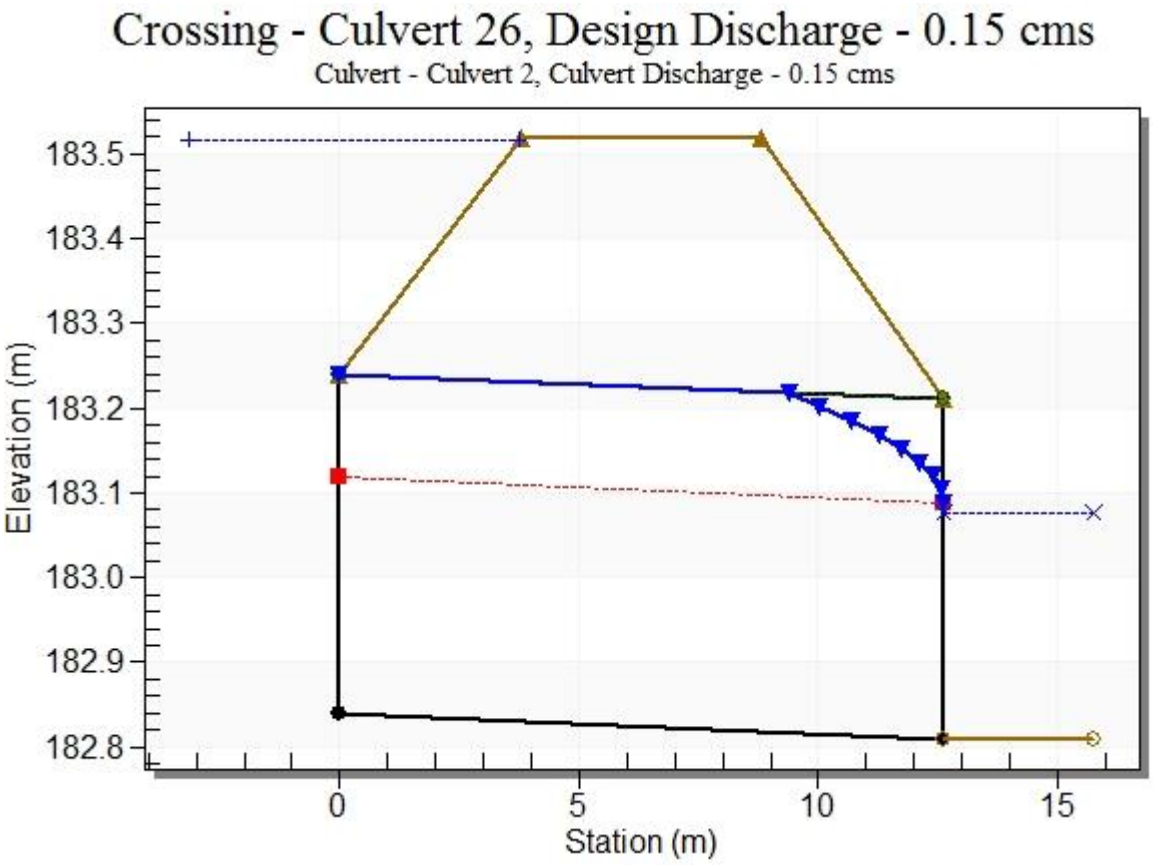
Crest Length: 10.00 m

Crest Elevation: 184.03 m

Roadway Surface: Gravel

Roadway Top Width: 5.00 m

Water Surface Profile Plot for Culvert: Culvert 2



Site Data - Culvert 2

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 m

Inlet Elevation: 182.84 m

Outlet Station: 12.60 m

Outlet Elevation: 182.81 m

Number of Barrels: 1

Culvert Data Summary - Culvert 2

Barrel Shape: Circular

Barrel Diameter: 400.00 mm

Barrel Material: Corrugated Steel

Embedment: 0.00 mm

Barrel Manning's n: 0.0240

Culvert Type: Straight

Inlet Configuration: Thin Edge Projecting

Inlet Depression: NONE

Table 10 - Downstream Channel Rating Curve (Crossing: Culvert 26)

Flow (cms)	Water Surface Elev (m)	Depth (m)	Velocity (m/s)	Shear (Pa)	Froude Number
0.01	182.87	0.06	0.15	1.14	0.22
0.15	183.08	0.27	0.37	5.24	0.26

Tailwater Channel Data - Culvert 26

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 1.00 m

Side Slope (H:V): 2.00 (_:1)

Channel Slope: 0.0020

Channel Manning's n: 0.0400

Channel Invert Elevation: 182.81 m

Roadway Data for Crossing: Culvert 26

Roadway Profile Shape: Constant Roadway Elevation

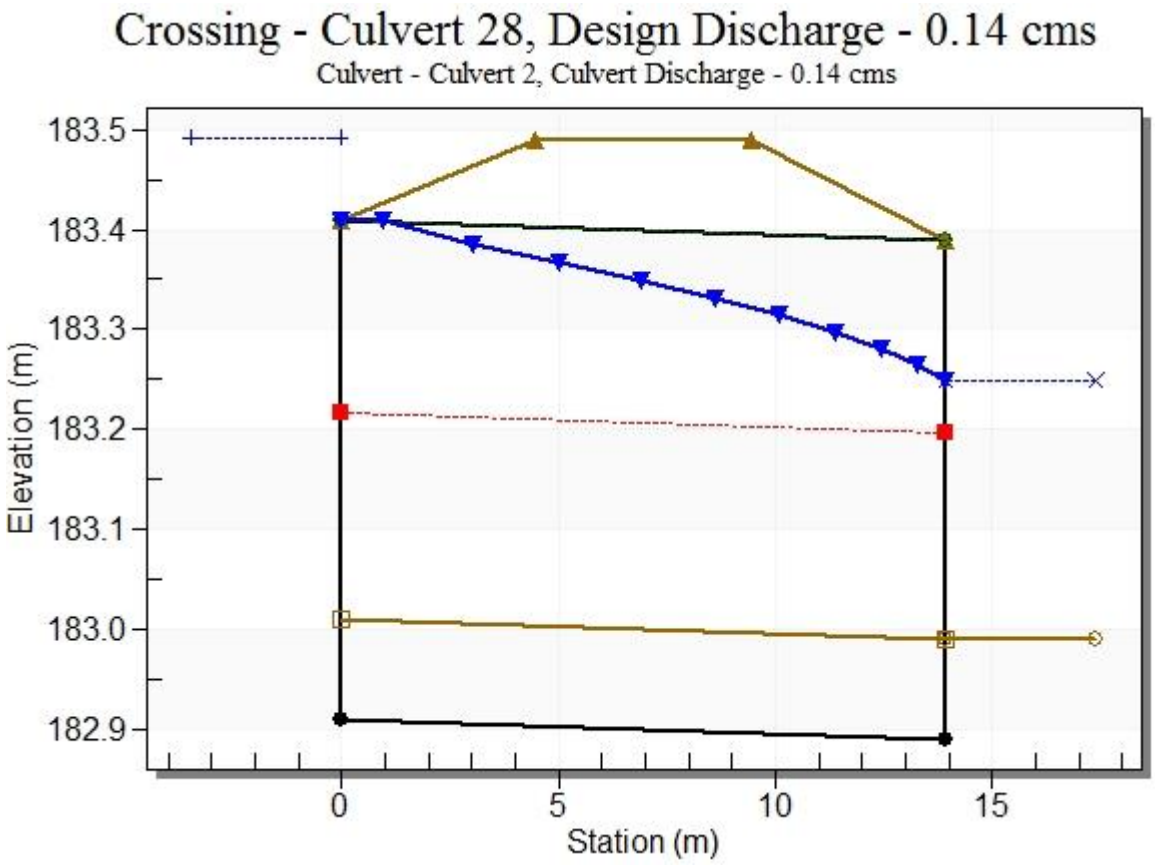
Crest Length: 10.00 m

Crest Elevation: 183.52 m

Roadway Surface: Gravel

Roadway Top Width: 5.00 m

Water Surface Profile Plot for Culvert: Culvert 2



Site Data - Culvert 2

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 m

Inlet Elevation: 182.91 m

Outlet Station: 13.90 m

Outlet Elevation: 182.89 m

Number of Barrels: 1

Culvert Data Summary - Culvert 2

Barrel Shape: Circular

Barrel Diameter: 500.00 mm

Barrel Material: Corrugated Steel

Embedment: 100.00 mm

Barrel Manning's n: 0.0240 (top and sides)

Manning's n: 0.0350 (bottom)

Culvert Type: Straight

Inlet Configuration: Thin Edge Projecting

Inlet Depression: NONE

Table 11 - Downstream Channel Rating Curve (Crossing: Culvert 28)

Flow (cms)	Water Surface Elev (m)	Depth (m)	Velocity (m/s)	Shear (Pa)	Froude Number
0.10	183.20	0.21	0.32	4.19	0.26
0.14	183.25	0.26	0.36	5.05	0.26

Tailwater Channel Data - Culvert 28

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 1.00 m

Side Slope (H:V): 2.00 (_:1)

Channel Slope: 0.0020

Channel Manning's n: 0.0400

Channel Invert Elevation: 182.99 m

Roadway Data for Crossing: Culvert 28

Roadway Profile Shape: Constant Roadway Elevation

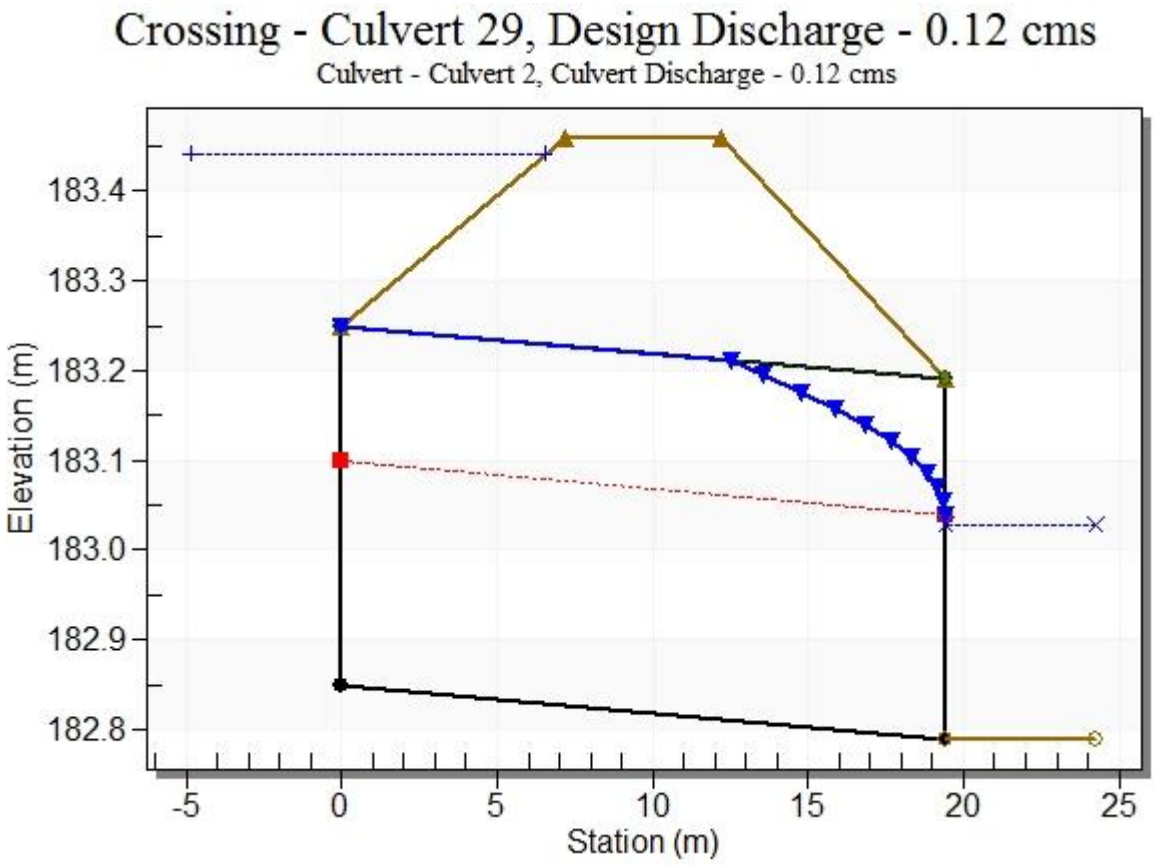
Crest Length: 10.00 m

Crest Elevation: 183.49 m

Roadway Surface: Gravel

Roadway Top Width: 5.00 m

Water Surface Profile Plot for Culvert: Culvert 2



Site Data - Culvert 2

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 m

Inlet Elevation: 182.85 m

Outlet Station: 19.40 m

Outlet Elevation: 182.79 m

Number of Barrels: 1

Culvert Data Summary - Culvert 2

Barrel Shape: Circular

Barrel Diameter: 400.00 mm

Barrel Material: Corrugated Steel

Embedment: 0.00 mm

Barrel Manning's n: 0.0240

Culvert Type: Straight

Inlet Configuration: Thin Edge Projecting

Inlet Depression: NONE

Table 12 - Downstream Channel Rating Curve (Crossing: Culvert 29)

Flow (cms)	Water Surface Elev (m)	Depth (m)	Velocity (m/s)	Shear (Pa)	Froude Number
0.02	182.87	0.08	0.19	1.65	0.23
0.12	183.03	0.24	0.34	4.65	0.26

Tailwater Channel Data - Culvert 29

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 1.00 m

Side Slope (H:V): 2.00 (_:1)

Channel Slope: 0.0020

Channel Manning's n: 0.0400

Channel Invert Elevation: 182.79 m

Roadway Data for Crossing: Culvert 29

Roadway Profile Shape: Constant Roadway Elevation

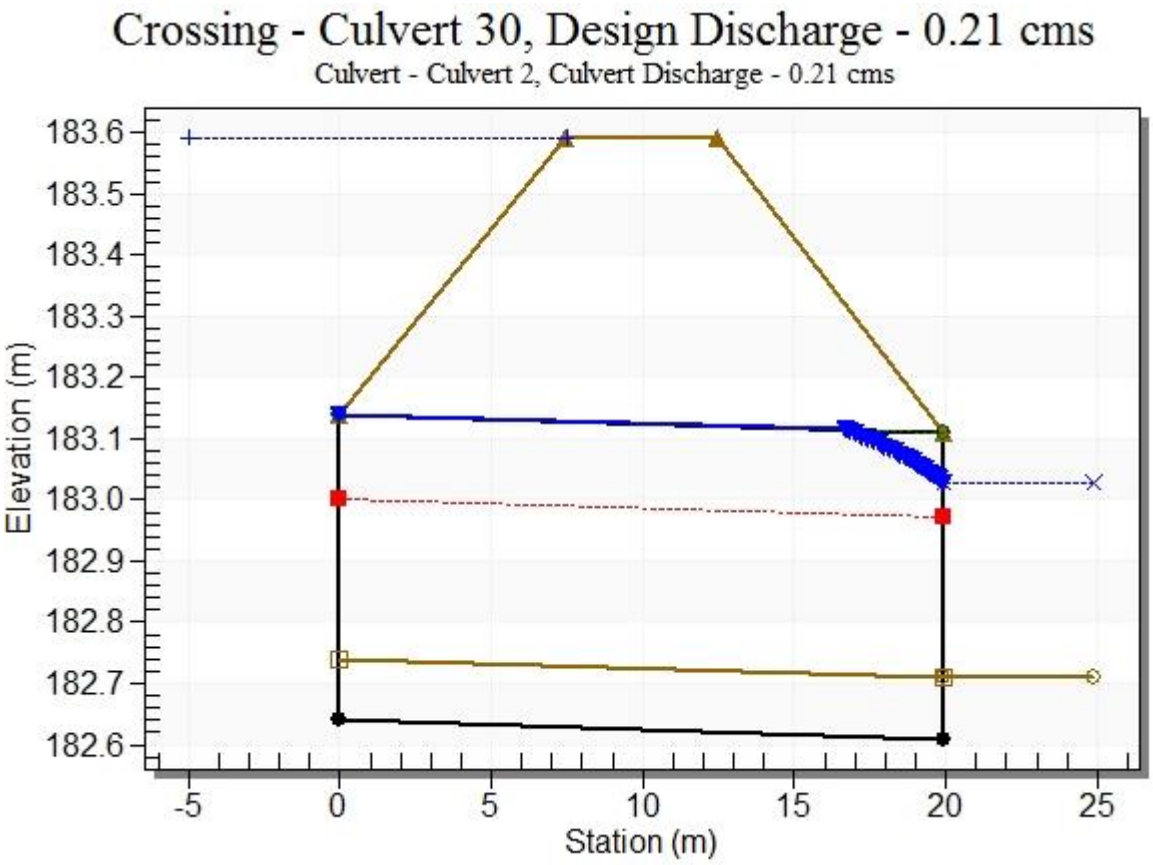
Crest Length: 10.00 m

Crest Elevation: 183.46 m

Roadway Surface: Gravel

Roadway Top Width: 5.00 m

Water Surface Profile Plot for Culvert: Culvert 2



Site Data - Culvert 2

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 m

Inlet Elevation: 182.64 m

Outlet Station: 19.90 m

Outlet Elevation: 182.61 m

Number of Barrels: 1

Culvert Data Summary - Culvert 2

Barrel Shape: Circular

Barrel Diameter: 500.00 mm

Barrel Material: Corrugated Steel

Embedment: 100.00 mm

Barrel Manning's n: 0.0240 (top and sides)

Manning's n: 0.0350 (bottom)

Culvert Type: Straight

Inlet Configuration: Thin Edge Projecting

Inlet Depression: NONE

Table 13 - Downstream Channel Rating Curve (Crossing: Culvert 30)

Flow (cms)	Water Surface Elev (m)	Depth (m)	Velocity (m/s)	Shear (Pa)	Froude Number
0.10	182.92	0.21	0.32	4.19	0.26
0.21	183.03	0.32	0.40	6.26	0.27

Tailwater Channel Data - Culvert 30

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 1.00 m

Side Slope (H:V): 2.00 (_:1)

Channel Slope: 0.0020

Channel Manning's n: 0.0400

Channel Invert Elevation: 182.71 m

Roadway Data for Crossing: Culvert 30

Roadway Profile Shape: Constant Roadway Elevation

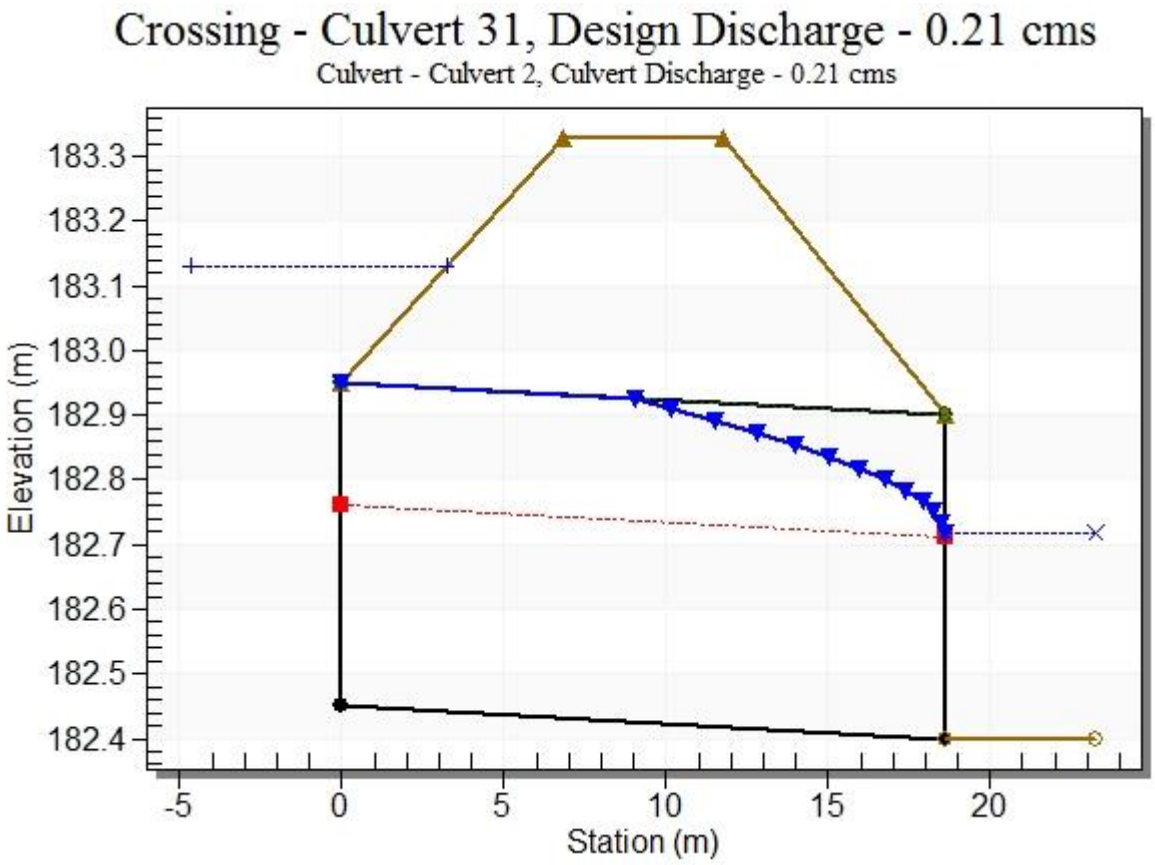
Crest Length: 10.00 m

Crest Elevation: 183.59 m

Roadway Surface: Gravel

Roadway Top Width: 5.00 m

Water Surface Profile Plot for Culvert: Culvert 2



Site Data - Culvert 2

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 m

Inlet Elevation: 182.45 m

Outlet Station: 18.60 m

Outlet Elevation: 182.40 m

Number of Barrels: 1

Culvert Data Summary - Culvert 2

Barrel Shape: Circular

Barrel Diameter: 500.00 mm

Barrel Material: Corrugated Steel

Embedment: 0.00 mm

Barrel Manning's n: 0.0240

Culvert Type: Straight

Inlet Configuration: Thin Edge Projecting

Inlet Depression: NONE

Table 14 - Downstream Channel Rating Curve (Crossing: Culvert 31)

Flow (cms)	Water Surface Elev (m)	Depth (m)	Velocity (m/s)	Shear (Pa)	Froude Number
0.10	182.61	0.21	0.32	4.19	0.26
0.21	182.72	0.32	0.40	6.26	0.27

Tailwater Channel Data - Culvert 31

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 1.00 m

Side Slope (H:V): 2.00 (_:1)

Channel Slope: 0.0020

Channel Manning's n: 0.0400

Channel Invert Elevation: 182.40 m

Roadway Data for Crossing: Culvert 31

Roadway Profile Shape: Constant Roadway Elevation

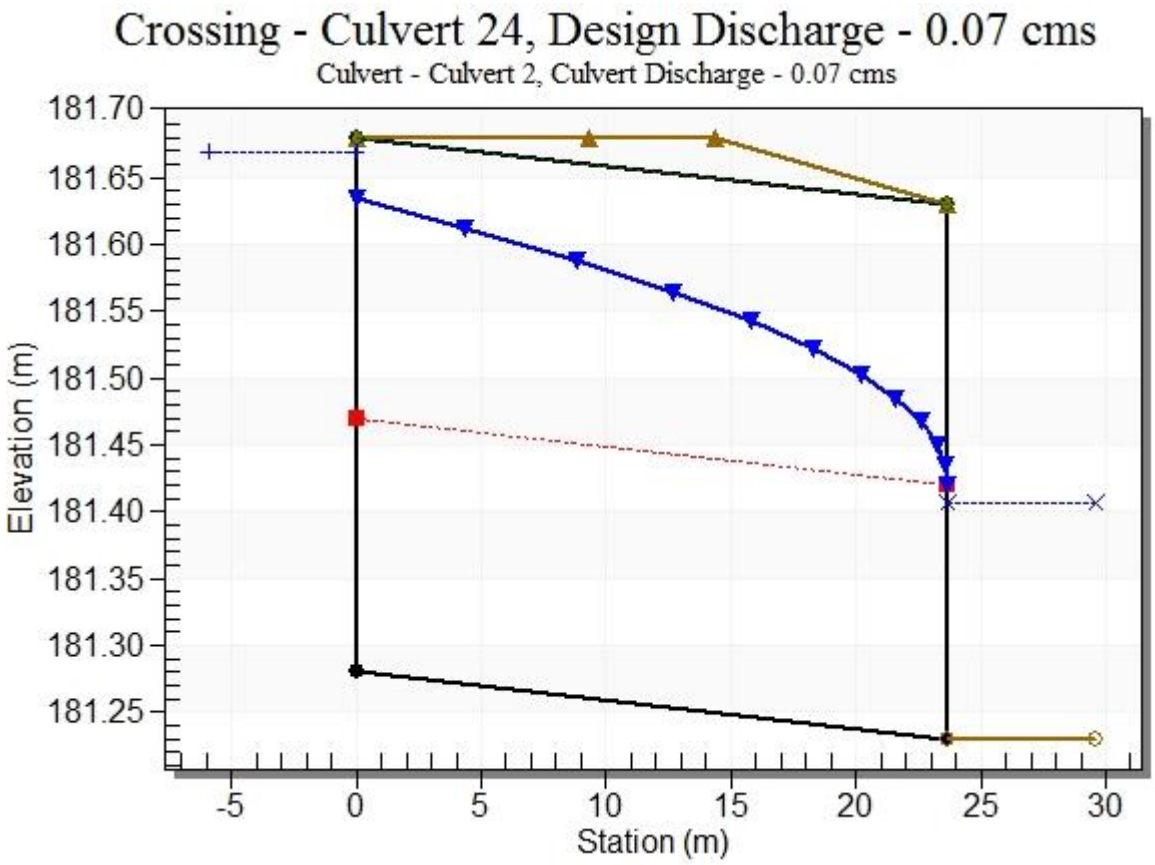
Crest Length: 10.00 m

Crest Elevation: 183.33 m

Roadway Surface: Gravel

Roadway Top Width: 5.00 m

Water Surface Profile Plot for Culvert: Culvert 2



Site Data - Culvert 2

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 m

Inlet Elevation: 181.28 m

Outlet Station: 23.70 m

Outlet Elevation: 181.23 m

Number of Barrels: 1

Culvert Data Summary - Culvert 2

Barrel Shape: Circular

Barrel Diameter: 400.00 mm

Barrel Material: Corrugated Steel

Embedment: 0.00 mm

Barrel Manning's n: 0.0240

Culvert Type: Straight

Inlet Configuration: Thin Edge Projecting

Inlet Depression: NONE

Table 15 - Downstream Channel Rating Curve (Crossing: Culvert 24)

Flow (cms)	Water Surface Elev (m)	Depth (m)	Velocity (m/s)	Shear (Pa)	Froude Number
0.05	181.38	0.15	0.27	2.91	0.24
0.07	181.41	0.18	0.29	3.47	0.25

Tailwater Channel Data - Culvert 24

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 1.00 m

Side Slope (H:V): 2.00 (_:1)

Channel Slope: 0.0020

Channel Manning's n: 0.0400

Channel Invert Elevation: 181.23 m

Roadway Data for Crossing: Culvert 24

Roadway Profile Shape: Constant Roadway Elevation

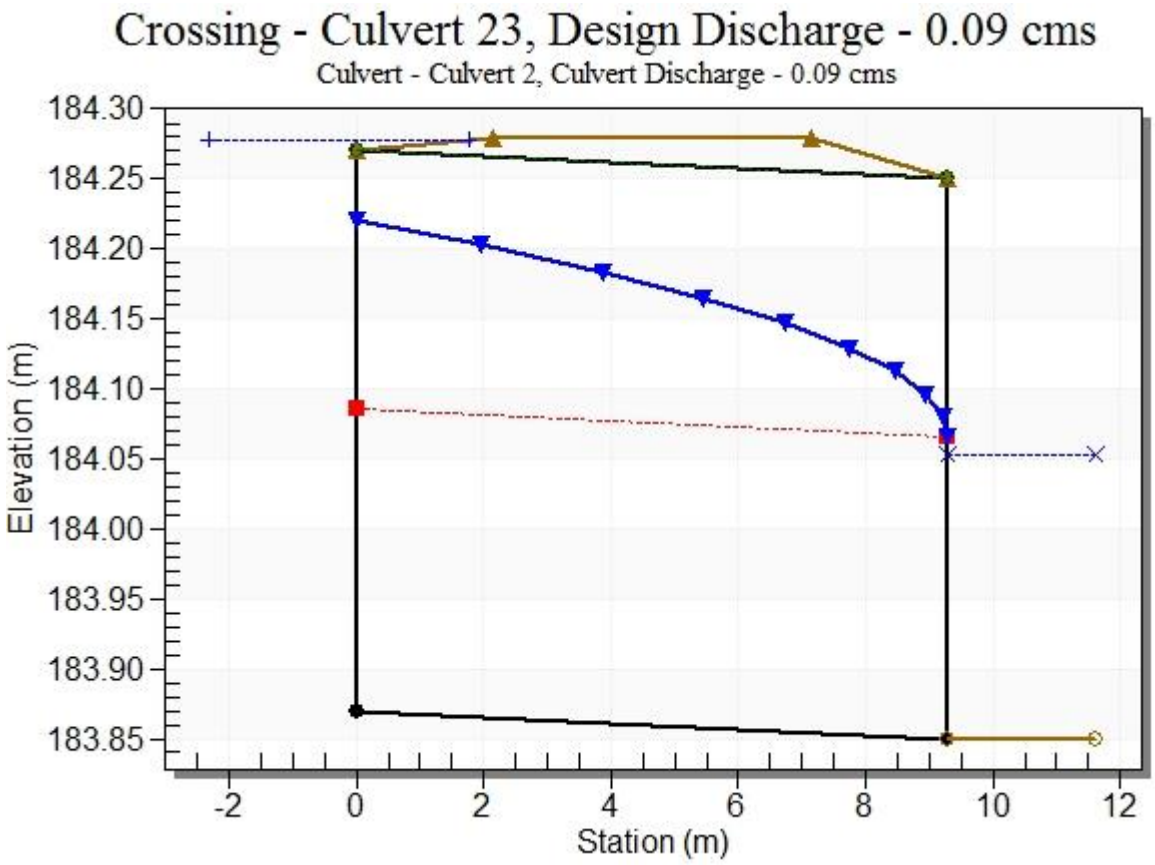
Crest Length: 10.00 m

Crest Elevation: 181.68 m

Roadway Surface: Gravel

Roadway Top Width: 5.00 m

Water Surface Profile Plot for Culvert: Culvert 2



Site Data - Culvert 2

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 m

Inlet Elevation: 183.87 m

Outlet Station: 9.30 m

Outlet Elevation: 183.85 m

Number of Barrels: 1

Culvert Data Summary - Culvert 2

Barrel Shape: Circular

Barrel Diameter: 400.00 mm

Barrel Material: Corrugated Steel

Embedment: 0.00 mm

Barrel Manning's n: 0.0240

Culvert Type: Straight

Inlet Configuration: Thin Edge Projecting

Inlet Depression: NONE

Table 16 - Downstream Channel Rating Curve (Crossing: Culvert 23)

Flow (cms)	Water Surface Elev (m)	Depth (m)	Velocity (m/s)	Shear (Pa)	Froude Number
0.04	183.97	0.12	0.24	2.43	0.24
0.09	184.05	0.20	0.32	3.98	0.25

Tailwater Channel Data - Culvert 23

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 1.00 m

Side Slope (H:V): 2.00 (_:1)

Channel Slope: 0.0020

Channel Manning's n: 0.0400

Channel Invert Elevation: 183.85 m

Roadway Data for Crossing: Culvert 23

Roadway Profile Shape: Constant Roadway Elevation

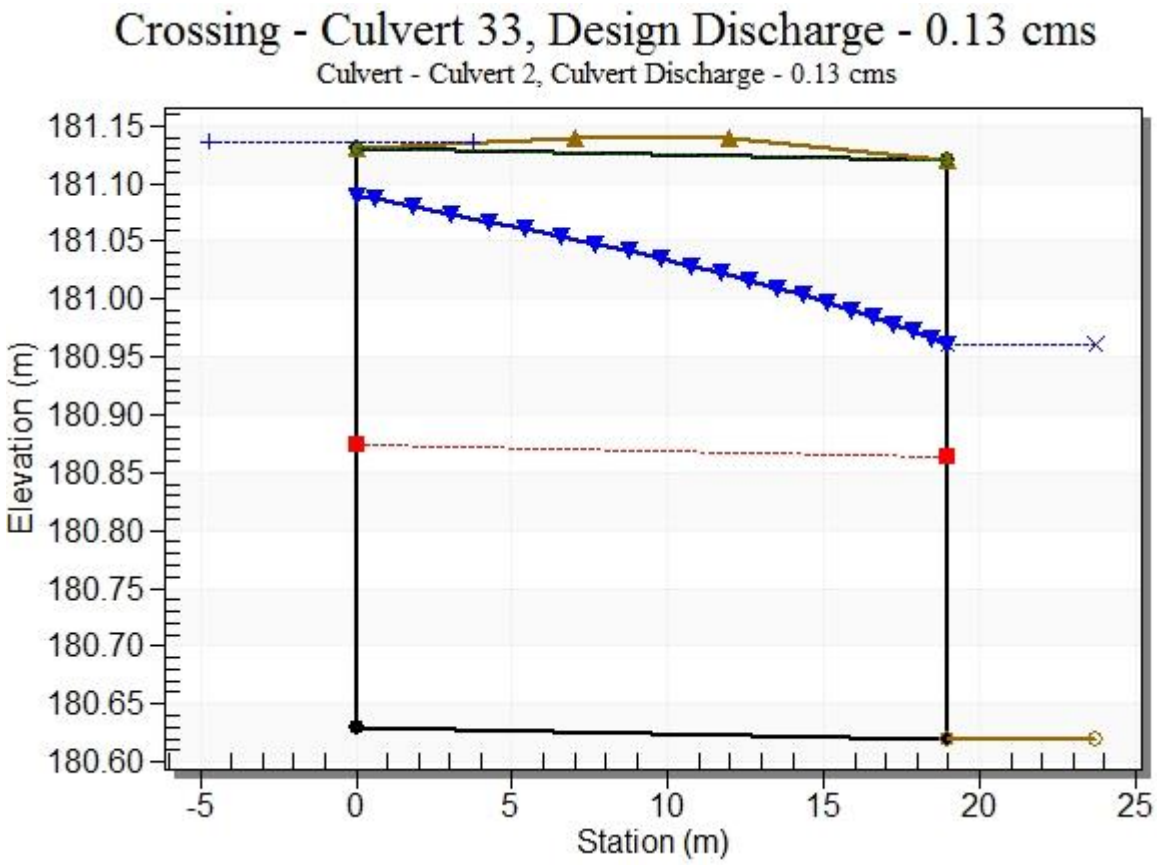
Crest Length: 10.00 m

Crest Elevation: 184.28 m

Roadway Surface: Gravel

Roadway Top Width: 5.00 m

Water Surface Profile Plot for Culvert: Culvert 2



Site Data - Culvert 2

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 m

Inlet Elevation: 180.63 m

Outlet Station: 19.00 m

Outlet Elevation: 180.62 m

Number of Barrels: 1

Culvert Data Summary - Culvert 2

Barrel Shape: Circular

Barrel Diameter: 500.00 mm

Barrel Material: Corrugated Steel

Embedment: 0.00 mm

Barrel Manning's n: 0.0240

Culvert Type: Straight

Inlet Configuration: Thin Edge Projecting

Inlet Depression: NONE

Table 17 - Downstream Channel Rating Curve (Crossing: Culvert 33)

Flow (cms)	Water Surface Elev (m)	Depth (m)
3.67	180.96	0.34
4.59	180.96	0.34

Tailwater Channel Data - Culvert 33

Tailwater Channel Option: Enter Constant Tailwater Elevation

Constant Tailwater Elevation: 180.96 m

Roadway Data for Crossing: Culvert 33

Roadway Profile Shape: Constant Roadway Elevation

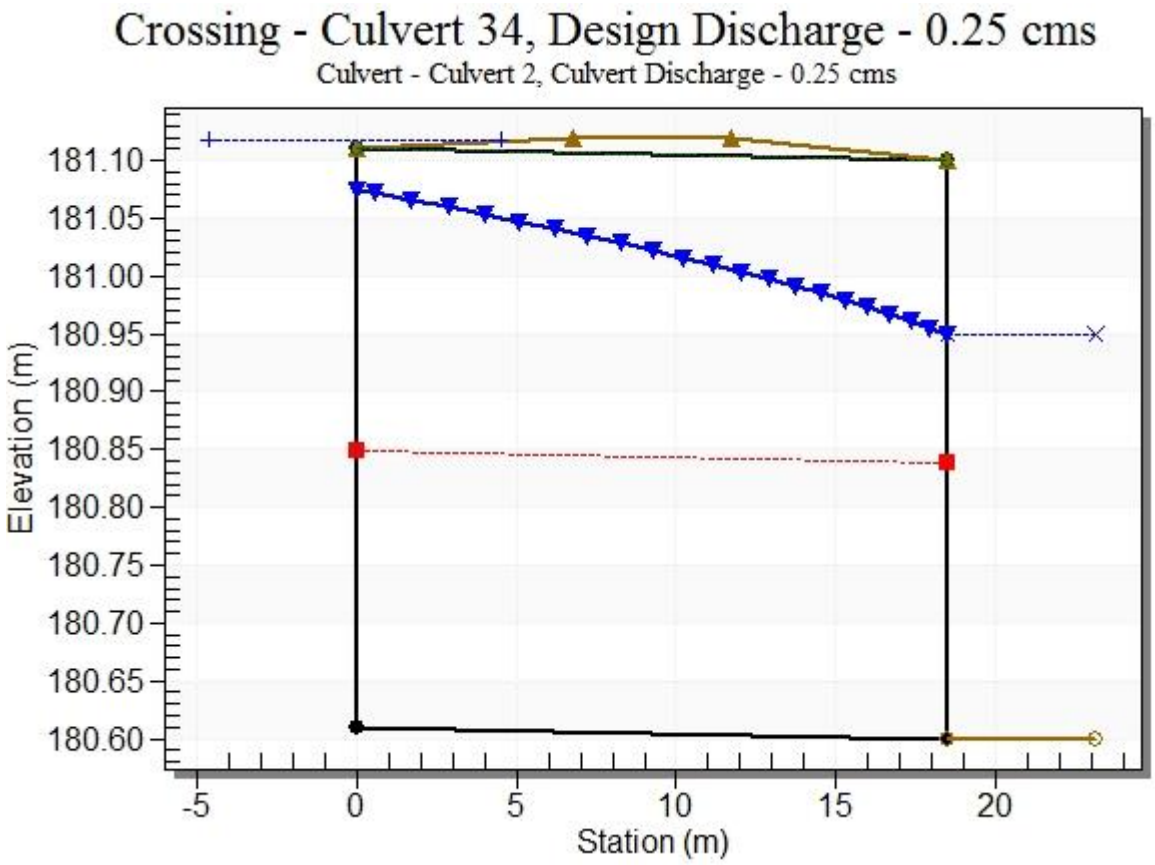
Crest Length: 10.00 m

Crest Elevation: 181.14 m

Roadway Surface: Gravel

Roadway Top Width: 5.00 m

Water Surface Profile Plot for Culvert: Culvert 2



Site Data - Culvert 2

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 m

Inlet Elevation: 180.61 m

Outlet Station: 18.50 m

Outlet Elevation: 180.60 m

Number of Barrels: 2

Culvert Data Summary - Culvert 2

Barrel Shape: Circular

Barrel Diameter: 500.00 mm

Barrel Material: Corrugated Steel

Embedment: 0.00 mm

Barrel Manning's n: 0.0240

Culvert Type: Straight

Inlet Configuration: Thin Edge Projecting

Inlet Depression: NONE

Table 18 - Downstream Channel Rating Curve (Crossing: Culvert 34)

Flow (cms)	Water Surface Elev (m)	Depth (m)	Velocity (m/s)	Shear (Pa)	Froude Number
0.14	180.85	0.25	0.36	4.98	0.26
0.25	180.95	0.35	0.42	6.85	0.27

Tailwater Channel Data - Culvert 34

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 1.00 m

Side Slope (H:V): 2.00 (_:1)

Channel Slope: 0.0020

Channel Manning's n: 0.0400

Channel Invert Elevation: 180.60 m

Roadway Data for Crossing: Culvert 34

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 10.00 m

Crest Elevation: 181.12 m

Roadway Surface: Gravel

Roadway Top Width: 5.00 m

APPENDIX D
RUNOFF QUANTITY (PEAK FLOWS)

1335-60106 - Windsor Solar Project
SWMHYMO Parameters

Existing Conditions

Catchment Number	SWMHYMO Command	Comments	Area (ha)	CN	Slope (%)	Length (m)	Tc (hrs)	Tp (hrs)
EXT1	DESIGN NASHYD	Airfield drainage to Lappan Drain upstream of Pilette Road	42.26	73	0.3	650	1.85	1.11
EXT2	DESIGN NASHYD	Cropped land drainage to Lappan Drain via roadside ditch	22.52	82	0.2	650	2.12	1.27
EXT3	DESIGN NASHYD	Cropped land drainage to Lappan Drain via roadside ditch	42.81	82	0.3	650	1.85	1.11
104	DESIGN NASHYD	Cropped land drainage to Lappan Drain via ditches	19.36	82	0.2	850	2.42	1.45
105	DESIGN NASHYD	Cropped land drainage to Lappan Drain via ditches	25.24	82	0.2	850	2.42	1.45
105A	DESIGN NASHYD	Cropped land drainage to Lappan Drain via shallow surface flow	6.80	82	0.3	480	1.59	0.96
106	DESIGN NASHYD	Cropped land drainage to McGill Drain via ditches	39.07	82	0.2	1070	2.72	1.63
EXT4	DESIGN NASHYD	Cropped land drainage to McGill Drain via ditches	21.08	80	0.2	1340	3.04	1.83
107	DESIGN NASHYD	Cropped land drainage to McGill Drain via ditches	6.53	82	0.3	350	1.36	0.82
108	DESIGN NASHYD	Cropped land drainage to McGill Drain via Jefferson Blvd ditch	15.67	82	0.2	480	1.82	1.09
109	DESIGN NASHYD	Cropped land drainage to McGill Drain via roadside ditch	47.17	82	0.3	630	1.83	1.10
EXT8	DESIGN NASHYD	Cropped land drainage to Lappan Drain via shallow surface flow	6.60	82	0.2	270	1.37	0.82
EXT5	DESIGN NASHYD	Cropped land drainage to McGill Drain via shallow surface flow	14.81	82	0.1	590	2.54	1.52
EXT6	DESIGN NASHYD	Cropped land drainage to McGill Drain via shallow surface flow	24.11	80	0.1	590	2.54	1.52
113	DESIGN NASHYD	Cropped land drainage to culvert via shallow surface flow	17.65	82	0.2	330	1.51	0.91
114	DESIGN NASHYD	Cropped land drainage to McGill Drain via roadside ditch	4.88	82	0.2	330	1.51	0.91
EXT7	DESIGN NASHYD	Cropped land drainage to McGill Drain via shallow surface flow	18.59	82	0.1	550	2.45	1.47
Total			***375.15***					

Proposed Conditions

Catchment Number	SWMHYMO Command		Area (ha)	CN	Slope (%)	Length (m)	Tc (hrs)	Tp (hrs)
EXT1	DESIGN NASHYD	Airfield drainage to Lappan Drain upstream of Pilette Road	42.26	73	0.3	650	1.85	1.11
EXT2	DESIGN NASHYD	Cropped land drainage to Lappan Drain via roadside ditch	22.52	82	0.2	650	2.12	1.27
EXT3	DESIGN NASHYD	Cropped land drainage to Lappan Drain via roadside ditch	42.81	82	0.3	650	1.85	1.11
EXT4	DESIGN NASHYD	Cropped land drainage to McGill Drain via ditches	21.08	80	0.2	1340	3.04	1.83
EXT5	DESIGN NASHYD	Cropped land drainage to McGill Drain via shallow surface flow	14.81	82	0.1	590	2.54	1.52
EXT6	DESIGN NASHYD	Cropped land drainage to McGill Drain via shallow surface flow	24.11	80	0.1	590	2.54	1.52
EXT7	DESIGN NASHYD	Cropped land drainage to McGill Drain via shallow surface flow	18.59	82	0.1	550	2.45	1.47
EXT8	DESIGN NASHYD	Cropped land drainage to Lappan Drain via shallow surface flow	6.60	82	0.2	270	1.37	0.82
201	DESIGN NASHYD	Cropped land drainage to Lappan Drain via ditches	15.29	82	0.2	670	2.15	1.29
202	DESIGN NASHYD	Proposed solar project drainage to Lappan Drain via proposed grassed swale	10.43	72	0.2	380	1.62	0.97
203	DESIGN NASHYD	Proposed solar project drainage to McGill Drain via proposed grassed swale	12.75	72	0.2	380	1.62	0.97
204	DESIGN NASHYD	Proposed solar project drainage to Lappan Drain via proposed grassed swale	10.88	72	0.2	290	1.42	0.85
205	DESIGN NASHYD	Proposed solar project drainage to McGill Drain via proposed grassed swale	12.89	72	0.2	300	1.44	0.86
206	DESIGN NASHYD	Proposed solar project drainage to Lappan Drain via proposed grassed swale	4.78	72	0.1	200	1.48	0.89
207	DESIGN NASHYD	Proposed solar project drainage to Lappan Drain via proposed grassed swale	14.96	72	0.1	450	2.22	1.33
208	DESIGN NASHYD	Proposed solar project drainage to Lappan Drain via shallow surface flow	7.92	72	0.3	650	1.85	1.11
209	DESIGN NASHYD	Proposed solar project drainage to McGill Drain via proposed grassed swale	15.50	72	0.2	380	1.62	0.97
210	DESIGN NASHYD	Cropped land drainage to McGill Drain via shallow surface flow	7.27	82	0.3	350	1.36	0.82
211	DESIGN NASHYD	Cropped land drainage to McGill Drain via proposed grassed swale	14.49	82	0.3	600	1.78	1.07
212	DESIGN NASHYD	Proposed solar project drainage to Lappan Drain via proposed grassed swale	4.95	73	0.3	120	0.80	0.48
213	DESIGN NASHYD	Proposed solar project drainage to McGill Drain via proposed grassed swale	16.88	72	0.3	310	1.28	0.77
214	DESIGN NASHYD	Proposed solar project drainage to McGill Drain via proposed grassed swale	17.47	76	0.6	300	1.00	0.60
215	DESIGN NASHYD	Proposed solar project drainage to McGill Drain via shallow surface flow	5.34	72	0.2	300	1.44	0.86
216	DESIGN NASHYD	Proposed solar project drainage to McGill Drain via proposed grassed swale	10.57	72	0.1	370	2.01	1.21
Total			***375.15***					

Notes:

Time of Concentration calculated using the Airport Method ⟶ $Tc = [\ 3.26\ (1.1-C)\ L^{0.5}\ ]\ /\ S^{0.33}$

Where:

C = Runoff Coefficient = 0.2 for undeveloped areas
L = Length of Overland Flow (m)
= (Area/1.5)^0.5
S = Slope (%)

Time to Peak ⟶ $Tp = 0.6Tc$

1335-60106 - Windsor Solar Project
NRCS (SCS) Curve Number Determination
Existing Conditions

TABLE OF CURVE NUMBERS (CN's)									Source
Land Use		Hydrologic Soil Type							
		A	AB	B	BC	C	CD	D	
Meadow	"Good"	30	44	58	65	71	75	78	MTO
Woodlot	"Good"	25	40	55	63	70	74	77	MTO
Lawns	"Good"	39	50	61	68	74	77	80	USDA
Pasture/Range		58	62	65	71	76	79	81	MTO
Crop		66	70	74	78	82	84	86	MTO
Bare Soil (Fallow)		77	82	86	89	91	93	94	MTO
Wetland/Lake		50	50	50	50	50	50	50	MTO
Impervious		98	98	98	98	98	98	98	MTO

MTO - Ministry of Transportation Ontario Drainage Manual (1997), Design Chart 1.09-Soil/Land Use Curve Numbers
USDA - United States Department of Agriculture (2004), National Engineering Handbook, Part 630 Hydrology,
Chapter 9 Hydrologic Soil Cover Compexes

HYDROLOGIC SOIL TYPE (%) - Existing Conditions								
Catchment	Hydrologic Soil Type							TOTAL
	A	AB	B	BC	C	CD	D	
EXT1					100			100
EXT2					100			100
EXT3					100			100
104					100			100
105					100			100
105A					100			100
106					100			100
EXT4					100			100
107					100			100
108					100			100
109					100			100
110					100			100
EXT5					100			100
EXT6					100			100
113					100			100
114					100			100
EXT7					100			100

LAND USE (%) - Existing Conditions									
Catchment	Meadow	Woodlot	Lawns	Pasture Range	Crop	Bare Soil	Wetland	Impervious	Total
EXT1	94							6	100
EXT2					98			2	100
EXT3					97			3	100
104					99			1	100
105					99			1	100
105A					99			1	100
106					100				100
EXT4		18			81			1	100
107					99			1	100
108					98			2	100
109					99			1	100
110					98			2	100
EXT5					99			1	100
EXT6		19			80			1	100
113					98			2	100
114					98			2	100
EXT7					98			2	100

Note: Where STANDHYD command used (shaded), impervious fraction is not considered in CN determination, since %Imp directly input in STANDHYD command

CURVE NUMBER (CN) - Existing Conditions										
Catchment	Meadow	Woodlot	Lawns	Pasture Range	Crop	Bare Soil	Wetland/ Lakes	Impervious	Weighted CN w/ imp area	Weighted CN w/o imp area
EXT1	67							6	73	71
EXT2					80			2	82	82
EXT3					80			3	82	82
104					81			1	82	82
105					81			1	82	82
105A					81			1	82	82
106					82				82	82
EXT4		13			66			1	80	80
107					81			1	82	82
108					80			2	82	82
109					81			1	82	82
110					80			2	82	82
EXT5					81			1	82	82
EXT6		13			66			1	80	80
113					80			2	82	82
114					80			2	82	82
EXT7					80			2	82	82

Notes:

AMC II assumed
Hydrological Soil Groups taken from MTO Drainage Manual

1335-60106 - Windsor Solar Project
NRCS (SCS) Curve Number Determination
Proposed Conditions

TABLE OF CURVE NUMBERS (CN's)									
Land Use		Hydrologic Soil Type							Source
		A	AB	B	BC	C	CD	D	
Meadow	"Good"	30	44	58	65	71	75	78	MTO
Woodlot	"Fair"	25	40	55	63	70	74	77	MTO
Lawns	"Good"	39	50	61	68	74	77	80	USDA
Pasture/Range		58	62	65	71	76	79	81	MTO
Crop		66	70	74	78	82	84	86	MTO
Bare Soil (Fallow)		77	82	86	89	91	93	94	MTO
Wetland/Lake		50	50	50	50	50	50	50	MTO
Impervious		98	98	98	98	98	98	98	MTO

MTO - Ministry of Transportation Ontario Drainage Manual (1997), Design Chart 1.09-Soil/Land Use Curve Numbers
USDA - United States Department of Agriculture (2004), National Engineering Handbook, Part 630 Hydrology, Chapter 9 Hydrologic Soil Cover Compexes

HYDROLOGIC SOIL TYPE (%) - Proposed Conditions								
Catchment	Hydrologic Soil Type							TOTAL
	A	AB	B	BC	C	CD	D	
EXT1					100			100
EXT2					100			100
EXT3					100			100
EXT4					100			100
EXT5					100			100
EXT6					100			100
EXT7					100			100
EXT8					100			100
201					100			100
202					100			100
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211					100			100
212					100			100
213					100			100
214					100			100
215					100			100
216					100			100

LAND USE (%) - Proposed Conditions									
Catchment	Meadow	Woodlot	Lawns	Pasture Range	Crop	Bare Soil	Wetland	Impervious	Total
EXT1	94							6	100
EXT2					98			2	100
EXT3					97			3	100
EXT4		18			81			1	100
EXT5					99			1	100
EXT6		19			80			1	100
EXT7					98			2	100
EXT8					98			2	100
201					99			1	100
202	98							2	100
203	98							2	100
204	98							2	100
205	97							3	100
206	98							2	100
207	98							2	100
208	98							2	100
209	97							3	100
210	5				92			3	100
211					98			2	100
212	93							7	100
213	97							3	100
214	67				23			10	100
215	98							2	100
216	97							3	100

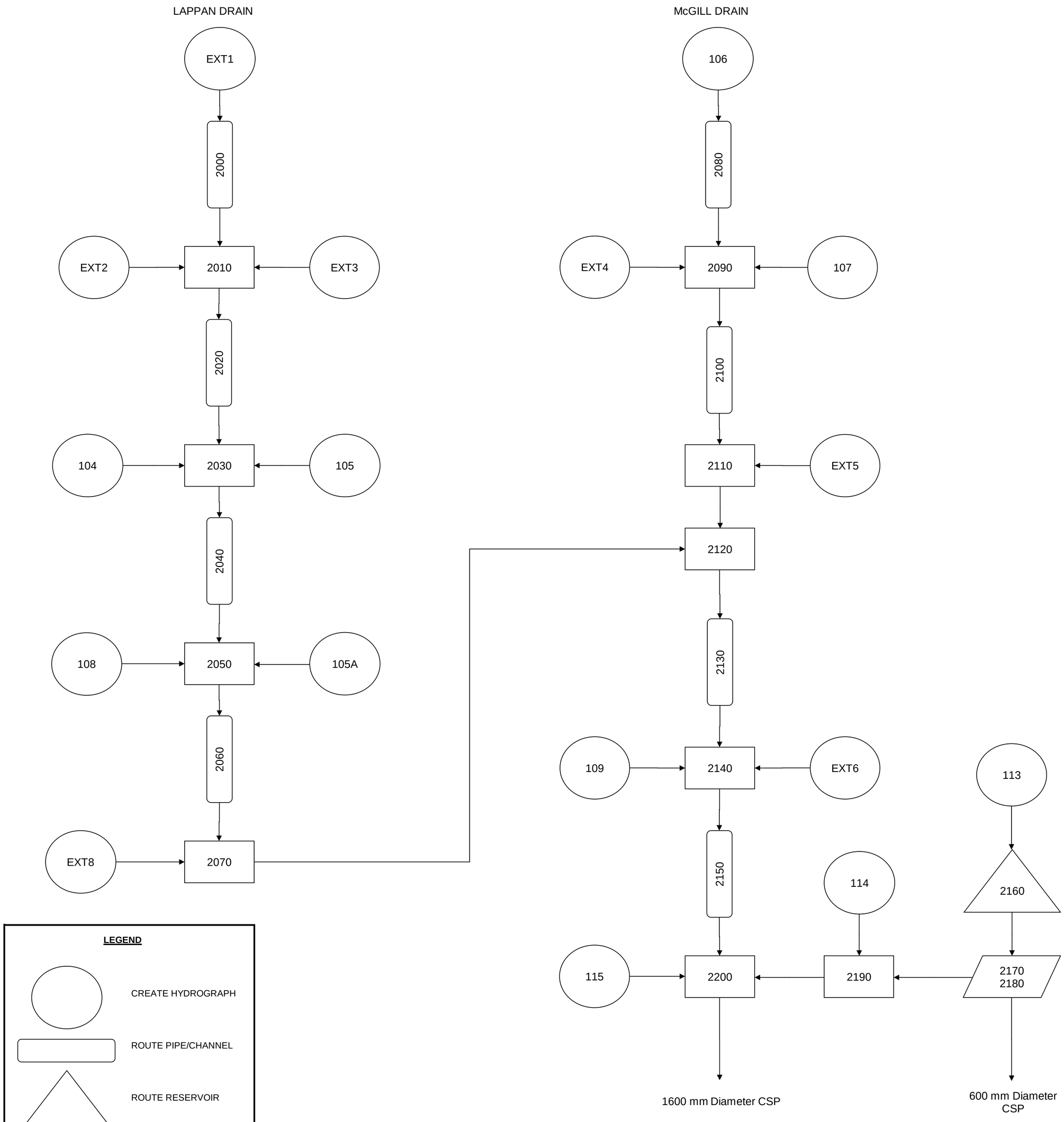
Note: Where STANDHYD command used (shaded), impervious fraction is not considered in CN determination, since %Imp directly input in STANDHYD command

CURVE NUMBER (CN) - Proposed Conditions										
Catchment	Meadow	Woodlot	Lawns	Pasture Range	Crop	Bare Soil	Wetland/ Lakes	Impervious	Weighted CN w/ imp area	Weighted CN w/o imp area
EXT1	67							6	73	71
EXT2					80			2	82	82
EXT3					80			3	82	82
EXT4		13			66			1	80	80
EXT5					81			1	82	82
EXT6		13			66			1	80	80
EXT7					80			2	82	82
EXT8					80			2	82	82
201					81			1	82	82
202	70							2	72	71
203	70							2	72	71
204	70							2	72	71
205	69							3	72	71
206	70							2	72	71
207	70							2	72	71
208	70							2	72	71
209	69							3	72	71
210	4				75			3	82	81
211					80			2	82	82
212	66							7	73	71
213	69							3	72	71
214	48				19			10	76	74
215	70							2	72	71
216	69							3	72	71

Notes:

AMC II assumed
Hydrological Soil Groups taken from MTO Drainage Manual

Subject: Proposed Conditions SWMHYMO Schematic
Project: Windsor Solar Project
Project No.: 133560106
Client: Windsor Solar LP
Date: February 1, 2016



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       S  W W W  M   M  H   H    Y    M   M  O   O        9999   9999    Sept 2011
   SSSSS   W W   M   M  H   H    Y    M   M   OOO            9      9    =========
                                                          9   9  9   9    # 4730904
         StormWater Management HYdrologic Model            999    999    =========

 ********************************************************************************
 ****************************** SWMHYMO Ver/4.05  *******************************
 *********  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) 836-3884            *********
 *********                  Gatineau, Quebec: (819) 243-6858            *********
 *********                  E-Mail: swmhymo@jfsa.com                    *********
 ********************************************************************************

 ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
 +++++++++ Licensed user: Stantec Consulting Ltd. (Kitchener)          +++++++++
 +++++++++               Kitchener          SERIAL#:4730904          +++++++++
 ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

 ********************************************************************************
 *********           ++++++ PROGRAM ARRAY DIMENSIONS ++++++             *********
 *********           Maximum value for ID numbers  :    10             *********
 *********           Max. number of rainfall points: 105408            *********
 *********           Max. number of flow points    : 105408            *********
 ********************************************************************************


 **********************   D E T A I L E D   O U T P U T   **********************
 ********************************************************************************
 *       DATE: 2016-02-11       TIME: 16:33:37      RUN COUNTER: 000339         *
 ********************************************************************************
 * Input   filename: F:\WSP\60106EX2.dat                                        *
 * Output  filename: F:\WSP\60106EX2.out                                        *
 * Summary filename: F:\WSP\60106EX2.sum                                        *
 * User comments:                                                               *
 * 1:_____________________________________________________________________      *
 * 2:_____________________________________________________________________      *
 * 3:_____________________________________________________________________      *
 ********************************************************************************

--------------------------------------------------------------------------------
001:0001----------------------------------------------------------------------
*#*****************************************************************************
*#  Project Name: [Windsor Solar Project] Project Number: [1335-60106]
*#  Date       : 02-02-2016
*#  Modeller   : [NE]
*#  Company    : Stantec Consulting Ltd. (London)
*#  License #  :  4730904
*#*****************************************************************************
*#
*#  Existing Conditions
*#  25 mm Water Quality Event
*#  2, 5, 10, 25, 50, 100, 250-year 3-Hour Chicago Design Storm
*#
*#*****************************************************************************
  ** END OF RUN :   1

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


--------------------
| START            |  Project  dir.: F:\WSP\
--------------------  Rainfall dir.: F:\WSP\
    TZERO =   .00 hrs on      0
    METOUT=  2 (output = METRIC)
    NRUN  = 002
    NSTORM=  1
           #  1=12SCS2.stm
--------------------------------------------------------------------------------
002:0002----------------------------------------------------------------------
*#*****************************************************************************
*#  Project Name: [Windsor Solar Project] Project Number: [1335-60106]
*#  Date       : 02-02-2016
*#  Modeller   : [NE]
*#  Company    : Stantec Consulting Ltd. (London)
*#  License #  :  4730904
*#*****************************************************************************
*#
*#  Existing Conditions
*#  25 mm Water Quality Event
*#  2, 5, 10, 25, 50, 100, 250-year 3-Hour Chicago Design Storm
*#
*#*****************************************************************************
--------------------------------------------------------------------------------
002:0002----------------------------------------------------------------------
--------------------
| READ STORM       |    Filename: 2-yr scs 12 hr windsor
| Ptotal=  46.20 mm|    Comments: 2-yr scs 12 hr windsor
--------------------
            TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
             hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
             .50    .924 |   3.50   1.848 |   6.50   8.316 |   9.50   1.848
            1.00    .924 |   4.00   1.848 |   7.00   3.696 |  10.00    .924
            1.50    .924 |   4.50   2.772 |   7.50   2.772 |  10.50    .924
            2.00    .924 |   5.00   3.696 |   8.00   2.772 |  11.00    .924
            2.50   1.848 |   5.50   5.544 |   8.50   1.848 |  11.50    .924
            3.00   1.848 |   6.00  41.580 |   9.00   1.848 |  12.00    .924

--------------------------------------------------------------------------------
002:0003----------------------------------------------------------------------
*#*****************************************************************************
*# LAPPAN DRAIN
*#*****************************************************************************
---------------------
| DESIGN NASHYD     |   Area    (ha)=   42.26   Curve Number   (CN)=73.00
| 01:101    DT= 1.00 |  Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
---------------------  U.H. Tp(hrs)=   1.110

     Unit Hyd Qpeak  (cms)=    1.454

     PEAK FLOW       (cms)=     .514 (i)
     TIME TO PEAK    (hrs)=    7.117
     RUNOFF VOLUME    (mm)=   14.412
     TOTAL RAINFALL   (mm)=   46.200
     RUNOFF COEFFICIENT   =     .312

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

--------------------------------------------------------------------------------
002:0004----------------------------------------------------------------------
--------------------
| ROUTE CHANNEL    |     Routing time step (min) =  1.00
|  IN> 01:101      |     Number of SEGMENTS =  3
| OUT< 02:002000   |     Slopes (%), CHANNEL= .1000  FLOODPLAIN= .2000
--------------------                 LENGTH =  700.00     (m)

             <------ DATA FOR SECTION (   1.0) ------>
             Distance      Elevation       Manning
                .00          1.40          .2000
              100.00         1.20     .2000 /  .0850  Main Channel
              101.80          .00          .0850      Main Channel
              103.00          .00          .0850      Main Channel
              104.80         1.20     .0850 / .2000  Main Channel
              204.80         1.40          .2000

   <---------------------- TRAVEL TIME TABLE ----------------------->
    DEPTH    ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME   D x V
      (m)     (m)   (cu.m.)   (cu.m.)      (cms)     (m/s)      (min)   (m2/s)
     .071    .071  .645E+02  .325E+01       .005      .059     197.27     .004
     .141    .141  .140E+03  .141E+02       .018      .089     131.37     .013
     .212    .212  .225E+03  .340E+02       .036      .111     104.80     .024
     .282    .282  .321E+03  .647E+02       .060      .130      89.71     .037
     .353    .353  .427E+03  .108E+03       .089      .146      79.68     .052
     .424    .424  .544E+03  .165E+03       .125      .161      72.40     .068
     .494    .494  .671E+03  .237E+03       .168      .175      66.79     .086
     .565    .565  .809E+03  .326E+03       .217      .187      62.29     .106
     .635    .635  .957E+03  .434E+03       .272      .199      58.56     .127
     .706    .706  .112E+04  .563E+03*      .336      .211      55.41     .149
     .776    .776  .129E+04  .713E+03*      .407      .221      52.69     .172
     .847    .847  .146E+04  .886E+03*      .485      .232      50.32     .196
     .918    .918  .166E+04  .108E+04*      .572      .242      48.22     .222
     .988    .988  .186E+04  .131E+04*      .667      .252      46.35     .249
    1.059   1.059  .207E+04  .156E+04*      .771      .261      44.66     .277
    1.129   1.129  .229E+04  .185E+04*      .884      .271      43.13     .306
    1.200   1.200  .252E+04  .216E+04*     1.006      .280      41.73     .335
    1.300   1.300  .636E+04  .590E+04*     1.392      .153      76.12     .199
    1.400   1.400  .172E+05  .172E+05*     2.456      .100     116.67     .140

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
 (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                                  <---- hydrograph ---->   <-pipe / channel->
                          AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                          (ha)    (cms)   (hrs)   (mm)       (m)      (m/s)
   INFLOW : ID= 1:101     42.26     .514    7.12 14.412      .870      .235
   OUTFLOW: ID= 2:002000  42.26     .396    7.67 14.411      .766      .220


--------------------------------------------------------------------------------
002:0005----------------------------------------------------------------------
---------------------
| DESIGN NASHYD     |   Area    (ha)=   22.52   Curve Number   (CN)=82.00
| 01:102    DT= 1.00 |  Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
---------------------  U.H. Tp(hrs)=   1.270

     Unit Hyd Qpeak  (cms)=     .677

     PEAK FLOW       (cms)=     .348 (i)
     TIME TO PEAK    (hrs)=    7.283
     RUNOFF VOLUME    (mm)=   19.890
     TOTAL RAINFALL   (mm)=   46.200
     RUNOFF COEFFICIENT   =     .431

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

--------------------------------------------------------------------------------
002:0006----------------------------------------------------------------------
---------------------
| DESIGN NASHYD     |   Area    (ha)=   42.81   Curve Number   (CN)=82.00
| 03:103    DT= 1.00 |  Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
---------------------  U.H. Tp(hrs)=   1.110

     Unit Hyd Qpeak  (cms)=    1.473

     PEAK FLOW       (cms)=     .732 (i)
     TIME TO PEAK    (hrs)=    7.100
     RUNOFF VOLUME    (mm)=   19.890
     TOTAL RAINFALL   (mm)=   46.200
     RUNOFF COEFFICIENT   =     .431

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

--------------------------------------------------------------------------------
002:0007----------------------------------------------------------------------
*#*****************************************************************************
*# Lappan Drain - Total Flow at Pilette Road
*#*****************************************************************************
---------------------
| ADD HYD (      2010) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
---------------------                      (ha)     (cms)   (hrs)   (mm)   (cms)
                     ID1 01:102           22.52     .348    7.28  19.89    .000
                    +ID2 02:      2000    42.26     .396    7.67  14.41    .000
                    +ID3 03:103           42.81     .732    7.10  19.89    .000
                     ==========================================================
                     SUM 04:      2010   107.59    1.436    7.30  17.74    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
002:0008----------------------------------------------------------------------
--------------------
| ROUTE CHANNEL    |     Routing time step (min) =  1.00
|  IN> 04:002010   |     Number of SEGMENTS =  3
| OUT< 01:002020   |     Slopes (%), CHANNEL= .1700  FLOODPLAIN= .2000
--------------------                 LENGTH = 1000.00     (m)

             <------ DATA FOR SECTION (   2.0) ------>
             Distance      Elevation       Manning
                .00          2.00          .2000
              100.00         1.80     .2000 /  .0850  Main Channel
              102.75          .00          .0850      Main Channel
              104.25          .00          .0850      Main Channel
              107.00         1.80     .0850 / .2000  Main Channel
              207.00         2.00          .2000

   <---------------------- TRAVEL TIME TABLE ----------------------->
    DEPTH    ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME   D x V
      (m)     (m)   (cu.m.)   (cu.m.)      (cms)     (m/s)      (min)   (m2/s)
     .100    .100  .165E+03  .486E+01       .016      .096     172.86     .010
     .200    .200  .361E+03  .212E+02       .052      .144     115.66     .029
     .300    .300  .588E+03  .518E+02       .106      .180      92.51     .054
     .400    .400  .844E+03  .993E+02       .177      .210      79.29     .084
     .500    .500  .113E+04  .166E+03       .268      .236      70.48     .118
     .600    .600  .145E+04  .256E+03       .377      .260      64.05     .156
     .700    .700  .180E+04  .370E+03       .507      .282      59.09     .197
     .800    .800  .218E+04  .512E+03       .659      .303      55.09     .242
     .900    .900  .259E+04  .685E+03       .833      .322      51.78     .290
    1.000   1.000  .303E+04  .891E+03      1.031      .340      48.97     .340
    1.100   1.100  .350E+04  .113E+04      1.253      .358      46.55     .394
    1.200   1.200  .400E+04  .141E+04      1.500      .375      44.43     .450
    1.300   1.300  .453E+04  .173E+04      1.775      .392      42.56     .509
    1.400   1.400  .509E+04  .210E+04      2.077      .408      40.88     .571
    1.500   1.500  .569E+04  .251E+04      2.407      .423      39.37     .635
    1.600   1.600  .631E+04  .297E+04      2.768      .439      38.01     .702
    1.700   1.700  .697E+04  .348E+04      3.158      .453      36.76     .771
    1.800   1.800  .765E+04  .405E+04*     3.580      .468      35.61     .842
    2.000   2.000  .291E+05  .171E+05*     5.701      .196      84.93     .392

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
 (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                                  <---- hydrograph ---->   <-pipe / channel->
                          AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                          (ha)    (cms)   (hrs)   (mm)       (m)      (m/s)
   INFLOW : ID= 4:002010  107.59   1.436    7.30 17.738     1.174      .371
   OUTFLOW: ID= 1:002020  107.59   1.188    7.93 17.738     1.067      .352


--------------------------------------------------------------------------------
002:0009----------------------------------------------------------------------
---------------------
| DESIGN NASHYD     |   Area    (ha)=   19.36   Curve Number   (CN)=82.00
| 02:104    DT= 1.00 |  Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
```

```
----------------------  U.H. Tp(hrs)=   1.450

     Unit Hyd Qpeak  (cms)=      .510

     PEAK FLOW       (cms)=      .271 (i)
     TIME TO PEAK    (hrs)=    7.483
     RUNOFF VOLUME    (mm)=   19.890
     TOTAL RAINFALL   (mm)=   46.200
     RUNOFF COEFFICIENT   =     .431

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

--------------------------------------------------------------------------------
002:0010--------------------------------------------------------------------------
----------------------
| DESIGN NASHYD     |   Area     (ha)=   25.24   Curve Number    (CN)=82.00
| 03:105    DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------  U.H. Tp(hrs)=   1.450

     Unit Hyd Qpeak  (cms)=      .665

     PEAK FLOW       (cms)=      .353 (i)
     TIME TO PEAK    (hrs)=    7.483
     RUNOFF VOLUME    (mm)=   19.890
     TOTAL RAINFALL   (mm)=   46.200
     RUNOFF COEFFICIENT   =     .431

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

--------------------------------------------------------------------------------
002:0011--------------------------------------------------------------------------
----------------------
| ADD HYD (      2030) | ID: NHYD          AREA     QPEAK    TPEAK    R.V.     DWF
----------------------                     (ha)     (cms)    (hrs)    (mm)    (cms)
                    ID1 01:      2020   107.59    1.188    7.93  17.74     .000
                   +ID2 02:104           19.36     .271    7.48  19.89     .000
                   +ID3 03:105           25.24     .353    7.48  19.89     .000
                    ==========================================================
                    SUM 04:      2030   152.19    1.789    7.80  18.37     .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
002:0012--------------------------------------------------------------------------
----------------------
| ROUTE CHANNEL     |     Routing time step (min) =  1.00
|  IN> 04:002030    |     Number of SEGMENTS =  3
| OUT< 01:002040    |     Slopes (%), CHANNEL= .1200  FLOODPLAIN= .2000
--------------------                    LENGTH =  500.00     (m)

              <------ DATA FOR SECTION (   3.0) ------>
              Distance       Elevation        Manning
                 .00            2.20           .2000
               200.00            1.80     .2000 / .0850  Main Channel
               202.75             .00          .0850      Main Channel
               204.25             .00          .0850      Main Channel
               207.00            1.80     .0850 / .2000  Main Channel
               407.00            2.20           .2000

   <---------------------------- TRAVEL TIME TABLE ---------------------------->
    DEPTH     ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME    D x V
      (m)      (m)   (cu.m.)   (cu.m.)      (cms)     (m/s)      (min)   (m2/s)
     .112     .112  .940E+02  .882E+01       .016      .087      95.91     .010
     .225     .225  .207E+03  .389E+02       .054      .129      64.45     .029
     .337     .337  .340E+03  .957E+02       .110      .161      51.67     .054
     .450     .450  .492E+03  .185E+03       .185      .188      44.34     .085
     .562     .562  .664E+03  .311E+03       .280      .211      39.43     .119
     .675     .675  .854E+03  .481E+03*      .397      .233      35.84     .157
     .788     .788  .106E+04  .698E+03*      .537      .252      33.06     .199
     .900     .900  .129E+04  .970E+03*      .700      .270      30.81     .243
    1.013    1.013  .154E+04  .130E+04*      .888      .288      28.95     .291
    1.125    1.125  .181E+04  .170E+04*     1.102      .304      27.37     .343
    1.238    1.238  .210E+04  .216E+04*     1.344      .320      26.01     .397
    1.350    1.350  .240E+04  .271E+04*     1.615      .336      24.81     .453
    1.463    1.463  .273E+04  .333E+04*     1.916      .351      23.76     .513
    1.575    1.575  .308E+04  .404E+04*     2.247      .365      22.82     .575
    1.688    1.688  .344E+04  .484E+04*     2.611      .379      21.97     .640
    1.800    1.800  .382E+04  .574E+04*     3.008      .393      21.19     .708
    1.933    1.933  .874E+04  .141E+05*     3.971      .227      36.67     .439
    2.067    2.067  .225E+05  .388E+05*     6.403      .142      58.66     .294
    2.200    2.200  .452E+05  .829E+05*    11.177      .124      67.44     .272

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
 (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                                <---- hydrograph ---->   <-pipe / channel->
                           AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                           (ha)    (cms)   (hrs)   (mm)      (m)       (m/s)
   INFLOW : ID= 4:002030    152.19    1.789    7.80 18.369     1.415      .344
   OUTFLOW: ID= 1:002040    152.19    1.672    8.07 18.369     1.372      .339


--------------------------------------------------------------------------------
002:0013--------------------------------------------------------------------------
----------------------
| DESIGN NASHYD     |   Area     (ha)=   15.67   Curve Number    (CN)=82.00
| 02:108    DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------  U.H. Tp(hrs)=   1.090

     Unit Hyd Qpeak  (cms)=      .549

     PEAK FLOW       (cms)=      .272 (i)
     TIME TO PEAK    (hrs)=    7.067
     RUNOFF VOLUME    (mm)=   19.890
     TOTAL RAINFALL   (mm)=   46.200
     RUNOFF COEFFICIENT   =     .431

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

--------------------------------------------------------------------------------
002:0014--------------------------------------------------------------------------
----------------------
| DESIGN NASHYD     |   Area     (ha)=    6.80   Curve Number    (CN)=82.00
| 03:105A   DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------  U.H. Tp(hrs)=    .960

     Unit Hyd Qpeak  (cms)=      .271

     PEAK FLOW       (cms)=      .130 (i)
     TIME TO PEAK    (hrs)=    6.917
     RUNOFF VOLUME    (mm)=   19.890
     TOTAL RAINFALL   (mm)=   46.200
     RUNOFF COEFFICIENT   =     .431

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

--------------------------------------------------------------------------------
002:0015--------------------------------------------------------------------------
*#############################################################################
*# Lappan Drain - Total Flow at Jefferson Boulevard
*#############################################################################
----------------------
| ADD HYD (      2050) | ID: NHYD          AREA     QPEAK    TPEAK    R.V.     DWF
----------------------                     (ha)     (cms)    (hrs)    (mm)    (cms)
                    ID1 01:      2040   152.19    1.672    8.07  18.37     .000
                   +ID2 02:108           15.67     .272    7.07  19.89     .000
                   +ID3 03:105A           6.80     .130    6.92  19.89     .000
                    ==========================================================
                    SUM 04:      2050   174.66    1.946    7.92  18.56     .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
002:0016--------------------------------------------------------------------------
----------------------
| ROUTE CHANNEL     |     Routing time step (min) =  1.00
|  IN> 04:002050    |     Number of SEGMENTS =  3
| OUT< 01:002060    |     Slopes (%), CHANNEL= .1200  FLOODPLAIN= .2000
--------------------                    LENGTH =  450.00     (m)

              <------ DATA FOR SECTION (   4.0) ------>
              Distance       Elevation        Manning
                 .00            2.20           .2000
               200.00            1.80     .2000 / .0850  Main Channel
               202.75             .00          .0850      Main Channel
               204.25             .00          .0850      Main Channel
               207.00            1.80     .0850 / .2000  Main Channel
               407.00            2.20           .2000

   <---------------------------- TRAVEL TIME TABLE ---------------------------->
    DEPTH     ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME    D x V
      (m)      (m)   (cu.m.)   (cu.m.)      (cms)     (m/s)      (min)   (m2/s)
     .112     .112  .846E+02  .882E+01       .016      .087      86.32     .010
     .225     .225  .187E+03  .389E+02       .054      .129      58.01     .029
     .337     .337  .306E+03  .957E+02       .110      .161      46.50     .054
     .450     .450  .443E+03  .185E+03       .185      .188      39.90     .085
     .562     .562  .597E+03  .311E+03*      .280      .211      35.49     .119
     .675     .675  .769E+03  .481E+03*      .397      .233      32.26     .157
     .788     .788  .958E+03  .698E+03*      .537      .252      29.75     .199
     .900     .900  .116E+04  .970E+03*      .700      .270      27.73     .243
    1.013    1.013  .139E+04  .130E+04*      .888      .288      26.06     .291
    1.125    1.125  .163E+04  .170E+04*     1.102      .304      24.63     .343
    1.238    1.238  .189E+04  .216E+04*     1.344      .320      23.41     .397
    1.350    1.350  .216E+04  .271E+04*     1.615      .336      22.33     .453
    1.463    1.463  .246E+04  .333E+04*     1.916      .351      21.38     .513
    1.575    1.575  .277E+04  .404E+04*     2.247      .365      20.53     .575
    1.688    1.688  .310E+04  .484E+04*     2.611      .379      19.77     .640
    1.800    1.800  .344E+04  .574E+04*     3.008      .393      19.07     .708
    1.933    1.933  .786E+04  .141E+05*     3.971      .227      33.00     .439
    2.067    2.067  .203E+05  .388E+05*     6.403      .142      52.79     .294
    2.200    2.200  .407E+05  .829E+05*    11.177      .124      60.70     .272

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
 (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                                <---- hydrograph ---->   <-pipe / channel->
                           AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                           (ha)    (cms)   (hrs)   (mm)      (m)       (m/s)
   INFLOW : ID= 4:002050    174.66    1.946    7.92 18.564     1.473      .352
   OUTFLOW: ID= 1:002060    174.66    1.845    8.27 18.564     1.437      .347


--------------------------------------------------------------------------------
002:0017--------------------------------------------------------------------------
----------------------
| DESIGN NASHYD     |   Area     (ha)=    6.60   Curve Number    (CN)=82.00
| 02:EXT8   DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------  U.H. Tp(hrs)=    .820

     Unit Hyd Qpeak  (cms)=      .307

     PEAK FLOW       (cms)=      .141 (i)
     TIME TO PEAK    (hrs)=    6.750
     RUNOFF VOLUME    (mm)=   19.890
     TOTAL RAINFALL   (mm)=   46.200
     RUNOFF COEFFICIENT   =     .431

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

--------------------------------------------------------------------------------
002:0018--------------------------------------------------------------------------
*#############################################################################
*# Lappan Drain - Total Flow at McGill Drain
*#############################################################################
----------------------
| ADD HYD (      2070) | ID: NHYD          AREA     QPEAK    TPEAK    R.V.     DWF
----------------------                     (ha)     (cms)    (hrs)    (mm)    (cms)
                    ID1 01:      2060   174.66    1.845    8.27  18.56     .000
                   +ID2 02:EXT8           6.60     .141    6.75  19.89     .000
                    ==========================================================
                    SUM 10:      2070   181.26    1.906    8.15  18.61     .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
002:0019--------------------------------------------------------------------------
*#############################################################################
*# McGILL DRAIN
*#############################################################################
----------------------
| DESIGN NASHYD     |   Area     (ha)=   39.07   Curve Number    (CN)=82.00
| 01:106    DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------  U.H. Tp(hrs)=   1.630

     Unit Hyd Qpeak  (cms)=      .916

     PEAK FLOW       (cms)=      .499 (i)
     TIME TO PEAK    (hrs)=    7.717
     RUNOFF VOLUME    (mm)=   19.890
     TOTAL RAINFALL   (mm)=   46.200
     RUNOFF COEFFICIENT   =     .431

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

--------------------------------------------------------------------------------
002:0020--------------------------------------------------------------------------
----------------------
| ROUTE CHANNEL     |     Routing time step (min) =  1.00
|  IN> 01:106       |     Number of SEGMENTS =  3
| OUT< 02:002080    |     Slopes (%), CHANNEL= .1500  FLOODPLAIN= .2000
--------------------                    LENGTH =  250.00     (m)

              <------ DATA FOR SECTION (   5.0) ------>
              Distance       Elevation        Manning
                 .00            1.40           .2000
               200.00            1.00     .2000 / .1000  Main Channel
               201.50             .00          .1000      Main Channel
               203.50             .00          .1000      Main Channel
               205.00            1.00     .1000 / .2000  Main Channel
               405.00            1.40           .2000

   <---------------------------- TRAVEL TIME TABLE ---------------------------->
    DEPTH     ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME    D x V
      (m)      (m)   (cu.m.)   (cu.m.)      (cms)     (m/s)      (min)   (m2/s)
     .071     .071  .376E+02  .358E+01       .010      .064      65.43     .005
     .143     .143  .791E+02  .151E+02       .031      .097      42.85     .014
     .214     .214  .124E+03  .355E+02       .061      .123      33.82     .026
     .286     .286  .173E+03  .661E+02       .101      .145      28.74     .041
     .357     .357  .226E+03  .108E+03       .148      .164      25.41     .059
     .429     .429  .283E+03  .162E+03*      .205      .181      23.02     .078
     .500     .500  .344E+03  .229E+03*      .270      .197      21.20     .098
     .571     .571  .408E+03  .311E+03*      .344      .211      19.75     .121
     .643     .643  .476E+03  .408E+03*      .428      .225      18.56     .144
     .714     .714  .548E+03  .522E+03*      .521      .237      17.56     .169
     .786     .786  .624E+03  .654E+03*      .623      .249      16.71     .196
     .857     .857  .704E+03  .805E+03*      .735      .261      15.96     .224
     .929     .929  .788E+03  .975E+03*      .858      .272      15.31     .253
    1.000    1.000  .875E+03  .117E+04*      .990      .283      14.73     .283
    1.080    1.080  .177E+04  .256E+04*     1.270      .179      23.30     .193
    1.160    1.160  .427E+04  .661E+04*     1.927      .113      36.97     .131
    1.240    1.240  .837E+04  .138E+05*     3.185      .095      43.82     .118
    1.320    1.320  .141E+05  .248E+05*     5.229      .093      44.86     .123
    1.400    1.400  .214E+05  .399E+05*     8.222      .096      43.33     .135
```

```
 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
 (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                                <---- hydrograph ---->   <-pipe / channel->
                           AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                            (ha)    (cms)   (hrs)   (mm)      (m)      (m/s)
   INFLOW : ID= 1:106      39.07     .499    7.72 19.890      .698      .234
   OUTFLOW: ID= 2:002080   39.07     .483    7.98 19.890      .685      .232


002:0021------------------------------------------------------------------------------
--------------------
| DESIGN NASHYD     |   Area     (ha)=   21.08   Curve Number    (CN)=81.00
| 01:EXT4   DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   1.830

     Unit Hyd Qpeak  (cms)=     .440

     PEAK FLOW       (cms)=     .237 (i)
     TIME TO PEAK    (hrs)=    7.967
     RUNOFF VOLUME    (mm)=   19.161
     TOTAL RAINFALL   (mm)=   46.200
     RUNOFF COEFFICIENT   =     .415

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

------------------------------------------------------------------------------
002:0022------------------------------------------------------------------------
--------------------
| DESIGN NASHYD     |   Area     (ha)=    6.53   Curve Number    (CN)=82.00
| 03:107    DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=    .820

     Unit Hyd Qpeak  (cms)=     .304

     PEAK FLOW       (cms)=     .139 (i)
     TIME TO PEAK    (hrs)=    6.750
     RUNOFF VOLUME    (mm)=   19.890
     TOTAL RAINFALL   (mm)=   46.200
     RUNOFF COEFFICIENT   =     .431

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

------------------------------------------------------------------------------
002:0023------------------------------------------------------------------------
*#*************************************************************************
*# McGill Drain - Total Flow at Jefferson Boulevard
*#*************************************************************************
------------------------
| ADD HYD (      2090) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
                       ID1 01:EXT4          21.08     .237    7.97  19.16     .000
                      +ID2 02:      2080    39.07     .483    7.98  19.89     .000
                      +ID3 03:107            6.53     .139    6.75  19.89     .000
                       ==========================================================
                       SUM 04:      2090    66.68     .795    7.82  19.66     .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
002:0024------------------------------------------------------------------------
--------------------
| ROUTE CHANNEL     |     Routing time step (min) =  1.00
|  IN> 04:002090    |     Number of SEGMENTS =  3
| OUT< 01:002100    |     Slopes (%), CHANNEL= .3000  FLOODPLAIN= .2000
--------------------                 LENGTH =  280.00     (m)

               <------ DATA FOR SECTION (   6.0) ------>
               Distance      Elevation       Manning
                   .00           1.40          .2000
                200.00           1.00     .2000 / .1000  Main Channel
                201.50            .00          .1000      Main Channel
                203.50            .00          .1000      Main Channel
                205.00           1.00     .1000 / .2000  Main Channel
                405.00           1.40          .2000

  <---------------------------- TRAVEL TIME TABLE ---------------------------->
   DEPTH    ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME   D x V
     (m)     (m)   (cu.m.)   (cu.m.)      (cms)     (m/s)     (min)   (m2/s)
    .071    .071  .421E+02  .179E+01       .014      .090     51.82     .006
    .143    .143  .886E+02  .753E+01       .043      .138     33.94     .020
    .214    .214  .139E+03  .178E+02       .087      .174     26.78     .037
    .286    .286  .194E+03  .330E+02       .142      .205     22.76     .059
    .357    .357  .254E+03  .539E+02       .210      .232     20.12     .083
    .429    .429  .317E+03  .809E+02       .290      .256     18.23     .110
    .500    .500  .385E+03  .115E+03       .382      .278     16.79     .139
    .571    .571  .457E+03  .155E+03       .487      .298     15.64     .171
    .643    .643  .534E+03  .204E+03       .605      .318     14.70     .204
    .714    .714  .614E+03  .261E+03       .736      .336     13.91     .240
    .786    .786  .699E+03  .327E+03       .881      .353     13.23     .277
    .857    .857  .789E+03  .402E+03*     1.040      .369     12.64     .316
    .929    .929  .882E+03  .488E+03*     1.213      .385     12.12     .357
   1.000   1.000  .980E+03  .583E+03*     1.401      .400     11.66     .400
   1.080   1.080  .199E+04  .128E+04*     1.761      .248     18.81     .268
   1.160   1.160  .479E+04  .331E+04*     2.505      .147     31.85     .170
   1.240   1.240  .938E+04  .692E+04*     3.856      .115     40.54     .143
   1.320   1.320  .158E+05  .124E+05*     5.997      .107     43.81     .141
   1.400   1.400  .239E+05  .199E+05*     9.093      .106     43.88     .149

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
 (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                                <---- hydrograph ---->   <-pipe / channel->
                           AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                            (ha)    (cms)   (hrs)   (mm)      (m)      (m/s)
   INFLOW : ID= 4:002090   66.68     .795    7.82 19.660      .743      .342
   OUTFLOW: ID= 1:002100   66.68     .785    7.98 19.660      .737      .341

------------------------------------------------------------------------------
002:0025------------------------------------------------------------------------
--------------------
| DESIGN NASHYD     |   Area     (ha)=   14.81   Curve Number    (CN)=82.00
| 02:EXT5   DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   1.520

     Unit Hyd Qpeak  (cms)=     .372

     PEAK FLOW       (cms)=     .200 (i)
     TIME TO PEAK    (hrs)=    7.567
     RUNOFF VOLUME    (mm)=   19.890
     TOTAL RAINFALL   (mm)=   46.200
     RUNOFF COEFFICIENT   =     .431

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

------------------------------------------------------------------------------
002:0026------------------------------------------------------------------------
------------------------
| ADD HYD (      2110) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
                       ID1 01:      2100    66.68     .785    7.98  19.66     .000
                      +ID2 02:EXT5           14.81     .200    7.57  19.89     .000
                       ==========================================================
                       SUM 03:      2110    81.49     .978    7.87  19.70     .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
002:0027------------------------------------------------------------------------
*#*************************************************************************
*# McGill Drain - Total Flow at Lappan Drain Confluence
*#*************************************************************************
------------------------
| ADD HYD (      2120) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
                       ID1 03:      2110    81.49     .978    7.87  19.70     .000
                      +ID2 10:      2070   181.26    1.906    8.15  18.61     .000
                       ==========================================================
                       SUM 01:      2120   262.75    2.872    8.15  18.95     .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
002:0028------------------------------------------------------------------------
--------------------
| ROUTE CHANNEL     |     Routing time step (min) =  1.00
|  IN> 01:002120    |     Number of SEGMENTS =  3
| OUT< 02:002130    |     Slopes (%), CHANNEL= .1500  FLOODPLAIN= .2000
--------------------                 LENGTH =  370.00     (m)

               <------ DATA FOR SECTION (   7.0) ------>
               Distance      Elevation       Manning
                   .00           1.80          .2000
                200.00           1.40     .2000 / .0850  Main Channel
                202.60            .00          .0850      Main Channel
                204.40            .00          .0850      Main Channel
                207.00           1.40     .0850 / .2000  Main Channel
                407.00           1.80          .2000

  <---------------------------- TRAVEL TIME TABLE ---------------------------->
   DEPTH    ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME   D x V
     (m)     (m)   (cu.m.)   (cu.m.)      (cms)     (m/s)     (min)   (m2/s)
    .093    .093  .681E+02  .573E+01       .016      .087     70.58     .008
    .187    .187  .148E+03  .249E+02       .053      .131     46.93     .025
    .280    .280  .240E+03  .606E+02       .107      .165     37.37     .046
    .373    .373  .344E+03  .116E+03       .180      .193     31.94     .072
    .467    .467  .460E+03  .194E+03       .271      .218     28.33     .102
    .560    .560  .588E+03  .297E+03*      .382      .240     25.70     .134
    .653    .653  .728E+03  .429E+03*      .513      .260     23.68     .170
    .747    .747  .880E+03  .592E+03*      .665      .280     22.05     .209
    .840    .840  .104E+04  .790E+03*      .840      .298     20.71     .250
    .933    .933  .122E+04  .103E+04*     1.039      .315     19.58     .294
   1.027   1.027  .141E+04  .130E+04*     1.262      .332     18.60     .340
   1.120   1.120  .161E+04  .162E+04*     1.510      .348     17.74     .389
   1.213   1.213  .182E+04  .199E+04*     1.785      .363     16.99     .440
   1.307   1.307  .204E+04  .241E+04*     2.087      .378     16.32     .494
   1.400   1.400  .228E+04  .287E+04*     2.418      .392     15.71     .549
   1.500   1.500  .439E+04  .593E+04*     3.044      .257     24.02     .385
   1.600   1.600  .102E+05  .147E+05*     4.365      .158     38.94     .253
   1.700   1.700  .197E+05  .302E+05*     6.783      .127     48.42     .217
   1.800   1.800  .329E+05  .534E+05*    10.633      .120     51.59     .215

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
 (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                                <---- hydrograph ---->   <-pipe / channel->
                           AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                            (ha)    (cms)   (hrs)   (mm)      (m)      (m/s)
   INFLOW : ID= 1:002120   262.75   2.872    8.15 18.950     1.473      .284
   OUTFLOW: ID= 2:002130   262.75   2.742    8.77 18.950     1.452      .308

------------------------------------------------------------------------------
002:0029------------------------------------------------------------------------
--------------------
| DESIGN NASHYD     |   Area     (ha)=   47.17   Curve Number    (CN)=82.00
| 03:109    DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   1.100

     Unit Hyd Qpeak  (cms)=    1.638

     PEAK FLOW       (cms)=     .812 (i)
     TIME TO PEAK    (hrs)=    7.083
     RUNOFF VOLUME    (mm)=   19.890
     TOTAL RAINFALL   (mm)=   46.200
     RUNOFF COEFFICIENT   =     .431

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

------------------------------------------------------------------------------
002:0030------------------------------------------------------------------------
--------------------
| DESIGN NASHYD     |   Area     (ha)=   24.11   Curve Number    (CN)=80.00
| 04:EXT6   DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   1.520

     Unit Hyd Qpeak  (cms)=     .606

     PEAK FLOW       (cms)=     .300 (i)
     TIME TO PEAK    (hrs)=    7.583
     RUNOFF VOLUME    (mm)=   18.467
     TOTAL RAINFALL   (mm)=   46.200
     RUNOFF COEFFICIENT   =     .400

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

------------------------------------------------------------------------------
002:0031------------------------------------------------------------------------
------------------------
| ADD HYD (      2140) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
                       ID1 02:      2130   262.75    2.742    8.77  18.95     .000
                      +ID2 03:109           47.17     .812    7.08  19.89     .000
                      +ID3 04:EXT6          24.11     .300    7.58  18.47     .000
                       ==========================================================
                       SUM 01:      2140   334.03    3.439    8.33  19.05     .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
002:0032------------------------------------------------------------------------
--------------------
| ROUTE CHANNEL     |     Routing time step (min) =  1.00
|  IN> 01:002140    |     Number of SEGMENTS =  3
| OUT< 10:002150    |     Slopes (%), CHANNEL= .0800  FLOODPLAIN= .2000
--------------------                 LENGTH =  370.00     (m)

               <------ DATA FOR SECTION (   7.0) ------>
               Distance      Elevation       Manning
                   .00           1.80          .2000
                200.00           1.40     .2000 / .0850  Main Channel
                202.60            .00          .0850      Main Channel
                204.40            .00          .0850      Main Channel
                207.00           1.40     .0850 / .2000  Main Channel
                407.00           1.80          .2000

  <---------------------------- TRAVEL TIME TABLE ---------------------------->
   DEPTH    ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME   D x V
     (m)     (m)   (cu.m.)   (cu.m.)      (cms)     (m/s)     (min)   (m2/s)
    .093    .093  .681E+02  .107E+02       .012      .064     96.65     .006
    .187    .187  .148E+03  .467E+02       .038      .096     64.26     .018
    .280    .280  .240E+03  .139E+03       .078      .121     51.18     .034
    .373    .373  .344E+03  .217E+03*      .131      .141     43.73     .053
    .467    .467  .460E+03  .363E+03*      .198      .159     38.79     .074
    .560    .560  .588E+03  .557E+03*      .279      .175     35.19     .098
    .653    .653  .728E+03  .804E+03*      .374      .190     32.42     .124
    .747    .747  .880E+03  .111E+04*      .486      .204     30.20     .152
    .840    .840  .104E+04  .148E+04*      .614      .217     28.36     .183
    .933    .933  .122E+04  .192E+04*      .759      .230     26.81     .215
   1.027   1.027  .141E+04  .244E+04*      .921      .242     25.47     .249
   1.120   1.120  .161E+04  .304E+04*     1.103      .254     24.30     .284
```

```
    1.213    1.213  .182E+04  .373E+04*     1.304      .265     23.27     .322
    1.307    1.307  .204E+04  .451E+04*     1.524      .276     22.34     .361
    1.400    1.400  .228E+04  .539E+04*     1.766      .287     21.51     .401
    1.500    1.500  .439E+04  .111E+05*     2.264      .191     32.30     .286
    1.600    1.600  .102E+05  .276E+05*     3.447      .125     49.30     .200
    1.700    1.700  .197E+05  .566E+05*     5.720      .107     57.42     .183
    1.800    1.800  .329E+05  .100E+06*     9.415      .106     58.27     .191

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
 (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                              <---- hydrograph ---->   <-pipe / channel->
                          AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                          (ha)    (cms)   (hrs)   (mm)       (m)      (m/s)
   INFLOW : ID= 1:002140    334.03    3.439    8.33 19.048     1.599      .125
   OUTFLOW: ID=10:002150    334.03    3.075    9.43 19.048     1.568      .140


--------------------------------------------------------------------------------
002:0033----------------------------------------------------------------------
---------------------
| DESIGN NASHYD     |   Area     (ha)=   17.65   Curve Number   (CN)=82.00
| 01:113    DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=    .910

     Unit Hyd Qpeak  (cms)=     .741

     PEAK FLOW       (cms)=     .350 (i)
     TIME TO PEAK    (hrs)=    6.867
     RUNOFF VOLUME    (mm)=   19.890
     TOTAL RAINFALL   (mm)=   46.200
     RUNOFF COEFFICIENT   =     .431

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

--------------------------------------------------------------------------------
002:0034----------------------------------------------------------------------
*#*****************************************************************************
*# Calculate culvert routing and flow split near eastern site boundary
*#   - Storage volumes calculated based on site survey
*#   - Discharges calculated based on the 600 mm diameter CSP and 1500 mm
*#     diameter CSP capacities
*#*****************************************************************************
---------------------
| ROUTE RESERVOIR   |    Requested routing time step =  1.0 min.
|  IN>01:(113   )   |
| OUT<02:(002160)   |    =========  OUTFLOW STORAGE TABLE  =========
---------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                           (cms)     (ha.m.)   |    (cms)    (ha.m.)
                            .000  .0000E+00    |    1.130  .4600E+00
                            .150  .0000E+00    |    5.470  .8100E+00
                            .450  .0000E+00    |   83.090  .3400E+01
                            .820  .6500E-01    |    .000   .0000E+00

     ROUTING RESULTS             AREA     QPEAK     TPEAK       R.V.
     ---------------             (ha)     (cms)     (hrs)       (mm)
     INFLOW >01: (113   )       17.65      .350     6.867     19.890
     OUTFLOW<02: (002160)       17.65      .350     6.867     19.890

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  100.000
                  TIME SHIFT OF PEAK FLOW       (min)=     .00
                  MAXIMUM  STORAGE   USED       (ha.m.)=.2593E-08

      *** WARNING: Inflow peak was not reduced!
                   Check OUTFLOW/STORAGE table or reduce DT.
--------------------------------------------------------------------------------
002:0035----------------------------------------------------------------------
--------------------
| DIVERT HYD       |
| INID=02  (002160)|
--------------------
      Outflow / Inflow  Relationships
      Flow 03 +  Flow 04 =  Total
       (cms)      (cms)      (cms)
        .000       .000       .000
        .150       .000       .150
        .400       .050       .450
        .680       .140       .820
        .930       .200      1.130
       1.040     4.430      5.470
       1.460    81.630     83.090

            NHYD       AREA    QPEAK  TpeakDate_hh:mm       R.V.  NFE WetHrs
                       (ha)    (cms)                        (mm)       (hrs)
   IDin = 02:002160    17.65     .350  No_date    6:52     19.890    1    15.
   ==========================================================================
   IDout= 03:002170    16.83     .316  No_date    6:52     19.890    1    15.
   IDout= 04:002180      .82     .033  No_date    6:52     19.890    1     2.
--------------------------------------------------------------------------------
002:0036----------------------------------------------------------------------
---------------------
| DESIGN NASHYD     |   Area     (ha)=    4.88   Curve Number   (CN)=82.00
| 01:114    DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=    .910

     Unit Hyd Qpeak  (cms)=     .205

     PEAK FLOW       (cms)=     .097 (i)
     TIME TO PEAK    (hrs)=    6.867
     RUNOFF VOLUME    (mm)=   19.890
     TOTAL RAINFALL   (mm)=   46.200
     RUNOFF COEFFICIENT   =     .431

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

--------------------------------------------------------------------------------
002:0037----------------------------------------------------------------------
---------------------
| ADD HYD (      2190) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
---------------------                      (ha)     (cms)   (hrs)   (mm)    (cms)
                        ID1 01:114           4.88      .097    6.87  19.89     .000
                      +ID2 03:      2170    16.83      .316    6.87  19.89     .000
                       ========================================================
                        SUM 02:      2190    21.71      .413    6.87  19.89     .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
002:0038----------------------------------------------------------------------
---------------------
| DESIGN NASHYD     |   Area     (ha)=   18.59   Curve Number   (CN)=82.00
| 01:115    DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=   1.470

     Unit Hyd Qpeak  (cms)=     .483

     PEAK FLOW       (cms)=     .257 (i)
     TIME TO PEAK    (hrs)=    7.517
     RUNOFF VOLUME    (mm)=   19.890
     TOTAL RAINFALL   (mm)=   46.200
     RUNOFF COEFFICIENT   =     .431

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

--------------------------------------------------------------------------------
002:0039----------------------------------------------------------------------
*#*****************************************************************************
*# McGill Drain - Total Flow at Eastern WSP
*#*****************************************************************************
---------------------
| ADD HYD (      2200) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
---------------------                      (ha)     (cms)   (hrs)   (mm)    (cms)
                        ID1 01:115          18.59      .257    7.52  19.89     .000
                      +ID2 02:      2190    21.71      .413    6.87  19.89     .000
                      +ID3 10:      2150   334.03     3.075    9.43  19.05     .000
                       ========================================================
                        SUM 05:      2200   374.33     3.358    9.18  19.14     .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
002:0040----------------------------------------------------------------------
*#*****************************************************************************
*# AREA CHECK
*#*****************************************************************************
---------------------
| ADD HYD (      2210) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
---------------------                      (ha)     (cms)   (hrs)   (mm)    (cms)
                        ID1 04:      2180      .82      .033    6.87  19.89     .000
                      +ID2 05:      2200   374.33     3.358    9.18  19.14     .000
                       ========================================================
                        SUM 01:      2210   375.15     3.358    9.18  19.14     .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
002:0041----------------------------------------------------------------------
  ** END OF RUN :   4

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



-------------------
| START             |  Project  dir.: F:\WSP\
-------------------  Rainfall dir.: F:\WSP\
    TZERO =   .00 hrs on       0
    METOUT=  2 (output = METRIC)
    NRUN  = 005
    NSTORM=   1
           #  1=12scs5.stm
--------------------------------------------------------------------------------
005:0002----------------------------------------------------------------------
*#*****************************************************************************
*#  Project Name: [Windsor Solar Project] Project Number: [1335-60106]
*#  Date        : 02-02-2016
*#  Modeller    : [NE]
*#  Company     : Stantec Consulting Ltd. (London)
*#  License #   :  4730904
*#*****************************************************************************
*#
*#  Existing Conditions
*#  25 mm Water Quality Event
*#  2, 5, 10, 25, 50, 100, 250-year 3-Hour Chicago Design Storm
*#
*#*****************************************************************************
--------------------------------------------------------------------------------
005:0002----------------------------------------------------------------------
--------------------
| READ STORM        |    Filename: 5-yr scs 12 hr windsor
| Ptotal=  60.10 mm|    Comments: 5-yr scs 12 hr windsor
--------------------
            TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
             hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
             .50   1.202 |   3.50   2.404 |   6.50  10.818 |   9.50   2.404
            1.00   1.202 |   4.00   2.404 |   7.00   4.808 |  10.00   1.202
            1.50   1.202 |   4.50   3.606 |   7.50   3.606 |  10.50   1.202
            2.00   1.202 |   5.00   4.808 |   8.00   3.606 |  11.00   1.202
            2.50   2.404 |   5.50   7.212 |   8.50   2.404 |  11.50   1.202
            3.00   2.404 |   6.00  54.090 |   9.00   2.404 |  12.00   1.202

--------------------------------------------------------------------------------
005:0003----------------------------------------------------------------------
*#*****************************************************************************
*# LAPPAN DRAIN
*#*****************************************************************************
---------------------
| DESIGN NASHYD     |   Area     (ha)=   42.26   Curve Number   (CN)=73.00
| 01:101    DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=   1.110

     Unit Hyd Qpeak  (cms)=    1.454

     PEAK FLOW       (cms)=     .810 (i)
     TIME TO PEAK    (hrs)=    7.101
     RUNOFF VOLUME    (mm)=   22.511
     TOTAL RAINFALL   (mm)=   60.100
     RUNOFF COEFFICIENT   =     .375

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

--------------------------------------------------------------------------------
005:0004----------------------------------------------------------------------
--------------------
| ROUTE CHANNEL     |     Routing time step (min) =  1.00
|  IN> 01:101       |     Number of SEGMENTS =  3
| OUT< 02:002000    |     Slopes (%), CHANNEL= .1000  FLOODPLAIN= .2000
--------------------          LENGTH =  700.00     (m)

                <------ DATA FOR SECTION (   1.0) ------>
                Distance      Elevation       Manning
                    .00          1.40          .2000
                 100.00          1.20     .2000 / .0850  Main Channel
                 101.80           .00          .0850      Main Channel
                 103.00           .00          .0850      Main Channel
                 104.80          1.20     .0850 / .2000  Main Channel
                 204.80          1.40          .2000

   <------------------------------ TRAVEL TIME TABLE ------------------------------>
    DEPTH    ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME   D x V
      (m)     (m)   (cu.m.)   (cu.m.)      (cms)     (m/s)      (min)    (m2/s)
     .071    .071  .645E+02  .325E+01       .005      .059     197.27      .004
     .141    .141  .140E+03  .141E+02       .018      .089     131.37      .013
     .212    .212  .225E+03  .340E+02       .036      .111     104.80      .024
     .282    .282  .321E+03  .647E+02       .060      .130      89.71      .037
     .353    .353  .427E+03  .108E+03       .089      .146      79.68      .052
     .424    .424  .544E+03  .165E+03       .125      .161      72.40      .068
     .494    .494  .671E+03  .237E+03       .168      .175      66.79      .086
     .565    .565  .809E+03  .326E+03       .217      .187      62.29      .106
     .635    .635  .957E+03  .434E+03       .272      .199      58.56      .127
     .706    .706  .112E+04  .563E+03*      .336      .211      55.41      .149
     .776    .776  .129E+04  .713E+03*      .407      .221      52.69      .172
     .847    .847  .146E+04  .886E+03*      .485      .232      50.32      .196
     .918    .918  .166E+04  .108E+04*      .572      .242      48.22      .222
     .988    .988  .186E+04  .131E+04*      .667      .252      46.35      .249
    1.059   1.059  .207E+04  .156E+04*      .771      .261      44.66      .277
    1.129   1.129  .229E+04  .185E+04*      .884      .271      43.13      .306
    1.200   1.200  .252E+04  .216E+04*     1.006      .280      41.73      .335
    1.300   1.300  .636E+04  .590E+04*     1.392      .153      76.12      .199
    1.400   1.400  .172E+05  .172E+05*     2.456      .100     116.67      .140

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
 (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                              <---- hydrograph ---->   <-pipe / channel->
                          AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                          (ha)    (cms)   (hrs)   (mm)       (m)      (m/s)
   INFLOW : ID= 1:101       42.26     .810    7.10 22.511     1.083      .264
   OUTFLOW: ID= 2:002000    42.26     .643    7.63 22.511      .971      .249


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

```
005:0005-----------------------------------------------------------------------------
--------------------
| DESIGN NASHYD      |   Area     (ha)=   22.52   Curve Number    (CN)=82.00
| 01:102    DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=   1.270

     Unit Hyd Qpeak  (cms)=     .677

     PEAK FLOW       (cms)=     .530 (i)
     TIME TO PEAK    (hrs)=    7.251
     RUNOFF VOLUME    (mm)=   30.029
     TOTAL RAINFALL   (mm)=   60.100
     RUNOFF COEFFICIENT   =     .500

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

-----------------------------------------------------------------------------------
005:0006-----------------------------------------------------------------------------
--------------------
| DESIGN NASHYD      |   Area     (ha)=   42.81   Curve Number    (CN)=82.00
| 03:103    DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=   1.110

     Unit Hyd Qpeak  (cms)=    1.473

     PEAK FLOW       (cms)=    1.115 (i)
     TIME TO PEAK    (hrs)=    7.068
     RUNOFF VOLUME    (mm)=   30.029
     TOTAL RAINFALL   (mm)=   60.100
     RUNOFF COEFFICIENT   =     .500

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

-----------------------------------------------------------------------------------
005:0007-----------------------------------------------------------------------------
*#*************************************************************************
*# Lappan Drain - Total Flow at Pilette Road
*#*************************************************************************
--------------------
| ADD HYD (      2010) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
                       ID1 01:102           22.52     .530    7.25  30.03    .000
                      +ID2 02:      2000    42.26     .643    7.63  22.51    .000
                      +ID3 03:103           42.81    1.115    7.07  30.03    .000
                       ==========================================================
                       SUM 04:      2010   107.59    2.235    7.27  27.08    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-----------------------------------------------------------------------------------
005:0008-----------------------------------------------------------------------------
--------------------
| ROUTE CHANNEL      |     Routing time step (min) =  1.00
|  IN> 04:002010     |     Number of SEGMENTS =  3
| OUT< 01:002020     |     Slopes (%), CHANNEL= .1700  FLOODPLAIN= .2000
--------------------           LENGTH = 1000.00     (m)

              <------ DATA FOR SECTION (   2.0) ------>
              Distance      Elevation       Manning
                 .00           2.00          .2000
              100.00           1.80     .2000 / .0850  Main Channel
              102.75            .00          .0850      Main Channel
              104.25            .00          .0850      Main Channel
              107.00           1.80     .0850 / .2000  Main Channel
              207.00           2.00          .2000

   <---------------------------- TRAVEL TIME TABLE ---------------------------->
    DEPTH     ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME    D x V
      (m)      (m)   (cu.m.)   (cu.m.)      (cms)     (m/s)     (min)    (m2/s)
     .100     .100  .165E+03  .486E+01       .016      .096    172.86     .010
     .200     .200  .361E+03  .212E+02       .052      .144    115.66     .029
     .300     .300  .588E+03  .518E+02       .106      .180     92.51     .054
     .400     .400  .844E+03  .993E+02       .177      .210     79.29     .084
     .500     .500  .113E+04  .166E+03       .268      .236     70.48     .118
     .600     .600  .145E+04  .256E+03       .377      .260     64.05     .156
     .700     .700  .180E+04  .370E+03       .507      .282     59.09     .197
     .800     .800  .218E+04  .512E+03       .659      .303     55.09     .242
     .900     .900  .259E+04  .685E+03       .833      .322     51.78     .290
    1.000    1.000  .303E+04  .891E+03      1.031      .340     48.97     .340
    1.100    1.100  .350E+04  .113E+04      1.253      .358     46.55     .394
    1.200    1.200  .400E+04  .141E+04      1.500      .375     44.43     .450
    1.300    1.300  .453E+04  .173E+04      1.775      .392     42.56     .509
    1.400    1.400  .509E+04  .210E+04      2.077      .408     40.88     .571
    1.500    1.500  .569E+04  .251E+04      2.407      .423     39.37     .635
    1.600    1.600  .631E+04  .297E+04      2.768      .439     38.01     .702
    1.700    1.700  .697E+04  .348E+04      3.158      .453     36.76     .771
    1.800    1.800  .765E+04  .405E+04*     3.580      .468     35.61     .842
    2.000    2.000  .291E+05  .171E+05*     5.701      .196     84.93     .392

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
 (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                                <---- hydrograph ---->   <-pipe / channel->
                           AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                           (ha)    (cms)   (hrs)   (mm)       (m)      (m/s)
  INFLOW : ID= 4:002010    107.59   2.235    7.27 27.076     1.448      .415
  OUTFLOW: ID= 1:002020    107.59   1.889    7.83 27.076     1.334      .397

-----------------------------------------------------------------------------------
005:0009-----------------------------------------------------------------------------
--------------------
| DESIGN NASHYD      |   Area     (ha)=   19.36   Curve Number    (CN)=82.00
| 02:104    DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=   1.450

     Unit Hyd Qpeak  (cms)=     .510

     PEAK FLOW       (cms)=     .412 (i)
     TIME TO PEAK    (hrs)=    7.468
     RUNOFF VOLUME    (mm)=   30.029
     TOTAL RAINFALL   (mm)=   60.100
     RUNOFF COEFFICIENT   =     .500

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

-----------------------------------------------------------------------------------
005:0010-----------------------------------------------------------------------------
--------------------
| DESIGN NASHYD      |   Area     (ha)=   25.24   Curve Number    (CN)=82.00
| 03:105    DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=   1.450

     Unit Hyd Qpeak  (cms)=     .665

     PEAK FLOW       (cms)=     .537 (i)
     TIME TO PEAK    (hrs)=    7.468
     RUNOFF VOLUME    (mm)=   30.029
     TOTAL RAINFALL   (mm)=   60.100
     RUNOFF COEFFICIENT   =     .500

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

-----------------------------------------------------------------------------------
005:0011-----------------------------------------------------------------------------
--------------------
| ADD HYD (      2030) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
                       ID1 01:      2020   107.59    1.889    7.83  27.08    .000
                      +ID2 02:104           19.36     .412    7.47  30.03    .000
                      +ID3 03:105           25.24     .537    7.47  30.03    .000
                       ==========================================================
                       SUM 04:      2030   152.19    2.815    7.73  27.94    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-----------------------------------------------------------------------------------
005:0012-----------------------------------------------------------------------------
--------------------
| ROUTE CHANNEL      |     Routing time step (min) =  1.00
|  IN> 04:002030     |     Number of SEGMENTS =  3
| OUT< 01:002040     |     Slopes (%), CHANNEL= .1200  FLOODPLAIN= .2000
--------------------           LENGTH =  500.00     (m)

              <------ DATA FOR SECTION (   3.0) ------>
              Distance      Elevation       Manning
                 .00           2.20          .2000
              200.00           1.80     .2000 / .0850  Main Channel
              202.75            .00          .0850      Main Channel
              204.25            .00          .0850      Main Channel
              207.00           1.80     .0850 / .2000  Main Channel
              407.00           2.20          .2000

   <---------------------------- TRAVEL TIME TABLE ---------------------------->
    DEPTH     ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME    D x V
      (m)      (m)   (cu.m.)   (cu.m.)      (cms)     (m/s)     (min)    (m2/s)
     .112     .112  .940E+02  .882E+01       .016      .087     95.91     .010
     .225     .225  .207E+03  .389E+02       .054      .129     64.45     .029
     .337     .337  .340E+03  .957E+02       .110      .161     51.67     .054
     .450     .450  .492E+03  .185E+03       .185      .188     44.34     .085
     .562     .562  .664E+03  .311E+03       .280      .211     39.43     .119
     .675     .675  .854E+03  .481E+03*      .397      .233     35.84     .157
     .788     .788  .106E+04  .698E+03*      .537      .252     33.06     .199
     .900     .900  .129E+04  .970E+03*      .700      .270     30.81     .243
    1.013    1.013  .154E+04  .130E+04*      .888      .288     28.95     .291
    1.125    1.125  .181E+04  .170E+04*     1.102      .304     27.37     .343
    1.238    1.238  .210E+04  .216E+04*     1.344      .320     26.01     .397
    1.350    1.350  .240E+04  .271E+04*     1.615      .336     24.81     .453
    1.463    1.463  .273E+04  .333E+04*     1.916      .351     23.76     .513
    1.575    1.575  .308E+04  .404E+04*     2.247      .365     22.82     .575
    1.688    1.688  .344E+04  .484E+04*     2.611      .379     21.97     .640
    1.800    1.800  .382E+04  .574E+04*     3.008      .393     21.19     .708
    1.933    1.933  .874E+04  .141E+05*     3.971      .227     36.67     .439
    2.067    2.067  .225E+05  .388E+05*     6.403      .142     58.66     .294
    2.200    2.200  .452E+05  .829E+05*    11.177      .124     67.44     .272

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
 (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                                <---- hydrograph ---->   <-pipe / channel->
                           AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                           (ha)    (cms)   (hrs)   (mm)       (m)      (m/s)
  INFLOW : ID= 4:002030    152.19   2.815    7.73 27.941     1.745      .386
  OUTFLOW: ID= 1:002040    152.19   2.643    8.03 27.941     1.694      .380

-----------------------------------------------------------------------------------
005:0013-----------------------------------------------------------------------------
--------------------
| DESIGN NASHYD      |   Area     (ha)=   15.67   Curve Number    (CN)=82.00
| 02:108    DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=   1.090

     Unit Hyd Qpeak  (cms)=     .549

     PEAK FLOW       (cms)=     .414 (i)
     TIME TO PEAK    (hrs)=    7.051
     RUNOFF VOLUME    (mm)=   30.029
     TOTAL RAINFALL   (mm)=   60.100
     RUNOFF COEFFICIENT   =     .500

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

-----------------------------------------------------------------------------------
005:0014-----------------------------------------------------------------------------
--------------------
| DESIGN NASHYD      |   Area     (ha)=    6.80   Curve Number    (CN)=82.00
| 03:105A   DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .960

     Unit Hyd Qpeak  (cms)=     .271

     PEAK FLOW       (cms)=     .197 (i)
     TIME TO PEAK    (hrs)=    6.901
     RUNOFF VOLUME    (mm)=   30.028
     TOTAL RAINFALL   (mm)=   60.100
     RUNOFF COEFFICIENT   =     .500

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

-----------------------------------------------------------------------------------
005:0015-----------------------------------------------------------------------------
*#*************************************************************************
*# Lappan Drain - Total Flow at Jefferson Boulevard
*#*************************************************************************
--------------------
| ADD HYD (      2050) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
                       ID1 01:      2040   152.19    2.643    8.03  27.94    .000
                      +ID2 02:108           15.67     .414    7.05  30.03    .000
                      +ID3 03:105A           6.80     .197    6.90  30.03    .000
                       ==========================================================
                       SUM 04:      2050   174.66    3.082    7.88  28.21    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-----------------------------------------------------------------------------------
005:0016-----------------------------------------------------------------------------
--------------------
| ROUTE CHANNEL      |     Routing time step (min) =  1.00
|  IN> 04:002050     |     Number of SEGMENTS =  3
| OUT< 01:002060     |     Slopes (%), CHANNEL= .1200  FLOODPLAIN= .2000
--------------------           LENGTH =  450.00     (m)

              <------ DATA FOR SECTION (   4.0) ------>
              Distance      Elevation       Manning
                 .00           2.20          .2000
              200.00           1.80     .2000 / .0850  Main Channel
              202.75            .00          .0850      Main Channel
              204.25            .00          .0850      Main Channel
              207.00           1.80     .0850 / .2000  Main Channel
              407.00           2.20          .2000

   <---------------------------- TRAVEL TIME TABLE ---------------------------->
    DEPTH     ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME    D x V
      (m)      (m)   (cu.m.)   (cu.m.)      (cms)     (m/s)     (min)    (m2/s)
     .112     .112  .846E+02  .882E+01       .016      .087     86.32     .010
     .225     .225  .187E+03  .389E+02       .054      .129     58.01     .029
     .337     .337  .306E+03  .957E+02       .110      .161     46.50     .054
     .450     .450  .443E+03  .185E+03       .185      .188     39.90     .085
     .562     .562  .597E+03  .311E+03*      .280      .211     35.49     .119
     .675     .675  .769E+03  .481E+03*      .397      .233     32.26     .157
     .788     .788  .958E+03  .698E+03*      .537      .252     29.75     .199
     .900     .900  .116E+04  .970E+03*      .700      .270     27.73     .243
    1.013    1.013  .139E+04  .130E+04*      .888      .288     26.06     .291
    1.125    1.125  .163E+04  .170E+04*     1.102      .304     24.63     .343
    1.238    1.238  .189E+04  .216E+04*     1.344      .320     23.41     .397
    1.350    1.350  .216E+04  .271E+04*     1.615      .336     22.33     .453
    1.463    1.463  .246E+04  .333E+04*     1.916      .351     21.38     .513
    1.575    1.575  .277E+04  .404E+04*     2.247      .365     20.53     .575
    1.688    1.688  .310E+04  .484E+04*     2.611      .379     19.77     .640
    1.800    1.800  .344E+04  .574E+04*     3.008      .393     19.07     .708
    1.933    1.933  .786E+04  .141E+05*     3.971      .227     33.00     .439
    2.067    2.067  .203E+05  .388E+05*     6.403      .142     52.79     .294
```

```
   2.200    2.200  .407E+05  .829E+05*    11.177      .124     60.70     .272

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
 (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                              <---- hydrograph ---->   <-pipe / channel->
                           AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                            (ha)    (cms)   (hrs)   (mm)     (m)       (m/s)
  INFLOW : ID= 4:002050    174.66   3.082    7.88 28.209     1.810      .372
  OUTFLOW: ID= 1:002060    174.66   2.955    8.20 28.210     1.786      .391


--------------------------------------------------------------------------------
005:0017--------------------------------------------------------------------------
----------------------
| DESIGN NASHYD      |   Area     (ha)=    6.60   Curve Number    (CN)=82.00
| 02:EXT8   DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .820

     Unit Hyd Qpeak  (cms)=     .307

     PEAK FLOW       (cms)=     .215 (i)
     TIME TO PEAK    (hrs)=    6.751
     RUNOFF VOLUME    (mm)=   30.028
     TOTAL RAINFALL   (mm)=   60.100
     RUNOFF COEFFICIENT   =     .500

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


--------------------------------------------------------------------------------
005:0018--------------------------------------------------------------------------
*#*************************************************************************
*# Lappan Drain - Total Flow at McGill Drain
*#*************************************************************************
----------------------
| ADD HYD (      2070) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                     (ha)     (cms)   (hrs)   (mm)    (cms)
                        ID1 01:      2060   174.66   2.955    8.20  28.21    .000
                      +ID2 02:EXT8          6.60    .215    6.75  30.03    .000
                       ========================================================
                       SUM 10:      2070   181.26   3.044    8.13  28.28    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
005:0019--------------------------------------------------------------------------
*#*************************************************************************
*# McGILL DRAIN
*#*************************************************************************
----------------------
| DESIGN NASHYD      |   Area     (ha)=   39.07   Curve Number    (CN)=82.00
| 01:106    DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=   1.630

     Unit Hyd Qpeak  (cms)=     .916

     PEAK FLOW       (cms)=     .760 (i)
     TIME TO PEAK    (hrs)=    7.684
     RUNOFF VOLUME    (mm)=   30.029
     TOTAL RAINFALL   (mm)=   60.100
     RUNOFF COEFFICIENT   =     .500

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

--------------------------------------------------------------------------------
005:0020--------------------------------------------------------------------------
--------------------
| ROUTE CHANNEL    |     Routing time step (min) =  1.00
|  IN> 01:106      |     Number of SEGMENTS =  3
| OUT< 02:002080   |     Slopes (%), CHANNEL= .1500  FLOODPLAIN= .2000
--------------------                     LENGTH =  250.00     (m)

              <------ DATA FOR SECTION (   5.0) ------>
              Distance      Elevation       Manning
                  .00          1.40          .2000
                200.00          1.00     .2000 / .1000  Main Channel
                201.50           .00          .1000      Main Channel
                203.50           .00          .1000      Main Channel
                205.00          1.00     .1000 / .2000  Main Channel
                405.00          1.40          .2000

   <---------------------------- TRAVEL TIME TABLE ---------------------------->
    DEPTH     ELEV    X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME    D x V
      (m)      (m)    (cu.m.)   (cu.m.)      (cms)     (m/s)      (min)    (m2/s)
     .071     .071  .376E+02  .358E+01       .010      .064      65.43     .005
     .143     .143  .791E+02  .151E+02       .031      .097      42.85     .014
     .214     .214  .124E+03  .355E+02       .061      .123      33.82     .026
     .286     .286  .173E+03  .661E+02       .101      .145      28.74     .041
     .357     .357  .226E+03  .108E+03       .148      .164      25.41     .059
     .429     .429  .283E+03  .162E+03*      .205      .181      23.02     .078
     .500     .500  .344E+03  .229E+03*      .270      .197      21.20     .098
     .571     .571  .408E+03  .311E+03*      .344      .211      19.75     .121
     .643     .643  .476E+03  .408E+03*      .428      .225      18.56     .144
     .714     .714  .548E+03  .522E+03*      .521      .237      17.56     .169
     .786     .786  .624E+03  .654E+03*      .623      .249      16.71     .196
     .857     .857  .704E+03  .805E+03*      .735      .261      15.96     .224
     .929     .929  .788E+03  .975E+03*      .858      .272      15.31     .253
    1.000    1.000  .875E+03  .117E+04*      .990      .283      14.73     .283
    1.080    1.080  .177E+04  .256E+04*     1.270      .179      23.30     .193
    1.160    1.160  .427E+04  .661E+04*     1.927      .113      36.97     .131
    1.240    1.240  .837E+04  .138E+05*     3.185      .095      43.82     .118
    1.320    1.320  .141E+05  .248E+05*     5.229      .093      44.86     .123
    1.400    1.400  .214E+05  .399E+05*     8.222      .096      43.33     .135

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
 (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                              <---- hydrograph ---->   <-pipe / channel->
                           AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                            (ha)    (cms)   (hrs)   (mm)     (m)       (m/s)
  INFLOW : ID= 1:106        39.07    .760    7.68 30.029      .872      .263
  OUTFLOW: ID= 2:002080     39.07    .737    7.93 30.028      .859      .261


--------------------------------------------------------------------------------
005:0021--------------------------------------------------------------------------
----------------------
| DESIGN NASHYD      |   Area     (ha)=   21.08   Curve Number    (CN)=81.00
| 01:EXT4   DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=   1.830

     Unit Hyd Qpeak  (cms)=     .440

     PEAK FLOW       (cms)=     .362 (i)
     TIME TO PEAK    (hrs)=    7.934
     RUNOFF VOLUME    (mm)=   29.057
     TOTAL RAINFALL   (mm)=   60.100
     RUNOFF COEFFICIENT   =     .483

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

--------------------------------------------------------------------------------
005:0022--------------------------------------------------------------------------
----------------------
| DESIGN NASHYD      |   Area     (ha)=    6.53   Curve Number    (CN)=82.00
| 03:107    DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .820

     Unit Hyd Qpeak  (cms)=     .304

     PEAK FLOW       (cms)=     .212 (i)
     TIME TO PEAK    (hrs)=    6.751
     RUNOFF VOLUME    (mm)=   30.029
     TOTAL RAINFALL   (mm)=   60.100
     RUNOFF COEFFICIENT   =     .500

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


--------------------------------------------------------------------------------
005:0023--------------------------------------------------------------------------
*#*************************************************************************
*# McGill Drain - Total Flow at Jefferson Boulevard
*#*************************************************************************
----------------------
| ADD HYD (      2090) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                     (ha)     (cms)   (hrs)   (mm)    (cms)
                        ID1 01:EXT4         21.08    .362    7.93  29.06    .000
                      +ID2 02:      2080    39.07    .737    7.93  30.03    .000
                      +ID3 03:107           6.53     .212    6.75  30.03    .000
                       ========================================================
                       SUM 04:      2090   66.68    1.217    7.77  29.72    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
005:0024--------------------------------------------------------------------------
--------------------
| ROUTE CHANNEL    |     Routing time step (min) =  1.00
|  IN> 04:002090   |     Number of SEGMENTS =  3
| OUT< 01:002100   |     Slopes (%), CHANNEL= .3000  FLOODPLAIN= .2000
--------------------                     LENGTH =  280.00     (m)

              <------ DATA FOR SECTION (   6.0) ------>
              Distance      Elevation       Manning
                  .00          1.40          .2000
                200.00          1.00     .2000 / .1000  Main Channel
                201.50           .00          .1000      Main Channel
                203.50           .00          .1000      Main Channel
                205.00          1.00     .1000 / .2000  Main Channel
                405.00          1.40          .2000

   <---------------------------- TRAVEL TIME TABLE ---------------------------->
    DEPTH     ELEV    X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME    D x V
      (m)      (m)    (cu.m.)   (cu.m.)      (cms)     (m/s)      (min)    (m2/s)
     .071     .071  .421E+02  .179E+01       .014      .090      51.82     .006
     .143     .143  .886E+02  .753E+01       .043      .138      33.94     .020
     .214     .214  .139E+03  .178E+02       .087      .174      26.78     .037
     .286     .286  .194E+03  .330E+02       .142      .205      22.76     .059
     .357     .357  .254E+03  .539E+02       .210      .232      20.12     .083
     .429     .429  .317E+03  .809E+02       .290      .256      18.23     .110
     .500     .500  .385E+03  .115E+03       .382      .278      16.79     .139
     .571     .571  .457E+03  .155E+03       .487      .298      15.64     .171
     .643     .643  .534E+03  .204E+03       .605      .318      14.70     .204
     .714     .714  .614E+03  .261E+03       .736      .336      13.91     .240
     .786     .786  .699E+03  .327E+03       .881      .353      13.23     .277
     .857     .857  .789E+03  .402E+03*     1.040      .369      12.64     .316
     .929     .929  .882E+03  .488E+03*     1.213      .385      12.12     .357
    1.000    1.000  .980E+03  .583E+03*     1.401      .400      11.66     .400
    1.080    1.080  .199E+04  .128E+04*     1.761      .248      18.81     .268
    1.160    1.160  .479E+04  .331E+04*     2.505      .147      31.85     .170
    1.240    1.240  .938E+04  .692E+04*     3.856      .115      40.54     .143
    1.320    1.320  .158E+05  .124E+05*     5.997      .107      43.81     .141
    1.400    1.400  .239E+05  .199E+05*     9.093      .106      43.88     .149

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
 (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                              <---- hydrograph ---->   <-pipe / channel->
                           AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                            (ha)    (cms)   (hrs)   (mm)     (m)       (m/s)
  INFLOW : ID= 4:002090     66.68   1.217    7.77 29.721      .930      .385
  OUTFLOW: ID= 1:002100     66.68   1.203    7.90 29.721      .921      .383


--------------------------------------------------------------------------------
005:0025--------------------------------------------------------------------------
----------------------
| DESIGN NASHYD      |   Area     (ha)=   14.81   Curve Number    (CN)=82.00
| 02:EXT5   DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=   1.520

     Unit Hyd Qpeak  (cms)=     .372

     PEAK FLOW       (cms)=     .304 (i)
     TIME TO PEAK    (hrs)=    7.551
     RUNOFF VOLUME    (mm)=   30.029
     TOTAL RAINFALL   (mm)=   60.100
     RUNOFF COEFFICIENT   =     .500

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

--------------------------------------------------------------------------------
005:0026--------------------------------------------------------------------------
----------------------
| ADD HYD (      2110) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                     (ha)     (cms)   (hrs)   (mm)    (cms)
                        ID1 01:      2100   66.68   1.203    7.90  29.72    .000
                      +ID2 02:EXT5          14.81   1.304    7.55  30.03    .000
                       ========================================================
                       SUM 03:      2110   81.49   1.500    7.82  29.78    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
005:0027--------------------------------------------------------------------------
*#*************************************************************************
*# McGill Drain - Total Flow at Lappan Drain Confluence
*#*************************************************************************
----------------------
| ADD HYD (      2120) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                     (ha)     (cms)   (hrs)   (mm)    (cms)
                        ID1 03:      2110   81.49   1.500    7.82  29.78    .000
                      +ID2 10:      2070   181.26  3.044    8.13  28.28    .000
                       ========================================================
                       SUM 01:      2120   262.75   4.517    8.13  28.74    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
005:0028--------------------------------------------------------------------------
--------------------
| ROUTE CHANNEL    |     Routing time step (min) =  1.00
|  IN> 01:002120   |     Number of SEGMENTS =  3
| OUT< 02:002130   |     Slopes (%), CHANNEL= .1500  FLOODPLAIN= .2000
--------------------                     LENGTH =  370.00     (m)

              <------ DATA FOR SECTION (   7.0) ------>
              Distance      Elevation       Manning
                  .00          1.80          .2000
                200.00          1.40     .2000 / .0850  Main Channel
                202.60           .00          .0850      Main Channel
                204.40           .00          .0850      Main Channel
                207.00          1.40     .0850 / .2000  Main Channel
                407.00          1.80          .2000

   <---------------------------- TRAVEL TIME TABLE ---------------------------->
    DEPTH     ELEV    X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME    D x V
      (m)      (m)    (cu.m.)   (cu.m.)      (cms)     (m/s)      (min)    (m2/s)
     .093     .093  .681E+02  .573E+01       .016      .087      70.58     .008
     .187     .187  .148E+03  .249E+02       .053      .131      46.93     .025
     .280     .280  .240E+03  .606E+02       .107      .165      37.37     .046
     .373     .373  .344E+03  .116E+03       .180      .193      31.94     .072
     .467     .467  .460E+03  .194E+03       .271      .218      28.33     .102
```

```
     .560     .560  .588E+03  .297E+03*      .382      .240     25.70     .134
     .653     .653  .728E+03  .429E+03*      .513      .260     23.68     .170
     .747     .747  .880E+03  .592E+03*      .665      .280     22.05     .209
     .840     .840  .104E+04  .790E+03*      .840      .298     20.71     .250
     .933     .933  .122E+04  .103E+04*     1.039      .315     19.58     .294
    1.027    1.027  .141E+04  .130E+04*     1.262      .332     18.60     .340
    1.120    1.120  .161E+04  .162E+04*     1.510      .348     17.74     .389
    1.213    1.213  .182E+04  .199E+04*     1.785      .363     16.99     .440
    1.307    1.307  .204E+04  .241E+04*     2.087      .378     16.32     .494
    1.400    1.400  .228E+04  .287E+04*     2.418      .392     15.71     .549
    1.500    1.500  .439E+04  .593E+04*     3.044      .257     24.02     .385
    1.600    1.600  .102E+05  .147E+05*     4.365      .158     38.94     .253
    1.700    1.700  .197E+05  .302E+05*     6.783      .127     48.42     .217
    1.800    1.800  .329E+05  .534E+05*    10.633      .120     51.59     .215

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
 (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                              <---- hydrograph ---->   <-pipe / channel->
                           AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                           (ha)    (cms)   (hrs)   (mm)       (m)      (m/s)
  INFLOW : ID= 1:002120    262.75   4.517    8.13 28.741     1.606      .156
  OUTFLOW: ID= 2:002130    262.75   4.033    8.95 28.741     1.575      .175


--------------------------------------------------------------------------------
005:0029----------------------------------------------------------------------
---------------------
| DESIGN NASHYD     |   Area    (ha)=   47.17   Curve Number   (CN)=82.00
| 03:109    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=   1.100

     Unit Hyd Qpeak  (cms)=    1.638

     PEAK FLOW       (cms)=    1.237 (i)
     TIME TO PEAK    (hrs)=    7.068
     RUNOFF VOLUME    (mm)=   30.029
     TOTAL RAINFALL   (mm)=   60.100
     RUNOFF COEFFICIENT   =     .500

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

--------------------------------------------------------------------------------
005:0030----------------------------------------------------------------------
---------------------
| DESIGN NASHYD     |   Area    (ha)=   24.11   Curve Number   (CN)=80.00
| 04:EXT6   DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=   1.520

     Unit Hyd Qpeak  (cms)=     .606

     PEAK FLOW       (cms)=     .461 (i)
     TIME TO PEAK    (hrs)=    7.568
     RUNOFF VOLUME    (mm)=   28.124
     TOTAL RAINFALL   (mm)=   60.100
     RUNOFF COEFFICIENT   =     .468

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

--------------------------------------------------------------------------------
005:0031----------------------------------------------------------------------
----------------------
| ADD HYD (      2140) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                     (ha)     (cms)   (hrs)   (mm)    (cms)
                     ID1 02:      2130   262.75   4.033    8.95  28.74     .000
                    +ID2 03:109           47.17   1.237    7.07  30.03     .000
                    +ID3 04:EXT6          24.11    .461    7.57  28.12     .000
                     ==========================================================
                     SUM 01:      2140   334.03   4.960    8.53  28.88     .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
005:0032----------------------------------------------------------------------
--------------------
| ROUTE CHANNEL     |     Routing time step (min) =  1.00
|  IN> 01:002140    |     Number of SEGMENTS =  3
| OUT< 10:002150    |     Slopes (%), CHANNEL= .0800  FLOODPLAIN= .2000
--------------------          LENGTH =  370.00    (m)

              <------ DATA FOR SECTION (   7.0) ------>
              Distance      Elevation       Manning
                 .00          1.80          .2000
               200.00         1.40     .2000 / .0850  Main Channel
               202.60          .00          .0850      Main Channel
               204.40          .00          .0850      Main Channel
               207.00         1.40     .0850 / .2000  Main Channel
               407.00         1.80          .2000

   <------------------------- TRAVEL TIME TABLE ------------------------->
    DEPTH    ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME    D x V
      (m)     (m)   (cu.m.)   (cu.m.)      (cms)     (m/s)     (min)    (m2/s)
     .093    .093  .681E+02  .107E+02       .012      .064     96.65     .006
     .187    .187  .148E+03  .467E+02       .038      .096     64.26     .018
     .280    .280  .240E+03  .114E+03       .078      .121     51.18     .034
     .373    .373  .344E+03  .217E+03*      .131      .141     43.73     .053
     .467    .467  .460E+03  .363E+03*      .198      .159     38.79     .074
     .560    .560  .588E+03  .557E+03*      .279      .175     35.19     .098
     .653    .653  .728E+03  .804E+03*      .374      .190     32.42     .124
     .747    .747  .880E+03  .111E+04*      .486      .204     30.20     .152
     .840    .840  .104E+04  .148E+04*      .614      .217     28.36     .183
     .933    .933  .122E+04  .192E+04*      .759      .230     26.81     .215
    1.027   1.027  .141E+04  .244E+04*      .921      .242     25.47     .249
    1.120   1.120  .161E+04  .304E+04*     1.103      .254     24.30     .284
    1.213   1.213  .182E+04  .373E+04*     1.304      .265     23.27     .322
    1.307   1.307  .204E+04  .451E+04*     1.524      .276     22.34     .361
    1.400   1.400  .228E+04  .539E+04*     1.766      .287     21.51     .401
    1.500   1.500  .439E+04  .111E+05*     2.264      .191     32.30     .286
    1.600   1.600  .102E+05  .276E+05*     3.447      .125     49.30     .200
    1.700   1.700  .197E+05  .566E+05*     5.720      .107     57.42     .183
    1.800   1.800  .329E+05  .100E+06*     9.415      .106     58.27     .191

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
 (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                              <---- hydrograph ---->   <-pipe / channel->
                           AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                           (ha)    (cms)   (hrs)   (mm)       (m)      (m/s)
  INFLOW : ID= 1:002140    334.03   4.960    8.53 28.879     1.667      .113
  OUTFLOW: ID=10:002150    334.03   4.438    9.62 28.879     1.642      .117


--------------------------------------------------------------------------------
005:0033----------------------------------------------------------------------
---------------------
| DESIGN NASHYD     |   Area    (ha)=   17.65   Curve Number   (CN)=82.00
| 01:113    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .910

     Unit Hyd Qpeak  (cms)=     .741

     PEAK FLOW       (cms)=     .533 (i)
     TIME TO PEAK    (hrs)=    6.851
     RUNOFF VOLUME    (mm)=   30.029
     TOTAL RAINFALL   (mm)=   60.100
     RUNOFF COEFFICIENT   =     .500

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

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005:0034----------------------------------------------------------------------
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```
*#**************************************************************************
*# Calculate culvert routing and flow split near eastern site boundary
*#   - Storage volumes calculated based on site survey
*#   - Discharges calculated based on the 600 mm diameter CSP and 1500 mm
*#     diameter CSP capacities
*#**************************************************************************
---------------------
| ROUTE RESERVOIR   |    Requested routing time step =  1.0 min.
|  IN>01:(113   )   |
| OUT<02:(002160)   |    =========  OUTFLOW STORAGE TABLE  =========
---------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                           (cms)     (ha.m.)   |    (cms)     (ha.m.)
                            .000  .0000E+00    |    1.130  .4600E+00
                            .150  .0000E+00    |    5.470  .8100E+00
                            .450  .0000E+00    |   83.090  .3400E+01
                            .820  .6500E-01    |     .000  .0000E+00

     ROUTING RESULTS             AREA     QPEAK     TPEAK       R.V.
     ---------------             (ha)     (cms)     (hrs)       (mm)
     INFLOW >01: (113   )       17.65      .533     6.851     30.029
     OUTFLOW<02: (002160)       17.65      .501     7.151     30.033

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=   94.064
                  TIME SHIFT OF PEAK FLOW       (min)=    18.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=.8963E-02


--------------------------------------------------------------------------------
005:0035----------------------------------------------------------------------
---------------------
| DIVERT HYD        |
| INID=02  (002160)|
---------------------
      Outflow / Inflow  Relationships
      Flow 03 +  Flow 04 =  Total
       (cms)       (cms)       (cms)
         .000        .000        .000
         .150        .000        .150
         .400        .050        .450
         .680        .140        .820
         .930        .200       1.130
        1.040       4.430       5.470
        1.460      81.630      83.090

          NHYD        AREA     QPEAK   TpeakDate_hh:mm        R.V.  NFE WetHrs
                      (ha)     (cms)                          (mm)     (hrs)
   IDin = 02:002160    17.65     .501  No_date    7:09      30.033   99    14.
   ==========================================================================
   IDout= 03:002170    16.36     .439  No_date    7:09      30.033   99    14.
   IDout= 04:002180     1.29     .062  No_date    7:09      30.033   19     3.
--------------------------------------------------------------------------------
005:0036----------------------------------------------------------------------
---------------------
| DESIGN NASHYD     |   Area    (ha)=    4.88   Curve Number   (CN)=82.00
| 01:114    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .910

     Unit Hyd Qpeak  (cms)=     .205

     PEAK FLOW       (cms)=     .147 (i)
     TIME TO PEAK    (hrs)=    6.851
     RUNOFF VOLUME    (mm)=   30.028
     TOTAL RAINFALL   (mm)=   60.100
     RUNOFF COEFFICIENT   =     .500

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

--------------------------------------------------------------------------------
005:0037----------------------------------------------------------------------
----------------------
| ADD HYD (      2190) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                     (ha)     (cms)   (hrs)   (mm)    (cms)
                     ID1 01:114            4.88     .147    6.85  30.03     .000
                    +ID2 03:      2170    16.36     .439    7.15  30.03     .000
                     ==========================================================
                     SUM 02:      2190    21.24     .580    7.03  30.03     .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
005:0038----------------------------------------------------------------------
---------------------
| DESIGN NASHYD     |   Area    (ha)=   18.59   Curve Number   (CN)=82.00
| 01:115    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=   1.470

     Unit Hyd Qpeak  (cms)=     .483

     PEAK FLOW       (cms)=     .391 (i)
     TIME TO PEAK    (hrs)=    7.484
     RUNOFF VOLUME    (mm)=   30.029
     TOTAL RAINFALL   (mm)=   60.100
     RUNOFF COEFFICIENT   =     .500

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

--------------------------------------------------------------------------------
005:0039----------------------------------------------------------------------
*#**************************************************************************
*# McGill Drain - Total Flow at Eastern WSP
*#**************************************************************************
----------------------
| ADD HYD (      2200) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                     (ha)     (cms)   (hrs)   (mm)    (cms)
                     ID1 01:115           18.59     .391    7.48  30.03     .000
                    +ID2 02:      2190    21.24     .580    7.03  30.03     .000
                    +ID3 10:      2150   334.03    4.438    9.62  28.88     .000
                     ==========================================================
                     SUM 05:      2200   373.86    4.835    9.30  29.00     .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
005:0040----------------------------------------------------------------------
*#**************************************************************************
*# AREA CHECK
*#**************************************************************************
----------------------
| ADD HYD (      2210) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                     (ha)     (cms)   (hrs)   (mm)    (cms)
                     ID1 04:      2180     1.29     .062    7.15  30.03     .000
                    +ID2 05:      2200   373.86    4.835    9.30  29.00     .000
                     ==========================================================
                     SUM 01:      2210   375.15    4.836    9.30  29.00     .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
005:0041----------------------------------------------------------------------
--------------------------------------------------------------------------------
005:0002----------------------------------------------------------------------
  ** END OF RUN :   9

*#**************************************************************************




---------------------
| START             |  Project  dir.: F:\WSP\
---------------------  Rainfall dir.: F:\WSP\
    TZERO =   .00 hrs on      0
    METOUT=   2 (output = METRIC)
```

```
    NRUN  = 010
    NSTORM=   1
          #  1=12scs10.stm
-------------------------------------------------------------------------------
010:0002---------------------------------------------------------------------
*#*************************************************************************
*#  Project Name: [Windsor Solar Project] Project Number: [1335-60106]
*#  Date         : 02-02-2016
*#  Modeller     : [NE]
*#  Company      : Stantec Consulting Ltd. (London)
*#  License #    :  4730904
*#*************************************************************************
*#
*#  Existing Conditions
*#  25 mm Water Quality Event
*#  2, 5, 10, 25, 50, 100, 250-year 3-Hour Chicago Design Storm
*#
*#*************************************************************************
-------------------------------------------------------------------------------
010:0002---------------------------------------------------------------------
--------------------
| READ STORM       |    Filename: 10-yr scs 12 hr windsor
| Ptotal=  69.20 mm|    Comments: 10-yr scs 12 hr windsor
--------------------
             TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
              hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
              .50   1.384 |   3.50   2.768 |   6.50  12.456 |   9.50   2.768
             1.00   1.384 |   4.00   2.768 |   7.00   5.536 |  10.00   1.384
             1.50   1.384 |   4.50   4.152 |   7.50   4.152 |  10.50   1.384
             2.00   1.384 |   5.00   5.536 |   8.00   4.152 |  11.00   1.384
             2.50   2.768 |   5.50   8.304 |   8.50   2.768 |  11.50   1.384
             3.00   2.768 |   6.00  62.280 |   9.00   2.768 |  12.00   1.384

-------------------------------------------------------------------------------
010:0003---------------------------------------------------------------------
*#*************************************************************************
*# LAPPAN DRAIN
*#*************************************************************************
----------------------
| DESIGN NASHYD      |   Area     (ha)=   42.26   Curve Number    (CN)=73.00
| 01:101    DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=   1.110

     Unit Hyd Qpeak  (cms)=    1.454

     PEAK FLOW       (cms)=    1.025 (i)
     TIME TO PEAK    (hrs)=    7.101
     RUNOFF VOLUME    (mm)=   28.354
     TOTAL RAINFALL   (mm)=   69.200
     RUNOFF COEFFICIENT   =     .410

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

-------------------------------------------------------------------------------
010:0004---------------------------------------------------------------------
----------------------
| ROUTE CHANNEL      |     Routing time step (min) =  1.00
|  IN> 01:101        |     Number of SEGMENTS =  3
| OUT< 02:002000     |     Slopes (%), CHANNEL= .1000  FLOODPLAIN= .2000
----------------------                LENGTH =  700.00    (m)

              <------ DATA FOR SECTION (   1.0) ------>
              Distance      Elevation       Manning
                   .00         1.40          .2000
                100.00         1.20     .2000 / .0850  Main Channel
                101.80          .00          .0850      Main Channel
                103.00          .00          .0850      Main Channel
                104.80         1.20     .0850 / .2000  Main Channel
                204.80         1.40          .2000

   <---------------------------- TRAVEL TIME TABLE ---------------------------->
    DEPTH     ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME   D x V
      (m)      (m)   (cu.m.)   (cu.m.)      (cms)     (m/s)     (min)   (m2/s)
     .071     .071  .645E+02  .325E+01       .005      .059    197.27     .004
     .141     .141  .140E+03  .141E+02       .018      .089    131.37     .013
     .212     .212  .225E+03  .340E+02       .036      .111    104.80     .024
     .282     .282  .321E+03  .647E+02       .060      .130     89.71     .037
     .353     .353  .427E+03  .108E+03       .089      .146     79.68     .052
     .424     .424  .544E+03  .165E+03       .125      .161     72.40     .068
     .494     .494  .671E+03  .237E+03       .168      .175     66.79     .086
     .565     .565  .809E+03  .326E+03       .217      .187     62.29     .106
     .635     .635  .957E+03  .434E+03       .272      .199     58.56     .127
     .706     .706  .112E+04  .563E+03*      .336      .211     55.41     .149
     .776     .776  .129E+04  .713E+03*      .407      .221     52.69     .172
     .847     .847  .146E+04  .886E+03*      .485      .232     50.32     .196
     .918     .918  .166E+04  .108E+04*      .572      .242     48.22     .222
     .988     .988  .186E+04  .131E+04*      .667      .252     46.35     .249
    1.059    1.059  .207E+04  .156E+04*      .771      .261     44.66     .277
    1.129    1.129  .229E+04  .185E+04*      .884      .271     43.13     .306
    1.200    1.200  .252E+04  .216E+04*     1.006      .280     41.73     .335
    1.300    1.300  .636E+04  .590E+04*     1.392      .153     76.12     .199
    1.400    1.400  .172E+05  .172E+05*     2.456      .100    116.67     .140

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
 (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                                <---- hydrograph ---->   <-pipe / channel->
                           AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                           (ha)    (cms)   (hrs)   (mm)       (m)      (m/s)
   INFLOW : ID= 1:101     42.26    1.025    7.10 28.354     1.205      .269
   OUTFLOW: ID= 2:002000  42.26     .829    7.53 28.354     1.095      .266


-------------------------------------------------------------------------------
010:0005---------------------------------------------------------------------
----------------------
| DESIGN NASHYD      |   Area     (ha)=   22.52   Curve Number    (CN)=82.00
| 01:102    DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=   1.270

     Unit Hyd Qpeak  (cms)=     .677

     PEAK FLOW       (cms)=     .658 (i)
     TIME TO PEAK    (hrs)=    7.251
     RUNOFF VOLUME    (mm)=   37.125
     TOTAL RAINFALL   (mm)=   69.200
     RUNOFF COEFFICIENT   =     .536

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

-------------------------------------------------------------------------------
010:0006---------------------------------------------------------------------
----------------------
| DESIGN NASHYD      |   Area     (ha)=   42.81   Curve Number    (CN)=82.00
| 03:103    DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=   1.110

     Unit Hyd Qpeak  (cms)=    1.473

     PEAK FLOW       (cms)=    1.385 (i)
     TIME TO PEAK    (hrs)=    7.068
     RUNOFF VOLUME    (mm)=   37.125
     TOTAL RAINFALL   (mm)=   69.200
     RUNOFF COEFFICIENT   =     .536

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

-------------------------------------------------------------------------------
010:0007---------------------------------------------------------------------
*#*************************************************************************
*# Lappan Drain - Total Flow at Pilette Road
*#*************************************************************************
----------------------
| ADD HYD (     2010) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
                     ID1 01:102           22.52     .658    7.25  37.12    .000
                    +ID2 02:      2000    42.26     .829    7.53  28.35    .000
                    +ID3 03:103           42.81    1.385    7.07  37.12    .000
                     ==========================================================
                     SUM 04:      2010    107.59    2.808    7.28  33.68    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
010:0008---------------------------------------------------------------------
----------------------
| ROUTE CHANNEL      |     Routing time step (min) =  1.00
|  IN> 04:002010     |     Number of SEGMENTS =  3
| OUT< 01:002020     |     Slopes (%), CHANNEL= .1700  FLOODPLAIN= .2000
----------------------                LENGTH = 1000.00    (m)

              <------ DATA FOR SECTION (   2.0) ------>
              Distance      Elevation       Manning
                   .00         2.00          .2000
                100.00         1.80     .2000 / .0850  Main Channel
                102.75          .00          .0850      Main Channel
                104.25          .00          .0850      Main Channel
                107.00         1.80     .0850 / .2000  Main Channel
                207.00         2.00          .2000

   <---------------------------- TRAVEL TIME TABLE ---------------------------->
    DEPTH     ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME   D x V
      (m)      (m)   (cu.m.)   (cu.m.)      (cms)     (m/s)     (min)   (m2/s)
     .100     .100  .165E+03  .486E+01       .016      .096    172.86     .010
     .200     .200  .361E+03  .212E+02       .052      .144    115.66     .029
     .300     .300  .588E+03  .518E+02       .106      .180     92.51     .054
     .400     .400  .844E+03  .993E+02       .177      .210     79.29     .084
     .500     .500  .113E+04  .166E+03       .268      .236     70.48     .118
     .600     .600  .145E+04  .256E+03       .377      .260     64.05     .156
     .700     .700  .180E+04  .370E+03       .507      .282     59.09     .197
     .800     .800  .218E+04  .512E+03       .659      .303     55.09     .242
     .900     .900  .259E+04  .685E+03       .833      .322     51.78     .290
    1.000    1.000  .303E+04  .891E+03      1.031      .340     48.97     .340
    1.100    1.100  .350E+04  .113E+04      1.253      .358     46.55     .394
    1.200    1.200  .400E+04  .141E+04      1.500      .375     44.43     .450
    1.300    1.300  .453E+04  .173E+04      1.775      .392     42.56     .509
    1.400    1.400  .509E+04  .210E+04      2.077      .408     40.88     .571
    1.500    1.500  .569E+04  .251E+04      2.407      .423     39.37     .635
    1.600    1.600  .631E+04  .297E+04      2.768      .439     38.01     .702
    1.700    1.700  .697E+04  .348E+04      3.158      .453     36.76     .771
    1.800    1.800  .765E+04  .405E+04*     3.580      .468     35.61     .842
    2.000    2.000  .291E+05  .171E+05*     5.701      .196     84.93     .392

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
 (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                                <---- hydrograph ---->   <-pipe / channel->
                           AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                           (ha)    (cms)   (hrs)   (mm)       (m)      (m/s)
   INFLOW : ID= 4:002010  107.59    2.808    7.28 33.680     1.610      .440
   OUTFLOW: ID= 1:002020  107.59    2.397    7.78 33.680     1.494      .422

-------------------------------------------------------------------------------
010:0009---------------------------------------------------------------------
----------------------
| DESIGN NASHYD      |   Area     (ha)=   19.36   Curve Number    (CN)=82.00
| 02:104    DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=   1.450

     Unit Hyd Qpeak  (cms)=     .510

     PEAK FLOW       (cms)=     .511 (i)
     TIME TO PEAK    (hrs)=    7.451
     RUNOFF VOLUME    (mm)=   37.125
     TOTAL RAINFALL   (mm)=   69.200
     RUNOFF COEFFICIENT   =     .536

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

-------------------------------------------------------------------------------
010:0010---------------------------------------------------------------------
----------------------
| DESIGN NASHYD      |   Area     (ha)=   25.24   Curve Number    (CN)=82.00
| 03:105    DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=   1.450

     Unit Hyd Qpeak  (cms)=     .665

     PEAK FLOW       (cms)=     .667 (i)
     TIME TO PEAK    (hrs)=    7.451
     RUNOFF VOLUME    (mm)=   37.125
     TOTAL RAINFALL   (mm)=   69.200
     RUNOFF COEFFICIENT   =     .536

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

-------------------------------------------------------------------------------
010:0011---------------------------------------------------------------------
----------------------
| ADD HYD (     2030) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
                     ID1 01:      2020    107.59    2.397    7.78  33.68    .000
                    +ID2 02:104           19.36     .511    7.45  37.12    .000
                    +ID3 03:105           25.24     .667    7.45  37.12    .000
                     ==========================================================
                     SUM 04:      2030    152.19    3.549    7.67  34.69    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
010:0012---------------------------------------------------------------------
----------------------
| ROUTE CHANNEL      |     Routing time step (min) =  1.00
|  IN> 04:002030     |     Number of SEGMENTS =  3
| OUT< 01:002040     |     Slopes (%), CHANNEL= .1200  FLOODPLAIN= .2000
----------------------                LENGTH =  500.00    (m)

              <------ DATA FOR SECTION (   3.0) ------>
              Distance      Elevation       Manning
                   .00         2.20          .2000
                200.00         1.80     .2000 / .0850  Main Channel
                202.75          .00          .0850      Main Channel
                204.25          .00          .0850      Main Channel
                207.00         1.80     .0850 / .2000  Main Channel
                407.00         2.20          .2000

   <---------------------------- TRAVEL TIME TABLE ---------------------------->
    DEPTH     ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME   D x V
      (m)      (m)   (cu.m.)   (cu.m.)      (cms)     (m/s)     (min)   (m2/s)
     .112     .112  .940E+02  .882E+01       .016      .087     95.91     .010
     .225     .225  .207E+03  .389E+02       .054      .129     64.45     .029
     .337     .337  .340E+03  .957E+02       .110      .161     51.67     .054
     .450     .450  .492E+03  .185E+03       .185      .188     44.34     .085
     .562     .562  .654E+03  .311E+03       .280      .211     39.43     .119
     .675     .675  .854E+03  .481E+03*      .397      .233     35.84     .157
     .788     .788  .106E+04  .698E+03*      .537      .252     33.06     .199
     .900     .900  .129E+04  .970E+03*      .700      .270     30.81     .243
    1.013    1.013  .154E+04  .130E+04*      .888      .288     28.95     .291
    1.125    1.125  .181E+04  .170E+04*     1.102      .304     27.37     .343
    1.238    1.238  .210E+04  .216E+04*     1.344      .320     26.01     .397
    1.350    1.350  .240E+04  .271E+04*     1.615      .336     24.81     .453
    1.463    1.463  .273E+04  .333E+04*     1.916      .351     23.76     .513
    1.575    1.575  .308E+04  .404E+04*     2.247      .365     22.82     .575
```

```
   1.688    1.688  .344E+04  .484E+04*     2.611      .379     21.97     .640
   1.800    1.800  .382E+04  .574E+04*     3.008      .393     21.19     .708
   1.933    1.933  .874E+04  .141E+05*     3.971      .227     36.67     .439
   2.067    2.067  .225E+05  .388E+05*     6.403      .142     58.66     .294
   2.200    2.200  .452E+05  .829E+05*    11.177      .124     67.44     .272

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
 (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                              <---- hydrograph ---->   <-pipe / channel->
                           AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                           (ha)    (cms)   (hrs)   (mm)       (m)      (m/s)
  INFLOW : ID= 4:002030    152.19   3.549    7.67 34.689     1.875      .279
  OUTFLOW: ID= 1:002040    152.19   3.293    8.55 34.689     1.840      .322


------------------------------------------------------------------------------
010:0013------------------------------------------------------------------------
----------------------
| DESIGN NASHYD      |   Area     (ha)=   15.67   Curve Number    (CN)=82.00
| 02:108     DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=   1.090

     Unit Hyd Qpeak  (cms)=     .549

     PEAK FLOW       (cms)=     .514 (i)
     TIME TO PEAK    (hrs)=    7.051
     RUNOFF VOLUME    (mm)=   37.125
     TOTAL RAINFALL   (mm)=   69.200
     RUNOFF COEFFICIENT   =     .536

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

------------------------------------------------------------------------------
010:0014------------------------------------------------------------------------
----------------------
| DESIGN NASHYD      |   Area     (ha)=    6.80   Curve Number    (CN)=82.00
| 03:105A    DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=    .960

     Unit Hyd Qpeak  (cms)=     .271

     PEAK FLOW       (cms)=     .245 (i)
     TIME TO PEAK    (hrs)=    6.901
     RUNOFF VOLUME    (mm)=   37.125
     TOTAL RAINFALL   (mm)=   69.200
     RUNOFF COEFFICIENT   =     .536

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

------------------------------------------------------------------------------
010:0015------------------------------------------------------------------------
*#*************************************************************************
*# Lappan Drain - Total Flow at Jefferson Boulevard
*#*************************************************************************
------------------------
| ADD HYD (      2050) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                    (ha)     (cms)   (hrs)   (mm)   (cms)
                       ID1 01:      2040   152.19   3.293    8.55  34.69    .000
                      +ID2 02:002108        15.67    .514    7.05  37.12    .000
                      +ID3 03:105A           6.80    .245    6.90  37.12    .000
                       ==========================================================
                       SUM 04:      2050   174.66   3.725    8.22  35.00    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
010:0016------------------------------------------------------------------------
----------------------
| ROUTE CHANNEL      |     Routing time step (min) =  1.00
|  IN> 04:002050     |     Number of SEGMENTS =  3
| OUT< 01:002060     |     Slopes (%), CHANNEL= .1200  FLOODPLAIN= .2000
---------------------                   LENGTH =  450.00    (m)

              <------ DATA FOR SECTION (   4.0) ------>
              Distance      Elevation       Manning
                  .00          2.20          .2000
                200.00          1.80     .2000 / .0850  Main Channel
                202.75           .00          .0850      Main Channel
                204.25           .00          .0850      Main Channel
                207.00          1.80     .0850 / .2000  Main Channel
                407.00          2.20          .2000

   <---------------------------- TRAVEL TIME TABLE ---------------------------->
    DEPTH     ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME    D x V
      (m)      (m)   (cu.m.)   (cu.m.)      (cms)     (m/s)     (min)    (m2/s)
     .112     .112  .846E+02  .882E+01       .016      .087     86.32     .010
     .225     .225  .187E+03  .389E+02       .054      .129     58.01     .029
     .337     .337  .306E+03  .957E+02       .110      .161     46.50     .054
     .450     .450  .443E+03  .185E+03       .185      .188     39.90     .085
     .562     .562  .597E+03  .311E+03*      .280      .211     35.49     .119
     .675     .675  .769E+03  .481E+03*      .397      .233     32.26     .157
     .788     .788  .958E+03  .698E+03*      .537      .252     29.75     .199
     .900     .900  .116E+04  .970E+03*      .700      .270     27.73     .243
    1.013    1.013  .139E+04  .130E+04*      .888      .288     26.06     .291
    1.125    1.125  .163E+04  .170E+04*     1.102      .304     24.63     .343
    1.238    1.238  .189E+04  .216E+04*     1.344      .320     23.41     .397
    1.350    1.350  .216E+04  .271E+04*     1.615      .336     22.33     .453
    1.463    1.463  .246E+04  .333E+04*     1.916      .351     21.38     .513
    1.575    1.575  .277E+04  .404E+04*     2.247      .365     20.53     .575
    1.688    1.688  .310E+04  .484E+04*     2.611      .379     19.77     .640
    1.800    1.800  .344E+04  .574E+04*     3.008      .393     19.07     .708
    1.933    1.933  .786E+04  .141E+05*     3.971      .227     33.00     .439
    2.067    2.067  .203E+05  .388E+05*     6.403      .142     52.79     .294
    2.200    2.200  .407E+05  .829E+05*    11.177      .124     60.70     .272

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
 (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                              <---- hydrograph ---->   <-pipe / channel->
                           AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                           (ha)    (cms)   (hrs)   (mm)       (m)      (m/s)
  INFLOW : ID= 4:002050    174.66   3.725    8.22 35.002     1.899      .255
  OUTFLOW: ID= 1:002060    174.66   3.503    8.77 35.002     1.871      .284


------------------------------------------------------------------------------
010:0017------------------------------------------------------------------------
----------------------
| DESIGN NASHYD      |   Area     (ha)=    6.60   Curve Number    (CN)=82.00
| 02:EXT8    DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=    .820

     Unit Hyd Qpeak  (cms)=     .307

     PEAK FLOW       (cms)=     .267 (i)
     TIME TO PEAK    (hrs)=    6.734
     RUNOFF VOLUME    (mm)=   37.125
     TOTAL RAINFALL   (mm)=   69.200
     RUNOFF COEFFICIENT   =     .536

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

------------------------------------------------------------------------------
010:0018------------------------------------------------------------------------
*#*************************************************************************
*# Lappan Drain - Total Flow at McGill Drain
*#*************************************************************************
------------------------
| ADD HYD (      2070) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                    (ha)     (cms)   (hrs)   (mm)   (cms)
                       ID1 01:      2060   174.66   3.503    8.77  35.00    .000
                      +ID2 02:EXT8          6.60    .267    6.73  37.12    .000
                       ==========================================================
                       SUM 10:      2070   181.26   3.576    8.77  35.08    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
010:0019------------------------------------------------------------------------
*#*************************************************************************
*# McGILL DRAIN
*#*************************************************************************
----------------------
| DESIGN NASHYD      |   Area     (ha)=   39.07   Curve Number    (CN)=82.00
| 01:106     DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=   1.630

     Unit Hyd Qpeak  (cms)=     .916

     PEAK FLOW       (cms)=     .943 (i)
     TIME TO PEAK    (hrs)=    7.668
     RUNOFF VOLUME    (mm)=   37.125
     TOTAL RAINFALL   (mm)=   69.200
     RUNOFF COEFFICIENT   =     .536

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

------------------------------------------------------------------------------
010:0020------------------------------------------------------------------------
----------------------
| ROUTE CHANNEL      |     Routing time step (min) =  1.00
|  IN> 01:106        |     Number of SEGMENTS =  3
| OUT< 02:002080     |     Slopes (%), CHANNEL= .1500  FLOODPLAIN= .2000
---------------------                   LENGTH =  250.00    (m)

              <------ DATA FOR SECTION (   5.0) ------>
              Distance      Elevation       Manning
                  .00          1.40          .2000
                200.00          1.00     .2000 / .1000  Main Channel
                201.50           .00          .1000      Main Channel
                203.50           .00          .1000      Main Channel
                205.00          1.00     .1000 / .2000  Main Channel
                405.00          1.40          .2000

   <---------------------------- TRAVEL TIME TABLE ---------------------------->
    DEPTH     ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME    D x V
      (m)      (m)   (cu.m.)   (cu.m.)      (cms)     (m/s)     (min)    (m2/s)
     .071     .071  .376E+02  .358E+01       .010      .064     65.43     .005
     .143     .143  .791E+02  .151E+02       .031      .097     42.85     .014
     .214     .214  .124E+03  .355E+02       .061      .123     33.82     .026
     .286     .286  .173E+03  .661E+02       .101      .145     28.74     .041
     .357     .357  .226E+03  .108E+03       .148      .164     25.41     .059
     .429     .429  .283E+03  .162E+03*      .205      .181     23.02     .078
     .500     .500  .344E+03  .229E+03*      .270      .197     21.20     .098
     .571     .571  .408E+03  .311E+03*      .344      .211     19.75     .121
     .643     .643  .476E+03  .408E+03*      .428      .225     18.56     .144
     .714     .714  .548E+03  .522E+03*      .521      .237     17.56     .169
     .786     .786  .624E+03  .654E+03*      .623      .249     16.71     .196
     .857     .857  .704E+03  .805E+03*      .735      .261     15.96     .224
     .929     .929  .788E+03  .975E+03*      .858      .272     15.31     .253
    1.000    1.000  .875E+03  .117E+04*      .990      .283     14.73     .283
    1.080    1.080  .177E+04  .256E+04*     1.270      .179     23.30     .193
    1.160    1.160  .427E+04  .661E+04*     1.927      .113     36.97     .131
    1.240    1.240  .837E+04  .138E+05*     3.185      .095     43.82     .118
    1.320    1.320  .141E+05  .248E+05*     5.229      .093     44.86     .123
    1.400    1.400  .214E+05  .399E+05*     8.222      .096     43.33     .135

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
 (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                              <---- hydrograph ---->   <-pipe / channel->
                           AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                           (ha)    (cms)   (hrs)   (mm)       (m)      (m/s)
  INFLOW : ID= 1:106       39.07    .943    7.67 37.125      .975      .279
  OUTFLOW: ID= 2:002080    39.07    .917    7.78 37.125      .961      .277


------------------------------------------------------------------------------
010:0021------------------------------------------------------------------------
----------------------
| DESIGN NASHYD      |   Area     (ha)=   21.08   Curve Number    (CN)=81.00
| 01:EXT4    DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=   1.830

     Unit Hyd Qpeak  (cms)=     .440

     PEAK FLOW       (cms)=     .451 (i)
     TIME TO PEAK    (hrs)=    7.918
     RUNOFF VOLUME    (mm)=   36.009
     TOTAL RAINFALL   (mm)=   69.200
     RUNOFF COEFFICIENT   =     .520

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

------------------------------------------------------------------------------
010:0022------------------------------------------------------------------------
----------------------
| DESIGN NASHYD      |   Area     (ha)=    6.53   Curve Number    (CN)=82.00
| 03:107     DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=    .820

     Unit Hyd Qpeak  (cms)=     .304

     PEAK FLOW       (cms)=     .264 (i)
     TIME TO PEAK    (hrs)=    6.734
     RUNOFF VOLUME    (mm)=   37.125
     TOTAL RAINFALL   (mm)=   69.200
     RUNOFF COEFFICIENT   =     .536

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

------------------------------------------------------------------------------
010:0023------------------------------------------------------------------------
*#*************************************************************************
*# McGill Drain - Total Flow at Jefferson Boulevard
*#*************************************************************************
------------------------
| ADD HYD (      2090) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                    (ha)     (cms)   (hrs)   (mm)   (cms)
                       ID1 01:EXT4          21.08    .451    7.92  36.01    .000
                      +ID2 02:      2080    39.07    .917    7.78  37.12    .000
                      +ID3 03:107            6.53    .264    6.73  37.12    .000
                       ==========================================================
                       SUM 04:      2090    66.68   1.514    7.75  36.77    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
010:0024------------------------------------------------------------------------
----------------------
| ROUTE CHANNEL      |     Routing time step (min) =  1.00
|  IN> 04:002090     |     Number of SEGMENTS =  3
| OUT< 01:002100     |     Slopes (%), CHANNEL= .3000  FLOODPLAIN= .2000
---------------------                   LENGTH =  280.00    (m)

              <------ DATA FOR SECTION (   6.0) ------>
              Distance      Elevation       Manning
                  .00          1.40          .2000
                200.00          1.00     .2000 / .1000  Main Channel
                201.50           .00          .1000      Main Channel
                203.50           .00          .1000      Main Channel
                205.00          1.00     .1000 / .2000  Main Channel
```

```
              405.00          1.40          .2000

  <------------------------- TRAVEL TIME TABLE -------------------------->
   DEPTH     ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME    D x V
     (m)       (m)   (cu.m.)   (cu.m.)      (cms)     (m/s)     (min)   (m2/s)
    .071      .071  .421E+02  .179E+01       .014      .090     51.82     .006
    .143      .143  .886E+02  .753E+01       .043      .138     33.94     .020
    .214      .214  .139E+03  .178E+02       .087      .174     26.78     .037
    .286      .286  .194E+03  .330E+02       .142      .205     22.76     .059
    .357      .357  .254E+03  .539E+02       .210      .232     20.12     .083
    .429      .429  .317E+03  .809E+02       .290      .256     18.23     .110
    .500      .500  .385E+03  .115E+03       .382      .278     16.79     .139
    .571      .571  .457E+03  .155E+03       .487      .298     15.64     .171
    .643      .643  .534E+03  .204E+03       .605      .318     14.70     .204
    .714      .714  .614E+03  .261E+03       .736      .336     13.91     .240
    .786      .786  .699E+03  .327E+03       .881      .353     13.23     .277
    .857      .857  .789E+03  .402E+03*     1.040      .369     12.64     .316
    .929      .929  .882E+03  .488E+03*     1.213      .385     12.12     .357
   1.000     1.000  .980E+03  .583E+03*     1.401      .400     11.66     .400
   1.080     1.080  .199E+04  .128E+04*     1.761      .248     18.81     .268
   1.160     1.160  .479E+04  .331E+04*     2.505      .147     31.85     .170
   1.240     1.240  .938E+04  .692E+04*     3.856      .115     40.54     .143
   1.320     1.320  .158E+05  .124E+05*     5.997      .107     43.81     .141
   1.400     1.400  .239E+05  .199E+05*     9.093      .106     43.88     .149

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
 (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                                <---- hydrograph ---->   <-pipe / channel->
                             AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                             (ha)    (cms)   (hrs)   (mm)       (m)      (m/s)
  INFLOW : ID= 4:002090     66.68    1.514    7.75 36.772     1.025      .335
  OUTFLOW: ID= 1:002100     66.68    1.489    8.22 36.772     1.020      .348


--------------------------------------------------------------------------------
010:0025----------------------------------------------------------------------
----------------------
| DESIGN NASHYD     |   Area     (ha)=   14.81   Curve Number    (CN)=82.00
| 02:EXT5    DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=   1.520

     Unit Hyd Qpeak  (cms)=     .372

     PEAK FLOW       (cms)=     .377 (i)
     TIME TO PEAK    (hrs)=    7.534
     RUNOFF VOLUME    (mm)=   37.125
     TOTAL RAINFALL   (mm)=   69.200
     RUNOFF COEFFICIENT   =     .536

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

--------------------------------------------------------------------------------
010:0026----------------------------------------------------------------------
------------------------
| ADD HYD (      2110) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
                       ID1 01:       2100    66.68    1.489    8.22  36.77    .000
                      +ID2 02:EXT5         14.81     .377    7.53  37.12    .000
                      ========================================================
                       SUM 03:       2110    81.49    1.835    8.17  36.84    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
010:0027----------------------------------------------------------------------
*#*************************************************************************
*# McGill Drain - Total Flow at Lappan Drain Confluence
*#*************************************************************************
------------------------
| ADD HYD (      2120) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
                       ID1 03:       2110    81.49    1.835    8.17  36.84    .000
                      +ID2 10:       2070   181.26    3.576    8.77  35.08    .000
                      ========================================================
                       SUM 01:       2120   262.75    5.282    8.52  35.62    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
010:0028----------------------------------------------------------------------
----------------------
| ROUTE CHANNEL     |     Routing time step (min) =  1.00
|  IN> 01:002120    |     Number of SEGMENTS =  3
| OUT< 02:002130    |     Slopes (%), CHANNEL= .1500  FLOODPLAIN= .2000
----------------------                 LENGTH =  370.00    (m)

               <------ DATA FOR SECTION (   7.0) ------>
               Distance       Elevation        Manning
                  .00            1.80           .2000
                200.00           1.40     .2000 / .0850  Main Channel
                202.60            .00          .0850      Main Channel
                204.40            .00          .0850      Main Channel
                207.00           1.40     .0850 / .2000  Main Channel
                407.00           1.80           .2000

  <------------------------- TRAVEL TIME TABLE -------------------------->
   DEPTH     ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME    D x V
     (m)       (m)   (cu.m.)   (cu.m.)      (cms)     (m/s)     (min)   (m2/s)
    .093      .093  .681E+02  .573E+01       .016      .087     70.58     .008
    .187      .187  .148E+03  .249E+02       .053      .131     46.93     .025
    .280      .280  .240E+03  .606E+02       .107      .165     37.37     .046
    .373      .373  .344E+03  .116E+03       .180      .193     31.94     .072
    .467      .467  .460E+03  .194E+03       .271      .218     28.33     .102
    .560      .560  .588E+03  .297E+03*      .382      .240     25.70     .134
    .653      .653  .728E+03  .429E+03*      .513      .260     23.68     .170
    .747      .747  .880E+03  .592E+03*      .665      .280     22.05     .209
    .840      .840  .104E+04  .790E+03*      .840      .298     20.71     .250
    .933      .933  .122E+04  .103E+04*     1.039      .315     19.58     .294
   1.027     1.027  .141E+04  .130E+04*     1.262      .332     18.60     .340
   1.120     1.120  .161E+04  .162E+04*     1.510      .348     17.74     .389
   1.213     1.213  .182E+04  .199E+04*     1.785      .363     16.99     .440
   1.307     1.307  .204E+04  .241E+04*     2.087      .378     16.32     .494
   1.400     1.400  .228E+04  .287E+04*     2.418      .392     15.71     .549
   1.500     1.500  .439E+04  .593E+04*     3.044      .257     24.02     .385
   1.600     1.600  .102E+05  .147E+05*     4.365      .158     38.94     .253
   1.700     1.700  .197E+05  .302E+05*     6.783      .127     48.42     .217
   1.800     1.800  .329E+05  .534E+05*    10.633      .120     51.59     .215

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
 (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                                <---- hydrograph ---->   <-pipe / channel->
                             AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                             (ha)    (cms)   (hrs)   (mm)       (m)      (m/s)
  INFLOW : ID= 1:002120     262.75    5.282    8.52 35.624     1.638      .145
  OUTFLOW: ID= 2:002130     262.75    4.823    9.25 35.624     1.619      .151


--------------------------------------------------------------------------------
010:0029----------------------------------------------------------------------
----------------------
| DESIGN NASHYD     |   Area     (ha)=   47.17   Curve Number    (CN)=82.00
| 03:109     DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=   1.100

     Unit Hyd Qpeak  (cms)=    1.638

     PEAK FLOW       (cms)=    1.536 (i)
     TIME TO PEAK    (hrs)=    7.051
     RUNOFF VOLUME    (mm)=   37.125
     TOTAL RAINFALL   (mm)=   69.200
     RUNOFF COEFFICIENT   =     .536

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

--------------------------------------------------------------------------------
010:0030----------------------------------------------------------------------
----------------------
| DESIGN NASHYD     |   Area     (ha)=   24.11   Curve Number    (CN)=80.00
| 04:EXT6    DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=   1.520

     Unit Hyd Qpeak  (cms)=     .606

     PEAK FLOW       (cms)=     .576 (i)
     TIME TO PEAK    (hrs)=    7.551
     RUNOFF VOLUME    (mm)=   34.934
     TOTAL RAINFALL   (mm)=   69.200
     RUNOFF COEFFICIENT   =     .505

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

--------------------------------------------------------------------------------
010:0031----------------------------------------------------------------------
------------------------
| ADD HYD (      2140) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
                       ID1 02:       2130   262.75    4.823    9.25  35.62    .000
                      +ID2 03:109          47.17    1.536    7.05  37.12    .000
                      +ID3 04:EXT6         24.11     .576    7.55  34.93    .000
                      ========================================================
                       SUM 01:       2140   334.03    5.811    8.80  35.79    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
010:0032----------------------------------------------------------------------
----------------------
| ROUTE CHANNEL     |     Routing time step (min) =  1.00
|  IN> 01:002140    |     Number of SEGMENTS =  3
| OUT< 10:002150    |     Slopes (%), CHANNEL= .0800  FLOODPLAIN= .2000
----------------------                 LENGTH =  370.00    (m)

               <------ DATA FOR SECTION (   7.0) ------>
               Distance       Elevation        Manning
                  .00            1.80           .2000
                200.00           1.40     .2000 / .0850  Main Channel
                202.60            .00          .0850      Main Channel
                204.40            .00          .0850      Main Channel
                207.00           1.40     .0850 / .2000  Main Channel
                407.00           1.80           .2000

  <------------------------- TRAVEL TIME TABLE -------------------------->
   DEPTH     ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME    D x V
     (m)       (m)   (cu.m.)   (cu.m.)      (cms)     (m/s)     (min)   (m2/s)
    .093      .093  .681E+02  .107E+02       .012      .064     96.65     .006
    .187      .187  .148E+03  .467E+02       .038      .096     64.26     .018
    .280      .280  .240E+03  .114E+03       .078      .121     51.18     .034
    .373      .373  .344E+03  .217E+03*      .131      .141     43.73     .053
    .467      .467  .460E+03  .363E+03*      .198      .159     38.79     .074
    .560      .560  .588E+03  .557E+03*      .279      .175     35.19     .098
    .653      .653  .728E+03  .804E+03*      .374      .190     32.42     .124
    .747      .747  .880E+03  .111E+04*      .486      .204     30.20     .152
    .840      .840  .104E+04  .148E+04*      .614      .217     28.36     .183
    .933      .933  .122E+04  .192E+04*      .759      .230     26.81     .215
   1.027     1.027  .141E+04  .244E+04*      .921      .242     25.47     .249
   1.120     1.120  .161E+04  .304E+04*     1.103      .254     24.30     .284
   1.213     1.213  .182E+04  .373E+04*     1.304      .265     23.27     .322
   1.307     1.307  .204E+04  .451E+04*     1.524      .276     22.34     .361
   1.400     1.400  .228E+04  .539E+04*     1.766      .287     21.51     .401
   1.500     1.500  .439E+04  .111E+05*     2.264      .191     32.30     .286
   1.600     1.600  .102E+05  .276E+05*     3.447      .125     49.30     .200
   1.700     1.700  .197E+05  .566E+05*     5.720      .107     57.42     .183
   1.800     1.800  .329E+05  .100E+06*     9.415      .106     58.27     .191

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
 (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                                <---- hydrograph ---->   <-pipe / channel->
                             AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                             (ha)    (cms)   (hrs)   (mm)       (m)      (m/s)
  INFLOW : ID= 1:002140     334.03    5.811    8.80 35.786     1.702      .107
  OUTFLOW: ID=10:002150     334.03    5.284    9.83 35.786     1.679      .111


--------------------------------------------------------------------------------
010:0033----------------------------------------------------------------------
----------------------
| DESIGN NASHYD     |   Area     (ha)=   17.65   Curve Number    (CN)=82.00
| 01:113     DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .910

     Unit Hyd Qpeak  (cms)=     .741

     PEAK FLOW       (cms)=     .661 (i)
     TIME TO PEAK    (hrs)=    6.834
     RUNOFF VOLUME    (mm)=   37.125
     TOTAL RAINFALL   (mm)=   69.200
     RUNOFF COEFFICIENT   =     .536

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

--------------------------------------------------------------------------------
010:0034----------------------------------------------------------------------
*#*************************************************************************
*# Calculate culvert routing and flow split near eastern site boundary
*#   - Storage volumes calculated based on site survey
*#   - Discharges calculated based on the 600 mm diameter CSP and 1500 mm
*#     diameter CSP capacities
*#*************************************************************************
----------------------
| ROUTE RESERVOIR   |    Requested routing time step =  1.0 min.
|  IN>01:(113   )   |
| OUT<02:(002160)   |    =========  OUTFLOW STORAGE TABLE  =========
----------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                            (cms)    (ha.m.)   |    (cms)    (ha.m.)
                             .000  .0000E+00   |    1.130  .4600E+00
                             .150  .0000E+00   |    5.470  .8100E+00
                             .450  .0000E+00   |   83.090  .3400E+01
                             .820  .6500E-01   |     .000  .0000E+00

     ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
     ---------------           (ha)     (cms)     (hrs)       (mm)
     INFLOW >01: (113   )      17.65     .661     6.834     37.125
     OUTFLOW<02: (002160)      17.65     .603     7.218     37.136

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=   91.100
                  TIME SHIFT OF PEAK FLOW          (min)=    23.00
                  MAXIMUM  STORAGE   USED        (ha.m.)=.2680E-01

--------------------------------------------------------------------------------
010:0035----------------------------------------------------------------------
------------------
| DIVERT HYD      |
| INID=02  (002160)|
------------------
      Outflow / Inflow  Relationships
      Flow 03 +  Flow 04 =  Total
        (cms)       (cms)      (cms)
         .000        .000       .000
         .150        .000       .150
         .400        .050       .450
```

```
        .680      .140      .820
        .930      .200     1.130
      1.040     4.430     5.470
      1.460    81.630    83.090

            NHYD       AREA    QPEAK  TpeakDate_hh:mm       R.V.  NFE WetHrs
                        (ha)    (cms)                       (mm)       (hrs)
   IDin = 02:002160    17.65     .603  No_date    7:13    37.136  156    13.
   ==========================================================================
   IDout= 03:002170    16.03     .515  No_date    7:13    37.136  156    13.
   IDout= 04:002180     1.62     .087  No_date    7:13    37.136   59     4.
------------------------------------------------------------------------------
010:0036----------------------------------------------------------------------
----------------------
| DESIGN NASHYD      |   Area     (ha)=    4.88   Curve Number    (CN)=82.00
| 01:114    DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .910

     Unit Hyd Qpeak  (cms)=     .205

     PEAK FLOW       (cms)=     .183 (i)
     TIME TO PEAK    (hrs)=    6.834
     RUNOFF VOLUME    (mm)=   37.125
     TOTAL RAINFALL   (mm)=   69.200
     RUNOFF COEFFICIENT   =     .536

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

------------------------------------------------------------------------------
010:0037----------------------------------------------------------------------
----------------------
| ADD HYD (      2190) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
                     ID1 01:114            4.88      .183    6.83  37.12    .000
                    +ID2 03:      2170    16.03      .515    7.22  37.14    .000
                     ==========================================================
                     SUM 02:      2190    20.91      .687    7.08  37.13    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
010:0038----------------------------------------------------------------------
----------------------
| DESIGN NASHYD      |   Area     (ha)=   18.59   Curve Number    (CN)=82.00
| 01:115    DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=   1.470

     Unit Hyd Qpeak  (cms)=     .483

     PEAK FLOW       (cms)=     .486 (i)
     TIME TO PEAK    (hrs)=    7.484
     RUNOFF VOLUME    (mm)=   37.125
     TOTAL RAINFALL   (mm)=   69.200
     RUNOFF COEFFICIENT   =     .536

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

------------------------------------------------------------------------------
010:0039----------------------------------------------------------------------
*#*****************************************************************************
*# McGill Drain - Total Flow at Eastern WSP
*#*****************************************************************************
----------------------
| ADD HYD (      2200) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
                     ID1 01:115           18.59      .486    7.48  37.12    .000
                    +ID2 02:      2190    20.91      .687    7.08  37.13    .000
                    +ID3 10:      2150   334.03    5.284    9.83  35.79    .000
                     ==========================================================
                     SUM 05:      2200   373.53    5.750    9.42  35.93    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
010:0040----------------------------------------------------------------------
*#*****************************************************************************
*# AREA CHECK
*#*****************************************************************************
----------------------
| ADD HYD (      2210) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
                     ID1 04:      2180     1.62      .087    7.22  37.14    .000
                    +ID2 05:      2200   373.53    5.750    9.42  35.93    .000
                     ==========================================================
                     SUM 01:      2210   375.15    5.762    9.42  35.93    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
010:0041----------------------------------------------------------------------
------------------------------------------------------------------------------
010:0002----------------------------------------------------------------------
------------------------------------------------------------------------------
010:0002----------------------------------------------------------------------
  ** END OF RUN :  24

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



----------------------
| START              |  Project  dir.: F:\WSP\
----------------------  Rainfall dir.: F:\WSP\
    TZERO =   .00 hrs on      0
    METOUT=   2 (output = METRIC)
    NRUN  = 025
    NSTORM=   1
           #  1=12scs25.stm
------------------------------------------------------------------------------
025:0002----------------------------------------------------------------------
*#*****************************************************************************
*#  Project Name: [Windsor Solar Project] Project Number: [1335-60106]
*#  Date         : 02-02-2016
*#  Modeller     : [NE]
*#  Company      : Stantec Consulting Ltd. (London)
*#  License #    :  4730904
*#*****************************************************************************
*#
*#  Existing Conditions
*#  25 mm Water Quality Event
*#  2, 5, 10, 25, 50, 100, 250-year 3-Hour Chicago Design Storm
*#
*#*****************************************************************************
------------------------------------------------------------------------------
025:0002----------------------------------------------------------------------
----------------------
| READ STORM         |    Filename: 25-yr scs 12 hr windsor
| Ptotal=  80.80 mm  |    Comments: 25-yr scs 12 hr windsor
----------------------
            TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
             hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
             .50   1.616 |   3.50   3.232 |   6.50  14.544 |   9.50   3.232
            1.00   1.616 |   4.00   3.232 |   7.00   6.464 |  10.00   1.616
            1.50   1.616 |   4.50   4.848 |   7.50   4.848 |  10.50   1.616
            2.00   1.616 |   5.00   6.464 |   8.00   4.848 |  11.00   1.616
            2.50   3.232 |   5.50   9.696 |   8.50   3.232 |  11.50   1.616
            3.00   3.232 |   6.00  72.720 |   9.00   3.232 |  12.00   1.616

------------------------------------------------------------------------------
025:0003----------------------------------------------------------------------
*#*****************************************************************************
```

```
*# LAPPAN DRAIN
*#*****************************************************************************
----------------------
| DESIGN NASHYD      |   Area     (ha)=   42.26   Curve Number    (CN)=73.00
| 01:101    DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=   1.110

     Unit Hyd Qpeak  (cms)=    1.454

     PEAK FLOW       (cms)=    1.319 (i)
     TIME TO PEAK    (hrs)=    7.084
     RUNOFF VOLUME    (mm)=   36.299
     TOTAL RAINFALL   (mm)=   80.801
     RUNOFF COEFFICIENT   =     .449

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

------------------------------------------------------------------------------
025:0004----------------------------------------------------------------------
----------------------
| ROUTE CHANNEL      |     Routing time step (min) =  1.00
|  IN> 01:101        |     Number of SEGMENTS =  3
| OUT< 02:002000     |     Slopes (%), CHANNEL= .1000   FLOODPLAIN= .2000
---------------------                    LENGTH =  700.00     (m)

                <------ DATA FOR SECTION (   1.0) ------>
                Distance      Elevation       Manning
                    .00          1.40          .2000
                 100.00          1.20     .2000 / .0850  Main Channel
                 101.80           .00          .0850      Main Channel
                 103.00           .00          .0850      Main Channel
                 104.80          1.20     .0850 / .2000  Main Channel
                 204.80          1.40          .2000

   <------------------------------ TRAVEL TIME TABLE ------------------------------>
    DEPTH    ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME   D x V
      (m)     (m)   (cu.m.)   (cu.m.)      (cms)     (m/s)      (min)   (m2/s)
     .071    .071  .645E+02  .325E+01       .005      .059     197.27     .004
     .141    .141  .140E+03  .141E+02       .018      .089     131.37     .013
     .212    .212  .225E+03  .340E+02       .036      .111     104.80     .024
     .282    .282  .321E+03  .647E+02       .060      .130      89.71     .037
     .353    .353  .427E+03  .108E+03       .089      .146      79.68     .052
     .424    .424  .544E+03  .165E+03       .125      .161      72.40     .068
     .494    .494  .671E+03  .237E+03       .168      .175      66.79     .086
     .565    .565  .809E+03  .326E+03       .217      .187      62.29     .106
     .635    .635  .957E+03  .438E+03       .272      .199      58.56     .127
     .706    .706  .112E+04  .563E+03*      .336      .211      55.41     .149
     .776    .776  .129E+04  .713E+03*      .407      .221      52.69     .172
     .847    .847  .146E+04  .886E+03*      .485      .232      50.32     .196
     .918    .918  .166E+04  .108E+04*      .572      .242      48.22     .222
     .988    .988  .186E+04  .131E+04*      .667      .252      46.35     .249
    1.059   1.059  .207E+04  .156E+04*      .771      .261      44.66     .277
    1.129   1.129  .229E+04  .185E+04*      .884      .271      43.13     .306
    1.200   1.200  .252E+04  .216E+04*     1.006      .280      41.73     .335
    1.300   1.300  .636E+04  .590E+04*     1.392      .153      76.12     .199
    1.400   1.400  .172E+05  .172E+05*     2.456      .100     116.67     .140

  X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
  S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
  (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                                <---- hydrograph ---->   <-pipe / channel->
                           AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                           (ha)    (cms)   (hrs)   (mm)       (m)      (m/s)
   INFLOW : ID= 1:101     42.26    1.319    7.08 36.299     1.281      .168
   OUTFLOW: ID= 2:002000  42.26    1.100    7.97 36.298     1.223      .235


------------------------------------------------------------------------------
025:0005----------------------------------------------------------------------
----------------------
| DESIGN NASHYD      |   Area     (ha)=   22.52   Curve Number    (CN)=82.00
| 01:102    DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=   1.270

     Unit Hyd Qpeak  (cms)=     .677

     PEAK FLOW       (cms)=     .829 (i)
     TIME TO PEAK    (hrs)=    7.234
     RUNOFF VOLUME    (mm)=   46.563
     TOTAL RAINFALL   (mm)=   80.801
     RUNOFF COEFFICIENT   =     .576

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

------------------------------------------------------------------------------
025:0006----------------------------------------------------------------------
----------------------
| DESIGN NASHYD      |   Area     (ha)=   42.81   Curve Number    (CN)=82.00
| 03:103    DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=   1.110

     Unit Hyd Qpeak  (cms)=    1.473

     PEAK FLOW       (cms)=    1.744 (i)
     TIME TO PEAK    (hrs)=    7.051
     RUNOFF VOLUME    (mm)=   46.563
     TOTAL RAINFALL   (mm)=   80.801
     RUNOFF COEFFICIENT   =     .576

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

------------------------------------------------------------------------------
025:0007----------------------------------------------------------------------
*#*****************************************************************************
*# Lappan Drain - Total Flow at Pilette Road
*#*****************************************************************************
----------------------
| ADD HYD (      2010) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
                     ID1 01:102           22.52      .829    7.23  46.56    .000
                    +ID2 02:      2000    42.26    1.100    7.97  36.30    .000
                    +ID3 03:103           42.81    1.744    7.05  46.56    .000
                     ==========================================================
                     SUM 04:      2010   107.59    3.428    7.33  42.53    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
025:0008----------------------------------------------------------------------
----------------------
| ROUTE CHANNEL      |     Routing time step (min) =  1.00
|  IN> 04:002010     |     Number of SEGMENTS =  3
| OUT< 01:002020     |     Slopes (%), CHANNEL= .1700   FLOODPLAIN= .2000
---------------------                    LENGTH = 1000.00     (m)

                <------ DATA FOR SECTION (   2.0) ------>
                Distance      Elevation       Manning
                    .00          2.00          .2000
                 100.00          1.80     .2000 / .0850  Main Channel
                 102.75           .00          .0850      Main Channel
                 104.25           .00          .0850      Main Channel
                 107.00          1.80     .0850 / .2000  Main Channel
                 207.00          2.00          .2000

   <------------------------------ TRAVEL TIME TABLE ------------------------------>
    DEPTH    ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME   D x V
      (m)     (m)   (cu.m.)   (cu.m.)      (cms)     (m/s)      (min)   (m2/s)
     .100    .100  .165E+03  .486E+01       .016      .096     172.86     .010
     .200    .200  .361E+03  .212E+02       .052      .144     115.66     .029
     .300    .300  .588E+03  .518E+02       .106      .180      92.51     .054
     .400    .400  .844E+03  .993E+02       .177      .210      79.29     .084
     .500    .500  .113E+04  .166E+03       .268      .236      70.48     .118
```

```
    .600     .600  .145E+04  .256E+03       .377      .260     64.05     .156
    .700     .700  .180E+04  .370E+03       .507      .282     59.09     .197
    .800     .800  .218E+04  .512E+03       .659      .303     55.09     .242
    .900     .900  .259E+04  .685E+03       .833      .322     51.78     .290
   1.000    1.000  .303E+04  .891E+03      1.031      .340     48.97     .340
   1.100    1.100  .350E+04  .113E+04      1.253      .358     46.55     .394
   1.200    1.200  .400E+04  .141E+04      1.500      .375     44.43     .450
   1.300    1.300  .453E+04  .173E+04      1.775      .392     42.56     .509
   1.400    1.400  .509E+04  .210E+04      2.077      .408     40.88     .571
   1.500    1.500  .569E+04  .251E+04      2.407      .423     39.37     .635
   1.600    1.600  .631E+04  .297E+04      2.768      .439     38.01     .702
   1.700    1.700  .697E+04  .348E+04      3.158      .453     36.76     .771
   1.800    1.800  .765E+04  .405E+04*     3.580      .468     35.61     .842
   2.000    2.000  .291E+05  .171E+05*     5.701      .196     84.93     .392

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
 (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                                <---- hydrograph ---->   <-pipe / channel->
                             AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                             (ha)    (cms)   (hrs)   (mm)       (m)      (m/s)
   INFLOW : ID= 4:002010    107.59    3.428    7.33 42.531     1.764      .463
   OUTFLOW: ID= 1:002020    107.59    3.034    7.90 42.531     1.664      .448


--------------------------------------------------------------------------------
025:0009----------------------------------------------------------------------
----------------------
| DESIGN NASHYD      |   Area     (ha)=   19.36   Curve Number    (CN)=82.00
| 02:104     DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=   1.450

     Unit Hyd Qpeak  (cms)=     .510

     PEAK FLOW       (cms)=     .644 (i)
     TIME TO PEAK    (hrs)=    7.451
     RUNOFF VOLUME    (mm)=   46.563
     TOTAL RAINFALL   (mm)=   80.801
     RUNOFF COEFFICIENT   =     .576

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

--------------------------------------------------------------------------------
025:0010----------------------------------------------------------------------
----------------------
| DESIGN NASHYD      |   Area     (ha)=   25.24   Curve Number    (CN)=82.00
| 03:105     DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=   1.450

     Unit Hyd Qpeak  (cms)=     .665

     PEAK FLOW       (cms)=     .840 (i)
     TIME TO PEAK    (hrs)=    7.451
     RUNOFF VOLUME    (mm)=   46.563
     TOTAL RAINFALL   (mm)=   80.801
     RUNOFF COEFFICIENT   =     .576

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

--------------------------------------------------------------------------------
025:0011----------------------------------------------------------------------
------------------------
| ADD HYD (      2030) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
                      ID1 01:      2020   107.59    3.034    7.90  42.53    .000
                     +ID2 02:104           19.36     .644    7.45  46.56    .000
                     +ID3 03:105           25.24     .840    7.45  46.56    .000
                      ==========================================================
                      SUM 04:      2030   152.19    4.469    7.70  43.71    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
025:0012----------------------------------------------------------------------
--------------------
| ROUTE CHANNEL    |     Routing time step (min) =  1.00
|  IN> 04:002030   |     Number of SEGMENTS =  3
| OUT< 01:002040   |     Slopes (%), CHANNEL= .1200  FLOODPLAIN= .2000
--------------------                  LENGTH =  500.00     (m)

              <------ DATA FOR SECTION (   3.0) ------>
              Distance      Elevation       Manning
                 .00           2.20          .2000
               200.00          1.80     .2000 / .0850  Main Channel
               202.75           .00          .0850      Main Channel
               204.25           .00          .0850      Main Channel
               207.00          1.80     .0850 / .2000  Main Channel
               407.00          2.20          .2000

   <---------------------- TRAVEL TIME TABLE ---------------------->
    DEPTH    ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME    D x V
      (m)     (m)   (cu.m.)   (cu.m.)      (cms)     (m/s)     (min)    (m2/s)
     .112    .112  .940E+02  .882E+01       .016      .087     95.91     .010
     .225    .225  .207E+03  .389E+02       .054      .129     64.45     .029
     .337    .337  .340E+03  .957E+02       .110      .161     51.67     .054
     .450    .450  .492E+03  .185E+03       .185      .188     44.34     .085
     .562    .562  .664E+03  .311E+03       .280      .211     39.43     .119
     .675    .675  .854E+03  .481E+03*      .397      .233     35.84     .157
     .788    .788  .106E+04  .698E+03*      .537      .252     33.06     .199
     .900    .900  .129E+04  .970E+03*      .700      .270     30.81     .243
    1.013   1.013  .154E+04  .130E+04*      .888      .288     28.95     .291
    1.125   1.125  .181E+04  .170E+04*     1.102      .304     27.37     .343
    1.238   1.238  .210E+04  .216E+04*     1.344      .320     26.01     .397
    1.350   1.350  .240E+04  .271E+04*     1.615      .336     24.81     .453
    1.463   1.463  .273E+04  .333E+04*     1.916      .351     23.76     .513
    1.575   1.575  .308E+04  .404E+04*     2.247      .365     22.82     .575
    1.688   1.688  .344E+04  .484E+04*     2.611      .379     21.97     .640
    1.800   1.800  .382E+04  .574E+04*     3.008      .393     21.19     .708
    1.933   1.933  .874E+04  .141E+05*     3.971      .227     36.67     .439
    2.067   2.067  .225E+05  .388E+05*     6.403      .142     58.66     .294
    2.200   2.200  .452E+05  .829E+05*    11.177      .124     67.44     .272

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
 (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                                <---- hydrograph ---->   <-pipe / channel->
                             AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                             (ha)    (cms)   (hrs)   (mm)       (m)      (m/s)
   INFLOW : ID= 4:002030    152.19    4.469    7.70 43.712     1.961      .202
   OUTFLOW: ID= 1:002040    152.19    3.924    8.72 43.712     1.926      .233


--------------------------------------------------------------------------------
025:0013----------------------------------------------------------------------
----------------------
| DESIGN NASHYD      |   Area     (ha)=   15.67   Curve Number    (CN)=82.00
| 02:108     DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=   1.090

     Unit Hyd Qpeak  (cms)=     .549

     PEAK FLOW       (cms)=     .647 (i)
     TIME TO PEAK    (hrs)=    7.034
     RUNOFF VOLUME    (mm)=   46.563
     TOTAL RAINFALL   (mm)=   80.801
     RUNOFF COEFFICIENT   =     .576

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

--------------------------------------------------------------------------------
025:0014----------------------------------------------------------------------
----------------------
| DESIGN NASHYD      |   Area     (ha)=    6.80   Curve Number    (CN)=82.00
| 03:105A    DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .960

     Unit Hyd Qpeak  (cms)=     .271

     PEAK FLOW       (cms)=     .309 (i)
     TIME TO PEAK    (hrs)=    6.884
     RUNOFF VOLUME    (mm)=   46.563
     TOTAL RAINFALL   (mm)=   80.801
     RUNOFF COEFFICIENT   =     .576

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

--------------------------------------------------------------------------------
025:0015----------------------------------------------------------------------
*#*****************************************************************************
*# Lappan Drain - Total Flow at Jefferson Boulevard
*#*****************************************************************************
----------------------
| ADD HYD (      2050) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
                      ID1 01:      2040   152.19    3.924    8.72  43.71    .000
                     +ID2 02:108           15.67     .647    7.03  46.56    .000
                     +ID3 03:105A           6.80     .309    6.88  46.56    .000
                      ==========================================================
                      SUM 04:      2050   174.66    4.369    8.43  44.08    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
025:0016----------------------------------------------------------------------
--------------------
| ROUTE CHANNEL    |     Routing time step (min) =  1.00
|  IN> 04:002050   |     Number of SEGMENTS =  3
| OUT< 01:002060   |     Slopes (%), CHANNEL= .1200  FLOODPLAIN= .2000
--------------------                  LENGTH =  450.00     (m)

              <------ DATA FOR SECTION (   4.0) ------>
              Distance      Elevation       Manning
                 .00           2.20          .2000
               200.00          1.80     .2000 / .0850  Main Channel
               202.75           .00          .0850      Main Channel
               204.25           .00          .0850      Main Channel
               207.00          1.80     .0850 / .2000  Main Channel
               407.00          2.20          .2000

   <---------------------- TRAVEL TIME TABLE ---------------------->
    DEPTH    ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME    D x V
      (m)     (m)   (cu.m.)   (cu.m.)      (cms)     (m/s)     (min)    (m2/s)
     .112    .112  .846E+02  .882E+01       .016      .087     86.32     .010
     .225    .225  .187E+03  .389E+02       .054      .129     58.01     .029
     .337    .337  .306E+03  .957E+02       .110      .161     46.50     .054
     .450    .450  .443E+03  .185E+03       .185      .188     39.90     .085
     .562    .562  .597E+03  .311E+03*      .280      .211     35.49     .119
     .675    .675  .769E+03  .481E+03*      .397      .233     32.26     .157
     .788    .788  .958E+03  .698E+03*      .537      .252     29.75     .199
     .900    .900  .116E+04  .970E+03*      .700      .270     27.73     .243
    1.013   1.013  .139E+04  .130E+04*      .888      .288     26.06     .291
    1.125   1.125  .163E+04  .170E+04*     1.102      .304     24.63     .343
    1.238   1.238  .189E+04  .216E+04*     1.344      .320     23.41     .397
    1.350   1.350  .216E+04  .271E+04*     1.615      .336     22.33     .453
    1.463   1.463  .246E+04  .333E+04*     1.916      .351     21.38     .513
    1.575   1.575  .277E+04  .404E+04*     2.247      .365     20.53     .575
    1.688   1.688  .310E+04  .484E+04*     2.611      .379     19.77     .640
    1.800   1.800  .344E+04  .574E+04*     3.008      .393     19.07     .708
    1.933   1.933  .786E+04  .141E+05*     3.971      .227     33.00     .439
    2.067   2.067  .203E+05  .388E+05*     6.403      .142     52.79     .294
    2.200   2.200  .407E+05  .829E+05*    11.177      .124     60.70     .272

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
 (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                                <---- hydrograph ---->   <-pipe / channel->
                             AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                             (ha)    (cms)   (hrs)   (mm)       (m)      (m/s)
   INFLOW : ID= 4:002050    174.66    4.369    8.43 44.079     1.955      .207
   OUTFLOW: ID= 1:002060    174.66    4.086    9.45 44.079     1.938      .222


--------------------------------------------------------------------------------
025:0017----------------------------------------------------------------------
----------------------
| DESIGN NASHYD      |   Area     (ha)=    6.60   Curve Number    (CN)=82.00
| 02:EXT8    DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .820

     Unit Hyd Qpeak  (cms)=     .307

     PEAK FLOW       (cms)=     .336 (i)
     TIME TO PEAK    (hrs)=    6.734
     RUNOFF VOLUME    (mm)=   46.563
     TOTAL RAINFALL   (mm)=   80.801
     RUNOFF COEFFICIENT   =     .576

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

--------------------------------------------------------------------------------
025:0018----------------------------------------------------------------------
*#*****************************************************************************
*# Lappan Drain - Total Flow at McGill Drain
*#*****************************************************************************
----------------------
| ADD HYD (      2070) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
                      ID1 01:      2060   174.66    4.086    9.45  44.08    .000
                     +ID2 02:EXT8           6.60     .336    6.73  46.56    .000
                      ==========================================================
                      SUM 10:      2070   181.26    4.149    9.45  44.17    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
025:0019----------------------------------------------------------------------
*#*****************************************************************************
*# McGILL DRAIN
*#*****************************************************************************
----------------------
| DESIGN NASHYD      |   Area     (ha)=   39.07   Curve Number    (CN)=82.00
| 01:106     DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=   1.630

     Unit Hyd Qpeak  (cms)=     .916

     PEAK FLOW       (cms)=    1.188 (i)
     TIME TO PEAK    (hrs)=    7.651
     RUNOFF VOLUME    (mm)=   46.563
     TOTAL RAINFALL   (mm)=   80.801
     RUNOFF COEFFICIENT   =     .576

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

--------------------------------------------------------------------------------
025:0020----------------------------------------------------------------------
--------------------
| ROUTE CHANNEL    |     Routing time step (min) =  1.00
|  IN> 01:106      |     Number of SEGMENTS =  3
| OUT< 02:002080   |     Slopes (%), CHANNEL= .1500  FLOODPLAIN= .2000
--------------------                  LENGTH =  250.00     (m)

              <------ DATA FOR SECTION (   5.0) ------>
```

```
                Distance      Elevation       Manning
                    .00          1.40          .2000
                 200.00          1.00     .2000 / .1000  Main Channel
                 201.50           .00          .1000      Main Channel
                 203.50           .00          .1000      Main Channel
                 205.00          1.00     .1000 / .2000  Main Channel
                 405.00          1.40          .2000

  <---------------------------- TRAVEL TIME TABLE ---------------------------->
   DEPTH     ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME    D x V
     (m)      (m)   (cu.m.)   (cu.m.)     (cms)     (m/s)     (min)    (m2/s)
    .071     .071  .376E+02  .358E+01      .010      .064     65.43     .005
    .143     .143  .791E+02  .151E+02      .031      .097     42.85     .014
    .214     .214  .124E+03  .355E+02      .061      .123     33.82     .026
    .286     .286  .173E+03  .661E+02      .101      .145     28.74     .041
    .357     .357  .226E+03  .108E+03      .148      .164     25.41     .059
    .429     .429  .283E+03  .162E+03*     .205      .181     23.02     .078
    .500     .500  .344E+03  .229E+03*     .270      .197     21.20     .098
    .571     .571  .408E+03  .311E+03*     .344      .211     19.75     .121
    .643     .643  .476E+03  .408E+03*     .428      .225     18.56     .144
    .714     .714  .548E+03  .522E+03*     .521      .237     17.56     .169
    .786     .786  .624E+03  .654E+03*     .623      .249     16.71     .196
    .857     .857  .704E+03  .805E+03*     .735      .261     15.96     .224
    .929     .929  .788E+03  .975E+03*     .858      .272     15.31     .253
   1.000    1.000  .875E+03  .117E+04*     .990      .283     14.73     .283
   1.080    1.080  .177E+04  .256E+04*    1.270      .179     23.30     .193
   1.160    1.160  .427E+04  .661E+04*    1.927      .113     36.97     .131
   1.240    1.240  .837E+04  .138E+05*    3.185      .095     43.82     .118
   1.320    1.320  .141E+05  .248E+05*    5.229      .093     44.86     .123
   1.400    1.400  .214E+05  .399E+05*    8.222      .096     43.33     .135

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
 (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                                <---- hydrograph ---->   <-pipe / channel->
                             AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                              (ha)    (cms)   (hrs)   (mm)      (m)      (m/s)
  INFLOW : ID= 1:106         39.07   1.188    7.65 46.563     1.057      .200
  OUTFLOW: ID= 2:002080      39.07   1.129    8.23 46.562     1.039      .220


--------------------------------------------------------------------------------
025:0021----------------------------------------------------------------------
----------------------
| DESIGN NASHYD      |   Area     (ha)=   21.08   Curve Number    (CN)=81.00
| 01:EXT4   DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=   1.830

     Unit Hyd Qpeak  (cms)=      .440

     PEAK FLOW       (cms)=      .569 (i)
     TIME TO PEAK    (hrs)=     7.901
     RUNOFF VOLUME    (mm)=    45.280
     TOTAL RAINFALL   (mm)=    80.801
     RUNOFF COEFFICIENT    =      .560

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

--------------------------------------------------------------------------------
025:0022----------------------------------------------------------------------
----------------------
| DESIGN NASHYD      |   Area     (ha)=    6.53   Curve Number    (CN)=82.00
| 03:107    DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=    .820

     Unit Hyd Qpeak  (cms)=      .304

     PEAK FLOW       (cms)=      .332 (i)
     TIME TO PEAK    (hrs)=     6.734
     RUNOFF VOLUME    (mm)=    46.563
     TOTAL RAINFALL   (mm)=    80.801
     RUNOFF COEFFICIENT    =      .576

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

--------------------------------------------------------------------------------
025:0023----------------------------------------------------------------------
*#############################################################################
*# McGill Drain - Total Flow at Jefferson Boulevard
*#############################################################################
----------------------
| ADD HYD (      2090) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                     (ha)     (cms)   (hrs)   (mm)    (cms)
                     ID1 01:EXT4          21.08     .569    7.90  45.28     .000
                    +ID2 02:      2080    39.07    1.129    8.23  46.56     .000
                    +ID3 03:107            6.53     .332    6.73  46.56     .000
                     ==========================================================
                     SUM 04:      2090    66.68    1.840    7.87  46.16     .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
025:0024----------------------------------------------------------------------
----------------------
| ROUTE CHANNEL    |     Routing time step (min) =  1.00
|  IN> 04:002090   |     Number of SEGMENTS =  3
| OUT< 01:002100   |     Slopes (%), CHANNEL= .3000  FLOODPLAIN= .2000
----------------------              LENGTH =  280.00     (m)

                <------ DATA FOR SECTION (   6.0) ------>
                Distance      Elevation       Manning
                    .00          1.40          .2000
                 200.00          1.00     .2000 / .1000  Main Channel
                 201.50           .00          .1000      Main Channel
                 203.50           .00          .1000      Main Channel
                 205.00          1.00     .1000 / .2000  Main Channel
                 405.00          1.40          .2000

  <---------------------------- TRAVEL TIME TABLE ---------------------------->
   DEPTH     ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME    D x V
     (m)      (m)   (cu.m.)   (cu.m.)     (cms)     (m/s)     (min)    (m2/s)
    .071     .071  .421E+02  .179E+01      .014      .090     51.82     .006
    .143     .143  .886E+02  .753E+01      .043      .138     33.94     .020
    .214     .214  .139E+03  .178E+02      .087      .174     26.78     .037
    .286     .286  .194E+03  .330E+02      .142      .205     22.76     .059
    .357     .357  .254E+03  .539E+02      .210      .232     20.12     .083
    .429     .429  .317E+03  .809E+02      .290      .256     18.23     .110
    .500     .500  .385E+03  .115E+03      .382      .278     16.79     .139
    .571     .571  .457E+03  .155E+03      .487      .298     15.64     .171
    .643     .643  .534E+03  .204E+03      .605      .318     14.70     .204
    .714     .714  .614E+03  .261E+03      .736      .336     13.91     .240
    .786     .786  .699E+03  .327E+03      .881      .353     13.23     .277
    .857     .857  .789E+03  .402E+03*    1.040      .369     12.64     .316
    .929     .929  .882E+03  .488E+03*    1.213      .385     12.12     .357
   1.000    1.000  .980E+03  .583E+03*    1.401      .400     11.66     .400
   1.080    1.080  .199E+04  .128E+04*    1.761      .248     18.81     .268
   1.160    1.160  .479E+04  .331E+04*    2.505      .147     31.85     .170
   1.240    1.240  .938E+04  .692E+04*    3.856      .115     40.54     .143
   1.320    1.320  .158E+05  .124E+05*    5.997      .107     43.81     .141
   1.400    1.400  .239E+05  .199E+05*    9.093      .106     43.88     .149

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
 (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                                <---- hydrograph ---->   <-pipe / channel->
                             AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                              (ha)    (cms)   (hrs)   (mm)      (m)      (m/s)
  INFLOW : ID= 4:002090      66.68   1.840    7.87 46.157     1.089      .231
  OUTFLOW: ID= 1:002100      66.68   1.787    8.88 46.157     1.083      .242


--------------------------------------------------------------------------------
025:0025----------------------------------------------------------------------
----------------------
| DESIGN NASHYD      |   Area     (ha)=   14.81   Curve Number    (CN)=82.00
| 02:EXT5   DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=   1.520

     Unit Hyd Qpeak  (cms)=      .372

     PEAK FLOW       (cms)=      .475 (i)
     TIME TO PEAK    (hrs)=     7.518
     RUNOFF VOLUME    (mm)=    46.563
     TOTAL RAINFALL   (mm)=    80.801
     RUNOFF COEFFICIENT    =      .576

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

--------------------------------------------------------------------------------
025:0026----------------------------------------------------------------------
----------------------
| ADD HYD (      2110) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                     (ha)     (cms)   (hrs)   (mm)    (cms)
                     ID1 01:      2100    66.68    1.787    8.88  46.16     .000
                    +ID2 02:EXT5          14.81     .475    7.52  46.56     .000
                     ==========================================================
                     SUM 03:      2110    81.49    2.179    8.33  46.23     .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
025:0027----------------------------------------------------------------------
*#############################################################################
*# McGill Drain - Total Flow at Lappan Drain Confluence
*#############################################################################
----------------------
| ADD HYD (      2120) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                     (ha)     (cms)   (hrs)   (mm)    (cms)
                     ID1 03:      2110    81.49    2.179    8.33  46.23     .000
                    +ID2 10:      2070   181.26    4.149    9.45  44.17     .000
                     ==========================================================
                     SUM 01:      2120   262.75    6.173    8.87  44.81     .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
025:0028----------------------------------------------------------------------
----------------------
| ROUTE CHANNEL    |     Routing time step (min) =  1.00
|  IN> 01:002120   |     Number of SEGMENTS =  3
| OUT< 02:002130   |     Slopes (%), CHANNEL= .1500  FLOODPLAIN= .2000
----------------------              LENGTH =  370.00     (m)

                <------ DATA FOR SECTION (   7.0) ------>
                Distance      Elevation       Manning
                    .00          1.80          .2000
                 200.00          1.40     .2000 / .0850  Main Channel
                 202.60           .00          .0850      Main Channel
                 204.40           .00          .0850      Main Channel
                 207.00          1.40     .0850 / .2000  Main Channel
                 407.00          1.80          .2000

  <---------------------------- TRAVEL TIME TABLE ---------------------------->
   DEPTH     ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME    D x V
     (m)      (m)   (cu.m.)   (cu.m.)     (cms)     (m/s)     (min)    (m2/s)
    .093     .093  .681E+02  .573E+01      .016      .087     70.58     .008
    .187     .187  .148E+03  .249E+02      .053      .131     46.93     .025
    .280     .280  .240E+03  .606E+02      .107      .165     37.37     .046
    .373     .373  .344E+03  .116E+03      .180      .193     31.94     .072
    .467     .467  .460E+03  .194E+03      .271      .218     28.33     .102
    .560     .560  .588E+03  .297E+03*     .382      .240     25.70     .134
    .653     .653  .728E+03  .429E+03*     .513      .260     23.68     .170
    .747     .747  .880E+03  .592E+03*     .665      .280     22.05     .209
    .840     .840  .104E+04  .790E+03*     .840      .298     20.71     .250
    .933     .933  .122E+04  .103E+04*    1.039      .315     19.58     .294
   1.027    1.027  .141E+04  .130E+04*    1.262      .332     18.60     .340
   1.120    1.120  .161E+04  .162E+04*    1.510      .348     17.74     .389
   1.213    1.213  .182E+04  .199E+04*    1.785      .363     16.99     .440
   1.307    1.307  .204E+04  .241E+04*    2.087      .378     16.32     .494
   1.400    1.400  .228E+04  .287E+04*    2.418      .392     15.71     .549
   1.500    1.500  .439E+04  .593E+04*    3.044      .257     24.02     .385
   1.600    1.600  .102E+05  .147E+05*    4.365      .158     38.94     .253
   1.700    1.700  .197E+05  .302E+05*    6.783      .127     48.42     .217
   1.800    1.800  .329E+05  .534E+05*   10.633      .120     51.59     .215

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
 (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                                <---- hydrograph ---->   <-pipe / channel->
                             AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                              (ha)    (cms)   (hrs)   (mm)      (m)      (m/s)
  INFLOW : ID= 1:002120      262.75   6.173    8.87 44.809     1.675      .134
  OUTFLOW: ID= 2:002130      262.75   5.763    9.78 44.809     1.656      .139


--------------------------------------------------------------------------------
025:0029----------------------------------------------------------------------
----------------------
| DESIGN NASHYD      |   Area     (ha)=   47.17   Curve Number    (CN)=82.00
| 03:109    DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=   1.100

     Unit Hyd Qpeak  (cms)=     1.638

     PEAK FLOW       (cms)=     1.935 (i)
     TIME TO PEAK    (hrs)=     7.051
     RUNOFF VOLUME    (mm)=    46.563
     TOTAL RAINFALL   (mm)=    80.801
     RUNOFF COEFFICIENT    =      .576

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

--------------------------------------------------------------------------------
025:0030----------------------------------------------------------------------
----------------------
| DESIGN NASHYD      |   Area     (ha)=   24.11   Curve Number    (CN)=80.00
| 04:EXT6   DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=   1.520

     Unit Hyd Qpeak  (cms)=      .606

     PEAK FLOW       (cms)=      .729 (i)
     TIME TO PEAK    (hrs)=     7.534
     RUNOFF VOLUME    (mm)=    44.038
     TOTAL RAINFALL   (mm)=    80.801
     RUNOFF COEFFICIENT    =      .545

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

--------------------------------------------------------------------------------
025:0031----------------------------------------------------------------------
----------------------
| ADD HYD (      2140) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                     (ha)     (cms)   (hrs)   (mm)    (cms)
                     ID1 02:      2130   262.75    5.763    9.78  44.81     .000
                    +ID2 03:109           47.17    1.935    7.05  46.56     .000
                    +ID3 04:EXT6          24.11     .729    7.53  44.04     .000
                     ==========================================================
                     SUM 01:      2140   334.03    6.789    9.05  45.00     .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

```
025:0032----------------------------------------------------------------------------
--------------------
| ROUTE CHANNEL    |     Routing time step (min) =  1.00
|  IN> 01:002140   |     Number of SEGMENTS =  3
| OUT< 10:002150   |     Slopes (%), CHANNEL= .0800  FLOODPLAIN= .2000
--------------------                    LENGTH =  370.00    (m)

              <------ DATA FOR SECTION (   7.0) ------>
              Distance      Elevation       Manning
                 .00           1.80          .2000
               200.00          1.40     .2000 / .0850  Main Channel
               202.60           .00          .0850      Main Channel
               204.40           .00          .0850      Main Channel
               207.00          1.40     .0850 / .2000  Main Channel
               407.00          1.80          .2000

  <-------------------------- TRAVEL TIME TABLE ---------------------------->
   DEPTH    ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME   D x V
     (m)     (m)   (cu.m.)   (cu.m.)      (cms)     (m/s)     (min)   (m2/s)
    .093    .093  .681E+02  .107E+02       .012      .064     96.65    .006
    .187    .187  .148E+03  .467E+02       .038      .096     64.26    .018
    .280    .280  .240E+03  .114E+03       .078      .121     51.18    .034
    .373    .373  .344E+03  .217E+03*      .131      .141     43.73    .053
    .467    .467  .460E+03  .363E+03*      .198      .159     38.79    .074
    .560    .560  .588E+03  .557E+03*      .279      .175     35.19    .098
    .653    .653  .728E+03  .804E+03*      .374      .190     32.42    .124
    .747    .747  .880E+03  .111E+04*      .486      .204     30.20    .152
    .840    .840  .104E+04  .148E+04*      .614      .217     28.36    .183
    .933    .933  .122E+04  .192E+04*      .759      .230     26.81    .215
   1.027   1.027  .141E+04  .244E+04*      .921      .242     25.47    .249
   1.120   1.120  .161E+04  .304E+04*     1.103      .254     24.30    .284
   1.213   1.213  .182E+04  .373E+04*     1.304      .265     23.27    .322
   1.307   1.307  .204E+04  .451E+04*     1.524      .276     22.34    .361
   1.400   1.400  .228E+04  .539E+04*     1.766      .287     21.51    .401
   1.500   1.500  .439E+04  .111E+05*     2.264      .191     32.30    .286
   1.600   1.600  .102E+05  .276E+05*     3.447      .125     49.30    .200
   1.700   1.700  .197E+05  .566E+05*     5.720      .107     57.42    .183
   1.800   1.800  .329E+05  .100E+06*     9.415      .106     58.27    .191

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
 (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                                <---- hydrograph ---->   <-pipe / channel->
                           AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                           (ha)    (cms)   (hrs)   (mm)      (m)       (m/s)
  INFLOW : ID= 1:002140   334.03   6.789    9.05 45.001     1.729      .107
  OUTFLOW: ID=10:002150   334.03   6.311   10.05 45.001     1.716      .107


----------------------------------------------------------------------------------
025:0033----------------------------------------------------------------------------
--------------------
| DESIGN NASHYD      |   Area     (ha)=   17.65   Curve Number    (CN)=82.00
| 01:113    DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=    .910

     Unit Hyd Qpeak  (cms)=     .741

     PEAK FLOW       (cms)=     .833 (i)
     TIME TO PEAK    (hrs)=    6.834
     RUNOFF VOLUME    (mm)=   46.563
     TOTAL RAINFALL   (mm)=   80.801
     RUNOFF COEFFICIENT   =     .576

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

----------------------------------------------------------------------------------
025:0034----------------------------------------------------------------------------
*#*************************************************************************
*# Calculate culvert routing and flow split near eastern site boundary
*#   - Storage volumes calculated based on site survey
*#   - Discharges calculated based on the 600 mm diameter CSP and 1500 mm
*#     diameter CSP capacities
*#*************************************************************************
--------------------
| ROUTE RESERVOIR    |    Requested routing time step =  1.0 min.
|  IN>01:(113   )    |
| OUT<02:(002160)    |    =========  OUTFLOW STORAGE TABLE  =========
--------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                          (cms)     (ha.m.)   |    (cms)    (ha.m.)
                           .000  .0000E+00    |    1.130  .4600E+00
                           .150  .0000E+00    |    5.470  .8100E+00
                           .450  .0000E+00    |   83.090  .3400E+01
                           .820  .6500E-01    |    .000   .0000E+00

     ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
     ---------------            (ha)     (cms)     (hrs)       (mm)
     INFLOW >01: (113   )      17.65      .833     6.834     46.563
     OUTFLOW<02: (002160)      17.65      .745     7.251     46.567

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=   89.397
                  TIME SHIFT OF PEAK FLOW          (min)=    25.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=.5179E-01

----------------------------------------------------------------------------------
025:0035----------------------------------------------------------------------------
--------------------
| DIVERT HYD       |
| INID=02  (002160)|
--------------------
     Outflow / Inflow  Relationships
     Flow 03 +  Flow 04 =  Total
      (cms)      (cms)      (cms)
       .000       .000       .000
       .150       .000       .150
       .400       .050       .450
       .680       .140       .820
       .930       .200      1.130
      1.040     4.430      5.470
      1.460    81.630     83.090

          NHYD       AREA    QPEAK  TpeakDate_hh:mm       R.V.  NFE WetHrs
                     (ha)    (cms)                        (mm)       (hrs)
  IDin = 02:002160   17.65     .745  No_date    7:15     46.567   94    14.
  ==========================================================================
  IDout= 03:002170   15.78     .623  No_date    7:15     46.567   94    14.
  IDout= 04:002180    1.87     .122  No_date    7:15     46.567   25     4.
----------------------------------------------------------------------------------
025:0036----------------------------------------------------------------------------
--------------------
| DESIGN NASHYD      |   Area     (ha)=    4.88   Curve Number    (CN)=82.00
| 01:114    DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=    .910

     Unit Hyd Qpeak  (cms)=     .205

     PEAK FLOW       (cms)=     .230 (i)
     TIME TO PEAK    (hrs)=    6.834
     RUNOFF VOLUME    (mm)=   46.563
     TOTAL RAINFALL   (mm)=   80.801
     RUNOFF COEFFICIENT   =     .576

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

----------------------------------------------------------------------------------
025:0037----------------------------------------------------------------------------
--------------------
| ADD HYD (      2190) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                     (ha)     (cms)   (hrs)   (mm)    (cms)
                      ID1 01:114           4.88      .230    6.83  46.56    .000
                    +ID2 03:      2170    15.78      .623    7.25  46.57    .000
                     ================================================

                      SUM 02:      2190    20.66     .836    7.12  46.57    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

----------------------------------------------------------------------------------
025:0038----------------------------------------------------------------------------
--------------------
| DESIGN NASHYD      |   Area     (ha)=   18.59   Curve Number    (CN)=82.00
| 01:115    DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=   1.470

     Unit Hyd Qpeak  (cms)=     .483

     PEAK FLOW       (cms)=     .612 (i)
     TIME TO PEAK    (hrs)=    7.468
     RUNOFF VOLUME    (mm)=   46.563
     TOTAL RAINFALL   (mm)=   80.801
     RUNOFF COEFFICIENT   =     .576

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

----------------------------------------------------------------------------------
025:0039----------------------------------------------------------------------------
*#*************************************************************************
*# McGill Drain - Total Flow at Eastern WSP
*#*************************************************************************
----------------------
| ADD HYD (      2200) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                     (ha)     (cms)   (hrs)   (mm)    (cms)
                      ID1 01:115           18.59     .612    7.47  46.56    .000
                    +ID2 02:      2190    20.66     .836    7.12  46.57    .000
                    +ID3 10:      2150   334.03    6.311   10.05  45.00    .000
                     ================================================
                      SUM 05:      2200   373.28    6.806    9.77  45.17    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

----------------------------------------------------------------------------------
025:0040----------------------------------------------------------------------------
*#*************************************************************************
*# AREA CHECK
*#*************************************************************************
----------------------
| ADD HYD (      2210) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                     (ha)     (cms)   (hrs)   (mm)    (cms)
                      ID1 04:      2180     1.87      .122    7.25  46.57    .000
                    +ID2 05:      2200   373.28    6.806    9.77  45.17    .000
                     ================================================
                      SUM 01:      2210   375.15    6.813    9.77  45.17    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

----------------------------------------------------------------------------------
025:0041----------------------------------------------------------------------------
----------------------------------------------------------------------------------
025:0002----------------------------------------------------------------------------
----------------------------------------------------------------------------------
025:0002----------------------------------------------------------------------------
----------------------------------------------------------------------------------
025:0002----------------------------------------------------------------------------
  ** END OF RUN :  49

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



--------------------
| START            |  Project  dir.: F:\WSP\
--------------------  Rainfall dir.: F:\WSP\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 050
    NSTORM=   1
           #  1=12scs50.stm
----------------------------------------------------------------------------------
050:0002----------------------------------------------------------------------------
*#*************************************************************************
*#  Project Name: [Windsor Solar Project] Project Number: [1335-60106]
*#  Date        : 02-02-2016
*#  Modeller    : [NE]
*#  Company     : Stantec Consulting Ltd. (London)
*#  License #   : 4730904
*#*************************************************************************
*#
*#  Existing Conditions
*#  25 mm Water Quality Event
*#  2, 5, 10, 25, 50, 100, 250-year 3-Hour Chicago Design Storm
*#
*#*************************************************************************
----------------------------------------------------------------------------------
050:0002----------------------------------------------------------------------------
--------------------
| READ STORM       |    Filename: 50-yr scs 12 hr windsor
| Ptotal=  89.40 mm|    Comments: 50-yr scs 12 hr windsor
--------------------
            TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
             hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
             .50   1.788 |   3.50   3.576 |   6.50  16.092 |   9.50   3.576
            1.00   1.788 |   4.00   3.576 |   7.00   7.152 |  10.00   1.788
            1.50   1.788 |   4.50   5.364 |   7.50   5.364 |  10.50   1.788
            2.00   1.788 |   5.00   7.152 |   8.00   5.364 |  11.00   1.788
            2.50   3.576 |   5.50  10.728 |   8.50   3.576 |  11.50   1.788
            3.00   3.576 |   6.00  80.460 |   9.00   3.576 |  12.00   1.788

----------------------------------------------------------------------------------
050:0003----------------------------------------------------------------------------
*#*************************************************************************
*# LAPPAN DRAIN
*#*************************************************************************
----------------------
| DESIGN NASHYD      |   Area     (ha)=   42.26   Curve Number    (CN)=73.00
| 01:101    DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=   1.110

     Unit Hyd Qpeak  (cms)=    1.454

     PEAK FLOW       (cms)=    1.549 (i)
     TIME TO PEAK    (hrs)=    7.084
     RUNOFF VOLUME    (mm)=   42.489
     TOTAL RAINFALL   (mm)=   89.400
     RUNOFF COEFFICIENT   =     .475

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

----------------------------------------------------------------------------------
050:0004----------------------------------------------------------------------------
--------------------
| ROUTE CHANNEL    |     Routing time step (min) =  1.00
|  IN> 01:101      |     Number of SEGMENTS =  3
| OUT< 02:002000   |     Slopes (%), CHANNEL= .1000  FLOODPLAIN= .2000
--------------------                    LENGTH =  700.00    (m)

              <------ DATA FOR SECTION (   1.0) ------>
              Distance      Elevation       Manning
                 .00           1.40          .2000
               100.00          1.20     .2000 / .0850  Main Channel
               101.80           .00          .0850      Main Channel
               103.00           .00          .0850      Main Channel
               104.80          1.20     .0850 / .2000  Main Channel
               204.80          1.40          .2000
```

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

DEPTH (m)	ELEV (m)	X-VOLUME (cu.m.)	S-VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME (min)	D x V (m2/s)
.071	.071	.645E+02	.325E+01	.005	.059	197.27	.004
.141	.141	.140E+03	.141E+02	.018	.089	131.37	.013
.212	.212	.225E+03	.340E+02	.036	.111	104.80	.024
.282	.282	.321E+03	.647E+02	.060	.130	89.71	.037
.353	.353	.427E+03	.108E+03	.089	.146	79.68	.052
.424	.424	.544E+03	.165E+03	.125	.161	72.40	.068
.494	.494	.671E+03	.237E+03	.168	.175	66.79	.086
.565	.565	.809E+03	.326E+03	.217	.187	62.29	.106
.635	.635	.957E+03	.434E+03	.272	.199	58.56	.127
.706	.706	.112E+04	.563E+03*	.336	.211	55.41	.149
.776	.776	.129E+04	.713E+03*	.407	.221	52.69	.172
.847	.847	.146E+04	.886E+03*	.485	.232	50.32	.196
.918	.918	.166E+04	.108E+04*	.572	.242	48.22	.222
.988	.988	.186E+04	.131E+04*	.667	.252	46.35	.249
1.059	1.059	.207E+04	.156E+04*	.771	.261	44.66	.277
1.129	1.129	.229E+04	.185E+04*	.884	.271	43.13	.306
1.200	1.200	.252E+04	.216E+04*	1.006	.280	41.73	.335
1.300	1.300	.636E+04	.590E+04*	1.392	.153	76.12	.199
1.400	1.400	.172E+05	.172E+05*	2.456	.100	116.67	.140

X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
(*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

	<---- hydrograph ----> AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	<-pipe / channel-> MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 1:101	42.26	1.549	7.08	42.489	1.315	.142
OUTFLOW: ID= 2:002000	42.26	1.225	8.25	42.489	1.256	.191

050:0005

DESIGN NASHYD	Area (ha)= 22.52	Curve Number (CN)=82.00
01:102 DT= 1.00	Ia (mm)= 1.500	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 1.270	

Unit Hyd Qpeak (cms)= .677

PEAK FLOW (cms)= .960 (i)
TIME TO PEAK (hrs)= 7.234
RUNOFF VOLUME (mm)= 53.785
TOTAL RAINFALL (mm)= 89.400
RUNOFF COEFFICIENT = .602

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

050:0006

DESIGN NASHYD	Area (ha)= 42.81	Curve Number (CN)=82.00
03:103 DT= 1.00	Ia (mm)= 1.500	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 1.110	

Unit Hyd Qpeak (cms)= 1.473

PEAK FLOW (cms)= 2.020 (i)
TIME TO PEAK (hrs)= 7.051
RUNOFF VOLUME (mm)= 53.785
TOTAL RAINFALL (mm)= 89.400
RUNOFF COEFFICIENT = .602

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

050:0007

*#**********
*# Lappan Drain - Total Flow at Pilette Road
*#**********

ADD HYD (2010)	ID: NHYD	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	DWF (cms)
ID1 01:102		22.52	.960	7.23	53.78	.000
+ID2 02:	2000	42.26	1.225	8.25	42.49	.000
+ID3 03:103		42.81	2.020	7.05	53.78	.000
SUM 04:	2010	107.59	3.916	7.30	49.35	.000

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

050:0008

ROUTE CHANNEL	Routing time step (min) = 1.00
IN> 04:002010	Number of SEGMENTS = 3
OUT< 01:002020	Slopes (%), CHANNEL= .1700 FLOODPLAIN= .2000
	LENGTH = 1000.00 (m)

<------ DATA FOR SECTION (2.0) ------>

Distance	Elevation	Manning	
.00	2.00	.2000	
100.00	1.80	.2000 / .0850	Main Channel
102.75	.00	.0850	Main Channel
104.25	.00	.0850	Main Channel
107.00	1.80	.0850 / .2000	Main Channel
207.00	2.00	.2000	

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

DEPTH (m)	ELEV (m)	X-VOLUME (cu.m.)	S-VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME (min)	D x V (m2/s)
.100	.100	.165E+03	.486E+01	.016	.096	172.86	.010
.200	.200	.361E+03	.212E+02	.052	.144	115.66	.029
.300	.300	.588E+03	.518E+02	.106	.180	92.51	.054
.400	.400	.844E+03	.993E+02	.177	.210	79.29	.084
.500	.500	.113E+04	.166E+03	.268	.236	70.48	.118
.600	.600	.145E+04	.256E+03	.377	.260	64.05	.156
.700	.700	.180E+04	.370E+03	.507	.282	59.09	.197
.800	.800	.218E+04	.513E+03	.659	.303	55.09	.242
.900	.900	.259E+04	.685E+03	.833	.322	51.78	.290
1.000	1.000	.303E+04	.891E+03	1.031	.340	48.97	.340
1.100	1.100	.350E+04	.113E+04	1.253	.358	46.55	.394
1.200	1.200	.400E+04	.141E+04	1.500	.375	44.43	.450
1.300	1.300	.453E+04	.173E+04	1.775	.392	42.56	.509
1.400	1.400	.509E+04	.210E+04	2.077	.408	40.88	.571
1.500	1.500	.569E+04	.251E+04	2.407	.423	39.37	.635
1.600	1.600	.631E+04	.297E+04	2.768	.439	38.01	.702
1.700	1.700	.697E+04	.348E+04	3.158	.453	36.76	.771
1.800	1.800	.765E+04	.405E+04*	3.580	.468	35.61	.842
2.000	2.000	.291E+05	.171E+05*	5.701	.196	84.93	.392

X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
(*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

	<---- hydrograph ----> AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	<-pipe / channel-> MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 4:002010	107.59	3.916	7.30	49.348	1.832	.384
OUTFLOW: ID= 1:002020	107.59	3.603	7.88	49.348	1.801	.465

050:0009

DESIGN NASHYD	Area (ha)= 19.36	Curve Number (CN)=82.00
02:104 DT= 1.00	Ia (mm)= 1.500	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 1.450	

Unit Hyd Qpeak (cms)= .510

PEAK FLOW (cms)= .746 (i)
TIME TO PEAK (hrs)= 7.434
RUNOFF VOLUME (mm)= 53.784
TOTAL RAINFALL (mm)= 89.400
RUNOFF COEFFICIENT = .602

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

050:0010

DESIGN NASHYD	Area (ha)= 25.24	Curve Number (CN)=82.00
03:105 DT= 1.00	Ia (mm)= 1.500	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 1.450	

Unit Hyd Qpeak (cms)= .665

PEAK FLOW (cms)= .972 (i)
TIME TO PEAK (hrs)= 7.434
RUNOFF VOLUME (mm)= 53.784
TOTAL RAINFALL (mm)= 89.400
RUNOFF COEFFICIENT = .602

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

050:0011

ADD HYD (2030)	ID: NHYD	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	DWF (cms)
ID1 01:	2020	107.59	3.603	7.88	49.35	.000
+ID2 02:104		19.36	.746	7.43	53.78	.000
+ID3 03:105		25.24	.972	7.43	53.78	.000
SUM 04:	2030	152.19	5.233	7.87	50.65	.000

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

050:0012

ROUTE CHANNEL	Routing time step (min) = 1.00
IN> 04:002030	Number of SEGMENTS = 3
OUT< 01:002040	Slopes (%), CHANNEL= .1200 FLOODPLAIN= .2000
	LENGTH = 500.00 (m)

<------ DATA FOR SECTION (3.0) ------>

Distance	Elevation	Manning	
.00	2.20	.2000	
200.00	1.80	.2000 / .0850	Main Channel
202.75	.00	.0850	Main Channel
204.25	.00	.0850	Main Channel
207.00	1.80	.0850 / .2000	Main Channel
407.00	2.20	.2000	

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

DEPTH (m)	ELEV (m)	X-VOLUME (cu.m.)	S-VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME (min)	D x V (m2/s)
.112	.112	.940E+02	.882E+01	.016	.087	95.91	.010
.225	.225	.207E+03	.389E+02	.054	.129	64.45	.029
.337	.337	.340E+03	.957E+02	.110	.161	51.67	.054
.450	.450	.492E+03	.185E+03	.185	.188	44.34	.085
.562	.562	.664E+03	.311E+03	.280	.211	39.43	.119
.675	.675	.854E+03	.481E+03*	.397	.233	35.84	.157
.788	.788	.106E+04	.698E+03*	.537	.252	33.06	.199
.900	.900	.129E+04	.970E+03*	.700	.270	30.81	.243
1.013	1.013	.154E+04	.130E+04*	.888	.288	28.95	.291
1.125	1.125	.181E+04	.170E+04*	1.102	.304	27.37	.343
1.238	1.238	.210E+04	.216E+04*	1.344	.320	26.01	.397
1.350	1.350	.240E+04	.271E+04*	1.615	.336	24.81	.453
1.463	1.463	.273E+04	.333E+04*	1.916	.351	23.76	.513
1.575	1.575	.308E+04	.404E+04*	2.247	.365	22.82	.575
1.688	1.688	.344E+04	.484E+04*	2.611	.379	21.97	.640
1.800	1.800	.382E+04	.574E+04*	3.008	.393	21.19	.708
1.933	1.933	.874E+04	.141E+05*	3.971	.227	36.67	.439
2.067	2.067	.225E+05	.388E+05*	6.403	.142	58.66	.294
2.200	2.200	.452E+05	.829E+05*	11.177	.124	67.44	.272

X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
(*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

	<---- hydrograph ----> AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	<-pipe / channel-> MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 4:002030	152.19	5.233	7.87	50.648	2.003	.173
OUTFLOW: ID= 1:002040	152.19	4.424	8.82	50.648	1.958	.205

050:0013

DESIGN NASHYD	Area (ha)= 15.67	Curve Number (CN)=82.00
02:108 DT= 1.00	Ia (mm)= 1.500	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 1.090	

Unit Hyd Qpeak (cms)= .549

PEAK FLOW (cms)= .749 (i)
TIME TO PEAK (hrs)= 7.034
RUNOFF VOLUME (mm)= 53.784
TOTAL RAINFALL (mm)= 89.400
RUNOFF COEFFICIENT = .602

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

050:0014

DESIGN NASHYD	Area (ha)= 6.80	Curve Number (CN)=82.00
03:105A DT= 1.00	Ia (mm)= 1.500	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= .960	

Unit Hyd Qpeak (cms)= .271

PEAK FLOW (cms)= .357 (i)
TIME TO PEAK (hrs)= 6.884
RUNOFF VOLUME (mm)= 53.784
TOTAL RAINFALL (mm)= 89.400
RUNOFF COEFFICIENT = .602

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

050:0015

*#**********
*# Lappan Drain - Total Flow at Jefferson Boulevard
*#**********

ADD HYD (2050)	ID: NHYD	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	DWF (cms)
ID1 01:	2040	152.19	4.424	8.82	50.65	.000
+ID2 02:108		15.67	.749	7.03	53.78	.000
+ID3 03:105A		6.80	.357	6.88	53.78	.000
SUM 04:	2050	174.66	4.928	8.60	51.05	.000

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

050:0016

```
| ROUTE CHANNEL    |     Routing time step (min) =  1.00
|  IN> 04:002050   |     Number of SEGMENTS =  3
| OUT< 01:002060   |     Slopes (%), CHANNEL= .1200  FLOODPLAIN= .2000
-------------------                LENGTH =  450.00    (m)

              <------ DATA FOR SECTION (   4.0) ------>
              Distance      Elevation       Manning
                 .00           2.20          .2000
               200.00           1.80     .2000 / .0850  Main Channel
               202.75            .00          .0850     Main Channel
               204.25            .00          .0850     Main Channel
               207.00           1.80     .0850 / .2000  Main Channel
               407.00           2.20          .2000

  <---------------------------- TRAVEL TIME TABLE ----------------------------->
   DEPTH     ELEV    X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME   D x V
     (m)      (m)    (cu.m.)   (cu.m.)     (cms)     (m/s)     (min)     (m2/s)
    .112     .112  .846E+02  .882E+01      .016      .087     86.32      .010
    .225     .225  .187E+03  .389E+02      .054      .129     58.01      .029
    .337     .337  .306E+03  .957E+02      .110      .161     46.50      .054
    .450     .450  .443E+03  .185E+03      .185      .188     39.90      .085
    .562     .562  .597E+03  .311E+03*     .280      .211     35.49      .119
    .675     .675  .769E+03  .481E+03*     .397      .233     32.26      .157
    .788     .788  .958E+03  .698E+03*     .537      .252     29.75      .199
    .900     .900  .116E+04  .970E+03*     .700      .270     27.73      .243
   1.013    1.013  .139E+04  .130E+04*     .888      .288     26.06      .291
   1.125    1.125  .163E+04  .170E+04*    1.102      .304     24.63      .343
   1.238    1.238  .189E+04  .216E+04*    1.344      .320     23.41      .397
   1.350    1.350  .216E+04  .271E+04*    1.615      .336     22.33      .453
   1.463    1.463  .246E+04  .333E+04*    1.916      .351     21.38      .513
   1.575    1.575  .277E+04  .404E+04*    2.247      .365     20.53      .575
   1.688    1.688  .310E+04  .484E+04*    2.611      .379     19.77      .640
   1.800    1.800  .344E+04  .574E+04*    3.008      .393     19.07      .708
   1.933    1.933  .786E+04  .141E+05*    3.971      .227     33.00      .439
   2.067    2.067  .203E+05  .388E+05*    6.403      .142     52.79      .294
   2.200    2.200  .407E+05  .829E+05*   11.177      .124     60.70      .272

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
 (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                              <---- hydrograph ---->   <-pipe / channel->
                          AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                           (ha)    (cms)   (hrs)   (mm)      (m)      (m/s)
  INFLOW : ID= 4:002050   174.66   4.928    8.60 51.051     1.986      .184
  OUTFLOW: ID= 1:002060   174.66   4.576    9.70 51.051     1.964      .200


-------------------------------------------------------------------------------
050:0017-------------------------------------------------------------------------
----------------------
| DESIGN NASHYD      |   Area     (ha)=    6.60   Curve Number    (CN)=82.00
| 02:EXT8   DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=    .820

     Unit Hyd Qpeak  (cms)=     .307

     PEAK FLOW       (cms)=     .389 (i)
     TIME TO PEAK    (hrs)=    6.734
     RUNOFF VOLUME    (mm)=   53.784
     TOTAL RAINFALL   (mm)=   89.400
     RUNOFF COEFFICIENT   =     .602

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

-------------------------------------------------------------------------------
050:0018-------------------------------------------------------------------------
*#############################################################################
*# Lappan Drain - Total Flow at McGill Drain
*#############################################################################
----------------------
| ADD HYD (      2070) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                     (ha)     (cms)   (hrs)   (mm)    (cms)
                       ID1 01:      2060   174.66   4.576    9.70  51.05    .000
                      +ID2 02:EXT8         6.60     .389    6.73  53.78    .000
                      ========================================================
                       SUM 10:      2070   181.26   4.641    9.70  51.15    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
050:0019-------------------------------------------------------------------------
*#############################################################################
*# McGILL DRAIN
*#############################################################################
----------------------
| DESIGN NASHYD      |   Area     (ha)=   39.07   Curve Number    (CN)=82.00
| 01:106    DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=   1.630

     Unit Hyd Qpeak  (cms)=     .916

     PEAK FLOW       (cms)=    1.375 (i)
     TIME TO PEAK    (hrs)=    7.651
     RUNOFF VOLUME    (mm)=   53.784
     TOTAL RAINFALL   (mm)=   89.400
     RUNOFF COEFFICIENT   =     .602

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

-------------------------------------------------------------------------------
050:0020-------------------------------------------------------------------------
----------------------
| ROUTE CHANNEL    |     Routing time step (min) =  1.00
|  IN> 01:106      |     Number of SEGMENTS =  3
| OUT< 02:002080   |     Slopes (%), CHANNEL= .1500  FLOODPLAIN= .2000
-------------------                LENGTH =  250.00    (m)

              <------ DATA FOR SECTION (   5.0) ------>
              Distance      Elevation       Manning
                 .00           1.40          .2000
               200.00           1.00     .2000 / .1000  Main Channel
               201.50            .00          .1000     Main Channel
               203.50            .00          .1000     Main Channel
               205.00           1.00     .1000 / .2000  Main Channel
               405.00           1.40          .2000

  <---------------------------- TRAVEL TIME TABLE ----------------------------->
   DEPTH     ELEV    X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME   D x V
     (m)      (m)    (cu.m.)   (cu.m.)     (cms)     (m/s)     (min)     (m2/s)
    .071     .071  .376E+02  .358E+01      .010      .064     65.43      .005
    .143     .143  .791E+02  .151E+02      .031      .097     42.85      .014
    .214     .214  .124E+03  .355E+02      .061      .123     33.82      .026
    .286     .286  .173E+03  .661E+02      .101      .145     28.74      .041
    .357     .357  .226E+03  .108E+03      .148      .164     25.41      .059
    .429     .429  .283E+03  .162E+03*     .205      .181     23.02      .078
    .500     .500  .344E+03  .229E+03*     .270      .197     21.20      .098
    .571     .571  .408E+03  .311E+03*     .344      .211     19.75      .121
    .643     .643  .476E+03  .408E+03*     .428      .225     18.56      .144
    .714     .714  .548E+03  .522E+03*     .521      .237     17.56      .169
    .786     .786  .624E+03  .654E+03*     .623      .249     16.71      .196
    .857     .857  .704E+03  .805E+03*     .735      .261     15.96      .224
    .929     .929  .788E+03  .975E+03*     .858      .272     15.31      .253
   1.000    1.000  .875E+03  .117E+04*     .990      .283     14.73      .283
   1.080    1.080  .177E+04  .256E+04*    1.270      .179     23.30      .193
   1.160    1.160  .427E+04  .661E+04*    1.927      .113     36.97      .131
   1.240    1.240  .837E+04  .138E+05*    3.185      .095     43.82      .118
   1.320    1.320  .141E+05  .248E+05*    5.229      .093     44.86      .123
   1.400    1.400  .214E+05  .399E+05*    8.222      .096     43.33      .135

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
 (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                              <---- hydrograph ---->   <-pipe / channel->
                          AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                           (ha)    (cms)   (hrs)   (mm)      (m)      (m/s)
  INFLOW : ID= 1:106      39.07   1.375    7.65 53.784     1.093      .163
  OUTFLOW: ID= 2:002080   39.07   1.273    8.42 53.784     1.080      .178


-------------------------------------------------------------------------------
050:0021-------------------------------------------------------------------------
----------------------
| DESIGN NASHYD      |   Area     (ha)=   21.08   Curve Number    (CN)=81.00
| 01:EXT4   DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=   1.830

     Unit Hyd Qpeak  (cms)=     .440

     PEAK FLOW       (cms)=     .660 (i)
     TIME TO PEAK    (hrs)=    7.901
     RUNOFF VOLUME    (mm)=   52.390
     TOTAL RAINFALL   (mm)=   89.400
     RUNOFF COEFFICIENT   =     .586

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

-------------------------------------------------------------------------------
050:0022-------------------------------------------------------------------------
----------------------
| DESIGN NASHYD      |   Area     (ha)=    6.53   Curve Number    (CN)=82.00
| 03:107    DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=    .820

     Unit Hyd Qpeak  (cms)=     .304

     PEAK FLOW       (cms)=     .385 (i)
     TIME TO PEAK    (hrs)=    6.734
     RUNOFF VOLUME    (mm)=   53.784
     TOTAL RAINFALL   (mm)=   89.400
     RUNOFF COEFFICIENT   =     .602

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

-------------------------------------------------------------------------------
050:0023-------------------------------------------------------------------------
*#############################################################################
*# McGill Drain - Total Flow at Jefferson Boulevard
*#############################################################################
----------------------
| ADD HYD (      2090) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                     (ha)     (cms)   (hrs)   (mm)    (cms)
                       ID1 01:EXT4          21.08     .660    7.90  52.39    .000
                      +ID2 02:      2080   39.07    1.273    8.42  53.78    .000
                      +ID3 03:107           6.53     .385    6.73  53.78    .000
                      ========================================================
                       SUM 04:      2090   66.68    2.080    7.97  53.34    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
050:0024-------------------------------------------------------------------------
----------------------
| ROUTE CHANNEL    |     Routing time step (min) =  1.00
|  IN> 04:002090   |     Number of SEGMENTS =  3
| OUT< 01:002100   |     Slopes (%), CHANNEL= .3000  FLOODPLAIN= .2000
-------------------                LENGTH =  280.00    (m)

              <------ DATA FOR SECTION (   6.0) ------>
              Distance      Elevation       Manning
                 .00           1.40          .2000
               200.00           1.00     .2000 / .1000  Main Channel
               201.50            .00          .1000     Main Channel
               203.50            .00          .1000     Main Channel
               205.00           1.00     .1000 / .2000  Main Channel
               405.00           1.40          .2000

  <---------------------------- TRAVEL TIME TABLE ----------------------------->
   DEPTH     ELEV    X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME   D x V
     (m)      (m)    (cu.m.)   (cu.m.)     (cms)     (m/s)     (min)     (m2/s)
    .071     .071  .421E+02  .179E+01      .014      .090     51.82      .006
    .143     .143  .886E+02  .753E+01      .043      .138     33.94      .020
    .214     .214  .139E+03  .178E+02      .087      .174     26.78      .037
    .286     .286  .194E+03  .330E+02      .142      .205     22.76      .059
    .357     .357  .254E+03  .539E+02      .210      .232     20.12      .083
    .429     .429  .317E+03  .809E+02      .290      .256     18.23      .110
    .500     .500  .385E+03  .115E+03      .382      .278     16.79      .139
    .571     .571  .457E+03  .155E+03      .487      .298     15.64      .171
    .643     .643  .534E+03  .204E+03      .605      .318     14.70      .204
    .714     .714  .614E+03  .261E+03      .736      .336     13.91      .240
    .786     .786  .699E+03  .327E+03      .881      .353     13.23      .277
    .857     .857  .789E+03  .402E+03*     1.040     .369     12.64      .316
    .929     .929  .882E+03  .488E+03*     1.213     .385     12.12      .357
   1.000    1.000  .980E+03  .583E+03*     1.401     .400     11.66      .400
   1.080    1.080  .199E+04  .128E+04*     1.761     .248     18.81      .268
   1.160    1.160  .479E+04  .331E+04*     2.505     .147     31.85      .170
   1.240    1.240  .938E+04  .692E+04*     3.856     .115     40.54      .143
   1.320    1.320  .158E+05  .124E+05*     5.997     .107     43.81      .141
   1.400    1.400  .239E+05  .199E+05*     9.093     .106     43.88      .149

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
 (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                              <---- hydrograph ---->   <-pipe / channel->
                          AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                           (ha)    (cms)   (hrs)   (mm)      (m)      (m/s)
  INFLOW : ID= 4:002090   66.68   2.080    7.97 53.343     1.114      .191
  OUTFLOW: ID= 1:002100   66.68   2.006    8.73 53.343     1.105      .204


-------------------------------------------------------------------------------
050:0025-------------------------------------------------------------------------
----------------------
| DESIGN NASHYD      |   Area     (ha)=   14.81   Curve Number    (CN)=82.00
| 02:EXT5   DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=   1.520

     Unit Hyd Qpeak  (cms)=     .372

     PEAK FLOW       (cms)=     .550 (i)
     TIME TO PEAK    (hrs)=    7.518
     RUNOFF VOLUME    (mm)=   53.785
     TOTAL RAINFALL   (mm)=   89.400
     RUNOFF COEFFICIENT   =     .602

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

-------------------------------------------------------------------------------
050:0026-------------------------------------------------------------------------
----------------------
| ADD HYD (      2110) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                     (ha)     (cms)   (hrs)   (mm)    (cms)
                       ID1 01:      2100   66.68    2.006    8.73  53.34    .000
                      +ID2 02:EXT5         14.81     .550    7.52  53.78    .000
                      ========================================================
                       SUM 03:      2110   81.49    2.441    8.50  53.42    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
050:0027-------------------------------------------------------------------------
*#############################################################################
*# McGill Drain - Total Flow at Lappan Drain Confluence
*#############################################################################
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------------------------
| ADD HYD (      2120) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
                    ID1 03:      2110    81.49    2.441    8.50  53.42    .000
                   +ID2 10:      2070   181.26    4.641    9.70  51.15    .000
                    ========================================================
                    SUM 01:      2120   262.75    6.922    9.25  51.86    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
050:0028----------------------------------------------------------------------
--------------------
| ROUTE CHANNEL    |     Routing time step (min) =  1.00
|  IN> 01:002120   |     Number of SEGMENTS =  3
| OUT< 02:002130   |     Slopes (%), CHANNEL= .1500  FLOODPLAIN= .2000
--------------------          LENGTH =  370.00    (m)

                <------ DATA FOR SECTION (   7.0) ------>
                Distance      Elevation       Manning
                    .00          1.80          .2000
                 200.00          1.40     .2000 / .0850  Main Channel
                 202.60           .00          .0850      Main Channel
                 204.40           .00          .0850      Main Channel
                 207.00          1.40     .0850 / .2000  Main Channel
                 407.00          1.80          .2000

   <---------------------------- TRAVEL TIME TABLE ---------------------------->
    DEPTH    ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME   D x V
      (m)     (m)   (cu.m.)   (cu.m.)     (cms)     (m/s)     (min)   (m2/s)
     .093    .093  .681E+02  .573E+01      .016      .087     70.58    .008
     .187    .187  .148E+03  .249E+02      .053      .131     46.93    .025
     .280    .280  .240E+03  .606E+02      .107      .165     37.37    .046
     .373    .373  .344E+03  .116E+03      .180      .193     31.94    .072
     .467    .467  .460E+03  .194E+03      .271      .218     28.33    .102
     .560    .560  .588E+03  .297E+03*     .382      .240     25.70    .134
     .653    .653  .728E+03  .429E+03*     .513      .260     23.68    .170
     .747    .747  .880E+03  .592E+03*     .665      .280     22.05    .209
     .840    .840  .104E+04  .790E+03*     .840      .298     20.71    .250
     .933    .933  .122E+04  .103E+04*    1.039      .315     19.58    .294
    1.027   1.027  .141E+04  .130E+04*    1.262      .332     18.60    .340
    1.120   1.120  .161E+04  .162E+04*    1.510      .348     17.74    .389
    1.213   1.213  .182E+04  .199E+04*    1.785      .363     16.99    .440
    1.307   1.307  .204E+04  .241E+04*    2.087      .378     16.32    .494
    1.400   1.400  .228E+04  .287E+04*    2.418      .392     15.71    .549
    1.500   1.500  .439E+04  .593E+04*    3.044      .257     24.02    .385
    1.600   1.600  .102E+05  .147E+05*    4.365      .158     38.94    .253
    1.700   1.700  .197E+05  .302E+05*    6.783      .127     48.42    .217
    1.800   1.800  .329E+05  .534E+05*   10.633      .120     51.59    .215

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
 (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                                 <---- hydrograph ---->   <-pipe / channel->
                            AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                            (ha)    (cms)   (hrs)   (mm)       (m)      (m/s)
  INFLOW : ID= 1:002120    262.75    6.922    9.25 51.856     1.704      .127
  OUTFLOW: ID= 2:002130    262.75    6.441    9.87 51.856     1.686      .131

--------------------------------------------------------------------------------
050:0029----------------------------------------------------------------------
--------------------
| DESIGN NASHYD    |   Area    (ha)=   47.17   Curve Number   (CN)=82.00
| 03:109    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   1.100

     Unit Hyd Qpeak  (cms)=    1.638

     PEAK FLOW       (cms)=    2.241 (i)
     TIME TO PEAK    (hrs)=    7.034
     RUNOFF VOLUME    (mm)=   53.784
     TOTAL RAINFALL   (mm)=   89.400
     RUNOFF COEFFICIENT   =     .602

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

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050:0030----------------------------------------------------------------------
--------------------
| DESIGN NASHYD    |   Area    (ha)=   24.11   Curve Number   (CN)=80.00
| 04:EXT6   DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   1.520

     Unit Hyd Qpeak  (cms)=     .606

     PEAK FLOW       (cms)=     .847 (i)
     TIME TO PEAK    (hrs)=    7.534
     RUNOFF VOLUME    (mm)=   51.033
     TOTAL RAINFALL   (mm)=   89.400
     RUNOFF COEFFICIENT   =     .571

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

--------------------------------------------------------------------------------
050:0031----------------------------------------------------------------------
------------------------
| ADD HYD (      2140) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
                    ID1 02:      2130   262.75    6.441    9.87  51.86    .000
                   +ID2 03:109           47.17    2.241    7.03  53.78    .000
                   +ID3 04:EXT6          24.11     .847    7.53  51.03    .000
                    ========================================================
                    SUM 01:      2140   334.03    7.490    9.22  52.07    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
050:0032----------------------------------------------------------------------
--------------------
| ROUTE CHANNEL    |     Routing time step (min) =  1.00
|  IN> 01:002140   |     Number of SEGMENTS =  3
| OUT< 10:002150   |     Slopes (%), CHANNEL= .0800  FLOODPLAIN= .2000
--------------------          LENGTH =  370.00    (m)

                <------ DATA FOR SECTION (   7.0) ------>
                Distance      Elevation       Manning
                    .00          1.80          .2000
                 200.00          1.40     .2000 / .0850  Main Channel
                 202.60           .00          .0850      Main Channel
                 204.40           .00          .0850      Main Channel
                 207.00          1.40     .0850 / .2000  Main Channel
                 407.00          1.80          .2000

   <---------------------------- TRAVEL TIME TABLE ---------------------------->
    DEPTH    ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME   D x V
      (m)     (m)   (cu.m.)   (cu.m.)     (cms)     (m/s)     (min)   (m2/s)
     .093    .093  .681E+02  .107E+02      .012      .064     96.65    .006
     .187    .187  .148E+03  .467E+02      .038      .096     64.26    .018
     .280    .280  .240E+03  .114E+03      .078      .121     51.18    .034
     .373    .373  .344E+03  .217E+03*     .131      .141     43.73    .053
     .467    .467  .460E+03  .363E+03*     .198      .159     38.79    .074
     .560    .560  .588E+03  .558E+03*     .279      .175     35.19    .098
     .653    .653  .728E+03  .804E+03*     .374      .190     32.42    .124
     .747    .747  .880E+03  .111E+04*     .486      .204     30.20    .152
     .840    .840  .104E+04  .148E+04*     .614      .217     28.36    .183
     .933    .933  .122E+04  .192E+04*     .759      .230     26.81    .215
    1.027   1.027  .141E+04  .244E+04*     .921      .242     25.47    .249
    1.120   1.120  .161E+04  .304E+04*    1.103      .254     24.30    .284
    1.213   1.213  .182E+04  .373E+04*    1.304      .265     23.27    .322
    1.307   1.307  .204E+04  .451E+04*    1.524      .276     22.34    .361
    1.400   1.400  .228E+04  .539E+04*    1.766      .287     21.51    .401
    1.500   1.500  .439E+04  .111E+05*    2.264      .191     32.30    .286
    1.600   1.600  .102E+05  .276E+05*    3.447      .125     49.30    .200
    1.700   1.700  .197E+05  .566E+05*    5.720      .107     57.42    .183
    1.800   1.800  .329E+05  .100E+06*    9.415      .106     58.27    .191

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
 (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                                 <---- hydrograph ---->   <-pipe / channel->
                            AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                            (ha)    (cms)   (hrs)   (mm)       (m)      (m/s)
  INFLOW : ID= 1:002140    334.03    7.490    9.22 52.069     1.748      .107
  OUTFLOW: ID=10:002150    334.03    7.065   10.33 52.069     1.735      .107

--------------------------------------------------------------------------------
050:0033----------------------------------------------------------------------
--------------------
| DESIGN NASHYD    |   Area    (ha)=   17.65   Curve Number   (CN)=82.00
| 01:113    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=    .910

     Unit Hyd Qpeak  (cms)=     .741

     PEAK FLOW       (cms)=     .965 (i)
     TIME TO PEAK    (hrs)=    6.818
     RUNOFF VOLUME    (mm)=   53.784
     TOTAL RAINFALL   (mm)=   89.400
     RUNOFF COEFFICIENT   =     .602

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

--------------------------------------------------------------------------------
050:0034----------------------------------------------------------------------
*#*****************************************************************************
*# Calculate culvert routing and flow split near eastern site boundary
*#   - Storage volumes calculated based on site survey
*#   - Discharges calculated based on the 600 mm diameter CSP and 1500 mm
*#     diameter CSP capacities
*#*****************************************************************************
--------------------
| ROUTE RESERVOIR  |    Requested routing time step =  1.0 min.
|  IN>01:(113   )  |
| OUT<02:(002160)  |    ==========  OUTFLOW STORAGE TABLE  ==========
--------------------    OUTFLOW     STORAGE   |  OUTFLOW     STORAGE
                          (cms)     (ha.m.)   |    (cms)     (ha.m.)
                           .000  .0000E+00    |   1.130  .4600E+00
                           .150  .0000E+00    |   5.470  .8100E+00
                           .450  .0000E+00    |  83.090  .3400E+01
                           .820  .6500E-01    |    .000  .0000E+00

     ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
     ---------------            (ha)     (cms)     (hrs)       (mm)
     INFLOW >01: (113   )      17.65      .965     6.818     53.784
     OUTFLOW<02: (002160)      17.65      .827     7.334     53.792

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=   85.700
                    TIME SHIFT OF PEAK FLOW          (min)=    31.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=.7360E-01

--------------------------------------------------------------------------------
050:0035----------------------------------------------------------------------
--------------------
| DIVERT HYD       |
| INID=02  (002160)|
--------------------
      Outflow / Inflow  Relationships
      Flow 03 +  Flow 04 =  Total
        (cms)      (cms)      (cms)
         .000       .000       .000
         .150       .000       .150
         .400       .050       .450
         .680       .140       .820
         .930       .200      1.130
        1.040     4.430      5.470
        1.460    81.630     83.090

          NHYD       AREA    QPEAK  TpeakDate_hh:mm       R.V.  NFE WetHrs
                     (ha)    (cms)                        (mm)        (hrs)
  IDin = 02:002160    17.65     .827  No_date    7:20     53.792  104    14.
  ==========================================================================
  IDout= 03:002170    15.58     .685  No_date    7:20     53.792  104    14.
  IDout= 04:002180     2.07     .141  No_date    7:20     53.792   41     5.
--------------------------------------------------------------------------------
050:0036----------------------------------------------------------------------
--------------------
| DESIGN NASHYD    |   Area    (ha)=    4.88   Curve Number   (CN)=82.00
| 01:114    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=    .910

     Unit Hyd Qpeak  (cms)=     .205

     PEAK FLOW       (cms)=     .267 (i)
     TIME TO PEAK    (hrs)=    6.818
     RUNOFF VOLUME    (mm)=   53.784
     TOTAL RAINFALL   (mm)=   89.400
     RUNOFF COEFFICIENT   =     .602

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

--------------------------------------------------------------------------------
050:0037----------------------------------------------------------------------
--------------------
| ADD HYD (      2190) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
                    ID1 01:114            4.88     .267    6.82  53.78    .000
                   +ID2 03:      2170    15.58     .685    7.33  53.79    .000
                    ========================================================
                    SUM 02:      2190    20.46     .941    6.98  53.79    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
050:0038----------------------------------------------------------------------
--------------------
| DESIGN NASHYD    |   Area    (ha)=   18.59   Curve Number   (CN)=82.00
| 01:115    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   1.470

     Unit Hyd Qpeak  (cms)=     .483

     PEAK FLOW       (cms)=     .709 (i)
     TIME TO PEAK    (hrs)=    7.451
     RUNOFF VOLUME    (mm)=   53.784
     TOTAL RAINFALL   (mm)=   89.400
     RUNOFF COEFFICIENT   =     .602

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

--------------------------------------------------------------------------------
050:0039----------------------------------------------------------------------
*#*****************************************************************************
*# McGill Drain - Total Flow at Eastern WSP
*#*****************************************************************************
------------------------
| ADD HYD (      2200) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
                    ID1 01:115            18.59     .709    7.45  53.78    .000
                   +ID2 02:      2190    20.46     .941    6.98  53.79    .000
                   +ID3 10:      2150   334.03    7.065   10.33  52.07    .000
                    ========================================================
                    SUM 05:      2200   373.08    7.599    9.80  52.25    .000
```
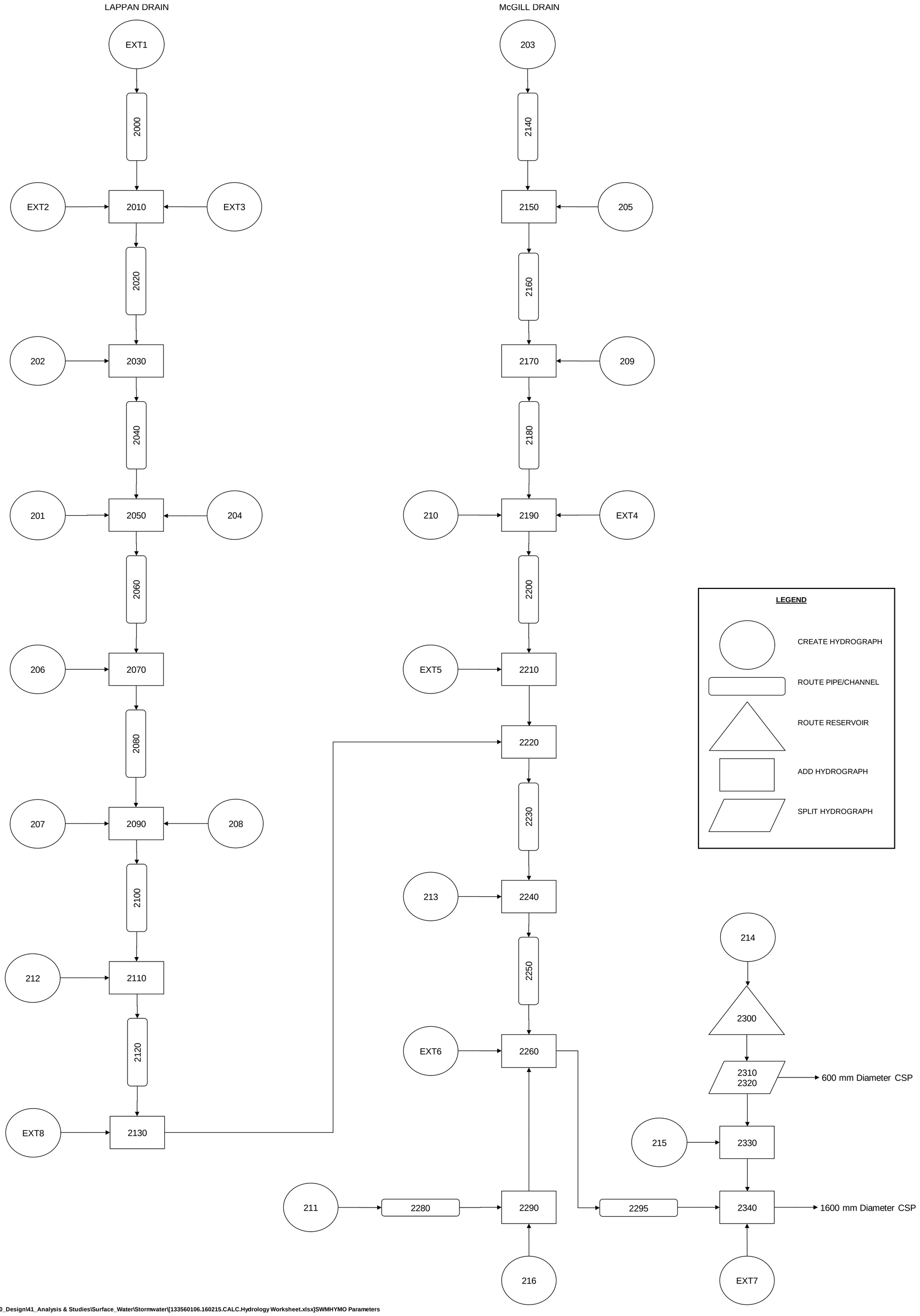

```
   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
050:0040-------------------------------------------------------------------------
*#**************************************************************************
*# AREA CHECK
*#**************************************************************************
----------------------
| ADD HYD (     2210) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                   (ha)     (cms)   (hrs)   (mm)   (cms)
                    ID1 04:      2180     2.07     .141    7.33  53.79    .000
                   +ID2 05:      2200   373.08    7.599    9.80  52.25    .000
                    ========================================================
                    SUM 01:      2210   375.15    7.612    9.80  52.26    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
050:0041-------------------------------------------------------------------------
------------------------------------------------------------------------------
050:0002-------------------------------------------------------------------------
------------------------------------------------------------------------------
050:0002-------------------------------------------------------------------------
------------------------------------------------------------------------------
050:0002-------------------------------------------------------------------------
------------------------------------------------------------------------------
050:0002-------------------------------------------------------------------------
  ** END OF RUN :  99

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



----------------------
| START              |  Project  dir.: F:\WSP\
----------------------  Rainfall dir.: F:\WSP\
    TZERO =   .00 hrs on      0
    METOUT=  2 (output = METRIC)
    NRUN  = 100
    NSTORM=  1
           #  1=12scs100.stm
------------------------------------------------------------------------------
100:0002-------------------------------------------------------------------------
*#**************************************************************************
*#  Project Name: [Windsor Solar Project] Project Number: [1335-60106]
*#  Date        : 02-02-2016
*#  Modeller    : [NE]
*#  Company     : Stantec Consulting Ltd. (London)
*#  License #   :  4730904
*#**************************************************************************
*#
*#  Existing Conditions
*#  25 mm Water Quality Event
*#  2, 5, 10, 25, 50, 100, 250-year 3-Hour Chicago Design Storm
*#
*#**************************************************************************
------------------------------------------------------------------------------
100:0002-------------------------------------------------------------------------
----------------------
| READ STORM         |    Filename: 100-yr scs 12 hr windsor
| Ptotal=  98.00 mm  |    Comments: 100-yr scs 12 hr windsor
----------------------
            TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
             hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
             .50   1.960 |   3.50   3.920 |   6.50  17.640 |   9.50   3.920
            1.00   1.960 |   4.00   3.920 |   7.00   7.840 |  10.00   1.960
            1.50   1.960 |   4.50   5.880 |   7.50   5.880 |  10.50   1.960
            2.00   1.960 |   5.00   7.840 |   8.00   5.880 |  11.00   1.960
            2.50   3.920 |   5.50  11.760 |   8.50   3.920 |  11.50   1.960
            3.00   3.920 |   6.00  88.200 |   9.00   3.920 |  12.00   1.960

------------------------------------------------------------------------------
100:0003-------------------------------------------------------------------------
*#**************************************************************************
*# LAPPAN DRAIN
*#**************************************************************************
----------------------
| DESIGN NASHYD      |   Area     (ha)=   42.26   Curve Number    (CN)=73.00
| 01:101    DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=   1.110

     Unit Hyd Qpeak  (cms)=    1.454

     PEAK FLOW       (cms)=    1.788 (i)
     TIME TO PEAK    (hrs)=    7.068
     RUNOFF VOLUME    (mm)=   48.897
     TOTAL RAINFALL   (mm)=   98.000
     RUNOFF COEFFICIENT   =     .499

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

------------------------------------------------------------------------------
100:0004-------------------------------------------------------------------------
----------------------
| ROUTE CHANNEL      |     Routing time step (min) =  1.00
|  IN> 01:101        |     Number of SEGMENTS =  3
| OUT< 02:002000     |     Slopes (%), CHANNEL= .1000  FLOODPLAIN= .2000
----------------------                  LENGTH =  700.00     (m)

              <------ DATA FOR SECTION (   1.0) ------>
              Distance      Elevation       Manning
                 .00           1.40          .2000
               100.00          1.20     .2000 / .0850  Main Channel
               101.80           .00          .0850      Main Channel
               103.00           .00          .0850      Main Channel
               104.80          1.20     .0850 / .2000  Main Channel
               204.80          1.40          .2000

  <------------------------- TRAVEL TIME TABLE ------------------------->
   DEPTH    ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME   D x V
     (m)     (m)   (cu.m.)   (cu.m.)      (cms)     (m/s)     (min)   (m2/s)
    .071    .071  .645E+02  .325E+01       .005      .059    197.27     .004
    .141    .141  .140E+03  .141E+02       .018      .089    131.37     .013
    .212    .212  .225E+03  .340E+02       .036      .111    104.80     .024
    .282    .282  .321E+03  .647E+02       .060      .130     89.71     .037
    .353    .353  .427E+03  .108E+03       .089      .146     79.68     .052
    .424    .424  .544E+03  .165E+03       .125      .161     72.40     .068
    .494    .494  .671E+03  .237E+03       .168      .175     66.79     .086
    .565    .565  .809E+03  .326E+03       .217      .187     62.29     .106
    .635    .635  .957E+03  .434E+03       .272      .199     58.56     .127
    .706    .706  .112E+04  .563E+03*      .336      .211     55.41     .149
    .776    .776  .129E+04  .713E+03*      .407      .221     52.69     .172
    .847    .847  .146E+04  .886E+03*      .485      .232     50.32     .196
    .918    .918  .166E+04  .108E+04*      .572      .242     48.22     .222
    .988    .988  .186E+04  .131E+04*      .667      .252     46.35     .249
   1.059   1.059  .207E+04  .156E+04*      .771      .261     44.66     .277
   1.129   1.129  .229E+04  .185E+04*      .884      .271     43.13     .306
   1.200   1.200  .252E+04  .216E+04*     1.006      .280     41.73     .335
   1.300   1.300  .636E+04  .590E+04*     1.392      .153     76.12     .199
   1.400   1.400  .172E+05  .172E+05*     2.456      .100    116.67     .140

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
 (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                                <---- hydrograph ---->   <-pipe / channel->
                           AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                           (ha)    (cms)   (hrs)   (mm)      (m)       (m/s)
  INFLOW : ID= 1:101       42.26   1.788    7.07 48.897     1.337      .128
  OUTFLOW: ID= 2:002000    42.26   1.336    8.50 48.897     1.285      .164

------------------------------------------------------------------------------
100:0005-------------------------------------------------------------------------
----------------------
| DESIGN NASHYD      |   Area     (ha)=   22.52   Curve Number    (CN)=82.00
| 01:102    DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=   1.270

     Unit Hyd Qpeak  (cms)=     .677

     PEAK FLOW       (cms)=    1.094 (i)
     TIME TO PEAK    (hrs)=    7.218
     RUNOFF VOLUME    (mm)=   61.161
     TOTAL RAINFALL   (mm)=   98.000
     RUNOFF COEFFICIENT   =     .624

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

------------------------------------------------------------------------------
100:0006-------------------------------------------------------------------------
----------------------
| DESIGN NASHYD      |   Area     (ha)=   42.81   Curve Number    (CN)=82.00
| 03:103    DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=   1.110

     Unit Hyd Qpeak  (cms)=    1.473

     PEAK FLOW       (cms)=    2.302 (i)
     TIME TO PEAK    (hrs)=    7.051
     RUNOFF VOLUME    (mm)=   61.161
     TOTAL RAINFALL   (mm)=   98.000
     RUNOFF COEFFICIENT   =     .624

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

------------------------------------------------------------------------------
100:0007-------------------------------------------------------------------------
*#**************************************************************************
*# Lappan Drain - Total Flow at Pilette Road
*#**************************************************************************
----------------------
| ADD HYD (     2010) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                   (ha)     (cms)   (hrs)   (mm)   (cms)
                    ID1 01:102           22.52    1.094    7.22  61.16    .000
                   +ID2 02:     2000     42.26    1.336    8.50  48.90    .000
                   +ID3 03:103           42.81    2.302    7.05  61.16    .000
                    ========================================================
                    SUM 04:      2010   107.59    4.402    7.23  56.34    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
100:0008-------------------------------------------------------------------------
----------------------
| ROUTE CHANNEL      |     Routing time step (min) =  1.00
|  IN> 04:002010     |     Number of SEGMENTS =  3
| OUT< 01:002020     |     Slopes (%), CHANNEL= .1700  FLOODPLAIN= .2000
----------------------                  LENGTH = 1000.00     (m)

              <------ DATA FOR SECTION (   2.0) ------>
              Distance      Elevation       Manning
                 .00           2.00          .2000
               100.00          1.80     .2000 / .0850  Main Channel
               102.75           .00          .0850      Main Channel
               104.25           .00          .0850      Main Channel
               107.00          1.80     .0850 / .2000  Main Channel
               207.00          2.00          .2000

  <------------------------- TRAVEL TIME TABLE ------------------------->
   DEPTH    ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME   D x V
     (m)     (m)   (cu.m.)   (cu.m.)      (cms)     (m/s)     (min)   (m2/s)
    .100    .100  .165E+03  .486E+01       .016      .096    172.86     .010
    .200    .200  .361E+03  .212E+02       .052      .144    115.66     .029
    .300    .300  .588E+03  .518E+02       .106      .180     92.51     .054
    .400    .400  .844E+03  .993E+02       .177      .210     79.29     .084
    .500    .500  .113E+04  .166E+03       .268      .236     70.48     .118
    .600    .600  .145E+04  .256E+03       .377      .260     64.05     .156
    .700    .700  .180E+04  .370E+03       .507      .282     59.09     .197
    .800    .800  .218E+04  .512E+03       .659      .303     55.09     .242
    .900    .900  .259E+04  .685E+03       .833      .322     51.78     .290
   1.000   1.000  .303E+04  .891E+03      1.031      .340     48.97     .340
   1.100   1.100  .350E+04  .113E+04      1.253      .358     46.55     .394
   1.200   1.200  .400E+04  .141E+04      1.500      .375     44.43     .450
   1.300   1.300  .453E+04  .173E+04      1.775      .392     42.56     .509
   1.400   1.400  .509E+04  .210E+04      2.077      .408     40.88     .571
   1.500   1.500  .569E+04  .251E+04      2.407      .423     39.37     .635
   1.600   1.600  .631E+04  .297E+04      2.768      .439     38.01     .702
   1.700   1.700  .697E+04  .348E+04      3.158      .453     36.76     .771
   1.800   1.800  .765E+04  .404E+04*     3.580      .468     35.61     .842
   2.000   2.000  .291E+05  .171E+05*     5.701      .196     84.93     .392

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
 (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                                <---- hydrograph ---->   <-pipe / channel->
                           AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                           (ha)    (cms)   (hrs)   (mm)      (m)       (m/s)
  INFLOW : ID= 4:002010    107.59   4.402    7.23 56.344     1.878      .304
  OUTFLOW: ID= 1:002020    107.59   3.926    8.18 56.344     1.836      .375

------------------------------------------------------------------------------
100:0009-------------------------------------------------------------------------
----------------------
| DESIGN NASHYD      |   Area     (ha)=   19.36   Curve Number    (CN)=82.00
| 02:104    DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=   1.450

     Unit Hyd Qpeak  (cms)=     .510

     PEAK FLOW       (cms)=     .850 (i)
     TIME TO PEAK    (hrs)=    7.434
     RUNOFF VOLUME    (mm)=   61.161
     TOTAL RAINFALL   (mm)=   98.000
     RUNOFF COEFFICIENT   =     .624

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

------------------------------------------------------------------------------
100:0010-------------------------------------------------------------------------
----------------------
| DESIGN NASHYD      |   Area     (ha)=   25.24   Curve Number    (CN)=82.00
| 03:105    DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=   1.450

     Unit Hyd Qpeak  (cms)=     .665

     PEAK FLOW       (cms)=    1.108 (i)
     TIME TO PEAK    (hrs)=    7.434
     RUNOFF VOLUME    (mm)=   61.161
     TOTAL RAINFALL   (mm)=   98.000
     RUNOFF COEFFICIENT   =     .624

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

------------------------------------------------------------------------------
100:0011-------------------------------------------------------------------------
----------------------
| ADD HYD (     2030) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                   (ha)     (cms)   (hrs)   (mm)   (cms)
                    ID1 01:      2020   107.59    3.926    8.18  56.34    .000
```

```
                +ID2 02:104          19.36     .850    7.43  61.16    .000
                +ID3 03:105          25.24    1.108    7.43  61.16    .000
                 ========================================================
                 SUM 04:     2030   152.19    5.663    7.98  57.76    .000

  NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
100:0012----------------------------------------------------------------------
--------------------
| ROUTE CHANNEL    |     Routing time step (min) =  1.00
|  IN> 04:002030   |     Number of SEGMENTS =  3
| OUT< 01:002040   |     Slopes (%), CHANNEL= .1200  FLOODPLAIN= .2000
--------------------                 LENGTH =  500.00    (m)

             <------ DATA FOR SECTION (   3.0) ------>
             Distance       Elevation       Manning
                .00            2.20          .2000
              200.00           1.80     .2000 / .0850  Main Channel
              202.75            .00          .0850      Main Channel
              204.25            .00          .0850      Main Channel
              207.00           1.80     .0850 / .2000  Main Channel
              407.00           2.20          .2000

  <---------------------------- TRAVEL TIME TABLE ---------------------------->
   DEPTH     ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME   D x V
     (m)      (m)   (cu.m.)   (cu.m.)      (cms)     (m/s)     (min)   (m2/s)
    .112     .112  .940E+02  .882E+01       .016      .087     95.91    .010
    .225     .225  .207E+03  .389E+02       .054      .129     64.45    .029
    .337     .337  .340E+03  .957E+02       .110      .161     51.67    .054
    .450     .450  .492E+03  .185E+03       .185      .188     44.34    .085
    .562     .562  .664E+03  .311E+03       .280      .211     39.43    .119
    .675     .675  .854E+03  .481E+03*      .397      .233     35.84    .157
    .788     .788  .106E+04  .698E+03*      .537      .252     33.06    .199
    .900     .900  .129E+04  .970E+03*      .700      .270     30.81    .243
   1.013    1.013  .154E+04  .130E+04*      .888      .288     28.95    .291
   1.125    1.125  .181E+04  .170E+04*     1.102      .304     27.37    .343
   1.238    1.238  .210E+04  .216E+04*     1.344      .320     26.01    .397
   1.350    1.350  .240E+04  .271E+04*     1.615      .336     24.81    .453
   1.463    1.463  .273E+04  .333E+04*     1.916      .351     23.76    .513
   1.575    1.575  .308E+04  .404E+04*     2.247      .365     22.82    .575
   1.688    1.688  .344E+04  .484E+04*     2.611      .379     21.97    .640
   1.800    1.800  .382E+04  .574E+04*     3.008      .393     21.19    .708
   1.933    1.933  .874E+04  .141E+05*     3.971      .227     36.67    .439
   2.067    2.067  .225E+05  .388E+05*     6.403      .142     58.66    .294
   2.200    2.200  .452E+05  .829E+05*    11.177      .124     67.44    .272

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
 (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                                <---- hydrograph ---->   <-pipe / channel->
                          AREA     QPEAK    TPEAK    R.V.   MAX DEPTH  MAX VEL
                           (ha)     (cms)    (hrs)    (mm)      (m)      (m/s)
  INFLOW : ID= 4:002030   152.19    5.663    7.98 57.755     2.026      .160
  OUTFLOW: ID= 1:002040   152.19    4.915    9.05 57.755     1.984      .185


------------------------------------------------------------------------------
100:0013----------------------------------------------------------------------
---------------------
| DESIGN NASHYD      |   Area     (ha)=   15.67   Curve Number    (CN)=82.00
| 02:108     DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=   1.090

     Unit Hyd Qpeak  (cms)=     .549

     PEAK FLOW       (cms)=     .854 (i)
     TIME TO PEAK    (hrs)=    7.018
     RUNOFF VOLUME    (mm)=   61.161
     TOTAL RAINFALL   (mm)=   98.000
     RUNOFF COEFFICIENT   =     .624

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

------------------------------------------------------------------------------
100:0014----------------------------------------------------------------------
---------------------
| DESIGN NASHYD      |   Area     (ha)=    6.80   Curve Number    (CN)=82.00
| 03:105A    DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=    .960

     Unit Hyd Qpeak  (cms)=     .271

     PEAK FLOW       (cms)=     .407 (i)
     TIME TO PEAK    (hrs)=    6.884
     RUNOFF VOLUME    (mm)=   61.161
     TOTAL RAINFALL   (mm)=   98.000
     RUNOFF COEFFICIENT   =     .624

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

------------------------------------------------------------------------------
100:0015----------------------------------------------------------------------
*#############################################################################
*# Lappan Drain - Total Flow at Jefferson Boulevard
*#############################################################################
---------------------
| ADD HYD (      2050) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
                     ID1 01:      2040   152.19    4.915    9.05  57.76    .000
                    +ID2 02:108           15.67     .854    7.02  61.16    .000
                    +ID3 03:105A           6.80     .407    6.88  61.16    .000
                     ========================================================
                     SUM 04:      2050   174.66    5.394    8.82  58.19    .000

  NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
100:0016----------------------------------------------------------------------
--------------------
| ROUTE CHANNEL    |     Routing time step (min) =  1.00
|  IN> 04:002050   |     Number of SEGMENTS =  3
| OUT< 01:002060   |     Slopes (%), CHANNEL= .1200  FLOODPLAIN= .2000
--------------------                 LENGTH =  450.00    (m)

             <------ DATA FOR SECTION (   4.0) ------>
             Distance       Elevation       Manning
                .00            2.20          .2000
              200.00           1.80     .2000 / .0850  Main Channel
              202.75            .00          .0850      Main Channel
              204.25            .00          .0850      Main Channel
              207.00           1.80     .0850 / .2000  Main Channel
              407.00           2.20          .2000

  <---------------------------- TRAVEL TIME TABLE ---------------------------->
   DEPTH     ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME   D x V
     (m)      (m)   (cu.m.)   (cu.m.)      (cms)     (m/s)     (min)   (m2/s)
    .112     .112  .846E+02  .882E+01       .016      .087     86.32    .010
    .225     .225  .187E+03  .389E+02       .054      .129     58.01    .029
    .337     .337  .306E+03  .957E+02       .110      .161     46.50    .054
    .450     .450  .443E+03  .185E+03       .185      .188     39.90    .085
    .562     .562  .597E+03  .311E+03*      .280      .211     35.49    .119
    .675     .675  .769E+03  .481E+03*      .397      .233     32.26    .157
    .788     .788  .958E+03  .698E+03*      .537      .252     29.75    .199
    .900     .900  .116E+04  .970E+03*      .700      .270     27.73    .243
   1.013    1.013  .139E+04  .130E+04*      .888      .288     26.06    .291
   1.125    1.125  .163E+04  .170E+04*     1.102      .304     24.63    .343
   1.238    1.238  .189E+04  .216E+04*     1.344      .320     23.41    .397
   1.350    1.350  .216E+04  .271E+04*     1.615      .336     22.33    .453
   1.463    1.463  .245E+04  .333E+04*     1.916      .351     21.38    .513
   1.575    1.575  .277E+04  .404E+04*     2.247      .365     20.53    .575
   1.688    1.688  .310E+04  .484E+04*     2.611      .379     19.77    .640
   1.800    1.800  .344E+04  .574E+04*     3.008      .393     19.07    .708
   1.933    1.933  .786E+04  .141E+05*     3.971      .227     33.00    .439
   2.067    2.067  .203E+05  .388E+05*     6.403      .142     52.79    .294
   2.200    2.200  .407E+05  .829E+05*    11.177      .124     60.70    .272

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
 (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                                <---- hydrograph ---->   <-pipe / channel->
                          AREA     QPEAK    TPEAK    R.V.   MAX DEPTH  MAX VEL
                           (ha)     (cms)    (hrs)    (mm)      (m)      (m/s)
  INFLOW : ID= 4:002050   174.66    5.394    8.82 58.194     2.011      .168
  OUTFLOW: ID= 1:002060   174.66    5.013    9.83 58.194     1.991      .181


------------------------------------------------------------------------------
100:0017----------------------------------------------------------------------
---------------------
| DESIGN NASHYD      |   Area     (ha)=    6.60   Curve Number    (CN)=82.00
| 02:EXT8    DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=    .820

     Unit Hyd Qpeak  (cms)=     .307

     PEAK FLOW       (cms)=     .443 (i)
     TIME TO PEAK    (hrs)=    6.718
     RUNOFF VOLUME    (mm)=   61.161
     TOTAL RAINFALL   (mm)=   98.000
     RUNOFF COEFFICIENT   =     .624

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

------------------------------------------------------------------------------
100:0018----------------------------------------------------------------------
*#############################################################################
*# Lappan Drain - Total Flow at McGill Drain
*#############################################################################
---------------------
| ADD HYD (      2070) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
                     ID1 01:      2060   174.66    5.013    9.83  58.19    .000
                    +ID2 02:EXT8           6.60     .443    6.72  61.16    .000
                     ========================================================
                     SUM 10:      2070   181.26    5.084    9.77  58.30    .000

  NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
100:0019----------------------------------------------------------------------
*#############################################################################
*# McGILL DRAIN
*#############################################################################
---------------------
| DESIGN NASHYD      |   Area     (ha)=   39.07   Curve Number    (CN)=82.00
| 01:106     DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=   1.630

     Unit Hyd Qpeak  (cms)=     .916

     PEAK FLOW       (cms)=    1.567 (i)
     TIME TO PEAK    (hrs)=    7.634
     RUNOFF VOLUME    (mm)=   61.161
     TOTAL RAINFALL   (mm)=   98.000
     RUNOFF COEFFICIENT   =     .624

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

------------------------------------------------------------------------------
100:0020----------------------------------------------------------------------
--------------------
| ROUTE CHANNEL    |     Routing time step (min) =  1.00
|  IN> 01:106      |     Number of SEGMENTS =  3
| OUT< 02:002080   |     Slopes (%), CHANNEL= .1500  FLOODPLAIN= .2000
--------------------                 LENGTH =  250.00    (m)

             <------ DATA FOR SECTION (   5.0) ------>
             Distance       Elevation       Manning
                .00            1.40          .2000
              200.00           1.00     .2000 / .1000  Main Channel
              201.50            .00          .1000      Main Channel
              203.50            .00          .1000      Main Channel
              205.00           1.00     .1000 / .2000  Main Channel
              405.00           1.40          .2000

  <---------------------------- TRAVEL TIME TABLE ---------------------------->
   DEPTH     ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME   D x V
     (m)      (m)   (cu.m.)   (cu.m.)      (cms)     (m/s)     (min)   (m2/s)
    .071     .071  .376E+02  .358E+01       .010      .064     65.43    .005
    .143     .143  .791E+02  .151E+02       .031      .097     42.85    .014
    .214     .214  .124E+03  .355E+02       .061      .123     33.82    .026
    .286     .286  .173E+03  .661E+02       .101      .145     28.74    .041
    .357     .357  .226E+03  .108E+03       .148      .164     25.41    .059
    .429     .429  .283E+03  .162E+03*      .205      .181     23.02    .078
    .500     .500  .344E+03  .229E+03*      .270      .197     21.20    .098
    .571     .571  .408E+03  .311E+03*      .344      .211     19.75    .121
    .643     .643  .476E+03  .408E+03*      .428      .225     18.56    .144
    .714     .714  .548E+03  .522E+03*      .521      .237     17.56    .169
    .786     .786  .624E+03  .654E+03*      .623      .249     16.71    .196
    .857     .857  .704E+03  .805E+03*      .735      .261     15.96    .224
    .929     .929  .788E+03  .975E+03*      .858      .272     15.31    .253
   1.000    1.000  .875E+03  .117E+04*      .990      .283     14.73    .283
   1.080    1.080  .177E+04  .256E+04*     1.270      .179     23.30    .193
   1.160    1.160  .427E+04  .661E+04*     1.927      .113     36.97    .131
   1.240    1.240  .837E+04  .138E+05*     3.185      .095     43.82    .118
   1.320    1.320  .141E+05  .248E+05*     5.229      .093     44.86    .123
   1.400    1.400  .214E+05  .399E+05*     8.222      .096     43.33    .135

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
 (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                                <---- hydrograph ---->   <-pipe / channel->
                          AREA     QPEAK    TPEAK    R.V.   MAX DEPTH  MAX VEL
                           (ha)     (cms)    (hrs)    (mm)      (m)      (m/s)
  INFLOW : ID= 1:106      39.07    1.567    7.63 61.161     1.116      .141
  OUTFLOW: ID= 2:002080   39.07    1.434    8.47 61.161     1.100      .156


------------------------------------------------------------------------------
100:0021----------------------------------------------------------------------
---------------------
| DESIGN NASHYD      |   Area     (ha)=   21.08   Curve Number    (CN)=81.00
| 01:EXT4    DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=   1.830

     Unit Hyd Qpeak  (cms)=     .440

     PEAK FLOW       (cms)=     .753 (i)
     TIME TO PEAK    (hrs)=    7.884
     RUNOFF VOLUME    (mm)=   59.663
     TOTAL RAINFALL   (mm)=   98.000
     RUNOFF COEFFICIENT   =     .609

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

------------------------------------------------------------------------------
100:0022----------------------------------------------------------------------
---------------------
| DESIGN NASHYD      |   Area     (ha)=    6.53   Curve Number    (CN)=82.00
| 03:107     DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=    .820
```

```
     Unit Hyd Qpeak  (cms)=     .304

     PEAK FLOW       (cms)=     .438 (i)
     TIME TO PEAK    (hrs)=    6.718
     RUNOFF VOLUME    (mm)=   61.161
     TOTAL RAINFALL   (mm)=   98.000
     RUNOFF COEFFICIENT   =     .624

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

------------------------------------------------------------------------------
100:0023------------------------------------------------------------------------
*#**************************************************************************
*# McGill Drain - Total Flow at Jefferson Boulevard
*#**************************************************************************
----------------------
| ADD HYD (     2090) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
                    ID1 01:EXT4          21.08     .753    7.88  59.66    .000
                   +ID2 02:      2080    39.07    1.434    8.47  61.16    .000
                   +ID3 03:107           6.53     .438    6.72  61.16    .000
                    ==========================================================
                    SUM 04:      2090    66.68    2.343    8.03  60.69    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
100:0024------------------------------------------------------------------------
-------------------
| ROUTE CHANNEL    |     Routing time step (min) =  1.00
|  IN> 04:002090   |     Number of SEGMENTS =  3
| OUT< 01:002100   |     Slopes (%), CHANNEL= .3000  FLOODPLAIN= .2000
-------------------                LENGTH =  280.00    (m)

               <------ DATA FOR SECTION (   6.0) ------>
               Distance      Elevation       Manning
                  .00           1.40          .2000
                200.00          1.00     .2000 / .1000  Main Channel
                201.50           .00          .1000      Main Channel
                203.50           .00          .1000      Main Channel
                205.00          1.00     .1000 / .2000  Main Channel
                405.00          1.40          .2000

   <------------------------- TRAVEL TIME TABLE -------------------------->
    DEPTH     ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME   D x V
      (m)      (m)   (cu.m.)   (cu.m.)     (cms)     (m/s)     (min)    (m2/s)
     .071     .071  .421E+02  .179E+01      .014      .090     51.82     .006
     .143     .143  .886E+02  .753E+01      .043      .138     33.94     .020
     .214     .214  .139E+03  .178E+02      .087      .174     26.78     .037
     .286     .286  .194E+03  .330E+02      .142      .205     22.76     .059
     .357     .357  .254E+03  .539E+02      .210      .232     20.12     .083
     .429     .429  .317E+03  .809E+02      .290      .256     18.23     .110
     .500     .500  .385E+03  .115E+03      .382      .278     16.79     .139
     .571     .571  .457E+03  .155E+03      .487      .298     15.64     .171
     .643     .643  .534E+03  .204E+03      .605      .318     14.70     .204
     .714     .714  .614E+03  .261E+03      .736      .336     13.91     .240
     .786     .786  .699E+03  .327E+03      .881      .353     13.23     .277
     .857     .857  .789E+03  .402E+03*    1.040      .369     12.64     .316
     .929     .929  .882E+03  .488E+03*    1.213      .385     12.12     .357
    1.000    1.000  .980E+03  .583E+03*    1.401      .400     11.66     .400
    1.080    1.080  .199E+04  .128E+04*    1.761      .248     18.81     .268
    1.160    1.160  .479E+04  .331E+04*    2.505      .147     31.85     .170
    1.240    1.240  .938E+04  .692E+04*    3.856      .115     40.54     .143
    1.320    1.320  .158E+05  .124E+05*    5.997      .107     43.81     .141
    1.400    1.400  .239E+05  .199E+05*    9.093      .106     43.88     .149

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
 (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                              <---- hydrograph ---->   <-pipe / channel->
                          AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                          (ha)    (cms)   (hrs)   (mm)       (m)      (m/s)
   INFLOW : ID= 4:002090    66.68    2.343    8.03 60.687     1.143      .161
   OUTFLOW: ID= 1:002100    66.68    2.229    8.97 60.687     1.131      .173

------------------------------------------------------------------------------
100:0025------------------------------------------------------------------------
----------------------
| DESIGN NASHYD      |   Area     (ha)=   14.81   Curve Number   (CN)=82.00
| 02:EXT5   DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=   1.520

     Unit Hyd Qpeak  (cms)=     .372

     PEAK FLOW       (cms)=     .627 (i)
     TIME TO PEAK    (hrs)=    7.518
     RUNOFF VOLUME    (mm)=   61.161
     TOTAL RAINFALL   (mm)=   98.000
     RUNOFF COEFFICIENT   =     .624

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

------------------------------------------------------------------------------
100:0026------------------------------------------------------------------------
----------------------
| ADD HYD (     2110) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
                    ID1 01:      2100    66.68    2.229    8.97  60.69    .000
                   +ID2 02:EXT5          14.81     .627    7.52  61.16    .000
                    ==========================================================
                    SUM 03:      2110    81.49    2.707    8.55  60.77    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
100:0027------------------------------------------------------------------------
*#**************************************************************************
*# McGill Drain - Total Flow at Lappan Drain Confluence
*#**************************************************************************
----------------------
| ADD HYD (     2120) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
                    ID1 03:      2110    81.49    2.707    8.55  60.77    .000
                   +ID2 10:      2070   181.26    5.084    9.77  58.30    .000
                    ==========================================================
                    SUM 01:      2120   262.75    7.589    9.42  59.07    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
100:0028------------------------------------------------------------------------
-------------------
| ROUTE CHANNEL    |     Routing time step (min) =  1.00
|  IN> 01:002120   |     Number of SEGMENTS =  3
| OUT< 02:002130   |     Slopes (%), CHANNEL= .1500  FLOODPLAIN= .2000
-------------------                LENGTH =  370.00    (m)

               <------ DATA FOR SECTION (   7.0) ------>
               Distance      Elevation       Manning
                  .00           1.80          .2000
                200.00          1.40     .2000 / .0850  Main Channel
                202.60           .00          .0850      Main Channel
                204.40           .00          .0850      Main Channel
                207.00          1.40     .0850 / .2000  Main Channel
                407.00          1.80          .2000

   <------------------------- TRAVEL TIME TABLE -------------------------->
    DEPTH     ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME   D x V
      (m)      (m)   (cu.m.)   (cu.m.)     (cms)     (m/s)     (min)    (m2/s)
     .093     .093  .681E+02  .573E+01      .016      .087     70.58     .008
     .187     .187  .148E+03  .249E+02      .053      .131     46.93     .025
     .280     .280  .240E+03  .606E+02      .107      .165     37.37     .046
     .373     .373  .344E+03  .116E+03      .180      .193     31.94     .072
     .467     .467  .460E+03  .194E+03      .271      .218     28.33     .102
     .560     .560  .588E+03  .297E+03*     .382      .240     25.70     .134
     .653     .653  .728E+03  .429E+03*     .513      .260     23.68     .170
     .747     .747  .880E+03  .592E+03*     .665      .280     22.05     .209
     .840     .840  .104E+04  .790E+03*     .840      .298     20.71     .250
     .933     .933  .122E+04  .103E+04*    1.039      .315     19.58     .294
    1.027    1.027  .141E+04  .130E+04*    1.262      .332     18.60     .340
    1.120    1.120  .161E+04  .162E+04*    1.510      .348     17.74     .389
    1.213    1.213  .182E+04  .199E+04*    1.785      .363     16.99     .440
    1.307    1.307  .204E+04  .241E+04*    2.087      .378     16.32     .494
    1.400    1.400  .228E+04  .287E+04*    2.418      .392     15.71     .549
    1.500    1.500  .439E+04  .593E+04*    3.044      .257     24.02     .385
    1.600    1.600  .102E+05  .147E+05*    4.365      .158     38.94     .253
    1.700    1.700  .197E+05  .302E+05*    6.783      .127     48.42     .217
    1.800    1.800  .329E+05  .534E+05*   10.633      .120     51.59     .215

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
 (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                              <---- hydrograph ---->   <-pipe / channel->
                          AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                          (ha)    (cms)   (hrs)   (mm)       (m)      (m/s)
   INFLOW : ID= 1:002120    262.75    7.589    9.42 59.068     1.721      .126
   OUTFLOW: ID= 2:002130    262.75    7.110   10.17 59.068     1.707      .127

------------------------------------------------------------------------------
100:0029------------------------------------------------------------------------
----------------------
| DESIGN NASHYD      |   Area     (ha)=   47.17   Curve Number   (CN)=82.00
| 03:109    DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=   1.100

     Unit Hyd Qpeak  (cms)=    1.638

     PEAK FLOW       (cms)=    2.553 (i)
     TIME TO PEAK    (hrs)=    7.034
     RUNOFF VOLUME    (mm)=   61.161
     TOTAL RAINFALL   (mm)=   98.000
     RUNOFF COEFFICIENT   =     .624

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

------------------------------------------------------------------------------
100:0030------------------------------------------------------------------------
----------------------
| DESIGN NASHYD      |   Area     (ha)=   24.11   Curve Number   (CN)=80.00
| 04:EXT6   DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=   1.520

     Unit Hyd Qpeak  (cms)=     .606

     PEAK FLOW       (cms)=     .968 (i)
     TIME TO PEAK    (hrs)=    7.518
     RUNOFF VOLUME    (mm)=   58.201
     TOTAL RAINFALL   (mm)=   98.000
     RUNOFF COEFFICIENT   =     .594

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

------------------------------------------------------------------------------
100:0031------------------------------------------------------------------------
----------------------
| ADD HYD (     2140) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
                    ID1 02:      2130   262.75    7.110   10.17  59.07    .000
                   +ID2 03:109           47.17    2.553    7.03  61.16    .000
                   +ID3 04:EXT6          24.11     .968    7.52  58.20    .000
                    ==========================================================
                    SUM 01:      2140   334.03    8.180    9.67  59.30    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
100:0032------------------------------------------------------------------------
-------------------
| ROUTE CHANNEL    |     Routing time step (min) =  1.00
|  IN> 01:002140   |     Number of SEGMENTS =  3
| OUT< 10:002150   |     Slopes (%), CHANNEL= .0800  FLOODPLAIN= .2000
-------------------                LENGTH =  370.00    (m)

               <------ DATA FOR SECTION (   7.0) ------>
               Distance      Elevation       Manning
                  .00           1.80          .2000
                200.00          1.40     .2000 / .0850  Main Channel
                202.60           .00          .0850      Main Channel
                204.40           .00          .0850      Main Channel
                207.00          1.40     .0850 / .2000  Main Channel
                407.00          1.80          .2000

   <------------------------- TRAVEL TIME TABLE -------------------------->
    DEPTH     ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME   D x V
      (m)      (m)   (cu.m.)   (cu.m.)     (cms)     (m/s)     (min)    (m2/s)
     .093     .093  .681E+02  .107E+02      .012      .064     96.65     .006
     .187     .187  .148E+03  .467E+02      .038      .096     64.26     .018
     .280     .280  .240E+03  .114E+03      .078      .121     51.18     .034
     .373     .373  .344E+03  .217E+03*     .131      .141     43.73     .053
     .467     .467  .460E+03  .363E+03*     .198      .159     38.79     .074
     .560     .560  .588E+03  .557E+03*     .279      .175     35.19     .098
     .653     .653  .728E+03  .804E+03*     .374      .190     32.42     .124
     .747     .747  .880E+03  .111E+04*     .486      .204     30.20     .152
     .840     .840  .104E+04  .148E+04*     .614      .217     28.36     .183
     .933     .933  .122E+04  .192E+04*     .759      .230     26.81     .215
    1.027    1.027  .141E+04  .244E+04*     .921      .242     25.47     .249
    1.120    1.120  .161E+04  .304E+04*    1.103      .254     24.30     .284
    1.213    1.213  .182E+04  .373E+04*    1.304      .265     23.27     .322
    1.307    1.307  .204E+04  .451E+04*    1.524      .276     22.34     .361
    1.400    1.400  .228E+04  .539E+04*    1.766      .287     21.51     .401
    1.500    1.500  .439E+04  .111E+05*    2.264      .191     32.30     .286
    1.600    1.600  .102E+05  .276E+05*    3.447      .125     49.30     .200
    1.700    1.700  .197E+05  .566E+05*    5.720      .107     57.42     .183
    1.800    1.800  .329E+05  .100E+06*    9.415      .106     58.27     .191

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
 (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                              <---- hydrograph ---->   <-pipe / channel->
                          AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                          (ha)    (cms)   (hrs)   (mm)       (m)      (m/s)
   INFLOW : ID= 1:002140    334.03    8.180    9.67 59.301     1.767      .106
   OUTFLOW: ID=10:002150    334.03    7.784   10.27 59.301     1.756      .107

------------------------------------------------------------------------------
100:0033------------------------------------------------------------------------
----------------------
| DESIGN NASHYD      |   Area     (ha)=   17.65   Curve Number   (CN)=82.00
| 01:113    DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .910

     Unit Hyd Qpeak  (cms)=     .741

     PEAK FLOW       (cms)=    1.099 (i)
     TIME TO PEAK    (hrs)=    6.818
     RUNOFF VOLUME    (mm)=   61.161
     TOTAL RAINFALL   (mm)=   98.000
     RUNOFF COEFFICIENT   =     .624

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

```
--------------------------------------------------------------------------------
100:0034--------------------------------------------------------------------------
*#*************************************************************************
*# Calculate culvert routing and flow split near eastern site boundary
*#   - Storage volumes calculated based on site survey
*#   - Discharges calculated based on the 600 mm diameter CSP and 1500 mm
*#     diameter CSP capacities
*#*************************************************************************
---------------------
| ROUTE RESERVOIR   |    Requested routing time step =  1.0 min.
|  IN>01:(113   )   |
| OUT<02:(002160)   |    =========  OUTFLOW STORAGE TABLE  =========
--------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                          (cms)     (ha.m.)   |    (cms)    (ha.m.)
                           .000  .0000E+00    |    1.130  .4600E+00
                           .150  .0000E+00    |    5.470  .8100E+00
                           .450  .0000E+00    |   83.090  .3400E+01
                           .820  .6500E-01    |     .000  .0000E+00

     ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
     -------------------         (ha)     (cms)     (hrs)       (mm)
     INFLOW >01: (113   )       17.65     1.099     6.818     61.161
     OUTFLOW<02: (002160)       17.65      .856     7.484     61.166

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=   77.903
                  TIME SHIFT OF PEAK FLOW         (min)=    40.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=.1113E+00

--------------------------------------------------------------------------------
100:0035--------------------------------------------------------------------------
--------------------
| DIVERT HYD       |
| INID=02  (002160)|
--------------------
      Outflow / Inflow  Relationships
      Flow 03 +  Flow 04 =  Total
       (cms)      (cms)      (cms)
         .000       .000       .000
         .150       .000       .150
         .400       .050       .450
         .680       .140       .820
         .930       .200      1.130
        1.040     4.430      5.470
        1.460    81.630     83.090

            NHYD       AREA    QPEAK  TpeakDate_hh:mm       R.V.  NFE WetHrs
                        (ha)    (cms)                       (mm)       (hrs)
   IDin = 02:002160    17.65     .856  No_date    7:29     61.166   85    14.
   ==========================================================================
   IDout= 03:002170    15.45     .709  No_date    7:29     61.166   85    14.
   IDout= 04:002180     2.20     .147  No_date    7:29     61.166   21     5.
--------------------------------------------------------------------------------
100:0036--------------------------------------------------------------------------
----------------------
| DESIGN NASHYD      |   Area     (ha)=    4.88   Curve Number    (CN)=82.00
| 01:114    DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .910

     Unit Hyd Qpeak  (cms)=     .205

     PEAK FLOW       (cms)=     .304 (i)
     TIME TO PEAK    (hrs)=    6.818
     RUNOFF VOLUME    (mm)=   61.161
     TOTAL RAINFALL   (mm)=   98.000
     RUNOFF COEFFICIENT   =     .624

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

--------------------------------------------------------------------------------
100:0037--------------------------------------------------------------------------
----------------------
| ADD HYD (      2190) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                   (ha)     (cms)   (hrs)   (mm)    (cms)
                     ID1 01:114           4.88      .304    6.82  61.16    .000
                    +ID2 03:     2170    15.45      .709    7.48  61.17    .000
                     ==========================================================
                     SUM 02:      2190    20.33      .993    6.95  61.16    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
100:0038--------------------------------------------------------------------------
----------------------
| DESIGN NASHYD      |   Area     (ha)=   18.59   Curve Number    (CN)=82.00
| 01:115    DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=   1.470

     Unit Hyd Qpeak  (cms)=     .483

     PEAK FLOW       (cms)=     .807 (i)
     TIME TO PEAK    (hrs)=    7.451
     RUNOFF VOLUME    (mm)=   61.161
     TOTAL RAINFALL   (mm)=   98.000
     RUNOFF COEFFICIENT   =     .624

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

--------------------------------------------------------------------------------
100:0039--------------------------------------------------------------------------
*#*************************************************************************
*# McGill Drain - Total Flow at Eastern WSP
*#*************************************************************************
----------------------
| ADD HYD (      2200) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                   (ha)     (cms)   (hrs)   (mm)    (cms)
                     ID1 01:115          18.59      .807    7.45  61.16    .000
                    +ID2 02:     2190    20.33      .993    6.95  61.16    .000
                    +ID3 10:     2150   334.03    7.784   10.27  59.30    .000
                     ==========================================================
                     SUM 05:      2200   372.95    8.327    9.85  59.50    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
100:0040--------------------------------------------------------------------------
*#*************************************************************************
*# AREA CHECK
*#*************************************************************************
----------------------
| ADD HYD (      2210) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                   (ha)     (cms)   (hrs)   (mm)    (cms)
                     ID1 04:      2180     2.20      .147    7.48  61.17    .000
                    +ID2 05:      2200   372.95    8.327    9.85  59.50    .000
                     ==========================================================
                     SUM 01:      2210   375.15    8.340    9.85  59.51    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
100:0041--------------------------------------------------------------------------
--------------------------------------------------------------------------------
100:0002--------------------------------------------------------------------------
--------------------------------------------------------------------------------
100:0002--------------------------------------------------------------------------
--------------------------------------------------------------------------------
100:0002--------------------------------------------------------------------------
--------------------------------------------------------------------------------
100:0002--------------------------------------------------------------------------
--------------------------------------------------------------------------------
100:0002--------------------------------------------------------------------------
      FINISH
--------------------------------------------------------------------------------

*******************************************************************************
     WARNINGS / ERRORS / NOTES
     -------------------------
 002:0034 ROUTE RESERVOIR
      *** WARNING: Inflow peak was not reduced!
                   Check OUTFLOW/STORAGE table or reduce DT.
   Simulation ended on 2016-02-11     at 16:33:45
===============================================================================
```

Subject: Proposed Conditions SWMHYMO Schematic
Project: Windsor Solar Project
Project No.: 133560106
Client: Windsor Solar LP
Date: February 1, 2016



K:\01335\active\133560106\40_Design\41_Analysis & Studies\Surface_Water\Stormwater\[133560106.160215.CALC.Hydrology Worksheet.xlsx]SWMHYMO Parameters

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

   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  4.05
       S  W W W  M   M  H   H    Y    M   M  O   O       9999   9999   Sept 2011
   SSSSS   W W   M   M  H   H    Y    M   M   OOO            9      9   =========
                                                          9   9  9   9   # 4730904
         StormWater Management HYdrologic Model            999    999    =========

 ************************************************************************
 ***************************** SWMHYMO Ver/4.05  ************************
 *********  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) 836-3884           *********
 *********                  Gatineau, Quebec: (819) 243-6858           *********
 *********                  E-Mail: swmhymo@jfsa.com                   *********
 ************************************************************************

 ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
 +++++++++ Licensed user: Stantec Consulting Ltd. (Kitchener)          +++++++++
 +++++++++               Kitchener              SERIAL#:4730904       +++++++++
 ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

 ************************************************************************
 *********           ++++++ PROGRAM ARRAY DIMENSIONS ++++++            *********
 *********           Maximum value for ID numbers  :    10            *********
 *********           Max. number of rainfall points: 105408           *********
 *********           Max. number of flow points   : 105408            *********
 ************************************************************************


 *********************   D E T A I L E D   O U T P U T   *********************
 ************************************************************************
 *       DATE: 2016-02-15       TIME: 14:15:11       RUN COUNTER: 000342     *
 ************************************************************************
 * Input   filename: F:\WSP\60106PR3.dat                                    *
 * Output  filename: F:\WSP\60106PR3.out                                    *
 * Summary filename: F:\WSP\60106PR3.sum                                    *
 * User comments:                                                           *
 * 1:_______________________________________________________________________*
 * 2:_______________________________________________________________________*
 * 3:_______________________________________________________________________*
 ************************************************************************

-------------------------------------------------------------------------------
001:0001-------------------------------------------------------------------------
*#*********************************************************************
*#  Project Name: [Windsor Solar Project] Project Number: [1335-60106]
*#  Date       : 02-10-2016
*#  Modeller   : [NE]
*#  Company    : Stantec Consulting Ltd. (London)
*#  License #  :  4730904
*#*********************************************************************
*#
*#  Proposed Conditions
*#  25 mm Water Quality Event
*#  2, 5, 10, 25, 50, 100, 250-year 3-Hour Chicago Design Storm
*#
*#*********************************************************************
  ** END OF RUN :   1

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


--------------------
| START            |  Project  dir.: F:\WSP\
--------------------  Rainfall dir.: F:\WSP\
    TZERO =   .00 hrs on      0
    METOUT=  2 (output = METRIC)
    NRUN  = 002
    NSTORM=  1
           #  1=12SCS2.stm
-------------------------------------------------------------------------------
002:0002-------------------------------------------------------------------------
*#*********************************************************************
*#  Project Name: [Windsor Solar Project] Project Number: [1335-60106]
*#  Date       : 02-10-2016
*#  Modeller   : [NE]
*#  Company    : Stantec Consulting Ltd. (London)
*#  License #  :  4730904
*#*********************************************************************
*#
*#  Proposed Conditions
*#  25 mm Water Quality Event
*#  2, 5, 10, 25, 50, 100, 250-year 3-Hour Chicago Design Storm
*#
*#*********************************************************************
-------------------------------------------------------------------------------
002:0002-------------------------------------------------------------------------
--------------------
| READ STORM       |    Filename: 2-yr scs 12 hr windsor
| Ptotal=  46.20 mm|    Comments: 2-yr scs 12 hr windsor
--------------------
            TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
             hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
             .50    .924 |   3.50   1.848 |   6.50   8.316 |   9.50   1.848
            1.00    .924 |   4.00   1.848 |   7.00   3.696 |  10.00    .924
            1.50    .924 |   4.50   2.772 |   7.50   2.772 |  10.50    .924
            2.00    .924 |   5.00   3.696 |   8.00   2.772 |  11.00    .924
            2.50   1.848 |   5.50   5.544 |   8.50   1.848 |  11.50    .924
            3.00   1.848 |   6.00  41.580 |   9.00   1.848 |  12.00    .924

-------------------------------------------------------------------------------
002:0003-------------------------------------------------------------------------
*#*********************************************************************
*# LAPPAN DRAIN
*#*********************************************************************
---------------------
| DESIGN NASHYD     |   Area    (ha)=   42.26   Curve Number   (CN)=73.00
| 01:EXT1   DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
---------------------  U.H. Tp(hrs)=   1.110

     Unit Hyd Qpeak  (cms)=    1.454

     PEAK FLOW       (cms)=     .514 (i)
     TIME TO PEAK    (hrs)=    7.117
     RUNOFF VOLUME    (mm)=   14.412
     TOTAL RAINFALL   (mm)=   46.200
     RUNOFF COEFFICIENT   =     .312

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

-------------------------------------------------------------------------------
002:0004-------------------------------------------------------------------------
--------------------
| ROUTE CHANNEL    |     Routing time step (min) =  1.00
|  IN> 01:EXT1     |     Number of SEGMENTS =  3
| OUT< 02:002000   |     Slopes (%), CHANNEL= .1000  FLOODPLAIN= .2000
--------------------           LENGTH =  700.00     (m)

              <------ DATA FOR SECTION (   1.0) ------>
              Distance      Elevation       Manning
                 .00           1.40          .2000
               100.00           1.20     .2000 / .0850  Main Channel
               101.80            .00         .0850      Main Channel
               103.00            .00         .0850      Main Channel
               104.80           1.20     .0850 / .2000  Main Channel
               204.80           1.40          .2000

   <---------------------------- TRAVEL TIME TABLE ---------------------------->
    DEPTH    ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME   D x V
      (m)     (m)   (cu.m.)   (cu.m.)      (cms)     (m/s)      (min)   (m2/s)
     .071    .071  .645E+02  .325E+01       .005      .059     197.27     .004
     .141    .141  .140E+03  .141E+02       .018      .089     131.37     .013
     .212    .212  .225E+03  .340E+02       .036      .111     104.80     .024
     .282    .282  .321E+03  .647E+02       .060      .130      89.71     .037
     .353    .353  .427E+03  .108E+03       .089      .146      79.68     .052
     .424    .424  .544E+03  .165E+03       .125      .161      72.40     .068
     .494    .494  .671E+03  .237E+03       .168      .175      66.79     .086
     .565    .565  .809E+03  .326E+03       .217      .187      62.29     .106
     .635    .635  .957E+03  .434E+03       .272      .199      58.56     .127
     .706    .706  .112E+04  .563E+03*      .336      .211      55.41     .149
     .776    .776  .129E+04  .713E+03*      .407      .221      52.69     .172
     .847    .847  .146E+04  .886E+03*      .485      .232      50.32     .196
     .918    .918  .166E+04  .108E+04*      .572      .242      48.22     .222
     .988    .988  .186E+04  .131E+04*      .667      .252      46.35     .249
    1.059   1.059  .207E+04  .156E+04*      .771      .261      44.66     .277
    1.129   1.129  .229E+04  .185E+04*      .884      .271      43.13     .306
    1.200   1.200  .252E+04  .216E+04*     1.006      .280      41.73     .335
    1.300   1.300  .636E+04  .590E+04*     1.392      .153      76.12     .199
    1.400   1.400  .172E+05  .172E+05*     2.456      .100     116.67     .140

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
 (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                                  <---- hydrograph ---->   <-pipe / channel->
                            AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                            (ha)    (cms)   (hrs)   (mm)      (m)       (m/s)
   INFLOW : ID= 1:EXT1     42.26     .514    7.12 14.412      .870       .235
   OUTFLOW: ID= 2:002000   42.26     .396    7.67 14.411      .766       .220


-------------------------------------------------------------------------------
002:0005-------------------------------------------------------------------------
---------------------
| DESIGN NASHYD     |   Area    (ha)=   22.52   Curve Number   (CN)=82.00
| 01:EXT2   DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
---------------------  U.H. Tp(hrs)=   1.270

     Unit Hyd Qpeak  (cms)=     .677

     PEAK FLOW       (cms)=     .348 (i)
     TIME TO PEAK    (hrs)=    7.283
     RUNOFF VOLUME    (mm)=   19.890
     TOTAL RAINFALL   (mm)=   46.200
     RUNOFF COEFFICIENT   =     .431

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

-------------------------------------------------------------------------------
002:0006-------------------------------------------------------------------------
---------------------
| DESIGN NASHYD     |   Area    (ha)=   42.81   Curve Number   (CN)=82.00
| 03:EXT3   DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
---------------------  U.H. Tp(hrs)=   1.110

     Unit Hyd Qpeak  (cms)=    1.473

     PEAK FLOW       (cms)=     .732 (i)
     TIME TO PEAK    (hrs)=    7.100
     RUNOFF VOLUME    (mm)=   19.890
     TOTAL RAINFALL   (mm)=   46.200
     RUNOFF COEFFICIENT   =     .431

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

-------------------------------------------------------------------------------
002:0007-------------------------------------------------------------------------
*#*********************************************************************
*# Lappan Drain - Total Flow at Pilette Road
*#*********************************************************************
-------------------------
| ADD HYD (      2010) | ID: NHYD          AREA     QPEAK    TPEAK    R.V.     DWF
-------------------------                    (ha)     (cms)    (hrs)    (mm)    (cms)
                      ID1 01:EXT2          22.52     .348    7.28   19.89     .000
                    +ID2 02:     2000     42.26     .396    7.67   14.41     .000
                    +ID3 03:EXT3          42.81     .732    7.10   19.89     .000
                     ==========================================================
                     SUM 04:     2010    107.59    1.436    7.30   17.74     .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
002:0008-------------------------------------------------------------------------
--------------------
| ROUTE CHANNEL    |     Routing time step (min) =  1.00
|  IN> 04:002010   |     Number of SEGMENTS =  3
| OUT< 01:002020   |     Slopes (%), CHANNEL= .1700  FLOODPLAIN= .2000
--------------------           LENGTH =  350.00     (m)

              <------ DATA FOR SECTION (   2.0) ------>
              Distance      Elevation       Manning
                 .00           2.00          .2000
               100.00           1.80     .2000 / .0850  Main Channel
               102.75            .00         .0850      Main Channel
               104.25            .00         .0850      Main Channel
               107.00           1.80     .0850 / .1400  Main Channel
               207.00           2.00          .1400

   <---------------------------- TRAVEL TIME TABLE ---------------------------->
    DEPTH    ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME   D x V
      (m)     (m)   (cu.m.)   (cu.m.)      (cms)     (m/s)      (min)   (m2/s)
     .100    .100  .578E+02  .486E+01       .016      .096      60.50     .010
     .200    .200  .126E+03  .212E+02       .052      .144      40.48     .029
     .300    .300  .206E+03  .518E+02       .106      .180      32.38     .054
     .400    .400  .296E+03  .993E+02       .177      .210      27.75     .084
     .500    .500  .396E+03  .166E+03       .268      .236      24.67     .118
     .600    .600  .508E+03  .256E+03*      .377      .260      22.42     .156
     .700    .700  .630E+03  .370E+03*      .507      .282      20.68     .197
     .800    .800  .762E+03  .512E+03*      .659      .303      19.28     .242
     .900    .900  .906E+03  .685E+03*      .833      .322      18.12     .290
    1.000   1.000  .106E+04  .891E+03*     1.031      .340      17.14     .340
    1.100   1.100  .122E+04  .113E+04*     1.253      .358      16.29     .394
    1.200   1.200  .140E+04  .141E+04*     1.500      .375      15.55     .450
    1.300   1.300  .159E+04  .173E+04*     1.775      .392      14.89     .509
    1.400   1.400  .178E+04  .210E+04*     2.077      .408      14.31     .571
    1.500   1.500  .199E+04  .251E+04*     2.407      .423      13.78     .635
    1.600   1.600  .221E+04  .297E+04*     2.768      .439      13.30     .702
    1.700   1.700  .244E+04  .348E+04*     3.158      .453      12.87     .771
    1.800   1.800  .268E+04  .405E+04*     3.580      .468      12.46     .842
    2.000   2.000  .102E+05  .171E+05*     5.907      .203      28.69     .407

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
 (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                                  <---- hydrograph ---->   <-pipe / channel->
                            AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                            (ha)    (cms)   (hrs)   (mm)      (m)       (m/s)
   INFLOW : ID= 4:002010    107.59   1.436    7.30 17.738     1.174       .371
   OUTFLOW: ID= 1:002020    107.59   1.376    7.52 17.738     1.144       .365


-------------------------------------------------------------------------------
002:0009-------------------------------------------------------------------------
---------------------
| DESIGN NASHYD     |   Area    (ha)=   10.43   Curve Number   (CN)=72.00
| 02:202    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
```

```
----------------------  U.H. Tp(hrs)=    .970

     Unit Hyd Qpeak  (cms)=     .411

     PEAK FLOW       (cms)=     .135 (i)
     TIME TO PEAK    (hrs)=    6.950
     RUNOFF VOLUME    (mm)=   13.926
     TOTAL RAINFALL   (mm)=   46.200
     RUNOFF COEFFICIENT   =     .301

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

--------------------------------------------------------------------------------
002:0010--------------------------------------------------------------------------
------------------------
| ADD HYD (      2030) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                   (ha)     (cms)   (hrs)   (mm)    (cms)
                     ID1 01:      2020   107.59    1.376    7.52  17.74    .000
                    +ID2 02:202           10.43     .135    6.95  13.93    .000
                     ==========================================================
                     SUM 03:      2030   118.02    1.492    7.48  17.40    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
002:0011--------------------------------------------------------------------------
--------------------
| ROUTE CHANNEL    |     Routing time step (min) =  1.00
|  IN> 03:002030   |     Number of SEGMENTS =  3
| OUT< 01:002040   |     Slopes (%), CHANNEL= .1700  FLOODPLAIN= .2000
--------------------          LENGTH =  450.00    (m)

              <------ DATA FOR SECTION (   3.0) ------>
              Distance      Elevation       Manning
                  .00           2.00          .2000
                100.00          1.80     .2000 / .0850  Main Channel
                102.75           .00          .0850      Main Channel
                104.25           .00          .0850      Main Channel
                107.00          1.80     .0850 / .1400  Main Channel
                207.00          2.00          .1400

   <------------------------- TRAVEL TIME TABLE -------------------------->
    DEPTH     ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME   D x V
      (m)      (m)   (cu.m.)   (cu.m.)      (cms)     (m/s)     (min)   (m2/s)
     .100     .100  .744E+02  .486E+01       .016      .096     77.79     .010
     .200     .200  .163E+03  .212E+02       .052      .144     52.05     .029
     .300     .300  .264E+03  .518E+02       .106      .180     41.63     .054
     .400     .400  .380E+03  .993E+02       .177      .210     35.68     .084
     .500     .500  .509E+03  .166E+03       .268      .236     31.72     .118
     .600     .600  .653E+03  .256E+03       .377      .260     28.82     .156
     .700     .700  .809E+03  .370E+03       .507      .282     26.59     .197
     .800     .800  .980E+03  .512E+03*      .659      .303     24.79     .242
     .900     .900  .116E+04  .685E+03*      .833      .322     23.30     .290
    1.000    1.000  .136E+04  .891E+03*     1.031      .340     22.04     .340
    1.100    1.100  .157E+04  .113E+04*     1.253      .358     20.95     .394
    1.200    1.200  .180E+04  .141E+04*     1.500      .375     19.99     .450
    1.300    1.300  .204E+04  .173E+04*     1.775      .392     19.15     .509
    1.400    1.400  .229E+04  .210E+04*     2.077      .408     18.40     .571
    1.500    1.500  .256E+04  .251E+04*     2.407      .423     17.72     .635
    1.600    1.600  .284E+04  .297E+04*     2.768      .439     17.10     .702
    1.700    1.700  .313E+04  .348E+04*     3.158      .453     16.54     .771
    1.800    1.800  .344E+04  .405E+04*     3.580      .468     16.03     .842
    2.000    2.000  .131E+05  .171E+05*     5.907      .203     36.88     .407

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
 (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                              <---- hydrograph ---->   <-pipe / channel->
                         AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                         (ha)    (cms)   (hrs)   (mm)       (m)      (m/s)
   INFLOW : ID= 3:002030   118.02    1.492    7.48 17.401     1.197      .375
   OUTFLOW: ID= 1:002040   118.02    1.406    7.78 17.401     1.156      .367

--------------------------------------------------------------------------------
002:0012--------------------------------------------------------------------------
----------------------
| DESIGN NASHYD      |   Area     (ha)=   15.29   Curve Number    (CN)=82.00
| 02:201    DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=   1.290

     Unit Hyd Qpeak  (cms)=     .453

     PEAK FLOW       (cms)=     .234 (i)
     TIME TO PEAK    (hrs)=    7.300
     RUNOFF VOLUME    (mm)=   19.890
     TOTAL RAINFALL   (mm)=   46.200
     RUNOFF COEFFICIENT   =     .431

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

--------------------------------------------------------------------------------
002:0013--------------------------------------------------------------------------
----------------------
| DESIGN NASHYD      |   Area     (ha)=   10.88   Curve Number    (CN)=72.00
| 03:204    DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .850

     Unit Hyd Qpeak  (cms)=     .489

     PEAK FLOW       (cms)=     .155 (i)
     TIME TO PEAK    (hrs)=    6.817
     RUNOFF VOLUME    (mm)=   13.926
     TOTAL RAINFALL   (mm)=   46.200
     RUNOFF COEFFICIENT   =     .301

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

--------------------------------------------------------------------------------
002:0014--------------------------------------------------------------------------
------------------------
| ADD HYD (      2050) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                   (ha)     (cms)   (hrs)   (mm)    (cms)
                     ID1 01:      2040   118.02    1.406    7.78  17.40    .000
                    +ID2 02:201           15.29     .234    7.30  19.89    .000
                    +ID3 03:204           10.88     .155    6.82  13.93    .000
                     ==========================================================
                     SUM 04:      2050   144.19    1.729    7.67  17.40    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
002:0015--------------------------------------------------------------------------
--------------------
| ROUTE CHANNEL    |     Routing time step (min) =  1.00
|  IN> 04:002050   |     Number of SEGMENTS =  3
| OUT< 01:002060   |     Slopes (%), CHANNEL= .1700  FLOODPLAIN= .2000
--------------------          LENGTH =  200.00    (m)

              <------ DATA FOR SECTION (   4.0) ------>
              Distance      Elevation       Manning
                  .00           2.00          .1400
                100.00          1.80     .1400 / .0850  Main Channel
                102.75           .00          .0850      Main Channel
                104.25           .00          .0850      Main Channel
                107.00          1.80     .0850 / .1400  Main Channel
                207.00          2.00          .1400

   <------------------------- TRAVEL TIME TABLE -------------------------->
    DEPTH     ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME   D x V
      (m)      (m)   (cu.m.)   (cu.m.)      (cms)     (m/s)     (min)   (m2/s)
     .100     .100  .331E+02  .486E+01       .016      .096     34.57     .010
     .200     .200  .722E+02  .212E+02       .052      .144     23.13     .029
     .300     .300  .118E+03  .518E+02       .106      .180     18.50     .054
     .400     .400  .169E+03  .993E+02*      .177      .210     15.86     .084
     .500     .500  .226E+03  .166E+03*      .268      .236     14.10     .118
     .600     .600  .290E+03  .256E+03*      .377      .260     12.81     .156
     .700     .700  .360E+03  .370E+03*      .507      .282     11.82     .197
     .800     .800  .436E+03  .512E+03*      .659      .303     11.02     .242
     .900     .900  .518E+03  .685E+03*      .833      .322     10.36     .290
    1.000    1.000  .606E+03  .891E+03*     1.031      .340      9.79     .340
    1.100    1.100  .700E+03  .113E+04*     1.253      .358      9.31     .394
    1.200    1.200  .800E+03  .141E+04*     1.500      .375      8.89     .450
    1.300    1.300  .906E+03  .173E+04*     1.775      .392      8.51     .509
    1.400    1.400  .102E+04  .210E+04*     2.077      .408      8.18     .571
    1.500    1.500  .114E+04  .251E+04*     2.407      .423      7.87     .635
    1.600    1.600  .126E+04  .297E+04*     2.768      .439      7.60     .702
    1.700    1.700  .139E+04  .348E+04*     3.158      .453      7.35     .771
    1.800    1.800  .153E+04  .405E+04*     3.580      .468      7.12     .842
    2.000    2.000  .581E+04  .171E+05*     6.114      .210     15.84     .421

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
 (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                              <---- hydrograph ---->   <-pipe / channel->
                         AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                         (ha)    (cms)   (hrs)   (mm)       (m)      (m/s)
   INFLOW : ID= 4:002050   144.19    1.729    7.67 17.403     1.283      .389
   OUTFLOW: ID= 1:002060   144.19    1.706    7.78 17.403     1.270      .387

--------------------------------------------------------------------------------
002:0016--------------------------------------------------------------------------
----------------------
| DESIGN NASHYD      |   Area     (ha)=    4.78   Curve Number    (CN)=72.00
| 02:206    DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .890

     Unit Hyd Qpeak  (cms)=     .205

     PEAK FLOW       (cms)=     .066 (i)
     TIME TO PEAK    (hrs)=    6.850
     RUNOFF VOLUME    (mm)=   13.926
     TOTAL RAINFALL   (mm)=   46.200
     RUNOFF COEFFICIENT   =     .301

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

--------------------------------------------------------------------------------
002:0017--------------------------------------------------------------------------
------------------------
| ADD HYD (      2070) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                   (ha)     (cms)   (hrs)   (mm)    (cms)
                     ID1 01:      2060   144.19    1.706    7.78  17.40    .000
                    +ID2 02:206            4.78     .066    6.85  13.93    .000
                     ==========================================================
                     SUM 03:      2070   148.97    1.750    7.77  17.29    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
002:0018--------------------------------------------------------------------------
--------------------
| ROUTE CHANNEL    |     Routing time step (min) =  1.00
|  IN> 03:002070   |     Number of SEGMENTS =  3
| OUT< 01:002080   |     Slopes (%), CHANNEL= .1200  FLOODPLAIN= .2000
--------------------          LENGTH =  500.00    (m)

              <------ DATA FOR SECTION (   5.0) ------>
              Distance      Elevation       Manning
                  .00           2.20          .1400
                200.00          1.80     .1400 / .0850  Main Channel
                202.75           .00          .0850      Main Channel
                204.25           .00          .0850      Main Channel
                207.00          1.80     .0850 / .1400  Main Channel
                407.00          2.20          .1400

   <------------------------- TRAVEL TIME TABLE -------------------------->
    DEPTH     ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME   D x V
      (m)      (m)   (cu.m.)   (cu.m.)      (cms)     (m/s)     (min)   (m2/s)
     .112     .112  .940E+02  .882E+01       .016      .087     95.91     .010
     .225     .225  .207E+03  .389E+02       .054      .129     64.45     .029
     .337     .337  .340E+03  .957E+02       .110      .161     51.67     .054
     .450     .450  .492E+03  .185E+03       .185      .188     44.34     .085
     .562     .562  .664E+03  .311E+03       .280      .211     39.43     .119
     .675     .675  .854E+03  .481E+03*      .397      .233     35.84     .157
     .788     .788  .106E+04  .698E+03*      .537      .252     33.06     .199
     .900     .900  .129E+04  .970E+03*      .700      .270     30.81     .243
    1.013    1.013  .154E+04  .130E+04*      .888      .288     28.95     .291
    1.125    1.125  .181E+04  .170E+04*     1.102      .304     27.37     .343
    1.238    1.238  .210E+04  .215E+04*     1.344      .320     26.01     .397
    1.350    1.350  .240E+04  .271E+04*     1.615      .336     24.81     .453
    1.463    1.463  .273E+04  .333E+04*     1.916      .351     23.76     .513
    1.575    1.575  .308E+04  .404E+04*     2.247      .365     22.82     .575
    1.688    1.688  .344E+04  .484E+04*     2.611      .379     21.97     .640
    1.800    1.800  .382E+04  .574E+04*     3.008      .393     21.19     .708
    1.933    1.933  .874E+04  .141E+05*     4.111      .235     35.42     .455
    2.067    2.067  .225E+05  .388E+05*     7.293      .162     51.50     .334
    2.200    2.200  .452E+05  .829E+05*    13.799      .153     54.62     .336

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
 (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                              <---- hydrograph ---->   <-pipe / channel->
                         AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                         (ha)    (cms)   (hrs)   (mm)       (m)      (m/s)
   INFLOW : ID= 3:002070   148.97    1.750    7.77 17.291     1.401      .342
   OUTFLOW: ID= 1:002080   148.97    1.617    8.10 17.291     1.344      .335

--------------------------------------------------------------------------------
002:0019--------------------------------------------------------------------------
----------------------
| DESIGN NASHYD      |   Area     (ha)=   14.96   Curve Number    (CN)=72.00
| 02:207    DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=   1.330

     Unit Hyd Qpeak  (cms)=     .430

     PEAK FLOW       (cms)=     .153 (i)
     TIME TO PEAK    (hrs)=    7.383
     RUNOFF VOLUME    (mm)=   13.926
     TOTAL RAINFALL   (mm)=   46.200
     RUNOFF COEFFICIENT   =     .301

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

--------------------------------------------------------------------------------
002:0020--------------------------------------------------------------------------
----------------------
| DESIGN NASHYD      |   Area     (ha)=    7.92   Curve Number    (CN)=72.00
| 03:208    DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=   1.110

     Unit Hyd Qpeak  (cms)=     .273

     PEAK FLOW       (cms)=     .093 (i)
     TIME TO PEAK    (hrs)=    7.117
     RUNOFF VOLUME    (mm)=   13.926
     TOTAL RAINFALL   (mm)=   46.200
     RUNOFF COEFFICIENT   =     .301

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

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------------------------------------------------------------------------------
002:0021------------------------------------------------------------------------
*#**************************************************************************
*# Lappan Drain - Total Flow at Jefferson Boulevard
*#**************************************************************************
----------------------
| ADD HYD (      2090) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                     (ha)     (cms)   (hrs)   (mm)    (cms)
                        ID1 01:      2080   148.97   1.617   8.10  17.29    .000
                       +ID2 02:207          14.96    .153   7.38  13.93    .000
                       +ID3 03:208           7.92    .093   7.12  13.93    .000
                        ==========================================================
                        SUM 04:      2090   171.85   1.820   8.08  16.84    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
002:0022------------------------------------------------------------------------
--------------------
| ROUTE CHANNEL    |     Routing time step (min) =  1.00
|  IN> 04:002090   |     Number of SEGMENTS =  3
| OUT< 01:002100   |     Slopes (%), CHANNEL= .1200  FLOODPLAIN= .2000
--------------------                  LENGTH =  130.00    (m)

              <------ DATA FOR SECTION (   6.0) ------>
              Distance      Elevation       Manning
                  .00          2.20          .1400
                200.00          1.80     .1400 / .0850  Main Channel
                202.75           .00          .0850      Main Channel
                204.25           .00          .0850      Main Channel
                207.00          1.80     .0850 / .2000  Main Channel
                407.00          2.20          .2000

  <------------------------- TRAVEL TIME TABLE -------------------------->
   DEPTH    ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME   D x V
     (m)     (m)   (cu.m.)   (cu.m.)      (cms)     (m/s)     (min)   (m2/s)
    .112    .112  .245E+02  .882E+01       .016      .087     24.94    .010
    .225    .225  .539E+02  .389E+02*      .054      .129     16.76    .029
    .337    .337  .884E+02  .957E+02*      .110      .161     13.43    .054
    .450    .450  .128E+03  .185E+03*      .185      .188     11.53    .085
    .562    .562  .173E+03  .311E+03*      .280      .211     10.25    .119
    .675    .675  .222E+03  .481E+03*      .397      .233      9.32    .157
    .788    .788  .277E+03  .698E+03*      .537      .252      8.59    .199
    .900    .900  .336E+03  .970E+03*      .700      .270      8.01    .243
   1.013   1.013  .401E+03  .130E+04*      .888      .288      7.53    .291
   1.125   1.125  .471E+03  .170E+04*     1.102      .304      7.12    .343
   1.238   1.238  .545E+03  .216E+04*     1.344      .320      6.76    .397
   1.350   1.350  .625E+03  .271E+04*     1.615      .336      6.45    .453
   1.463   1.463  .710E+03  .333E+04*     1.916      .351      6.18    .513
   1.575   1.575  .800E+03  .404E+04*     2.247      .365      5.93    .575
   1.688   1.688  .895E+03  .484E+04*     2.611      .379      5.71    .640
   1.800   1.800  .994E+03  .574E+04*     3.008      .393      5.51    .708
   1.933   1.933  .227E+04  .141E+05*     4.041      .231      9.37    .447
   2.067   2.067  .586E+04  .388E+05*     6.848      .152     14.26    .314
   2.200   2.200  .118E+05  .829E+05*    12.488      .138     15.69    .304

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
 (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                              <---- hydrograph ---->   <-pipe / channel->
                          AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                          (ha)    (cms)   (hrs)   (mm)       (m)      (m/s)
   INFLOW : ID= 4:002090  171.85   1.820    8.08 16.843     1.427      .346
   OUTFLOW: ID= 1:002100  171.85   1.807    8.10 16.843     1.421      .345

------------------------------------------------------------------------------
002:0023------------------------------------------------------------------------
----------------------
| DESIGN NASHYD      |   Area    (ha)=    4.95   Curve Number   (CN)=73.00
| 02:212    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------  U.H. Tp(hrs)=    .480

     Unit Hyd Qpeak  (cms)=     .394

     PEAK FLOW       (cms)=     .107 (i)
     TIME TO PEAK    (hrs)=    6.367
     RUNOFF VOLUME    (mm)=   14.411
     TOTAL RAINFALL   (mm)=   46.200
     RUNOFF COEFFICIENT   =     .312

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

------------------------------------------------------------------------------
002:0024------------------------------------------------------------------------
----------------------
| ADD HYD (      2110) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                     (ha)     (cms)   (hrs)   (mm)    (cms)
                        ID1 01:      2100   171.85   1.807   8.10  16.84    .000
                       +ID2 02:212           4.95    .107   6.37  14.41    .000
                        ==========================================================
                        SUM 03:      2110   176.80   1.829   8.10  16.78    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
002:0025------------------------------------------------------------------------
--------------------
| ROUTE CHANNEL    |     Routing time step (min) =  1.00
|  IN> 03:002110   |     Number of SEGMENTS =  3
| OUT< 01:002120   |     Slopes (%), CHANNEL= .1200  FLOODPLAIN= .2000
--------------------                  LENGTH =  330.00    (m)

              <------ DATA FOR SECTION (   7.0) ------>
              Distance      Elevation       Manning
                  .00          2.20          .1400
                200.00          1.80     .1400 / .0850  Main Channel
                202.75           .00          .0850      Main Channel
                204.25           .00          .0850      Main Channel
                207.00          1.80     .0850 / .2000  Main Channel
                407.00          2.20          .2000

  <------------------------- TRAVEL TIME TABLE -------------------------->
   DEPTH    ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME   D x V
     (m)     (m)   (cu.m.)   (cu.m.)      (cms)     (m/s)     (min)   (m2/s)
    .112    .112  .621E+02  .882E+01       .016      .087     63.30    .010
    .225    .225  .137E+03  .389E+02       .054      .129     42.54    .029
    .337    .337  .224E+03  .957E+02       .110      .161     34.10    .054
    .450    .450  .325E+03  .185E+03*      .185      .188     29.26    .085
    .562    .562  .438E+03  .311E+03*      .280      .211     26.02    .119
    .675    .675  .564E+03  .481E+03*      .397      .233     23.65    .157
    .788    .788  .702E+03  .698E+03*      .537      .252     21.82    .199
    .900    .900  .854E+03  .970E+03*      .700      .270     20.34    .243
   1.013   1.013  .102E+04  .130E+04*      .888      .288     19.11    .291
   1.125   1.125  .119E+04  .170E+04*     1.102      .304     18.06    .343
   1.238   1.238  .138E+04  .216E+04*     1.344      .320     17.16    .397
   1.350   1.350  .159E+04  .271E+04*     1.615      .336     16.38    .453
   1.463   1.463  .180E+04  .333E+04*     1.916      .351     15.68    .513
   1.575   1.575  .203E+04  .404E+04*     2.247      .365     15.06    .575
   1.688   1.688  .227E+04  .484E+04*     2.611      .379     14.50    .640
   1.800   1.800  .252E+04  .574E+04*     3.008      .393     13.99    .708
   1.933   1.933  .577E+04  .141E+05*     4.041      .231     23.78    .447
   2.067   2.067  .149E+05  .388E+05*     6.848      .152     36.20    .314
   2.200   2.200  .298E+05  .829E+05*    12.488      .138     39.84    .304

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
 (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                              <---- hydrograph ---->   <-pipe / channel->
                          AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                          (ha)    (cms)   (hrs)   (mm)       (m)      (m/s)
   INFLOW : ID= 3:002110  176.80   1.829    8.10 16.775     1.430      .346
   OUTFLOW: ID= 1:002120  176.80   1.754    8.33 16.775     1.402      .343

------------------------------------------------------------------------------
002:0026------------------------------------------------------------------------
----------------------
| DESIGN NASHYD      |   Area    (ha)=    6.60   Curve Number   (CN)=82.00
| 02:EXT8   DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------  U.H. Tp(hrs)=    .820

     Unit Hyd Qpeak  (cms)=     .307

     PEAK FLOW       (cms)=     .141 (i)
     TIME TO PEAK    (hrs)=    6.750
     RUNOFF VOLUME    (mm)=   19.890
     TOTAL RAINFALL   (mm)=   46.200
     RUNOFF COEFFICIENT   =     .431

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

------------------------------------------------------------------------------
002:0027------------------------------------------------------------------------
*#**************************************************************************
*# Lappan Drain - Total Flow at McGill Drain
*#**************************************************************************
----------------------
| ADD HYD (      2130) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                     (ha)     (cms)   (hrs)   (mm)    (cms)
                        ID1 01:      2120   176.80   1.754   8.33  16.78    .000
                       +ID2 02:EXT8           6.60    .141   6.75  19.89    .000
                        ==========================================================
                        SUM 10:      2130   183.40   1.812   8.18  16.89    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
002:0028------------------------------------------------------------------------
*#**************************************************************************
*# McGILL DRAIN
*#**************************************************************************
----------------------
| DESIGN NASHYD      |   Area    (ha)=   12.75   Curve Number   (CN)=72.00
| 01:203    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------  U.H. Tp(hrs)=    .970

     Unit Hyd Qpeak  (cms)=     .502

     PEAK FLOW       (cms)=     .165 (i)
     TIME TO PEAK    (hrs)=    6.950
     RUNOFF VOLUME    (mm)=   13.926
     TOTAL RAINFALL   (mm)=   46.200
     RUNOFF COEFFICIENT   =     .301

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

------------------------------------------------------------------------------
002:0029------------------------------------------------------------------------
--------------------
| ROUTE CHANNEL    |     Routing time step (min) =  1.00
|  IN> 01:203      |     Number of SEGMENTS =  3
| OUT< 02:002140   |     Slopes (%), CHANNEL= .3500  FLOODPLAIN= .2000
--------------------                  LENGTH =  500.00    (m)

              <------ DATA FOR SECTION (   8.0) ------>
              Distance      Elevation       Manning
                  .00          1.40          .1400
                200.00          1.00     .1400 / .1000  Main Channel
                201.50           .00          .1000      Main Channel
                203.50           .00          .1000      Main Channel
                205.00          1.00     .1000 / .2000  Main Channel
                405.00          1.40          .2000

  <------------------------- TRAVEL TIME TABLE -------------------------->
   DEPTH    ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME   D x V
     (m)     (m)   (cu.m.)   (cu.m.)      (cms)     (m/s)     (min)   (m2/s)
    .071    .071  .753E+02  .154E+01       .015      .097     85.67    .007
    .143    .143  .158E+03  .646E+01       .047      .149     56.11    .021
    .214    .214  .249E+03  .152E+02       .094      .188     44.28    .040
    .286    .286  .347E+03  .283E+02       .154      .221     37.63    .063
    .357    .357  .453E+03  .462E+02       .227      .250     33.27    .089
    .429    .429  .566E+03  .693E+02       .313      .276     30.14    .118
    .500    .500  .687E+03  .982E+02       .413      .300     27.75    .150
    .571    .571  .816E+03  .133E+03       .526      .322     25.85    .184
    .643    .643  .953E+03  .175E+03       .654      .343     24.30    .220
    .714    .714  .110E+04  .224E+03       .795      .362     22.99    .259
    .786    .786  .125E+04  .280E+03       .952      .381     21.87    .299
    .857    .857  .141E+04  .345E+03      1.123      .399     20.90    .342
    .929    .929  .158E+04  .418E+03      1.310      .416     20.04    .386
   1.000   1.000  .175E+04  .500E+03      1.513      .432     19.28    .432
   1.080   1.080  .355E+04  .110E+04      1.913      .269     30.92    .291
   1.160   1.160  .855E+04  .283E+04      2.777      .162     51.31    .188
   1.240   1.240  .167E+05  .593E+04      4.375      .131     63.81    .162
   1.320   1.320  .281E+05  .106E+05      6.931      .123     67.70    .162
   1.400   1.400  .427E+05  .171E+05     10.642      .124     66.95    .174

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.

                              <---- hydrograph ---->   <-pipe / channel->
                          AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                          (ha)    (cms)   (hrs)   (mm)       (m)      (m/s)
   INFLOW : ID= 1:203     12.75    .165    6.95 13.926      .297       .226
   OUTFLOW: ID= 2:002140  12.75    .137    7.43 13.926      .265       .211

------------------------------------------------------------------------------
002:0030------------------------------------------------------------------------
----------------------
| DESIGN NASHYD      |   Area    (ha)=   12.89   Curve Number   (CN)=72.00
| 01:205    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------  U.H. Tp(hrs)=    .860

     Unit Hyd Qpeak  (cms)=     .572

     PEAK FLOW       (cms)=     .182 (i)
     TIME TO PEAK    (hrs)=    6.817
     RUNOFF VOLUME    (mm)=   13.926
     TOTAL RAINFALL   (mm)=   46.200
     RUNOFF COEFFICIENT   =     .301

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

------------------------------------------------------------------------------
002:0031------------------------------------------------------------------------
----------------------
| ADD HYD (      2150) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                     (ha)     (cms)   (hrs)   (mm)    (cms)
                        ID1 01:205           12.89    .182   6.82  13.93    .000
                       +ID2 02:      2140    12.75    .137   7.43  13.93    .000
                        ==========================================================
                        SUM 03:      2150   25.64    .300   7.10  13.93    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
002:0032------------------------------------------------------------------------
--------------------
| ROUTE CHANNEL    |     Routing time step (min) =  1.00
|  IN> 03:002150   |     Number of SEGMENTS =  3
| OUT< 01:002160   |     Slopes (%), CHANNEL= .0500  FLOODPLAIN= .2000
--------------------                  LENGTH =  360.00    (m)
```

```
                <------ DATA FOR SECTION (   9.0) ------>
                Distance      Elevation       Manning
                    .00          1.40          .1400
                  200.00         1.00     .1400 / .1000  Main Channel
                  201.50          .00          .1000      Main Channel
                  203.50          .00          .1000      Main Channel
                  205.00         1.00     .1000 / .2000  Main Channel
                  405.00         1.40          .2000

 <---------------------------- TRAVEL TIME TABLE ----------------------------->
  DEPTH    ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME    D x V
    (m)     (m)   (cu.m.)   (cu.m.)      (cms)     (m/s)     (min)    (m2/s)
   .071    .071  .542E+02  .108E+02       .006      .037    163.19     .003
   .143    .143  .114E+03  .452E+02       .018      .056    106.89     .008
   .214    .214  .179E+03  .107E+03*      .035      .071     84.35     .015
   .286    .286  .250E+03  .198E+03*      .058      .084     71.69     .024
   .357    .357  .326E+03  .323E+03*      .086      .095     63.38     .034
   .429    .429  .408E+03  .485E+03*      .118      .105     57.41     .045
   .500    .500  .495E+03  .687E+03*      .156      .113     52.87     .057
   .571    .571  .588E+03  .933E+03*      .199      .122     49.25     .070
   .643    .643  .686E+03  .123E+04*      .247      .130     46.29     .083
   .714    .714  .790E+03  .157E+04*      .301      .137     43.80     .098
   .786    .786  .899E+03  .196E+04*      .360      .144     41.67     .113
   .857    .857  .101E+04  .241E+04*      .424      .151     39.81     .129
   .929    .929  .113E+04  .293E+04*      .495      .157     38.18     .146
  1.000   1.000  .126E+04  .350E+04*      .572      .163     36.73     .163
  1.080   1.080  .256E+04  .767E+04*      .786      .111     54.17     .120
  1.160   1.160  .616E+04  .198E+05*     1.451      .085     70.71     .098
  1.240   1.240  .121E+05  .415E+05*     2.837      .085     70.85     .105
  1.320   1.320  .203E+05  .743E+05*     5.168      .092     65.36     .121
  1.400   1.400  .308E+05  .120E+06*     8.644      .101     59.35     .142

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
 (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                                <---- hydrograph ---->   <-pipe / channel->
                           AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                           (ha)    (cms)   (hrs)   (mm)       (m)      (m/s)
  INFLOW : ID= 3:002150    25.64     .300    7.10 13.926      .713      .137
  OUTFLOW: ID= 1:002160    25.64     .234    7.38 13.926      .624      .127


--------------------------------------------------------------------------------
002:0033----------------------------------------------------------------------
----------------------
| DESIGN NASHYD      |   Area     (ha)=   15.50   Curve Number    (CN)=72.00
| 02:209    DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .970

     Unit Hyd Qpeak  (cms)=     .610

     PEAK FLOW       (cms)=     .201 (i)
     TIME TO PEAK    (hrs)=    6.950
     RUNOFF VOLUME    (mm)=   13.926
     TOTAL RAINFALL   (mm)=   46.200
     RUNOFF COEFFICIENT   =     .301

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

--------------------------------------------------------------------------------
002:0034----------------------------------------------------------------------
----------------------
| ADD HYD (      2170) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
                       ID1 01:      2160    25.64     .234    7.38  13.93    .000
                      +ID2 02:209          15.50     .201    6.95  13.93    .000
                       ==========================================================
                       SUM 03:      2170    41.14     .420    7.22  13.93    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
002:0035----------------------------------------------------------------------
----------------------
| ROUTE CHANNEL    |     Routing time step (min) =  1.00
|  IN> 03:002170   |     Number of SEGMENTS =  3
| OUT< 01:002180   |     Slopes (%), CHANNEL= .1500  FLOODPLAIN= .2000
----------------------          LENGTH =  250.00    (m)

                <------ DATA FOR SECTION (  10.0) ------>
                Distance      Elevation       Manning
                    .00          1.40          .2000
                  200.00         1.00     .2000 / .1000  Main Channel
                  201.50          .00          .1000      Main Channel
                  203.50          .00          .1000      Main Channel
                  205.00         1.00     .1000 / .2000  Main Channel
                  405.00         1.40          .2000

 <---------------------------- TRAVEL TIME TABLE ----------------------------->
  DEPTH    ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME    D x V
    (m)     (m)   (cu.m.)   (cu.m.)      (cms)     (m/s)     (min)    (m2/s)
   .071    .071  .376E+02  .358E+01       .010      .064     65.43     .005
   .143    .143  .791E+02  .151E+02       .031      .097     42.85     .014
   .214    .214  .124E+03  .355E+02       .061      .123     33.82     .026
   .286    .286  .173E+03  .661E+02       .101      .145     28.74     .041
   .357    .357  .226E+03  .108E+03       .148      .164     25.41     .059
   .429    .429  .283E+03  .162E+03*      .205      .181     23.02     .078
   .500    .500  .344E+03  .229E+03*      .270      .197     21.20     .098
   .571    .571  .408E+03  .311E+03*      .344      .211     19.75     .121
   .643    .643  .476E+03  .408E+03*      .428      .225     18.56     .144
   .714    .714  .548E+03  .522E+03*      .521      .237     17.56     .169
   .786    .786  .624E+03  .654E+03*      .623      .249     16.71     .196
   .857    .857  .704E+03  .805E+03*      .735      .261     15.96     .224
   .929    .929  .788E+03  .975E+03*      .858      .272     15.31     .253
  1.000   1.000  .875E+03  .117E+04*      .990      .283     14.73     .283
  1.080   1.080  .177E+04  .256E+04*     1.270      .179     23.30     .193
  1.160   1.160  .427E+04  .661E+04*     1.927      .113     36.97     .131
  1.240   1.240  .837E+04  .138E+05*     3.185      .095     43.82     .118
  1.320   1.320  .141E+05  .248E+05*     5.229      .093     44.86     .123
  1.400   1.400  .214E+05  .399E+05*     8.222      .096     43.33     .135

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
 (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                                <---- hydrograph ---->   <-pipe / channel->
                           AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                           (ha)    (cms)   (hrs)   (mm)       (m)      (m/s)
  INFLOW : ID= 3:002170    41.14     .420    7.22 13.926      .636      .223
  OUTFLOW: ID= 1:002180    41.14     .393    7.48 13.926      .610      .218


--------------------------------------------------------------------------------
002:0036----------------------------------------------------------------------
----------------------
| DESIGN NASHYD      |   Area     (ha)=    7.27   Curve Number    (CN)=82.00
| 02:210    DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .820

     Unit Hyd Qpeak  (cms)=     .339

     PEAK FLOW       (cms)=     .155 (i)
     TIME TO PEAK    (hrs)=    6.750
     RUNOFF VOLUME    (mm)=   19.890
     TOTAL RAINFALL   (mm)=   46.200
     RUNOFF COEFFICIENT   =     .431

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

--------------------------------------------------------------------------------
002:0037----------------------------------------------------------------------
----------------------
| DESIGN NASHYD      |   Area     (ha)=   21.08   Curve Number    (CN)=80.00
| 03:EXT4   DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=   1.830

     Unit Hyd Qpeak  (cms)=     .440

     PEAK FLOW       (cms)=     .228 (i)
     TIME TO PEAK    (hrs)=    7.983
     RUNOFF VOLUME    (mm)=   18.467
     TOTAL RAINFALL   (mm)=   46.200
     RUNOFF COEFFICIENT   =     .400

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

--------------------------------------------------------------------------------
002:0038----------------------------------------------------------------------
*#*****************************************************************************
*# McGill Drain - Total Flow at Jefferson Boulevard
*#*****************************************************************************
----------------------
| ADD HYD (      2190) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
                       ID1 01:      2180    41.14     .393    7.48  13.93    .000
                      +ID2 02:210           7.27     .155    6.75  19.89    .000
                      +ID3 03:EXT4         21.08     .228    7.98  18.47    .000
                       ==========================================================
                       SUM 04:      2190    69.49     .722    7.40  15.93    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
002:0039----------------------------------------------------------------------
----------------------
| ROUTE CHANNEL    |     Routing time step (min) =  1.00
|  IN> 04:002190   |     Number of SEGMENTS =  3
| OUT< 01:002200   |     Slopes (%), CHANNEL= .3000  FLOODPLAIN= .2000
----------------------          LENGTH =  280.00    (m)

                <------ DATA FOR SECTION (  11.0) ------>
                Distance      Elevation       Manning
                    .00          1.40          .2000
                  200.00         1.00     .2000 / .1000  Main Channel
                  201.50          .00          .1000      Main Channel
                  203.50          .00          .1000      Main Channel
                  205.00         1.00     .1000 / .2000  Main Channel
                  405.00         1.40          .2000

 <---------------------------- TRAVEL TIME TABLE ----------------------------->
  DEPTH    ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME    D x V
    (m)     (m)   (cu.m.)   (cu.m.)      (cms)     (m/s)     (min)    (m2/s)
   .071    .071  .421E+02  .179E+01       .014      .090     51.82     .006
   .143    .143  .886E+02  .753E+01       .043      .138     33.94     .020
   .214    .214  .139E+03  .178E+02       .087      .174     26.78     .037
   .286    .286  .194E+03  .330E+02       .142      .205     22.76     .059
   .357    .357  .254E+03  .539E+02       .210      .232     20.12     .083
   .429    .429  .317E+03  .809E+02       .290      .256     18.23     .110
   .500    .500  .385E+03  .115E+03       .382      .278     16.79     .139
   .571    .571  .457E+03  .155E+03       .487      .298     15.64     .171
   .643    .643  .534E+03  .204E+03       .605      .318     14.70     .204
   .714    .714  .614E+03  .261E+03       .736      .336     13.91     .240
   .786    .786  .699E+03  .327E+03       .881      .353     13.23     .277
   .857    .857  .789E+03  .402E+03*     1.040      .369     12.64     .316
   .929    .929  .882E+03  .488E+03*     1.213      .385     12.12     .357
  1.000   1.000  .980E+03  .583E+03*     1.401      .400     11.66     .400
  1.080   1.080  .199E+04  .128E+04*     1.761      .248     18.81     .268
  1.160   1.160  .479E+04  .331E+04*     2.505      .147     31.85     .170
  1.240   1.240  .938E+04  .692E+04*     3.856      .115     40.54     .143
  1.320   1.320  .158E+05  .124E+05*     5.997      .107     43.81     .141
  1.400   1.400  .239E+05  .199E+05*     9.093      .106     43.88     .149

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
 (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                                <---- hydrograph ---->   <-pipe / channel->
                           AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                           (ha)    (cms)   (hrs)   (mm)       (m)      (m/s)
  INFLOW : ID= 4:002190    69.49     .722    7.40 15.927      .707      .334
  OUTFLOW: ID= 1:002200    69.49     .705    7.63 15.927      .697      .331


--------------------------------------------------------------------------------
002:0040----------------------------------------------------------------------
----------------------
| DESIGN NASHYD      |   Area     (ha)=   14.81   Curve Number    (CN)=82.00
| 02:EXT5   DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=   1.520

     Unit Hyd Qpeak  (cms)=     .372

     PEAK FLOW       (cms)=     .200 (i)
     TIME TO PEAK    (hrs)=    7.567
     RUNOFF VOLUME    (mm)=   19.890
     TOTAL RAINFALL   (mm)=   46.200
     RUNOFF COEFFICIENT   =     .431

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

--------------------------------------------------------------------------------
002:0041----------------------------------------------------------------------
----------------------
| ADD HYD (      2210) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
                       ID1 01:      2200    69.49     .705    7.63  15.93    .000
                      +ID2 02:EXT5          14.81     .200    7.57  19.89    .000
                       ==========================================================
                       SUM 03:      2210    84.30     .905    7.63  16.62    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
002:0042----------------------------------------------------------------------
*#*****************************************************************************
*# McGill Drain - Total Flow at Lappan Drain Confluence
*#*****************************************************************************
----------------------
| ADD HYD (      2220) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
                       ID1 03:      2210    84.30     .905    7.63  16.62    .000
                      +ID2 10:      2130   183.40    1.812    8.18  16.89    .000
                       ==========================================================
                       SUM 01:      2220   267.70    2.655    8.12  16.80    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
002:0043----------------------------------------------------------------------
----------------------
| ROUTE CHANNEL    |     Routing time step (min) =  1.00
|  IN> 01:002220   |     Number of SEGMENTS =  3
| OUT< 02:002230   |     Slopes (%), CHANNEL= .1500  FLOODPLAIN= .2000
----------------------          LENGTH =  200.00    (m)

                <------ DATA FOR SECTION (  12.0) ------>
                Distance      Elevation       Manning
                    .00          1.80          .1400
                  200.00         1.40     .1400 / .0850  Main Channel
                  202.60          .00          .0850      Main Channel
                  204.40          .00          .0850      Main Channel
                  207.00         1.40     .0850 / .2000  Main Channel
                  407.00         1.80          .2000
```

```
<---------------------------- TRAVEL TIME TABLE ----------------------------->
 DEPTH     ELEV    X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME    D x V
   (m)      (m)   (cu.m.)    (cu.m.)     (cms)      (m/s)     (min)     (m2/s)
  .093     .093  .368E+02  .573E+01      .016       .087     38.15      .008
  .187     .187  .801E+02  .249E+02      .053       .131     25.37      .025
  .280     .280  .130E+03  .606E+02      .107       .165     20.20      .046
  .373     .373  .186E+03  .116E+03*     .180       .193     17.26      .072
  .467     .467  .249E+03  .194E+03*     .271       .218     15.31      .102
  .560     .560  .318E+03  .297E+03*     .382       .240     13.89      .134
  .653     .653  .394E+03  .429E+03*     .513       .260     12.80      .170
  .747     .747  .476E+03  .592E+03*     .665       .280     11.92      .209
  .840     .840  .564E+03  .790E+03*     .840       .298     11.20      .250
  .933     .933  .660E+03  .103E+04*    1.039       .315     10.58      .294
 1.027    1.027  .761E+03  .130E+04*    1.262       .332     10.05      .340
 1.120    1.120  .869E+03  .162E+04*    1.510       .348      9.59      .389
 1.213    1.213  .984E+03  .199E+04*    1.785       .363      9.18      .440
 1.307    1.307  .110E+04  .241E+04*    2.087       .378      8.82      .494
 1.400    1.400  .123E+04  .287E+04*    2.418       .392      8.49      .549
 1.500    1.500  .237E+04  .593E+04*    3.077       .259     12.85      .389
 1.600    1.600  .551E+04  .147E+05*    4.571       .166     20.10      .265
 1.700    1.700  .107E+05  .302E+05*    7.392       .139     24.02      .236
 1.800    1.800  .178E+05  .534E+05*   11.944       .134     24.83      .242

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
 (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                                <---- hydrograph ---->   <-pipe / channel->
                             AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                              (ha)    (cms)   (hrs)   (mm)      (m)      (m/s)
  INFLOW : ID= 1:002220     267.70    2.655    8.12 16.804     1.436      .331
  OUTFLOW: ID= 2:002230     267.70    2.597    8.35 16.804     1.428      .344


--------------------------------------------------------------------------------
002:0044----------------------------------------------------------------------
---------------------
| DESIGN NASHYD     |   Area     (ha)=   16.88   Curve Number    (CN)=72.00
| 01:213    DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=    .770

     Unit Hyd Qpeak  (cms)=     .837

     PEAK FLOW       (cms)=     .258 (i)
     TIME TO PEAK    (hrs)=    6.717
     RUNOFF VOLUME    (mm)=   13.926
     TOTAL RAINFALL   (mm)=   46.200
     RUNOFF COEFFICIENT   =    .301

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

--------------------------------------------------------------------------------
002:0045----------------------------------------------------------------------
-----------------------
| ADD HYD (      2240) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
-----------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
                      ID1 01:213          16.88      .258    6.72  13.93     .000
                     +ID2 02:      2230   267.70    2.597    8.35  16.80     .000
                      ==========================================================
                      SUM 03:      2240   284.58    2.690    8.35  16.63     .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
002:0046----------------------------------------------------------------------
--------------------
| ROUTE CHANNEL     |     Routing time step (min) =  1.00
|  IN> 03:002240    |     Number of SEGMENTS =  3
| OUT< 01:002250    |     Slopes (%), CHANNEL= .1500  FLOODPLAIN= .2000
--------------------          LENGTH =  170.00     (m)

               <------ DATA FOR SECTION (  13.0) ------>
               Distance      Elevation       Manning
                  .00           1.80          .1400
                200.00          1.40     .1400 / .0850  Main Channel
                202.60           .00          .0850      Main Channel
                204.40           .00          .0850      Main Channel
                207.00          1.40     .0850 / .2000  Main Channel
                407.00          1.80          .2000

<---------------------------- TRAVEL TIME TABLE ----------------------------->
 DEPTH     ELEV    X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME    D x V
   (m)      (m)   (cu.m.)    (cu.m.)     (cms)      (m/s)     (min)     (m2/s)
  .093     .093  .313E+02  .573E+01      .016       .087     32.43      .008
  .187     .187  .681E+02  .249E+02      .053       .131     21.56      .025
  .280     .280  .110E+03  .606E+02*     .107       .165     17.17      .046
  .373     .373  .158E+03  .116E+03*     .180       .193     14.67      .072
  .467     .467  .212E+03  .194E+03*     .271       .218     13.02      .102
  .560     .560  .270E+03  .297E+03*     .382       .240     11.81      .134
  .653     .653  .335E+03  .429E+03*     .513       .260     10.88      .170
  .747     .747  .404E+03  .592E+03*     .665       .280     10.13      .209
  .840     .840  .480E+03  .790E+03*     .840       .298      9.52      .250
  .933     .933  .561E+03  .103E+04*    1.039       .315      8.99      .294
 1.027    1.027  .647E+03  .130E+04*    1.262       .332      8.55      .340
 1.120    1.120  .739E+03  .162E+04*    1.510       .348      8.15      .389
 1.213    1.213  .836E+03  .199E+04*    1.785       .363      7.81      .440
 1.307    1.307  .939E+03  .241E+04*    2.087       .378      7.50      .494
 1.400    1.400  .105E+04  .287E+04*    2.418       .392      7.22      .549
 1.500    1.500  .202E+04  .593E+04*    3.077       .259     10.92      .389
 1.600    1.600  .469E+04  .147E+05*    4.571       .166     17.08      .265
 1.700    1.700  .905E+04  .302E+05*    7.392       .139     20.42      .236
 1.800    1.800  .151E+05  .534E+05*   11.944       .134     21.10      .242

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
 (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                                <---- hydrograph ---->   <-pipe / channel->
                             AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                              (ha)    (cms)   (hrs)   (mm)      (m)      (m/s)
  INFLOW : ID= 3:002240     284.58    2.690    8.35 16.634     1.441      .324
  OUTFLOW: ID= 1:002250     284.58    2.647    8.60 16.634     1.435      .333


--------------------------------------------------------------------------------
002:0047----------------------------------------------------------------------
---------------------
| DESIGN NASHYD     |   Area     (ha)=   24.11   Curve Number    (CN)=80.00
| 02:EXT6   DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=   1.520

     Unit Hyd Qpeak  (cms)=     .606

     PEAK FLOW       (cms)=     .300 (i)
     TIME TO PEAK    (hrs)=    7.583
     RUNOFF VOLUME    (mm)=   18.467
     TOTAL RAINFALL   (mm)=   46.200
     RUNOFF COEFFICIENT   =    .400

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

--------------------------------------------------------------------------------
002:0048----------------------------------------------------------------------
---------------------
| DESIGN NASHYD     |   Area     (ha)=   14.49   Curve Number    (CN)=82.00
| 03:211    DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=   1.070

     Unit Hyd Qpeak  (cms)=     .517

     PEAK FLOW       (cms)=     .255 (i)
     TIME TO PEAK    (hrs)=    7.050
     RUNOFF VOLUME    (mm)=   19.890
     TOTAL RAINFALL   (mm)=   46.200
     RUNOFF COEFFICIENT   =    .431

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

--------------------------------------------------------------------------------
002:0049----------------------------------------------------------------------
--------------------
| ROUTE CHANNEL     |     Routing time step (min) =  1.00
|  IN> 03:211       |     Number of SEGMENTS =  3
| OUT< 04:002280    |     Slopes (%), CHANNEL= .2000  FLOODPLAIN= .2000
--------------------          LENGTH =  500.00     (m)

               <------ DATA FOR SECTION (  15.0) ------>
               Distance      Elevation       Manning
                  .00           .62          .1400
                10.00           .60     .1400 / .0400  Main Channel
                11.80           .00          .0400      Main Channel
                12.80           .00          .0400      Main Channel
                14.60           .62     .0400 / .2000  Main Channel
                24.60           .60          .2000

<---------------------------- TRAVEL TIME TABLE ----------------------------->
 DEPTH     ELEV    X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME    D x V
   (m)      (m)   (cu.m.)    (cu.m.)     (cms)      (m/s)     (min)     (m2/s)
  .030     .030  .163E+02  .245E+00      .003       .102     81.78      .003
  .060     .060  .353E+02  .106E+01      .011       .155     53.91      .009
  .090     .090  .570E+02  .256E+01      .022       .195     42.68      .018
  .120     .120  .813E+02  .488E+01      .037       .229     36.32      .028
  .150     .150  .108E+03  .812E+01      .056       .260     32.11      .039
  .180     .180  .138E+03  .124E+02      .079       .287     29.06      .052
  .210     .210  .170E+03  .179E+02      .106       .312     26.72      .065
  .240     .240  .205E+03  .246E+02      .138       .335     24.85      .080
  .270     .270  .243E+03  .327E+02      .173       .358     23.31      .097
  .300     .300  .283E+03  .424E+02      .214       .379     22.01      .114
  .330     .330  .326E+03  .537E+02      .260       .399     20.89      .132
  .360     .360  .371E+03  .668E+02      .311       .418     19.92      .151
  .390     .390  .419E+03  .818E+02      .367       .437     19.06      .171
  .420     .420  .470E+03  .988E+02      .428       .455     18.30      .191
  .450     .450  .524E+03  .118E+03      .496       .473     17.61      .213
  .480     .480  .580E+03  .139E+03      .569       .491     16.99      .235
  .510     .510  .639E+03  .163E+03      .648       .507     16.42      .259
  .540     .540  .700E+03  .189E+03      .734       .524     15.90      .283
  .570     .570  .764E+03  .218E+03      .826       .540     15.43      .308

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.

                                <---- hydrograph ---->   <-pipe / channel->
                             AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                              (ha)    (cms)   (hrs)   (mm)      (m)      (m/s)
  INFLOW : ID= 3:211        14.49     .255    7.05 19.890      .327      .397
  OUTFLOW: ID= 4:002280     14.49     .238    7.35 19.890      .314      .388


--------------------------------------------------------------------------------
002:0050----------------------------------------------------------------------
---------------------
| DESIGN NASHYD     |   Area     (ha)=   10.57   Curve Number    (CN)=72.00
| 03:216    DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=   1.210

     Unit Hyd Qpeak  (cms)=     .334

     PEAK FLOW       (cms)=     .116 (i)
     TIME TO PEAK    (hrs)=    7.233
     RUNOFF VOLUME    (mm)=   13.926
     TOTAL RAINFALL   (mm)=   46.200
     RUNOFF COEFFICIENT   =    .301

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

--------------------------------------------------------------------------------
002:0051----------------------------------------------------------------------
-----------------------
| ADD HYD (      2290) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
-----------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
                      ID1 03:216          10.57      .116    7.23  13.93     .000
                     +ID2 04:      2280   14.49      .238    7.35  19.89     .000
                      ==========================================================
                      SUM 05:      2290   25.06      .354    7.32  17.37     .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
002:0052----------------------------------------------------------------------
-----------------------
| ADD HYD (      2260) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
-----------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
                      ID1 01:      2250   284.58    2.647    8.60  16.63     .000
                     +ID2 02:EXT6          24.11      .300    7.58  18.47     .000
                     +ID3 05:      2290   25.06      .354    7.32  17.37     .000
                      ==========================================================
                      SUM 03:      2260   333.75    3.146    8.37  16.82     .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
002:0053----------------------------------------------------------------------
--------------------
| ROUTE CHANNEL     |     Routing time step (min) =  1.00
|  IN> 03:002260    |     Number of SEGMENTS =  3
| OUT< 10:002295    |     Slopes (%), CHANNEL= .0800  FLOODPLAIN= .2000
--------------------          LENGTH =  370.00     (m)

               <------ DATA FOR SECTION (  14.0) ------>
               Distance      Elevation       Manning
                  .00           1.80          .1400
                200.00          1.40     .1400 / .0850  Main Channel
                202.60           .00          .0850      Main Channel
                204.40           .00          .0850      Main Channel
                207.00          1.40     .0850 / .2000  Main Channel
                407.00          1.80          .2000

<---------------------------- TRAVEL TIME TABLE ----------------------------->
 DEPTH     ELEV    X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME    D x V
   (m)      (m)   (cu.m.)    (cu.m.)     (cms)      (m/s)     (min)     (m2/s)
  .093     .093  .681E+02  .107E+02      .012       .064     96.65      .006
  .187     .187  .148E+03  .467E+02      .038       .096     64.26      .018
  .280     .280  .240E+03  .114E+03      .078       .121     51.18      .034
  .373     .373  .344E+03  .217E+03*     .131       .141     43.73      .053
  .467     .467  .460E+03  .363E+03*     .198       .159     38.79      .074
  .560     .560  .588E+03  .557E+03*     .279       .175     35.19      .098
  .653     .653  .728E+03  .804E+03*     .374       .190     32.42      .124
  .747     .747  .880E+03  .111E+04*     .486       .204     30.20      .152
  .840     .840  .104E+04  .148E+04*     .614       .217     28.36      .183
  .933     .933  .122E+04  .192E+04*     .759       .230     26.81      .215
 1.027    1.027  .141E+04  .244E+04*     .921       .242     25.47      .249
 1.120    1.120  .161E+04  .304E+04*    1.103       .254     24.30      .284
 1.213    1.213  .182E+04  .373E+04*    1.304       .265     23.27      .322
 1.307    1.307  .204E+04  .451E+04*    1.524       .276     22.34      .361
 1.400    1.400  .228E+04  .539E+04*    1.766       .287     21.51      .401
 1.500    1.500  .439E+04  .111E+05*    2.297       .194     31.84      .290
 1.600    1.600  .102E+05  .276E+05*    3.654       .133     46.51      .212
 1.700    1.700  .197E+05  .566E+05*    6.329       .119     51.90      .202
 1.800    1.800  .329E+05  .100E+06*   10.726       .121     51.14      .217

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
 (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                                <---- hydrograph ---->   <-pipe / channel->
                             AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
```

```
                                (ha)    (cms)   (hrs)    (mm)       (m)      (m/s)
  INFLOW : ID= 3:002260     333.75    3.146    8.37 16.822     1.563      .150
  OUTFLOW: ID=10:002295     333.75    2.854    9.27 16.822     1.541      .163


--------------------------------------------------------------------------------
002:0054----------------------------------------------------------------------
---------------------
| DESIGN NASHYD     |   Area     (ha)=   17.47   Curve Number    (CN)=76.00
| 03:214    DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=    .600

     Unit Hyd Qpeak  (cms)=    1.112

     PEAK FLOW       (cms)=     .366 (i)
     TIME TO PEAK    (hrs)=    6.517
     RUNOFF VOLUME    (mm)=   15.996
     TOTAL RAINFALL   (mm)=   46.200
     RUNOFF COEFFICIENT   =     .346

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

--------------------------------------------------------------------------------
002:0055----------------------------------------------------------------------
*#**********************************************************************
*# Calculate culvert routing and flow split near eastern site boundary
*#   - Storage volumes calculated based on site survey
*#   - Discharges calculated based on the 600 mm diameter CSP and 1500 mm
*#     diameter CSP capacities
*#**********************************************************************
---------------------
| ROUTE RESERVOIR   |    Requested routing time step =  1.0 min.
|  IN>03:(214   )   |
| OUT<01:(002300)   |    =========  OUTFLOW STORAGE TABLE  =========
---------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                           (cms)    (ha.m.)   |    (cms)    (ha.m.)
                            .000  .0000E+00   |    1.130  .4600E+00
                            .150  .0000E+00   |    5.470  .8100E+00
                            .450  .0000E+00   |   83.090  .3400E+01
                            .820  .6500E-01   |     .000  .0000E+00

     ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
     ---------------            (ha)     (cms)     (hrs)       (mm)
     INFLOW >03: (214   )      17.47      .366     6.517     15.996
     OUTFLOW<01: (002300)      17.47      .366     6.517     15.996

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=  100.000
                   TIME SHIFT OF PEAK FLOW       (min)=      .00
                   MAXIMUM  STORAGE   USED       (ha.m.)=.3322E-08

--------------------------------------------------------------------------------
002:0056----------------------------------------------------------------------
---------------------
| DIVERT HYD        |
| INID=01  (002300)|
---------------------
      Outflow / Inflow  Relationships
      Flow 02 +  Flow 03 =  Total
       (cms)     (cms)      (cms)
         .000      .000       .000
         .150      .000       .150
         .400      .050       .450
         .680      .140       .820
         .930      .200      1.130
        1.040     4.430      5.470
        1.460    81.630     83.090

           NHYD       AREA    QPEAK  TpeakDate_hh:mm       R.V.  NFE WetHrs
                       (ha)    (cms)                      (mm)          (hrs)
   IDin = 01:002300    17.47     .366  No_date    6:31     15.996    1    13.
   ==========================================================================
   IDout= 02:002310    16.69     .330  No_date    6:31     15.996    1    13.
   IDout= 03:002320      .78     .036  No_date    6:31     15.996    1     2.
--------------------------------------------------------------------------------
002:0057----------------------------------------------------------------------
---------------------
| DESIGN NASHYD     |   Area     (ha)=    5.34   Curve Number    (CN)=72.00
| 01:215    DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=    .860

     Unit Hyd Qpeak  (cms)=     .237

     PEAK FLOW       (cms)=     .075 (i)
     TIME TO PEAK    (hrs)=    6.817
     RUNOFF VOLUME    (mm)=   13.926
     TOTAL RAINFALL   (mm)=   46.200
     RUNOFF COEFFICIENT   =     .301

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

--------------------------------------------------------------------------------
002:0058----------------------------------------------------------------------
------------------------
| ADD HYD (      2330) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
                         ID1 01:215          5.34      .075    6.82  13.93     .000
                        +ID2 02:      2310   16.69      .330    6.52  16.00     .000
                         ========================================================
                         SUM 04:       2330   22.03     .399    6.57  15.49     .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
002:0059----------------------------------------------------------------------
---------------------
| DESIGN NASHYD     |   Area     (ha)=   18.59   Curve Number    (CN)=82.00
| 01:EXT7   DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=   1.470

     Unit Hyd Qpeak  (cms)=     .483

     PEAK FLOW       (cms)=     .257 (i)
     TIME TO PEAK    (hrs)=    7.517
     RUNOFF VOLUME    (mm)=   19.890
     TOTAL RAINFALL   (mm)=   46.200
     RUNOFF COEFFICIENT   =     .431

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

--------------------------------------------------------------------------------
002:0060----------------------------------------------------------------------
*#**********************************************************************
*# McGill Drain - Total Flow at Eastern WSP
*#**********************************************************************
------------------------
| ADD HYD (      2340) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
                         ID1 01:EXT7        18.59      .257    7.52  19.89     .000
                        +ID2 04:      2330   22.03      .399    6.57  15.49     .000
                        +ID3 10:      2295  333.75     2.854    9.27  16.82     .000
                         ========================================================
                         SUM 05:       2340  374.37    3.104    9.08  16.90     .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
002:0061----------------------------------------------------------------------
*#**********************************************************************
*# AREA CHECK
*#**********************************************************************
------------------------
| ADD HYD (      2350) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
                         ID1 03:       2320      .78     .036    6.52  16.00     .000
                        +ID2 05:       2340   374.37    3.104    9.08  16.90     .000
                         ========================================================
                         SUM 01:       2350   375.15    3.104    9.08  16.89     .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
002:0062----------------------------------------------------------------------
  ** END OF RUN :   4

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




-------------------
| START             |  Project  dir.: F:\WSP\
-------------------  Rainfall dir.: F:\WSP\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 005
    NSTORM=   1
           #  1=12scs5.stm
--------------------------------------------------------------------------------
005:0002----------------------------------------------------------------------
*#**********************************************************************
*#  Project Name: [Windsor Solar Project] Project Number: [1335-60106]
*#  Date         : 02-10-2016
*#  Modeller     : [NE]
*#  Company      : Stantec Consulting Ltd. (London)
*#  License #    :  4730904
*#**********************************************************************
*#
*#  Proposed Conditions
*#  25 mm Water Quality Event
*#  2, 5, 10, 25, 50, 100, 250-year 3-Hour Chicago Design Storm
*#
*#**********************************************************************
--------------------------------------------------------------------------------
005:0002----------------------------------------------------------------------
---------------------
| READ STORM        |    Filename: 5-yr scs 12 hr windsor
| Ptotal=  60.10 mm|    Comments: 5-yr scs 12 hr windsor
---------------------
            TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
            hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
             .50   1.202 |   3.50   2.404 |   6.50  10.818 |   9.50   2.404
            1.00   1.202 |   4.00   2.404 |   7.00   4.808 |  10.00   1.202
            1.50   1.202 |   4.50   3.606 |   7.50   3.606 |  10.50   1.202
            2.00   1.202 |   5.00   4.808 |   8.00   3.606 |  11.00   1.202
            2.50   2.404 |   5.50   7.212 |   8.50   2.404 |  11.50   1.202
            3.00   2.404 |   6.00  54.090 |   9.00   2.404 |  12.00   1.202

--------------------------------------------------------------------------------
005:0003----------------------------------------------------------------------
*#**********************************************************************
*# LAPPAN DRAIN
*#**********************************************************************
---------------------
| DESIGN NASHYD     |   Area     (ha)=   42.26   Curve Number    (CN)=73.00
| 01:EXT1   DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=   1.110

     Unit Hyd Qpeak  (cms)=    1.454

     PEAK FLOW       (cms)=     .810 (i)
     TIME TO PEAK    (hrs)=    7.101
     RUNOFF VOLUME    (mm)=   22.511
     TOTAL RAINFALL   (mm)=   60.100
     RUNOFF COEFFICIENT   =     .375

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

--------------------------------------------------------------------------------
005:0004----------------------------------------------------------------------
---------------------
| ROUTE CHANNEL     |     Routing time step (min) =  1.00
|  IN> 01:EXT1      |     Number of SEGMENTS =  3
| OUT< 02:002000    |     Slopes (%), CHANNEL= .1000  FLOODPLAIN= .2000
---------------------                 LENGTH =  700.00     (m)

              <------ DATA FOR SECTION (   1.0) ------>
              Distance      Elevation       Manning
                  .00          1.40          .2000
                100.00          1.20     .2000 / .0850  Main Channel
                101.80           .00          .0850      Main Channel
                103.00           .00          .0850      Main Channel
                104.80          1.20     .0850 / .2000  Main Channel
                204.80          1.40          .2000

  <---------------------------- TRAVEL TIME TABLE ----------------------------->
   DEPTH    ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME   D x V
     (m)     (m)   (cu.m.)   (cu.m.)      (cms)     (m/s)     (min)   (m2/s)
    .071    .071  .645E+02  .325E+01       .005      .059    197.27     .004
    .141    .141  .140E+03  .141E+02       .018      .089    131.37     .013
    .212    .212  .225E+03  .340E+02       .036      .111    104.80     .024
    .282    .282  .321E+03  .647E+02       .060      .130     89.71     .037
    .353    .353  .427E+03  .108E+03       .089      .146     79.68     .052
    .424    .424  .544E+03  .165E+03       .125      .161     72.40     .068
    .494    .494  .671E+03  .237E+03       .168      .175     66.79     .086
    .565    .565  .809E+03  .326E+03       .217      .187     62.29     .106
    .635    .635  .957E+03  .434E+03       .272      .199     58.56     .127
    .706    .706  .112E+04  .563E+03*      .336      .211     55.41     .149
    .776    .776  .129E+04  .713E+03*      .407      .221     52.69     .172
    .847    .847  .146E+04  .886E+03*      .485      .232     50.32     .196
    .918    .918  .166E+04  .108E+04*      .572      .242     48.22     .222
    .988    .988  .186E+04  .131E+04*      .667      .252     46.35     .249
   1.059   1.059  .207E+04  .156E+04*      .771      .261     44.66     .277
   1.129   1.129  .229E+04  .185E+04*      .884      .271     43.13     .306
   1.200   1.200  .252E+04  .216E+04*     1.006      .280     41.73     .335
   1.300   1.300  .636E+04  .590E+04*     1.392      .153     76.12     .199
   1.400   1.400  .172E+05  .172E+05*     2.456      .100    116.67     .140

  X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
  S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
  (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                                  <---- hydrograph ---->   <-pipe / channel->
                           AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                           (ha)    (cms)   (hrs)   (mm)       (m)      (m/s)
   INFLOW : ID= 1:EXT1     42.26     .810    7.10 22.511      1.083      .264
   OUTFLOW: ID= 2:002000   42.26     .643    7.63 22.511       .971      .249

--------------------------------------------------------------------------------
005:0005----------------------------------------------------------------------
---------------------
| DESIGN NASHYD     |   Area     (ha)=   22.52   Curve Number    (CN)=82.00
| 01:EXT2   DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=   1.270

     Unit Hyd Qpeak  (cms)=     .677

     PEAK FLOW       (cms)=     .530 (i)
     TIME TO PEAK    (hrs)=    7.251
     RUNOFF VOLUME    (mm)=   30.029
     TOTAL RAINFALL   (mm)=   60.100
     RUNOFF COEFFICIENT   =     .500

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

```
005:0006
| DESIGN NASHYD      |   Area     (ha)=   42.81   Curve Number   (CN)=82.00
| 03:EXT3   DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
                       U.H. Tp(hrs)=   1.110

     Unit Hyd Qpeak  (cms)=    1.473

     PEAK FLOW       (cms)=    1.115 (i)
     TIME TO PEAK    (hrs)=    7.068
     RUNOFF VOLUME    (mm)=   30.029
     TOTAL RAINFALL   (mm)=   60.100
     RUNOFF COEFFICIENT   =     .500

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

005:0007
*#####################################################################################
*# Lappan Drain - Total Flow at Pilette Road
*#####################################################################################
| ADD HYD (      2010) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
                                            (ha)     (cms)   (hrs)   (mm)    (cms)
                    ID1 01:EXT2           22.52     .530    7.25  30.03     .000
                   +ID2 02:      2000     42.26     .643    7.63  22.51     .000
                   +ID3 03:EXT3           42.81    1.115    7.07  30.03     .000
                    ==========================================================
                    SUM 04:       2010   107.59    2.235    7.27  27.08     .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

005:0008
| ROUTE CHANNEL    |     Routing time step (min) =  1.00
|  IN> 04:002010   |     Number of SEGMENTS =  3
| OUT< 01:002020   |     Slopes (%), CHANNEL= .1700  FLOODPLAIN= .2000
                                 LENGTH =  350.00    (m)

              <------ DATA FOR SECTION (   2.0) ------>
              Distance      Elevation       Manning
                 .00           2.00          .2000
               100.00           1.80     .2000 / .0850  Main Channel
               102.75            .00          .0850      Main Channel
               104.25            .00          .0850      Main Channel
               107.00           1.80     .0850 / .1400  Main Channel
               207.00           2.00          .1400

   <---------------------------- TRAVEL TIME TABLE ---------------------------->
    DEPTH    ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME   D x V
      (m)     (m)   (cu.m.)   (cu.m.)     (cms)     (m/s)     (min)   (m2/s)
     .100    .100  .578E+02  .486E+01      .016      .096     60.50     .010
     .200    .200  .126E+03  .212E+02      .052      .144     40.48     .029
     .300    .300  .206E+03  .518E+02      .106      .180     32.38     .054
     .400    .400  .296E+03  .993E+02      .177      .210     27.75     .084
     .500    .500  .396E+03  .166E+03      .268      .236     24.67     .118
     .600    .600  .508E+03  .256E+03*     .377      .260     22.42     .156
     .700    .700  .630E+03  .370E+03*     .507      .282     20.68     .197
     .800    .800  .762E+03  .512E+03*     .659      .303     19.28     .242
     .900    .900  .906E+03  .685E+03*     .833      .322     18.12     .290
    1.000   1.000  .106E+04  .891E+03*    1.031      .340     17.14     .340
    1.100   1.100  .122E+04  .113E+04*    1.253      .358     16.29     .394
    1.200   1.200  .140E+04  .141E+04*    1.500      .375     15.55     .450
    1.300   1.300  .159E+04  .173E+04*    1.775      .392     14.89     .509
    1.400   1.400  .178E+04  .210E+04*    2.077      .408     14.31     .571
    1.500   1.500  .199E+04  .251E+04*    2.407      .423     13.78     .635
    1.600   1.600  .221E+04  .297E+04*    2.768      .439     13.30     .702
    1.700   1.700  .244E+04  .348E+04*    3.158      .453     12.87     .771
    1.800   1.800  .268E+04  .405E+04*    3.580      .468     12.46     .842
    2.000   2.000  .102E+05  .171E+05*    5.907      .203     28.69     .407

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
 (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                                <---- hydrograph ---->   <-pipe / channel->
                             AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                             (ha)    (cms)   (hrs)   (mm)     (m)       (m/s)
   INFLOW : ID= 4:002010    107.59   2.235    7.27 27.076    1.448       .415
   OUTFLOW: ID= 1:002020    107.59   2.150    7.47 27.076    1.420       .411

005:0009
| DESIGN NASHYD      |   Area     (ha)=   10.43   Curve Number   (CN)=72.00
| 02:202    DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
                       U.H. Tp(hrs)=    .970

     Unit Hyd Qpeak  (cms)=     .411

     PEAK FLOW       (cms)=     .214 (i)
     TIME TO PEAK    (hrs)=    6.934
     RUNOFF VOLUME    (mm)=   21.820
     TOTAL RAINFALL   (mm)=   60.100
     RUNOFF COEFFICIENT   =     .363

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

005:0010
| ADD HYD (      2030) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
                                            (ha)     (cms)   (hrs)   (mm)    (cms)
                    ID1 01:       2020   107.59    2.150    7.47  27.08     .000
                   +ID2 02:202            10.43     .214    6.93  21.82     .000
                    ==========================================================
                    SUM 03:       2030   118.02    2.336    7.43  26.61     .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

005:0011
| ROUTE CHANNEL    |     Routing time step (min) =  1.00
|  IN> 03:002030   |     Number of SEGMENTS =  3
| OUT< 01:002040   |     Slopes (%), CHANNEL= .1700  FLOODPLAIN= .2000
                                 LENGTH =  450.00    (m)

              <------ DATA FOR SECTION (   3.0) ------>
              Distance      Elevation       Manning
                 .00           2.00          .2000
               100.00           1.80     .2000 / .0850  Main Channel
               102.75            .00          .0850      Main Channel
               104.25            .00          .0850      Main Channel
               107.00           1.80     .0850 / .1400  Main Channel
               207.00           2.00          .1400

   <---------------------------- TRAVEL TIME TABLE ---------------------------->
    DEPTH    ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME   D x V
      (m)     (m)   (cu.m.)   (cu.m.)     (cms)     (m/s)     (min)   (m2/s)
     .100    .100  .744E+02  .486E+01      .016      .096     77.79     .010
     .200    .200  .163E+03  .212E+02      .052      .144     52.05     .029
     .300    .300  .264E+03  .518E+02      .106      .180     41.63     .054
     .400    .400  .380E+03  .993E+02      .177      .210     35.68     .084
     .500    .500  .509E+03  .166E+03      .268      .236     31.72     .118
     .600    .600  .653E+03  .256E+03      .377      .260     28.82     .156
     .700    .700  .809E+03  .370E+03      .507      .282     26.59     .197
     .800    .800  .980E+03  .512E+03*     .659      .303     24.79     .242
     .900    .900  .116E+04  .685E+03*     .833      .322     23.30     .290
    1.000   1.000  .136E+04  .891E+03*    1.031      .340     22.04     .340
    1.100   1.100  .157E+04  .113E+04*    1.253      .358     20.95     .394
    1.200   1.200  .180E+04  .141E+04*    1.500      .375     19.99     .450
    1.300   1.300  .204E+04  .173E+04*    1.775      .392     19.15     .509
    1.400   1.400  .229E+04  .210E+04*    2.077      .408     18.40     .571
    1.500   1.500  .256E+04  .251E+04*    2.407      .423     17.72     .635
    1.600   1.600  .284E+04  .297E+04*    2.768      .439     17.10     .702
    1.700   1.700  .313E+04  .348E+04*    3.158      .453     16.54     .771
    1.800   1.800  .344E+04  .405E+04*    3.580      .468     16.03     .842
    2.000   2.000  .131E+05  .171E+05*    5.907      .203     36.88     .407

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
 (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                                <---- hydrograph ---->   <-pipe / channel->
                             AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                             (ha)    (cms)   (hrs)   (mm)     (m)       (m/s)
   INFLOW : ID= 3:002030    118.02   2.336    7.43 26.611    1.478       .420
   OUTFLOW: ID= 1:002040    118.02   2.216    7.65 26.611    1.443       .414

005:0012
| DESIGN NASHYD      |   Area     (ha)=   15.29   Curve Number   (CN)=82.00
| 02:201    DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
                       U.H. Tp(hrs)=   1.290

     Unit Hyd Qpeak  (cms)=     .453

     PEAK FLOW       (cms)=     .356 (i)
     TIME TO PEAK    (hrs)=    7.284
     RUNOFF VOLUME    (mm)=   30.029
     TOTAL RAINFALL   (mm)=   60.100
     RUNOFF COEFFICIENT   =     .500

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

005:0013
| DESIGN NASHYD      |   Area     (ha)=   10.88   Curve Number   (CN)=72.00
| 03:204    DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
                       U.H. Tp(hrs)=    .850

     Unit Hyd Qpeak  (cms)=     .489

     PEAK FLOW       (cms)=     .245 (i)
     TIME TO PEAK    (hrs)=    6.801
     RUNOFF VOLUME    (mm)=   21.820
     TOTAL RAINFALL   (mm)=   60.100
     RUNOFF COEFFICIENT   =     .363

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

005:0014
| ADD HYD (      2050) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
                                            (ha)     (cms)   (hrs)   (mm)    (cms)
                    ID1 01:       2040   118.02    2.216    7.65  26.61     .000
                   +ID2 02:201            15.29     .356    7.28  30.03     .000
                   +ID3 03:204            10.88     .245    6.80  21.82     .000
                    ==========================================================
                    SUM 04:       2050   144.19    2.726    7.58  26.61     .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

005:0015
| ROUTE CHANNEL    |     Routing time step (min) =  1.00
|  IN> 04:002050   |     Number of SEGMENTS =  3
| OUT< 01:002060   |     Slopes (%), CHANNEL= .1700  FLOODPLAIN= .2000
                                 LENGTH =  200.00    (m)

              <------ DATA FOR SECTION (   4.0) ------>
              Distance      Elevation       Manning
                 .00           2.00          .1400
               100.00           1.80     .1400 / .0850  Main Channel
               102.75            .00          .0850      Main Channel
               104.25            .00          .0850      Main Channel
               107.00           1.80     .0850 / .1400  Main Channel
               207.00           2.00          .1400

   <---------------------------- TRAVEL TIME TABLE ---------------------------->
    DEPTH    ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME   D x V
      (m)     (m)   (cu.m.)   (cu.m.)     (cms)     (m/s)     (min)   (m2/s)
     .100    .100  .331E+02  .486E+01      .016      .096     34.57     .010
     .200    .200  .722E+02  .212E+02      .052      .144     23.13     .029
     .300    .300  .118E+03  .518E+02      .106      .180     18.50     .054
     .400    .400  .169E+03  .993E+02*     .177      .210     15.86     .084
     .500    .500  .226E+03  .166E+03*     .268      .236     14.10     .118
     .600    .600  .290E+03  .256E+03*     .377      .260     12.81     .156
     .700    .700  .360E+03  .370E+03*     .507      .282     11.82     .197
     .800    .800  .436E+03  .512E+03*     .659      .303     11.02     .242
     .900    .900  .518E+03  .685E+03*     .833      .322     10.36     .290
    1.000   1.000  .606E+03  .891E+03*    1.031      .340      9.79     .340
    1.100   1.100  .700E+03  .113E+04*    1.253      .358      9.31     .394
    1.200   1.200  .800E+03  .141E+04*    1.500      .375      8.89     .450
    1.300   1.300  .906E+03  .173E+04*    1.775      .392      8.51     .509
    1.400   1.400  .102E+04  .210E+04*    2.077      .408      8.18     .571
    1.500   1.500  .114E+04  .251E+04*    2.407      .423      7.87     .635
    1.600   1.600  .126E+04  .297E+04*    2.768      .439      7.60     .702
    1.700   1.700  .139E+04  .348E+04*    3.158      .453      7.35     .771
    1.800   1.800  .153E+04  .405E+04*    3.580      .468      7.12     .842
    2.000   2.000  .581E+04  .171E+05*    6.114      .210     15.84     .421

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
 (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                                <---- hydrograph ---->   <-pipe / channel->
                             AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                             (ha)    (cms)   (hrs)   (mm)     (m)       (m/s)
   INFLOW : ID= 4:002050    144.19   2.726    7.58 26.612    1.589       .437
   OUTFLOW: ID= 1:002060    144.19   2.693    7.62 26.612    1.580       .435

005:0016
| DESIGN NASHYD      |   Area     (ha)=    4.78   Curve Number   (CN)=72.00
| 02:206    DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
                       U.H. Tp(hrs)=    .890

     Unit Hyd Qpeak  (cms)=     .205

     PEAK FLOW       (cms)=     .104 (i)
     TIME TO PEAK    (hrs)=    6.851
     RUNOFF VOLUME    (mm)=   21.820
     TOTAL RAINFALL   (mm)=   60.100
     RUNOFF COEFFICIENT   =     .363

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

005:0017
| ADD HYD (      2070) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
                                            (ha)     (cms)   (hrs)   (mm)    (cms)
                    ID1 01:       2060   144.19    2.693    7.62  26.61     .000
                   +ID2 02:206             4.78     .104    6.85  21.82     .000
```

```
                  ================================================================
                  SUM 03:      2070   148.97    2.769    7.62  26.46    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
005:0018-----------------------------------------------------------------------
---------------------
| ROUTE CHANNEL     |     Routing time step (min) =  1.00
|  IN> 03:002070    |     Number of SEGMENTS =  3
| OUT< 01:002080    |     Slopes (%), CHANNEL= .1200  FLOODPLAIN= .2000
--------------------          LENGTH =  500.00    (m)

              <------ DATA FOR SECTION (   5.0) ------>
              Distance      Elevation       Manning
                  .00          2.20          .1400
                200.00         1.80     .1400 / .0850  Main Channel
                202.75          .00          .0850      Main Channel
                204.25          .00          .0850      Main Channel
                207.00         1.80     .0850 / .1400  Main Channel
                407.00         2.20          .1400

  <---------------------------- TRAVEL TIME TABLE ---------------------------->
   DEPTH     ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME    D x V
     (m)      (m)   (cu.m.)   (cu.m.)      (cms)     (m/s)      (min)   (m2/s)
    .112     .112  .940E+02  .882E+01       .016      .087      95.91     .010
    .225     .225  .207E+03  .389E+02       .054      .129      64.45     .029
    .337     .337  .340E+03  .957E+02       .110      .161      51.67     .054
    .450     .450  .492E+03  .185E+03       .185      .188      44.34     .085
    .562     .562  .664E+03  .311E+03       .280      .211      39.43     .119
    .675     .675  .854E+03  .481E+03*      .397      .233      35.84     .157
    .788     .788  .106E+04  .698E+03*      .537      .252      33.06     .199
    .900     .900  .129E+04  .970E+03*      .700      .270      30.81     .243
   1.013    1.013  .154E+04  .130E+04*      .888      .288      28.95     .291
   1.125    1.125  .181E+04  .170E+04*     1.102      .304      27.37     .343
   1.238    1.238  .210E+04  .216E+04*     1.344      .320      26.01     .397
   1.350    1.350  .240E+04  .271E+04*     1.615      .336      24.81     .453
   1.463    1.463  .273E+04  .333E+04*     1.916      .351      23.76     .513
   1.575    1.575  .308E+04  .404E+04*     2.247      .365      22.82     .575
   1.688    1.688  .344E+04  .484E+04*     2.611      .379      21.97     .640
   1.800    1.800  .382E+04  .574E+04*     3.008      .393      21.19     .708
   1.933    1.933  .874E+04  .141E+05*     4.111      .235      35.42     .455
   2.067    2.067  .225E+05  .388E+05*     7.293      .162      51.50     .334
   2.200    2.200  .452E+05  .829E+05*    13.799      .153      54.62     .336

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
 (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                                <---- hydrograph ---->   <-pipe / channel->
                             AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                             (ha)    (cms)   (hrs)   (mm)      (m)      (m/s)
   INFLOW : ID= 3:002070    148.97   2.769    7.62 26.458     1.732      .385
   OUTFLOW: ID= 1:002080    148.97   2.572    8.00 26.458     1.671      .377

--------------------------------------------------------------------------------
005:0019-----------------------------------------------------------------------
---------------------
| DESIGN NASHYD     |   Area     (ha)=   14.96   Curve Number    (CN)=72.00
| 02:207     DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=   1.330

     Unit Hyd Qpeak  (cms)=     .430

     PEAK FLOW       (cms)=     .242 (i)
     TIME TO PEAK    (hrs)=    7.368
     RUNOFF VOLUME    (mm)=   21.820
     TOTAL RAINFALL   (mm)=   60.100
     RUNOFF COEFFICIENT   =     .363

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

--------------------------------------------------------------------------------
005:0020-----------------------------------------------------------------------
---------------------
| DESIGN NASHYD     |   Area     (ha)=    7.92   Curve Number    (CN)=72.00
| 03:208     DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=   1.110

     Unit Hyd Qpeak  (cms)=     .273

     PEAK FLOW       (cms)=     .147 (i)
     TIME TO PEAK    (hrs)=    7.101
     RUNOFF VOLUME    (mm)=   21.820
     TOTAL RAINFALL   (mm)=   60.100
     RUNOFF COEFFICIENT   =     .363

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

--------------------------------------------------------------------------------
005:0021-----------------------------------------------------------------------
*#*****************************************************************************
*# Lappan Drain - Total Flow at Jefferson Boulevard
*#*****************************************************************************
----------------------
| ADD HYD (     2090) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
------------------------ ID1 01:      2080   148.97    2.572    8.00  26.46    .000
                        +ID2 02:207           14.96     .242    7.37  21.82    .000
                        +ID3 03:208            7.92     .147    7.10  21.82    .000
                         ================================================================
                         SUM 04:      2090   171.85    2.906    7.92  25.84    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
005:0022-----------------------------------------------------------------------
---------------------
| ROUTE CHANNEL     |     Routing time step (min) =  1.00
|  IN> 04:002090    |     Number of SEGMENTS =  3
| OUT< 01:002100    |     Slopes (%), CHANNEL= .1200  FLOODPLAIN= .2000
--------------------          LENGTH =  130.00    (m)

              <------ DATA FOR SECTION (   6.0) ------>
              Distance      Elevation       Manning
                  .00          2.20          .1400
                200.00         1.80     .1400 / .0850  Main Channel
                202.75          .00          .0850      Main Channel
                204.25          .00          .0850      Main Channel
                207.00         1.80     .0850 / .2000  Main Channel
                407.00         2.20          .2000

  <---------------------------- TRAVEL TIME TABLE ---------------------------->
   DEPTH     ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME    D x V
     (m)      (m)   (cu.m.)   (cu.m.)      (cms)     (m/s)      (min)   (m2/s)
    .112     .112  .245E+02  .882E+01       .016      .087      24.94     .010
    .225     .225  .539E+02  .389E+02*      .054      .129      16.76     .029
    .337     .337  .884E+02  .957E+02*      .110      .161      13.43     .054
    .450     .450  .128E+03  .185E+03*      .185      .188      11.53     .085
    .562     .562  .173E+03  .311E+03*      .280      .211      10.25     .119
    .675     .675  .222E+03  .481E+03*      .397      .233       9.32     .157
    .788     .788  .277E+03  .698E+03*      .537      .252       8.59     .199
    .900     .900  .336E+03  .970E+03*      .700      .270       8.01     .243
   1.013    1.013  .401E+03  .130E+04*      .888      .288       7.53     .291
   1.125    1.125  .471E+03  .170E+04*     1.102      .304       7.12     .343
   1.238    1.238  .545E+03  .216E+04*     1.344      .320       6.76     .397
   1.350    1.350  .625E+03  .271E+04*     1.615      .336       6.45     .453
   1.463    1.463  .710E+03  .333E+04*     1.916      .351       6.18     .513
   1.575    1.575  .800E+03  .404E+04*     2.247      .365       5.93     .575
   1.688    1.688  .895E+03  .484E+04*     2.611      .379       5.71     .640
   1.800    1.800  .994E+03  .574E+04*     3.008      .393       5.51     .708
   1.933    1.933  .227E+04  .141E+05*     4.041      .231       9.37     .447
   2.067    2.067  .586E+04  .388E+05*     6.848      .152      14.26     .314
   2.200    2.200  .118E+05  .829E+05*    12.488      .138      15.69     .304

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
 (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                                <---- hydrograph ---->   <-pipe / channel->
                             AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                             (ha)    (cms)   (hrs)   (mm)      (m)      (m/s)
   INFLOW : ID= 4:002090    171.85   2.906    7.92 25.841     1.771      .390
   OUTFLOW: ID= 1:002100    171.85   2.784    7.70 25.841     2.047      .160

--------------------------------------------------------------------------------
005:0023-----------------------------------------------------------------------
---------------------
| DESIGN NASHYD     |   Area     (ha)=    4.95   Curve Number    (CN)=73.00
| 02:212     DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=    .480

     Unit Hyd Qpeak  (cms)=     .394

     PEAK FLOW       (cms)=     .170 (i)
     TIME TO PEAK    (hrs)=    6.351
     RUNOFF VOLUME    (mm)=   22.511
     TOTAL RAINFALL   (mm)=   60.100
     RUNOFF COEFFICIENT   =     .375

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

--------------------------------------------------------------------------------
005:0024-----------------------------------------------------------------------
----------------------
| ADD HYD (     2110) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
------------------------ ID1 01:      2100   171.85    2.784    7.70  25.84    .000
                        +ID2 02:212            4.95     .170    6.35  22.51    .000
                         ================================================================
                         SUM 03:      2110   176.80    2.827    7.67  25.75    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
005:0025-----------------------------------------------------------------------
---------------------
| ROUTE CHANNEL     |     Routing time step (min) =  1.00
|  IN> 03:002110    |     Number of SEGMENTS =  3
| OUT< 01:002120    |     Slopes (%), CHANNEL= .1200  FLOODPLAIN= .2000
--------------------          LENGTH =  330.00    (m)

              <------ DATA FOR SECTION (   7.0) ------>
              Distance      Elevation       Manning
                  .00          2.20          .1400
                200.00         1.80     .1400 / .0850  Main Channel
                202.75          .00          .0850      Main Channel
                204.25          .00          .0850      Main Channel
                207.00         1.80     .0850 / .2000  Main Channel
                407.00         2.20          .2000

  <---------------------------- TRAVEL TIME TABLE ---------------------------->
   DEPTH     ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME    D x V
     (m)      (m)   (cu.m.)   (cu.m.)      (cms)     (m/s)      (min)   (m2/s)
    .112     .112  .621E+02  .882E+01       .016      .087      63.30     .010
    .225     .225  .137E+03  .389E+02       .054      .129      42.54     .029
    .337     .337  .224E+03  .957E+02       .110      .161      34.10     .054
    .450     .450  .325E+03  .185E+03*      .185      .188      29.26     .085
    .562     .562  .438E+03  .311E+03*      .280      .211      26.02     .119
    .675     .675  .564E+03  .481E+03*      .397      .233      23.65     .157
    .788     .788  .702E+03  .698E+03*      .537      .252      21.82     .199
    .900     .900  .854E+03  .970E+03*      .700      .270      20.34     .243
   1.013    1.013  .102E+04  .130E+04*      .888      .288      19.11     .291
   1.125    1.125  .119E+04  .170E+04*     1.102      .304      18.06     .343
   1.238    1.238  .138E+04  .216E+04*     1.344      .320      17.16     .397
   1.350    1.350  .159E+04  .271E+04*     1.615      .336      16.38     .453
   1.463    1.463  .180E+04  .333E+04*     1.916      .351      15.68     .513
   1.575    1.575  .203E+04  .404E+04*     2.247      .365      15.06     .575
   1.688    1.688  .227E+04  .484E+04*     2.611      .379      14.50     .640
   1.800    1.800  .252E+04  .574E+04*     3.008      .393      13.99     .708
   1.933    1.933  .577E+04  .141E+05*     4.041      .231      23.78     .447
   2.067    2.067  .149E+05  .388E+05*     6.848      .152      36.20     .314
   2.200    2.200  .298E+05  .829E+05*    12.488      .138      39.84     .304

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
 (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                                <---- hydrograph ---->   <-pipe / channel->
                             AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                             (ha)    (cms)   (hrs)   (mm)      (m)      (m/s)
   INFLOW : ID= 3:002110    176.80   2.827    7.67 25.747     1.749      .387
   OUTFLOW: ID= 1:002120    176.80   2.609    8.63 25.747     1.688      .379

--------------------------------------------------------------------------------
005:0026-----------------------------------------------------------------------
---------------------
| DESIGN NASHYD     |   Area     (ha)=    6.60   Curve Number    (CN)=82.00
| 02:EXT8    DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=    .820

     Unit Hyd Qpeak  (cms)=     .307

     PEAK FLOW       (cms)=     .215 (i)
     TIME TO PEAK    (hrs)=    6.751
     RUNOFF VOLUME    (mm)=   30.028
     TOTAL RAINFALL   (mm)=   60.100
     RUNOFF COEFFICIENT   =     .500

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

--------------------------------------------------------------------------------
005:0027-----------------------------------------------------------------------
*#*****************************************************************************
*# Lappan Drain - Total Flow at McGill Drain
*#*****************************************************************************
----------------------
| ADD HYD (     2130) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
------------------------ ID1 01:      2120   176.80    2.609    8.63  25.75    .000
                        +ID2 02:EXT8           6.60     .215    6.75  30.03    .000
                         ================================================================
                         SUM 10:      2130   183.40    2.734    7.70  25.90    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
005:0028-----------------------------------------------------------------------
*#*****************************************************************************
*# McGILL DRAIN
*#*****************************************************************************
---------------------
| DESIGN NASHYD     |   Area     (ha)=   12.75   Curve Number    (CN)=72.00
| 01:203     DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=    .970

     Unit Hyd Qpeak  (cms)=     .502

     PEAK FLOW       (cms)=     .261 (i)
     TIME TO PEAK    (hrs)=    6.934
     RUNOFF VOLUME    (mm)=   21.820
     TOTAL RAINFALL   (mm)=   60.100
     RUNOFF COEFFICIENT   =     .363
```

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

------------------------------------------------------------------------------
005:0029------------------------------------------------------------------------
--------------------
| ROUTE CHANNEL    |     Routing time step (min) =  1.00
|  IN> 01:203      |     Number of SEGMENTS =  3
| OUT< 02:002140   |     Slopes (%), CHANNEL= .3500  FLOODPLAIN= .2000
--------------------                  LENGTH =  500.00    (m)

                <------ DATA FOR SECTION (   8.0) ------>
                Distance      Elevation       Manning
                    .00          1.40          .1400
                 200.00          1.00     .1400 / .1000  Main Channel
                 201.50           .00          .1000      Main Channel
                 203.50           .00          .1000      Main Channel
                 205.00          1.00     .1000 / .2000  Main Channel
                 405.00          1.40          .2000

   <---------------------------- TRAVEL TIME TABLE ----------------------------->
    DEPTH    ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME   D x V
      (m)     (m)   (cu.m.)   (cu.m.)     (cms)     (m/s)     (min)   (m2/s)
     .071    .071  .753E+02  .154E+01      .015      .097     85.67     .007
     .143    .143  .158E+03  .646E+01      .047      .149     56.11     .021
     .214    .214  .249E+03  .152E+02      .094      .188     44.28     .040
     .286    .286  .347E+03  .283E+02      .154      .221     37.63     .063
     .357    .357  .453E+03  .462E+02      .227      .250     33.27     .089
     .429    .429  .566E+03  .693E+02      .313      .276     30.14     .118
     .500    .500  .687E+03  .982E+02      .413      .300     27.75     .150
     .571    .571  .816E+03  .133E+03      .526      .322     25.85     .184
     .643    .643  .953E+03  .175E+03      .654      .343     24.30     .220
     .714    .714  .110E+04  .224E+03      .795      .362     22.99     .259
     .786    .786  .125E+04  .280E+03      .952      .381     21.87     .299
     .857    .857  .141E+04  .345E+03     1.123      .399     20.90     .342
     .929    .929  .158E+04  .418E+03     1.310      .416     20.04     .386
    1.000   1.000  .175E+04  .500E+03     1.513      .432     19.28     .432
    1.080   1.080  .355E+04  .110E+04     1.913      .269     30.92     .291
    1.160   1.160  .855E+04  .283E+04     2.777      .162     51.31     .188
    1.240   1.240  .167E+05  .593E+04     4.375      .131     63.81     .162
    1.320   1.320  .281E+05  .106E+05     6.931      .123     67.70     .162
    1.400   1.400  .427E+05  .171E+05    10.642      .124     66.95     .174

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.

                              <---- hydrograph ---->   <-pipe / channel->
                          AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                          (ha)    (cms)   (hrs)   (mm)       (m)      (m/s)
   INFLOW : ID= 1:203     12.75     .261    6.93 21.820      .385      .260
   OUTFLOW: ID= 2:002140  12.75     .225    7.38 21.820      .355      .250


------------------------------------------------------------------------------
005:0030------------------------------------------------------------------------
----------------------
| DESIGN NASHYD      |   Area    (ha)=   12.89   Curve Number   (CN)=72.00
| 01:205    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .860

     Unit Hyd Qpeak  (cms)=     .572

     PEAK FLOW       (cms)=     .288 (i)
     TIME TO PEAK    (hrs)=    6.818
     RUNOFF VOLUME    (mm)=   21.820
     TOTAL RAINFALL   (mm)=   60.100
     RUNOFF COEFFICIENT   =     .363

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

------------------------------------------------------------------------------
005:0031------------------------------------------------------------------------
----------------------
| ADD HYD (      2150) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
                        ID1 01:205          12.89     .288    6.82  21.82    .000
                       +ID2 02:      2140   12.75     .225    7.38  21.82    .000
                        ========================================================
                        SUM 03:      2150   25.64     .486    7.07  21.82    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
005:0032------------------------------------------------------------------------
--------------------
| ROUTE CHANNEL    |     Routing time step (min) =  1.00
|  IN> 03:002150   |     Number of SEGMENTS =  3
| OUT< 01:002160   |     Slopes (%), CHANNEL= .0500  FLOODPLAIN= .2000
--------------------                  LENGTH =  360.00    (m)

                <------ DATA FOR SECTION (   9.0) ------>
                Distance      Elevation       Manning
                    .00          1.40          .1400
                 200.00          1.00     .1400 / .1000  Main Channel
                 201.50           .00          .1000      Main Channel
                 203.50           .00          .1000      Main Channel
                 205.00          1.00     .1000 / .2000  Main Channel
                 405.00          1.40          .2000

   <---------------------------- TRAVEL TIME TABLE ----------------------------->
    DEPTH    ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME   D x V
      (m)     (m)   (cu.m.)   (cu.m.)     (cms)     (m/s)     (min)   (m2/s)
     .071    .071  .542E+02  .108E+02      .006      .037    163.19     .003
     .143    .143  .114E+03  .452E+02      .018      .056    106.89     .008
     .214    .214  .179E+03  .107E+03*     .035      .071     84.35     .015
     .286    .286  .250E+03  .198E+03*     .058      .084     71.69     .024
     .357    .357  .326E+03  .323E+03*     .086      .095     63.38     .034
     .429    .429  .408E+03  .485E+03*     .118      .105     57.41     .045
     .500    .500  .495E+03  .687E+03*     .156      .113     52.87     .057
     .571    .571  .588E+03  .933E+03*     .199      .122     49.25     .070
     .643    .643  .686E+03  .123E+04*     .247      .130     46.29     .083
     .714    .714  .790E+03  .157E+04*     .301      .137     43.80     .098
     .786    .786  .899E+03  .196E+04*     .360      .144     41.67     .113
     .857    .857  .101E+04  .241E+04*     .424      .151     39.81     .129
     .929    .929  .113E+04  .293E+04*     .495      .157     38.18     .146
    1.000   1.000  .126E+04  .350E+04*     .572      .163     36.73     .163
    1.080   1.080  .256E+04  .767E+04*     .786      .111     54.17     .120
    1.160   1.160  .616E+04  .198E+05*    1.451      .085     70.71     .098
    1.240   1.240  .121E+05  .415E+05*    2.837      .085     70.85     .105
    1.320   1.320  .203E+05  .743E+05*    5.168      .092     65.36     .121
    1.400   1.400  .308E+05  .120E+06*    8.644      .101     59.35     .142

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
 (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                              <---- hydrograph ---->   <-pipe / channel->
                          AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                          (ha)    (cms)   (hrs)   (mm)       (m)      (m/s)
   INFLOW : ID= 3:002150  25.64     .486    7.07 21.820      .919      .156
   OUTFLOW: ID= 1:002160  25.64     .392    7.33 21.820      .822      .147


------------------------------------------------------------------------------
005:0033------------------------------------------------------------------------
----------------------
| DESIGN NASHYD      |   Area    (ha)=   15.50   Curve Number   (CN)=72.00
| 02:209    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .970

     Unit Hyd Qpeak  (cms)=     .610

     PEAK FLOW       (cms)=     .317 (i)
     TIME TO PEAK    (hrs)=    6.934
     RUNOFF VOLUME    (mm)=   21.820
     TOTAL RAINFALL   (mm)=   60.100
     RUNOFF COEFFICIENT   =     .363

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

------------------------------------------------------------------------------
005:0034------------------------------------------------------------------------
----------------------
| ADD HYD (      2170) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
                        ID1 01:      2160   25.64     .392    7.33  21.82    .000
                       +ID2 02:209          15.50     .317    6.93  21.82    .000
                        ========================================================
                        SUM 03:      2170   41.14     .690    7.22  21.82    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
005:0035------------------------------------------------------------------------
--------------------
| ROUTE CHANNEL    |     Routing time step (min) =  1.00
|  IN> 03:002170   |     Number of SEGMENTS =  3
| OUT< 01:002180   |     Slopes (%), CHANNEL= .1500  FLOODPLAIN= .2000
--------------------                  LENGTH =  250.00     (m)

                <------ DATA FOR SECTION (  10.0) ------>
                Distance      Elevation       Manning
                    .00          1.40          .2000
                 200.00          1.00     .2000 / .1000  Main Channel
                 201.50           .00          .1000      Main Channel
                 203.50           .00          .1000      Main Channel
                 205.00          1.00     .1000 / .2000  Main Channel
                 405.00          1.40          .2000

   <---------------------------- TRAVEL TIME TABLE ----------------------------->
    DEPTH    ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME   D x V
      (m)     (m)   (cu.m.)   (cu.m.)     (cms)     (m/s)     (min)   (m2/s)
     .071    .071  .376E+02  .358E+01      .010      .064     65.43     .005
     .143    .143  .791E+02  .151E+02      .031      .097     42.85     .014
     .214    .214  .124E+03  .355E+02      .061      .123     33.82     .026
     .286    .286  .173E+03  .661E+02      .101      .145     28.74     .041
     .357    .357  .226E+03  .108E+03      .148      .164     25.41     .059
     .429    .429  .283E+03  .162E+03*     .205      .181     23.02     .078
     .500    .500  .344E+03  .229E+03*     .270      .197     21.20     .098
     .571    .571  .408E+03  .311E+03*     .344      .211     19.75     .121
     .643    .643  .476E+03  .408E+03*     .428      .225     18.56     .144
     .714    .714  .548E+03  .522E+03*     .521      .237     17.56     .169
     .786    .786  .624E+03  .654E+03*     .623      .249     16.71     .196
     .857    .857  .704E+03  .805E+03*     .735      .261     15.96     .224
     .929    .929  .788E+03  .975E+03*     .858      .272     15.31     .253
    1.000   1.000  .875E+03  .117E+04*     .990      .283     14.73     .283
    1.080   1.080  .177E+04  .256E+04*    1.270      .179     23.30     .193
    1.160   1.160  .427E+04  .661E+04*    1.927      .113     36.97     .131
    1.240   1.240  .837E+04  .138E+05*    3.185      .095     43.82     .118
    1.320   1.320  .141E+05  .248E+05*    5.229      .093     44.86     .123
    1.400   1.400  .214E+05  .399E+05*    8.222      .096     43.33     .135

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
 (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                              <---- hydrograph ---->   <-pipe / channel->
                          AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                          (ha)    (cms)   (hrs)   (mm)       (m)      (m/s)
   INFLOW : ID= 3:002170  41.14     .690    7.22 21.820      .828      .256
   OUTFLOW: ID= 1:002180  41.14     .650    7.38 21.820      .803      .252


------------------------------------------------------------------------------
005:0036------------------------------------------------------------------------
----------------------
| DESIGN NASHYD      |   Area    (ha)=    7.27   Curve Number   (CN)=82.00
| 02:210    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .820

     Unit Hyd Qpeak  (cms)=     .339

     PEAK FLOW       (cms)=     .237 (i)
     TIME TO PEAK    (hrs)=    6.751
     RUNOFF VOLUME    (mm)=   30.028
     TOTAL RAINFALL   (mm)=   60.100
     RUNOFF COEFFICIENT   =     .500

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

------------------------------------------------------------------------------
005:0037------------------------------------------------------------------------
----------------------
| DESIGN NASHYD      |   Area    (ha)=   21.08   Curve Number   (CN)=80.00
| 03:EXT4   DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=   1.830

     Unit Hyd Qpeak  (cms)=     .440

     PEAK FLOW       (cms)=     .350 (i)
     TIME TO PEAK    (hrs)=    7.951
     RUNOFF VOLUME    (mm)=   28.124
     TOTAL RAINFALL   (mm)=   60.100
     RUNOFF COEFFICIENT   =     .468

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

------------------------------------------------------------------------------
005:0038------------------------------------------------------------------------
*#*************************************************************************
*# McGill Drain - Total Flow at Jefferson Boulevard
*#*************************************************************************
----------------------
| ADD HYD (      2190) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
                        ID1 01:      2180   41.14     .650    7.38  21.82    .000
                       +ID2 02:210           7.27     .237    6.75  30.03    .000
                       +ID3 03:EXT4         21.08     .350    7.95  28.12    .000
                        ========================================================
                        SUM 04:      2190   69.49    1.158    7.35  24.59    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
005:0039------------------------------------------------------------------------
--------------------
| ROUTE CHANNEL    |     Routing time step (min) =  1.00
|  IN> 04:002190   |     Number of SEGMENTS =  3
| OUT< 01:002200   |     Slopes (%), CHANNEL= .3000  FLOODPLAIN= .2000
--------------------                  LENGTH =  280.00     (m)

                <------ DATA FOR SECTION (  11.0) ------>
                Distance      Elevation       Manning
                    .00          1.40          .2000
                 200.00          1.00     .2000 / .1000  Main Channel
                 201.50           .00          .1000      Main Channel
                 203.50           .00          .1000      Main Channel
                 205.00          1.00     .1000 / .2000  Main Channel
                 405.00          1.40          .2000

   <---------------------------- TRAVEL TIME TABLE ----------------------------->
    DEPTH    ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME   D x V
      (m)     (m)   (cu.m.)   (cu.m.)     (cms)     (m/s)     (min)   (m2/s)
     .071    .071  .421E+02  .179E+01      .014      .090     51.82     .006
     .143    .143  .886E+02  .753E+01      .043      .138     33.94     .020
     .214    .214  .139E+03  .178E+02      .087      .174     26.78     .037
```

```
    .286     .286  .194E+03  .330E+02       .142      .205     22.76     .059
    .357     .357  .254E+03  .539E+02       .210      .232     20.12     .083
    .429     .429  .317E+03  .809E+02       .290      .256     18.23     .110
    .500     .500  .385E+03  .115E+03       .382      .278     16.79     .139
    .571     .571  .457E+03  .155E+03       .487      .298     15.64     .171
    .643     .643  .534E+03  .204E+03       .605      .318     14.70     .204
    .714     .714  .614E+03  .261E+03       .736      .336     13.91     .240
    .786     .786  .699E+03  .327E+03       .881      .353     13.23     .277
    .857     .857  .789E+03  .402E+03*     1.040      .369     12.64     .316
    .929     .929  .882E+03  .488E+03*     1.213      .385     12.12     .357
   1.000    1.000  .980E+03  .583E+03*     1.401      .400     11.66     .400
   1.080    1.080  .199E+04  .128E+04*     1.761      .248     18.81     .268
   1.160    1.160  .479E+04  .331E+04*     2.505      .147     31.85     .170
   1.240    1.240  .938E+04  .692E+04*     3.856      .115     40.54     .143
   1.320    1.320  .158E+05  .124E+05*     5.997      .107     43.81     .141
   1.400    1.400  .239E+05  .199E+05*     9.093      .106     43.88     .149

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
 (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                                  <---- hydrograph ---->   <-pipe / channel->
                               AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                                (ha)    (cms)   (hrs)   (mm)     (m)       (m/s)
   INFLOW : ID= 4:002190      69.49    1.158    7.35 24.591      .906      .380
   OUTFLOW: ID= 1:002200      69.49    1.132    7.57 24.591      .894      .377


--------------------------------------------------------------------------------
005:0040--------------------------------------------------------------------------
---------------------
| DESIGN NASHYD     |   Area     (ha)=   14.81   Curve Number    (CN)=82.00
| 02:EXT5   DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=   1.520

     Unit Hyd Qpeak  (cms)=     .372

     PEAK FLOW       (cms)=     .304 (i)
     TIME TO PEAK    (hrs)=    7.551
     RUNOFF VOLUME    (mm)=   30.029
     TOTAL RAINFALL   (mm)=   60.100
     RUNOFF COEFFICIENT   =     .500

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

--------------------------------------------------------------------------------
005:0041--------------------------------------------------------------------------
----------------------
| ADD HYD (      2210) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                     (ha)     (cms)   (hrs)   (mm)    (cms)
                       ID1 01:      2200    69.49    1.132    7.57  24.59    .000
                      +ID2 02:EXT5          14.81     .304    7.55  30.03    .000
                       ==========================================================
                       SUM 03:      2210    84.30    1.436    7.57  25.55    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
005:0042--------------------------------------------------------------------------
*#########################################################################
*# McGill Drain - Total Flow at Lappan Drain Confluence
*#########################################################################
----------------------
| ADD HYD (      2220) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                     (ha)     (cms)   (hrs)   (mm)    (cms)
                       ID1 03:      2210    84.30    1.436    7.57  25.55    .000
                      +ID2 10:      2130   183.40    2.734    7.70  25.90    .000
                       ==========================================================
                       SUM 01:      2220   267.70    4.160    7.70  25.79    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
005:0043--------------------------------------------------------------------------
---------------------
| ROUTE CHANNEL     |     Routing time step (min) =  1.00
|  IN> 01:002220    |     Number of SEGMENTS =  3
| OUT< 02:002230    |     Slopes (%), CHANNEL= .1500  FLOODPLAIN= .2000
---------------------                  LENGTH =  200.00     (m)

               <------ DATA FOR SECTION (  12.0) ------>
               Distance      Elevation       Manning
                  .00           1.80           .1400
                200.00           1.40     .1400 / .0850  Main Channel
                202.60            .00          .0850      Main Channel
                204.40            .00          .0850      Main Channel
                207.00           1.40     .0850 / .2000  Main Channel
                407.00           1.80          .2000

   <---------------------------- TRAVEL TIME TABLE ---------------------------->
    DEPTH    ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME    D x V
      (m)     (m)   (cu.m.)   (cu.m.)      (cms)     (m/s)      (min)    (m2/s)
     .093    .093  .368E+02  .573E+01       .016      .087      38.15     .008
     .187    .187  .801E+02  .249E+02       .053      .131      25.37     .025
     .280    .280  .130E+03  .606E+02       .107      .165      20.20     .046
     .373    .373  .186E+03  .116E+03*      .180      .193      17.26     .072
     .467    .467  .249E+03  .194E+03*      .271      .218      15.31     .102
     .560    .560  .318E+03  .297E+03*      .382      .240      13.89     .134
     .653    .653  .394E+03  .429E+03*      .513      .260      12.80     .170
     .747    .747  .476E+03  .592E+03*      .665      .280      11.92     .209
     .840    .840  .564E+03  .790E+03*      .840      .298      11.20     .250
     .933    .933  .660E+03  .103E+04*     1.039      .315      10.58     .294
    1.027   1.027  .761E+03  .130E+04*     1.262      .332      10.05     .340
    1.120   1.120  .869E+03  .162E+04*     1.510      .348       9.59     .389
    1.213   1.213  .984E+03  .199E+04*     1.785      .363       9.18     .440
    1.307   1.307  .110E+04  .241E+04*     2.087      .378       8.82     .494
    1.400   1.400  .123E+04  .287E+04*     2.418      .392       8.49     .549
    1.500   1.500  .237E+04  .593E+04*     3.077      .259      12.85     .389
    1.600   1.600  .551E+04  .147E+05*     4.571      .166      20.10     .265
    1.700   1.700  .107E+05  .302E+05*     7.392      .139      24.02     .236
    1.800   1.800  .178E+05  .534E+05*    11.944      .134      24.83     .242

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
 (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                                  <---- hydrograph ---->   <-pipe / channel->
                               AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                                (ha)    (cms)   (hrs)   (mm)     (m)       (m/s)
   INFLOW : ID= 1:002220      267.70    4.160    7.70 25.790      1.572      .184
   OUTFLOW: ID= 2:002230      267.70    3.768    8.77 25.789      1.546      .206


--------------------------------------------------------------------------------
005:0044--------------------------------------------------------------------------
---------------------
| DESIGN NASHYD     |   Area     (ha)=   16.88   Curve Number    (CN)=72.00
| 01:213    DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=    .770

     Unit Hyd Qpeak  (cms)=     .837

     PEAK FLOW       (cms)=     .408 (i)
     TIME TO PEAK    (hrs)=    6.718
     RUNOFF VOLUME    (mm)=   21.820
     TOTAL RAINFALL   (mm)=   60.100
     RUNOFF COEFFICIENT   =     .363

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

--------------------------------------------------------------------------------
005:0045--------------------------------------------------------------------------
----------------------
| ADD HYD (      2240) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                     (ha)     (cms)   (hrs)   (mm)    (cms)
                       ID1 01:213           16.88     .408    6.72  21.82    .000
                      +ID2 02:      2230   267.70    3.768    8.77  25.79    .000
                       ==========================================================
                       SUM 03:      2240   284.58    3.878    8.55  25.55    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
005:0046--------------------------------------------------------------------------
---------------------
| ROUTE CHANNEL     |     Routing time step (min) =  1.00
|  IN> 03:002240    |     Number of SEGMENTS =  3
| OUT< 01:002250    |     Slopes (%), CHANNEL= .1500  FLOODPLAIN= .2000
---------------------                  LENGTH =  170.00     (m)

               <------ DATA FOR SECTION (  13.0) ------>
               Distance      Elevation       Manning
                  .00           1.80           .1400
                200.00           1.40     .1400 / .0850  Main Channel
                202.60            .00          .0850      Main Channel
                204.40            .00          .0850      Main Channel
                207.00           1.40     .0850 / .2000  Main Channel
                407.00           1.80          .2000

   <---------------------------- TRAVEL TIME TABLE ---------------------------->
    DEPTH    ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME    D x V
      (m)     (m)   (cu.m.)   (cu.m.)      (cms)     (m/s)      (min)    (m2/s)
     .093    .093  .313E+02  .573E+01       .016      .087      32.43     .008
     .187    .187  .681E+02  .249E+02       .053      .131      21.56     .025
     .280    .280  .110E+03  .606E+02*      .107      .165      17.17     .046
     .373    .373  .158E+03  .116E+03*      .180      .193      14.67     .072
     .467    .467  .212E+03  .194E+03*      .271      .218      13.02     .102
     .560    .560  .270E+03  .297E+03*      .382      .240      11.81     .134
     .653    .653  .335E+03  .429E+03*      .513      .260      10.88     .170
     .747    .747  .404E+03  .592E+03*      .665      .280      10.13     .209
     .840    .840  .480E+03  .790E+03*      .840      .298       9.52     .250
     .933    .933  .561E+03  .103E+04*     1.039      .315       8.99     .294
    1.027   1.027  .647E+03  .130E+04*     1.262      .332       8.55     .340
    1.120   1.120  .739E+03  .162E+04*     1.510      .348       8.15     .389
    1.213   1.213  .836E+03  .199E+04*     1.785      .363       7.81     .440
    1.307   1.307  .939E+03  .241E+04*     2.087      .378       7.50     .494
    1.400   1.400  .105E+04  .287E+04*     2.418      .392       7.22     .549
    1.500   1.500  .202E+04  .593E+04*     3.077      .259      10.92     .389
    1.600   1.600  .469E+04  .147E+05*     4.571      .166      17.08     .265
    1.700   1.700  .905E+04  .302E+05*     7.392      .139      20.42     .236
    1.800   1.800  .151E+05  .534E+05*    11.944      .134      21.10     .242

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
 (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                                  <---- hydrograph ---->   <-pipe / channel->
                               AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                                (ha)    (cms)   (hrs)   (mm)     (m)       (m/s)
   INFLOW : ID= 3:002240      284.58    3.878    8.55 25.554      1.554      .199
   OUTFLOW: ID= 1:002250      284.58    3.824    8.97 25.554      1.550      .202


--------------------------------------------------------------------------------
005:0047--------------------------------------------------------------------------
---------------------
| DESIGN NASHYD     |   Area     (ha)=   24.11   Curve Number    (CN)=80.00
| 02:EXT6   DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=   1.520

     Unit Hyd Qpeak  (cms)=     .606

     PEAK FLOW       (cms)=     .461 (i)
     TIME TO PEAK    (hrs)=    7.568
     RUNOFF VOLUME    (mm)=   28.124
     TOTAL RAINFALL   (mm)=   60.100
     RUNOFF COEFFICIENT   =     .468

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

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005:0048--------------------------------------------------------------------------
---------------------
| DESIGN NASHYD     |   Area     (ha)=   14.49   Curve Number    (CN)=82.00
| 03:211    DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=   1.070

     Unit Hyd Qpeak  (cms)=     .517

     PEAK FLOW       (cms)=     .388 (i)
     TIME TO PEAK    (hrs)=    7.034
     RUNOFF VOLUME    (mm)=   30.029
     TOTAL RAINFALL   (mm)=   60.100
     RUNOFF COEFFICIENT   =     .500

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

--------------------------------------------------------------------------------
005:0049--------------------------------------------------------------------------
---------------------
| ROUTE CHANNEL     |     Routing time step (min) =  1.00
|  IN> 03:211       |     Number of SEGMENTS =  3
| OUT< 04:002280    |     Slopes (%), CHANNEL= .2000  FLOODPLAIN= .2000
---------------------                  LENGTH =  500.00     (m)

               <------ DATA FOR SECTION (  15.0) ------>
               Distance      Elevation       Manning
                  .00           .62            .1400
                10.00           .60      .1400 / .0400  Main Channel
                11.80           .00           .0400      Main Channel
                12.80           .00           .0400      Main Channel
                14.60           .62      .0400 / .2000  Main Channel
                24.60           .60           .2000

   <---------------------------- TRAVEL TIME TABLE ---------------------------->
    DEPTH    ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME    D x V
      (m)     (m)   (cu.m.)   (cu.m.)      (cms)     (m/s)      (min)    (m2/s)
     .030    .030  .163E+02  .245E+00       .003      .102      81.78     .003
     .060    .060  .353E+02  .106E+01       .011      .155      53.91     .009
     .090    .090  .570E+02  .256E+01       .022      .195      42.68     .018
     .120    .120  .813E+02  .488E+01       .037      .229      36.32     .028
     .150    .150  .108E+03  .812E+01       .056      .260      32.11     .039
     .180    .180  .138E+03  .124E+02       .079      .287      29.06     .052
     .210    .210  .170E+03  .179E+02       .106      .312      26.72     .065
     .240    .240  .205E+03  .246E+02       .138      .335      24.85     .080
     .270    .270  .243E+03  .327E+02       .173      .358      23.31     .097
     .300    .300  .283E+03  .424E+02       .214      .379      22.01     .114
     .330    .330  .326E+03  .537E+02       .260      .399      20.89     .132
     .360    .360  .371E+03  .668E+02       .311      .418      19.92     .151
     .390    .390  .419E+03  .818E+02       .367      .437      19.06     .171
     .420    .420  .470E+03  .988E+02       .428      .455      18.30     .191
     .450    .450  .524E+03  .118E+03       .496      .473      17.61     .213
     .480    .480  .580E+03  .139E+03       .569      .491      16.99     .235
     .510    .510  .639E+03  .163E+03       .648      .507      16.42     .259
     .540    .540  .700E+03  .189E+03       .734      .524      15.90     .283
     .570    .570  .764E+03  .218E+03       .826      .540      15.43     .308

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.

                                  <---- hydrograph ---->   <-pipe / channel->
                               AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                                (ha)    (cms)   (hrs)   (mm)     (m)       (m/s)
   INFLOW : ID= 3:211         14.49     .388    7.03 30.029      .400      .443
   OUTFLOW: ID= 4:002280      14.49     .367    7.32 30.028      .390      .437
```

```
------------------------------------------------------------------------------
005:0050------------------------------------------------------------------------
---------------------
| DESIGN NASHYD     |   Area    (ha)=   10.57   Curve Number   (CN)=72.00
| 03:216    DT= 1.00 |  Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
---------------------  U.H. Tp(hrs)=   1.210

     Unit Hyd Qpeak  (cms)=     .334

     PEAK FLOW       (cms)=     .184 (i)
     TIME TO PEAK    (hrs)=    7.218
     RUNOFF VOLUME    (mm)=   21.820
     TOTAL RAINFALL   (mm)=   60.100
     RUNOFF COEFFICIENT   =     .363

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

------------------------------------------------------------------------------
005:0051------------------------------------------------------------------------
---------------------
| ADD HYD (      2290) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
---------------------                     (ha)     (cms)   (hrs)   (mm)    (cms)
                    ID1 03:216          10.57     .184    7.22  21.82    .000
                   +ID2 04:      2280   14.49     .367    7.32  30.03    .000
                    ================================================================
                    SUM 05:      2290   25.06     .550    7.28  26.57    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
005:0052------------------------------------------------------------------------
---------------------
| ADD HYD (      2260) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
---------------------                     (ha)     (cms)   (hrs)   (mm)    (cms)
                    ID1 01:      2250   284.58   3.824    8.97  25.55    .000
                   +ID2 02:EXT6        24.11     .461    7.57  28.12    .000
                   +ID3 05:      2290   25.06     .550    7.28  26.57    .000
                    ================================================================
                    SUM 03:      2260   333.75    4.483    8.52  25.82    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
005:0053------------------------------------------------------------------------
---------------------
| ROUTE CHANNEL     |     Routing time step (min) =  1.00
|  IN> 03:002260    |     Number of SEGMENTS =  3
| OUT< 10:002295    |     Slopes (%), CHANNEL= .0800  FLOODPLAIN= .2000
---------------------           LENGTH =  370.00    (m)

               <------ DATA FOR SECTION (  14.0) ------>
               Distance      Elevation       Manning
                  .00          1.80          .1400
                200.00         1.40     .1400 / .0850  Main Channel
                202.60          .00          .0850      Main Channel
                204.40          .00          .0850      Main Channel
                207.00         1.40     .0850 / .2000  Main Channel
                407.00         1.80          .2000

  <------------------------- TRAVEL TIME TABLE ------------------------->
    DEPTH     ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME    D x V
      (m)      (m)   (cu.m.)   (cu.m.)      (cms)     (m/s)     (min)   (m2/s)
     .093     .093  .681E+02  .107E+02       .012      .064     96.65    .006
     .187     .187  .148E+03  .467E+02       .038      .096     64.26    .018
     .280     .280  .240E+03  .114E+03       .078      .121     51.18    .034
     .373     .373  .344E+03  .217E+03*      .131      .141     43.73    .053
     .467     .467  .460E+03  .363E+03*      .198      .159     38.79    .074
     .560     .560  .588E+03  .557E+03*      .279      .175     35.19    .098
     .653     .653  .728E+03  .804E+03*      .374      .190     32.42    .124
     .747     .747  .880E+03  .111E+04*      .486      .204     30.20    .152
     .840     .840  .104E+04  .148E+04*      .614      .217     28.36    .183
     .933     .933  .122E+04  .192E+04*      .759      .230     26.81    .215
    1.027    1.027  .141E+04  .244E+04*      .921      .242     25.47    .249
    1.120    1.120  .161E+04  .304E+04*     1.103      .254     24.30    .284
    1.213    1.213  .182E+04  .373E+04*     1.304      .265     23.27    .322
    1.307    1.307  .204E+04  .451E+04*     1.524      .276     22.34    .361
    1.400    1.400  .228E+04  .539E+04*     1.766      .287     21.51    .401
    1.500    1.500  .439E+04  .111E+05*     2.297      .194     31.84    .290
    1.600    1.600  .102E+05  .276E+05*     3.654      .133     46.51    .212
    1.700    1.700  .197E+05  .566E+05*     6.329      .119     51.90    .202
    1.800    1.800  .329E+05  .100E+06*    10.726      .121     51.14    .217

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
 (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                                <---- hydrograph ---->   <-pipe / channel->
                           AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                           (ha)    (cms)   (hrs)   (mm)      (m)       (m/s)
  INFLOW : ID= 3:002260   333.75   4.483    8.52 25.816     1.631      .128
  OUTFLOW: ID=10:002295   333.75   4.087    9.58 25.816     1.616      .130

------------------------------------------------------------------------------
005:0054------------------------------------------------------------------------
---------------------
| DESIGN NASHYD     |   Area    (ha)=   17.47   Curve Number   (CN)=76.00
| 03:214    DT= 1.00 |  Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
---------------------  U.H. Tp(hrs)=    .600

     Unit Hyd Qpeak  (cms)=    1.112

     PEAK FLOW       (cms)=     .572 (i)
     TIME TO PEAK    (hrs)=    6.501
     RUNOFF VOLUME    (mm)=   24.738
     TOTAL RAINFALL   (mm)=   60.100
     RUNOFF COEFFICIENT   =     .412

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

------------------------------------------------------------------------------
005:0055------------------------------------------------------------------------
*#**************************************************************************
*# Calculate culvert routing and flow split near eastern site boundary
*#   - Storage volumes calculated based on site survey
*#   - Discharges calculated based on the 600 mm diameter CSP and 1500 mm
*#     diameter CSP capacities
*#**************************************************************************
---------------------
| ROUTE RESERVOIR   |    Requested routing time step =  1.0 min.
|  IN>03:(214   )   |
| OUT<01:(002300)   |    =========  OUTFLOW STORAGE TABLE  =========
---------------------   OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                          (cms)     (ha.m.)   |    (cms)    (ha.m.)
                           .000  .0000E+00    |    1.130  .4600E+00
                           .150  .0000E+00    |    5.470  .8100E+00
                           .450  .0000E+00    |   83.090  .3400E+01
                           .820  .6500E-01    |    .000   .0000E+00

     ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
     ---------------           (ha)     (cms)     (hrs)       (mm)
     INFLOW >03: (214   )      17.47     .572     6.501     24.738
     OUTFLOW<01: (002300)      17.47     .519     6.784     24.754

                PEAK   FLOW   REDUCTION [Qout/Qin](%)=   90.773
                TIME SHIFT OF PEAK FLOW          (min)=    17.00
                MAXIMUM  STORAGE   USED       (ha.m.)=.1212E-01

------------------------------------------------------------------------------
005:0056------------------------------------------------------------------------
---------------------
| DIVERT HYD        |
| INID=01  (002300)|
---------------------
      Outflow / Inflow  Relationships
      Flow 02 +  Flow 03 =  Total
       (cms)      (cms)      (cms)
         .000       .000       .000
         .150       .000       .150
         .400       .050       .450
         .680       .140       .820
         .930       .200      1.130
        1.040     4.430      5.470
        1.460    81.630     83.090

            NHYD       AREA     QPEAK   TpeakDate_hh:mm       R.V.   NFE WetHrs
                        (ha)     (cms)                        (mm)        (hrs)
   IDin = 01:002300     17.47     .519  No_date    6:47     24.754  184    11.
   ========================================================================
   IDout= 02:002310     16.14     .452  No_date    6:47     24.754  184    11.
   IDout= 03:002320      1.33     .067  No_date    6:47     24.754   67     3.
------------------------------------------------------------------------------
005:0057------------------------------------------------------------------------
---------------------
| DESIGN NASHYD     |   Area    (ha)=    5.34   Curve Number   (CN)=72.00
| 01:215    DT= 1.00 |  Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
---------------------  U.H. Tp(hrs)=    .860

     Unit Hyd Qpeak  (cms)=     .237

     PEAK FLOW       (cms)=     .119 (i)
     TIME TO PEAK    (hrs)=    6.818
     RUNOFF VOLUME    (mm)=   21.820
     TOTAL RAINFALL   (mm)=   60.100
     RUNOFF COEFFICIENT   =     .363

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

------------------------------------------------------------------------------
005:0058------------------------------------------------------------------------
---------------------
| ADD HYD (      2330) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
---------------------                     (ha)     (cms)   (hrs)   (mm)    (cms)
                    ID1 01:215           5.34     .119    6.82  21.82    .000
                   +ID2 02:      2310   16.14     .452    6.78  24.75    .000
                    ================================================================
                    SUM 04:      2330   21.48     .571    6.78  24.02    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
005:0059------------------------------------------------------------------------
---------------------
| DESIGN NASHYD     |   Area    (ha)=   18.59   Curve Number   (CN)=82.00
| 01:EXT7   DT= 1.00 |  Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
---------------------  U.H. Tp(hrs)=   1.470

     Unit Hyd Qpeak  (cms)=     .483

     PEAK FLOW       (cms)=     .391 (i)
     TIME TO PEAK    (hrs)=    7.484
     RUNOFF VOLUME    (mm)=   30.029
     TOTAL RAINFALL   (mm)=   60.100
     RUNOFF COEFFICIENT   =     .500

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

------------------------------------------------------------------------------
005:0060------------------------------------------------------------------------
*#**************************************************************************
*# McGill Drain - Total Flow at Eastern WSP
*#**************************************************************************
---------------------
| ADD HYD (      2340) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
---------------------                     (ha)     (cms)   (hrs)   (mm)    (cms)
                    ID1 01:EXT7          18.59     .391    7.48  30.03    .000
                   +ID2 04:      2330   21.48     .571    6.78  24.02    .000
                   +ID3 10:      2295   333.75    4.087   9.58  25.82    .000
                    ================================================================
                    SUM 05:      2340   373.82    4.487   9.37  25.92    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
005:0061------------------------------------------------------------------------
*#**************************************************************************
*# AREA CHECK
*#**************************************************************************
---------------------
| ADD HYD (      2350) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
---------------------                     (ha)     (cms)   (hrs)   (mm)    (cms)
                    ID1 03:      2320    1.33     .067    6.78  24.75    .000
                   +ID2 05:      2340   373.82    4.487   9.37  25.92    .000
                    ================================================================
                    SUM 01:      2350   375.15    4.489   9.37  25.92    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
005:0062------------------------------------------------------------------------
------------------------------------------------------------------------------
005:0002------------------------------------------------------------------------
  ** END OF RUN :   9

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




---------------------
| START             |  Project  dir.: F:\WSP\
---------------------  Rainfall dir.: F:\WSP\
    TZERO =    .00 hrs on       0
    METOUT=   2 (output = METRIC)
    NRUN  = 010
    NSTORM=   1
           #  1=12scs10.stm
------------------------------------------------------------------------------
010:0002------------------------------------------------------------------------
*#**************************************************************************
*#  Project Name: [Windsor Solar Project] Project Number: [1335-60106]
*#  Date        : 02-10-2016
*#  Modeller    : [NE]
*#  Company     : Stantec Consulting Ltd. (London)
*#  License #   :  4730904
*#**************************************************************************
*#
*#  Proposed Conditions
*#  25 mm Water Quality Event
*#  2, 5, 10, 25, 50, 100, 250-year 3-Hour Chicago Design Storm
*#
*#**************************************************************************
------------------------------------------------------------------------------
010:0002------------------------------------------------------------------------
---------------------
| READ STORM        |    Filename: 10-yr scs 12 hr windsor
| Ptotal=  69.20 mm|    Comments: 10-yr scs 12 hr windsor
---------------------
            TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
             hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
             .50   1.384 |   3.50   2.768 |   6.50  12.456 |   9.50   2.768
            1.00   1.384 |   4.00   2.768 |   7.00   5.536 |  10.00   1.384
            1.50   1.384 |   4.50   4.152 |   7.50   4.152 |  10.50   1.384
            2.00   1.384 |   5.00   5.536 |   8.00   4.152 |  11.00   1.384
```

```
           2.50   2.768 |   5.50   8.304 |   8.50   2.768 |  11.50   1.384
           3.00   2.768 |   6.00  62.280 |   9.00   2.768 |  12.00   1.384

--------------------------------------------------------------------------------
010:0003----------------------------------------------------------------------------
*#*****************************************************************************
*# LAPPAN DRAIN
*#*****************************************************************************
---------------------
| DESIGN NASHYD     |   Area     (ha)=   42.26   Curve Number    (CN)=73.00
| 01:EXT1   DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=   1.110

     Unit Hyd Qpeak  (cms)=    1.454

     PEAK FLOW       (cms)=    1.025 (i)
     TIME TO PEAK    (hrs)=    7.101
     RUNOFF VOLUME    (mm)=   28.354
     TOTAL RAINFALL   (mm)=   69.200
     RUNOFF COEFFICIENT   =     .410

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

--------------------------------------------------------------------------------
010:0004----------------------------------------------------------------------------
---------------------
| ROUTE CHANNEL     |     Routing time step (min) =  1.00
|  IN> 01:EXT1      |     Number of SEGMENTS =  3
| OUT< 02:002000    |     Slopes (%), CHANNEL= .1000  FLOODPLAIN= .2000
---------------------                 LENGTH =  700.00    (m)

               <------ DATA FOR SECTION (   1.0) ------>
               Distance      Elevation       Manning
                   .00          1.40          .2000
                 100.00         1.20     .2000 / .0850  Main Channel
                 101.80          .00          .0850      Main Channel
                 103.00          .00          .0850      Main Channel
                 104.80         1.20     .0850 / .2000  Main Channel
                 204.80         1.40          .2000

   <---------------------------- TRAVEL TIME TABLE ----------------------------->
    DEPTH     ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME    D x V
      (m)      (m)   (cu.m.)   (cu.m.)      (cms)     (m/s)     (min)    (m2/s)
     .071     .071  .645E+02  .325E+01       .005      .059    197.27     .004
     .141     .141  .140E+03  .141E+02       .018      .089    131.37     .013
     .212     .212  .225E+03  .340E+02       .036      .111    104.80     .024
     .282     .282  .321E+03  .647E+02       .060      .130     89.71     .037
     .353     .353  .427E+03  .108E+03       .089      .146     79.68     .052
     .424     .424  .544E+03  .165E+03       .125      .161     72.40     .068
     .494     .494  .671E+03  .237E+03       .168      .175     66.79     .086
     .565     .565  .809E+03  .326E+03       .217      .187     62.29     .106
     .635     .635  .957E+03  .434E+03       .272      .199     58.56     .127
     .706     .706  .112E+04  .563E+03*      .336      .211     55.41     .149
     .776     .776  .129E+04  .713E+03*      .407      .221     52.69     .172
     .847     .847  .146E+04  .886E+03*      .485      .232     50.32     .196
     .918     .918  .166E+04  .108E+04*      .572      .242     48.22     .222
     .988     .988  .186E+04  .131E+04*      .667      .252     46.35     .249
    1.059    1.059  .207E+04  .156E+04*      .771      .261     44.66     .277
    1.129    1.129  .229E+04  .185E+04*      .884      .271     43.13     .306
    1.200    1.200  .252E+04  .216E+04*     1.006      .280     41.73     .335
    1.300    1.300  .636E+04  .590E+04*     1.392      .153     76.12     .199
    1.400    1.400  .172E+05  .172E+05*     2.456      .100    116.67     .140

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
 (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                                  <---- hydrograph ---->   <-pipe / channel->
                            AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                             (ha)    (cms)   (hrs)   (mm)      (m)      (m/s)
   INFLOW : ID= 1:EXT1      42.26    1.025    7.10 28.354     1.205      .269
   OUTFLOW: ID= 2:002000    42.26     .829    7.53 28.354     1.095      .266


--------------------------------------------------------------------------------
010:0005----------------------------------------------------------------------------
---------------------
| DESIGN NASHYD     |   Area     (ha)=   22.52   Curve Number    (CN)=82.00
| 01:EXT2   DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=   1.270

     Unit Hyd Qpeak  (cms)=     .677

     PEAK FLOW       (cms)=     .658 (i)
     TIME TO PEAK    (hrs)=    7.251
     RUNOFF VOLUME    (mm)=   37.125
     TOTAL RAINFALL   (mm)=   69.200
     RUNOFF COEFFICIENT   =     .536

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

--------------------------------------------------------------------------------
010:0006----------------------------------------------------------------------------
---------------------
| DESIGN NASHYD     |   Area     (ha)=   42.81   Curve Number    (CN)=82.00
| 03:EXT3   DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=   1.110

     Unit Hyd Qpeak  (cms)=    1.473

     PEAK FLOW       (cms)=    1.385 (i)
     TIME TO PEAK    (hrs)=    7.068
     RUNOFF VOLUME    (mm)=   37.125
     TOTAL RAINFALL   (mm)=   69.200
     RUNOFF COEFFICIENT   =     .536

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

--------------------------------------------------------------------------------
010:0007----------------------------------------------------------------------------
*#*****************************************************************************
*# Lappan Drain - Total Flow at Pilette Road
*#*****************************************************************************
---------------------
| ADD HYD (      2010) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
-------------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
                        ID1 01:EXT2         22.52     .658    7.25  37.12    .000
                       +ID2 02:      2000   42.26     .829    7.53  28.35    .000
                       +ID3 03:EXT3        42.81    1.385    7.07  37.12    .000
                        ==========================================================
                        SUM 04:      2010  107.59    2.808    7.28  33.68    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
010:0008----------------------------------------------------------------------------
---------------------
| ROUTE CHANNEL     |     Routing time step (min) =  1.00
|  IN> 04:002010    |     Number of SEGMENTS =  3
| OUT< 01:002020    |     Slopes (%), CHANNEL= .1700  FLOODPLAIN= .2000
---------------------                 LENGTH =  350.00    (m)

               <------ DATA FOR SECTION (   2.0) ------>
               Distance      Elevation       Manning
                   .00          2.00          .2000
                 100.00         1.80     .2000 / .0850  Main Channel
                 102.75          .00          .0850      Main Channel
                 104.25          .00          .0850      Main Channel
                 107.00         1.80     .0850 / .1400  Main Channel
                 207.00         2.00          .1400

   <---------------------------- TRAVEL TIME TABLE ----------------------------->
    DEPTH     ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME    D x V
      (m)      (m)   (cu.m.)   (cu.m.)      (cms)     (m/s)     (min)    (m2/s)
     .100     .100  .578E+02  .486E+01       .016      .096     60.50     .010
     .200     .200  .126E+03  .212E+02       .052      .144     40.48     .029
     .300     .300  .206E+03  .518E+02       .106      .180     32.38     .054
     .400     .400  .296E+03  .993E+02       .177      .210     27.75     .084
     .500     .500  .396E+03  .166E+03       .268      .236     24.67     .118
     .600     .600  .508E+03  .256E+03*      .377      .260     22.42     .156
     .700     .700  .630E+03  .370E+03*      .507      .282     20.68     .197
     .800     .800  .762E+03  .512E+03*      .659      .303     19.28     .242
     .900     .900  .906E+03  .685E+03*      .833      .322     18.12     .290
    1.000    1.000  .106E+04  .891E+03*     1.031      .340     17.14     .340
    1.100    1.100  .122E+04  .113E+04*     1.253      .358     16.29     .394
    1.200    1.200  .140E+04  .141E+04*     1.500      .375     15.55     .450
    1.300    1.300  .159E+04  .173E+04*     1.775      .392     14.89     .509
    1.400    1.400  .178E+04  .210E+04*     2.077      .408     14.31     .571
    1.500    1.500  .199E+04  .251E+04*     2.407      .423     13.78     .635
    1.600    1.600  .221E+04  .297E+04*     2.768      .439     13.30     .702
    1.700    1.700  .244E+04  .348E+04*     3.158      .453     12.87     .771
    1.800    1.800  .268E+04  .405E+04*     3.580      .468     12.46     .842
    2.000    2.000  .102E+05  .171E+05*     5.907      .203     28.69     .407

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
 (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                                  <---- hydrograph ---->   <-pipe / channel->
                            AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                             (ha)    (cms)   (hrs)   (mm)      (m)      (m/s)
   INFLOW : ID= 4:002010    107.59    2.808    7.28 33.680     1.610      .440
   OUTFLOW: ID= 1:002020    107.59    2.710    7.45 33.680     1.578      .435


--------------------------------------------------------------------------------
010:0009----------------------------------------------------------------------------
---------------------
| DESIGN NASHYD     |   Area     (ha)=   10.43   Curve Number    (CN)=72.00
| 02:202    DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=    .970

     Unit Hyd Qpeak  (cms)=     .411

     PEAK FLOW       (cms)=     .271 (i)
     TIME TO PEAK    (hrs)=    6.934
     RUNOFF VOLUME    (mm)=   27.531
     TOTAL RAINFALL   (mm)=   69.200
     RUNOFF COEFFICIENT   =     .398

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

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010:0010----------------------------------------------------------------------------
---------------------
| ADD HYD (      2030) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
-------------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
                        ID1 01:      2020   107.59    2.710    7.45  33.68    .000
                       +ID2 02:202          10.43     .271    6.93  27.53    .000
                        ==========================================================
                        SUM 03:      2030   118.02    2.949    7.42  33.14    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
010:0011----------------------------------------------------------------------------
---------------------
| ROUTE CHANNEL     |     Routing time step (min) =  1.00
|  IN> 03:002030    |     Number of SEGMENTS =  3
| OUT< 01:002040    |     Slopes (%), CHANNEL= .1700  FLOODPLAIN= .2000
---------------------                 LENGTH =  450.00    (m)

               <------ DATA FOR SECTION (   3.0) ------>
               Distance      Elevation       Manning
                   .00          2.00          .2000
                 100.00         1.80     .2000 / .0850  Main Channel
                 102.75          .00          .0850      Main Channel
                 104.25          .00          .0850      Main Channel
                 107.00         1.80     .0850 / .1400  Main Channel
                 207.00         2.00          .1400

   <---------------------------- TRAVEL TIME TABLE ----------------------------->
    DEPTH     ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME    D x V
      (m)      (m)   (cu.m.)   (cu.m.)      (cms)     (m/s)     (min)    (m2/s)
     .100     .100  .744E+02  .486E+01       .016      .096     77.79     .010
     .200     .200  .163E+03  .212E+02       .052      .144     52.05     .029
     .300     .300  .264E+03  .518E+02       .106      .180     41.63     .054
     .400     .400  .380E+03  .993E+02       .177      .210     35.68     .084
     .500     .500  .509E+03  .166E+03       .268      .236     31.72     .118
     .600     .600  .653E+03  .256E+03       .377      .260     28.82     .156
     .700     .700  .809E+03  .370E+03       .507      .282     26.59     .197
     .800     .800  .980E+03  .512E+03*      .659      .303     24.79     .242
     .900     .900  .116E+04  .685E+03*      .833      .322     23.30     .290
    1.000    1.000  .136E+04  .891E+03*     1.031      .340     22.04     .340
    1.100    1.100  .157E+04  .113E+04*     1.253      .358     20.95     .394
    1.200    1.200  .180E+04  .141E+04*     1.500      .375     19.99     .450
    1.300    1.300  .204E+04  .173E+04*     1.775      .392     19.15     .509
    1.400    1.400  .229E+04  .210E+04*     2.077      .408     18.40     .571
    1.500    1.500  .256E+04  .251E+04*     2.407      .423     17.72     .635
    1.600    1.600  .284E+04  .297E+04*     2.768      .439     17.10     .702
    1.700    1.700  .313E+04  .348E+04*     3.158      .453     16.54     .771
    1.800    1.800  .344E+04  .405E+04*     3.580      .468     16.03     .842
    2.000    2.000  .131E+05  .171E+05*     5.907      .203     36.88     .407

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
 (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                                  <---- hydrograph ---->   <-pipe / channel->
                            AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                             (ha)    (cms)   (hrs)   (mm)      (m)      (m/s)
   INFLOW : ID= 3:002030    118.02    2.949    7.42 33.136     1.646      .445
   OUTFLOW: ID= 1:002040    118.02    2.798    7.58 33.136     1.608      .440


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010:0012----------------------------------------------------------------------------
---------------------
| DESIGN NASHYD     |   Area     (ha)=   15.29   Curve Number    (CN)=82.00
| 02:201    DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=   1.290

     Unit Hyd Qpeak  (cms)=     .453

     PEAK FLOW       (cms)=     .442 (i)
     TIME TO PEAK    (hrs)=    7.268
     RUNOFF VOLUME    (mm)=   37.125
     TOTAL RAINFALL   (mm)=   69.200
     RUNOFF COEFFICIENT   =     .536

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

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010:0013----------------------------------------------------------------------------
---------------------
| DESIGN NASHYD     |   Area     (ha)=   10.88   Curve Number    (CN)=72.00
| 03:204    DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=    .850

     Unit Hyd Qpeak  (cms)=     .489

     PEAK FLOW       (cms)=     .311 (i)
     TIME TO PEAK    (hrs)=    6.801
     RUNOFF VOLUME    (mm)=   27.531
     TOTAL RAINFALL   (mm)=   69.200
     RUNOFF COEFFICIENT   =     .398
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    (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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010:0014------------------------------------------------------------------------
----------------------
| ADD HYD (      2050) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
                        ID1 01:      2040   118.02   2.798   7.58  33.14    .000
                       +ID2 02:201           15.29    .442   7.27  37.12    .000
                       +ID3 03:204           10.88    .311   6.80  27.53    .000
                        ========================================================
                        SUM 04:      2050   144.19   3.448   7.55  33.14    .000

  NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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010:0015------------------------------------------------------------------------
--------------------
| ROUTE CHANNEL    |     Routing time step (min) =  1.00
|  IN> 04:002050   |     Number of SEGMENTS =  3
| OUT< 01:002060   |     Slopes (%), CHANNEL= .1700  FLOODPLAIN= .2000
--------------------                  LENGTH =  200.00    (m)

              <------ DATA FOR SECTION (   4.0) ------>
              Distance      Elevation       Manning
                  .00          2.00          .1400
                100.00         1.80     .1400 / .0850  Main Channel
                102.75          .00          .0850      Main Channel
                104.25          .00          .0850      Main Channel
                107.00         1.80     .0850 / .1400  Main Channel
                207.00         2.00          .1400

  <---------------------------- TRAVEL TIME TABLE ---------------------------->
   DEPTH     ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME    D x V
     (m)      (m)   (cu.m.)   (cu.m.)      (cms)     (m/s)     (min)   (m2/s)
    .100     .100  .331E+02  .486E+01       .016      .096     34.57    .010
    .200     .200  .722E+02  .212E+02       .052      .144     23.13    .029
    .300     .300  .118E+03  .518E+02       .106      .180     18.50    .054
    .400     .400  .169E+03  .993E+02*      .177      .210     15.86    .084
    .500     .500  .226E+03  .166E+03*      .268      .236     14.10    .118
    .600     .600  .290E+03  .256E+03*      .377      .260     12.81    .156
    .700     .700  .360E+03  .370E+03*      .507      .282     11.82    .197
    .800     .800  .436E+03  .512E+03*      .659      .303     11.02    .242
    .900     .900  .518E+03  .685E+03*      .833      .322     10.36    .290
   1.000    1.000  .606E+03  .891E+03*     1.031      .340      9.79    .340
   1.100    1.100  .700E+03  .113E+04*     1.253      .358      9.31    .394
   1.200    1.200  .800E+03  .141E+04*     1.500      .375      8.89    .450
   1.300    1.300  .906E+03  .173E+04*     1.775      .392      8.51    .509
   1.400    1.400  .102E+04  .210E+04*     2.077      .408      8.18    .571
   1.500    1.500  .114E+04  .251E+04*     2.407      .423      7.87    .635
   1.600    1.600  .126E+04  .297E+04*     2.768      .439      7.60    .702
   1.700    1.700  .139E+04  .348E+04*     3.158      .453      7.35    .771
   1.800    1.800  .153E+04  .405E+04*     3.580      .468      7.12    .842
   2.000    2.000  .581E+04  .171E+05*     6.114      .210     15.84    .421

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
 (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                              <---- hydrograph ---->   <-pipe / channel->
                           AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                           (ha)    (cms)   (hrs)   (mm)       (m)      (m/s)
  INFLOW : ID= 4:002050    144.19   3.448    7.55 33.136     1.769      .463
  OUTFLOW: ID= 1:002060    144.19   3.395    7.60 33.136     1.756      .461


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010:0016------------------------------------------------------------------------
--------------------
| DESIGN NASHYD    |   Area    (ha)=    4.78   Curve Number    (CN)=72.00
| 02:206    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=    .890

     Unit Hyd Qpeak  (cms)=     .205

     PEAK FLOW       (cms)=     .132 (i)
     TIME TO PEAK    (hrs)=    6.834
     RUNOFF VOLUME    (mm)=   27.531
     TOTAL RAINFALL   (mm)=   69.200
     RUNOFF COEFFICIENT   =     .398

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

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010:0017------------------------------------------------------------------------
----------------------
| ADD HYD (      2070) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
                        ID1 01:      2060   144.19   3.395   7.60  33.14    .000
                       +ID2 02:206           4.78    .132   6.83  27.53    .000
                        ========================================================
                        SUM 03:      2070   148.97   3.492   7.58  32.96    .000

  NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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010:0018------------------------------------------------------------------------
--------------------
| ROUTE CHANNEL    |     Routing time step (min) =  1.00
|  IN> 03:002070   |     Number of SEGMENTS =  3
| OUT< 01:002080   |     Slopes (%), CHANNEL= .1200  FLOODPLAIN= .2000
--------------------                  LENGTH =  500.00    (m)

              <------ DATA FOR SECTION (   5.0) ------>
              Distance      Elevation       Manning
                  .00          2.20          .1400
                200.00         1.80     .1400 / .0850  Main Channel
                202.75          .00          .0850      Main Channel
                204.25          .00          .0850      Main Channel
                207.00         1.80     .0850 / .1400  Main Channel
                407.00         2.20          .1400

  <---------------------------- TRAVEL TIME TABLE ---------------------------->
   DEPTH     ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME    D x V
     (m)      (m)   (cu.m.)   (cu.m.)      (cms)     (m/s)     (min)   (m2/s)
    .112     .112  .940E+02  .882E+01       .016      .087     95.91    .010
    .225     .225  .207E+03  .389E+02       .054      .129     64.45    .029
    .337     .337  .340E+03  .957E+02       .110      .161     51.67    .054
    .450     .450  .492E+03  .185E+03       .185      .188     44.34    .085
    .562     .562  .664E+03  .311E+03       .280      .211     39.43    .119
    .675     .675  .854E+03  .481E+03*      .397      .233     35.84    .157
    .788     .788  .106E+04  .698E+03*      .537      .252     33.06    .199
    .900     .900  .129E+04  .970E+03*      .700      .270     30.81    .243
   1.013    1.013  .154E+04  .130E+04*      .888      .288     28.95    .291
   1.125    1.125  .181E+04  .170E+04*     1.102      .304     27.37    .343
   1.238    1.238  .210E+04  .216E+04*     1.344      .320     26.01    .397
   1.350    1.350  .240E+04  .271E+04*     1.615      .336     24.81    .453
   1.463    1.463  .273E+04  .333E+04*     1.916      .351     23.76    .513
   1.575    1.575  .308E+04  .404E+04*     2.247      .365     22.82    .575
   1.688    1.688  .344E+04  .484E+04*     2.611      .379     21.97    .640
   1.800    1.800  .382E+04  .574E+04*     3.008      .393     21.19    .708
   1.933    1.933  .874E+04  .141E+05*     4.111      .235     35.42    .455
   2.067    2.067  .225E+05  .388E+05*     7.293      .162     51.50    .334
   2.200    2.200  .452E+05  .829E+05*    13.799      .153     54.62    .336

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
 (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                              <---- hydrograph ---->   <-pipe / channel->
                           AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                           (ha)    (cms)   (hrs)   (mm)       (m)      (m/s)
  INFLOW : ID= 3:002070    148.97   3.492    7.58 32.956     1.859      .304
  OUTFLOW: ID= 1:002080    148.97   3.242    8.38 32.956     1.827      .346


------------------------------------------------------------------------------
010:0019------------------------------------------------------------------------
--------------------
| DESIGN NASHYD    |   Area    (ha)=   14.96   Curve Number    (CN)=72.00
| 02:207    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   1.330

     Unit Hyd Qpeak  (cms)=     .430

     PEAK FLOW       (cms)=     .307 (i)
     TIME TO PEAK    (hrs)=    7.351
     RUNOFF VOLUME    (mm)=   27.531
     TOTAL RAINFALL   (mm)=   69.200
     RUNOFF COEFFICIENT   =     .398

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

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010:0020------------------------------------------------------------------------
--------------------
| DESIGN NASHYD    |   Area    (ha)=    7.92   Curve Number    (CN)=72.00
| 03:208    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   1.110

     Unit Hyd Qpeak  (cms)=     .273

     PEAK FLOW       (cms)=     .186 (i)
     TIME TO PEAK    (hrs)=    7.101
     RUNOFF VOLUME    (mm)=   27.531
     TOTAL RAINFALL   (mm)=   69.200
     RUNOFF COEFFICIENT   =     .398

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

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010:0021------------------------------------------------------------------------
*#*************************************************************************
*# Lappan Drain - Total Flow at Jefferson Boulevard
*#*************************************************************************
----------------------
| ADD HYD (      2090) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
                        ID1 01:      2080   148.97   3.242   8.38  32.96    .000
                       +ID2 02:207           14.96    .307   7.35  27.53    .000
                       +ID3 03:208            7.92    .186   7.10  27.53    .000
                        ========================================================
                        SUM 04:      2090   171.85   3.617   8.15  32.23    .000

  NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
010:0022------------------------------------------------------------------------
--------------------
| ROUTE CHANNEL    |     Routing time step (min) =  1.00
|  IN> 04:002090   |     Number of SEGMENTS =  3
| OUT< 01:002100   |     Slopes (%), CHANNEL= .1200  FLOODPLAIN= .2000
--------------------                  LENGTH =  130.00    (m)

              <------ DATA FOR SECTION (   6.0) ------>
              Distance      Elevation       Manning
                  .00          2.20          .1400
                200.00         1.80     .1400 / .0850  Main Channel
                202.75          .00          .0850      Main Channel
                204.25          .00          .0850      Main Channel
                207.00         1.80     .0850 / .2000  Main Channel
                407.00         2.20          .2000

  <---------------------------- TRAVEL TIME TABLE ---------------------------->
   DEPTH     ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME    D x V
     (m)      (m)   (cu.m.)   (cu.m.)      (cms)     (m/s)     (min)   (m2/s)
    .112     .112  .245E+02  .882E+01       .016      .087     24.94    .010
    .225     .225  .539E+02  .389E+02*      .054      .129     16.76    .029
    .337     .337  .884E+02  .957E+02*      .110      .161     13.43    .054
    .450     .450  .128E+03  .185E+03*      .185      .188     11.53    .085
    .562     .562  .173E+03  .311E+03*      .280      .211     10.25    .119
    .675     .675  .222E+03  .481E+03*      .397      .233      9.32    .157
    .788     .788  .277E+03  .698E+03*      .537      .252      8.59    .199
    .900     .900  .336E+03  .970E+03*      .700      .270      8.01    .243
   1.013    1.013  .401E+03  .130E+04*      .888      .288      7.53    .291
   1.125    1.125  .471E+03  .170E+04*     1.102      .304      7.12    .343
   1.238    1.238  .545E+03  .216E+04*     1.344      .320      6.76    .397
   1.350    1.350  .625E+03  .271E+04*     1.615      .336      6.45    .453
   1.463    1.463  .710E+03  .333E+04*     1.916      .351      6.18    .513
   1.575    1.575  .800E+03  .404E+04*     2.247      .365      5.93    .575
   1.688    1.688  .895E+03  .484E+04*     2.611      .379      5.71    .640
   1.800    1.800  .994E+03  .574E+04*     3.008      .393      5.51    .708
   1.933    1.933  .227E+04  .141E+05*     4.041      .231      9.37    .447
   2.067    2.067  .586E+04  .388E+05*     6.848      .152     14.26    .314
   2.200    2.200  .118E+05  .829E+05*    12.488      .138     15.69    .304

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
 (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                              <---- hydrograph ---->   <-pipe / channel->
                           AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                           (ha)    (cms)   (hrs)   (mm)       (m)      (m/s)
  INFLOW : ID= 4:002090    171.85   3.617    8.15 32.234     1.879      .278
  OUTFLOW: ID= 1:002100    171.85   3.381    7.95 32.234     2.139      .144


------------------------------------------------------------------------------
010:0023------------------------------------------------------------------------
--------------------
| DESIGN NASHYD    |   Area    (ha)=    4.95   Curve Number    (CN)=73.00
| 02:212    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=    .480

     Unit Hyd Qpeak  (cms)=     .394

     PEAK FLOW       (cms)=     .215 (i)
     TIME TO PEAK    (hrs)=    6.351
     RUNOFF VOLUME    (mm)=   28.354
     TOTAL RAINFALL   (mm)=   69.200
     RUNOFF COEFFICIENT   =     .410

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

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010:0024------------------------------------------------------------------------
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| ADD HYD (      2110) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
                        ID1 01:      2100   171.85   3.381   7.95  32.23    .000
                       +ID2 02:212           4.95    .215   6.35  28.35    .000
                        ========================================================
                        SUM 03:      2110   176.80   3.425   7.95  32.13    .000

  NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
010:0025------------------------------------------------------------------------
--------------------
| ROUTE CHANNEL    |     Routing time step (min) =  1.00
|  IN> 03:002110   |     Number of SEGMENTS =  3
| OUT< 01:002120   |     Slopes (%), CHANNEL= .1200  FLOODPLAIN= .2000
--------------------                  LENGTH =  330.00    (m)

              <------ DATA FOR SECTION (   7.0) ------>
```

Distance	Elevation	Manning	
.00	2.20	.1400	
200.00	1.80	.1400 / .0850	Main Channel
202.75	.00	.0850	Main Channel
204.25	.00	.0850	Main Channel
207.00	1.80	.0850 / .2000	Main Channel
407.00	2.20	.2000	

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

DEPTH (m)	ELEV (m)	X-VOLUME (cu.m.)	S-VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME (min)	D x V (m2/s)
.112	.112	.621E+02	.882E+01	.016	.087	63.30	.010
.225	.225	.137E+03	.389E+02	.054	.129	42.54	.029
.337	.337	.224E+03	.957E+02	.110	.161	34.10	.054
.450	.450	.325E+03	.185E+03*	.185	.188	29.26	.085
.562	.562	.438E+03	.311E+03*	.280	.211	26.02	.119
.675	.675	.564E+03	.481E+03*	.397	.233	23.65	.157
.788	.788	.702E+03	.698E+03*	.537	.252	21.82	.199
.900	.900	.854E+03	.970E+03*	.700	.270	20.34	.243
1.013	1.013	.102E+04	.130E+04*	.888	.288	19.11	.291
1.125	1.125	.119E+04	.170E+04*	1.102	.304	18.06	.343
1.238	1.238	.138E+04	.216E+04*	1.344	.320	17.16	.397
1.350	1.350	.159E+04	.271E+04*	1.615	.336	16.38	.453
1.463	1.463	.180E+04	.333E+04*	1.916	.351	15.68	.513
1.575	1.575	.203E+04	.404E+04*	2.247	.365	15.06	.575
1.688	1.688	.227E+04	.484E+04*	2.611	.379	14.50	.640
1.800	1.800	.252E+04	.574E+04*	3.008	.393	13.99	.708
1.933	1.933	.577E+04	.141E+05*	4.041	.231	23.78	.447
2.067	2.067	.149E+05	.388E+05*	6.848	.152	36.20	.314
2.200	2.200	.298E+05	.829E+05*	12.488	.138	39.84	.304

X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
(*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

	AREA (ha)	<---- hydrograph ----> QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	<-pipe / channel-> MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 3:002110	176.80	3.425	7.95	32.125	1.854	.307
OUTFLOW: ID= 1:002120	176.80	3.158	8.10	32.125	1.819	.358

010:0026

DESIGN NASHYD	Area (ha)= 6.60	Curve Number (CN)=82.00
02:EXT8 DT= 1.00	Ia (mm)= 1.500	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= .820	

Unit Hyd Qpeak (cms)= .307

PEAK FLOW (cms)= .267 (i)
TIME TO PEAK (hrs)= 6.734
RUNOFF VOLUME (mm)= 37.125
TOTAL RAINFALL (mm)= 69.200
RUNOFF COEFFICIENT = .536

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

010:0027

*#***
*# Lappan Drain - Total Flow at McGill Drain
*#***

ADD HYD		ID: NHYD	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	DWF (cms)
	ID1 01:	2120	176.80	3.158	8.10	32.13	.000
	+ID2 02:EXT8		6.60	.267	6.73	37.12	.000
	SUM 10:	2130	183.40	3.276	8.10	32.31	.000

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

010:0028

*#***
*# McGILL DRAIN
*#***

DESIGN NASHYD	Area (ha)= 12.75	Curve Number (CN)=72.00
01:203 DT= 1.00	Ia (mm)= 1.500	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= .970	

Unit Hyd Qpeak (cms)= .502

PEAK FLOW (cms)= .331 (i)
TIME TO PEAK (hrs)= 6.934
RUNOFF VOLUME (mm)= 27.531
TOTAL RAINFALL (mm)= 69.200
RUNOFF COEFFICIENT = .398

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

010:0029

ROUTE CHANNEL	Routing time step (min) = 1.00
IN> 01:203	Number of SEGMENTS = 3
OUT< 02:002140	Slopes (%), CHANNEL= .3500 FLOODPLAIN= .2000
	LENGTH = 500.00 (m)

<------ DATA FOR SECTION (8.0) ------>

Distance	Elevation	Manning	
.00	1.40	.1400	
200.00	1.00	.1400 / .1000	Main Channel
201.50	.00	.1000	Main Channel
203.50	.00	.1000	Main Channel
205.00	1.00	.1000 / .2000	Main Channel
405.00	1.40	.2000	

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

DEPTH (m)	ELEV (m)	X-VOLUME (cu.m.)	S-VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME (min)	D x V (m2/s)
.071	.071	.753E+02	.154E+01	.015	.097	85.67	.007
.143	.143	.158E+03	.646E+01	.047	.149	56.11	.021
.214	.214	.249E+03	.152E+02	.094	.188	44.28	.040
.286	.286	.347E+03	.283E+02	.154	.221	37.63	.063
.357	.357	.453E+03	.462E+02	.227	.250	33.27	.089
.429	.429	.566E+03	.693E+02	.313	.276	30.14	.118
.500	.500	.687E+03	.982E+02	.413	.300	27.75	.150
.571	.571	.816E+03	.133E+03	.526	.322	25.85	.184
.643	.643	.953E+03	.175E+03	.654	.343	24.30	.220
.714	.714	.110E+04	.224E+03	.795	.362	22.99	.259
.786	.786	.125E+04	.280E+03	.952	.381	21.87	.299
.857	.857	.141E+04	.345E+03	1.123	.399	20.90	.342
.929	.929	.158E+04	.418E+03	1.310	.416	20.04	.386
1.000	1.000	.175E+04	.500E+03	1.513	.432	19.28	.432
1.080	1.080	.355E+04	.110E+04	1.913	.269	30.92	.291
1.160	1.160	.855E+04	.283E+04	2.777	.162	51.31	.188
1.240	1.240	.167E+05	.593E+04	4.375	.131	63.81	.162
1.320	1.320	.281E+05	.106E+05	6.931	.123	67.70	.162
1.400	1.400	.427E+05	.171E+05	10.642	.124	66.95	.174

X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
S-VOLUME= Volume that can be stored in channel at specified ELEVATION.

	AREA (ha)	<---- hydrograph ----> QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	<-pipe / channel-> MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 1:203	12.75	.331	6.93	27.531	.441	.280
OUTFLOW: ID= 2:002140	12.75	.289	7.33	27.531	.407	.268

010:0030

DESIGN NASHYD	Area (ha)= 12.89	Curve Number (CN)=72.00
01:205 DT= 1.00	Ia (mm)= 1.500	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= .860	

Unit Hyd Qpeak (cms)= .572

PEAK FLOW (cms)= .365 (i)
TIME TO PEAK (hrs)= 6.801
RUNOFF VOLUME (mm)= 27.531
TOTAL RAINFALL (mm)= 69.200
RUNOFF COEFFICIENT = .398

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

010:0031

ADD HYD		ID: NHYD	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	DWF (cms)
	ID1 01:205		12.89	.365	6.80	27.53	.000
	+ID2 02:	2140	12.75	.289	7.33	27.53	.000
	SUM 03:	2150	25.64	.623	7.05	27.53	.000

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

010:0032

ROUTE CHANNEL	Routing time step (min) = 1.00
IN> 03:002150	Number of SEGMENTS = 3
OUT< 01:002160	Slopes (%), CHANNEL= .0500 FLOODPLAIN= .2000
	LENGTH = 360.00 (m)

<------ DATA FOR SECTION (9.0) ------>

Distance	Elevation	Manning	
.00	1.40	.1400	
200.00	1.00	.1400 / .1000	Main Channel
201.50	.00	.1000	Main Channel
203.50	.00	.1000	Main Channel
205.00	1.00	.1000 / .2000	Main Channel
405.00	1.40	.2000	

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

DEPTH (m)	ELEV (m)	X-VOLUME (cu.m.)	S-VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME (min)	D x V (m2/s)
.071	.071	.542E+02	.108E+02	.006	.037	163.19	.003
.143	.143	.114E+03	.452E+02	.018	.056	106.89	.008
.214	.214	.179E+03	.107E+03*	.035	.071	84.35	.015
.286	.286	.250E+03	.198E+03*	.058	.084	71.69	.024
.357	.357	.326E+03	.323E+03*	.086	.095	63.38	.034
.429	.429	.408E+03	.485E+03*	.118	.105	57.41	.045
.500	.500	.495E+03	.687E+03*	.156	.113	52.87	.057
.571	.571	.588E+03	.933E+03*	.199	.122	49.25	.070
.643	.643	.686E+03	.123E+04*	.247	.130	46.29	.083
.714	.714	.790E+03	.157E+04*	.301	.137	43.80	.098
.786	.786	.899E+03	.196E+04*	.360	.144	41.67	.113
.857	.857	.101E+04	.241E+04*	.424	.151	39.81	.129
.929	.929	.113E+04	.293E+04*	.495	.157	38.18	.146
1.000	1.000	.126E+04	.350E+04*	.572	.163	36.73	.163
1.080	1.080	.256E+04	.767E+04*	.786	.111	54.17	.120
1.160	1.160	.616E+04	.198E+05*	1.451	.085	70.71	.098
1.240	1.240	.121E+05	.415E+05*	2.837	.085	70.85	.105
1.320	1.320	.203E+05	.743E+05*	5.168	.092	65.36	.121
1.400	1.400	.308E+05	.120E+06*	8.644	.101	59.35	.142

X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
(*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

	AREA (ha)	<---- hydrograph ----> QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	<-pipe / channel-> MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 3:002150	25.64	.623	7.05	27.531	1.019	.147
OUTFLOW: ID= 1:002160	25.64	.514	7.45	27.531	.948	.159

010:0033

DESIGN NASHYD	Area (ha)= 15.50	Curve Number (CN)=72.00
02:209 DT= 1.00	Ia (mm)= 1.500	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= .970	

Unit Hyd Qpeak (cms)= .610

PEAK FLOW (cms)= .402 (i)
TIME TO PEAK (hrs)= 6.934
RUNOFF VOLUME (mm)= 27.531
TOTAL RAINFALL (mm)= 69.200
RUNOFF COEFFICIENT = .398

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

010:0034

ADD HYD		ID: NHYD	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	DWF (cms)
	ID1 01:	2160	25.64	.514	7.45	27.53	.000
	+ID2 02:209		15.50	.402	6.93	27.53	.000
	SUM 03:	2170	41.14	.874	7.30	27.53	.000

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

010:0035

ROUTE CHANNEL	Routing time step (min) = 1.00
IN> 03:002170	Number of SEGMENTS = 3
OUT< 01:002180	Slopes (%), CHANNEL= .1500 FLOODPLAIN= .2000
	LENGTH = 250.00 (m)

<------ DATA FOR SECTION (10.0) ------>

Distance	Elevation	Manning	
.00	1.40	.2000	
200.00	1.00	.2000 / .1000	Main Channel
201.50	.00	.1000	Main Channel
203.50	.00	.1000	Main Channel
205.00	1.00	.1000 / .2000	Main Channel
405.00	1.40	.2000	

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

DEPTH (m)	ELEV (m)	X-VOLUME (cu.m.)	S-VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME (min)	D x V (m2/s)
.071	.071	.376E+02	.358E+01	.010	.064	65.43	.005
.143	.143	.791E+02	.151E+02	.031	.097	42.85	.014
.214	.214	.124E+03	.355E+02	.061	.123	33.82	.026
.286	.286	.173E+03	.661E+02	.101	.145	28.74	.041
.357	.357	.226E+03	.108E+03	.148	.164	25.41	.059
.429	.429	.283E+03	.162E+03*	.205	.181	23.02	.078
.500	.500	.344E+03	.229E+03*	.270	.197	21.20	.098
.571	.571	.408E+03	.311E+03*	.344	.211	19.75	.121
.643	.643	.476E+03	.408E+03*	.428	.225	18.56	.144
.714	.714	.548E+03	.522E+03*	.521	.237	17.56	.169
.786	.786	.624E+03	.654E+03*	.623	.249	16.71	.196
.857	.857	.704E+03	.805E+03*	.735	.261	15.96	.224
.929	.929	.788E+03	.975E+03*	.858	.272	15.31	.253

```
   1.000    1.000  .875E+03  .117E+04*      .990      .283     14.73     .283
   1.080    1.080  .177E+04  .256E+04*     1.270      .179     23.30     .193
   1.160    1.160  .427E+04  .661E+04*     1.927      .113     36.97     .131
   1.240    1.240  .837E+04  .138E+05*     3.185      .095     43.82     .118
   1.320    1.320  .141E+05  .248E+05*     5.229      .093     44.86     .123
   1.400    1.400  .214E+05  .399E+05*     8.222      .096     43.33     .135

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
 (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                                <---- hydrograph ---->   <-pipe / channel->
                            AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                            (ha)    (cms)   (hrs)   (mm)      (m)      (m/s)
  INFLOW : ID= 3:002170     41.14     .874    7.30 27.531      .937      .273
  OUTFLOW: ID= 1:002180     41.14     .838    7.45 27.531      .916      .270


--------------------------------------------------------------------------------
010:0036--------------------------------------------------------------------------
--------------------
| DESIGN NASHYD     |   Area     (ha)=    7.27   Curve Number    (CN)=82.00
| 02:210    DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=    .820

     Unit Hyd Qpeak  (cms)=     .339

     PEAK FLOW       (cms)=     .294 (i)
     TIME TO PEAK    (hrs)=    6.734
     RUNOFF VOLUME    (mm)=   37.125
     TOTAL RAINFALL   (mm)=   69.200
     RUNOFF COEFFICIENT    =     .536

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

--------------------------------------------------------------------------------
010:0037--------------------------------------------------------------------------
--------------------
| DESIGN NASHYD     |   Area     (ha)=   21.08   Curve Number    (CN)=80.00
| 03:EXT4   DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   1.830

     Unit Hyd Qpeak  (cms)=     .440

     PEAK FLOW       (cms)=     .437 (i)
     TIME TO PEAK    (hrs)=    7.934
     RUNOFF VOLUME    (mm)=   34.934
     TOTAL RAINFALL   (mm)=   69.200
     RUNOFF COEFFICIENT    =     .505

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

--------------------------------------------------------------------------------
010:0038--------------------------------------------------------------------------
*################################################################################
*# McGill Drain - Total Flow at Jefferson Boulevard
*################################################################################
------------------------
| ADD HYD (      2190) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
                        ID1 01:      2180    41.14     .838    7.45  27.53     .000
                      +ID2 02:210            7.27     .294    6.73  37.12     .000
                      +ID3 03:EXT4          21.08     .437    7.93  34.93     .000
                       ========================================================
                       SUM 04:      2190    69.49    1.466    7.43  30.78     .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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010:0039--------------------------------------------------------------------------
--------------------
| ROUTE CHANNEL     |     Routing time step (min) =  1.00
|  IN> 04:002190    |     Number of SEGMENTS =  3
| OUT< 01:002200    |     Slopes (%), CHANNEL= .3000  FLOODPLAIN= .2000
--------------------              LENGTH =  280.00     (m)

                <------ DATA FOR SECTION (  11.0) ------>
                Distance      Elevation       Manning
                    .00          1.40          .2000
                  200.00         1.00     .2000 / .1000  Main Channel
                  201.50          .00          .1000      Main Channel
                  203.50          .00          .1000      Main Channel
                  205.00         1.00     .1000 / .2000  Main Channel
                  405.00         1.40          .2000

   <---------------------------- TRAVEL TIME TABLE ----------------------------->
    DEPTH     ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME    D x V
      (m)      (m)   (cu.m.)   (cu.m.)      (cms)     (m/s)     (min)   (m2/s)
     .071     .071  .421E+02  .179E+01       .014      .090     51.82     .006
     .143     .143  .886E+02  .753E+01       .043      .138     33.94     .020
     .214     .214  .139E+03  .178E+02       .087      .174     26.78     .037
     .286     .286  .194E+03  .330E+02       .142      .205     22.76     .059
     .357     .357  .254E+03  .539E+02       .210      .232     20.12     .083
     .429     .429  .317E+03  .809E+02       .290      .256     18.23     .110
     .500     .500  .385E+03  .115E+03       .382      .278     16.79     .139
     .571     .571  .457E+03  .155E+03       .487      .298     15.64     .171
     .643     .643  .534E+03  .204E+03       .605      .318     14.70     .204
     .714     .714  .614E+03  .261E+03       .736      .336     13.91     .240
     .786     .786  .699E+03  .327E+03       .881      .353     13.23     .277
     .857     .857  .789E+03  .402E+03*     1.040      .369     12.64     .316
     .929     .929  .882E+03  .488E+03*     1.213      .385     12.12     .357
    1.000    1.000  .980E+03  .583E+03*     1.401      .400     11.66     .400
    1.080    1.080  .199E+04  .128E+04*     1.761      .248     18.81     .268
    1.160    1.160  .479E+04  .331E+04*     2.505      .147     31.85     .170
    1.240    1.240  .938E+04  .692E+04*     3.856      .115     40.54     .143
    1.320    1.320  .158E+05  .124E+05*     5.997      .107     43.81     .141
    1.400    1.400  .239E+05  .199E+05*     9.093      .106     43.88     .149

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
 (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                                <---- hydrograph ---->   <-pipe / channel->
                            AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                            (ha)    (cms)   (hrs)   (mm)      (m)      (m/s)
  INFLOW : ID= 4:002190     69.49    1.466    7.43 30.780     1.015      .360
  OUTFLOW: ID= 1:002200     69.49    1.444    7.72 30.780     1.009      .373


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010:0040--------------------------------------------------------------------------
--------------------
| DESIGN NASHYD     |   Area     (ha)=   14.81   Curve Number    (CN)=82.00
| 02:EXT5   DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   1.520

     Unit Hyd Qpeak  (cms)=     .372

     PEAK FLOW       (cms)=     .377 (i)
     TIME TO PEAK    (hrs)=    7.534
     RUNOFF VOLUME    (mm)=   37.125
     TOTAL RAINFALL   (mm)=   69.200
     RUNOFF COEFFICIENT    =     .536

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

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010:0041--------------------------------------------------------------------------
------------------------
| ADD HYD (      2210) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
                        ID1 01:      2200    69.49    1.444    7.72  30.78     .000
                      +ID2 02:EXT5           14.81     .377    7.53  37.12     .000
                       ========================================================
                       SUM 03:      2210    84.30    1.818    7.72  31.89     .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
010:0042--------------------------------------------------------------------------
*################################################################################
*# McGill Drain - Total Flow at Lappan Drain Confluence
*################################################################################
------------------------
| ADD HYD (      2220) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
                        ID1 03:      2210    84.30    1.818    7.72  31.89     .000
                      +ID2 10:      2130   183.40    3.276    8.10  32.31     .000
                       ========================================================
                       SUM 01:      2220   267.70    5.008    7.98  32.18     .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
010:0043--------------------------------------------------------------------------
--------------------
| ROUTE CHANNEL     |     Routing time step (min) =  1.00
|  IN> 01:002220    |     Number of SEGMENTS =  3
| OUT< 02:002230    |     Slopes (%), CHANNEL= .1500  FLOODPLAIN= .2000
--------------------              LENGTH =  200.00     (m)

                <------ DATA FOR SECTION (  12.0) ------>
                Distance      Elevation       Manning
                    .00          1.80          .1400
                  200.00         1.40     .1400 / .0850  Main Channel
                  202.60          .00          .0850      Main Channel
                  204.40          .00          .0850      Main Channel
                  207.00         1.40     .0850 / .2000  Main Channel
                  407.00         1.80          .2000

   <---------------------------- TRAVEL TIME TABLE ----------------------------->
    DEPTH     ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME    D x V
      (m)      (m)   (cu.m.)   (cu.m.)      (cms)     (m/s)     (min)   (m2/s)
     .093     .093  .368E+02  .573E+01       .016      .087     38.15     .008
     .187     .187  .801E+02  .249E+02       .053      .131     25.37     .025
     .280     .280  .130E+03  .606E+02       .107      .165     20.20     .046
     .373     .373  .186E+03  .116E+03*      .180      .193     17.26     .072
     .467     .467  .249E+03  .194E+03*      .271      .218     15.31     .102
     .560     .560  .318E+03  .297E+03*      .382      .240     13.89     .134
     .653     .653  .394E+03  .429E+03*      .513      .260     12.80     .170
     .747     .747  .476E+03  .592E+03*      .665      .280     11.92     .209
     .840     .840  .564E+03  .790E+03*      .840      .298     11.20     .250
     .933     .933  .660E+03  .103E+04*     1.039      .315     10.58     .294
    1.027    1.027  .761E+03  .130E+04*     1.262      .332     10.05     .340
    1.120    1.120  .869E+03  .162E+04*     1.510      .348      9.59     .389
    1.213    1.213  .984E+03  .199E+04*     1.785      .363      9.18     .440
    1.307    1.307  .110E+04  .241E+04*     2.087      .378      8.82     .494
    1.400    1.400  .123E+04  .287E+04*     2.418      .392      8.49     .549
    1.500    1.500  .237E+04  .593E+04*     3.077      .259     12.85     .389
    1.600    1.600  .551E+04  .147E+05*     4.571      .166     20.10     .265
    1.700    1.700  .107E+05  .302E+05*     7.392      .139     24.02     .236
    1.800    1.800  .178E+05  .534E+05*    11.944      .134     24.83     .242

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
 (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                                <---- hydrograph ---->   <-pipe / channel->
                            AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                            (ha)    (cms)   (hrs)   (mm)      (m)      (m/s)
  INFLOW : ID= 1:002220     267.70    5.008    7.98 32.176     1.615      .161
  OUTFLOW: ID= 2:002230     267.70    4.567    8.20 32.176     1.600      .166


--------------------------------------------------------------------------------
010:0044--------------------------------------------------------------------------
--------------------
| DESIGN NASHYD     |   Area     (ha)=   16.88   Curve Number    (CN)=72.00
| 01:213    DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=    .770

     Unit Hyd Qpeak  (cms)=     .837

     PEAK FLOW       (cms)=     .517 (i)
     TIME TO PEAK    (hrs)=    6.701
     RUNOFF VOLUME    (mm)=   27.531
     TOTAL RAINFALL   (mm)=   69.200
     RUNOFF COEFFICIENT    =     .398

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

--------------------------------------------------------------------------------
010:0045--------------------------------------------------------------------------
------------------------
| ADD HYD (      2240) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
                        ID1 01:213            16.88     .517    6.70  27.53     .000
                      +ID2 02:      2230    267.70    4.567    8.20  32.18     .000
                       ========================================================
                       SUM 03:      2240    284.58    4.766    8.20  31.90     .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
010:0046--------------------------------------------------------------------------
--------------------
| ROUTE CHANNEL     |     Routing time step (min) =  1.00
|  IN> 03:002240    |     Number of SEGMENTS =  3
| OUT< 01:002250    |     Slopes (%), CHANNEL= .1500  FLOODPLAIN= .2000
--------------------              LENGTH =  170.00     (m)

                <------ DATA FOR SECTION (  13.0) ------>
                Distance      Elevation       Manning
                    .00          1.80          .1400
                  200.00         1.40     .1400 / .0850  Main Channel
                  202.60          .00          .0850      Main Channel
                  204.40          .00          .0850      Main Channel
                  207.00         1.40     .0850 / .2000  Main Channel
                  407.00         1.80          .2000

   <---------------------------- TRAVEL TIME TABLE ----------------------------->
    DEPTH     ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME    D x V
      (m)      (m)   (cu.m.)   (cu.m.)      (cms)     (m/s)     (min)   (m2/s)
     .093     .093  .313E+02  .573E+01       .016      .087     32.43     .008
     .187     .187  .681E+02  .249E+02       .053      .131     21.56     .025
     .280     .280  .110E+03  .606E+02*      .107      .165     17.17     .046
     .373     .373  .158E+03  .116E+03*      .180      .193     14.67     .072
     .467     .467  .212E+03  .194E+03*      .271      .218     13.02     .102
     .560     .560  .270E+03  .297E+03*      .382      .240     11.81     .134
     .653     .653  .335E+03  .429E+03*      .513      .260     10.88     .170
     .747     .747  .404E+03  .592E+03*      .665      .280     10.13     .209
     .840     .840  .480E+03  .790E+03*      .840      .298      9.52     .250
     .933     .933  .561E+03  .103E+04*     1.039      .315      8.99     .294
    1.027    1.027  .647E+03  .130E+04*     1.262      .332      8.55     .340
    1.120    1.120  .739E+03  .162E+04*     1.510      .348      8.15     .389
    1.213    1.213  .836E+03  .199E+04*     1.785      .363      7.81     .440
    1.307    1.307  .939E+03  .241E+04*     2.087      .378      7.50     .494
    1.400    1.400  .105E+04  .287E+04*     2.418      .392      7.22     .549
    1.500    1.500  .202E+04  .593E+04*     3.077      .259     10.92     .389
    1.600    1.600  .469E+04  .147E+05*     4.571      .166     17.08     .265
    1.700    1.700  .905E+04  .302E+05*     7.392      .139     20.42     .236
    1.800    1.800  .151E+05  .534E+05*    11.944      .134     21.10     .242

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
 (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.
```

```
                                <---- hydrograph ---->   <-pipe / channel->
                             AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                             (ha)    (cms)   (hrs)   (mm)      (m)       (m/s)
  INFLOW : ID= 3:002240    284.58    4.766    8.20 31.900     1.607      .164
  OUTFLOW: ID= 1:002250    284.58    4.578    9.38 31.900     1.601      .166


--------------------------------------------------------------------------------
010:0047----------------------------------------------------------------------
--------------------
| DESIGN NASHYD     |   Area     (ha)=   24.11   Curve Number    (CN)=80.00
| 02:EXT6   DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=   1.520

     Unit Hyd Qpeak  (cms)=     .606

     PEAK FLOW       (cms)=     .576 (i)
     TIME TO PEAK    (hrs)=    7.551
     RUNOFF VOLUME    (mm)=   34.934
     TOTAL RAINFALL   (mm)=   69.200
     RUNOFF COEFFICIENT   =     .505

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


--------------------------------------------------------------------------------
010:0048----------------------------------------------------------------------
--------------------
| DESIGN NASHYD     |   Area     (ha)=   14.49   Curve Number    (CN)=82.00
| 03:211    DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=   1.070

     Unit Hyd Qpeak  (cms)=     .517

     PEAK FLOW       (cms)=     .482 (i)
     TIME TO PEAK    (hrs)=    7.018
     RUNOFF VOLUME    (mm)=   37.125
     TOTAL RAINFALL   (mm)=   69.200
     RUNOFF COEFFICIENT   =     .536

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


--------------------------------------------------------------------------------
010:0049----------------------------------------------------------------------
--------------------
| ROUTE CHANNEL     |     Routing time step (min) =  1.00
|  IN> 03:211       |     Number of SEGMENTS =  3
| OUT< 04:002280    |     Slopes (%), CHANNEL=  .2000  FLOODPLAIN= .2000
--------------------                  LENGTH =  500.00     (m)

              <------ DATA FOR SECTION (  15.0) ------>
              Distance      Elevation       Manning
                 .00            .62          .1400
               10.00            .60     .1400 / .0400  Main Channel
               11.80            .00          .0400      Main Channel
               12.80            .00          .0400      Main Channel
               14.60            .62     .0400 / .2000  Main Channel
               24.60            .60          .2000

   <---------------------------- TRAVEL TIME TABLE ---------------------------->
    DEPTH     ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME    D x V
      (m)      (m)   (cu.m.)   (cu.m.)     (cms)     (m/s)     (min)     (m2/s)
     .030     .030  .163E+02  .245E+00      .003      .102     81.78      .003
     .060     .060  .353E+02  .106E+01      .011      .155     53.91      .009
     .090     .090  .570E+02  .256E+01      .022      .195     42.68      .018
     .120     .120  .813E+02  .488E+01      .037      .229     36.32      .028
     .150     .150  .108E+03  .812E+01      .056      .260     32.11      .039
     .180     .180  .138E+03  .124E+02      .079      .287     29.06      .052
     .210     .210  .170E+03  .179E+02      .106      .312     26.72      .065
     .240     .240  .205E+03  .246E+02      .138      .335     24.85      .080
     .270     .270  .243E+03  .327E+02      .173      .358     23.31      .097
     .300     .300  .283E+03  .424E+02      .214      .379     22.01      .114
     .330     .330  .326E+03  .537E+02      .260      .399     20.89      .132
     .360     .360  .371E+03  .668E+02      .311      .418     19.92      .151
     .390     .390  .419E+03  .818E+02      .367      .437     19.06      .171
     .420     .420  .470E+03  .988E+02      .428      .455     18.30      .191
     .450     .450  .524E+03  .118E+03      .496      .473     17.61      .213
     .480     .480  .580E+03  .139E+03      .569      .491     16.99      .235
     .510     .510  .639E+03  .163E+03      .648      .507     16.42      .259
     .540     .540  .700E+03  .189E+03      .734      .524     15.90      .283
     .570     .570  .764E+03  .218E+03      .826      .540     15.43      .308

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.

                                <---- hydrograph ---->   <-pipe / channel->
                             AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                             (ha)    (cms)   (hrs)   (mm)      (m)       (m/s)
  INFLOW : ID= 3:211        14.49     .482    7.02 37.125      .444      .469
  OUTFLOW: ID= 4:002280     14.49     .457    7.28 37.125      .431      .462


--------------------------------------------------------------------------------
010:0050----------------------------------------------------------------------
--------------------
| DESIGN NASHYD     |   Area     (ha)=   10.57   Curve Number    (CN)=72.00
| 03:216    DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=   1.210

     Unit Hyd Qpeak  (cms)=     .334

     PEAK FLOW       (cms)=     .233 (i)
     TIME TO PEAK    (hrs)=    7.218
     RUNOFF VOLUME    (mm)=   27.531
     TOTAL RAINFALL   (mm)=   69.200
     RUNOFF COEFFICIENT   =     .398

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


--------------------------------------------------------------------------------
010:0051----------------------------------------------------------------------
--------------------
| ADD HYD (      2290) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                     (ha)     (cms)   (hrs)   (mm)    (cms)
                    ID1 03:216            10.57     .233    7.22  27.53     .000
                   +ID2 04:      2280     14.49     .457    7.28  37.12     .000
                    ==========================================================
                    SUM 05:      2290     25.06     .690    7.27  33.08     .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.


--------------------------------------------------------------------------------
010:0052----------------------------------------------------------------------
--------------------
| ADD HYD (      2260) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                     (ha)     (cms)   (hrs)   (mm)    (cms)
                    ID1 01:      2250     284.58    4.578    9.38  31.90     .000
                   +ID2 02:EXT6           24.11     .576    7.55  34.93     .000
                   +ID3 05:      2290     25.06     .690    7.27  33.08     .000
                    ==========================================================
                    SUM 03:      2260    333.75    5.456    8.33  32.21     .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.


--------------------------------------------------------------------------------
010:0053----------------------------------------------------------------------
--------------------
| ROUTE CHANNEL     |     Routing time step (min) =  1.00
|  IN> 03:002260    |     Number of SEGMENTS =  3
| OUT< 10:002295    |     Slopes (%), CHANNEL=  .0800  FLOODPLAIN= .2000
--------------------                  LENGTH =  370.00     (m)

              <------ DATA FOR SECTION (  14.0) ------>
              Distance      Elevation       Manning
                 .00            1.80          .1400
               200.00           1.40     .1400 / .0850  Main Channel
               202.60            .00          .0850      Main Channel
               204.40            .00          .0850      Main Channel
               207.00           1.40     .0850 / .2000  Main Channel
               407.00           1.80          .2000

   <---------------------------- TRAVEL TIME TABLE ---------------------------->
    DEPTH     ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME    D x V
      (m)      (m)   (cu.m.)   (cu.m.)     (cms)     (m/s)     (min)     (m2/s)
     .093     .093  .681E+02  .107E+02      .012      .064     96.65      .006
     .187     .187  .148E+03  .467E+02      .038      .096     64.26      .018
     .280     .280  .240E+03  .114E+03      .078      .121     51.18      .034
     .373     .373  .344E+03  .217E+03*     .131      .141     43.73      .053
     .467     .467  .460E+03  .363E+03*     .198      .159     38.79      .074
     .560     .560  .588E+03  .557E+03*     .279      .175     35.19      .098
     .653     .653  .728E+03  .804E+03*     .374      .190     32.42      .124
     .747     .747  .880E+03  .111E+04*     .486      .204     30.20      .152
     .840     .840  .104E+04  .148E+04*     .614      .217     28.36      .183
     .933     .933  .122E+04  .192E+04*     .759      .230     26.81      .215
    1.027    1.027  .141E+04  .244E+04*     .921      .242     25.47      .249
    1.120    1.120  .161E+04  .304E+04*    1.103      .254     24.30      .284
    1.213    1.213  .182E+04  .373E+04*    1.304      .265     23.27      .322
    1.307    1.307  .204E+04  .451E+04*    1.524      .276     22.34      .361
    1.400    1.400  .228E+04  .539E+04*    1.766      .287     21.51      .401
    1.500    1.500  .439E+04  .111E+05*    2.297      .194     31.84      .290
    1.600    1.600  .102E+05  .276E+05*    3.654      .133     46.51      .212
    1.700    1.700  .197E+05  .566E+05*    6.329      .119     51.90      .202
    1.800    1.800  .329E+05  .100E+06*   10.726      .121     51.14      .217

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
 (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                                <---- hydrograph ---->   <-pipe / channel->
                             AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                             (ha)    (cms)   (hrs)   (mm)      (m)       (m/s)
  INFLOW : ID= 3:002260     333.75    5.456    8.33 32.208     1.667      .123
  OUTFLOW: ID=10:002295     333.75    4.947    9.65 32.208     1.647      .126


--------------------------------------------------------------------------------
010:0054----------------------------------------------------------------------
--------------------
| DESIGN NASHYD     |   Area     (ha)=   17.47   Curve Number    (CN)=76.00
| 03:214    DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=    .600

     Unit Hyd Qpeak  (cms)=    1.112

     PEAK FLOW       (cms)=     .720 (i)
     TIME TO PEAK    (hrs)=    6.501
     RUNOFF VOLUME    (mm)=   30.987
     TOTAL RAINFALL   (mm)=   69.200
     RUNOFF COEFFICIENT   =     .448

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


--------------------------------------------------------------------------------
010:0055----------------------------------------------------------------------
*#*************************************************************************
*# Calculate culvert routing and flow split near eastern site boundary
*#   - Storage volumes calculated based on site survey
*#   - Discharges calculated based on the 600 mm diameter CSP and 1500 mm
*#     diameter CSP capacities
*#*************************************************************************
--------------------
| ROUTE RESERVOIR   |     Requested routing time step =  1.0 min.
|  IN>03:(214   )   |
| OUT<01:(002300)   |     =========  OUTLFOW STORAGE TABLE  =========
--------------------     OUTFLOW     STORAGE   |  OUTFLOW     STORAGE
                           (cms)      (ha.m.)   |    (cms)     (ha.m.)
                            .000   .0000E+00    |    1.130   .4600E+00
                            .150   .0000E+00    |    5.470   .8100E+00
                            .450   .0000E+00    |   83.090   .3400E+01
                            .820   .6500E-01    |    .000    .0000E+00

     ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
     --------------------        (ha)     (cms)     (hrs)       (mm)
     INFLOW >03: (214   )      17.47      .720     6.501     30.987
     OUTFLOW<01: (002300)      17.47      .625     6.834     30.993

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=   86.843
                   TIME SHIFT OF PEAK FLOW          (min)=    20.00
                   MAXIMUM  STORAGE   USED        (ha.m.)=.3079E-01


--------------------------------------------------------------------------------
010:0056----------------------------------------------------------------------
--------------------
| DIVERT HYD        |
| INID=01  (002300)|
--------------------
      Outflow / Inflow  Relationships
      Flow 02 +  Flow 03 =  Total
       (cms)       (cms)      (cms)
         .000        .000       .000
         .150        .000       .150
         .400        .050       .450
         .680        .140       .820
         .930        .200      1.130
        1.040      4.430      5.470
        1.460     81.630     83.090

          NHYD        AREA     QPEAK   TpeakDate_hh:mm       R.V.   NFE WetHrs
                      (ha)     (cms)                         (mm)     (hrs)
   IDin = 01:002300    17.47      .625  No_date    6:50     30.993   79    13.
   ==========================================================================
   IDout= 02:002310    15.96      .533  No_date    6:50     30.993   79    13.
   IDout= 03:002320     1.51      .093  No_date    6:50     30.993   26     3.
--------------------------------------------------------------------------------
010:0057----------------------------------------------------------------------
--------------------
| DESIGN NASHYD     |   Area     (ha)=    5.34   Curve Number    (CN)=72.00
| 01:215    DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=    .860

     Unit Hyd Qpeak  (cms)=     .237

     PEAK FLOW       (cms)=     .151 (i)
     TIME TO PEAK    (hrs)=    6.801
     RUNOFF VOLUME    (mm)=   27.531
     TOTAL RAINFALL   (mm)=   69.200
     RUNOFF COEFFICIENT   =     .398

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


--------------------------------------------------------------------------------
010:0058----------------------------------------------------------------------
--------------------
| ADD HYD (      2330) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                     (ha)     (cms)   (hrs)   (mm)    (cms)
                    ID1 01:215             5.34     .151    6.80  27.53     .000
                   +ID2 02:      2310     15.96     .533    6.83  30.99     .000
                    ==========================================================
                    SUM 04:      2330     21.30     .684    6.83  30.13     .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.


--------------------------------------------------------------------------------
010:0059----------------------------------------------------------------------
--------------------
| DESIGN NASHYD     |   Area     (ha)=   18.59   Curve Number    (CN)=82.00
```

```
| 01:EXT7   DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=   1.470

     Unit Hyd Qpeak  (cms)=     .483

     PEAK FLOW       (cms)=     .486 (i)
     TIME TO PEAK    (hrs)=    7.484
     RUNOFF VOLUME    (mm)=   37.125
     TOTAL RAINFALL   (mm)=   69.200
     RUNOFF COEFFICIENT   =     .536

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

------------------------------------------------------------------------------
010:0060--------------------------------------------------------------------
*#*************************************************************************
*# McGill Drain - Total Flow at Eastern WSP
*#*************************************************************************
----------------------
| ADD HYD (      2340) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                   (ha)     (cms)   (hrs)   (mm)    (cms)
                       ID1 01:EXT7         18.59     .486   7.48  37.12    .000
                      +ID2 04:      2330   21.30     .684   6.83  30.13    .000
                      +ID3 10:      2295  333.75   4.947   9.65  32.21    .000
                       ==========================================================
                       SUM 05:      2340  373.64    5.364   9.47  32.33    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
010:0061--------------------------------------------------------------------
*#*************************************************************************
*# AREA CHECK
*#*************************************************************************
----------------------
| ADD HYD (      2350) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                   (ha)     (cms)   (hrs)   (mm)    (cms)
                       ID1 03:      2320     1.51      .093   6.83  30.99    .000
                      +ID2 05:      2340  373.64    5.364   9.47  32.33    .000
                       ==========================================================
                       SUM 01:      2350  375.15    5.364   9.47  32.33    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
010:0062--------------------------------------------------------------------
------------------------------------------------------------------------------
010:0002--------------------------------------------------------------------
------------------------------------------------------------------------------
010:0002--------------------------------------------------------------------
  ** END OF RUN :  24

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



--------------------
| START            |  Project  dir.: F:\WSP\
--------------------  Rainfall dir.: F:\WSP\
    TZERO =   .00 hrs on      0
    METOUT=   2 (output = METRIC)
    NRUN  = 025
    NSTORM=   1
           #  1=12scs25.stm
------------------------------------------------------------------------------
025:0002--------------------------------------------------------------------
*#*************************************************************************
*#  Project Name: [Windsor Solar Project] Project Number: [1335-60106]
*#  Date        : 02-10-2016
*#  Modeller    : [NE]
*#  Company     : Stantec Consulting Ltd. (London)
*#  License #   :  4730904
*#*************************************************************************
*#
*#  Proposed Conditions
*#  25 mm Water Quality Event
*#  2, 5, 10, 25, 50, 100, 250-year 3-Hour Chicago Design Storm
*#
*#*************************************************************************
------------------------------------------------------------------------------
025:0002--------------------------------------------------------------------
--------------------
| READ STORM       |    Filename: 25-yr scs 12 hr windsor
| Ptotal=  80.80 mm|    Comments: 25-yr scs 12 hr windsor
--------------------
            TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
             hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
             .50   1.616 |   3.50   3.232 |   6.50  14.544 |   9.50   3.232
            1.00   1.616 |   4.00   3.232 |   7.00   6.464 |  10.00   1.616
            1.50   1.616 |   4.50   4.848 |   7.50   4.848 |  10.50   1.616
            2.00   1.616 |   5.00   6.464 |   8.00   4.848 |  11.00   1.616
            2.50   3.232 |   5.50   9.696 |   8.50   3.232 |  11.50   1.616
            3.00   3.232 |   6.00  72.720 |   9.00   3.232 |  12.00   1.616

------------------------------------------------------------------------------
025:0003--------------------------------------------------------------------
*#*************************************************************************
*# LAPPAN DRAIN
*#*************************************************************************
----------------------
| DESIGN NASHYD      |   Area     (ha)=   42.26   Curve Number   (CN)=73.00
| 01:EXT1   DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=   1.110

     Unit Hyd Qpeak  (cms)=    1.454

     PEAK FLOW       (cms)=    1.319 (i)
     TIME TO PEAK    (hrs)=    7.084
     RUNOFF VOLUME    (mm)=   36.299
     TOTAL RAINFALL   (mm)=   80.801
     RUNOFF COEFFICIENT   =     .449

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

------------------------------------------------------------------------------
025:0004--------------------------------------------------------------------
--------------------
| ROUTE CHANNEL    |     Routing time step (min) =  1.00
|  IN> 01:EXT1     |     Number of SEGMENTS =  3
| OUT< 02:002000   |     Slopes (%), CHANNEL= .1000  FLOODPLAIN= .2000
--------------------                    LENGTH =  700.00     (m)

              <------ DATA FOR SECTION (   1.0) ------>
              Distance      Elevation       Manning
                  .00           1.40          .2000
                100.00          1.20     .2000 / .0850  Main Channel
                101.80           .00          .0850      Main Channel
                103.00           .00          .0850      Main Channel
                104.80          1.20     .0850 / .2000  Main Channel
                204.80          1.40          .2000

   <---------------------------- TRAVEL TIME TABLE ---------------------------->
    DEPTH    ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME    D x V
      (m)     (m)   (cu.m.)   (cu.m.)      (cms)     (m/s)      (min)   (m2/s)
     .071    .071  .645E+02  .325E+01       .005      .059     197.27     .004
     .141    .141  .140E+03  .141E+02       .018      .089     131.37     .013
     .212    .212  .225E+03  .340E+02       .036      .111     104.80     .024
     .282    .282  .321E+03  .647E+02       .060      .130      89.71     .037
     .353    .353  .427E+03  .108E+03       .089      .146      79.68     .052
     .424    .424  .544E+03  .165E+03       .125      .161      72.40     .068
     .494    .494  .671E+03  .237E+03       .168      .175      66.79     .086
     .565    .565  .809E+03  .326E+03       .217      .187      62.29     .106
     .635    .635  .957E+03  .434E+03       .272      .199      58.56     .127
     .706    .706  .112E+04  .563E+03*      .336      .211      55.41     .149
     .776    .776  .129E+04  .713E+03*      .407      .221      52.69     .172
     .847    .847  .146E+04  .886E+03*      .485      .232      50.32     .196
     .918    .918  .166E+04  .108E+04*      .572      .242      48.22     .222
     .988    .988  .186E+04  .131E+04*      .667      .252      46.35     .249
    1.059   1.059  .207E+04  .156E+04*      .771      .261      44.66     .277
    1.129   1.129  .229E+04  .185E+04*      .884      .271      43.13     .306
    1.200   1.200  .252E+04  .216E+04*     1.006      .280      41.73     .335
    1.300   1.300  .636E+04  .590E+04*     1.392      .153      76.12     .199
    1.400   1.400  .172E+05  .172E+05*     2.456      .100     116.67     .140

  X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
  S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
  (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                                  <---- hydrograph ---->   <-pipe / channel->
                                  AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                                  (ha)    (cms)   (hrs)   (mm)      (m)       (m/s)
    INFLOW : ID= 1:EXT1        42.26    1.319    7.08 36.299     1.281      .168
    OUTFLOW: ID= 2:002000      42.26    1.100    7.97 36.298     1.223      .235


------------------------------------------------------------------------------
025:0005--------------------------------------------------------------------
----------------------
| DESIGN NASHYD      |   Area     (ha)=   22.52   Curve Number   (CN)=82.00
| 01:EXT2   DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=   1.270

     Unit Hyd Qpeak  (cms)=     .677

     PEAK FLOW       (cms)=     .829 (i)
     TIME TO PEAK    (hrs)=    7.234
     RUNOFF VOLUME    (mm)=   46.563
     TOTAL RAINFALL   (mm)=   80.801
     RUNOFF COEFFICIENT   =     .576

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

------------------------------------------------------------------------------
025:0006--------------------------------------------------------------------
----------------------
| DESIGN NASHYD      |   Area     (ha)=   42.81   Curve Number   (CN)=82.00
| 03:EXT3   DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=   1.110

     Unit Hyd Qpeak  (cms)=    1.473

     PEAK FLOW       (cms)=    1.744 (i)
     TIME TO PEAK    (hrs)=    7.051
     RUNOFF VOLUME    (mm)=   46.563
     TOTAL RAINFALL   (mm)=   80.801
     RUNOFF COEFFICIENT   =     .576

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

------------------------------------------------------------------------------
025:0007--------------------------------------------------------------------
*#*************************************************************************
*# Lappan Drain - Total Flow at Pilette Road
*#*************************************************************************
----------------------
| ADD HYD (      2010) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                   (ha)     (cms)   (hrs)   (mm)    (cms)
                       ID1 01:EXT2         22.52     .829   7.23  46.56    .000
                      +ID2 02:      2000   42.26    1.100   7.97  36.30    .000
                      +ID3 03:EXT3        42.81    1.744   7.05  46.56    .000
                       ==========================================================
                       SUM 04:      2010  107.59    3.428   7.33  42.53    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
025:0008--------------------------------------------------------------------
--------------------
| ROUTE CHANNEL    |     Routing time step (min) =  1.00
|  IN> 04:002010   |     Number of SEGMENTS =  3
| OUT< 01:002020   |     Slopes (%), CHANNEL= .1700  FLOODPLAIN= .2000
--------------------                    LENGTH =  350.00     (m)

              <------ DATA FOR SECTION (   2.0) ------>
              Distance      Elevation       Manning
                  .00           2.00          .2000
                100.00          1.80     .2000 / .0850  Main Channel
                102.75           .00          .0850      Main Channel
                104.25           .00          .0850      Main Channel
                107.00          1.80     .0850 / .1400  Main Channel
                207.00          2.00          .1400

   <---------------------------- TRAVEL TIME TABLE ---------------------------->
    DEPTH    ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME    D x V
      (m)     (m)   (cu.m.)   (cu.m.)      (cms)     (m/s)      (min)   (m2/s)
     .100    .100  .578E+02  .486E+01       .016      .096     60.50     .010
     .200    .200  .126E+03  .212E+02       .052      .144     40.48     .029
     .300    .300  .206E+03  .518E+02       .106      .180     32.38     .054
     .400    .400  .296E+03  .993E+02       .177      .210     27.75     .084
     .500    .500  .396E+03  .166E+03       .268      .236     24.67     .118
     .600    .600  .508E+03  .256E+03*      .377      .260     22.42     .156
     .700    .700  .630E+03  .370E+03*      .507      .282     20.68     .197
     .800    .800  .762E+03  .512E+03*      .659      .303     19.28     .242
     .900    .900  .906E+03  .685E+03*      .833      .322     18.12     .290
    1.000   1.000  .106E+04  .891E+03*     1.031      .340     17.14     .340
    1.100   1.100  .122E+04  .113E+04*     1.253      .358     16.29     .394
    1.200   1.200  .140E+04  .141E+04*     1.500      .375     15.55     .450
    1.300   1.300  .159E+04  .173E+04*     1.775      .392     14.89     .509
    1.400   1.400  .178E+04  .210E+04*     2.077      .408     14.31     .571
    1.500   1.500  .199E+04  .251E+04*     2.407      .423     13.78     .635
    1.600   1.600  .221E+04  .297E+04*     2.768      .439     13.30     .702
    1.700   1.700  .244E+04  .348E+04*     3.158      .453     12.87     .771
    1.800   1.800  .268E+04  .405E+04*     3.580      .468     12.46     .842
    2.000   2.000  .102E+05  .171E+05*     5.907      .203     28.69     .407

  X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
  S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
  (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                                  <---- hydrograph ---->   <-pipe / channel->
                                  AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                                  (ha)    (cms)   (hrs)   (mm)      (m)       (m/s)
    INFLOW : ID= 4:002010      107.59    3.428    7.33 42.531     1.764      .463
    OUTFLOW: ID= 1:002020      107.59    3.339    7.43 42.531     1.744      .460


------------------------------------------------------------------------------
025:0009--------------------------------------------------------------------
----------------------
| DESIGN NASHYD      |   Area     (ha)=   10.43   Curve Number   (CN)=72.00
| 02:202    DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .970

     Unit Hyd Qpeak  (cms)=     .411

     PEAK FLOW       (cms)=     .349 (i)
     TIME TO PEAK    (hrs)=    6.918
     RUNOFF VOLUME    (mm)=   35.314
     TOTAL RAINFALL   (mm)=   80.801
     RUNOFF COEFFICIENT   =     .437

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

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025:0010----------

ADD HYD (2030)	ID: NHYD	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	DWF (cms)
	ID1 01: 2020	107.59	3.339	7.43	42.53	.000
	+ID2 02:202	10.43	.349	6.92	35.31	.000
	SUM 03: 2030	118.02	3.644	7.43	41.89	.000

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

025:0011----------

ROUTE CHANNEL	IN> 03:002030	OUT< 01:002040
Routing time step (min) = 1.00		
Number of SEGMENTS = 3		
Slopes (%), CHANNEL= .1700 FLOODPLAIN= .2000		
LENGTH = 450.00 (m)		

Distance	Elevation	Manning	
.00	2.00	.2000	
100.00	1.80	.2000 / .0850	Main Channel
102.75	.00	.0850	Main Channel
104.25	.00	.0850	Main Channel
107.00	1.80	.0850 / .1400	Main Channel
207.00	2.00	.1400	

TRAVEL TIME TABLE

DEPTH (m)	ELEV (m)	X-VOLUME (cu.m.)	S-VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME (min)	D x V (m2/s)
.100	.100	.744E+02	.486E+01	.016	.096	77.79	.010
.200	.200	.163E+03	.212E+02	.052	.144	52.05	.029
.300	.300	.264E+03	.518E+02	.106	.180	41.63	.054
.400	.400	.380E+03	.993E+02	.177	.210	35.68	.084
.500	.500	.509E+03	.166E+03	.268	.236	31.72	.118
.600	.600	.653E+03	.256E+03	.377	.260	28.82	.156
.700	.700	.809E+03	.370E+03	.507	.282	26.59	.197
.800	.800	.980E+03	.512E+03*	.659	.303	24.79	.242
.900	.900	.116E+04	.685E+03*	.833	.322	23.30	.290
1.000	1.000	.136E+04	.891E+03*	1.031	.340	22.04	.340
1.100	1.100	.157E+04	.113E+04*	1.253	.358	20.95	.394
1.200	1.200	.180E+04	.141E+04*	1.500	.375	19.99	.450
1.300	1.300	.204E+04	.173E+04*	1.775	.392	19.15	.509
1.400	1.400	.229E+04	.210E+04*	2.077	.408	18.40	.571
1.500	1.500	.256E+04	.251E+04*	2.407	.423	17.72	.635
1.600	1.600	.284E+04	.297E+04*	2.768	.439	17.10	.702
1.700	1.700	.313E+04	.348E+04*	3.158	.453	16.54	.771
1.800	1.800	.344E+04	.405E+04*	3.580	.468	16.03	.842
2.000	2.000	.131E+05	.171E+05*	5.907	.203	36.88	.407

X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
(*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

	AREA (ha)	<---- hydrograph ----> QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	<-pipe / channel-> MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 3:002030	118.02	3.644	7.43	41.893	1.805	.452
OUTFLOW: ID= 1:002040	118.02	3.527	7.70	41.893	1.779	.465

025:0012----------

DESIGN NASHYD	Area (ha)= 15.29	Curve Number (CN)=82.00
02:201 DT= 1.00	Ia (mm)= 1.500	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 1.290	

Unit Hyd Qpeak (cms)= .453

PEAK FLOW (cms)= .556 (i)
TIME TO PEAK (hrs)= 7.268
RUNOFF VOLUME (mm)= 46.563
TOTAL RAINFALL (mm)= 80.801
RUNOFF COEFFICIENT = .576

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

025:0013----------

DESIGN NASHYD	Area (ha)= 10.88	Curve Number (CN)=72.00
03:204 DT= 1.00	Ia (mm)= 1.500	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= .850	

Unit Hyd Qpeak (cms)= .489

PEAK FLOW (cms)= .401 (i)
TIME TO PEAK (hrs)= 6.784
RUNOFF VOLUME (mm)= 35.314
TOTAL RAINFALL (mm)= 80.801
RUNOFF COEFFICIENT = .437

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

025:0014----------

ADD HYD (2050)	ID: NHYD	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	DWF (cms)
	ID1 01: 2040	118.02	3.527	7.70	41.89	.000
	+ID2 02:201	15.29	.556	7.27	46.56	.000
	+ID3 03:204	10.88	.401	6.78	35.31	.000
	SUM 04: 2050	144.19	4.312	7.67	41.89	.000

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

025:0015----------

ROUTE CHANNEL	IN> 04:002050	OUT< 01:002060
Routing time step (min) = 1.00		
Number of SEGMENTS = 3		
Slopes (%), CHANNEL= .1700 FLOODPLAIN= .2000		
LENGTH = 200.00 (m)		

Distance	Elevation	Manning	
.00	2.00	.1400	
100.00	1.80	.1400 / .0850	Main Channel
102.75	.00	.0850	Main Channel
104.25	.00	.0850	Main Channel
107.00	1.80	.0850 / .1400	Main Channel
207.00	2.00	.1400	

TRAVEL TIME TABLE

DEPTH (m)	ELEV (m)	X-VOLUME (cu.m.)	S-VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME (min)	D x V (m2/s)
.100	.100	.331E+02	.486E+01	.016	.096	34.57	.010
.200	.200	.722E+02	.212E+02	.052	.144	23.13	.029
.300	.300	.118E+03	.518E+02	.106	.180	18.50	.054
.400	.400	.169E+03	.993E+02*	.177	.210	15.86	.084
.500	.500	.226E+03	.166E+03*	.268	.236	14.10	.118
.600	.600	.290E+03	.256E+03*	.377	.260	12.81	.156
.700	.700	.360E+03	.370E+03*	.507	.282	11.82	.197
.800	.800	.436E+03	.512E+03*	.659	.303	11.02	.242
.900	.900	.518E+03	.685E+03*	.833	.322	10.36	.290
1.000	1.000	.606E+03	.891E+03*	1.031	.340	9.79	.340
1.100	1.100	.700E+03	.113E+04*	1.253	.358	9.31	.394
1.200	1.200	.800E+03	.141E+04*	1.500	.375	8.89	.450
1.300	1.300	.906E+03	.173E+04*	1.775	.392	8.51	.509
1.400	1.400	.102E+04	.210E+04*	2.077	.408	8.18	.571
1.500	1.500	.114E+04	.251E+04*	2.407	.423	7.87	.635
1.600	1.600	.126E+04	.297E+04*	2.768	.439	7.60	.702
1.700	1.700	.139E+04	.348E+04*	3.158	.453	7.35	.771
1.800	1.800	.153E+04	.405E+04*	3.580	.468	7.12	.842
2.000	2.000	.581E+04	.171E+05*	6.114	.210	15.84	.421

X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
(*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

	AREA (ha)	<---- hydrograph ----> QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	<-pipe / channel-> MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 4:002050	144.19	4.312	7.67	41.892	1.858	.346
OUTFLOW: ID= 1:002060	144.19	4.204	7.85	41.892	1.850	.358

025:0016----------

DESIGN NASHYD	Area (ha)= 4.78	Curve Number (CN)=72.00
02:206 DT= 1.00	Ia (mm)= 1.500	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= .890	

Unit Hyd Qpeak (cms)= .205

PEAK FLOW (cms)= .170 (i)
TIME TO PEAK (hrs)= 6.834
RUNOFF VOLUME (mm)= 35.314
TOTAL RAINFALL (mm)= 80.801
RUNOFF COEFFICIENT = .437

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

025:0017----------

ADD HYD (2070)	ID: NHYD	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	DWF (cms)
	ID1 01: 2060	144.19	4.204	7.85	41.89	.000
	+ID2 02:206	4.78	.170	6.83	35.31	.000
	SUM 03: 2070	148.97	4.309	7.85	41.68	.000

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

025:0018----------

ROUTE CHANNEL	IN> 03:002070	OUT< 01:002080
Routing time step (min) = 1.00		
Number of SEGMENTS = 3		
Slopes (%), CHANNEL= .1200 FLOODPLAIN= .2000		
LENGTH = 500.00 (m)		

Distance	Elevation	Manning	
.00	2.20	.1400	
200.00	1.80	.1400 / .0850	Main Channel
202.75	.00	.0850	Main Channel
204.25	.00	.0850	Main Channel
207.00	1.80	.0850 / .1400	Main Channel
407.00	2.20	.1400	

TRAVEL TIME TABLE

DEPTH (m)	ELEV (m)	X-VOLUME (cu.m.)	S-VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME (min)	D x V (m2/s)
.112	.112	.940E+02	.882E+01	.016	.087	95.91	.010
.225	.225	.307E+03	.389E+02	.054	.129	64.45	.029
.337	.337	.340E+03	.957E+02	.110	.161	51.67	.054
.450	.450	.492E+03	.185E+03	.185	.188	44.34	.085
.562	.562	.664E+03	.311E+03	.280	.211	39.43	.119
.675	.675	.854E+03	.481E+03*	.397	.233	35.84	.157
.788	.788	.106E+04	.698E+03*	.537	.252	33.06	.199
.900	.900	.129E+04	.970E+03*	.700	.270	30.81	.243
1.013	1.013	.154E+04	.130E+04*	.888	.288	28.95	.291
1.125	1.125	.181E+04	.170E+04*	1.102	.304	27.37	.343
1.238	1.238	.210E+04	.216E+04*	1.344	.320	26.01	.397
1.350	1.350	.240E+04	.271E+04*	1.615	.336	24.81	.453
1.463	1.463	.273E+04	.333E+04*	1.916	.351	23.76	.513
1.575	1.575	.308E+04	.404E+04*	2.247	.365	22.82	.575
1.688	1.688	.344E+04	.484E+04*	2.611	.379	21.97	.640
1.800	1.800	.382E+04	.574E+04*	3.008	.393	21.19	.708
1.933	1.933	.874E+04	.141E+05*	4.111	.235	35.42	.455
2.067	2.067	.225E+05	.388E+05*	7.293	.162	51.50	.334
2.200	2.200	.452E+05	.829E+05*	13.799	.153	54.62	.336

X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
(*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

	AREA (ha)	<---- hydrograph ----> QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	<-pipe / channel-> MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 3:002070	148.97	4.309	7.85	41.681	1.942	.229
OUTFLOW: ID= 1:002080	148.97	3.895	8.72	41.681	1.907	.256

025:0019----------

DESIGN NASHYD	Area (ha)= 14.96	Curve Number (CN)=72.00
02:207 DT= 1.00	Ia (mm)= 1.500	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 1.330	

Unit Hyd Qpeak (cms)= .430

PEAK FLOW (cms)= .396 (i)
TIME TO PEAK (hrs)= 7.334
RUNOFF VOLUME (mm)= 35.314
TOTAL RAINFALL (mm)= 80.801
RUNOFF COEFFICIENT = .437

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

025:0020----------

DESIGN NASHYD	Area (ha)= 7.92	Curve Number (CN)=72.00
03:208 DT= 1.00	Ia (mm)= 1.500	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 1.110	

Unit Hyd Qpeak (cms)= .273

PEAK FLOW (cms)= .240 (i)
TIME TO PEAK (hrs)= 7.084
RUNOFF VOLUME (mm)= 35.314
TOTAL RAINFALL (mm)= 80.801
RUNOFF COEFFICIENT = .437

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

025:0021----------

*#**********
*# Lappan Drain - Total Flow at Jefferson Boulevard
*#**********

ADD HYD (2090)	ID: NHYD	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	DWF (cms)
	ID1 01: 2080	148.97	3.895	8.72	41.68	.000
	+ID2 02:207	14.96	.396	7.33	35.31	.000
	+ID3 03:208	7.92	.240	7.08	35.31	.000

```
                    SUM 04:      2090   171.85    4.301    8.60  40.83    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
025:0022----------------------------------------------------------------------
--------------------
| ROUTE CHANNEL    |     Routing time step (min) =  1.00
|  IN> 04:002090   |     Number of SEGMENTS =  3
| OUT< 01:002100   |     Slopes (%), CHANNEL= .1200  FLOODPLAIN= .2000
--------------------                 LENGTH =  130.00    (m)

              <------ DATA FOR SECTION (   6.0) ------>
              Distance      Elevation       Manning
                 .00          2.20          .1400
               200.00          1.80     .1400 / .0850  Main Channel
               202.75           .00          .0850      Main Channel
               204.25           .00          .0850      Main Channel
               207.00          1.80     .0850 / .2000  Main Channel
               407.00          2.20          .2000

   <---------------------------- TRAVEL TIME TABLE ---------------------------->
    DEPTH     ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME   D x V
      (m)      (m)   (cu.m.)   (cu.m.)     (cms)     (m/s)     (min)    (m2/s)
     .112     .112  .245E+02  .882E+01      .016      .087     24.94      .010
     .225     .225  .539E+02  .389E+02*     .054      .129     16.76      .029
     .337     .337  .884E+02  .957E+02*     .110      .161     13.43      .054
     .450     .450  .128E+03  .185E+03*     .185      .188     11.53      .085
     .562     .562  .173E+03  .311E+03*     .280      .211     10.25      .119
     .675     .675  .222E+03  .481E+03*     .397      .233      9.32      .157
     .788     .788  .277E+03  .698E+03*     .537      .252      8.59      .199
     .900     .900  .336E+03  .970E+03*     .700      .270      8.01      .243
    1.013    1.013  .401E+03  .130E+04*     .888      .288      7.53      .291
    1.125    1.125  .471E+03  .170E+04*    1.102      .304      7.12      .343
    1.238    1.238  .545E+03  .216E+04*    1.344      .320      6.76      .397
    1.350    1.350  .625E+03  .271E+04*    1.615      .336      6.45      .453
    1.463    1.463  .710E+03  .333E+04*    1.916      .351      6.18      .513
    1.575    1.575  .800E+03  .404E+04*    2.247      .365      5.93      .575
    1.688    1.688  .895E+03  .484E+04*    2.611      .379      5.71      .640
    1.800    1.800  .994E+03  .574E+04*    3.008      .393      5.51      .708
    1.933    1.933  .227E+04  .141E+05*    4.041      .231      9.37      .447
    2.067    2.067  .586E+04  .388E+05*    6.848      .152     14.26      .314
    2.200    2.200  .118E+05  .829E+05*   12.488      .138     15.69      .304

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
 (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                                  <---- hydrograph ---->   <-pipe / channel->
                              AREA    QPEAK   TPEAK   R.V.    MAX DEPTH  MAX VEL
                               (ha)    (cms)   (hrs)   (mm)      (m)      (m/s)
   INFLOW : ID= 4:002090     171.85   4.301    8.60 40.833     1.946      .221
   OUTFLOW: ID= 1:002100     171.85   4.235    8.75 40.833     1.943      .223


------------------------------------------------------------------------------
025:0023----------------------------------------------------------------------
---------------------
| DESIGN NASHYD     |   Area    (ha)=    4.95   Curve Number   (CN)=73.00
| 02:212    DT= 1.00 |  Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=    .480

     Unit Hyd Qpeak  (cms)=     .394

     PEAK FLOW       (cms)=     .277 (i)
     TIME TO PEAK    (hrs)=    6.351
     RUNOFF VOLUME    (mm)=   36.299
     TOTAL RAINFALL   (mm)=   80.801
     RUNOFF COEFFICIENT   =     .449

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


------------------------------------------------------------------------------
025:0024----------------------------------------------------------------------
---------------------
| ADD HYD (      2110) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                     (ha)     (cms)   (hrs)   (mm)    (cms)
                    ID1 01:      2100   171.85    4.235    8.75  40.83    .000
                   +ID2 02:212            4.95     .277    6.35  36.30    .000
                    ==========================================================
                    SUM 03:      2110   176.80    4.271    8.75  40.71    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.


------------------------------------------------------------------------------
025:0025----------------------------------------------------------------------
--------------------
| ROUTE CHANNEL    |     Routing time step (min) =  1.00
|  IN> 03:002110   |     Number of SEGMENTS =  3
| OUT< 01:002120   |     Slopes (%), CHANNEL= .1200  FLOODPLAIN= .2000
--------------------                 LENGTH =  330.00    (m)

              <------ DATA FOR SECTION (   7.0) ------>
              Distance      Elevation       Manning
                 .00          2.20          .1400
               200.00          1.80     .1400 / .0850  Main Channel
               202.75           .00          .0850      Main Channel
               204.25           .00          .0850      Main Channel
               207.00          1.80     .0850 / .2000  Main Channel
               407.00          2.20          .2000

   <---------------------------- TRAVEL TIME TABLE ---------------------------->
    DEPTH     ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME   D x V
      (m)      (m)   (cu.m.)   (cu.m.)     (cms)     (m/s)     (min)    (m2/s)
     .112     .112  .621E+02  .882E+01      .016      .087     63.30      .010
     .225     .225  .137E+03  .389E+02      .054      .129     42.54      .029
     .337     .337  .224E+03  .957E+02      .110      .161     34.10      .054
     .450     .450  .325E+03  .185E+03*     .185      .188     29.26      .085
     .562     .562  .438E+03  .311E+03*     .280      .211     26.02      .119
     .675     .675  .564E+03  .481E+03*     .397      .233     23.65      .157
     .788     .788  .702E+03  .698E+03*     .537      .252     21.82      .199
     .900     .900  .854E+03  .970E+03*     .700      .270     20.34      .243
    1.013    1.013  .102E+04  .130E+04*     .888      .288     19.11      .291
    1.125    1.125  .119E+04  .170E+04*    1.102      .304     18.06      .343
    1.238    1.238  .138E+04  .216E+04*    1.344      .320     17.16      .397
    1.350    1.350  .159E+04  .271E+04*    1.615      .336     16.38      .453
    1.463    1.463  .180E+04  .333E+04*    1.916      .351     15.68      .513
    1.575    1.575  .203E+04  .404E+04*    2.247      .365     15.06      .575
    1.688    1.688  .227E+04  .484E+04*    2.611      .379     14.50      .640
    1.800    1.800  .252E+04  .574E+04*    3.008      .393     13.99      .708
    1.933    1.933  .577E+04  .141E+05*    4.041      .231     23.78      .447
    2.067    2.067  .149E+05  .388E+05*    6.848      .152     36.20      .314
    2.200    2.200  .298E+05  .829E+05*   12.488      .138     39.84      .304

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
 (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                                  <---- hydrograph ---->   <-pipe / channel->
                              AREA    QPEAK   TPEAK   R.V.    MAX DEPTH  MAX VEL
                               (ha)    (cms)   (hrs)   (mm)      (m)      (m/s)
   INFLOW : ID= 3:002110     176.80   4.271    8.75 40.706     1.944      .222
   OUTFLOW: ID= 1:002120     176.80   4.032    9.40 40.706     1.931      .233


------------------------------------------------------------------------------
025:0026----------------------------------------------------------------------
---------------------
| DESIGN NASHYD     |   Area    (ha)=    6.60   Curve Number   (CN)=82.00
| 02:EXT8   DT= 1.00 |  Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=    .820

     Unit Hyd Qpeak  (cms)=     .307

     PEAK FLOW       (cms)=     .336 (i)
     TIME TO PEAK    (hrs)=    6.734
     RUNOFF VOLUME    (mm)=   46.563
     TOTAL RAINFALL   (mm)=   80.801
     RUNOFF COEFFICIENT   =     .576

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


------------------------------------------------------------------------------
025:0027----------------------------------------------------------------------
*#*************************************************************************
*# Lappan Drain - Total Flow at McGill Drain
*#*************************************************************************
----------------------
| ADD HYD (      2130) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                     (ha)     (cms)   (hrs)   (mm)    (cms)
                    ID1 01:      2120   176.80    4.032    9.40  40.71    .000
                   +ID2 02:EXT8           6.60     .336    6.73  46.56    .000
                    ==========================================================
                    SUM 10:      2130   183.40    4.096    9.40  40.92    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.


------------------------------------------------------------------------------
025:0028----------------------------------------------------------------------
*#*************************************************************************
*# McGILL DRAIN
*#*************************************************************************
----------------------
| DESIGN NASHYD     |   Area    (ha)=   12.75   Curve Number   (CN)=72.00
| 01:203    DT= 1.00 |  Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .970

     Unit Hyd Qpeak  (cms)=     .502

     PEAK FLOW       (cms)=     .427 (i)
     TIME TO PEAK    (hrs)=    6.918
     RUNOFF VOLUME    (mm)=   35.314
     TOTAL RAINFALL   (mm)=   80.801
     RUNOFF COEFFICIENT   =     .437

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


------------------------------------------------------------------------------
025:0029----------------------------------------------------------------------
--------------------
| ROUTE CHANNEL    |     Routing time step (min) =  1.00
|  IN> 01:203      |     Number of SEGMENTS =  3
| OUT< 02:002140   |     Slopes (%), CHANNEL= .3500  FLOODPLAIN= .2000
--------------------                 LENGTH =  500.00    (m)

              <------ DATA FOR SECTION (   8.0) ------>
              Distance      Elevation       Manning
                 .00          1.40          .1400
               200.00          1.00     .1400 / .1000  Main Channel
               201.50           .00          .1000      Main Channel
               203.50           .00          .1000      Main Channel
               205.00          1.00     .1000 / .2000  Main Channel
               405.00          1.40          .2000

   <---------------------------- TRAVEL TIME TABLE ---------------------------->
    DEPTH     ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME   D x V
      (m)      (m)   (cu.m.)   (cu.m.)     (cms)     (m/s)     (min)    (m2/s)
     .071     .071  .753E+02  .154E+01      .015      .097     85.67      .007
     .143     .143  .158E+03  .646E+01      .047      .149     56.11      .021
     .214     .214  .249E+03  .152E+02      .094      .188     44.28      .040
     .286     .286  .347E+03  .283E+02      .154      .221     37.63      .063
     .357     .357  .453E+03  .462E+02      .227      .250     33.27      .089
     .429     .429  .566E+03  .693E+02      .313      .276     30.14      .118
     .500     .500  .687E+03  .982E+02      .413      .300     27.75      .150
     .571     .571  .816E+03  .133E+03      .526      .322     25.85      .184
     .643     .643  .953E+03  .175E+03      .654      .343     24.30      .220
     .714     .714  .110E+04  .224E+03      .795      .362     22.99      .259
     .786     .786  .125E+04  .280E+03      .952      .381     21.87      .299
     .857     .857  .141E+04  .345E+03     1.123      .399     20.90      .342
     .929     .929  .158E+04  .418E+03     1.310      .416     20.04      .386
    1.000    1.000  .175E+04  .500E+03     1.513      .432     19.28      .432
    1.080    1.080  .355E+04  .110E+04     1.913      .269     30.92      .291
    1.160    1.160  .855E+04  .283E+04     2.777      .162     51.31      .188
    1.240    1.240  .167E+05  .593E+04     4.375      .131     63.81      .162
    1.320    1.320  .281E+05  .106E+05     6.931      .123     67.70      .162
    1.400    1.400  .427E+05  .171E+05    10.642      .124     66.95      .174

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.

                                  <---- hydrograph ---->   <-pipe / channel->
                              AREA    QPEAK   TPEAK   R.V.    MAX DEPTH  MAX VEL
                               (ha)    (cms)   (hrs)   (mm)      (m)      (m/s)
   INFLOW : ID= 1:203         12.75    .427    6.92 35.314      .509      .303
   OUTFLOW: ID= 2:002140      12.75    .378    7.30 35.314      .473      .291


------------------------------------------------------------------------------
025:0030----------------------------------------------------------------------
---------------------
| DESIGN NASHYD     |   Area    (ha)=   12.89   Curve Number   (CN)=72.00
| 01:205    DT= 1.00 |  Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=    .860

     Unit Hyd Qpeak  (cms)=     .572

     PEAK FLOW       (cms)=     .471 (i)
     TIME TO PEAK    (hrs)=    6.801
     RUNOFF VOLUME    (mm)=   35.314
     TOTAL RAINFALL   (mm)=   80.801
     RUNOFF COEFFICIENT   =     .437

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


------------------------------------------------------------------------------
025:0031----------------------------------------------------------------------
----------------------
| ADD HYD (      2150) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                     (ha)     (cms)   (hrs)   (mm)    (cms)
                    ID1 01:205             12.89     .471    6.80  35.31    .000
                   +ID2 02:      2140      12.75     .378    7.30  35.31    .000
                    ==========================================================
                    SUM 03:      2150      25.64     .812    7.03  35.31    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.


------------------------------------------------------------------------------
025:0032----------------------------------------------------------------------
--------------------
| ROUTE CHANNEL    |     Routing time step (min) =  1.00
|  IN> 03:002150   |     Number of SEGMENTS =  3
| OUT< 01:002160   |     Slopes (%), CHANNEL= .0500  FLOODPLAIN= .2000
--------------------                 LENGTH =  360.00    (m)

              <------ DATA FOR SECTION (   9.0) ------>
              Distance      Elevation       Manning
                 .00          1.40          .1400
               200.00          1.00     .1400 / .1000  Main Channel
               201.50           .00          .1000      Main Channel
               203.50           .00          .1000      Main Channel
               205.00          1.00     .1000 / .2000  Main Channel
               405.00          1.40          .2000

   <---------------------------- TRAVEL TIME TABLE ---------------------------->
    DEPTH     ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME   D x V
      (m)      (m)   (cu.m.)   (cu.m.)     (cms)     (m/s)     (min)    (m2/s)
```

```
    .071     .071  .542E+02  .108E+02       .006      .037    163.19     .003
    .143     .143  .114E+03  .452E+02       .018      .056    106.89     .008
    .214     .214  .179E+03  .107E+03*      .035      .071     84.35     .015
    .286     .286  .250E+03  .198E+03*      .058      .084     71.69     .024
    .357     .357  .326E+03  .323E+03*      .086      .095     63.38     .034
    .429     .429  .408E+03  .485E+03*      .118      .105     57.41     .045
    .500     .500  .495E+03  .687E+03*      .156      .113     52.87     .057
    .571     .571  .588E+03  .933E+03*      .199      .122     49.25     .070
    .643     .643  .686E+03  .123E+04*      .247      .130     46.29     .083
    .714     .714  .790E+03  .157E+04*      .301      .137     43.80     .098
    .786     .786  .899E+03  .196E+04*      .360      .144     41.67     .113
    .857     .857  .101E+04  .241E+04*      .424      .151     39.81     .129
    .929     .929  .113E+04  .293E+04*      .495      .157     38.18     .146
   1.000    1.000  .126E+04  .350E+04*      .572      .163     36.73     .163
   1.080    1.080  .256E+04  .767E+04*      .786      .111     54.17     .120
   1.160    1.160  .616E+04  .198E+05*     1.451      .085     70.71     .098
   1.240    1.240  .121E+05  .415E+05*     2.837      .085     70.85     .105
   1.320    1.320  .203E+05  .743E+05*     5.168      .092     65.36     .121
   1.400    1.400  .308E+05  .120E+06*     8.644      .101     59.35     .142

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
 (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                                <---- hydrograph ---->   <-pipe / channel->
                           AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                           (ha)    (cms)   (hrs)   (mm)       (m)      (m/s)
  INFLOW : ID= 3:002150    25.64     .812    7.03 35.314     1.083      .109
  OUTFLOW: ID= 1:002160    25.64     .632    7.73 35.313     1.022      .144


--------------------------------------------------------------------------------
025:0033--------------------------------------------------------------------------
----------------------
| DESIGN NASHYD      |   Area    (ha)=   15.50   Curve Number   (CN)=72.00
| 02:209    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .970

     Unit Hyd Qpeak  (cms)=     .610

     PEAK FLOW       (cms)=     .519 (i)
     TIME TO PEAK    (hrs)=    6.918
     RUNOFF VOLUME    (mm)=   35.314
     TOTAL RAINFALL   (mm)=   80.801
     RUNOFF COEFFICIENT   =     .437

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

--------------------------------------------------------------------------------
025:0034--------------------------------------------------------------------------
----------------------
| ADD HYD (      2170) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                     (ha)     (cms)   (hrs)   (mm)    (cms)
                        ID1 01:      2160    25.64     .632    7.73  35.31    .000
                      +ID2 02:209           15.50     .519    6.92  35.31    .000
                       ========================================================
                        SUM 03:      2170    41.14    1.076    7.27  35.31    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
025:0035--------------------------------------------------------------------------
----------------------
| ROUTE CHANNEL      |     Routing time step (min) =  1.00
|  IN> 03:002170     |     Number of SEGMENTS =  3
| OUT< 01:002180     |     Slopes (%), CHANNEL= .1500  FLOODPLAIN= .2000
----------------------                  LENGTH =  250.00    (m)

               <------ DATA FOR SECTION (  10.0) ------>
               Distance      Elevation       Manning
                   .00          1.40          .2000
                200.00          1.00     .2000 / .1000  Main Channel
                201.50           .00          .1000      Main Channel
                203.50           .00          .1000      Main Channel
                205.00          1.00     .1000 / .2000  Main Channel
                405.00          1.40          .2000

  <---------------------------- TRAVEL TIME TABLE ---------------------------->
   DEPTH     ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME    D x V
     (m)      (m)   (cu.m.)   (cu.m.)      (cms)     (m/s)     (min)    (m2/s)
    .071     .071  .376E+02  .358E+01       .010      .064     65.43     .005
    .143     .143  .791E+02  .151E+02       .031      .097     42.85     .014
    .214     .214  .124E+03  .355E+02       .061      .123     33.82     .026
    .286     .286  .173E+03  .661E+02       .101      .145     28.74     .041
    .357     .357  .226E+03  .108E+03       .148      .164     25.41     .059
    .429     .429  .283E+03  .162E+03*      .205      .181     23.02     .078
    .500     .500  .344E+03  .229E+03*      .270      .197     21.20     .098
    .571     .571  .408E+03  .311E+03*      .344      .211     19.75     .121
    .643     .643  .476E+03  .408E+03*      .428      .225     18.56     .144
    .714     .714  .548E+03  .522E+03*      .521      .237     17.56     .169
    .786     .786  .624E+03  .654E+03*      .623      .249     16.71     .196
    .857     .857  .704E+03  .805E+03*      .735      .261     15.96     .224
    .929     .929  .788E+03  .975E+03*      .858      .272     15.31     .253
   1.000    1.000  .875E+03  .117E+04*      .990      .283     14.73     .283
   1.080    1.080  .177E+04  .256E+04*     1.270      .179     23.30     .193
   1.160    1.160  .427E+04  .661E+04*     1.927      .113     36.97     .131
   1.240    1.240  .837E+04  .138E+05*     3.185      .095     43.82     .118
   1.320    1.320  .141E+05  .248E+05*     5.229      .093     44.86     .123
   1.400    1.400  .214E+05  .399E+05*     8.222      .096     43.33     .135

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
 (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                                <---- hydrograph ---->   <-pipe / channel->
                           AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                           (ha)    (cms)   (hrs)   (mm)       (m)      (m/s)
  INFLOW : ID= 3:002170    41.14    1.076    7.27 35.313     1.025      .240
  OUTFLOW: ID= 1:002180    41.14    1.035    7.73 35.313     1.012      .259


--------------------------------------------------------------------------------
025:0036--------------------------------------------------------------------------
----------------------
| DESIGN NASHYD      |   Area    (ha)=    7.27   Curve Number   (CN)=82.00
| 02:210    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .820

     Unit Hyd Qpeak  (cms)=     .339

     PEAK FLOW       (cms)=     .370 (i)
     TIME TO PEAK    (hrs)=    6.734
     RUNOFF VOLUME    (mm)=   46.563
     TOTAL RAINFALL   (mm)=   80.801
     RUNOFF COEFFICIENT   =     .576

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

--------------------------------------------------------------------------------
025:0037--------------------------------------------------------------------------
----------------------
| DESIGN NASHYD      |   Area    (ha)=   21.08   Curve Number   (CN)=80.00
| 03:EXT4   DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=   1.830

     Unit Hyd Qpeak  (cms)=     .440

     PEAK FLOW       (cms)=     .553 (i)
     TIME TO PEAK    (hrs)=    7.918
     RUNOFF VOLUME    (mm)=   44.038
     TOTAL RAINFALL   (mm)=   80.801
     RUNOFF COEFFICIENT   =     .545

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

--------------------------------------------------------------------------------
025:0038--------------------------------------------------------------------------
*#*************************************************************************
*# McGill Drain - Total Flow at Jefferson Boulevard
*#*************************************************************************
----------------------
| ADD HYD (      2190) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                     (ha)     (cms)   (hrs)   (mm)    (cms)
                        ID1 01:      2180    41.14    1.035    7.73  35.31    .000
                      +ID2 02:210           7.27     .370    6.73  46.56    .000
                      +ID3 03:EXT4          21.08     .553    7.92  44.04    .000
                       ========================================================
                        SUM 04:      2190    69.49    1.809    7.50  39.14    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
025:0039--------------------------------------------------------------------------
----------------------
| ROUTE CHANNEL      |     Routing time step (min) =  1.00
|  IN> 04:002190     |     Number of SEGMENTS =  3
| OUT< 01:002200     |     Slopes (%), CHANNEL= .3000  FLOODPLAIN= .2000
----------------------                  LENGTH =  280.00    (m)

               <------ DATA FOR SECTION (  11.0) ------>
               Distance      Elevation       Manning
                   .00          1.40          .2000
                200.00          1.00     .2000 / .1000  Main Channel
                201.50           .00          .1000      Main Channel
                203.50           .00          .1000      Main Channel
                205.00          1.00     .1000 / .2000  Main Channel
                405.00          1.40          .2000

  <---------------------------- TRAVEL TIME TABLE ---------------------------->
   DEPTH     ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME    D x V
     (m)      (m)   (cu.m.)   (cu.m.)      (cms)     (m/s)     (min)    (m2/s)
    .071     .071  .421E+02  .179E+01       .014      .090     51.82     .006
    .143     .143  .886E+02  .753E+01       .043      .138     33.94     .020
    .214     .214  .139E+03  .178E+02       .087      .174     26.78     .037
    .286     .286  .194E+03  .330E+02       .142      .205     22.76     .059
    .357     .357  .254E+03  .539E+02       .210      .232     20.12     .083
    .429     .429  .317E+03  .809E+02       .290      .256     18.23     .110
    .500     .500  .385E+03  .115E+03       .382      .278     16.79     .139
    .571     .571  .457E+03  .155E+03       .487      .298     15.64     .171
    .643     .643  .534E+03  .204E+03       .605      .318     14.70     .204
    .714     .714  .614E+03  .261E+03       .736      .336     13.91     .240
    .786     .786  .699E+03  .327E+03       .881      .353     13.23     .277
    .857     .857  .789E+03  .402E+03*     1.040      .369     12.64     .316
    .929     .929  .882E+03  .488E+03*     1.213      .385     12.12     .357
   1.000    1.000  .980E+03  .583E+03*     1.401      .400     11.66     .400
   1.080    1.080  .199E+04  .128E+04*     1.761      .248     18.81     .268
   1.160    1.160  .479E+04  .331E+04*     2.505      .147     31.85     .170
   1.240    1.240  .938E+04  .692E+04*     3.856      .115     40.54     .143
   1.320    1.320  .158E+05  .124E+05*     5.997      .107     43.81     .141
   1.400    1.400  .239E+05  .199E+05*     9.093      .106     43.88     .149

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
 (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                                <---- hydrograph ---->   <-pipe / channel->
                           AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                           (ha)    (cms)   (hrs)   (mm)       (m)      (m/s)
  INFLOW : ID= 4:002190    69.49    1.809    7.50 39.137     1.085      .237
  OUTFLOW: ID= 1:002200    69.49    1.749    8.22 39.137     1.078      .250


--------------------------------------------------------------------------------
025:0040--------------------------------------------------------------------------
----------------------
| DESIGN NASHYD      |   Area    (ha)=   14.81   Curve Number   (CN)=82.00
| 02:EXT5   DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=   1.520

     Unit Hyd Qpeak  (cms)=     .372

     PEAK FLOW       (cms)=     .475 (i)
     TIME TO PEAK    (hrs)=    7.518
     RUNOFF VOLUME    (mm)=   46.563
     TOTAL RAINFALL   (mm)=   80.801
     RUNOFF COEFFICIENT   =     .576

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

--------------------------------------------------------------------------------
025:0041--------------------------------------------------------------------------
----------------------
| ADD HYD (      2210) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                     (ha)     (cms)   (hrs)   (mm)    (cms)
                        ID1 01:      2200    69.49    1.749    8.22  39.14    .000
                      +ID2 02:EXT5          14.81     .475    7.52  46.56    .000
                       ========================================================
                        SUM 03:      2210    84.30    2.184    8.07  40.44    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
025:0042--------------------------------------------------------------------------
*#*************************************************************************
*# McGill Drain - Total Flow at Lappan Drain Confluence
*#*************************************************************************
----------------------
| ADD HYD (      2220) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                     (ha)     (cms)   (hrs)   (mm)    (cms)
                        ID1 03:      2210    84.30    2.184    8.07  40.44    .000
                      +ID2 10:      2130   183.40    4.096    9.40  40.92    .000
                       ========================================================
                        SUM 01:      2220   267.70    5.927    8.62  40.77    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
025:0043--------------------------------------------------------------------------
----------------------
| ROUTE CHANNEL      |     Routing time step (min) =  1.00
|  IN> 01:002220     |     Number of SEGMENTS =  3
| OUT< 02:002230     |     Slopes (%), CHANNEL= .1500  FLOODPLAIN= .2000
----------------------                  LENGTH =  200.00    (m)

               <------ DATA FOR SECTION (  12.0) ------>
               Distance      Elevation       Manning
                   .00          1.80          .1400
                200.00          1.40     .1400 / .0850  Main Channel
                202.60           .00          .0850      Main Channel
                204.40           .00          .0850      Main Channel
                207.00          1.40     .0850 / .2000  Main Channel
                407.00          1.80          .2000

  <---------------------------- TRAVEL TIME TABLE ---------------------------->
   DEPTH     ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME    D x V
     (m)      (m)   (cu.m.)   (cu.m.)      (cms)     (m/s)     (min)    (m2/s)
    .093     .093  .568E+02  .249E+02       .016      .087     38.15     .008
    .187     .187  .801E+02  .249E+02       .053      .131     25.37     .025
    .280     .280  .130E+03  .606E+02       .107      .165     20.20     .046
    .373     .373  .186E+03  .116E+03*      .180      .193     17.26     .072
    .467     .467  .249E+03  .194E+03*      .271      .218     15.31     .102
    .560     .560  .318E+03  .297E+03*      .382      .240     13.89     .134
    .653     .653  .394E+03  .429E+03*      .513      .260     12.80     .170
    .747     .747  .476E+03  .592E+03*      .665      .280     11.92     .209
    .840     .840  .564E+03  .790E+03*      .840      .298     11.20     .250
    .933     .933  .660E+03  .103E+04*     1.039      .315     10.58     .294
```

1.027	1.027	.761E+03	.130E+04*	1.262	.332	10.05	.340
1.120	1.120	.869E+03	.162E+04*	1.510	.348	9.59	.389
1.213	1.213	.984E+03	.199E+04*	1.785	.363	9.18	.440
1.307	1.307	.110E+04	.241E+04*	2.087	.378	8.82	.494
1.400	1.400	.123E+04	.287E+04*	2.418	.392	8.49	.549
1.500	1.500	.237E+04	.593E+04*	3.077	.259	12.85	.389
1.600	1.600	.551E+04	.147E+05*	4.571	.166	20.10	.265
1.700	1.700	.107E+05	.302E+05*	7.392	.139	24.02	.236
1.800	1.800	.178E+05	.534E+05*	11.944	.134	24.83	.242

X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
(*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

	<---- hydrograph ---->			<-pipe / channel->	
	AREA	QPEAK	TPEAK	R.V.	MAX DEPTH	MAX VEL
	(ha)	(cms)	(hrs)	(mm)	(m)	(m/s)
INFLOW : ID= 1:002220	267.70	5.927	8.62	40.767	1.648	.152
OUTFLOW: ID= 2:002230	267.70	5.751	8.97	40.767	1.642	.153

025:0044

DESIGN NASHYD	Area (ha)= 16.88	Curve Number (CN)=72.00
01:213 DT= 1.00	Ia (mm)= 1.500	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= .770	

Unit Hyd Qpeak (cms)= .837

PEAK FLOW (cms)= .668 (i)
TIME TO PEAK (hrs)= 6.701
RUNOFF VOLUME (mm)= 35.314
TOTAL RAINFALL (mm)= 80.801
RUNOFF COEFFICIENT = .437

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

025:0045

ADD HYD (2240)	ID: NHYD	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	DWF (cms)
	ID1 01:213	16.88	.668	6.70	35.31	.000
	+ID2 02: 2230	267.70	5.751	8.97	40.77	.000
	SUM 03: 2240	284.58	5.904	8.97	40.44	.000

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

025:0046

ROUTE CHANNEL	Routing time step (min) = 1.00
IN> 03:002240	Number of SEGMENTS = 3
OUT< 01:002250	Slopes (%), CHANNEL= .1500 FLOODPLAIN= .2000
	LENGTH = 170.00 (m)

<------ DATA FOR SECTION (13.0) ------>

Distance	Elevation	Manning	
.00	1.80	.1400	
200.00	1.40	.1400 / .0850	Main Channel
202.60	.00	.0850	Main Channel
204.40	.00	.0850	Main Channel
207.00	1.40	.0850 / .2000	Main Channel
407.00	1.80	.2000	

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

DEPTH (m)	ELEV (m)	X-VOLUME (cu.m.)	S-VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME (min)	D x V (m2/s)
.093	.093	.313E+02	.573E+01	.016	.087	32.43	.008
.187	.187	.681E+02	.249E+02	.053	.131	21.56	.025
.280	.280	.110E+03	.606E+02*	.107	.165	17.17	.046
.373	.373	.158E+03	.116E+03*	.180	.193	14.67	.072
.467	.467	.212E+03	.194E+03*	.271	.218	13.02	.102
.560	.560	.270E+03	.297E+03*	.382	.240	11.81	.134
.653	.653	.335E+03	.429E+03*	.513	.260	10.88	.170
.747	.747	.404E+03	.592E+03*	.665	.280	10.13	.209
.840	.840	.480E+03	.790E+03*	.840	.298	9.52	.250
.933	.933	.561E+03	.103E+04*	1.039	.315	8.99	.294
1.027	1.027	.647E+03	.130E+04*	1.262	.332	8.55	.340
1.120	1.120	.739E+03	.162E+04*	1.510	.348	8.15	.389
1.213	1.213	.836E+03	.199E+04*	1.785	.363	7.81	.440
1.307	1.307	.939E+03	.241E+04*	2.087	.378	7.50	.494
1.400	1.400	.105E+04	.287E+04*	2.418	.392	7.22	.549
1.500	1.500	.202E+04	.593E+04*	3.077	.259	10.92	.389
1.600	1.600	.469E+04	.147E+05*	4.571	.166	17.08	.265
1.700	1.700	.905E+04	.302E+05*	7.392	.139	20.42	.236
1.800	1.800	.151E+05	.534E+05*	11.944	.134	21.10	.242

X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
(*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

	<---- hydrograph ---->			<-pipe / channel->	
	AREA	QPEAK	TPEAK	R.V.	MAX DEPTH	MAX VEL
	(ha)	(cms)	(hrs)	(mm)	(m)	(m/s)
INFLOW : ID= 3:002240	284.58	5.904	8.97	40.443	1.647	.152
OUTFLOW: ID= 1:002250	284.58	5.798	9.33	40.443	1.641	.153

025:0047

DESIGN NASHYD	Area (ha)= 24.11	Curve Number (CN)=80.00
02:EXT6 DT= 1.00	Ia (mm)= 1.500	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 1.520	

Unit Hyd Qpeak (cms)= .606

PEAK FLOW (cms)= .729 (i)
TIME TO PEAK (hrs)= 7.534
RUNOFF VOLUME (mm)= 44.038
TOTAL RAINFALL (mm)= 80.801
RUNOFF COEFFICIENT = .545

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

025:0048

DESIGN NASHYD	Area (ha)= 14.49	Curve Number (CN)=82.00
03:211 DT= 1.00	Ia (mm)= 1.500	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 1.070	

Unit Hyd Qpeak (cms)= .517

PEAK FLOW (cms)= .607 (i)
TIME TO PEAK (hrs)= 7.018
RUNOFF VOLUME (mm)= 46.563
TOTAL RAINFALL (mm)= 80.801
RUNOFF COEFFICIENT = .576

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

025:0049

ROUTE CHANNEL	Routing time step (min) = 1.00
IN> 03:211	Number of SEGMENTS = 3
OUT< 04:002280	Slopes (%), CHANNEL= .2000 FLOODPLAIN= .2000
	LENGTH = 500.00 (m)

<------ DATA FOR SECTION (15.0) ------>

Distance	Elevation	Manning	
.00	.62	.1400	
10.00	.60	.1400 / .0400	Main Channel
11.80	.00	.0400	Main Channel
12.80	.00	.0400	Main Channel
14.60	.62	.0400 / .2000	Main Channel
24.60	.60	.2000	

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

DEPTH (m)	ELEV (m)	X-VOLUME (cu.m.)	S-VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME (min)	D x V (m2/s)
.030	.030	.163E+02	.245E+00	.003	.102	81.78	.003
.060	.060	.353E+02	.106E+01	.011	.155	53.91	.009
.090	.090	.570E+02	.256E+01	.022	.195	42.68	.018
.120	.120	.813E+02	.488E+01	.037	.229	36.32	.028
.150	.150	.108E+03	.812E+01	.056	.260	32.11	.039
.180	.180	.138E+03	.124E+02	.079	.287	29.06	.052
.210	.210	.170E+03	.179E+02	.106	.312	26.72	.065
.240	.240	.205E+03	.246E+02	.138	.335	24.85	.080
.270	.270	.243E+03	.327E+02	.173	.358	23.31	.097
.300	.300	.283E+03	.424E+02	.214	.379	22.01	.114
.330	.330	.326E+03	.537E+02	.260	.399	20.89	.132
.360	.360	.371E+03	.668E+02	.311	.418	19.92	.151
.390	.390	.419E+03	.818E+02	.367	.437	19.06	.171
.420	.420	.470E+03	.988E+02	.428	.455	18.30	.191
.450	.450	.524E+03	.118E+03	.496	.473	17.61	.213
.480	.480	.580E+03	.139E+03	.569	.491	16.99	.235
.510	.510	.639E+03	.163E+03	.648	.507	16.42	.259
.540	.540	.700E+03	.189E+03	.734	.524	15.90	.283
.570	.570	.764E+03	.218E+03	.826	.540	15.43	.308

X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
S-VOLUME= Volume that can be stored in channel at specified ELEVATION.

	<---- hydrograph ---->			<-pipe / channel->	
	AREA	QPEAK	TPEAK	R.V.	MAX DEPTH	MAX VEL
	(ha)	(cms)	(hrs)	(mm)	(m)	(m/s)
INFLOW : ID= 3:211	14.49	.607	7.02	46.563	.494	.498
OUTFLOW: ID= 4:002280	14.49	.579	7.27	46.563	.482	.492

025:0050

DESIGN NASHYD	Area (ha)= 10.57	Curve Number (CN)=72.00
03:216 DT= 1.00	Ia (mm)= 1.500	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 1.210	

Unit Hyd Qpeak (cms)= .334

PEAK FLOW (cms)= .300 (i)
TIME TO PEAK (hrs)= 7.201
RUNOFF VOLUME (mm)= 35.314
TOTAL RAINFALL (mm)= 80.801
RUNOFF COEFFICIENT = .437

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

025:0051

ADD HYD (2290)	ID: NHYD	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	DWF (cms)
	ID1 03:216	10.57	.300	7.20	35.31	.000
	+ID2 04: 2280	14.49	.579	7.27	46.56	.000
	SUM 05: 2290	25.06	.879	7.23	41.82	.000

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

025:0052

ADD HYD (2260)	ID: NHYD	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	DWF (cms)
	ID1 01: 2250	284.58	5.798	9.33	40.44	.000
	+ID2 02:EXT6	24.11	.729	7.53	44.04	.000
	+ID3 05: 2290	25.06	.879	7.23	41.82	.000
	SUM 03: 2260	333.75	6.683	8.97	40.81	.000

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

025:0053

ROUTE CHANNEL	Routing time step (min) = 1.00
IN> 03:002260	Number of SEGMENTS = 3
OUT< 10:002295	Slopes (%), CHANNEL= .0800 FLOODPLAIN= .2000
	LENGTH = 370.00 (m)

<------ DATA FOR SECTION (14.0) ------>

Distance	Elevation	Manning	
.00	1.80	.1400	
200.00	1.40	.1400 / .0850	Main Channel
202.60	.00	.0850	Main Channel
204.40	.00	.0850	Main Channel
207.00	1.40	.0850 / .2000	Main Channel
407.00	1.80	.2000	

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

DEPTH (m)	ELEV (m)	X-VOLUME (cu.m.)	S-VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME (min)	D x V (m2/s)
.093	.093	.681E+02	.107E+02	.012	.064	96.65	.006
.187	.187	.148E+03	.467E+02	.038	.096	64.26	.018
.280	.280	.240E+03	.114E+03	.078	.121	51.18	.034
.373	.373	.344E+03	.217E+03*	.131	.141	43.73	.053
.467	.467	.460E+03	.363E+03*	.198	.159	38.79	.074
.560	.560	.588E+03	.557E+03*	.279	.175	35.19	.098
.653	.653	.728E+03	.804E+03*	.374	.190	32.42	.124
.747	.747	.880E+03	.112E+04*	.486	.204	30.20	.152
.840	.840	.104E+04	.148E+04*	.614	.217	28.36	.183
.933	.933	.122E+04	.192E+04*	.759	.230	26.81	.215
1.027	1.027	.141E+04	.244E+04*	.921	.242	25.47	.249
1.120	1.120	.161E+04	.304E+04*	1.103	.254	24.30	.284
1.213	1.213	.182E+04	.373E+04*	1.304	.265	23.27	.322
1.307	1.307	.204E+04	.451E+04*	1.524	.276	22.34	.361
1.400	1.400	.228E+04	.539E+04*	1.766	.287	21.51	.401
1.500	1.500	.439E+04	.111E+05*	2.297	.194	31.84	.290
1.600	1.600	.102E+05	.276E+05*	3.654	.133	46.51	.212
1.700	1.700	.197E+05	.566E+05*	6.329	.119	51.90	.202
1.800	1.800	.329E+05	.100E+06*	10.726	.121	51.14	.217

X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
(*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

	<---- hydrograph ---->			<-pipe / channel->	
	AREA	QPEAK	TPEAK	R.V.	MAX DEPTH	MAX VEL
	(ha)	(cms)	(hrs)	(mm)	(m)	(m/s)
INFLOW : ID= 3:002260	333.75	6.683	8.97	40.806	1.708	.119
OUTFLOW: ID=10:002295	333.75	6.142	9.87	40.806	1.691	.120

025:0054

DESIGN NASHYD	Area (ha)= 17.47	Curve Number (CN)=76.00
03:214 DT= 1.00	Ia (mm)= 1.500	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= .600	

Unit Hyd Qpeak (cms)= 1.112

```
     PEAK FLOW       (cms)=     .921 (i)
     TIME TO PEAK    (hrs)=    6.501
     RUNOFF VOLUME    (mm)=   39.424
     TOTAL RAINFALL   (mm)=   80.801
     RUNOFF COEFFICIENT   =     .488

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

------------------------------------------------------------------------------
025:0055------------------------------------------------------------------------
*#**************************************************************************
*# Calculate culvert routing and flow split near eastern site boundary
*#   - Storage volumes calculated based on site survey
*#   - Discharges calculated based on the 600 mm diameter CSP and 1500 mm
*#     diameter CSP capacities
*#**************************************************************************
---------------------
| ROUTE RESERVOIR   |    Requested routing time step =  1.0 min.
|  IN>03:(214   )   |
| OUT<01:(002300)   |    =========  OUTFLOW STORAGE TABLE  =========
---------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                           (cms)    (ha.m.)   |    (cms)    (ha.m.)
                           .000  .0000E+00   |   1.130  .4600E+00
                           .150  .0000E+00   |   5.470  .8100E+00
                           .450  .0000E+00   |  83.090  .3400E+01
                           .820  .6500E-01   |    .000  .0000E+00

     ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
     ---------------            (ha)     (cms)     (hrs)       (mm)
     INFLOW >03: (214   )      17.47      .921     6.501     39.424
     OUTFLOW<01: (002300)      17.47      .777     6.868     39.428

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=   84.322
                   TIME SHIFT OF PEAK FLOW          (min)=    22.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=.5739E-01

------------------------------------------------------------------------------
025:0056------------------------------------------------------------------------
--------------------
| DIVERT HYD       |
| INID=01  (002300)|
--------------------
     Outflow / Inflow  Relationships
     Flow 02 +  Flow 03 =  Total
      (cms)       (cms)      (cms)
       .000        .000       .000
       .150        .000       .150
       .400        .050       .450
       .680        .140       .820
       .930        .200      1.130
      1.040      4.430      5.470
      1.460     81.630     83.090

          NHYD       AREA    QPEAK  TpeakDate_hh:mm       R.V.  NFE WetHrs
                     (ha)    (cms)                        (mm)       (hrs)
  IDin = 01:002300    17.47     .777  No_date    6:52     39.428   67    13.
  ==========================================================================
  IDout= 02:002310    15.68     .647  No_date    6:52     39.428   67    13.
  IDout= 03:002320     1.79     .129  No_date    6:52     39.428   23     3.
------------------------------------------------------------------------------
025:0057------------------------------------------------------------------------
----------------------
| DESIGN NASHYD      |   Area     (ha)=    5.34   Curve Number    (CN)=72.00
| 01:215    DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .860

     Unit Hyd Qpeak  (cms)=     .237

     PEAK FLOW       (cms)=     .195 (i)
     TIME TO PEAK    (hrs)=    6.801
     RUNOFF VOLUME    (mm)=   35.314
     TOTAL RAINFALL   (mm)=   80.801
     RUNOFF COEFFICIENT   =     .437

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

------------------------------------------------------------------------------
025:0058------------------------------------------------------------------------
----------------------
| ADD HYD (      2330) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                     (ha)     (cms)   (hrs)   (mm)    (cms)
                       ID1 01:215           5.34      .195    6.80  35.31     .000
                      +ID2 02:      2310    15.68      .647    6.87  39.43     .000
                       ================================================
                       SUM 04:      2330    21.02      .842    6.85  38.38     .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
025:0059------------------------------------------------------------------------
----------------------
| DESIGN NASHYD      |   Area     (ha)=   18.59   Curve Number    (CN)=82.00
| 01:EXT7   DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=   1.470

     Unit Hyd Qpeak  (cms)=     .483

     PEAK FLOW       (cms)=     .612 (i)
     TIME TO PEAK    (hrs)=    7.468
     RUNOFF VOLUME    (mm)=   46.563
     TOTAL RAINFALL   (mm)=   80.801
     RUNOFF COEFFICIENT   =     .576

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

------------------------------------------------------------------------------
025:0060------------------------------------------------------------------------
*#**************************************************************************
*# McGill Drain - Total Flow at Eastern WSP
*#**************************************************************************
----------------------
| ADD HYD (      2340) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                     (ha)     (cms)   (hrs)   (mm)    (cms)
                       ID1 01:EXT7          18.59      .612    7.47  46.56     .000
                      +ID2 04:      2330    21.02      .842    6.85  38.38     .000
                      +ID3 10:      2295   333.75    6.142    9.87  40.81     .000
                       ================================================
                       SUM 05:      2340   373.36    6.600    9.68  40.96     .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
025:0061------------------------------------------------------------------------
*#**************************************************************************
*# AREA CHECK
*#**************************************************************************
----------------------
| ADD HYD (      2350) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                     (ha)     (cms)   (hrs)   (mm)    (cms)
                       ID1 03:      2320     1.79      .129    6.87  39.43     .000
                      +ID2 05:      2340   373.36    6.600    9.68  40.96     .000
                       ================================================
                       SUM 01:      2350   375.15    6.600    9.68  40.95     .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
025:0062------------------------------------------------------------------------
------------------------------------------------------------------------------
025:0002------------------------------------------------------------------------
------------------------------------------------------------------------------
025:0002------------------------------------------------------------------------
  ** END OF RUN :  49

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



--------------------
| START            |  Project  dir.: F:\WSP\
-------------------- Rainfall dir.: F:\WSP\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 050
    NSTORM=   1
           #  1=12scs50.stm
------------------------------------------------------------------------------
050:0002------------------------------------------------------------------------
*#**************************************************************************
*#  Project Name: [Windsor Solar Project] Project Number: [1335-60106]
*#  Date        : 02-10-2016
*#  Modeller    : [NE]
*#  Company     : Stantec Consulting Ltd. (London)
*#  License #   :  4730904
*#**************************************************************************
*#
*#  Proposed Conditions
*#  25 mm Water Quality Event
*#  2, 5, 10, 25, 50, 100, 250-year 3-Hour Chicago Design Storm
*#
*#**************************************************************************
------------------------------------------------------------------------------
050:0002------------------------------------------------------------------------
--------------------
| READ STORM       |    Filename: 50-yr scs 12 hr windsor
| Ptotal=  89.40 mm|    Comments: 50-yr scs 12 hr windsor
--------------------
              TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
               hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
               .50   1.788 |   3.50   3.576 |   6.50  16.092 |   9.50   3.576
              1.00   1.788 |   4.00   3.576 |   7.00   7.152 |  10.00   1.788
              1.50   1.788 |   4.50   5.364 |   7.50   5.364 |  10.50   1.788
              2.00   1.788 |   5.00   7.152 |   8.00   5.364 |  11.00   1.788
              2.50   3.576 |   5.50  10.728 |   8.50   3.576 |  11.50   1.788
              3.00   3.576 |   6.00  80.460 |   9.00   3.576 |  12.00   1.788

------------------------------------------------------------------------------
050:0003------------------------------------------------------------------------
*#**************************************************************************
*# LAPPAN DRAIN
*#**************************************************************************
----------------------
| DESIGN NASHYD      |   Area     (ha)=   42.26   Curve Number    (CN)=73.00
| 01:EXT1   DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=   1.110

     Unit Hyd Qpeak  (cms)=    1.454

     PEAK FLOW       (cms)=    1.549 (i)
     TIME TO PEAK    (hrs)=    7.084
     RUNOFF VOLUME    (mm)=   42.489
     TOTAL RAINFALL   (mm)=   89.400
     RUNOFF COEFFICIENT   =     .475

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

------------------------------------------------------------------------------
050:0004------------------------------------------------------------------------
--------------------
| ROUTE CHANNEL    |     Routing time step (min) =  1.00
|  IN> 01:EXT1     |     Number of SEGMENTS =  3
| OUT< 02:002000   |     Slopes (%), CHANNEL= .1000  FLOODPLAIN= .2000
--------------------                  LENGTH =  700.00     (m)

              <------ DATA FOR SECTION (   1.0) ------>
              Distance      Elevation       Manning
                   .00          1.40          .2000
                100.00          1.20     .2000 / .0850  Main Channel
                101.80           .00          .0850      Main Channel
                103.00           .00          .0850      Main Channel
                104.80          1.20     .0850 / .2000  Main Channel
                204.80          1.40          .2000

   <------------------------------ TRAVEL TIME TABLE ------------------------------>
    DEPTH    ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME   D x V
      (m)     (m)   (cu.m.)   (cu.m.)      (cms)     (m/s)     (min)    (m2/s)
     .071    .071  .645E+02  .325E+01       .005      .059    197.27      .004
     .141    .141  .140E+03  .141E+02       .018      .089    131.37      .013
     .212    .212  .225E+03  .340E+02       .036      .111    104.80      .024
     .282    .282  .321E+03  .647E+02       .060      .130     89.71      .037
     .353    .353  .427E+03  .108E+03       .089      .146     79.68      .052
     .424    .424  .544E+03  .165E+03       .125      .161     72.40      .068
     .494    .494  .671E+03  .237E+03       .168      .175     66.79      .086
     .565    .565  .809E+03  .326E+03       .217      .187     62.29      .106
     .635    .635  .957E+03  .434E+03       .272      .199     58.56      .127
     .706    .706  .112E+04  .563E+03*      .336      .211     55.41      .149
     .776    .776  .129E+04  .713E+03*      .407      .221     52.69      .172
     .847    .847  .146E+04  .886E+03*      .485      .232     50.32      .196
     .918    .918  .166E+04  .108E+04*      .572      .242     48.22      .222
     .988    .988  .186E+04  .131E+04*      .667      .252     46.35      .249
    1.059   1.059  .207E+04  .156E+04*      .771      .261     44.66      .277
    1.129   1.129  .229E+04  .185E+04*      .884      .271     43.13      .306
    1.200   1.200  .252E+04  .216E+04*     1.006      .280     41.73      .335
    1.300   1.300  .636E+04  .590E+04*     1.392      .153     76.12      .199
    1.400   1.400  .172E+05  .172E+05*     2.456      .100    116.67      .140

  X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
  S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
  (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                                    <---- hydrograph ---->   <-pipe / channel->
                                  AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                                  (ha)    (cms)   (hrs)   (mm)       (m)      (m/s)
   INFLOW : ID= 1:EXT1         42.26    1.549    7.08 42.489     1.315       .142
   OUTFLOW: ID= 2:002000       42.26    1.225    8.25 42.489     1.256       .191

------------------------------------------------------------------------------
050:0005------------------------------------------------------------------------
----------------------
| DESIGN NASHYD      |   Area     (ha)=   22.52   Curve Number    (CN)=82.00
| 01:EXT2   DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=   1.270

     Unit Hyd Qpeak  (cms)=     .677

     PEAK FLOW       (cms)=     .960 (i)
     TIME TO PEAK    (hrs)=    7.234
     RUNOFF VOLUME    (mm)=   53.785
     TOTAL RAINFALL   (mm)=   89.400
     RUNOFF COEFFICIENT   =     .602

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

------------------------------------------------------------------------------
050:0006------------------------------------------------------------------------
----------------------
| DESIGN NASHYD      |   Area     (ha)=   42.81   Curve Number    (CN)=82.00
| 03:EXT3   DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=   1.110
```

```
     Unit Hyd Qpeak  (cms)=    1.473

     PEAK FLOW       (cms)=    2.020 (i)
     TIME TO PEAK    (hrs)=    7.051
     RUNOFF VOLUME    (mm)=   53.785
     TOTAL RAINFALL   (mm)=   89.400
     RUNOFF COEFFICIENT   =     .602

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

------------------------------------------------------------------------------
050:0007------------------------------------------------------------------------
*#############################################################################
*# Lappan Drain - Total Flow at Pilette Road
*#############################################################################
----------------------
| ADD HYD (     2010) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                   (ha)     (cms)   (hrs)   (mm)    (cms)
                    ID1 01:EXT2          22.52     .960    7.23  53.78    .000
                   +ID2 02:      2000    42.26    1.225    8.25  42.49    .000
                   +ID3 03:EXT3          42.81    2.020    7.05  53.78    .000
                    ==========================================================
                    SUM 04:      2010   107.59    3.916    7.30  49.35    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
050:0008------------------------------------------------------------------------
--------------------
| ROUTE CHANNEL    |     Routing time step (min) =  1.00
|  ID> 04:002010   |     Number of SEGMENTS =  3
| OUT< 01:002020   |     Slopes (%), CHANNEL= .1700  FLOODPLAIN= .2000
--------------------                LENGTH =  350.00    (m)

              <------ DATA FOR SECTION (   2.0) ------>
              Distance      Elevation       Manning
                  .00          2.00          .2000
                100.00          1.80     .2000 / .0850  Main Channel
                102.75           .00          .0850      Main Channel
                104.25           .00          .0850      Main Channel
                107.00          1.80     .0850 / .1400  Main Channel
                207.00          2.00          .1400

   <---------------------------- TRAVEL TIME TABLE ---------------------------->
    DEPTH     ELEV    X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME   D x V
      (m)      (m)    (cu.m.)   (cu.m.)     (cms)     (m/s)     (min)    (m2/s)
     .100     .100  .578E+02   .486E+01      .016      .096     60.50     .010
     .200     .200  .126E+03   .212E+02      .052      .144     40.48     .029
     .300     .300  .206E+03   .518E+02      .106      .180     32.38     .054
     .400     .400  .296E+03   .993E+02      .177      .210     27.75     .084
     .500     .500  .396E+03   .166E+03      .268      .236     24.67     .118
     .600     .600  .508E+03   .256E+03*     .377      .260     22.42     .156
     .700     .700  .630E+03   .370E+03*     .507      .282     20.68     .197
     .800     .800  .762E+03   .512E+03*     .659      .303     19.28     .242
     .900     .900  .906E+03   .685E+03*     .833      .322     18.12     .290
    1.000    1.000  .106E+04   .891E+03*    1.031      .340     17.14     .340
    1.100    1.100  .122E+04   .113E+04*    1.253      .358     16.29     .394
    1.200    1.200  .140E+04   .141E+04*    1.500      .375     15.55     .450
    1.300    1.300  .159E+04   .173E+04*    1.775      .392     14.89     .509
    1.400    1.400  .178E+04   .210E+04*    2.077      .408     14.31     .571
    1.500    1.500  .199E+04   .251E+04*    2.407      .423     13.78     .635
    1.600    1.600  .221E+04   .297E+04*    2.768      .439     13.30     .702
    1.700    1.700  .244E+04   .348E+04*    3.158      .453     12.87     .771
    1.800    1.800  .268E+04   .405E+04*    3.580      .468     12.46     .842
    2.000    2.000  .102E+05   .171E+05*    5.907      .203     28.69     .407

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
 (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                                <---- hydrograph ---->   <-pipe / channel->
                             AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                             (ha)    (cms)   (hrs)   (mm)      (m)       (m/s)
   INFLOW : ID= 4:002010    107.59   3.916    7.30 49.348     1.829      .394
   OUTFLOW: ID= 1:002020    107.59   3.785    7.75 49.348     1.818      .420

------------------------------------------------------------------------------
050:0009------------------------------------------------------------------------
----------------------
| DESIGN NASHYD      |   Area     (ha)=   10.43   Curve Number   (CN)=72.00
| 02:202     DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .970

     Unit Hyd Qpeak  (cms)=     .411

     PEAK FLOW       (cms)=     .411 (i)
     TIME TO PEAK    (hrs)=    6.918
     RUNOFF VOLUME    (mm)=   41.389
     TOTAL RAINFALL   (mm)=   89.400
     RUNOFF COEFFICIENT   =     .463

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

------------------------------------------------------------------------------
050:0010------------------------------------------------------------------------
----------------------
| ADD HYD (     2030) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                   (ha)     (cms)   (hrs)   (mm)    (cms)
                    ID1 01:      2020   107.59    3.785    7.75  49.35    .000
                   +ID2 02:202           10.43     .411    6.92  41.39    .000
                    ==========================================================
                    SUM 03:      2030   118.02    4.104    7.65  48.64    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
050:0011------------------------------------------------------------------------
--------------------
| ROUTE CHANNEL    |     Routing time step (min) =  1.00
|  ID> 03:002030   |     Number of SEGMENTS =  3
| OUT< 01:002040   |     Slopes (%), CHANNEL= .1700  FLOODPLAIN= .2000
--------------------                LENGTH =  450.00    (m)

              <------ DATA FOR SECTION (   3.0) ------>
              Distance      Elevation       Manning
                  .00          2.00          .2000
                100.00          1.80     .2000 / .0850  Main Channel
                102.75           .00          .0850      Main Channel
                104.25           .00          .0850      Main Channel
                107.00          1.80     .0850 / .1400  Main Channel
                207.00          2.00          .1400

   <---------------------------- TRAVEL TIME TABLE ---------------------------->
    DEPTH     ELEV    X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME   D x V
      (m)      (m)    (cu.m.)   (cu.m.)     (cms)     (m/s)     (min)    (m2/s)
     .100     .100  .744E+02   .486E+01      .016      .096     77.79     .010
     .200     .200  .163E+03   .212E+02      .052      .144     52.05     .029
     .300     .300  .264E+03   .518E+02      .106      .180     41.63     .054
     .400     .400  .380E+03   .993E+02      .177      .210     35.68     .084
     .500     .500  .509E+03   .166E+03      .268      .236     31.72     .118
     .600     .600  .653E+03   .256E+03      .377      .260     28.82     .156
     .700     .700  .809E+03   .370E+03      .507      .282     26.59     .197
     .800     .800  .980E+03   .512E+03*     .659      .303     24.79     .242
     .900     .900  .116E+04   .685E+03*     .833      .322     23.30     .290
    1.000    1.000  .136E+04   .891E+03*    1.031      .340     22.04     .340
    1.100    1.100  .157E+04   .113E+04*    1.253      .358     20.95     .394
    1.200    1.200  .180E+04   .141E+04*    1.500      .375     19.99     .450
    1.300    1.300  .204E+04   .173E+04*    1.775      .392     19.15     .509
    1.400    1.400  .229E+04   .210E+04*    2.077      .408     18.40     .571
    1.500    1.500  .256E+04   .251E+04*    2.407      .423     17.72     .635
    1.600    1.600  .284E+04   .297E+04*    2.768      .439     17.10     .702
    1.700    1.700  .313E+04   .348E+04*    3.158      .453     16.54     .771
    1.800    1.800  .344E+04   .405E+04*    3.580      .468     16.03     .842
    2.000    2.000  .131E+05   .171E+05*    5.907      .203     36.88     .407

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
 (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                                <---- hydrograph ---->   <-pipe / channel->
                             AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                             (ha)    (cms)   (hrs)   (mm)      (m)       (m/s)
   INFLOW : ID= 3:002030    118.02   4.104    7.65 48.644     1.845      .362
   OUTFLOW: ID= 1:002040    118.02   3.957    8.22 48.644     1.830      .392

------------------------------------------------------------------------------
050:0012------------------------------------------------------------------------
----------------------
| DESIGN NASHYD      |   Area     (ha)=   15.29   Curve Number   (CN)=82.00
| 02:201     DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=   1.290

     Unit Hyd Qpeak  (cms)=     .453

     PEAK FLOW       (cms)=     .644 (i)
     TIME TO PEAK    (hrs)=    7.251
     RUNOFF VOLUME    (mm)=   53.784
     TOTAL RAINFALL   (mm)=   89.400
     RUNOFF COEFFICIENT   =     .602

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

------------------------------------------------------------------------------
050:0013------------------------------------------------------------------------
----------------------
| DESIGN NASHYD      |   Area     (ha)=   10.88   Curve Number   (CN)=72.00
| 03:204     DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .850

     Unit Hyd Qpeak  (cms)=     .489

     PEAK FLOW       (cms)=     .472 (i)
     TIME TO PEAK    (hrs)=    6.784
     RUNOFF VOLUME    (mm)=   41.389
     TOTAL RAINFALL   (mm)=   89.400
     RUNOFF COEFFICIENT   =     .463

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

------------------------------------------------------------------------------
050:0014------------------------------------------------------------------------
----------------------
| ADD HYD (     2050) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                   (ha)     (cms)   (hrs)   (mm)    (cms)
                    ID1 01:      2040   118.02    3.957    8.22  48.64    .000
                   +ID2 02:201           15.29     .644    7.25  53.78    .000
                   +ID3 03:204           10.88     .472    6.78  41.39    .000
                    ==========================================================
                    SUM 04:      2050   144.19    4.704    7.98  48.64    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
050:0015------------------------------------------------------------------------
--------------------
| ROUTE CHANNEL    |     Routing time step (min) =  1.00
|  IN> 04:002050   |     Number of SEGMENTS =  3
| OUT< 01:002060   |     Slopes (%), CHANNEL= .1700  FLOODPLAIN= .2000
--------------------                LENGTH =  200.00    (m)

              <------ DATA FOR SECTION (   4.0) ------>
              Distance      Elevation       Manning
                  .00          2.00          .1400
                100.00          1.80     .1400 / .0850  Main Channel
                102.75           .00          .0850      Main Channel
                104.25           .00          .0850      Main Channel
                107.00          1.80     .0850 / .1400  Main Channel
                207.00          2.00          .1400

   <---------------------------- TRAVEL TIME TABLE ---------------------------->
    DEPTH     ELEV    X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME   D x V
      (m)      (m)    (cu.m.)   (cu.m.)     (cms)     (m/s)     (min)    (m2/s)
     .100     .100  .331E+02   .486E+01      .016      .096     34.57     .010
     .200     .200  .722E+02   .212E+02      .052      .144     23.13     .029
     .300     .300  .118E+03   .518E+02      .106      .180     18.50     .054
     .400     .400  .169E+03   .993E+02*     .177      .210     15.86     .084
     .500     .500  .226E+03   .166E+03*     .268      .236     14.10     .118
     .600     .600  .290E+03   .256E+03*     .377      .260     12.81     .156
     .700     .700  .360E+03   .370E+03*     .507      .282     11.82     .197
     .800     .800  .436E+03   .512E+03*     .659      .303     11.02     .242
     .900     .900  .518E+03   .685E+03*     .833      .322     10.36     .290
    1.000    1.000  .606E+03   .891E+03*    1.031      .340      9.79     .340
    1.100    1.100  .700E+03   .113E+04*    1.253      .358      9.31     .394
    1.200    1.200  .800E+03   .141E+04*    1.500      .375      8.89     .450
    1.300    1.300  .906E+03   .173E+04*    1.775      .392      8.51     .509
    1.400    1.400  .102E+04   .210E+04*    2.077      .408      8.18     .571
    1.500    1.500  .114E+04   .251E+04*    2.407      .423      7.87     .635
    1.600    1.600  .126E+04   .297E+04*    2.768      .439      7.60     .702
    1.700    1.700  .139E+04   .348E+04*    3.158      .453      7.35     .771
    1.800    1.800  .153E+04   .405E+04*    3.580      .468      7.12     .842
    2.000    2.000  .581E+04   .171E+05*    6.114      .210     15.84     .421

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
 (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                                <---- hydrograph ---->   <-pipe / channel->
                             AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                             (ha)    (cms)   (hrs)   (mm)      (m)       (m/s)
   INFLOW : ID= 4:002050    144.19   4.704    7.98 48.642     1.889      .303
   OUTFLOW: ID= 1:002060    144.19   4.640    8.33 48.642     1.883      .310

------------------------------------------------------------------------------
050:0016------------------------------------------------------------------------
----------------------
| DESIGN NASHYD      |   Area     (ha)=    4.78   Curve Number   (CN)=72.00
| 02:206     DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .890

     Unit Hyd Qpeak  (cms)=     .205

     PEAK FLOW       (cms)=     .200 (i)
     TIME TO PEAK    (hrs)=    6.834
     RUNOFF VOLUME    (mm)=   41.389
     TOTAL RAINFALL   (mm)=   89.400
     RUNOFF COEFFICIENT   =     .463

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

------------------------------------------------------------------------------
050:0017------------------------------------------------------------------------
----------------------
| ADD HYD (     2070) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                   (ha)     (cms)   (hrs)   (mm)    (cms)
                    ID1 01:      2060   144.19    4.640    8.33  48.64    .000
                   +ID2 02:206            4.78     .200    6.83  41.39    .000
                    ==========================================================
                    SUM 03:      2070   148.97    4.729    8.33  48.41    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
050:0018------------------------------------------------------------------------
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--------------------
| ROUTE CHANNEL    |     Routing time step (min) =  1.00
|  IN> 03:002070   |     Number of SEGMENTS =  3
| OUT< 01:002080   |     Slopes (%), CHANNEL= .1200  FLOODPLAIN= .2000
--------------------                LENGTH =  500.00    (m)

             <------ DATA FOR SECTION (   5.0) ------>
             Distance      Elevation       Manning
                .00           2.20          .1400
              200.00           1.80     .1400 / .0850  Main Channel
              202.75            .00          .0850      Main Channel
              204.25            .00          .0850      Main Channel
              207.00           1.80     .0850 / .1400  Main Channel
              407.00           2.20          .1400

  <---------------------------- TRAVEL TIME TABLE ----------------------------->
   DEPTH     ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME    D x V
     (m)      (m)   (cu.m.)   (cu.m.)      (cms)     (m/s)      (min)    (m2/s)
    .112     .112  .940E+02  .882E+01       .016      .087      95.91     .010
    .225     .225  .207E+03  .389E+02       .054      .129      64.45     .029
    .337     .337  .340E+03  .957E+02       .110      .161      51.67     .054
    .450     .450  .492E+03  .185E+03       .185      .188      44.34     .085
    .562     .562  .664E+03  .311E+03       .280      .211      39.43     .119
    .675     .675  .854E+03  .481E+03*      .397      .233      35.84     .157
    .788     .788  .106E+04  .698E+03*      .537      .252      33.06     .199
    .900     .900  .129E+04  .970E+03*      .700      .270      30.81     .243
   1.013    1.013  .154E+04  .130E+04*      .888      .288      28.95     .291
   1.125    1.125  .181E+04  .170E+04*     1.102      .304      27.37     .343
   1.238    1.238  .210E+04  .216E+04*     1.344      .320      26.01     .397
   1.350    1.350  .240E+04  .271E+04*     1.615      .336      24.81     .453
   1.463    1.463  .273E+04  .333E+04*     1.916      .351      23.76     .513
   1.575    1.575  .308E+04  .404E+04*     2.247      .365      22.82     .575
   1.688    1.688  .344E+04  .484E+04*     2.611      .379      21.97     .640
   1.800    1.800  .382E+04  .574E+04*     3.008      .393      21.19     .708
   1.933    1.933  .874E+04  .141E+05*     4.111      .235      35.42     .455
   2.067    2.067  .225E+05  .388E+05*     7.293      .162      51.50     .334
   2.200    2.200  .452E+05  .829E+05*    13.799      .153      54.62     .336

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
 (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                                <---- hydrograph ---->   <-pipe / channel->
                             AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                              (ha)    (cms)   (hrs)   (mm)     (m)       (m/s)
   INFLOW : ID= 3:002070    148.97    4.729    8.33 48.409     1.959      .216
   OUTFLOW: ID= 1:002080    148.97    4.317    9.02 48.409     1.942      .228


--------------------------------------------------------------------------------
050:0019----------------------------------------------------------------------
--------------------
| DESIGN NASHYD    |   Area     (ha)=   14.96   Curve Number    (CN)=72.00
| 02:207    DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   1.330

     Unit Hyd Qpeak  (cms)=     .430

     PEAK FLOW       (cms)=     .465 (i)
     TIME TO PEAK    (hrs)=    7.334
     RUNOFF VOLUME    (mm)=   41.389
     TOTAL RAINFALL   (mm)=   89.400
     RUNOFF COEFFICIENT   =     .463

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

--------------------------------------------------------------------------------
050:0020----------------------------------------------------------------------
--------------------
| DESIGN NASHYD    |   Area     (ha)=    7.92   Curve Number    (CN)=72.00
| 03:208    DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   1.110

     Unit Hyd Qpeak  (cms)=     .273

     PEAK FLOW       (cms)=     .282 (i)
     TIME TO PEAK    (hrs)=    7.084
     RUNOFF VOLUME    (mm)=   41.389
     TOTAL RAINFALL   (mm)=   89.400
     RUNOFF COEFFICIENT   =     .463

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

--------------------------------------------------------------------------------
050:0021----------------------------------------------------------------------
*#############################################################################
*# Lappan Drain - Total Flow at Jefferson Boulevard
*#############################################################################
----------------------
| ADD HYD (      2090) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
                    ID1 01:      2080   148.97    4.317    9.02  48.41    .000
                   +ID2 02:207           14.96     .465    7.33  41.39    .000
                   +ID3 03:208            7.92     .282    7.08  41.39    .000
                    ==========================================================
                    SUM 04:      2090   171.85    4.715    8.78  47.47    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
050:0022----------------------------------------------------------------------
----------------------
| ROUTE CHANNEL    |     Routing time step (min) =  1.00
|  IN> 04:002090   |     Number of SEGMENTS =  3
| OUT< 01:002100   |     Slopes (%), CHANNEL= .1200  FLOODPLAIN= .2000
----------------------                LENGTH =  130.00    (m)

             <------ DATA FOR SECTION (   6.0) ------>
             Distance      Elevation       Manning
                .00           2.20          .1400
              200.00           1.80     .1400 / .0850  Main Channel
              202.75            .00          .0850      Main Channel
              204.25            .00          .0850      Main Channel
              207.00           1.80     .0850 / .2000  Main Channel
              407.00           2.20          .2000

  <---------------------------- TRAVEL TIME TABLE ----------------------------->
   DEPTH     ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME    D x V
     (m)      (m)   (cu.m.)   (cu.m.)      (cms)     (m/s)      (min)    (m2/s)
    .112     .112  .245E+02  .882E+01       .016      .087      24.94     .010
    .225     .225  .539E+02  .389E+02*      .054      .129      16.76     .029
    .337     .337  .884E+02  .957E+02*      .110      .161      13.43     .054
    .450     .450  .128E+03  .185E+03*      .185      .188      11.53     .085
    .562     .562  .173E+03  .311E+03*      .280      .211      10.25     .119
    .675     .675  .222E+03  .481E+03*      .397      .233       9.32     .157
    .788     .788  .277E+03  .698E+03*      .537      .252       8.59     .199
    .900     .900  .336E+03  .970E+03*      .700      .270       8.01     .243
   1.013    1.013  .401E+03  .130E+04*      .888      .288       7.53     .291
   1.125    1.125  .471E+03  .170E+04*     1.102      .304       7.12     .343
   1.238    1.238  .545E+03  .216E+04*     1.344      .320       6.76     .397
   1.350    1.350  .625E+03  .271E+04*     1.615      .336       6.45     .453
   1.463    1.463  .710E+03  .333E+04*     1.916      .351       6.18     .513
   1.575    1.575  .800E+03  .404E+04*     2.247      .365       5.93     .575
   1.688    1.688  .895E+03  .484E+04*     2.611      .379       5.71     .640
   1.800    1.800  .994E+03  .574E+04*     3.008      .393       5.51     .708
   1.933    1.933  .227E+04  .141E+05*     4.041      .231       9.37     .447
   2.067    2.067  .586E+04  .388E+05*     6.848      .152      14.26     .314
   2.200    2.200  .118E+05  .829E+05*    12.488      .138      15.69     .304

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
 (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                                <---- hydrograph ---->   <-pipe / channel->
                             AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                              (ha)    (cms)   (hrs)   (mm)     (m)       (m/s)
   INFLOW : ID= 4:002090    171.85    4.715    8.78 47.475     1.965      .205
   OUTFLOW: ID= 1:002100    171.85    4.675    9.05 47.475     1.962      .208


--------------------------------------------------------------------------------
050:0023----------------------------------------------------------------------
--------------------
| DESIGN NASHYD    |   Area     (ha)=    4.95   Curve Number    (CN)=73.00
| 02:212    DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=    .480

     Unit Hyd Qpeak  (cms)=     .394

     PEAK FLOW       (cms)=     .325 (i)
     TIME TO PEAK    (hrs)=    6.351
     RUNOFF VOLUME    (mm)=   42.489
     TOTAL RAINFALL   (mm)=   89.400
     RUNOFF COEFFICIENT   =     .475

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

--------------------------------------------------------------------------------
050:0024----------------------------------------------------------------------
----------------------
| ADD HYD (      2110) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
                    ID1 01:      2100   171.85    4.675    9.05  47.47    .000
                   +ID2 02:212           4.95     .325    6.35  42.49    .000
                    ==========================================================
                    SUM 03:      2110   176.80    4.713    9.05  47.33    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
050:0025----------------------------------------------------------------------
----------------------
| ROUTE CHANNEL    |     Routing time step (min) =  1.00
|  IN> 03:002110   |     Number of SEGMENTS =  3
| OUT< 01:002120   |     Slopes (%), CHANNEL= .1200  FLOODPLAIN= .2000
----------------------                LENGTH =  330.00    (m)

             <------ DATA FOR SECTION (   7.0) ------>
             Distance      Elevation       Manning
                .00           2.20          .1400
              200.00           1.80     .1400 / .0850  Main Channel
              202.75            .00          .0850      Main Channel
              204.25            .00          .0850      Main Channel
              207.00           1.80     .0850 / .2000  Main Channel
              407.00           2.20          .2000

  <---------------------------- TRAVEL TIME TABLE ----------------------------->
   DEPTH     ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME    D x V
     (m)      (m)   (cu.m.)   (cu.m.)      (cms)     (m/s)      (min)    (m2/s)
    .112     .112  .621E+02  .882E+01       .016      .087      63.30     .010
    .225     .225  .137E+03  .389E+02       .054      .129      42.54     .029
    .337     .337  .224E+03  .957E+02       .110      .161      34.10     .054
    .450     .450  .325E+03  .185E+03*      .185      .188      29.26     .085
    .562     .562  .438E+03  .311E+03*      .280      .211      26.02     .119
    .675     .675  .564E+03  .481E+03*      .397      .233      23.65     .157
    .788     .788  .702E+03  .698E+03*      .537      .252      21.82     .199
    .900     .900  .854E+03  .970E+03*      .700      .270      20.34     .243
   1.013    1.013  .102E+04  .130E+04*      .888      .288      19.11     .291
   1.125    1.125  .119E+04  .170E+04*     1.102      .304      18.06     .343
   1.238    1.238  .138E+04  .216E+04*     1.344      .320      17.16     .397
   1.350    1.350  .159E+04  .271E+04*     1.615      .336      16.38     .453
   1.463    1.463  .180E+04  .333E+04*     1.916      .351      15.68     .513
   1.575    1.575  .203E+04  .404E+04*     2.247      .365      15.06     .575
   1.688    1.688  .227E+04  .484E+04*     2.611      .379      14.50     .640
   1.800    1.800  .252E+04  .574E+04*     3.008      .393      13.99     .708
   1.933    1.933  .577E+04  .141E+05*     4.041      .231      23.78     .447
   2.067    2.067  .149E+05  .388E+05*     6.848      .152      36.20     .314
   2.200    2.200  .298E+05  .829E+05*    12.488      .138      39.84     .304

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
 (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                                <---- hydrograph ---->   <-pipe / channel->
                             AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                              (ha)    (cms)   (hrs)   (mm)     (m)       (m/s)
   INFLOW : ID= 3:002110    176.80    4.713    9.05 47.335     1.965      .206
   OUTFLOW: ID= 1:002120    176.80    4.506    9.67 47.335     1.955      .213


--------------------------------------------------------------------------------
050:0026----------------------------------------------------------------------
--------------------
| DESIGN NASHYD    |   Area     (ha)=    6.60   Curve Number    (CN)=82.00
| 02:EXT8   DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=    .820

     Unit Hyd Qpeak  (cms)=     .307

     PEAK FLOW       (cms)=     .389 (i)
     TIME TO PEAK    (hrs)=    6.734
     RUNOFF VOLUME    (mm)=   53.784
     TOTAL RAINFALL   (mm)=   89.400
     RUNOFF COEFFICIENT   =     .602

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

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050:0027----------------------------------------------------------------------
*#############################################################################
*# Lappan Drain - Total Flow at McGill Drain
*#############################################################################
----------------------
| ADD HYD (      2130) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
                    ID1 01:      2120   176.80    4.506    9.67  47.33    .000
                   +ID2 02:EXT8           6.60     .389    6.73  53.78    .000
                    ==========================================================
                    SUM 10:      2130   183.40    4.572    9.65  47.57    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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050:0028----------------------------------------------------------------------
*#############################################################################
*# McGILL DRAIN
*#############################################################################
----------------------
| DESIGN NASHYD    |   Area     (ha)=   12.75   Curve Number    (CN)=72.00
| 01:203    DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=    .970

     Unit Hyd Qpeak  (cms)=     .502

     PEAK FLOW       (cms)=     .502 (i)
     TIME TO PEAK    (hrs)=    6.918
     RUNOFF VOLUME    (mm)=   41.389
     TOTAL RAINFALL   (mm)=   89.400
     RUNOFF COEFFICIENT   =     .463

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

--------------------------------------------------------------------------------
050:0029----------------------------------------------------------------------
--------------------
| ROUTE CHANNEL    |     Routing time step (min) =  1.00
```

```
|  IN> 01:203      |     Number of SEGMENTS =  3
| OUT< 02:002140   |     Slopes (%), CHANNEL= .3500  FLOODPLAIN= .2000
-------------------                    LENGTH =  500.00    (m)

                <------ DATA FOR SECTION (   8.0) ------>
                Distance      Elevation       Manning
                    .00          1.40          .1400
                  200.00         1.00     .1400 / .1000  Main Channel
                  201.50          .00          .1000      Main Channel
                  203.50          .00          .1000      Main Channel
                  205.00         1.00     .1000 / .2000  Main Channel
                  405.00         1.40          .2000

   <---------------------------- TRAVEL TIME TABLE ---------------------------->
    DEPTH    ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME   D x V
      (m)     (m)   (cu.m.)   (cu.m.)     (cms)     (m/s)     (min)   (m2/s)
     .071    .071  .753E+02  .154E+01      .015      .097     85.67     .007
     .143    .143  .158E+03  .646E+01      .047      .149     56.11     .021
     .214    .214  .249E+03  .152E+02      .094      .188     44.28     .040
     .286    .286  .347E+03  .283E+02      .154      .221     37.63     .063
     .357    .357  .453E+03  .462E+02      .227      .250     33.27     .089
     .429    .429  .566E+03  .693E+02      .313      .276     30.14     .118
     .500    .500  .687E+03  .982E+02      .413      .300     27.75     .150
     .571    .571  .816E+03  .133E+03      .526      .322     25.85     .184
     .643    .643  .953E+03  .175E+03      .654      .343     24.30     .220
     .714    .714  .110E+04  .224E+03      .795      .362     22.99     .259
     .786    .786  .125E+04  .280E+03      .952      .381     21.87     .299
     .857    .857  .141E+04  .345E+03     1.123      .399     20.90     .342
     .929    .929  .158E+04  .418E+03     1.310      .416     20.04     .386
    1.000   1.000  .175E+04  .500E+03     1.513      .432     19.28     .432
    1.080   1.080  .355E+04  .110E+04     1.913      .269     30.92     .291
    1.160   1.160  .855E+04  .283E+04     2.777      .162     51.31     .188
    1.240   1.240  .167E+05  .593E+04     4.375      .131     63.81     .162
    1.320   1.320  .281E+05  .106E+05     6.931      .123     67.70     .162
    1.400   1.400  .427E+05  .171E+05    10.642      .124     66.95     .174

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.

                                <---- hydrograph ---->   <-pipe / channel->
                           AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                           (ha)    (cms)   (hrs)   (mm)       (m)      (m/s)
   INFLOW : ID= 1:203     12.75     .502    6.92 41.389      .556      .317
   OUTFLOW: ID= 2:002140  12.75     .448    7.28 41.389      .522      .307



--------------------------------------------------------------------------------
050:0030----------------------------------------------------------------------
--------------------
| DESIGN NASHYD      |   Area     (ha)=   12.89   Curve Number    (CN)=72.00
| 01:205    DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
---------------------  U.H. Tp(hrs)=    .860

     Unit Hyd Qpeak  (cms)=     .572

     PEAK FLOW       (cms)=     .554 (i)
     TIME TO PEAK    (hrs)=    6.801
     RUNOFF VOLUME    (mm)=   41.389
     TOTAL RAINFALL   (mm)=   89.400
     RUNOFF COEFFICIENT   =    .463

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

--------------------------------------------------------------------------------
050:0031----------------------------------------------------------------------
------------------------
| ADD HYD (      2150) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
                        ID1 01:205          12.89     .554    6.80  41.39    .000
                       +ID2 02:      2140   12.75     .448    7.28  41.39    .000
                        ========================================================
                        SUM 03:       2150   25.64     .961    7.02  41.39    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
050:0032----------------------------------------------------------------------
--------------------
| ROUTE CHANNEL      |     Routing time step (min) =  1.00
|  IN> 03:002150     |     Number of SEGMENTS =  3
| OUT< 01:002160     |     Slopes (%), CHANNEL= .0500  FLOODPLAIN= .2000
--------------------                    LENGTH =  360.00    (m)

                <------ DATA FOR SECTION (   9.0) ------>
                Distance      Elevation       Manning
                    .00          1.40          .1400
                  200.00         1.00     .1400 / .1000  Main Channel
                  201.50          .00          .1000      Main Channel
                  203.50          .00          .1000      Main Channel
                  205.00         1.00     .1000 / .2000  Main Channel
                  405.00         1.40          .2000

   <---------------------------- TRAVEL TIME TABLE ---------------------------->
    DEPTH    ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME   D x V
      (m)     (m)   (cu.m.)   (cu.m.)     (cms)     (m/s)     (min)   (m2/s)
     .071    .071  .542E+02  .108E+02      .006      .037    163.19     .003
     .143    .143  .114E+03  .452E+02      .018      .056    106.89     .008
     .214    .214  .179E+03  .107E+03*     .035      .071     84.35     .015
     .286    .286  .250E+03  .198E+03*     .058      .084     71.69     .024
     .357    .357  .326E+03  .323E+03*     .086      .095     63.38     .034
     .429    .429  .408E+03  .485E+03*     .118      .105     57.41     .045
     .500    .500  .495E+03  .687E+03*     .156      .113     52.87     .057
     .571    .571  .588E+03  .933E+03*     .199      .122     49.25     .070
     .643    .643  .686E+03  .123E+04*     .247      .130     46.29     .083
     .714    .714  .790E+03  .157E+04*     .301      .137     43.80     .098
     .786    .786  .899E+03  .196E+04*     .360      .144     41.67     .113
     .857    .857  .101E+04  .241E+04*     .424      .151     39.81     .129
     .929    .929  .113E+04  .293E+04*     .495      .157     38.18     .146
    1.000   1.000  .126E+04  .350E+04*     .572      .163     36.73     .163
    1.080   1.080  .256E+04  .767E+04*     .786      .111     54.17     .120
    1.160   1.160  .616E+04  .198E+05*    1.451      .085     70.71     .098
    1.240   1.240  .121E+05  .415E+05*    2.837      .085     70.85     .105
    1.320   1.320  .203E+05  .743E+05*    5.168      .092     65.36     .121
    1.400   1.400  .308E+05  .120E+06*    8.644      .101     59.35     .142

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
 (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                                <---- hydrograph ---->   <-pipe / channel->
                           AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                           (ha)    (cms)   (hrs)   (mm)       (m)      (m/s)
   INFLOW : ID= 3:002150  25.64     .961    7.02 41.389     1.101      .103
   OUTFLOW: ID= 1:002160  25.64     .709    7.75 41.389     1.052      .125


--------------------------------------------------------------------------------
050:0033----------------------------------------------------------------------
--------------------
| DESIGN NASHYD      |   Area     (ha)=   15.50   Curve Number    (CN)=72.00
| 02:209    DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
---------------------  U.H. Tp(hrs)=    .970

     Unit Hyd Qpeak  (cms)=     .610

     PEAK FLOW       (cms)=     .610 (i)
     TIME TO PEAK    (hrs)=    6.918
     RUNOFF VOLUME    (mm)=   41.389
     TOTAL RAINFALL   (mm)=   89.400
     RUNOFF COEFFICIENT   =    .463

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

--------------------------------------------------------------------------------
050:0034----------------------------------------------------------------------
------------------------
| ADD HYD (      2170) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
                        ID1 01:      2160   25.64     .709    7.75  41.39    .000
                       +ID2 02:209          15.50     .610    6.92  41.39    .000
                        ========================================================
                        SUM 03:       2170   41.14    1.232    7.22  41.39    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
050:0035----------------------------------------------------------------------
--------------------
| ROUTE CHANNEL      |     Routing time step (min) =  1.00
|  IN> 03:002170     |     Number of SEGMENTS =  3
| OUT< 01:002180     |     Slopes (%), CHANNEL= .1500  FLOODPLAIN= .2000
--------------------                    LENGTH =  250.00    (m)

                <------ DATA FOR SECTION (  10.0) ------>
                Distance      Elevation       Manning
                    .00          1.40          .2000
                  200.00         1.00     .2000 / .1000  Main Channel
                  201.50          .00          .1000      Main Channel
                  203.50          .00          .1000      Main Channel
                  205.00         1.00     .1000 / .2000  Main Channel
                  405.00         1.40          .2000

   <---------------------------- TRAVEL TIME TABLE ---------------------------->
    DEPTH    ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME   D x V
      (m)     (m)   (cu.m.)   (cu.m.)     (cms)     (m/s)     (min)   (m2/s)
     .071    .071  .376E+02  .358E+01      .010      .064     65.43     .005
     .143    .143  .791E+02  .151E+02      .031      .097     42.85     .014
     .214    .214  .124E+03  .355E+02      .061      .123     33.82     .026
     .286    .286  .173E+03  .661E+02      .101      .145     28.74     .041
     .357    .357  .226E+03  .108E+03      .148      .164     25.41     .059
     .429    .429  .283E+03  .162E+03*     .205      .181     23.02     .078
     .500    .500  .344E+03  .229E+03*     .270      .197     21.20     .098
     .571    .571  .408E+03  .311E+03*     .344      .211     19.75     .121
     .643    .643  .476E+03  .408E+03*     .428      .225     18.56     .144
     .714    .714  .548E+03  .522E+03*     .521      .237     17.56     .169
     .786    .786  .624E+03  .654E+03*     .623      .249     16.71     .196
     .857    .857  .704E+03  .805E+03*     .735      .261     15.96     .224
     .929    .929  .788E+03  .975E+03*     .858      .272     15.31     .253
    1.000   1.000  .875E+03  .117E+04*     .990      .283     14.73     .283
    1.080   1.080  .177E+04  .256E+04*    1.270      .179     23.30     .193
    1.160   1.160  .427E+04  .661E+04*    1.927      .113     36.97     .131
    1.240   1.240  .837E+04  .138E+05*    3.185      .095     43.82     .118
    1.320   1.320  .141E+05  .248E+05*    5.229      .093     44.86     .123
    1.400   1.400  .214E+05  .399E+05*    8.222      .096     43.33     .135

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
 (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                                <---- hydrograph ---->   <-pipe / channel->
                           AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                           (ha)    (cms)   (hrs)   (mm)       (m)      (m/s)
   INFLOW : ID= 3:002170  41.14    1.232    7.22 41.389     1.069      .188
   OUTFLOW: ID= 1:002180  41.14    1.151    7.85 41.389     1.046      .212


--------------------------------------------------------------------------------
050:0036----------------------------------------------------------------------
--------------------
| DESIGN NASHYD      |   Area     (ha)=    7.27   Curve Number    (CN)=82.00
| 02:210    DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
---------------------  U.H. Tp(hrs)=    .820

     Unit Hyd Qpeak  (cms)=     .339

     PEAK FLOW       (cms)=     .428 (i)
     TIME TO PEAK    (hrs)=    6.734
     RUNOFF VOLUME    (mm)=   53.784
     TOTAL RAINFALL   (mm)=   89.400
     RUNOFF COEFFICIENT   =    .602

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

--------------------------------------------------------------------------------
050:0037----------------------------------------------------------------------
--------------------
| DESIGN NASHYD      |   Area     (ha)=   21.08   Curve Number    (CN)=80.00
| 03:EXT4   DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
---------------------  U.H. Tp(hrs)=   1.830

     Unit Hyd Qpeak  (cms)=     .440

     PEAK FLOW       (cms)=     .642 (i)
     TIME TO PEAK    (hrs)=    7.901
     RUNOFF VOLUME    (mm)=   51.033
     TOTAL RAINFALL   (mm)=   89.400
     RUNOFF COEFFICIENT   =    .571

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

--------------------------------------------------------------------------------
050:0038----------------------------------------------------------------------
*#**************************************************************************
*# McGill Drain - Total Flow at Jefferson Boulevard
*#**************************************************************************
------------------------
| ADD HYD (      2190) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
                        ID1 01:      2180   41.14    1.151    7.85  41.39    .000
                       +ID2 02:210          7.27     .428    6.73  53.78    .000
                       +ID3 03:EXT4         21.08     .642    7.90  51.03    .000
                        ========================================================
                        SUM 04:       2190   69.49    2.034    7.63  45.61    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
050:0039----------------------------------------------------------------------
--------------------
| ROUTE CHANNEL      |     Routing time step (min) =  1.00
|  IN> 04:002190     |     Number of SEGMENTS =  3
| OUT< 01:002200     |     Slopes (%), CHANNEL= .3000  FLOODPLAIN= .2000
--------------------                    LENGTH =  280.00    (m)

                <------ DATA FOR SECTION (  11.0) ------>
                Distance      Elevation       Manning
                    .00          1.40          .2000
                  200.00         1.00     .2000 / .1000  Main Channel
                  201.50          .00          .1000      Main Channel
                  203.50          .00          .1000      Main Channel
                  205.00         1.00     .1000 / .2000  Main Channel
                  405.00         1.40          .2000

   <---------------------------- TRAVEL TIME TABLE ---------------------------->
    DEPTH    ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME   D x V
      (m)     (m)   (cu.m.)   (cu.m.)     (cms)     (m/s)     (min)   (m2/s)
     .071    .071  .421E+02  .179E+01      .014      .090     51.82     .006
     .143    .143  .886E+02  .753E+01      .043      .138     33.94     .020
     .214    .214  .139E+03  .178E+02      .087      .174     26.78     .037
     .286    .286  .194E+03  .330E+02      .142      .205     22.76     .059
     .357    .357  .254E+03  .539E+02      .210      .232     20.12     .083
     .429    .429  .317E+03  .809E+02      .290      .256     18.23     .110
     .500    .500  .385E+03  .115E+03      .382      .278     16.79     .139
     .571    .571  .457E+03  .155E+03      .487      .298     15.64     .171
     .643    .643  .534E+03  .204E+03      .605      .318     14.70     .204
     .714    .714  .614E+03  .261E+03      .736      .336     13.91     .240
```

.786	.786	.699E+03	.327E+03	.881	.353	13.23	.277
.857	.857	.789E+03	.402E+03*	1.040	.369	12.64	.316
.929	.929	.882E+03	.488E+03*	1.213	.385	12.12	.357
1.000	1.000	.980E+03	.583E+03*	1.401	.400	11.66	.400
1.080	1.080	.199E+04	.128E+04*	1.761	.248	18.81	.268
1.160	1.160	.479E+04	.331E+04*	2.505	.147	31.85	.170
1.240	1.240	.938E+04	.692E+04*	3.856	.115	40.54	.143
1.320	1.320	.158E+05	.124E+05*	5.997	.107	43.81	.141
1.400	1.400	.239E+05	.199E+05*	9.093	.106	43.88	.149

X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
(*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

	<---- hydrograph ----> AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	<-pipe / channel-> MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 4:002190	69.49	2.034	7.63	45.611	1.109	.198
OUTFLOW: ID= 1:002200	69.49	1.955	8.45	45.611	1.099	.212

050:0040

DESIGN NASHYD	Area (ha)= 14.81	Curve Number (CN)=82.00
02:EXT5 DT= 1.00	Ia (mm)= 1.500	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 1.520	

Unit Hyd Qpeak (cms)= .372

PEAK FLOW (cms)= .550 (i)
TIME TO PEAK (hrs)= 7.518
RUNOFF VOLUME (mm)= 53.785
TOTAL RAINFALL (mm)= 89.400
RUNOFF COEFFICIENT = .602

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

050:0041

ADD HYD (2210)	ID: NHYD	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	DWF (cms)
	ID1 01: 2200	69.49	1.955	8.45	45.61	.000
	+ID2 02:EXT5	14.81	.550	7.52	53.78	.000
	SUM 03: 2210	84.30	2.430	8.23	47.05	.000

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

050:0042

```
*#########################################################################
*# McGill Drain - Total Flow at Lappan Drain Confluence
*#########################################################################
```

ADD HYD (2220)	ID: NHYD	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	DWF (cms)
	ID1 03: 2210	84.30	2.430	8.23	47.05	.000
	+ID2 10: 2130	183.40	4.572	9.65	47.57	.000
	SUM 01: 2220	267.70	6.598	8.88	47.40	.000

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

050:0043

ROUTE CHANNEL	Routing time step (min) = 1.00
IN> 01:002220	Number of SEGMENTS = 3
OUT< 02:002230	Slopes (%), CHANNEL= .1500 FLOODPLAIN= .2000
	LENGTH = 200.00 (m)

<------ DATA FOR SECTION (12.0) ------> Distance	Elevation (m)	Manning	
.00	1.80	.1400	
200.00	1.40	.1400 / .0850	Main Channel
202.60	.00	.0850	Main Channel
204.40	.00	.0850	Main Channel
207.00	1.40	.0850 / .2000	Main Channel
407.00	1.80	.2000	

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

DEPTH (m)	ELEV (m)	X-VOLUME (cu.m.)	S-VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME (min)	D x V (m2/s)
.093	.093	.368E+02	.573E+01	.016	.087	38.15	.008
.187	.187	.801E+02	.249E+02	.053	.131	25.37	.025
.280	.280	.130E+03	.606E+02	.107	.165	20.20	.046
.373	.373	.186E+03	.116E+03*	.180	.193	17.26	.072
.467	.467	.249E+03	.194E+03*	.271	.218	15.31	.102
.560	.560	.318E+03	.297E+03*	.382	.240	13.89	.134
.653	.653	.394E+03	.429E+03*	.513	.260	12.80	.170
.747	.747	.476E+03	.592E+03*	.665	.280	11.92	.209
.840	.840	.564E+03	.790E+03*	.840	.298	11.20	.250
.933	.933	.660E+03	.103E+04*	1.039	.315	10.58	.294
1.027	1.027	.761E+03	.130E+04*	1.262	.332	10.05	.340
1.120	1.120	.869E+03	.162E+04*	1.510	.348	9.59	.389
1.213	1.213	.984E+03	.199E+04*	1.785	.363	9.18	.440
1.307	1.307	.110E+04	.241E+04*	2.087	.378	8.82	.494
1.400	1.400	.123E+04	.287E+04*	2.418	.392	8.49	.549
1.500	1.500	.237E+04	.593E+04*	3.077	.259	12.85	.389
1.600	1.600	.551E+04	.147E+05*	4.571	.166	20.10	.265
1.700	1.700	.107E+05	.302E+05*	7.392	.139	24.02	.236
1.800	1.800	.178E+05	.534E+05*	11.944	.134	24.83	.242

X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
(*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

	<---- hydrograph ----> AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	<-pipe / channel-> MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 1:002220	267.70	6.598	8.88	47.403	1.672	.145
OUTFLOW: ID= 2:002230	267.70	6.429	9.37	47.403	1.665	.147

050:0044

DESIGN NASHYD	Area (ha)= 16.88	Curve Number (CN)=72.00
01:213 DT= 1.00	Ia (mm)= 1.500	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= .770	

Unit Hyd Qpeak (cms)= .837

PEAK FLOW (cms)= .785 (i)
TIME TO PEAK (hrs)= 6.701
RUNOFF VOLUME (mm)= 41.389
TOTAL RAINFALL (mm)= 89.400
RUNOFF COEFFICIENT = .463

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

050:0045

ADD HYD (2240)	ID: NHYD	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	DWF (cms)
	ID1 01:213	16.88	.785	6.70	41.39	.000
	+ID2 02: 2230	267.70	6.429	9.37	47.40	.000
	SUM 03: 2240	284.58	6.581	9.28	47.05	.000

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

050:0046

ROUTE CHANNEL	Routing time step (min) = 1.00
IN> 03:002240	Number of SEGMENTS = 3
OUT< 01:002250	Slopes (%), CHANNEL= .1500 FLOODPLAIN= .2000
	LENGTH = 170.00 (m)

<------ DATA FOR SECTION (13.0) ------> Distance	Elevation (m)	Manning	
.00	1.80	.1400	
200.00	1.40	.1400 / .0850	Main Channel
202.60	.00	.0850	Main Channel
204.40	.00	.0850	Main Channel
207.00	1.40	.0850 / .2000	Main Channel
407.00	1.80	.2000	

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

DEPTH (m)	ELEV (m)	X-VOLUME (cu.m.)	S-VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME (min)	D x V (m2/s)
.093	.093	.313E+02	.573E+01	.016	.087	32.43	.008
.187	.187	.681E+02	.249E+02	.053	.131	21.56	.025
.280	.280	.110E+03	.606E+02*	.107	.165	17.17	.046
.373	.373	.158E+03	.116E+03*	.180	.193	14.67	.072
.467	.467	.212E+03	.194E+03*	.271	.218	13.02	.102
.560	.560	.270E+03	.297E+03*	.382	.240	11.81	.134
.653	.653	.335E+03	.429E+03*	.513	.260	10.88	.170
.747	.747	.404E+03	.592E+03*	.665	.280	10.13	.209
.840	.840	.480E+03	.790E+03*	.840	.298	9.52	.250
.933	.933	.561E+03	.103E+04*	1.039	.315	8.99	.294
1.027	1.027	.647E+03	.130E+04*	1.262	.332	8.55	.340
1.120	1.120	.739E+03	.162E+04*	1.510	.348	8.15	.389
1.213	1.213	.836E+03	.199E+04*	1.785	.363	7.81	.440
1.307	1.307	.939E+03	.241E+04*	2.087	.378	7.50	.494
1.400	1.400	.105E+04	.287E+04*	2.418	.392	7.22	.549
1.500	1.500	.202E+04	.593E+04*	3.077	.259	10.92	.389
1.600	1.600	.469E+04	.147E+05*	4.571	.166	17.08	.265
1.700	1.700	.905E+04	.302E+05*	7.392	.139	20.42	.236
1.800	1.800	.151E+05	.534E+05*	11.944	.134	21.10	.242

X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
(*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

	<---- hydrograph ----> AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	<-pipe / channel-> MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 3:002240	284.58	6.581	9.28	47.047	1.671	.146
OUTFLOW: ID= 1:002250	284.58	6.479	9.62	47.047	1.666	.147

050:0047

DESIGN NASHYD	Area (ha)= 24.11	Curve Number (CN)=80.00
02:EXT6 DT= 1.00	Ia (mm)= 1.500	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 1.520	

Unit Hyd Qpeak (cms)= .606

PEAK FLOW (cms)= .847 (i)
TIME TO PEAK (hrs)= 7.534
RUNOFF VOLUME (mm)= 51.033
TOTAL RAINFALL (mm)= 89.400
RUNOFF COEFFICIENT = .571

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

050:0048

DESIGN NASHYD	Area (ha)= 14.49	Curve Number (CN)=82.00
03:211 DT= 1.00	Ia (mm)= 1.500	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 1.070	

Unit Hyd Qpeak (cms)= .517

PEAK FLOW (cms)= .703 (i)
TIME TO PEAK (hrs)= 7.001
RUNOFF VOLUME (mm)= 53.784
TOTAL RAINFALL (mm)= 89.400
RUNOFF COEFFICIENT = .602

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

050:0049

ROUTE CHANNEL	Routing time step (min) = 1.00
IN> 03:211	Number of SEGMENTS = 3
OUT< 04:002280	Slopes (%), CHANNEL= .2000 FLOODPLAIN= .2000
	LENGTH = 500.00 (m)

<------ DATA FOR SECTION (15.0) ------> Distance	Elevation (m)	Manning	
.00	.62	.1400	
10.00	.60	.1400 / .0400	Main Channel
11.80	.00	.0400	Main Channel
12.80	.00	.0400	Main Channel
14.60	.62	.0400 / .2000	Main Channel
24.60	.60	.2000	

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

DEPTH (m)	ELEV (m)	X-VOLUME (cu.m.)	S-VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME (min)	D x V (m2/s)
.030	.030	.163E+02	.245E+00	.003	.102	81.78	.003
.060	.060	.353E+02	.106E+01	.011	.155	53.91	.009
.090	.090	.570E+02	.256E+01	.022	.195	42.68	.018
.120	.120	.813E+02	.488E+01	.037	.229	36.32	.028
.150	.150	.108E+03	.812E+01	.056	.260	32.11	.039
.180	.180	.138E+03	.124E+02	.079	.287	29.06	.052
.210	.210	.170E+03	.179E+02	.106	.312	26.72	.065
.240	.240	.205E+03	.246E+02	.138	.335	24.85	.080
.270	.270	.243E+03	.327E+02	.173	.358	23.31	.097
.300	.300	.283E+03	.424E+02	.214	.379	22.01	.114
.330	.330	.326E+03	.537E+02	.260	.399	20.89	.132
.360	.360	.371E+03	.668E+02	.311	.418	19.92	.151
.390	.390	.419E+03	.818E+02	.367	.437	19.06	.171
.420	.420	.470E+03	.988E+02	.428	.455	18.30	.191
.450	.450	.524E+03	.118E+03	.496	.473	17.61	.213
.480	.480	.580E+03	.139E+03	.569	.491	16.99	.235
.510	.510	.639E+03	.163E+03	.648	.507	16.42	.259
.540	.540	.700E+03	.189E+03	.734	.524	15.90	.283
.570	.570	.764E+03	.218E+03	.826	.540	15.43	.308

X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
S-VOLUME= Volume that can be stored in channel at specified ELEVATION.

	<---- hydrograph ----> AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	<-pipe / channel-> MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 3:211	14.49	.703	7.00	53.784	.529	.518
OUTFLOW: ID= 4:002280	14.49	.672	7.25	53.784	.517	.511

050:0050

DESIGN NASHYD	Area (ha)= 10.57	Curve Number (CN)=72.00
03:216 DT= 1.00	Ia (mm)= 1.500	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 1.210	

```
     Unit Hyd Qpeak  (cms)=     .334

     PEAK FLOW       (cms)=     .353 (i)
     TIME TO PEAK    (hrs)=    7.201
     RUNOFF VOLUME    (mm)=   41.389
     TOTAL RAINFALL   (mm)=   89.400
     RUNOFF COEFFICIENT   =     .463

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

------------------------------------------------------------------------------
050:0051-------------------------------------------------------------------------
----------------------
| ADD HYD (      2290) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
                        ID1 03:216          10.57     .353    7.20  41.39     .000
                       +ID2 04:      2280   14.49     .672    7.25  53.78     .000
                        ==========================================================
                        SUM 05:      2290   25.06    1.025    7.23  48.56     .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
050:0052-------------------------------------------------------------------------
----------------------
| ADD HYD (      2260) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
                        ID1 01:      2250  284.58    6.479    9.62  47.05     .000
                       +ID2 02:EXT6        24.11     .847    7.53  51.03     .000
                       +ID3 05:      2290   25.06    1.025    7.23  48.56     .000
                        ==========================================================
                        SUM 03:      2260  333.75    7.372    9.10  47.45     .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
050:0053-------------------------------------------------------------------------
----------------------
| ROUTE CHANNEL    |     Routing time step (min) =  1.00
|  IN> 03:002260   |     Number of SEGMENTS =  3
| OUT< 10:002295   |     Slopes (%), CHANNEL= .0800  FLOODPLAIN= .2000
----------------------          LENGTH =  370.00    (m)

              <------ DATA FOR SECTION (  14.0) ------>
              Distance      Elevation       Manning
                 .00          1.80          .1400
               200.00         1.40     .1400 / .0850  Main Channel
               202.60          .00          .0850      Main Channel
               204.40          .00          .0850      Main Channel
               207.00         1.40     .0850 / .2000  Main Channel
               407.00         1.80          .2000

   <---------------------------- TRAVEL TIME TABLE ---------------------------->
    DEPTH    ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME   D x V
      (m)     (m)   (cu.m.)   (cu.m.)      (cms)     (m/s)     (min)   (m2/s)
     .093    .093  .681E+02  .107E+02       .012      .064     96.65    .006
     .187    .187  .148E+03  .467E+02       .038      .096     64.26    .018
     .280    .280  .240E+03  .114E+03       .078      .121     51.18    .034
     .373    .373  .344E+03  .217E+03*      .131      .141     43.73    .053
     .467    .467  .460E+03  .363E+03*      .198      .159     38.79    .074
     .560    .560  .588E+03  .557E+03*      .279      .175     35.19    .098
     .653    .653  .728E+03  .804E+03*      .374      .190     32.42    .124
     .747    .747  .880E+03  .111E+04*      .486      .204     30.20    .152
     .840    .840  .104E+04  .148E+04*      .614      .217     28.36    .183
     .933    .933  .122E+04  .192E+04*      .759      .230     26.81    .215
    1.027   1.027  .141E+04  .244E+04*      .921      .242     25.47    .249
    1.120   1.120  .161E+04  .304E+04*     1.103      .254     24.30    .284
    1.213   1.213  .182E+04  .373E+04*     1.304      .265     23.27    .322
    1.307   1.307  .204E+04  .451E+04*     1.524      .276     22.34    .361
    1.400   1.400  .228E+04  .539E+04*     1.766      .287     21.51    .401
    1.500   1.500  .439E+04  .111E+05*     2.297      .194     31.84    .290
    1.600   1.600  .102E+05  .276E+05*     3.654      .133     46.51    .212
    1.700   1.700  .197E+05  .566E+05*     6.329      .119     51.90    .202
    1.800   1.800  .329E+05  .100E+06*    10.726      .121     51.14    .217

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
 (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                              <---- hydrograph ---->   <-pipe / channel->
                         AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                         (ha)    (cms)   (hrs)   (mm)       (m)      (m/s)
   INFLOW : ID= 3:002260    333.75    7.372    9.10 47.448     1.724      .119
   OUTFLOW: ID=10:002295    333.75    6.903   10.12 47.448     1.713      .119

------------------------------------------------------------------------------
050:0054-------------------------------------------------------------------------
----------------------
| DESIGN NASHYD      |   Area     (ha)=   17.47   Curve Number    (CN)=76.00
| 03:214    DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .600

     Unit Hyd Qpeak  (cms)=    1.112

     PEAK FLOW       (cms)=    1.077 (i)
     TIME TO PEAK    (hrs)=    6.484
     RUNOFF VOLUME    (mm)=   45.961
     TOTAL RAINFALL   (mm)=   89.400
     RUNOFF COEFFICIENT   =     .514

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

------------------------------------------------------------------------------
050:0055-------------------------------------------------------------------------
*#*************************************************************************
*# Calculate culvert routing and flow split near eastern site boundary
*#   - Storage volumes calculated based on site survey
*#   - Discharges calculated based on the 600 mm diameter CSP and 1500 mm
*#     diameter CSP capacities
*#*************************************************************************
----------------------
| ROUTE RESERVOIR    |    Requested routing time step =  1.0 min.
|  IN>03:(214    )   |
| OUT<01:(002300)    |    =========  OUTLFOW STORAGE TABLE  =========
---------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                           (cms)     (ha.m.)   |    (cms)    (ha.m.)
                            .000   .0000E+00   |    1.130  .4600E+00
                            .150   .0000E+00   |    5.470  .8100E+00
                            .450   .0000E+00   |   83.090  .3400E+01
                            .820   .6500E-01   |    .000   .0000E+00

     ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
     ---------------            (ha)     (cms)     (hrs)       (mm)
     INFLOW >03: (214    )     17.47     1.077     6.484     45.961
     OUTFLOW<01: (002300)      17.47      .835     6.968     45.987

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=   77.491
                  TIME SHIFT OF PEAK FLOW         (min)=    29.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=.8405E-01

------------------------------------------------------------------------------
050:0056-------------------------------------------------------------------------
--------------------
| DIVERT HYD       |
| INID=01  (002300)|
--------------------
     Outflow / Inflow  Relationships
     Flow 02 +  Flow 03 =  Total
      (cms)      (cms)      (cms)
       .000       .000       .000
       .150       .000       .150
       .400       .050       .450
       .680       .140       .820
       .930       .200      1.130
      1.040     4.430      5.470
      1.460    81.630     83.090

          NHYD       AREA     QPEAK   TpeakDate_hh:mm       R.V.  NFE WetHrs
                     (ha)     (cms)                         (mm)        (hrs)
   IDin = 01:002300     17.47     .835  No_date    6:58    45.987  181    11.
   ==========================================================================
   IDout= 02:002310     15.35     .692  No_date    6:58    45.987  181    11.
   IDout= 03:002320      2.12     .143  No_date    6:58    45.987   86     4.

------------------------------------------------------------------------------
050:0057-------------------------------------------------------------------------
----------------------
| DESIGN NASHYD      |   Area     (ha)=    5.34   Curve Number    (CN)=72.00
| 01:215    DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .860

     Unit Hyd Qpeak  (cms)=     .237

     PEAK FLOW       (cms)=     .230 (i)
     TIME TO PEAK    (hrs)=    6.801
     RUNOFF VOLUME    (mm)=   41.389
     TOTAL RAINFALL   (mm)=   89.400
     RUNOFF COEFFICIENT   =     .463

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

------------------------------------------------------------------------------
050:0058-------------------------------------------------------------------------
----------------------
| ADD HYD (      2330) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
                        ID1 01:215           5.34     .230    6.80  41.39     .000
                       +ID2 02:      2310   15.35     .692    6.97  45.99     .000
                        ==========================================================
                        SUM 04:      2330   20.69     .920    6.85  44.80     .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
050:0059-------------------------------------------------------------------------
----------------------
| DESIGN NASHYD      |   Area     (ha)=   18.59   Curve Number    (CN)=82.00
| 01:EXT7   DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=   1.470

     Unit Hyd Qpeak  (cms)=     .483

     PEAK FLOW       (cms)=     .709 (i)
     TIME TO PEAK    (hrs)=    7.451
     RUNOFF VOLUME    (mm)=   53.784
     TOTAL RAINFALL   (mm)=   89.400
     RUNOFF COEFFICIENT   =     .602

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

------------------------------------------------------------------------------
050:0060-------------------------------------------------------------------------
*#*************************************************************************
*# McGill Drain - Total Flow at Eastern WSP
*#*************************************************************************
----------------------
| ADD HYD (      2340) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
                        ID1 01:EXT7          18.59     .709    7.45  53.78     .000
                       +ID2 04:      2330   20.69     .920    6.85  44.80     .000
                       +ID3 10:      2295  333.75    6.903   10.12  47.45     .000
                        ==========================================================
                        SUM 05:      2340  373.03    7.506    9.77  47.62     .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
050:0061-------------------------------------------------------------------------
*#*************************************************************************
*# AREA CHECK
*#*************************************************************************
----------------------
| ADD HYD (      2350) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
                        ID1 03:      2320    2.12     .143    6.97  45.99     .000
                       +ID2 05:      2340  373.03    7.506    9.77  47.62     .000
                        ==========================================================
                        SUM 01:      2350  375.15    7.524    9.77  47.61     .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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050:0062-------------------------------------------------------------------------
------------------------------------------------------------------------------
050:0002-------------------------------------------------------------------------
------------------------------------------------------------------------------
050:0002-------------------------------------------------------------------------
------------------------------------------------------------------------------
050:0002-------------------------------------------------------------------------
------------------------------------------------------------------------------
050:0002-------------------------------------------------------------------------
  ** END OF RUN :  99

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

--------------------
| START            |  Project  dir.: F:\WSP\
--------------------  Rainfall dir.: F:\WSP\
    TZERO =   .00 hrs on      0
    METOUT=  2 (output = METRIC)
    NRUN  = 100
    NSTORM=   1
           #  1=12scs100.stm
------------------------------------------------------------------------------
100:0002-------------------------------------------------------------------------
*#*************************************************************************
*#  Project Name: [Windsor Solar Project] Project Number: [1335-60106]
*#  Date        : 02-10-2016
*#  Modeller    : [NE]
*#  Company     : Stantec Consulting Ltd. (London)
*#  License #   :  4730904
*#*************************************************************************
*#
*#  Proposed Conditions
*#  25 mm Water Quality Event
*#  2, 5, 10, 25, 50, 100, 250-year 3-Hour Chicago Design Storm
*#
*#*************************************************************************
------------------------------------------------------------------------------
100:0002-------------------------------------------------------------------------
--------------------
| READ STORM       |    Filename: 100-yr scs 12 hr windsor
| Ptotal= 98.00 mm|    Comments: 100-yr scs 12 hr windsor
--------------------
            TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
             hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
             .50   1.960 |   3.50   3.920 |   6.50  17.640 |   9.50   3.920
            1.00   1.960 |   4.00   3.920 |   7.00   7.840 |  10.00   1.960
            1.50   1.960 |   4.50   5.880 |   7.50   5.880 |  10.50   1.960
            2.00   1.960 |   5.00   7.840 |   8.00   5.880 |  11.00   1.960
            2.50   3.920 |   5.50  11.760 |   8.50   3.920 |  11.50   1.960
```

```
            3.00   3.920 |   6.00  88.200 |   9.00   3.920 |  12.00   1.960

-------------------------------------------------------------------------------
100:0003-------------------------------------------------------------------------
*#*****************************************************************************
*# LAPPAN DRAIN
*#*****************************************************************************
----------------------
| DESIGN NASHYD      |   Area    (ha)=   42.26   Curve Number    (CN)=73.00
| 01:EXT1   DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=   1.110

     Unit Hyd Qpeak  (cms)=    1.454

     PEAK FLOW       (cms)=    1.788 (i)
     TIME TO PEAK    (hrs)=    7.068
     RUNOFF VOLUME    (mm)=   48.897
     TOTAL RAINFALL   (mm)=   98.000
     RUNOFF COEFFICIENT   =     .499

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

-------------------------------------------------------------------------------
100:0004-------------------------------------------------------------------------
--------------------
| ROUTE CHANNEL    |     Routing time step (min) =  1.00
|  IN> 01:EXT1     |     Number of SEGMENTS =  3
| OUT< 02:002000   |     Slopes (%), CHANNEL= .1000  FLOODPLAIN= .2000
--------------------                  LENGTH =  700.00    (m)

              <------ DATA FOR SECTION (   1.0) ------>
              Distance      Elevation       Manning
                 .00           1.40          .2000
               100.00          1.20     .2000 / .0850  Main Channel
               101.80           .00          .0850      Main Channel
               103.00           .00          .0850      Main Channel
               104.80          1.20     .0850 / .2000  Main Channel
               204.80          1.40          .2000

   <------------------------- TRAVEL TIME TABLE ------------------------->
    DEPTH    ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME   D x V
      (m)     (m)   (cu.m.)   (cu.m.)      (cms)     (m/s)     (min)   (m2/s)
     .071    .071  .645E+02  .325E+01       .005      .059    197.27    .004
     .141    .141  .140E+03  .141E+02       .018      .089    131.37    .013
     .212    .212  .225E+03  .340E+02       .036      .111    104.80    .024
     .282    .282  .321E+03  .647E+02       .060      .130     89.71    .037
     .353    .353  .427E+03  .108E+03       .089      .146     79.68    .052
     .424    .424  .544E+03  .165E+03       .125      .161     72.40    .068
     .494    .494  .671E+03  .237E+03       .168      .175     66.79    .086
     .565    .565  .809E+03  .326E+03       .217      .187     62.29    .106
     .635    .635  .957E+03  .434E+03       .272      .199     58.56    .127
     .706    .706  .112E+04  .563E+03*      .336      .211     55.41    .149
     .776    .776  .129E+04  .713E+03*      .407      .221     52.69    .172
     .847    .847  .146E+04  .886E+03*      .485      .232     50.32    .196
     .918    .918  .166E+04  .108E+04*      .572      .242     48.22    .222
     .988    .988  .186E+04  .131E+04*      .667      .252     46.35    .249
    1.059   1.059  .207E+04  .156E+04*      .771      .261     44.66    .277
    1.129   1.129  .229E+04  .185E+04*      .884      .271     43.13    .306
    1.200   1.200  .252E+04  .216E+04*     1.006      .280     41.73    .335
    1.300   1.300  .636E+04  .590E+04*     1.392      .153     76.12    .199
    1.400   1.400  .172E+05  .172E+05*     2.456      .100    116.67    .140

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
 (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                                <---- hydrograph ---->   <-pipe / channel->
                           AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                           (ha)    (cms)   (hrs)   (mm)      (m)      (m/s)
  INFLOW : ID= 1:EXT1      42.26   1.788    7.07 48.897     1.337      .128
  OUTFLOW: ID= 2:002000    42.26   1.336    8.50 48.897     1.285      .164

-------------------------------------------------------------------------------
100:0005-------------------------------------------------------------------------
----------------------
| DESIGN NASHYD      |   Area    (ha)=   22.52   Curve Number    (CN)=82.00
| 01:EXT2   DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=   1.270

     Unit Hyd Qpeak  (cms)=     .677

     PEAK FLOW       (cms)=    1.094 (i)
     TIME TO PEAK    (hrs)=    7.218
     RUNOFF VOLUME    (mm)=   61.161
     TOTAL RAINFALL   (mm)=   98.000
     RUNOFF COEFFICIENT   =     .624

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

-------------------------------------------------------------------------------
100:0006-------------------------------------------------------------------------
----------------------
| DESIGN NASHYD      |   Area    (ha)=   42.81   Curve Number    (CN)=82.00
| 03:EXT3   DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=   1.110

     Unit Hyd Qpeak  (cms)=    1.473

     PEAK FLOW       (cms)=    2.302 (i)
     TIME TO PEAK    (hrs)=    7.051
     RUNOFF VOLUME    (mm)=   61.161
     TOTAL RAINFALL   (mm)=   98.000
     RUNOFF COEFFICIENT   =     .624

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

-------------------------------------------------------------------------------
100:0007-------------------------------------------------------------------------
*#*****************************************************************************
*# Lappan Drain - Total Flow at Pilette Road
*#*****************************************************************************
----------------------
| ADD HYD (      2010) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                     (ha)     (cms)   (hrs)   (mm)    (cms)
                     ID1 01:EXT2          22.52    1.094    7.22  61.16    .000
                    +ID2 02:      2000    42.26    1.336    8.50  48.90    .000
                    +ID3 03:EXT3          42.81    2.302    7.05  61.16    .000
                     ==========================================================
                     SUM 04:      2010    107.59   4.402    7.23  56.34    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
100:0008-------------------------------------------------------------------------
--------------------
| ROUTE CHANNEL    |     Routing time step (min) =  1.00
|  IN> 04:002010   |     Number of SEGMENTS =  3
| OUT< 01:002020   |     Slopes (%), CHANNEL= .1700  FLOODPLAIN= .2000
--------------------                  LENGTH =  350.00    (m)

              <------ DATA FOR SECTION (   2.0) ------>
              Distance      Elevation       Manning
                 .00           2.00          .2000
               100.00          1.80     .2000 / .0850  Main Channel
               102.75           .00          .0850      Main Channel
               104.25           .00          .0850      Main Channel
               107.00          1.80     .0850 / .1400  Main Channel
               207.00          2.00          .1400

   <------------------------- TRAVEL TIME TABLE ------------------------->
    DEPTH    ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME   D x V
      (m)     (m)   (cu.m.)   (cu.m.)      (cms)     (m/s)     (min)   (m2/s)
     .100    .100  .578E+02  .486E+01       .016      .096     60.50    .010
     .200    .200  .126E+03  .212E+02       .052      .144     40.48    .029
     .300    .300  .206E+03  .518E+02       .106      .180     32.38    .054
     .400    .400  .296E+03  .993E+02       .177      .210     27.75    .084
     .500    .500  .396E+03  .166E+03       .268      .236     24.67    .118
     .600    .600  .508E+03  .256E+03*      .377      .260     22.42    .156
     .700    .700  .630E+03  .370E+03*      .507      .282     20.68    .197
     .800    .800  .762E+03  .512E+03*      .659      .303     19.28    .242
     .900    .900  .906E+03  .685E+03*      .833      .322     18.12    .290
    1.000   1.000  .106E+04  .891E+03*     1.031      .340     17.14    .340
    1.100   1.100  .122E+04  .113E+04*     1.253      .358     16.29    .394
    1.200   1.200  .140E+04  .141E+04*     1.500      .375     15.55    .450
    1.300   1.300  .159E+04  .173E+04*     1.775      .392     14.89    .509
    1.400   1.400  .178E+04  .210E+04*     2.077      .408     14.31    .571
    1.500   1.500  .199E+04  .251E+04*     2.407      .423     13.78    .635
    1.600   1.600  .221E+04  .297E+04*     2.768      .439     13.30    .702
    1.700   1.700  .244E+04  .348E+04*     3.158      .453     12.87    .771
    1.800   1.800  .268E+04  .405E+04*     3.580      .468     12.46    .842
    2.000   2.000  .102E+05  .171E+05*     5.907      .203     28.69    .407

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
 (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                                <---- hydrograph ---->   <-pipe / channel->
                           AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                           (ha)    (cms)   (hrs)   (mm)      (m)      (m/s)
  INFLOW : ID= 4:002010    107.59   4.402    7.23 56.344     1.871      .321
  OUTFLOW: ID= 1:002020    107.59   4.173    7.83 56.344     1.849      .356

-------------------------------------------------------------------------------
100:0009-------------------------------------------------------------------------
----------------------
| DESIGN NASHYD      |   Area    (ha)=   10.43   Curve Number    (CN)=72.00
| 02:202    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .970

     Unit Hyd Qpeak  (cms)=     .411

     PEAK FLOW       (cms)=     .475 (i)
     TIME TO PEAK    (hrs)=    6.918
     RUNOFF VOLUME    (mm)=   47.687
     TOTAL RAINFALL   (mm)=   98.000
     RUNOFF COEFFICIENT   =     .487

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

-------------------------------------------------------------------------------
100:0010-------------------------------------------------------------------------
----------------------
| ADD HYD (      2030) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                     (ha)     (cms)   (hrs)   (mm)    (cms)
                     ID1 01:      2020    107.59   4.173    7.83  56.34    .000
                    +ID2 02:202           10.43    .475     6.92  47.69    .000
                     ==========================================================
                     SUM 03:      2030    118.02   4.506    7.63  55.58    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
100:0011-------------------------------------------------------------------------
--------------------
| ROUTE CHANNEL    |     Routing time step (min) =  1.00
|  IN> 03:002030   |     Number of SEGMENTS =  3
| OUT< 01:002040   |     Slopes (%), CHANNEL= .1700  FLOODPLAIN= .2000
--------------------                  LENGTH =  450.00    (m)

              <------ DATA FOR SECTION (   3.0) ------>
              Distance      Elevation       Manning
                 .00           2.00          .2000
               100.00          1.80     .2000 / .0850  Main Channel
               102.75           .00          .0850      Main Channel
               104.25           .00          .0850      Main Channel
               107.00          1.80     .0850 / .1400  Main Channel
               207.00          2.00          .1400

   <------------------------- TRAVEL TIME TABLE ------------------------->
    DEPTH    ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME   D x V
      (m)     (m)   (cu.m.)   (cu.m.)      (cms)     (m/s)     (min)   (m2/s)
     .100    .100  .744E+02  .486E+01       .016      .096     77.79    .010
     .200    .200  .163E+03  .212E+02       .052      .144     52.05    .029
     .300    .300  .264E+03  .518E+02       .106      .180     41.63    .054
     .400    .400  .380E+03  .993E+02       .177      .210     35.68    .084
     .500    .500  .509E+03  .166E+03       .268      .236     31.72    .118
     .600    .600  .653E+03  .256E+03       .377      .260     28.82    .156
     .700    .700  .809E+03  .370E+03       .507      .282     26.59    .197
     .800    .800  .980E+03  .512E+03*      .659      .303     24.79    .242
     .900    .900  .116E+04  .685E+03*      .833      .322     23.30    .290
    1.000   1.000  .136E+04  .891E+03*     1.031      .340     22.04    .340
    1.100   1.100  .157E+04  .113E+04*     1.253      .358     20.95    .394
    1.200   1.200  .180E+04  .141E+04*     1.500      .375     19.99    .450
    1.300   1.300  .204E+04  .173E+04*     1.775      .392     19.15    .509
    1.400   1.400  .229E+04  .210E+04*     2.077      .408     18.40    .571
    1.500   1.500  .256E+04  .251E+04*     2.407      .423     17.72    .635
    1.600   1.600  .284E+04  .297E+04*     2.768      .439     17.10    .702
    1.700   1.700  .313E+04  .348E+04*     3.158      .453     16.54    .771
    1.800   1.800  .344E+04  .405E+04*     3.580      .468     16.03    .842
    2.000   2.000  .131E+05  .171E+05*     5.907      .203     36.88    .407

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
 (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                                <---- hydrograph ---->   <-pipe / channel->
                           AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                           (ha)    (cms)   (hrs)   (mm)      (m)      (m/s)
  INFLOW : ID= 3:002030    118.02   4.506    7.63 55.579     1.880      .308
  OUTFLOW: ID= 1:002040    118.02   4.294    8.35 55.579     1.863      .332

-------------------------------------------------------------------------------
100:0012-------------------------------------------------------------------------
----------------------
| DESIGN NASHYD      |   Area    (ha)=   15.29   Curve Number    (CN)=82.00
| 02:201    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=   1.290

     Unit Hyd Qpeak  (cms)=     .453

     PEAK FLOW       (cms)=     .734 (i)
     TIME TO PEAK    (hrs)=    7.251
     RUNOFF VOLUME    (mm)=   61.161
     TOTAL RAINFALL   (mm)=   98.000
     RUNOFF COEFFICIENT   =     .624

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

-------------------------------------------------------------------------------
100:0013-------------------------------------------------------------------------
----------------------
| DESIGN NASHYD      |   Area    (ha)=   10.88   Curve Number    (CN)=72.00
| 03:204    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .850

     Unit Hyd Qpeak  (cms)=     .489

     PEAK FLOW       (cms)=     .545 (i)
     TIME TO PEAK    (hrs)=    6.784
     RUNOFF VOLUME    (mm)=   47.687
     TOTAL RAINFALL   (mm)=   98.000
     RUNOFF COEFFICIENT   =     .487
```

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

------------------------------------------------------------------------------
100:0014------------------------------------------------------------------------
---------------------
| ADD HYD (      2050) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
-----------------------                   (ha)     (cms)   (hrs)   (mm)    (cms)
                       ID1 01:      2040   118.02   4.294    8.35  55.58    .000
                      +ID2 02:201           15.29    .734    7.25  61.16    .000
                      +ID3 03:204           10.88    .545    6.78  47.69    .000
                       ==========================================================
                       SUM 04:      2050   144.19   5.065    8.08  55.58    .000

  NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
100:0015------------------------------------------------------------------------
--------------------
| ROUTE CHANNEL    |     Routing time step (min) =  1.00
|  IN> 04:002050   |     Number of SEGMENTS =  3
| OUT< 01:002060   |     Slopes (%), CHANNEL= .1700  FLOODPLAIN= .2000
--------------------                  LENGTH =  200.00    (m)

              <------ DATA FOR SECTION (   4.0) ------>
              Distance      Elevation       Manning
                 .00           2.00          .1400
               100.00          1.80     .1400 / .0850  Main Channel
               102.75           .00         .0850      Main Channel
               104.25           .00         .0850      Main Channel
               107.00          1.80     .0850 / .1400  Main Channel
               207.00          2.00          .1400

   <------------------------- TRAVEL TIME TABLE ------------------------->
    DEPTH    ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME   D x V
      (m)     (m)   (cu.m.)   (cu.m.)      (cms)     (m/s)     (min)   (m2/s)
     .100    .100  .331E+02  .486E+01        .016      .096     34.57    .010
     .200    .200  .722E+02  .212E+02        .052      .144     23.13    .029
     .300    .300  .118E+03  .518E+02        .106      .180     18.50    .054
     .400    .400  .169E+03  .993E+02*       .177      .210     15.86    .084
     .500    .500  .226E+03  .166E+03*       .268      .236     14.10    .118
     .600    .600  .290E+03  .256E+03*       .377      .260     12.81    .156
     .700    .700  .360E+03  .370E+03*       .507      .282     11.82    .197
     .800    .800  .436E+03  .512E+03*       .659      .303     11.02    .242
     .900    .900  .518E+03  .685E+03*       .833      .322     10.36    .290
    1.000   1.000  .606E+03  .891E+03*      1.031      .340      9.79    .340
    1.100   1.100  .700E+03  .113E+04*      1.253      .358      9.31    .394
    1.200   1.200  .800E+03  .141E+04*      1.500      .375      8.89    .450
    1.300   1.300  .906E+03  .173E+04*      1.775      .392      8.51    .509
    1.400   1.400  .102E+04  .210E+04*      2.077      .408      8.18    .571
    1.500   1.500  .114E+04  .251E+04*      2.407      .423      7.87    .635
    1.600   1.600  .126E+04  .297E+04*      2.768      .439      7.60    .702
    1.700   1.700  .139E+04  .348E+04*      3.158      .453      7.35    .771
    1.800   1.800  .153E+04  .405E+04*      3.580      .468      7.12    .842
    2.000   2.000  .581E+04  .171E+05*      6.114      .210     15.84    .421

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
 (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                                 <---- hydrograph ---->   <-pipe / channel->
                            AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                            (ha)    (cms)   (hrs)   (mm)       (m)      (m/s)
  INFLOW : ID= 4:002050    144.19   5.065    8.08 55.575     1.917      .273
  OUTFLOW: ID= 1:002060    144.19   4.987    8.33 55.575     1.913      .277

------------------------------------------------------------------------------
100:0016------------------------------------------------------------------------
---------------------
| DESIGN NASHYD      |   Area     (ha)=    4.78   Curve Number    (CN)=72.00
| 02:206    DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=    .890

     Unit Hyd Qpeak  (cms)=     .205

     PEAK FLOW       (cms)=     .232 (i)
     TIME TO PEAK    (hrs)=    6.818
     RUNOFF VOLUME    (mm)=   47.687
     TOTAL RAINFALL   (mm)=   98.000
     RUNOFF COEFFICIENT   =     .487

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

------------------------------------------------------------------------------
100:0017------------------------------------------------------------------------
---------------------
| ADD HYD (      2070) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
-----------------------                   (ha)     (cms)   (hrs)   (mm)    (cms)
                       ID1 01:      2060   144.19   4.987    8.33  55.58    .000
                      +ID2 02:206           4.78    .232    6.82  47.69    .000
                       ==========================================================
                       SUM 03:      2070   148.97   5.088    8.33  55.32    .000

  NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
100:0018------------------------------------------------------------------------
--------------------
| ROUTE CHANNEL    |     Routing time step (min) =  1.00
|  IN> 03:002070   |     Number of SEGMENTS =  3
| OUT< 01:002080   |     Slopes (%), CHANNEL= .1200  FLOODPLAIN= .2000
--------------------                  LENGTH =  500.00    (m)

              <------ DATA FOR SECTION (   5.0) ------>
              Distance      Elevation       Manning
                 .00           2.20          .1400
               200.00          1.80     .1400 / .0850  Main Channel
               202.75           .00         .0850      Main Channel
               204.25           .00         .0850      Main Channel
               207.00          1.80     .0850 / .1400  Main Channel
               407.00          2.20          .1400

   <------------------------- TRAVEL TIME TABLE ------------------------->
    DEPTH    ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME   D x V
      (m)     (m)   (cu.m.)   (cu.m.)      (cms)     (m/s)     (min)   (m2/s)
     .112    .112  .940E+02  .882E+01        .016      .087     95.91    .010
     .225    .225  .207E+03  .389E+02        .054      .129     64.45    .029
     .337    .337  .340E+03  .957E+02        .110      .161     51.67    .054
     .450    .450  .492E+03  .185E+03        .185      .188     44.34    .085
     .562    .562  .664E+03  .311E+03        .280      .211     39.43    .119
     .675    .675  .854E+03  .481E+03*       .397      .233     35.84    .157
     .788    .788  .106E+04  .698E+03*       .537      .252     33.06    .199
     .900    .900  .129E+04  .970E+03*       .700      .270     30.81    .243
    1.013   1.013  .154E+04  .130E+04*       .888      .288     28.95    .291
    1.125   1.125  .181E+04  .170E+04*      1.102      .304     27.37    .343
    1.238   1.238  .210E+04  .216E+04*      1.344      .320     26.01    .397
    1.350   1.350  .240E+04  .271E+04*      1.615      .336     24.81    .453
    1.463   1.463  .273E+04  .333E+04*      1.916      .351     23.76    .513
    1.575   1.575  .308E+04  .404E+04*      2.247      .365     22.82    .575
    1.688   1.688  .344E+04  .484E+04*      2.611      .379     21.97    .640
    1.800   1.800  .382E+04  .574E+04*      3.008      .393     21.19    .708
    1.933   1.933  .874E+04  .141E+05*      4.111      .235     35.42    .455
    2.067   2.067  .225E+05  .388E+05*      7.293      .162     51.50    .334
    2.200   2.200  .452E+05  .829E+05*     13.799      .153     54.62    .336

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
 (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                                 <---- hydrograph ---->   <-pipe / channel->
                            AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                            (ha)    (cms)   (hrs)   (mm)       (m)      (m/s)
  INFLOW : ID= 3:002070    148.97   5.088    8.33 55.322     1.974      .206
  OUTFLOW: ID= 1:002080    148.97   4.737    9.22 55.322     1.958      .217

------------------------------------------------------------------------------
100:0019------------------------------------------------------------------------
---------------------
| DESIGN NASHYD      |   Area     (ha)=   14.96   Curve Number    (CN)=72.00
| 02:207    DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=   1.330

     Unit Hyd Qpeak  (cms)=     .430

     PEAK FLOW       (cms)=     .538 (i)
     TIME TO PEAK    (hrs)=    7.334
     RUNOFF VOLUME    (mm)=   47.687
     TOTAL RAINFALL   (mm)=   98.000
     RUNOFF COEFFICIENT   =     .487

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

------------------------------------------------------------------------------
100:0020------------------------------------------------------------------------
---------------------
| DESIGN NASHYD      |   Area     (ha)=    7.92   Curve Number    (CN)=72.00
| 03:208    DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=   1.110

     Unit Hyd Qpeak  (cms)=     .273

     PEAK FLOW       (cms)=     .326 (i)
     TIME TO PEAK    (hrs)=    7.084
     RUNOFF VOLUME    (mm)=   47.687
     TOTAL RAINFALL   (mm)=   98.000
     RUNOFF COEFFICIENT   =     .487

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

------------------------------------------------------------------------------
100:0021------------------------------------------------------------------------
*#**************************************************************************
*# Lappan Drain - Total Flow at Jefferson Boulevard
*#**************************************************************************
---------------------
| ADD HYD (      2090) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
-----------------------                   (ha)     (cms)   (hrs)   (mm)    (cms)
                       ID1 01:      2080   148.97   4.737    9.22  55.32    .000
                      +ID2 02:207           14.96    .538    7.33  47.69    .000
                      +ID3 03:208            7.92    .326    7.08  47.69    .000
                       ==========================================================
                       SUM 04:      2090   171.85   5.152    9.00  54.31    .000

  NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
100:0022------------------------------------------------------------------------
--------------------
| ROUTE CHANNEL    |     Routing time step (min) =  1.00
|  IN> 04:002090   |     Number of SEGMENTS =  3
| OUT< 01:002100   |     Slopes (%), CHANNEL= .1200  FLOODPLAIN= .2000
--------------------                  LENGTH =  130.00    (m)

              <------ DATA FOR SECTION (   6.0) ------>
              Distance      Elevation       Manning
                 .00           2.20          .1400
               200.00          1.80     .1400 / .0850  Main Channel
               202.75           .00         .0850      Main Channel
               204.25           .00         .0850      Main Channel
               207.00          1.80     .0850 / .2000  Main Channel
               407.00          2.20          .2000

   <------------------------- TRAVEL TIME TABLE ------------------------->
    DEPTH    ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME   D x V
      (m)     (m)   (cu.m.)   (cu.m.)      (cms)     (m/s)     (min)   (m2/s)
     .112    .112  .245E+02  .882E+01        .016      .087     24.94    .010
     .225    .225  .539E+02  .389E+02*       .054      .129     16.76    .029
     .337    .337  .884E+02  .957E+02*       .110      .161     13.43    .054
     .450    .450  .128E+03  .185E+03*       .185      .188     11.53    .085
     .562    .562  .173E+03  .311E+03*       .280      .211     10.25    .119
     .675    .675  .222E+03  .481E+03*       .397      .233      9.32    .157
     .788    .788  .277E+03  .698E+03*       .537      .252      8.59    .199
     .900    .900  .336E+03  .970E+03*       .700      .270      8.01    .243
    1.013   1.013  .401E+03  .130E+04*       .888      .288      7.53    .291
    1.125   1.125  .471E+03  .170E+04*      1.102      .304      7.12    .343
    1.238   1.238  .545E+03  .216E+04*      1.344      .320      6.76    .397
    1.350   1.350  .625E+03  .271E+04*      1.615      .336      6.45    .453
    1.463   1.463  .710E+03  .333E+04*      1.916      .351      6.18    .513
    1.575   1.575  .800E+03  .404E+04*      2.247      .365      5.93    .575
    1.688   1.688  .895E+03  .484E+04*      2.611      .379      5.71    .640
    1.800   1.800  .994E+03  .574E+04*      3.008      .393      5.51    .708
    1.933   1.933  .227E+04  .141E+05*      4.041      .231      9.37    .447
    2.067   2.067  .586E+04  .388E+05*      6.848      .152     14.26    .314
    2.200   2.200  .118E+05  .829E+05*     12.488      .138     15.69    .304

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
 (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                                 <---- hydrograph ---->   <-pipe / channel->
                            AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                            (ha)    (cms)   (hrs)   (mm)       (m)      (m/s)
  INFLOW : ID= 4:002090    171.85   5.152    9.00 54.305     1.986      .192
  OUTFLOW: ID= 1:002100    171.85   5.103    9.18 54.305     1.985      .192

------------------------------------------------------------------------------
100:0023------------------------------------------------------------------------
---------------------
| DESIGN NASHYD      |   Area     (ha)=    4.95   Curve Number    (CN)=73.00
| 02:212    DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=    .480

     Unit Hyd Qpeak  (cms)=     .394

     PEAK FLOW       (cms)=     .376 (i)
     TIME TO PEAK    (hrs)=    6.334
     RUNOFF VOLUME    (mm)=   48.897
     TOTAL RAINFALL   (mm)=   98.000
     RUNOFF COEFFICIENT   =     .499

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

------------------------------------------------------------------------------
100:0024------------------------------------------------------------------------
---------------------
| ADD HYD (      2110) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
-----------------------                   (ha)     (cms)   (hrs)   (mm)    (cms)
                       ID1 01:      2100   171.85   5.103    9.18  54.31    .000
                      +ID2 02:212           4.95    .376    6.33  48.90    .000
                       ==========================================================
                       SUM 03:      2110   176.80   5.145    9.18  54.15    .000

  NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
100:0025------------------------------------------------------------------------
--------------------
| ROUTE CHANNEL    |     Routing time step (min) =  1.00
|  IN> 03:002110   |     Number of SEGMENTS =  3
| OUT< 01:002120   |     Slopes (%), CHANNEL= .1200  FLOODPLAIN= .2000
--------------------                  LENGTH =  330.00    (m)

              <------ DATA FOR SECTION (   7.0) ------>
              Distance      Elevation       Manning
```

```
                .00          2.20         .1400
             200.00          1.80     .1400 / .0850  Main Channel
             202.75           .00         .0850      Main Channel
             204.25           .00         .0850      Main Channel
             207.00          1.80     .0850 / .2000  Main Channel
             407.00          2.20         .2000

  <---------------------------- TRAVEL TIME TABLE ---------------------------->
   DEPTH     ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME    D x V
     (m)      (m)   (cu.m.)   (cu.m.)      (cms)     (m/s)      (min)   (m2/s)
    .112     .112  .621E+02  .882E+01       .016      .087      63.30     .010
    .225     .225  .137E+03  .389E+02       .054      .129      42.54     .029
    .337     .337  .224E+03  .957E+02       .110      .161      34.10     .054
    .450     .450  .325E+03  .185E+03*      .185      .188      29.26     .085
    .562     .562  .438E+03  .311E+03*      .280      .211      26.02     .119
    .675     .675  .564E+03  .481E+03*      .397      .233      23.65     .157
    .788     .788  .702E+03  .698E+03*      .537      .252      21.82     .199
    .900     .900  .854E+03  .970E+03*      .700      .270      20.34     .243
   1.013    1.013  .102E+04  .130E+04*      .888      .288      19.11     .291
   1.125    1.125  .119E+04  .170E+04*     1.102      .304      18.06     .343
   1.238    1.238  .138E+04  .216E+04*     1.344      .320      17.16     .397
   1.350    1.350  .159E+04  .271E+04*     1.615      .336      16.38     .453
   1.463    1.463  .180E+04  .333E+04*     1.916      .351      15.68     .513
   1.575    1.575  .203E+04  .404E+04*     2.247      .365      15.06     .575
   1.688    1.688  .227E+04  .484E+04*     2.611      .379      14.50     .640
   1.800    1.800  .252E+04  .574E+04*     3.008      .393      13.99     .708
   1.933    1.933  .577E+04  .141E+05*     4.041      .231      23.78     .447
   2.067    2.067  .149E+05  .388E+05*     6.848      .152      36.20     .314
   2.200    2.200  .298E+05  .829E+05*    12.488      .138      39.84     .304

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
 (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                              <---- hydrograph ---->   <-pipe / channel->
                          AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                          (ha)    (cms)   (hrs)   (mm)       (m)      (m/s)
  INFLOW : ID= 3:002110   176.80   5.145    9.18 54.154     1.986      .192
  OUTFLOW: ID= 1:002120   176.80   4.956    9.97 54.154     1.975      .199


--------------------------------------------------------------------------------
100:0026--------------------------------------------------------------------------
----------------------
| DESIGN NASHYD      |   Area     (ha)=    6.60   Curve Number    (CN)=82.00
| 02:EXT8    DT= 1.00 |   Ia       (mm)=    1.500   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=    .820

     Unit Hyd Qpeak  (cms)=     .307

     PEAK FLOW       (cms)=     .443 (i)
     TIME TO PEAK    (hrs)=    6.718
     RUNOFF VOLUME    (mm)=   61.161
     TOTAL RAINFALL   (mm)=   98.000
     RUNOFF COEFFICIENT   =     .624

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

--------------------------------------------------------------------------------
100:0027--------------------------------------------------------------------------
*#*************************************************************************
*# Lappan Drain - Total Flow at McGill Drain
*#*************************************************************************
----------------------
| ADD HYD (      2130) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
-----------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
                       ID1 01:      2120   176.80   4.956    9.97  54.15     .000
                      +ID2 02:EXT8        6.60     .443    6.72  61.16     .000
                      ========================================================
                       SUM 10:      2130   183.40   5.020    9.95  54.41     .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
100:0028--------------------------------------------------------------------------
*#*************************************************************************
*# McGILL DRAIN
*#*************************************************************************
----------------------
| DESIGN NASHYD      |   Area     (ha)=   12.75   Curve Number    (CN)=72.00
| 01:203     DT= 1.00 |   Ia       (mm)=    1.500   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=    .970

     Unit Hyd Qpeak  (cms)=     .502

     PEAK FLOW       (cms)=     .580 (i)
     TIME TO PEAK    (hrs)=    6.918
     RUNOFF VOLUME    (mm)=   47.687
     TOTAL RAINFALL   (mm)=   98.000
     RUNOFF COEFFICIENT   =     .487

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

--------------------------------------------------------------------------------
100:0029--------------------------------------------------------------------------
--------------------
| ROUTE CHANNEL    |     Routing time step (min) =  1.00
|  IN> 01:203      |     Number of SEGMENTS =  3
| OUT< 02:002140   |     Slopes (%), CHANNEL= .3500  FLOODPLAIN= .2000
-------------------                    LENGTH =  500.00     (m)

              <------ DATA FOR SECTION (   8.0) ------>
              Distance      Elevation       Manning
                 .00           1.40          .1400
              200.00           1.00     .1400 / .1000  Main Channel
              201.50            .00         .1000      Main Channel
              203.50            .00         .1000      Main Channel
              205.00           1.00     .1000 / .2000  Main Channel
              405.00           1.40         .2000

  <---------------------------- TRAVEL TIME TABLE ---------------------------->
   DEPTH     ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME    D x V
     (m)      (m)   (cu.m.)   (cu.m.)      (cms)     (m/s)      (min)   (m2/s)
    .071     .071  .753E+02  .154E+01       .015      .097      85.67     .007
    .143     .143  .158E+03  .646E+01       .047      .149      56.11     .021
    .214     .214  .249E+03  .152E+02       .094      .188      44.28     .040
    .286     .286  .347E+03  .283E+02       .154      .221      37.63     .063
    .357     .357  .453E+03  .462E+02       .227      .250      33.27     .089
    .429     .429  .566E+03  .693E+02       .313      .276      30.14     .118
    .500     .500  .687E+03  .982E+02       .413      .300      27.75     .150
    .571     .571  .816E+03  .133E+03       .526      .322      25.85     .184
    .643     .643  .953E+03  .175E+03       .654      .343      24.30     .220
    .714     .714  .110E+04  .224E+03       .795      .362      22.99     .259
    .786     .786  .125E+04  .280E+03       .952      .381      21.87     .299
    .857     .857  .141E+04  .345E+03      1.123      .399      20.90     .342
    .929     .929  .158E+04  .418E+03      1.310      .416      20.04     .386
   1.000    1.000  .175E+04  .500E+03      1.513      .432      19.28     .432
   1.080    1.080  .355E+04  .110E+04      1.913      .269      30.92     .291
   1.160    1.160  .855E+04  .283E+04      2.777      .162      51.31     .188
   1.240    1.240  .167E+05  .593E+04      4.375      .131      63.81     .162
   1.320    1.320  .281E+05  .106E+05      6.931      .123      67.70     .162
   1.400    1.400  .427E+05  .171E+05     10.642      .124      66.95     .174

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.

                              <---- hydrograph ---->   <-pipe / channel->
                          AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                          (ha)    (cms)   (hrs)   (mm)       (m)      (m/s)
  INFLOW : ID= 1:203      12.75    .580    6.92 47.687      .602      .331
  OUTFLOW: ID= 2:002140   12.75    .522    7.27 47.687      .566      .321


--------------------------------------------------------------------------------
100:0030--------------------------------------------------------------------------
----------------------
| DESIGN NASHYD      |   Area     (ha)=   12.89   Curve Number    (CN)=72.00
| 01:205     DT= 1.00 |   Ia       (mm)=    1.500   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=    .860

     Unit Hyd Qpeak  (cms)=     .572

     PEAK FLOW       (cms)=     .640 (i)
     TIME TO PEAK    (hrs)=    6.784
     RUNOFF VOLUME    (mm)=   47.687
     TOTAL RAINFALL   (mm)=   98.000
     RUNOFF COEFFICIENT   =     .487

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

--------------------------------------------------------------------------------
100:0031--------------------------------------------------------------------------
----------------------
| ADD HYD (      2150) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
-----------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
                       ID1 01:205          12.89     .640    6.78  47.69     .000
                      +ID2 02:     2140    12.75     .522    7.27  47.69     .000
                      ========================================================
                       SUM 03:      2150   25.64    1.116    7.00  47.69     .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
100:0032--------------------------------------------------------------------------
--------------------
| ROUTE CHANNEL    |     Routing time step (min) =  1.00
|  IN> 03:002150   |     Number of SEGMENTS =  3
| OUT< 01:002160   |     Slopes (%), CHANNEL= .0500  FLOODPLAIN= .2000
-------------------                    LENGTH =  360.00     (m)

              <------ DATA FOR SECTION (   9.0) ------>
              Distance      Elevation       Manning
                 .00           1.40          .1400
              200.00           1.00     .1400 / .1000  Main Channel
              201.50            .00         .1000      Main Channel
              203.50            .00         .1000      Main Channel
              205.00           1.00     .1000 / .2000  Main Channel
              405.00           1.40         .2000

  <---------------------------- TRAVEL TIME TABLE ---------------------------->
   DEPTH     ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME    D x V
     (m)      (m)   (cu.m.)   (cu.m.)      (cms)     (m/s)      (min)   (m2/s)
    .071     .071  .542E+02  .108E+02       .006      .037     163.19     .003
    .143     .143  .114E+03  .452E+02       .018      .056     106.89     .008
    .214     .214  .179E+03  .107E+03*      .035      .071      84.35     .015
    .286     .286  .250E+03  .198E+03*      .058      .084      71.69     .024
    .357     .357  .326E+03  .323E+03*      .086      .095      63.38     .034
    .429     .429  .408E+03  .485E+03*      .118      .105      57.41     .045
    .500     .500  .495E+03  .687E+03*      .156      .113      52.87     .057
    .571     .571  .588E+03  .933E+03*      .199      .122      49.25     .070
    .643     .643  .686E+03  .123E+04*      .247      .130      46.29     .083
    .714     .714  .790E+03  .157E+04*      .301      .137      43.80     .098
    .786     .786  .899E+03  .196E+04*      .360      .144      41.67     .113
    .857     .857  .101E+04  .241E+04*      .424      .151      39.81     .129
    .929     .929  .113E+04  .293E+04*      .495      .157      38.18     .146
   1.000    1.000  .126E+04  .350E+04*      .572      .163      36.73     .163
   1.080    1.080  .256E+04  .767E+04*      .786      .111      54.17     .120
   1.160    1.160  .616E+04  .198E+05*     1.451      .085      70.71     .098
   1.240    1.240  .121E+05  .415E+05*     2.837      .085      70.85     .105
   1.320    1.320  .203E+05  .743E+05*     5.168      .092      65.36     .121
   1.400    1.400  .308E+05  .120E+06*     8.644      .101      59.35     .142

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
 (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                              <---- hydrograph ---->   <-pipe / channel->
                          AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                          (ha)    (cms)   (hrs)   (mm)       (m)      (m/s)
  INFLOW : ID= 3:002150   25.64   1.116    7.00 47.687     1.120      .096
  OUTFLOW: ID= 1:002160   25.64    .786    7.87 47.687     1.079      .111


--------------------------------------------------------------------------------
100:0033--------------------------------------------------------------------------
----------------------
| DESIGN NASHYD      |   Area     (ha)=   15.50   Curve Number    (CN)=72.00
| 02:209     DT= 1.00 |   Ia       (mm)=    1.500   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=    .970

     Unit Hyd Qpeak  (cms)=     .610

     PEAK FLOW       (cms)=     .705 (i)
     TIME TO PEAK    (hrs)=    6.918
     RUNOFF VOLUME    (mm)=   47.687
     TOTAL RAINFALL   (mm)=   98.000
     RUNOFF COEFFICIENT   =     .487

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

--------------------------------------------------------------------------------
100:0034--------------------------------------------------------------------------
----------------------
| ADD HYD (      2170) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
-----------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
                       ID1 01:      2160   25.64    .786    7.87  47.69     .000
                      +ID2 02:209         15.50    .705    6.92  47.69     .000
                      ========================================================
                       SUM 03:      2170   41.14   1.389    7.22  47.69     .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
100:0035--------------------------------------------------------------------------
--------------------
| ROUTE CHANNEL    |     Routing time step (min) =  1.00
|  IN> 03:002170   |     Number of SEGMENTS =  3
| OUT< 01:002180   |     Slopes (%), CHANNEL= .1500  FLOODPLAIN= .2000
-------------------                    LENGTH =  250.00     (m)

              <------ DATA FOR SECTION (  10.0) ------>
              Distance      Elevation       Manning
                 .00           1.40          .2000
              200.00           1.00     .2000 / .1000  Main Channel
              201.50            .00         .1000      Main Channel
              203.50            .00         .1000      Main Channel
              205.00           1.00     .1000 / .2000  Main Channel
              405.00           1.40         .2000

  <---------------------------- TRAVEL TIME TABLE ---------------------------->
   DEPTH     ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME    D x V
     (m)      (m)   (cu.m.)   (cu.m.)      (cms)     (m/s)      (min)   (m2/s)
    .071     .071  .376E+02  .358E+01       .010      .064      65.43     .005
    .143     .143  .791E+02  .151E+02       .031      .097      42.85     .014
    .214     .214  .124E+03  .355E+02       .061      .123      33.82     .026
    .286     .286  .173E+03  .661E+02       .101      .145      28.74     .041
    .357     .357  .226E+03  .108E+03       .148      .164      25.41     .059
    .429     .429  .283E+03  .162E+03*      .205      .181      23.02     .078
    .500     .500  .344E+03  .229E+03*      .270      .197      21.20     .098
    .571     .571  .408E+03  .311E+03*      .344      .211      19.75     .121
    .643     .643  .476E+03  .408E+03*      .428      .225      18.56     .144
    .714     .714  .548E+03  .522E+03*      .521      .237      17.56     .169
    .786     .786  .624E+03  .654E+03*      .623      .249      16.71     .196
    .857     .857  .706E+03  .805E+03*      .735      .261      15.96     .224
    .929     .929  .788E+03  .975E+03*      .858      .272      15.31     .253
   1.000    1.000  .875E+03  .117E+04*      .990      .283      14.73     .283
```

```
   1.080    1.080  .177E+04  .256E+04*     1.270      .179     23.30     .193
   1.160    1.160  .427E+04  .661E+04*     1.927      .113     36.97     .131
   1.240    1.240  .837E+04  .138E+05*     3.185      .095     43.82     .118
   1.320    1.320  .141E+05  .248E+05*     5.229      .093     44.86     .123
   1.400    1.400  .214E+05  .399E+05*     8.222      .096     43.33     .135

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
 (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                                <---- hydrograph ---->   <-pipe / channel->
                           AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                           (ha)    (cms)   (hrs)   (mm)       (m)      (m/s)
  INFLOW : ID= 3:002170    41.14   1.389    7.22 47.687     1.095      .162
  OUTFLOW: ID= 1:002180    41.14   1.265    8.03 47.687     1.078      .180


------------------------------------------------------------------------------
100:0036--------------------------------------------------------------------
--------------------
| DESIGN NASHYD      |   Area     (ha)=    7.27   Curve Number    (CN)=82.00
| 02:210     DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=    .820

     Unit Hyd Qpeak  (cms)=     .339

     PEAK FLOW       (cms)=     .488 (i)
     TIME TO PEAK    (hrs)=    6.718
     RUNOFF VOLUME    (mm)=   61.161
     TOTAL RAINFALL   (mm)=   98.000
     RUNOFF COEFFICIENT   =     .624

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


------------------------------------------------------------------------------
100:0037--------------------------------------------------------------------
--------------------
| DESIGN NASHYD      |   Area     (ha)=   21.08   Curve Number    (CN)=80.00
| 03:EXT4    DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=   1.830

     Unit Hyd Qpeak  (cms)=     .440

     PEAK FLOW       (cms)=     .734 (i)
     TIME TO PEAK    (hrs)=    7.884
     RUNOFF VOLUME    (mm)=   58.201
     TOTAL RAINFALL   (mm)=   98.000
     RUNOFF COEFFICIENT   =     .594

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


------------------------------------------------------------------------------
100:0038--------------------------------------------------------------------
*#############################################################################
*# McGill Drain - Total Flow at Jefferson Boulevard
*#############################################################################
-------------------------
| ADD HYD (      2190) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
-------------------------                   (ha)     (cms)   (hrs)   (mm)   (cms)
                       ID1 01:      2180    41.14   1.265    8.03  47.69    .000
                      +ID2 02:210           7.27    .488    6.72  61.16    .000
                      +ID3 03:EXT4         21.08    .734    7.88  58.20    .000
                       ==========================================================
                       SUM 04:      2190    69.49   2.265    7.63  52.29    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.


------------------------------------------------------------------------------
100:0039--------------------------------------------------------------------
-----------------
| ROUTE CHANNEL    |     Routing time step (min) =  1.00
|  IN> 04:002190   |     Number of SEGMENTS =  3
| OUT< 01:002200   |     Slopes (%), CHANNEL= .3000  FLOODPLAIN= .2000
-----------------                    LENGTH =  280.00    (m)

              <------ DATA FOR SECTION (  11.0) ------>
              Distance      Elevation       Manning
                  .00          1.40          .2000
                200.00          1.00     .2000 / .1000  Main Channel
                201.50           .00          .1000      Main Channel
                203.50           .00          .1000      Main Channel
                205.00          1.00     .1000 / .2000  Main Channel
                405.00          1.40          .2000

   <---------------------------- TRAVEL TIME TABLE ---------------------------->
    DEPTH     ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME    D x V
      (m)      (m)   (cu.m.)   (cu.m.)      (cms)     (m/s)     (min)    (m2/s)
     .071     .071  .421E+02  .179E+01       .014      .090     51.82     .006
     .143     .143  .886E+02  .753E+01       .043      .138     33.94     .020
     .214     .214  .139E+03  .178E+02       .087      .174     26.78     .037
     .286     .286  .194E+03  .330E+02       .142      .205     22.76     .059
     .357     .357  .254E+03  .539E+02       .210      .232     20.12     .083
     .429     .429  .317E+03  .809E+02       .290      .256     18.23     .110
     .500     .500  .385E+03  .115E+03       .382      .278     16.79     .139
     .571     .571  .457E+03  .155E+03       .487      .298     15.64     .171
     .643     .643  .534E+03  .204E+03       .605      .318     14.70     .204
     .714     .714  .614E+03  .261E+03       .736      .336     13.91     .240
     .786     .786  .699E+03  .327E+03       .881      .353     13.23     .277
     .857     .857  .789E+03  .402E+03*     1.040      .369     12.64     .316
     .929     .929  .882E+03  .488E+03*     1.213      .385     12.12     .357
    1.000    1.000  .980E+03  .583E+03*     1.401      .400     11.66     .400
    1.080    1.080  .199E+04  .128E+04*     1.761      .248     18.81     .268
    1.160    1.160  .479E+04  .331E+04*     2.505      .147     31.85     .170
    1.240    1.240  .938E+04  .692E+04*     3.856      .115     40.54     .143
    1.320    1.320  .158E+05  .124E+05*     5.997      .107     43.81     .141
    1.400    1.400  .239E+05  .199E+05*     9.093      .106     43.88     .149

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
 (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                                <---- hydrograph ---->   <-pipe / channel->
                           AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                           (ha)    (cms)   (hrs)   (mm)       (m)      (m/s)
  INFLOW : ID= 4:002190    69.49   2.265    7.63 52.286     1.134      .169
  OUTFLOW: ID= 1:002200    69.49   2.147    8.67 52.286     1.121      .183


------------------------------------------------------------------------------
100:0040--------------------------------------------------------------------
--------------------
| DESIGN NASHYD      |   Area     (ha)=   14.81   Curve Number    (CN)=82.00
| 02:EXT5    DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=   1.520

     Unit Hyd Qpeak  (cms)=     .372

     PEAK FLOW       (cms)=     .627 (i)
     TIME TO PEAK    (hrs)=    7.518
     RUNOFF VOLUME    (mm)=   61.161
     TOTAL RAINFALL   (mm)=   98.000
     RUNOFF COEFFICIENT   =     .624

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


------------------------------------------------------------------------------
100:0041--------------------------------------------------------------------
-------------------------
| ADD HYD (      2210) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
-------------------------                   (ha)     (cms)   (hrs)   (mm)   (cms)
                       ID1 01:      2200    69.49   2.147    8.67  52.29    .000
                      +ID2 02:EXT5          14.81    .627    7.52  61.16    .000
                       ==========================================================
                       SUM 03:      2210    84.30   2.680    8.17  53.85    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.


------------------------------------------------------------------------------
100:0042--------------------------------------------------------------------
*#############################################################################
*# McGill Drain - Total Flow at Lappan Drain Confluence
*#############################################################################
-------------------------
| ADD HYD (      2220) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
-------------------------                   (ha)     (cms)   (hrs)   (mm)   (cms)
                       ID1 03:      2210    84.30   2.680    8.17  53.85    .000
                      +ID2 10:      2130   183.40   5.020    9.95  54.41    .000
                       ==========================================================
                       SUM 01:      2220   267.70   7.280    9.20  54.23    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.


------------------------------------------------------------------------------
100:0043--------------------------------------------------------------------
--------------------
| ROUTE CHANNEL    |     Routing time step (min) =  1.00
|  IN> 01:002220   |     Number of SEGMENTS =  3
| OUT< 02:002230   |     Slopes (%), CHANNEL= .1500  FLOODPLAIN= .2000
--------------------                    LENGTH =  200.00    (m)

              <------ DATA FOR SECTION (  12.0) ------>
              Distance      Elevation       Manning
                  .00          1.80          .1400
                200.00          1.40     .1400 / .0850  Main Channel
                202.60           .00          .0850      Main Channel
                204.40           .00          .0850      Main Channel
                207.00          1.40     .0850 / .2000  Main Channel
                407.00          1.80          .2000

   <---------------------------- TRAVEL TIME TABLE ---------------------------->
    DEPTH     ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME    D x V
      (m)      (m)   (cu.m.)   (cu.m.)      (cms)     (m/s)     (min)    (m2/s)
     .093     .093  .368E+02  .573E+01       .016      .087     38.15     .008
     .187     .187  .801E+02  .249E+02       .053      .131     25.37     .025
     .280     .280  .130E+03  .606E+02       .107      .165     20.20     .046
     .373     .373  .186E+03  .116E+03*      .180      .193     17.26     .072
     .467     .467  .249E+03  .194E+03*      .271      .218     15.31     .102
     .560     .560  .318E+03  .297E+03*      .382      .240     13.89     .134
     .653     .653  .394E+03  .429E+03*      .513      .260     12.80     .170
     .747     .747  .476E+03  .592E+03*      .665      .280     11.92     .209
     .840     .840  .564E+03  .790E+03*      .840      .298     11.20     .250
     .933     .933  .660E+03  .103E+04*     1.039      .315     10.58     .294
    1.027    1.027  .761E+03  .130E+04*     1.262      .332     10.05     .340
    1.120    1.120  .869E+03  .162E+04*     1.510      .348      9.59     .389
    1.213    1.213  .984E+03  .199E+04*     1.785      .363      9.18     .440
    1.307    1.307  .110E+04  .241E+04*     2.087      .378      8.82     .494
    1.400    1.400  .123E+04  .287E+04*     2.418      .392      8.49     .549
    1.500    1.500  .237E+04  .593E+04*     3.077      .259     12.85     .389
    1.600    1.600  .551E+04  .147E+05*     4.571      .166     20.10     .265
    1.700    1.700  .107E+05  .302E+05*     7.392      .139     24.02     .236
    1.800    1.800  .178E+05  .534E+05*    11.944      .134     24.83     .242

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
 (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                                <---- hydrograph ---->   <-pipe / channel->
                           AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                           (ha)    (cms)   (hrs)   (mm)       (m)      (m/s)
  INFLOW : ID= 1:002220    267.70   7.280    9.20 54.229     1.696      .140
  OUTFLOW: ID= 2:002230    267.70   7.102    9.58 54.229     1.689      .141


------------------------------------------------------------------------------
100:0044--------------------------------------------------------------------
----------------------
| DESIGN NASHYD      |   Area     (ha)=   16.88   Curve Number    (CN)=72.00
| 01:213     DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .770

     Unit Hyd Qpeak  (cms)=     .837

     PEAK FLOW       (cms)=     .907 (i)
     TIME TO PEAK    (hrs)=    6.684
     RUNOFF VOLUME    (mm)=   47.687
     TOTAL RAINFALL   (mm)=   98.000
     RUNOFF COEFFICIENT   =     .487

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


------------------------------------------------------------------------------
100:0045--------------------------------------------------------------------
-------------------------
| ADD HYD (      2240) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
-------------------------                   (ha)     (cms)   (hrs)   (mm)   (cms)
                       ID1 01:213           16.88    .907    6.68  47.69    .000
                      +ID2 02:      2230   267.70   7.102    9.58  54.23    .000
                       ==========================================================
                       SUM 03:      2240   284.58   7.257    9.58  53.84    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.


------------------------------------------------------------------------------
100:0046--------------------------------------------------------------------
--------------------
| ROUTE CHANNEL    |     Routing time step (min) =  1.00
|  IN> 03:002240   |     Number of SEGMENTS =  3
| OUT< 01:002250   |     Slopes (%), CHANNEL= .1500  FLOODPLAIN= .2000
--------------------                    LENGTH =  170.00    (m)

              <------ DATA FOR SECTION (  13.0) ------>
              Distance      Elevation       Manning
                  .00          1.80          .1400
                200.00          1.40     .1400 / .0850  Main Channel
                202.60           .00          .0850      Main Channel
                204.40           .00          .0850      Main Channel
                207.00          1.40     .0850 / .2000  Main Channel
                407.00          1.80          .2000

   <---------------------------- TRAVEL TIME TABLE ---------------------------->
    DEPTH     ELEV   X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME    D x V
      (m)      (m)   (cu.m.)   (cu.m.)      (cms)     (m/s)     (min)    (m2/s)
     .093     .093  .313E+02  .573E+01       .016      .087     32.43     .008
     .187     .187  .681E+02  .249E+02       .053      .131     21.56     .025
     .280     .280  .110E+03  .606E+02*      .107      .165     17.17     .046
     .373     .373  .158E+03  .116E+03*      .180      .193     14.67     .072
     .467     .467  .212E+03  .194E+03*      .271      .218     13.02     .102
     .560     .560  .270E+03  .297E+03*      .382      .240     11.81     .134
     .653     .653  .335E+03  .429E+03*      .513      .260     10.88     .170
     .747     .747  .404E+03  .592E+03*      .665      .280     10.13     .209
     .840     .840  .480E+03  .790E+03*      .840      .298      9.52     .250
     .933     .933  .561E+03  .103E+04*     1.039      .315      8.99     .294
    1.027    1.027  .647E+03  .130E+04*     1.262      .332      8.55     .340
    1.120    1.120  .739E+03  .162E+04*     1.510      .348      8.15     .389
    1.213    1.213  .836E+03  .199E+04*     1.785      .363      7.81     .440
    1.307    1.307  .939E+03  .241E+04*     2.087      .378      7.50     .494
    1.400    1.400  .105E+04  .287E+04*     2.418      .392      7.22     .549
    1.500    1.500  .202E+04  .593E+04*     3.077      .259     10.92     .389
    1.600    1.600  .469E+04  .147E+05*     4.571      .166     17.08     .265
    1.700    1.700  .905E+04  .302E+05*     7.392      .139     20.42     .236
    1.800    1.800  .151E+05  .534E+05*    11.944      .134     21.10     .242

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
 (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.
```

```
                                <---- hydrograph ---->   <-pipe / channel->
                             AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                              (ha)    (cms)   (hrs)   (mm)      (m)      (m/s)
  INFLOW : ID= 3:002240     284.58    7.257    9.58 53.841     1.695      .140
  OUTFLOW: ID= 1:002250     284.58    7.128    9.95 53.841     1.690      .141


--------------------------------------------------------------------------------
100:0047--------------------------------------------------------------------------
----------------------
| DESIGN NASHYD      |   Area     (ha)=   24.11   Curve Number    (CN)=80.00
| 02:EXT6    DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=   1.520

     Unit Hyd Qpeak  (cms)=     .606

     PEAK FLOW       (cms)=     .968 (i)
     TIME TO PEAK    (hrs)=    7.518
     RUNOFF VOLUME    (mm)=   58.201
     TOTAL RAINFALL   (mm)=   98.000
     RUNOFF COEFFICIENT   =     .594

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

--------------------------------------------------------------------------------
100:0048--------------------------------------------------------------------------
----------------------
| DESIGN NASHYD      |   Area     (ha)=   14.49   Curve Number    (CN)=82.00
| 03:211     DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=   1.070

     Unit Hyd Qpeak  (cms)=     .517

     PEAK FLOW       (cms)=     .801 (i)
     TIME TO PEAK    (hrs)=    7.001
     RUNOFF VOLUME    (mm)=   61.161
     TOTAL RAINFALL   (mm)=   98.000
     RUNOFF COEFFICIENT   =     .624

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

--------------------------------------------------------------------------------
100:0049--------------------------------------------------------------------------
--------------------
| ROUTE CHANNEL    |     Routing time step (min) =  1.00
|  IN> 03:211      |     Number of SEGMENTS =  3
| OUT< 04:002280   |     Slopes (%), CHANNEL= .2000  FLOODPLAIN= .2000
--------------------              LENGTH =  500.00    (m)

              <------ DATA FOR SECTION (  15.0) ------>
              Distance      Elevation       Manning
                  .00           .62          .1400
                10.00           .60     .1400 / .0400  Main Channel
                11.80           .00          .0400     Main Channel
                12.80           .00          .0400     Main Channel
                14.60           .62     .0400 / .2000  Main Channel
                24.60           .60          .2000

   <---------- TRAVEL TIME TABLE ---------->
    DEPTH     ELEV    X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME   D x V
      (m)      (m)    (cu.m.)   (cu.m.)     (cms)      (m/s)     (min)     (m2/s)
     .030     .030  .163E+02  .245E+00      .003       .102     81.78      .003
     .060     .060  .353E+02  .106E+01      .011       .155     53.91      .009
     .090     .090  .570E+02  .256E+01      .022       .195     42.68      .018
     .120     .120  .813E+02  .488E+01      .037       .229     36.32      .028
     .150     .150  .108E+03  .812E+01      .056       .260     32.11      .039
     .180     .180  .138E+03  .124E+02      .079       .287     29.06      .052
     .210     .210  .170E+03  .179E+02      .106       .312     26.72      .065
     .240     .240  .205E+03  .246E+02      .138       .335     24.85      .080
     .270     .270  .243E+03  .327E+02      .173       .358     23.31      .097
     .300     .300  .283E+03  .424E+02      .214       .379     22.01      .114
     .330     .330  .326E+03  .537E+02      .260       .399     20.89      .132
     .360     .360  .371E+03  .668E+02      .311       .418     19.92      .151
     .390     .390  .419E+03  .818E+02      .367       .437     19.06      .171
     .420     .420  .470E+03  .988E+02      .428       .455     18.30      .191
     .450     .450  .524E+03  .118E+03      .496       .473     17.61      .213
     .480     .480  .580E+03  .139E+03      .569       .491     16.99      .235
     .510     .510  .639E+03  .163E+03      .648       .507     16.42      .259
     .540     .540  .700E+03  .189E+03      .734       .524     15.90      .283
     .570     .570  .764E+03  .218E+03      .826       .540     15.43      .308

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.

                                <---- hydrograph ---->   <-pipe / channel->
                             AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                              (ha)    (cms)   (hrs)   (mm)      (m)      (m/s)
  INFLOW : ID= 3:211         14.49     .801    7.00 61.161      .562      .536
  OUTFLOW: ID= 4:002280      14.49     .768    7.23 61.161      .549      .529

--------------------------------------------------------------------------------
100:0050--------------------------------------------------------------------------
----------------------
| DESIGN NASHYD      |   Area     (ha)=   10.57   Curve Number    (CN)=72.00
| 03:216     DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=   1.210

     Unit Hyd Qpeak  (cms)=     .334

     PEAK FLOW       (cms)=     .408 (i)
     TIME TO PEAK    (hrs)=    7.184
     RUNOFF VOLUME    (mm)=   47.687
     TOTAL RAINFALL   (mm)=   98.000
     RUNOFF COEFFICIENT   =     .487

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

--------------------------------------------------------------------------------
100:0051--------------------------------------------------------------------------
----------------------
| ADD HYD (      2290) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                     (ha)     (cms)   (hrs)   (mm)    (cms)
                     ID1 03:216           10.57     .408    7.18  47.69     .000
                    +ID2 04:      2280    14.49     .768    7.23  61.16     .000
                     ================================================================
                     SUM 05:      2290    25.06    1.176    7.22  55.48     .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
100:0052--------------------------------------------------------------------------
----------------------
| ADD HYD (      2260) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                     (ha)     (cms)   (hrs)   (mm)    (cms)
                     ID1 01:      2250    284.58    7.128    9.95  53.84     .000
                    +ID2 02:EXT6          24.11     .968    7.52  58.20     .000
                    +ID3 05:      2290    25.06    1.176    7.22  55.48     .000
                     ================================================================
                     SUM 03:      2260    333.75    8.040    9.25  54.28     .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
100:0053--------------------------------------------------------------------------
--------------------
| ROUTE CHANNEL    |     Routing time step (min) =  1.00
|  IN> 03:002260   |     Number of SEGMENTS =  3
| OUT< 10:002295   |     Slopes (%), CHANNEL= .0800  FLOODPLAIN= .2000
--------------------              LENGTH =  370.00    (m)

              <------ DATA FOR SECTION (  14.0) ------>
              Distance      Elevation       Manning
                  .00           1.80          .1400
                200.00          1.40     .1400 / .0850  Main Channel
                202.60           .00          .0850     Main Channel
                204.40           .00          .0850     Main Channel
                207.00          1.40     .0850 / .2000  Main Channel
                407.00          1.80          .2000

   <---------- TRAVEL TIME TABLE ---------->
    DEPTH     ELEV    X-VOLUME  S-VOLUME  FLOW RATE  VELOCITY  TRAV.TIME   D x V
      (m)      (m)    (cu.m.)   (cu.m.)     (cms)      (m/s)     (min)     (m2/s)
     .093     .093  .681E+02  .107E+02      .012       .064     96.65      .006
     .187     .187  .148E+03  .467E+02      .038       .096     64.26      .018
     .280     .280  .240E+03  .114E+03      .078       .121     51.18      .034
     .373     .373  .344E+03  .217E+03*     .131       .141     43.73      .053
     .467     .467  .460E+03  .363E+03*     .198       .159     38.79      .074
     .560     .560  .588E+03  .557E+03*     .279       .175     35.19      .098
     .653     .653  .724E+03  .804E+03*     .374       .190     32.42      .124
     .747     .747  .880E+03  .111E+04*     .486       .204     30.20      .152
     .840     .840  .104E+04  .148E+04*     .614       .217     28.36      .183
     .933     .933  .122E+04  .192E+04*     .759       .230     26.81      .215
    1.027    1.027  .141E+04  .244E+04*     .921       .242     25.47      .249
    1.120    1.120  .161E+04  .304E+04*    1.103       .254     24.30      .284
    1.213    1.213  .182E+04  .373E+04*    1.304       .265     23.27      .322
    1.307    1.307  .204E+04  .451E+04*    1.524       .276     22.34      .361
    1.400    1.400  .228E+04  .539E+04*    1.766       .287     21.51      .401
    1.500    1.500  .439E+04  .111E+05*    2.297       .194     31.84      .290
    1.600    1.600  .102E+05  .276E+05*    3.654       .133     46.51      .212
    1.700    1.700  .197E+05  .566E+05*    6.329       .119     51.90      .202
    1.800    1.800  .329E+05  .100E+06*   10.726       .121     51.14      .217

 X-VOLUME= Total X-Section volume over given CHANNEL LENGTH at specified DEPTH.
 S-VOLUME= Volume that can be stored in channel at specified ELEVATION.
 (*) Actual value may be less due to limited CHANNEL LENGTH for given SLOPE.

                                <---- hydrograph ---->   <-pipe / channel->
                             AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                              (ha)    (cms)   (hrs)   (mm)      (m)      (m/s)
  INFLOW : ID= 3:002260     333.75    8.040    9.25 54.279     1.739      .119
  OUTFLOW: ID=10:002295     333.75    7.637   10.28 54.279     1.729      .119

--------------------------------------------------------------------------------
100:0054--------------------------------------------------------------------------
----------------------
| DESIGN NASHYD      |   Area     (ha)=   17.47   Curve Number    (CN)=76.00
| 03:214     DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .600

     Unit Hyd Qpeak  (cms)=    1.112

     PEAK FLOW       (cms)=    1.239 (i)
     TIME TO PEAK    (hrs)=    6.484
     RUNOFF VOLUME    (mm)=   52.697
     TOTAL RAINFALL   (mm)=   98.000
     RUNOFF COEFFICIENT   =     .538

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

--------------------------------------------------------------------------------
100:0055--------------------------------------------------------------------------
*#*************************************************************************
*# Calculate culvert routing and flow split near eastern site boundary
*#   - Storage volumes calculated based on site survey
*#   - Discharges calculated based on the 600 mm diameter CSP and 1500 mm
*#     diameter CSP capacities
*#*************************************************************************
----------------------
| ROUTE RESERVOIR    |    Requested routing time step =  1.0 min.
|  IN>03:(214    )   |
| OUT<01:(002300)   |    =========  OUTFLOW STORAGE TABLE  =========
----------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                            (cms)     (ha.m.)  |    (cms)     (ha.m.)
                             .000  .0000E+00   |    1.130  .4600E+00
                             .150  .0000E+00   |    5.470  .8100E+00
                             .450  .0000E+00   |   83.090  .3400E+01
                             .820  .6500E-01   |    .000   .0000E+00

     ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
     ---------------           (ha)     (cms)     (hrs)       (mm)
     INFLOW >03: (214   )      17.47    1.239     6.484     52.697
     OUTFLOW<01: (002300)      17.47     .866     7.068     52.728

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=   69.883
                    TIME SHIFT OF PEAK FLOW       (min)=    35.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=.1235E+00

--------------------------------------------------------------------------------
100:0056--------------------------------------------------------------------------
----------------------
| DIVERT HYD       |
| INID=01   (002300)|
----------------------
      Outflow / Inflow  Relationships
      Flow 02 +  Flow 03 =  Total
       (cms)      (cms)      (cms)
         .000       .000       .000
         .150       .000       .150
         .400       .050       .450
         .680       .140       .820
         .930       .200      1.130
        1.040     4.430      5.470
        1.460    81.630     83.090

           NHYD       AREA     QPEAK   TpeakDate_hh:mm       R.V.  NFE WetHrs
                       (ha)     (cms)                         (mm)        (hrs)
   IDin = 01:002300    17.47     .866  No_date    7:04      52.728  182    11.
   ==========================================================================
   IDout= 02:002310    15.22     .717  No_date    7:04      52.728  182    11.
   IDout= 03:002320     2.25     .149  No_date    7:04      52.728  113     5.
--------------------------------------------------------------------------------
100:0057--------------------------------------------------------------------------
----------------------
| DESIGN NASHYD      |   Area     (ha)=    5.34   Curve Number    (CN)=72.00
| 01:215     DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .860

     Unit Hyd Qpeak  (cms)=     .237

     PEAK FLOW       (cms)=     .265 (i)
     TIME TO PEAK    (hrs)=    6.784
     RUNOFF VOLUME    (mm)=   47.687
     TOTAL RAINFALL   (mm)=   98.000
     RUNOFF COEFFICIENT   =     .487

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

--------------------------------------------------------------------------------
100:0058--------------------------------------------------------------------------
----------------------
| ADD HYD (      2330) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                     (ha)     (cms)   (hrs)   (mm)    (cms)
                     ID1 01:215            5.34     .265    6.78  47.69     .000
                    +ID2 02:      2310    15.22     .717    7.07  52.73     .000
                     ================================================================
                     SUM 04:      2330    20.56     .977    6.88  51.42     .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
100:0059--------------------------------------------------------------------------
----------------------
| DESIGN NASHYD      |   Area     (ha)=   18.59   Curve Number    (CN)=82.00
| 01:EXT7    DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
```

```
----------------------   U.H. Tp(hrs)=   1.470

     Unit Hyd Qpeak  (cms)=     .483

     PEAK FLOW       (cms)=     .807 (i)
     TIME TO PEAK    (hrs)=    7.451
     RUNOFF VOLUME    (mm)=   61.161
     TOTAL RAINFALL   (mm)=   98.000
     RUNOFF COEFFICIENT   =     .624

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

---------------------------------------------------------------------------------------------
100:0060-------------------------------------------------------------------------------------
*##############################################################################
*# McGill Drain - Total Flow at Eastern WSP
*##############################################################################
------------------------
| ADD HYD (      2340) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                   (ha)     (cms)   (hrs)   (mm)   (cms)
                       ID1 01:EXT7         18.59     .807    7.45  61.16    .000
                      +ID2 04:      2330   20.56     .977    6.88  51.42    .000
                      +ID3 10:      2295  333.75   7.637   10.28  54.28    .000
                       ==========================================================
                       SUM 05:      2340  372.90    8.272    9.87  54.46    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

---------------------------------------------------------------------------------------------
100:0061-------------------------------------------------------------------------------------
*##############################################################################
*# AREA CHECK
*##############################################################################
------------------------
| ADD HYD (      2350) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                   (ha)     (cms)   (hrs)   (mm)   (cms)
                       ID1 03:      2320    2.25     .149    7.07  52.73    .000
                      +ID2 05:      2340  372.90    8.272    9.87  54.46    .000
                       ==========================================================
                       SUM 01:      2350  375.15    8.294    9.87  54.45    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

---------------------------------------------------------------------------------------------
100:0062-------------------------------------------------------------------------------------
---------------------------------------------------------------------------------------------
100:0002-------------------------------------------------------------------------------------
---------------------------------------------------------------------------------------------
100:0002-------------------------------------------------------------------------------------
---------------------------------------------------------------------------------------------
100:0002-------------------------------------------------------------------------------------
---------------------------------------------------------------------------------------------
100:0002-------------------------------------------------------------------------------------
---------------------------------------------------------------------------------------------
100:0002-------------------------------------------------------------------------------------
      FINISH
---------------------------------------------------------------------------------------------
*********************************************************************************************
     WARNINGS / ERRORS / NOTES
     -------------------------
   Simulation ended on 2016-02-15     at 14:15:22
=============================================================================================
```

Hydrologic Response of Solar Farms

Lauren M. Cook, S.M.ASCE[1]; and Richard H. McCuen, M.ASCE[2]

Abstract: Because of the benefits of solar energy, the number of solar farms is increasing; however, their hydrologic impacts have not been studied. The goal of this study was to determine the hydrologic effects of solar farms and examine whether or not storm-water management is needed to control runoff volumes and rates. A model of a solar farm was used to simulate runoff for two conditions: the pre- and postpaneled conditions. Using sensitivity analyses, modeling showed that the solar panels themselves did not have a significant effect on the runoff volumes, peaks, or times to peak. However, if the ground cover under the panels is gravel or bare ground, owing to design decisions or lack of maintenance, the peak discharge may increase significantly with storm-water management needed. In addition, the kinetic energy of the flow that drains from the panels was found to be greater than that of the rainfall, which could cause erosion at the base of the panels. Thus, it is recommended that the grass beneath the panels be well maintained or that a buffer strip be placed after the most downgradient row of panels. This study, along with design recommendations, can be used as a guide for the future design of solar farms. **DOI: 10.1061/(ASCE)HE.1943-5584.0000530.**

CE Database subject headings: Hydrology; Land use; Solar power; Floods; Surface water; Runoff; Stormwater management.

Author keywords: Hydrology; Land use change; Solar energy; Flooding; Surface water runoff; Storm-water management.

Introduction

Storm-water management practices are generally implemented to reverse the effects of land-cover changes that cause increases in volumes and rates of runoff. This is a concern posed for new types of land-cover change such as the solar farm. Solar energy is a renewable energy source that is expected to increase in importance in the near future. Because solar farms require considerable land, it is necessary to understand the design of solar farms and their potential effect on erosion rates and storm runoff, especially the impact on offsite properties and receiving streams. These farms can vary in size from 8 ha (20 acres) in residential areas to 250 ha (600 acres) in areas where land is abundant.

The solar panels are impervious to rain water; however, they are mounted on metal rods and placed over pervious land. In some cases, the area below the panel is paved or covered with gravel. Service roads are generally located between rows of panels. Although some panels are stationary, others are designed to move so that the angle of the panel varies with the angle of the sun. The angle can range, depending on the latitude, from 22° during the summer months to 74° during the winter months. In addition, the angle and direction can also change throughout the day. The issue posed is whether or not these rows of impervious panels will change the runoff characteristics of the site, specifically increase runoff volumes or peak discharge rates. If the increases are hydrologically significant, storm-water management facilities may be needed. Additionally, it is possible that the velocity of water draining from the edge of the panels is sufficient to cause erosion of the soil below the panels, especially where the maintenance roadways are bare ground.

The outcome of this study provides guidance for assessing the hydrologic effects of solar farms, which is important to those who plan, design, and install arrays of solar panels. Those who design solar farms may need to provide for storm-water management. This study investigated the hydrologic effects of solar farms, assessed whether or not storm-water management might be needed, and if the velocity of the runoff from the panels could be sufficient to cause erosion of the soil below the panels.

Model Development

Solar farms are generally designed to maximize the amount of energy produced per unit of land area, while still allowing space for maintenance. The hydrologic response of solar farms is not usually considered in design. Typically, the panels will be arrayed in long rows with separations between the rows to allow for maintenance vehicles. To model a typical layout, a unit width of one panel was assumed, with the length of the downgradient strip depending on the size of the farm. For example, a solar farm with 30 rows of 200 panels each could be modeled as a strip of 30 panels with space between the panels for maintenance vehicles. Rainwater that drains from the upper panel onto the ground will flow over the land under the 29 panels on the downgradient strip. Depending on the land cover, infiltration losses would be expected as the runoff flows to the bottom of the slope.

To determine the effects that the solar panels have on runoff characteristics, a model of a solar farm was developed. Runoff in the form of sheet flow without the addition of the solar panels served as the prepaneled condition. The paneled condition assumed a downgradient series of cells with one solar panel per ground cell. Each cell was separated into three sections: wet, dry, and spacer.

The dry section is that portion directly underneath the solar panel, unexposed directly to the rainfall. As the angle of the panel from the horizontal increases, more of the rain will fall directly onto

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the ground; this section of the cell is referred to as the wet section. The spacer section is the area between the rows of panels used by maintenance vehicles. Fig. 1 is an image of two solar panels and the spacer section allotted for maintenance vehicles. Fig. 2 is a schematic of the wet, dry, and spacer sections with their respective dimensions. In Fig. 1, tracks from the vehicles are visible on what is modeled within as the spacer section. When the solar panel is horizontal, then the length longitudinal to the direction that runoff will occur is the length of the dry and wet sections combined. Runoff from a dry section drains onto the downgradient spacer section. Runoff from the spacer section flows to the wet section of the next downgradient cell. Water that drains from a solar panel falls directly onto the spacer section of that cell.

The length of the spacer section is constant. During a storm event, the loss rate was assumed constant for the 24-h storm because a wet antecedent condition was assumed. The lengths of the wet and dry sections changed depending on the angle of the solar panel. The total length of the wet and dry sections was set equal to the length of one horizontal solar panel, which was assumed to be 3.5 m. When a solar panel is horizontal, the dry section length would equal 3.5 m and the wet section length would be zero. In the paneled condition, the dry section does not receive direct rainfall because the rain first falls onto the solar panel then drains onto the spacer section. However, the dry section does infiltrate some of the runoff that comes from the upgradient wet section. The wet section was modeled similar to the spacer section with rain falling directly onto the section and assuming a constant loss rate.

For the presolar panel condition, the spacer and wet sections are modeled the same as in the paneled condition; however, the cell does not include a dry section. In the prepaneled condition, rain falls directly onto the entire cell. When modeling the prepaneled condition, all cells receive rainfall at the same rate and are subject to losses. All other conditions were assumed to remain the same such that the prepaneled and paneled conditions can be compared.

Rainfall was modeled after an natural resources conservation service (NRCS) Type II Storm (McCuen 2005) because it is an accurate representation of actual storms of varying characteristics that are imbedded in intensity-duration-frequency (IDF) curves. For each duration of interest, a dimensionless hyetograph was developed using a time increment of 12 s over the duration of the storm (see Fig. 3). The depth of rainfall that corresponds to each storm magnitude was then multiplied by the dimensionless hyetograph. For a 2-h storm duration, depths of 40.6, 76.2, and 101.6 mm were used for the 2-, 25-, and 100-year events. The 2- and 6-h duration hyetographs were developed using the center portion of the 24-h storm, with the rainfall depths established with the Baltimore IDF curve. The corresponding depths for a 6-h duration were 53.3, 106.7, and 132.1 mm, respectively. These magnitudes were chosen to give a range of storm conditions.

During each time increment, the depth of rain is multiplied by the cell area to determine the volume of rain added to each section of each cell. This volume becomes the storage in each cell. Depending on the soil group, a constant volume of losses was subtracted from the storage. The runoff velocity from a solar panel was calculated using Manning's equation, with the hydraulic radius for sheet flow assumed to equal the depth of the storage on the panel (Bedient and Huber 2002). Similar assumptions were made to compute the velocities in each section of the surface sections.

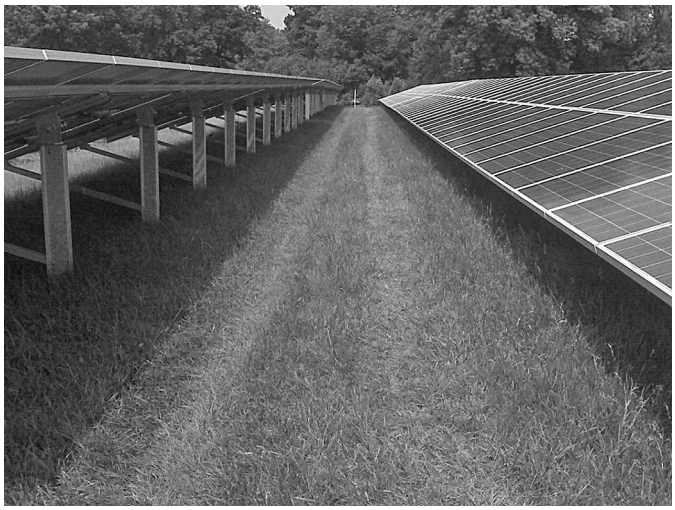

Fig. 1. Maintenance or "spacer" section between two rows of solar panels (photo by John E. Showler, reprinted with permission)

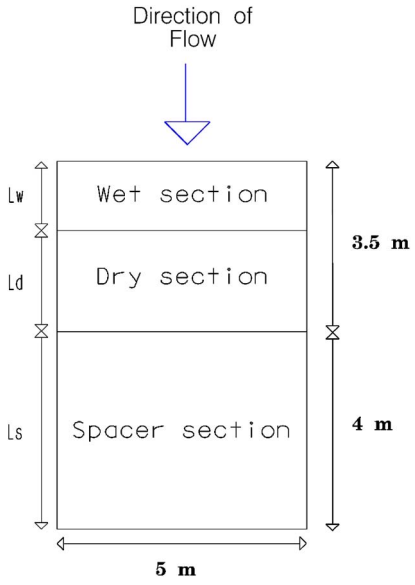

Fig. 2. Wet, dry, and spacer sections of a single cell with lengths *Lw*, *Ls*, and *Ld* with the solar panel covering the dry section

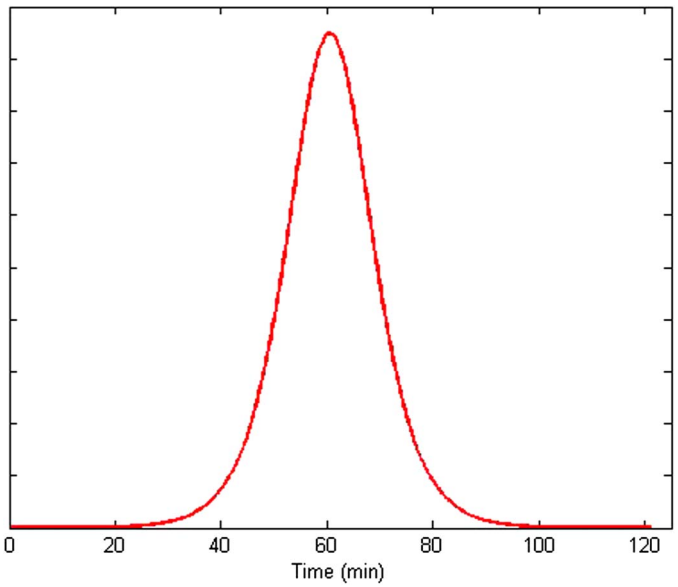

Fig. 3. Dimensionless hyetograph of 2-h Type II storm

Runoff from one section to the next and then to the next downgradient cell was routed using the continuity of mass. The routing coefficient depended on the depth of flow in storage and the velocity of runoff. Flow was routed from the wet section to the dry section to the spacer section, with flow from the spacer section draining to the wet section of the next cell. Flow from the most downgradient cell was assumed to be the outflow. Discharge rates and volumes from the most downgradient cell were used for comparisons between the prepaneled and paneled conditions.

Alternative Model Scenarios

To assess the effects of the different variables, a section of 30 cells, each with a solar panel, was assumed for the base model. Each cell was separated individually into wet, dry, and spacer sections. The area had a total ground length of 225 m with a ground slope of 1% and width of 5 m, which was the width of an average solar panel. The roughness coefficient (Engman 1986) for the silicon solar panel was assumed to be that of glass, 0.01. Roughness coefficients of 0.15 for grass and 0.02 for bare ground were also assumed. Loss rates of 0.5715 cm/h (0.225 in./h) and 0.254 cm/h (0.1 in./h) for B and C soils, respectively, were assumed.

The prepaneled condition using the 2-h, 25-year rainfall was assumed for the base condition, with each cell assumed to have a good grass cover condition. All other analyses were made assuming a paneled condition. For most scenarios, the runoff volumes and peak discharge rates from the paneled model were not significantly greater than those for the prepaneled condition. Over a total length of 225 m with 30 solar panels, the runoff increased by 0.26 m^3, which was a difference of only 0.35%. The slight increase in runoff volume reflects the slightly higher velocities for the paneled condition. The peak discharge increased by 0.0013 m^3, a change of only 0.31%. The time to peak was delayed by one time increment, i.e., 12 s. Inclusion of the panels did not have a significant hydrologic impact.

Storm Magnitude

The effect of storm magnitude was investigated by changing the magnitude from a 25-year storm to a 2-year storm. For the 2-year storm, the rainfall and runoff volumes decreased by approximately 50%. However, the runoff from the paneled watershed condition increased compared to the prepaneled condition by approximately the same volume as for the 25-year analysis, 0.26 m^3. This increase represents only a 0.78% increase in volume. The peak discharge and the time to peak did not change significantly. These results reflect runoff from a good grass cover condition and indicated that the general conclusion of very minimal impacts was the same for different storm magnitudes.

Ground Slope

The effect of the downgradient ground slope of the solar farm was also examined. The angle of the solar panels would influence the velocity of flows from the panels. As the ground slope was increased, the velocity of flow over the ground surface would be closer to that on the panels. This could cause an overall increase in discharge rates. The ground slope was changed from 1 to 5%, with all other conditions remaining the same as the base conditions.

With the steeper incline, the volume of losses decreased from that for the 1% slope, which is to be expected because the faster velocity of the runoff would provide less opportunity for infiltration. However, between the prepaneled and paneled conditions, the increase in runoff volume was less than 1%. The peak discharge and the time to peak did not change. Therefore, the greater ground slope did not significantly influence the response of the solar farm.

Soil Type

The effect of soil type on the runoff was also examined. The soil group was changed from B soil to C soil by varying the loss rate. As expected, owing to the higher loss rate for the C soil, the depths of runoff increased by approximately 7.5% with the C soil when compared with the volume for B soils. However, the runoff volume for the C soil condition only increased by 0.17% from the prepaneled condition to the paneled condition. In comparison with the B soil, a difference of 0.35% in volume resulted between the two conditions. Therefore, the soil group influenced the actual volumes and rates, but not the relative effect of the paneled condition when compared to the prepaneled condition.

Panel Angle

Because runoff velocities increase with slope, the effect of the angle of the solar panel on the hydrologic response was examined. Analyses were made for angles of 30° and 70° to test an average range from winter to summer. The hydrologic response for these angles was compared to that of the base condition angle of 45°. The other site conditions remained the same. The analyses showed that the angle of the panel had only a slight effect on runoff volumes and discharge rates. The lower angle of 30° was associated with an increased runoff volume, whereas the runoff volume decreased for the steeper angle of 70° when compared with the base condition of 45°. However, the differences (~0.5%) were very slight. Nevertheless, these results indicate that, when the solar panel was closer to horizontal, i.e., at a lower angle, a larger difference in runoff volume occurred between the prepaneled and paneled conditions. These differences in the response result are from differences in loss rates.

The peak discharge was also lower at the lower angle. At an angle of 30°, the peak discharge was slightly lower than at the higher angle of 70°. For the 2-h storm duration, the time to peak of the 30° angle was 2 min delayed from the time to peak of when the panel was positioned at a 70° angle, which reflects the longer travel times across the solar panels.

Storm Duration

To assess the effect of storm duration, analyses were made for 6-h storms, testing magnitudes for 2-, 25-, and 100-year return periods, with the results compared with those for the 2-h rainfall events. The longer storm duration was tested to determine whether a longer duration storm would produce a different ratio of increase in runoff between the prepaneled and paneled conditions. When compared to runoff volumes from the 2-h storm, those for the 6-h storm were 34% greater in both the paneled and prepaneled cases. However, when comparing the prepaneled to the paneled condition, the increase in the runoff volume with the 6-h storm was less than 1% regardless of the return period. The peak discharge and the time-to-peak did not differ significantly between the two conditions. The trends in the hydrologic response of the solar farm did not vary with storm duration.

Ground Cover

The ground cover under the panels was assumed to be a native grass that received little maintenance. For some solar farms, the area beneath the panel is covered in gravel or partially paved because the panels prevent the grass from receiving sunlight. Depending on the

volume of traffic, the spacer cell could be grass, patches of grass, or bare ground. Thus, it was necessary to determine whether or not these alternative ground-cover conditions would affect the runoff characteristics. This was accomplished by changing the Manning's n for the ground beneath the panels. The value of n under the panels, i.e., the dry section, was set to 0.015 for gravel, with the value for the spacer or maintenance section set to 0.02, i.e., bare ground. These can be compared to the base condition of a native grass ($n = 0.15$). A good cover should promote losses and delay the runoff.

For the smoother surfaces, the velocity of the runoff increased and the losses decreased, which resulted in increasing runoff volumes. This occurred both when the ground cover under the panels was changed to gravel and when the cover in the spacer section was changed to bare ground. Owing to the higher velocities of the flow, runoff rates from the cells increased significantly such that it was necessary to reduce the computational time increment. Fig. 4(a) shows the hydrograph from a 30-panel area with a time increment of 12 s. With a time increment of 12 s, the water in each cell is discharged at the end of every time increment, which results in no attenuation of the flow; thus, the undulations shown in Fig. 4(a) result. The time increment was reduced to 3 s for the 2-h storm, which resulted in watershed smoothing and a rational hydrograph shape [Fig. 4(b)]. The results showed that the storm runoff

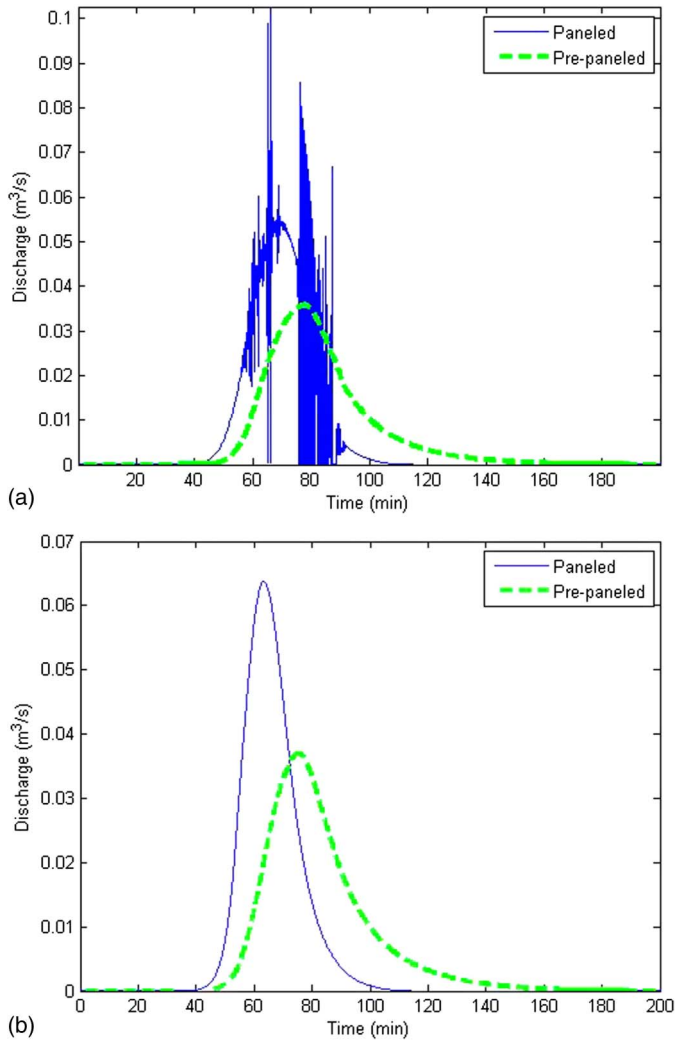

Fig. 4. Hydrograph with time increment of (a) 12 s; (b) 3 s with Manning's n for bare ground

increased by 7% from the grass-covered scenario to the scenario with gravel under the panel. The peak discharge increased by 73% for the gravel ground cover when compared with the grass cover without the panels. The time to peak was 10 min less with the gravel than with the grass, which reflects the effect of differences in surface roughness and the resulting velocities.

If maintenance vehicles used the spacer section regularly and the grass cover was not adequately maintained, the soil in the spacer section would be compacted and potentially the runoff volumes and rates would increase. Grass that is not maintained has the potential to become patchy and turn to bare ground. The grass under the panel may not get enough sunlight and die. Fig. 1 shows the result of the maintenance trucks frequently driving in the spacer section, which diminished the grass cover.

The effect of the lack of solar farm maintenance on runoff characteristics was modeled by changing the Manning's n to a value of 0.02 for bare ground. In this scenario, the roughness coefficient for the ground under the panels, i.e., the dry section, as well as in the spacer cell was changed from grass covered to bare ground ($n = 0.02$).The effects were nearly identical to that of the gravel. The runoff volume increased by 7% from the grass-covered to the bare-ground condition. The peak discharge increased by 72% when compared with the grass-covered condition. The runoff for the bare-ground condition also resulted in an earlier time to peak by approximately 10 min. Two other conditions were also modeled, showing similar results. In the first scenario, gravel was placed directly under the panel, and healthy grass was placed in the spacer section, which mimics a possible design decision. Under these conditions, the peak discharge increased by 42%, and the volume of runoff increased by 4%, which suggests that storm-water management would be necessary if gravel is placed anywhere.

Fig. 5 shows two solar panels from a solar farm in New Jersey. The bare ground between the panels can cause increased runoff rates and reductions in time of concentration, both of which could necessitate storm-water management. The final condition modeled involved the assumption of healthy grass beneath the panels and bare ground in the spacer section, which would simulate the condition of unmaintained grass resulting from vehicles that drive over the spacer section. Because the spacer section is 53% of the cell, the change in land cover to bare ground would reduce losses and decrease runoff travel times, which would cause runoff to amass as it

Fig. 5. Site showing the initiation of bare ground below the panels, which increases the potential for erosion (photo by John Showler, reprinted with permission)

moves downgradient. With the spacer section as bare ground, the peak discharge increased by 100%, which reflected the increases in volume and decrease in timing. These results illustrate the need for maintenance of the grass below and between the panels.

Design Suggestions

With well-maintained grass underneath the panels, the solar panels themselves do not have much effect on total volumes of the runoff or peak discharge rates. Although the panels are impervious, the rainwater that drains from the panels appears as runoff over the downgradient cells. Some of the runoff infiltrates. If the grass cover of a solar farm is not maintained, it can deteriorate either because of a lack of sunlight or maintenance vehicle traffic. In this case, the runoff characteristics can change significantly with both runoff rates and volumes increasing by significant amounts. In addition, if gravel or pavement is placed underneath the panels, this can also contribute to a significant increase in the hydrologic response.

If bare ground is foreseen to be a problem or gravel is to be placed under the panels to prevent erosion, it is necessary to counteract the excess runoff using some form of storm-water management. A simple practice that can be implemented is a buffer strip (Dabney et al. 2006) at the downgradient end of the solar farm. The buffer strip length must be sufficient to return the runoff characteristics with the panels to those of runoff experienced before the gravel and panels were installed. Alternatively, a detention basin can be installed.

A buffer strip was modeled along with the panels. For approximately every 200 m of panels, or 29 cells, the buffer must be 5 cells long (or 35 m) to reduce the runoff volume to that which occurred before the panels were added. Even if a gravel base is not placed under the panels, the inclusion of a buffer strip may be a good practice when grass maintenance is not a top funding priority. Fig. 6 shows the peak discharge from the graveled surface versus the length of the buffer needed to keep the discharge to prepaneled peak rate.

Water draining from a solar panel can increase the potential for erosion of the spacer section. If the spacer section is bare ground, the high kinetic energy of water draining from the panel can cause soil detachment and transport (Garde and Raju 1977; Beuselinck et al. 2002). The amount and risk of erosion was modeled using the velocity of water coming off a solar panel compared with the velocity and intensity of the rainwater. The velocity of panel runoff was calculated using Manning's equation, and the velocity of falling rainwater was calculated using the following:

$$V_t = 120\, d_r^{0.35} \tag{1}$$

where d_r = diameter of a raindrop, assumed to be 1 mm. The relationship between kinetic energy and rainfall intensity is

$$K_e = 916 + 330 \log_{10} i \tag{2}$$

where i = rainfall intensity (in./h) and K_e = kinetic energy (ft-tons per ac-in. of rain) of rain falling onto the wet section and the panel, as well as the water flowing off of the end of the panel (Wischmeier and Smith 1978). The kinetic energy (Salles et al. 2002) of the rainfall was greater than that coming off the panel, but the area under the panel (i.e., the product of the length, width, and cosine of the panel angle) is greater than the area under the edge of the panel where the water drains from the panel onto the ground. Thus, dividing the kinetic energy by the respective areas gives a more accurate representation of the kinetic energy experienced by the soil. The energy of the water draining from the panel onto the ground can be nearly 10 times greater than the rain itself falling onto the ground area. If the solar panel runoff falls onto an unsealed soil, considerable detachment can result (Motha et al. 2004). Thus, because of the increased kinetic energy, it is possible that the soil is much more prone to erosion with the panels than without. Where panels are installed, methods of erosion control should be included in the design.

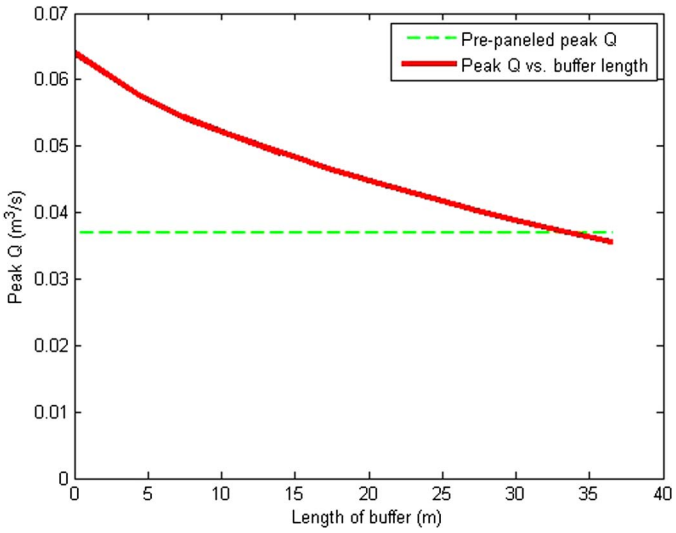

Fig. 6. Peak discharge over gravel compared with buffer length

Conclusions

Solar farms are the energy generators of the future; thus, it is important to determine the environmental and hydrologic effects of these farms, both existing and proposed. A model was created to simulate storm-water runoff over a land surface without panels and then with solar panels added. Various sensitivity analyses were conducted including changing the storm duration and volume, soil type, ground slope, panel angle, and ground cover to determine the effect that each of these factors would have on the volumes and peak discharge rates of the runoff.

The addition of solar panels over a grassy field does not have much of an effect on the volume of runoff, the peak discharge, nor the time to peak. With each analysis, the runoff volume increased slightly but not enough to require storm-water management facilities. However, when the land-cover type was changed under the panels, the hydrologic response changed significantly. When gravel or pavement was placed under the panels, with the spacer section left as patchy grass or bare ground, the volume of the runoff increased significantly and the peak discharge increased by approximately 100%. This was also the result when the entire cell was assumed to be bare ground.

The potential for erosion of the soil at the base of the solar panels was also studied. It was determined that the kinetic energy of the water draining from the solar panel could be as much as 10 times greater than that of rainfall. Thus, because the energy of the water draining from the panels is much higher, it is very possible that soil below the base of the solar panel could erode owing to the concentrated flow of water off the panel, especially if there is bare ground in the spacer section of the cell. If necessary, erosion control methods should be used.

Bare ground beneath the panels and in the spacer section is a realistic possibility (see Figs. 1 and 5). Thus, a good, well-maintained grass cover beneath the panels and in the spacer section is highly recommended. If gravel, pavement, or bare ground is

deemed unavoidable below the panels or in the spacer section, it may necessary to add a buffer section to control the excess runoff volume and ensure adequate losses. If these simple measures are taken, solar farms will not have an adverse hydrologic impact from excess runoff or contribute eroded soil particles to receiving streams and waterways.

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References

Bedient, P. B., and Huber, W. C. (2002). *Hydrology and floodplain analysis*, Prentice-Hall, Upper Saddle River, NJ.

Beuselinck, L., Govers, G., Hairsince, P. B., Sander, G. C., and Breynaert, M. (2002). "The influence of rainfall on sediment transport by overland flow over areas of net deposition." *J. Hydrol.*, 257(1–4), 145–163.

Dabney, S. M., Moore, M. T., and Locke, M. A. (2006). "Integrated management of in-field, edge-of-field, and after-field buffers." *J. Amer. Water Resour. Assoc.*, 42(1), 15–24.

Engman, E. T. (1986). "Roughness coefficients for routing surface runoff." *J. Irrig. Drain. Eng.*, 112(1), 39–53.

Garde, R. J., and Raju, K. G. (1977). *Mechanics of sediment transportation and alluvial stream problems*, Wiley, New York.

McCuen, R. H. (2005). *Hydrologic analysis and design*, 3rd Ed., Pearson/Prentice-Hall, Upper Saddle River, NJ.

Motha, J. A., Wallbrink, P. J., Hairsine, P. B., and Grayson, R. B. (2004). "Unsealed roads as suspended sediment sources in agricultural catchment in south-eastern Australia." *J. Hydrol.*, 286(1–4), 1–18.

Salles, C., Poesen, J., and Sempere-Torres, D. (2002). "Kinetic energy of rain and its functional relationship with intensity." *J. Hydrol.*, 257(1–4), 256–270.

Wischmeier, W. H., and Smith, D. D. (1978). *Predicting rainfall erosion losses: A guide to conservation planning, USDA Handbook 537*, U.S. Government Printing Office, Washington, DC.

APPENDIX E
RUNOFF QUALITY

Ontario
Ministry of Agriculture and Food
ORDER NO. 86-092
OCTOBER 1986
AGDEX 573
Factsheet

CONTROL OF SOIL EROSION

(Revision of Factsheet "Control of Soil Erosion", January 1979)

N. Moore, Soil & Water Management Branch, Lindsay
P. Fish, Upper Thames River Conservation Authority, London
J. Arnold, Soil & Water Management Branch, Guelph

While protecting and improving land investment, controlling soil erosion will sustain or improve crop yields; reduce drainage costs; retain nutrients and chemicals where applied; reduce hazards when working on eroding soil, and help improve water quality.

Management of soil for water and wind erosion control is based on sensible soil conservation practices. The majority of these practices are not new. They are recognized components of good soil, crop, and water management. For effective erosion control, the following factors are involved:

(a) maintaining good soil structure
(b) protecting the soil surface by adequate crop and residue cover; and
(c) using special structural erosion control practices where necessary.

These factors are often interrelated in controlling both water and wind erosion. Not all erosion control practices will fit into every farm management scheme. However, each erosion problem can be remedied by choosing one or more of the remedial practices available. The choice of any such practice should be appropriate to the problem and also be a practical and economical solution.

Soil Structure

Good soil structure is a consequence of management systems that include the regular use of soil improving crops such as forages; the frequent return of organic matter in residues and manure; and include tillage practices which avoid unnecessary breakdown of soil structure.

A forage crop, such as grass-legume hay, in a rotation improves soil structure as reflected by an increased degree of aggregate stability (Table l). Corn stover residue, when not removed, also improves soil structure and reduces soil

Table 1. Effect of forage crops in rotation on aggregate stability — Haldimand Clay.

Cropping System	Water-stable aggregation %	Corn yield %
Corn, oats, hay, hay rotation	74*	100
Continuous corn	22	90

** Measured in the second hay crop of the rotation.*

Table 2. Effect of corn stover residue on aggregate stability and erosion control with a continuous corn cropping system — Guelph loam with 8% slope

Residue management	Water-stable aggregation %	Soil loss in runoff t/ha*
Stover removed —		
— plowed in fall	18	54
Stover not removed —		
— plowed in fall	32	35
— not plowed	—	4

** Metric tonnes per hectare (15 t/ha = 1 mm depth of soil)*

erosion (Table 2). However, soil losses from plowed soil — even where the stover is not removed — can exceed the limit (7 tonnes per hectare), considered tolerable for most field situations. By leaving corn stover residue at the soil surface as with no till or mulch tillage, soil losses may be reduced below tolerable limits.(Figure l).

Figure 1. Crop residue cover reduces erosion

Tillage practices also affect soil structure. Proper tillage reduces soil aggregates to the most effective size for a favorable seedbed. Excess tillage, however, can break down soil aggregates to primary particles, destroying the soil structure formed previously by good crop and residue management, contribute to undesirable compaction, accelerate erosion, and waste time and energy. Timeliness of tillage operations is also important. For example, working

finely-textured soils when wet should be avoided in order to prevent compaction, puddling, and the resulting formation of hard clods when dry. Timely tillage will help maintain soil structure and reduce its erosion potential. See OMAF Factsheets. *Tillage for Crop Production on Ontario Soils — Practices,* Agdex 100/5/6, *Tillage for Crop Production on Ontario Soils — Principles,* Agdex 110/632, and *Tillage Practices for Residue Management and Erosion control,* Agdex 100/ 516.

Crop & Residue Cover

The benefits of growing the appropriate crops on specific soils must be recognized. Crops help reduce the erosive forces of water and wind by means of their canopy intercepting rain, and acting as a windbreak. Root systems stabilize the soil and reduce losses. Crop residues perform similar functions and, in addition, form small dams that help retain runoff water, thereby reducing erosion.

Crop Rotations

Fallow land has the highest erosion potential in any cropping system. Row crops such as corn or beans reduce this potential by half, which is still considered to be excessive. Sod crops such as hay and permanent pasture keep soil erosion to a minimum and should, therefore, be used in rotation with other crops where erosion is a problem. Compared to continuous corn, hay or pasture crops reduce soil loss by about 90% (Table 3). A rotation involving row crops and grain crops, while not as effective as a sod-based rotation, may reduce soil losses by 30% compared to continuous row crops.

Table 3. Reduction in soil loss compared to continuous corn or beans*

	%
Mixed grain or winter wheat	40
Rotation of 1 year corn, 1 year grain 2 years hay-pasture or 3 years corn, 3 years hay pasture	60
Rotation of 2 years corn, 4 years hay pasture	70
Hay-pasture	87
Permanent pasture	93

** Values from parameters used in Universal Soil Loss Equation.*

A crop rotation that includes forages can reduce soil loss by water erosion and, at the same time, slow the buildup of insect and disease problems encountered with a continuous cropping program. On farms where crop rotations are not adequate to control soil erosion, other management factors should be considered.

Tillage Practices

Proper tillage practices, employed separately or in combination with crop rotations, can be very effective in reducing soil erosion losses. Compared to conventional fall plowing, a mulch tiller used in the fall can reduce soil loss by up to 40% (Table 4). On sandy soils, planting can be done without any previous tillage or following discing only. Compared to fall plowing, water related soil losses can be reduced by up to 80% by these methods. The objective with any tillage practice is to leave the soil surface in a rough condition, and where practical protected with crop residues. These conditions facilitate easier infiltration of water by slowing surface water runoff, and minimize soil erosion. Choice of a tillage program depends on many factors which are described in other OMAF factsheets on Tillage.

Table 4. Reduction in soil losses compared to fall plowing*

	%
Spring plowing	15
Spring chisel	30
Fall mulch tiller	40
Disk-plant	70
No-till plant	80

** Values from parameters used in Universal Soil Loss Equation.*

Contour and Strip Cropping

Tillage and planting of the crop across, rather than with the slope, can reduce soil loss by 25%. (Value from parameters used in Universal Soil Loss Equation.) Strip cropping — alternative hay and grain strips — is an erosion control measure that can be used on long, smooth slopes where forages are part of the rotation. Strip cropping across the slope can reduce soil losses by 50% when compared to up-down slope cropping. Contour strip cropping will reduce soil losses even further. Small grains, with red clover plow-down, should also be highly effective in place of the hay strips on some slopes.

Wind Erosion Control

Management practices to control wind erosion are a must on sandy, muck, or peat soils, and should also be considered on clayey or silty soils. The maintenance of good soil structure and residue cover provides good resistance to wind erosion. Where little or no residue is left on the soil surface,(e.g. corn silage), a cover crop of winter rye may be sown to protect the surface of wind susceptible soils until spring. Fencerows and snowfencing also provide good protection. Strip cropping, or even planting crops at right angles to prevailing winds is a method of controlling wind erosion on land susceptible to strong winds.

Special practices

Tree windbreaks should be planted along the north and west boundaries of fields, and may be planted all around fields where wind erosion is a particular problem. On very steep slopes or areas where blowouts or rills/gullies frequently occur, permanent sod or tree cover should be maintained, and may in fact provide better financial returns.

When surface runoff concentrates, rills develop. If these rills are not addressed with appropriate control practices, a gully may result. Runoff will continue to be a problem on some areas even after conservation tillage and cropping practices are followed. A properly prepared and maintained waterway with good grass cover may be a practical way to prevent this type of water erosion problem. Often, a diversion terrace can be constructed across the slope to divert surface water from affecting soil further down the slope. Diversion terraces can be used as a short-term solution while correcting erosion problems and constructing grassed waterways, or may be permanently grassed to direct water flow to stable outlets. Waterways must have a smoothly contoured channel with a constant grade and a hard-wearing grass sod cover to

carry water safely. Usually, they can be designed to be wide and shallow to facilitate equipment crossing. See OMAF Factsheet *Grassed Waterways*, Agdex 573.

Buffer strips along the banks of drainage ditches and streams should be maintained with grass cover. These buffer strips will help stabilize ditch banks by preventing slumping and wash-outs as well as subsequent siltation. Maintenance costs in cleaning will also be reduced. Ditch or stream banks should have proper side slopes according to recommendations for each soil type. The banks must be smoothly contoured so that a good grass sod can be maintained. See OMAF Factsheet *Considerations for Stable Open Ditch Constructions*, Agdex 751.

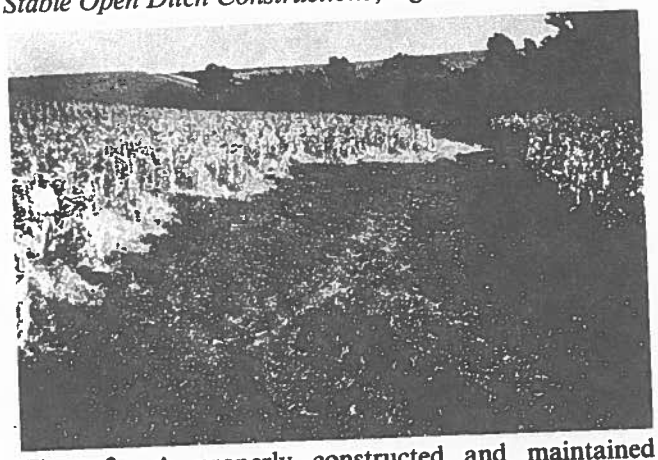

Figure 2. A properly constructed and maintained grassed waterway

Water and sediment control basins, or channel terraces, can be employed to temporarily pond surface runoff from relatively small upland areas and direct these flows into subsurface tile systems. These types of structures effectively reduce the peak flows of surface runoff and can sometimes reduce the need for elaborate structural measures further downslope.

Tile drainage systems can also prove to be an effective means of reducing surface runoff. They can be designed to complement surface water control measures such as water and sediment control basins, catch basins, blind inlets or terracing. These structures require design by qualified specialists.

Controlling livestock access to ditches and streams with fencing and low level crossings can be a cost effective means of maintaining bank stability, decreasing sedimentation, and reducing water quality problems.

Tile outlet protection is one of the most important practices that can be used in drainage ditches. Proper use of rip rap stone, and rodent guard outlet pipes, will discharge water safely into ditches and streams.

In summary, management for wind and water erosion control involves several alternative practices that are based on maintaining good soil structure, protection of the soil surfaces and the use of special practices. Adherence to these practices will do much to enable farmers to continue to maximize crop yields, minimize soil erosion, and enhance the quality of surface water.